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# OMITIOMIRE COPPER PROJECT: HEAP LEACH EARTHWORKS AND FOUNDATION DESIGN, PHASE 2 GROUND WATER AND SURFACE WATER STUDIES

# FEASIBILITY LEVEL GEOTECHNICAL INVESTIGATION - FACTUAL AND INTERPRETIVE REPORT

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Knight Piésold CONSULTING

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# ABBREVIATIONS

| | |
|---|---|
| AAR | Alkaline Aggregate Reactivity (AAR) |
| AM | Additional Materials |
| BH | Borehole |
| CBR | California Bearing Ratio |
| Cu | Copper |
| CUT | Consolidated Undrained Triaxial |
| DSS | Direct Shear Strength Test |
| EOH | End of Hole |
| ERT | Electrical Resistivity Tomography |
| GEM | Global Earthquake Model |
| GSHM | Global Seismic Hazard Map |
| HLP | Heap Leach Pad |
| $I_{s(50)}$ | Corrected Point Load Index |
| KP | Knight Piésold Consulting (Pty) Ltd |
| MDD | Maximum Dry Density |
| ML | Mining License |
| MM/A | Millimeters per annum |
| Myr | Million years |
| NGL | Natural Ground Level |
| OCP | Omitiomire Copper Project |
| OMC | Optimum Moisture Content |
| PGA | Peak Ground Acceleration |
| RD | Road |
| RQD | Rock Quality Designation |
| SPT | Standard Penetration Test |
| SWD | Stormwater Diversion Channel |
| TP | Test Pit |
| UCS | Uniaxial Compressive Strength |
| WGS | World Geodetic System 1984 |
| WRD | Waste Rock Dump |

# 1.0 INTRODUCTION

## 1.1 BACKGROUND

Knight Piésold Consulting (KP) was appointed by Craton Mining and Exploration Pty (Ltd) to provide feasibility level geotechnical investigation services to support engineering designs for the Bankable Feasibility Study of the Omitiomire Copper Project (OCP) in Namibia.

Omico through its Namibian subsidiary, Craton Mining and Exploration (Pty) Ltd (Craton), holds Mining LicenceML197 and Exclusive Prospecting Licence EPL8550, together a 30,000 Ha licence area which makes up the Omitiomire Copper Project. The mining licence is valid until March 2036.The development base case anticipates the production of 30,000 tonnes per annum of LME Grade A copper cathode for at least 15 years, targeting only open-pit mineralisation [Omico, November 2022 Press Release].

The Project is located 120km northeast from Windhoek in central Namibia and will comprise an open pit, a processing plant and heap leaching facility with associated crushing, agglomeration, stacking system, leaching process and SE/EW copper cathode extraction. The Project operation will be phased, with an estimated 104 million tonnes crushed throughput throughout the estimated 18 years Life of Mine (LOM), which is to be confirmed during the study.

## 1.2 SCOPE OF WORK

The purpose of this feasibility level geotechnical investigation was to characterize the foundation conditions, determine the nature and distribution of the soils and bedrock across the various sites, assess excavatability and to provide recommendations for the design of the foundations and earthworks required. In addition, areas of seepage and material sources for re-use as construction materials were investigated.

The feasibility level geotechnical and materials investigation provided in this report will aid feasibility level engineering designs for the following structures:

- Heap Leach Pad (HLP),
- Processing Plant (Plant),
- Stormwater Diversion Channel (SWD),
- New Road (RD) and
- Waste Rock Dump (WRD),

In addition, potential borrow areas (AM) and the re-use of the materials encountered across the site (AM) were investigated.

This report details the fieldwork carried out and provides the factual data retrieved from the geotechnical investigation, summary of all the laboratory results and the evaluation of all the data in order to provide feasibility level geotechnical recommendations for the project.

## 1.3 PREVIOUS INVESTIGATIONS

Previous geotechnical investigations undertaken by SRK focused at the TSF area (now referred to as the heap leach pads and plant area), documented in report 462312/Geotech Final, indicates that the project site is covered by a thin layer of reddish brown micaceous silty sand (assumed to be aeolian Kalahari sands). Areas close to the Black Nossob River, are underlain by a lighter-coloured alluvial soils. In some areas, where conditions are favourable, the Kalahari sands overlie a pedogenic hardpan calcrete horizon. Bedrock was noted to be highly irregular in weathering profile and varies according to fracture intensity and rock type.

# 2.0 SITE DESCRIPTION

## 2.1 PROJECT LOCATION

The Omitiomire Copper Project (OCP) is located 120 km northeast of Windhoek in the Khomas region, Namibia at latitude 802842.00 m E and longitude 7582808.00 m S (WGS84 UTM 33S). Smaller settlements border the site to the north (Hochfeld), east (Steinhausen) and south (Omitara).

The area is dominated by commercial wildlife farming with the overall proposed project footprint area measuring approximately 1000 Ha. Access to the site is via the M53 and D1435 gravel road, which is connected to the B6 National Trans Kalahari Highway from the capital city of Windhoek.

Appendix A1 provides a locality plan, whilst Appendix A2 provides the layout of the site investigated points at the stormwater diversion channel, waste rock dump, processing plant, heap leach pad, new road and additional materials investigation area.

## 2.2 TOPOGRAPHY

The terrain of the OCP project areas is generally flat, with flood plains and sporadic occurrences of low-laying pan / depressions containing clay soils within the central and western portions of the site.

The ephemeral Black Nossob intersects the OCP project site flowing in a general easterly direction through the southern part of farm Omitiomire.

Vegetation cover generally comprises a predominant mix of grassland plants, trees and shrubs. Soil conditions vary from transported material underlain by pedogenic soil with shallow bedrock.

The project site is generally flat lying with elevation ranging from 1650 meters above mean sea level (mamsl) to 1657 mamsl.

## 2.3 CLIMATE

The project area is located in a semi-arid climate region. It is characterized by tropical warm summer rainfalls and dry winter seasons. Rainfall distribution follows an irregular pattern, caused by rainfall falling in thunderstorms, generally during the months of January, February and March. Rainfall is of short duration, but intense and is characterized by extreme spatial and temporal variability. Typically, the Hochfeld area has an average precipitation rate of 400 mm/a (Mendelsohn, 2010).

## 2.4 SEISMICITY

A Global Earthquake Model (GEM) Global Seismic Hazard Map (GSHM) has been developed by (Pagani et al., 2018) which shows the global distribution of the Peak Ground Acceleration (PGA) with a 10% probability of exceedance (POE) in 50 years. The GSHM is based on the combination and computation of data from 30 hazard models which are distributed across the globe. Figure 2-1 shows the distribution of the PGA (g) values for the central region of Namibia. The PGA values are for a site condition with an average shear wave velocity in the upper 30 m (VS30) of 760-800 m/s. Based on the

GSHM, Omitiomire Copper Mine is situated on a low seismic hazard zone with a PGA value of approximately 0.0188227g.

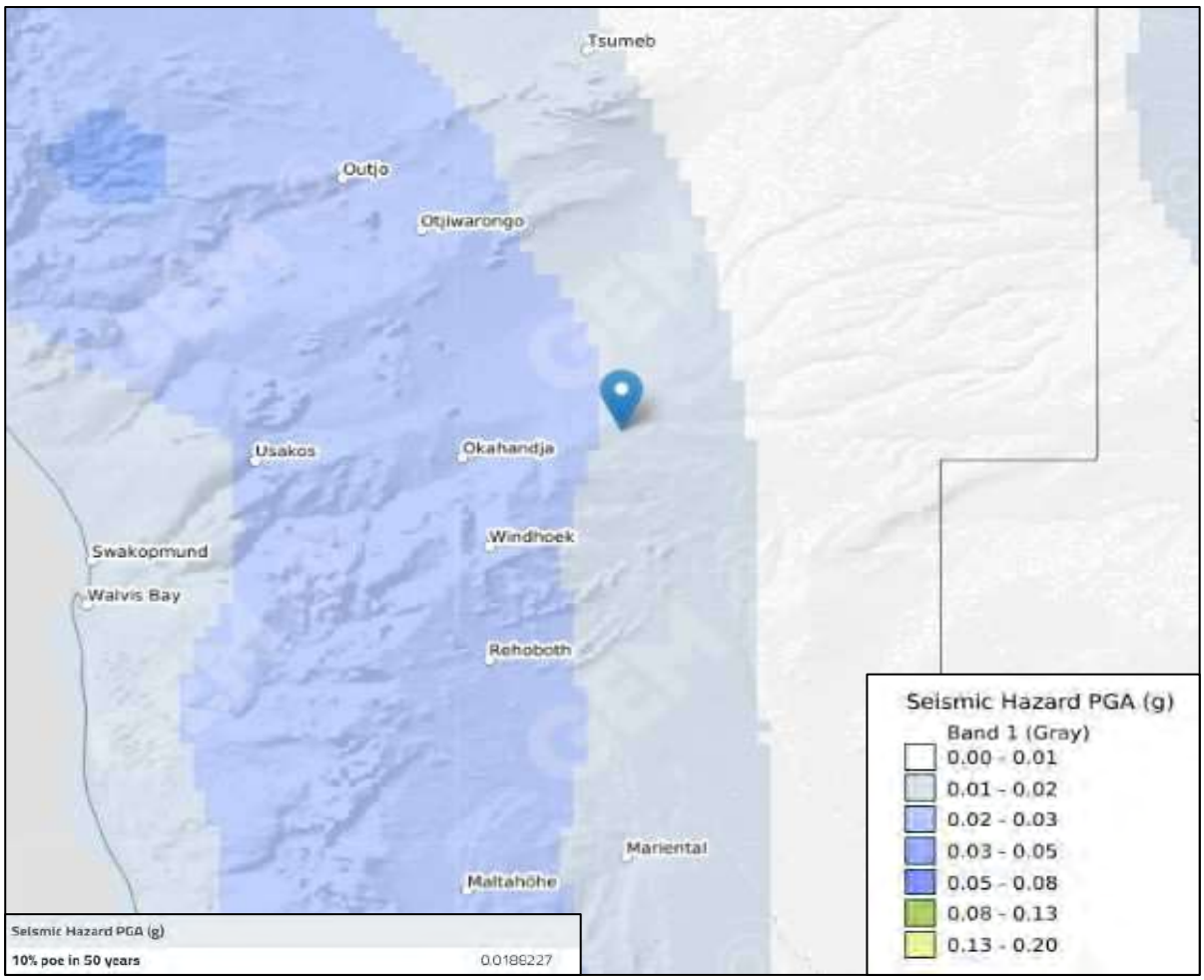



**Figure 2-1: GEM Seismic Hazard Map for a Return Period of 475-years (Pagani et al., 2018)**

# 3.0 GEOTECHNICAL METHODS OF INVESTIGATION

Details of the feasibility level geotechnical methods of investigation undertaken from March 2023 to May 2023 to investigate the scope as detailed in Section 1 are provided in the subsections below.

## 3.1 GEOPHYSICAL TESTING

A total of thirteen (13) Electrical Resistivity Tomography (ERT) Surveys were conducted by Gregory Symons Geophysics across the site from 3 March 2023 to 14 March 2023.

The ERT survey was performed by injecting a current into the ground and measuring a voltage. From this, the resistivity could be derived at certain points below the surface. The soil resistivity surveys were used to determine the depth of bedrock and measure the resistivity of various subsurface strata. The ERT test positions are presented in Appendix A2, the detailed report data is provided in Appendix F.

## 3.2 TEST PIT INVESTIGATION

A total of one-hundred and twenty seven (127) tests pits were excavated across the site from 10 May 2023 to 31 May 2023 to a maximum depth of 5m or until refusal was encountered, using a hired 20-ton Lovol (FR220D) tracked excavator from Sandworx cc. Test pitting in the SWD, WRD, Processing Plant, HLP, new road and borrow areas focused on ease of excavation for cost estimation, foundation conditions and seepage considerations, while also locating potential borrow areas for construction of platforms, roads and low permeability soils for liner materials. A layout of the test pit positions is provided in Appendix A2.

The nomenclature used for the naming of the test pits was adopted using the investigation area prefix defined in Section 1.1, followed by test pit prefix (TP) and the unique position number, e.g., SWD-TP1 refers to the stormwater diversion test pit 1.

The test pit positions planned were set out using Google Earth prior to establishment, based on the proposed footprint of the infrastructure at that time. The final positions of the test pits were adjusted on site, considering accessibility and safety factors. The test pits were logged in accordance with current standards (Guidelines for Soil and Rock Logging in South Africa, Brink and Bruin, 2002), using standard descriptors (moisture content, colour, consistency, soil structure, soil type and origin). The test pits were backfilled directly after completion of the logging, sampling and photographing.

The following test pits information is summarised in the respective appendices:

- The positions of all test pits are indicated on the site investigation plan in Appendix A2.
- A summary of the test pit logs is included in Appendix B1.
- The detailed test pit logs are provided in Appendix C1.
- Photographs of the test pit investigation are provided in Appendix D1.
- The terminology, conventions and symbols used in the logging are displayed in Appendix E.

## 3.3 BOREHOLE INVESTIGATION

In addition to the excavation of test pits, nineteen (19) rotary cored boreholes (BH) were drilled by RA Longstaff between 13April 2023 and 22 May 2023. The boreholes were drilled to depths ranging from 10.4 m to 25.1 m. End of hole (EOH) was determined by drilling into 6 m of bedrock with a consistency of soft rock or better or deeper to investigate the potential of geological structures which may affect the structure. A similar system was used for naming of the boreholes, by inserting a prefix of the area and borehole (BH) followed by a numeral for the unique position number.

Where conditions permitted, Standard Penetration Tests (SPT) were conducted to determine the SPT N-value and provide an indication of the material consistency of the subsurface strata.

The core samples obtained from the rotary core borehole drilling were logged according to current standards (Guidelines for Soil and Rock Logging in South Africa, Brink and Bruin, 2002).

The following borehole information is summarised in the respective appendices:

- The positions of the boreholes are shown on the site investigation plan in Appendix A2.
- A summary of the rotary core boreholes is included in Appendix B2.
- A summary of the SPT testing is included in Appendix B3.
- The detailed borehole logs are provided in Appendix C2.
- Photographs of borehole core are provided in Appendix D2.
- The terminology, conventions and symbols used in the logging of the boreholes are displayed in Appendix E.

## 3.4 LABORATORY TESTING

Representative soil and rock samples were taken from the test pits and boreholes and submitted to Namibia Technical Services (NTS) for the following laboratory testing:

- Soils:
  - 52x Foundation Indicator (particle size distribution, Atterberg limits, hydrometer including specific gravity).
  - 28x California Bearing Ratio (CBR) tests.
  - 28x Modified AASHTO Maximum Dry Density (MDD) Including Optimum Moisture Content (OMC).
  - 3x Standard Proctor and Optimum Moisture Content.
  - 4x Basson’s Index Tests.
  - 5x Direct Shear Strength Test.
  - 13x Falling/ Constant Head Permeability.
  - 2x Consolidated Undrained (CU) Triaxial Tests.
- Rock
  - 11x Uniaxial Compressive Strength (UCS).
  - 25x Point Load Test (I-s, 50).
  - 1x ACV (Wet and Dry).
  - 1x Petrographic Analysis for Concrete Use.
  - 1x Alkaline Aggregate Reactivity (AAR).

In addition to the samples collected from the boreholes for durability testing, samples will be sourced from the Open Pit pre-stripping works and submitted for laboratory testing. The results of those additional tests will be included in the interpretive report only.

A summary of the geotechnical laboratory testing schedule is provided in Appendix B4.

# 4.0 GEOPHYSICAL TESTING

Electrical Resistivity Tomography (ERT) Survey interpretation and results undertaken across the site in March 2023 are described below.

Thirteen (13) ERT lines were surveyed with a total traverse length of 2800 m near to and along the banks of the Nossob River and specifically at the inlet and outlet structures of the SWD. The locations of the survey lines are shown in Appendix A2. Detailed descriptions and results of the geophysical investigation are included in Appendix F.

The ERT surveys were used to provide possible depth to bedrock and identify water bearing structures using the Schlumberger array.

A summary of the geophysical report and the inverted resistivity depth sections show the following:

- A maximum of 3 overburden layers were identified. The subsurface strata are defined as follows:
  - A top sandy resistive layer,
  - A conductive clay bearing layer, and
  - A deeper resistive sandy layer.
- Below the overburden materials a weathered conductive basement is encountered, which transitions into resistive fresh rock.
- In places vertical to sub-vertical conductive features are observed in the weathered and fresh basement indicative of vertical faulting. The vertical faulting appears not to penetrate the overburden.
- Appendix F Figure 4 shows a structural interpretation of the area based on an aeromagnetic interpretation. Thrust faults are purported to be bringing in the copper (Cu) mineralization and are typically “old” (late Damaran 480-500 Myr). These faults are not expected to be identified in the resistivity data and in general this is the case with the current resistivity data set.
- Vertical faulting in a N/S and E/W direction is related to Cretaceous and late Karoo tectonics which appears to be detected by the resistivity as conductive water bearing faults and fractures.
- Overburden is Kalahari aged and the resistive layers may be related to windblown Kalahari sands.
- The conductive overburden layer appears to be associated with the Nossob River and could be related to flood events where the Nossob River has overflown its banks and deposited more clay like lithologies on the flood plain.

# 5.0 TYPICAL PROFILE

This section provides an overview of the material conditions encountered at the OCP site for the feasibility level geotechnical investigation undertaken. The areas investigated during the March to May 2023 program include the following investigation areas for the proposed structures detailed in Section 1.1. of this report.

A summary of the test pit and borehole logs is described for each investigation area in the subsections to follow.

## 5.1 HEAP LEACH PAD (HLP)

The heap leach pad area is located directly north of the plant and west of the deposit. Twenty-nine (29) test pits and four (4) boreholes were undertaken during the field investigation. The locations of the test pits are presented in Appendix A2.

The following sub-sections provide an overview of material horizons which were encountered at the proposed heap leach pad.

### 5.1.1 ALLUVIUM

Transported soils (mostly fine and coarse alluvium) were seen to form a surficial blanketing layer within the HLP. Fine alluvium is typically found across the HLP from surface in all the test pits and boreholes. This horizon was observed to have a variable thickness ranging from 0.3 m to 2.3 m. These soils are typically described as dry to slightly moist, loose to medium dense, brown to dark brown, silty sand with root voids.

Firm to stiff, sandy clay deposits occurring at shallow depths within the low-lying pans.

Localized occurrence of coarse alluvium is present below the fine alluvium across the HLP, and is described as reddish-brown, medium dense, matrix supported, silty sandy gravel comprising abundant fine to coarse subrounded to sub-angular quartz gravel with minor iron nodules. The alluvium is typically 0.2 m in thickness and but may be up to 1.5 m in places.

### 5.1.2 PEDOGENIC SOILS

The alluvium has been indurated by pedocretes of varying degrees of cementation.

These pedogenic soils predominantly comprise of calcified alluvium with sporadic occurrences of calcareous, ferruginous and ferruginised alluvium. The pedogenic soils in the HLP area extend from a depth of 0.3 m to 4.0 m, with excavator refusal commonly occurring on calcified and ferruginised alluvium between depths of 1.3 m to 2.35 m. Consistencies within the pedogenic soils are typically medium dense that become dense with depth.

Moderately to strongly cemented hardpan calcrete of medium hard rock consistency is present in the north of the HLP (HLP-BH01) as a 1 m thick horizon encountered at a depth of 3 m.

### 5.1.3 RESIDUAL GNEISS

Where encountered, the residual gneiss occurs below the alluvium and pedogenic horizons in the HLP at depths ranging between 1.4 m to 6.8 m. The residual gneiss comprises generally less than 0.5 m thick reddish brown to light brown, medium dense to dense, silty sandy gravel. With depth the residual soil becomes very dense towards bedrock.

### 5.1.4 GNEISS BEDROCK

The transported / pedogenic soils overly gneiss bedrock within the footprint of the HLP at depths ranging from 0.65 m to more than 6.1 m.

The typical bedrock profile is described as grey to brown speckled black banded white, medium to coarse grained, very closely jointed to widely jointed, soft to medium hard rock gneiss.

Shallow excavator refusal typically occurred on soft rock in the central and southern portion of the HLP.

Gneiss bedrock was not encountered in all test pits but was encountered in all boreholes. The HLP encountered gneiss from a minimum depth of 0.65 m to deeper than 6 m.

Joint surfaces generally infilled with silt, sand and iron oxide stained. On a macro-scale, the majority of joints are smooth to rough and planar, often breaking along fabric and quartz veins. Hydrothermal vein was observed within HLP-BH01 at a depth of 6.3 m to 13.3 m.

### 5.1.5 GENERAL

The bedrock topography is undulating across the HLP but generally expected within the upper 5 m below the dense to very dense ferruginised and calcified alluvium. Slight groundwater seepage was encountered within HLP-BH03 at a depth of 6.3 m.

## 5.2 PROCESSING PLANT (PLANT)

The proposed processing plant is located west of the deposit and south of the proposed Heap Leach Pad. The geotechnical site investigation aimed to obtain information on the material types and foundation conditions. Four (4) boreholes and four (4) test pits were completed at the plant site. The locations of the test pits and boreholes are presented in Appendix A2.

The following sub-sections provide an overview of material horizons which were encountered at the proposed processing plant.

### 5.2.1 ALLUVIUM

The typical profile at the processing plant comprises dark brown to brown, medium dense, silty sand, fine alluvium with minor sub-angular to subrounded fine gravel. This fine alluvium overlies medium dense to dense coarse alluvium (pebble marker) gravel with abundant quartz cobbles and boulders. The pebble marker was highly undulating with an average thickness of 0.3m.

Ferruginised alluvium is found southwest of the processing plant and is described as orange-brown mottled and blotched red, dense, silty gravelly sand with minor ferricrete nodules.

### 5.2.2 PEDOGENIC SOILS

Nodular tending to honeycomb ferricrete sporadically occurs in the southern portion of the of the Plant comprising silty sandy gravel with minor to traces of quartz cobbles. Refusal occurred on nodular tending to honeycomb calcrete at a depth ranging from 1.7m to 1.9m.

### 5.2.3 RESIDUAL GNEISS

The residual gneiss is very sparse in the processing plan area and was only encountered in Plant-BH02 as a thin light brown speckled white, very dense, silty sand horizon of 0.5 m.

### 5.2.4 GNEISS BEDROCK

Depth to bedrock at the plant site is encountered at shallow depths as soft to medium hard rock from 1.5m in (H/Plant Access-TP30). The gneiss bedrock encountered in Plant-BH2 is described as completely weathered to unweathered, grey to brown speckled black streaked and banded white, medium to coarse grained, extremely soft rock transitioning to very hard rock gneiss with depth.

The joint surfaces generally infilled with silt, sand, calcite and iron oxide staining. On a macro-scale, the majority of joints are smooth to rough and planar, often breaking along fabric.

### 5.2.5 GENERAL

Evidence of geological structures was present as breccia in Plant-BH02 from 22.9 m to 23.1 m and 23.8 m to 24.2 m. Significant pyrite mineralization was also noted along foliation in Plant-BH03.

No groundwater seepage was encountered in any of the test pits or boreholes undertaken at the Processing Plant. The presence of pedogenic materials, however, confirms the possibility of a seasonal perched water table.

## 5.3 STORMWATER DIVERSION CHANNEL (SWD)

The proposed Stormwater Diversion Channel is located south and east of the deposit in a north to south (N/S) direction. To the possibility of extreme flooding of the Nossob River during the rainy season flooding the pit requires the construction of the SWD prior to the commencement of mining.

Twenty-six (26) test pits and ten (10) boreholes were investigated to determine the ease of excavation for cost estimation, founding conditions along the proposed channel and suitability for material reuse.

Six (6) 63 mm diameter slotted PVC standpipes were installed at the inlet (SWD-BH02, SWD-BH03, SWD-BH04 and SWD-BH05) and outlet (SWD-BH08 and SWD-BH09) structures for monitoring of groundwater levels, with the completion zone at 20.0m to 25.1m.

The following sub-sections provide an overview of material horizons which were encountered at the proposed Stormwater Diversion Channel

### 5.3.1 ALLUVIUM

Transported soils comprise fine alluvium which is present in the majority of the test pits. The fine alluvium encountered at the inlet / outlet structures and along the diversion channel extends to variable

depths varying from surface to 4.9 m, comprising brown to dark brown, clayey silty sand / sandy silty clay with minor to traces of sub-angular to subrounded quartz gravel. The consistency of this horizon is highly variable from collapsing very loose in the upper profile typically becoming dense with depth, and often from medium dense or dense at surface.

Coarse alluvium was generally found below the fine alluvium above the deep bedrock. Where found the coarse alluvium is typically 1 m thick were encountered and largely comprises medium dense to dense, brown silty sandy gravel with traces of cobbles and boulders. The coarse alluvium is sporadic in occurrence across the site and occasionally includes a pebble marker horizon.

SPT tests were exclusively carried out in the fine and coarse alluvium in the upper 4 m where penetrable. The SPT typically either refused in dry, stiff fines alluvium or coarse gravel and cobbles. SPT N-values of less than 13 were also recorded for the fine alluvium indicating soft to firm or loose to medium dense conditions.

The alluvium, as anticipated for a depositional horizon is variable and variance within the profile should be anticipated over small distances.

### 5.3.2 PEDOGENIC SOILS

Pedogenic horizons are highly variable within the proposed SWD and comprise predominantly ferruginised alluvium with sporadic occurrences of ferruginous, calcareous and calcified alluvium. These pedogenic soils are generally encountered below the fine and coarse alluvium and extend to depths of more than 4.7 m, with refusal commonly occurring on dense to very dense ferruginised alluvium at depths ranging from 1.1 m to 4.3 m.

Medium dense to dense nodular calcrete / ferricrete is sparse along the channel comprising abundant nodules of soft to medium hard rock strength.

It is anticipated that the pedogenic soils, much like the alluvium, will vary considerably in horizontal and vertical distribution.

### 5.3.3 RESIDUAL GNEISS

The residual soils predominantly located at the inlet and outlet structures in limited test pits (SWD-TP04 and SWD-TP25) and often these horizons in the boreholes are derived from the gneiss rock of the area and consists of brown to grey, firm to very stiff sandy silt with occasional large gravel to cobble fragments present.

### 5.3.4 GNEISS BEDROCK

Gneiss bedrock was encountered in all the boreholes drilled at the SWD. Bedrock is generally encountered within 5m from surface as soft rock, becoming medium hard rock or better with deeply weathered joints or mafic bands with depth. Medium hard rock gneiss or better is generally encountered at depths greater than 6m.

SWD- BH6 along the south-eastern bend of the channel and SWD- BH8 and SWD- BH9 at the outlet are notably more deeply weathered compared to other profiles along the channel.

The typical bedrock profile is described as follows:

- Highly to moderately weathered, grey to brown speckled black streaked and banded white, medium to coarse grained, closely to moderately jointed infilled with silty sand and iron oxide stained, very soft to medium hard rock gneiss.
- Occasionally deeper and better-quality gneiss is encountered as slightly to unweathered, grey speckled white and black or blotched red, medium to coarse grained, moderately jointed, medium hard rock to very hard rock gneiss.
- The mafic bands are generally more deeply weathered along joints.
- Shallow excavator refusal on soft to medium hard rock occurred in some test pits at the inlet (SWD-TP01, SWD-TP05, SWD-TP07) from a depth of 0.6 m.
- Shallow refusal occurred in generally medium hard rock at the outlet structure (SWD-TP20, SWD-TP23, SWD-TP24, SWD-TP25 and SWD-TP26) from a depth of 2.4 m.
- The joints are described as being infilled with silty sand and iron oxide stained and the majority of joints are smooth to rough and planar, often breaking along fabric.
- Gneissic folding was noted in SWD-BH06.

### 5.3.5 GENERAL

The geophysics survey lines identified possible fault zones in the vicinity of SWD-BH08 and SWD-BH09. These, however, was not clearly identified during the borehole drilling at the SWD however a possible breccia zone was identified in SWD-BH2. Shear zones were identified in other areas of the site.

Slight to moderate groundwater seepage was encountered within SWD-TP04, SWD-TP05, SWD-BH01, SWD-BH04 and SWD-BH05, at depths ranging between 1.5 m and 14.6 m.

## 5.4 NEW ROAD (RD)

The new road is located east of the SWD channel oriented in a NE/SW direction. Access constraints in the south-western part of the proposed route restricted the test pit excavations. A total of sixteen (16) test pits were excavated along the route. The locations of the test pits are presented in Appendix A2.

The following sub-sections provide an overview of material horizons which were encountered along the new road.

### 5.4.1 ALLUVIUM

Similar to the SWD, WRD, Plant and HLP a surficial layer of fine alluvium blankets the entire road alignment in all but one the test pit. This material comprises a typically 1.4 m thick to 4.3 m thick in places brown to dark brown, medium dense to dense clayey silty sand with a root voided to pinholed soil structure. Very loose to loose zones occur in the upper profile. Excavator refusal was encountered within the fine alluvium at depths ranging from 1.4 m to 4.3 m.

Where refusal did not occur in the fine alluvium, coarse alluvium was encountered below in three test pits (RD-TP12, RD-TP13 and RD-TP14) along the new road. The coarse alluvium typically comprised yellowish brown to reddish brown mottled black and white, medium dense to dense, silty sandy gravel / clayey gravelly silty sand with minor ferricrete nodules. This horizon has an average thickness of 1.9m.

### 5.4.2 PEDOGENIC SOILS

Sporadic occurrences of pedocretes with little to no cementation (ferruginous / calcareous) of 0.6 m thick alluvium or indurated by cementation of 2.2 m thick calcified alluvium occur within the lower alluvium profile. These soils were profiled as having a medium dense to dense consistency.

### 5.4.3 GNEISS BEDROCK

Gneiss bedrock was encountered below the coarse alluvium at depths ranging from 1.4 m to 4.0 m often as a thin horizon of completely weathered gneiss becoming highly to moderately weathered, dark grey streaked white, stained orange, fine to medium grained, closely to moderately jointed, very soft to soft rock gneiss.

### 5.4.4 GENERAL

All but one test pit (RD-TP13) refused within the upper 5 m in alluvium or occasionally on very soft to soft rock gneiss.

## 5.5 WASTE ROCK DUMP (WRD)

The proposed WRD borders the proposed open pit to the north, east and south. In total, forty (40) test pits and one (1) borehole were completed during the field investigation to confirm soil/bedrock profile for founding and assess the in-situ rock and soils for use as construction materials. The locations of the test pits and borehole completed during the current feasibility level geotechnical investigation are shown on Appendix A2.

The following sub-sections provide an overview of material horizons which were encountered at the proposed Waste Rock Dump.

### 5.5.1 ALLUVIUM

The site of the proposed WRD facility is characterized by an approximately 1.1 m thick layer of fine alluvium, overlying a coarse alluvium. The fine alluvium consists of light brown to dark reddish brown, very loose to dense (non-cohesive soils) and firm to stiff (cohesive soils), silty sand / sandy clay or silt with presence of roots.

The underlying soil is coarse alluvium (pebble marker) comprising, typically a brown mottled black blotched white stained orange silty sandy gravel with traces subangular to subrounded cobbles and boulders extending to an average depth of 0.6m. Ferricrete nodules were observed to be present within the identified pebble marker.

### 5.5.2 PEDOGENIC SOILS

Below the fine and coarse alluvium horizons, pedocretes comprising ferruginous, ferruginised and calcified alluvium. Calcified alluvium is the most common of the pedocretes within the southern portion of the WRD. The calcified alluvium generally consists of brown speckled white, loose to medium dense (non-cohesive soils) or firm to stiff (cohesive soils), gravelly silty sand.

The central and northern portions of the WRD are characterized by well developed nodular, honeycomb and hardpan calcrete pedogenic horizons.

The nodular and honeycomb calcrete are similar, comprising pale brown blotched, medium dense to dense, white sandy silt with abundant calcrete nodules and cobbles.

Hardpan calcrete generally occurs in the northern parts of the site. The hardpan calcrete is described as moderately to very strongly cemented, light brown blotched white with very soft rock to medium hard rock consistency.

Ferruginous and ferruginised soils were encountered sporadically across the site and are anticipated to indicate localised perched water tables. These horizons are considerably more sporadic than the calcium-rich horizons. Occasional refusal occurred in ferruginised alluvium at shallow depths of approximate 1.5 m.

Refusal was typically encountered in the ferruginised alluvium or nodular, honeycomb or hardpan calcrete where encountered.

### 5.5.3 RESIDUAL GNEISS

Residual gneiss was encountered sporadically on site above the shallow bedrock. This residual gneiss is generally less than 0.3 m thick and described as white and brown to grey, very stiff/ dense, sandy silt to silty gravelly sand with traces of subrounded to subangular quartz gravel.

WRD-BH01 exposed the variation in weathering where soft rock was encountered then a completely weathered zone described as soil to a depth of 7.7 m.

### 5.5.4 GNEISS BEDROCK

Bedrock was encountered sporadically across the WRD area at shallow depths. The typical bedrock profile is described as follows:

- Highly weathered to moderately weathered, grey to brown speckled black, streaked and banded white, stained orange in places, medium to coarse grained, very soft rock to medium rock gneiss at the base of test pits.
- The borehole drilled in the northern portion of the WRD encountered very soft rock gneiss from 4.8m becoming medium hard rock with completely weathered zone of very soft rock becoming slightly to unweathered, hard to very hard rock from 14.3 m.
- Joint surfaces generally infilled with silty sand, iron oxide stained and void of any infill with depth.
- On a macro-scale, the majority of joints are smooth to rough and planar, often breaking along fabric.

### 5.5.5 GENERAL

Groundwater seepage was encountered at the southwestern corner (WRD-TP01) and north (WRD-BH01) of the WRD at a depth ranging between 1.4 m and 7.4 m respectively.

It should be noted that groundwater level in the area is subject to seasonal fluctuations and precipitation events. The presence of pedogenic soils, further, indicates the possibility of a perched water table.

## 5.6 POTENTIAL BORROW SOURCES (WRD AND AM)

Local borrow sources are required to provide materials for construction of the mine. The borrow materials are required to be geochemically innocuous (non-reactive), free of organics and non-deleterious. A total of twenty-four (24) test pits were excavated to investigate potential borrow sources. Twelve (12) test pits were undertaken on the footprint of the WRD on the southern bank of the Black Nossob river and an additional twelve (12) test pits were excavated south of the farmhouse at the northern end of the proposed new road. The main types of borrow source materials required include:

- Earthworks construction materials, including:
  - Low permeability soil (soil liners),
  - General fill,
  - Structural fill.
- Fine and coarse aggregate for use in concrete.

The interpretive report will include a full evaluation of the re-use of materials encountered across the site in the various areas. This section will focus on the materials targeted along the river as part of the WRD and the additional materials south of the farmhouse (AM). The following observations of the typical profile are made:

- The excavatable soil profiles are shallow across the majority of the investigated area and comprise of upper fine alluvium soils, underlain by coarse alluvium or calcified alluvium horizons at shallow depths.
- The fine alluvium is typically described as less than 1 m thick gravelly silty sand with minor rootlets and root voids or pinhole voided soil structure.
- The fine alluvium generally grades into a coarse alluvium with depth comprising clayey silty sandy gravel. The coarse alluvium contains trace to minor sub-angular cobbles. The thickness of this coarse alluvium is generally 0.4 m thick in the AM area and more than 1m thick at the WRD materials area.
- Pedogenic soils of varying developmental stages occur deeper in the WRD profile. The ferruginous / calcareous to more commonly encountered sandy silty gravel to gravelly silty sand, calcified alluvium is common. Occasionally with depth nodular calcrete (WRD-TP6, WRD-TP16 and WRD-TP17) is encountered as pale brown mottled white, sandy silt with abundant calcrete nodules.
- Gneiss bedrock was rarely encountered in the materials test pits at depths from 1.3 m and bedrock topography is anticipated to be undulating along the river.
- In addition to the typical profile described for the WRD above, the AM profile comprises fine alluvium described as clayey silty sand, marginally finer than that of the WRD with limited coarse alluvium and pedogenic soil development. Refusal of the excavator occurred at a typical depth of 1.1 m in dense to very dense fine alluvium. Shallow gneiss bedrock was encountered in AM-TP02 and AM-TP04 as very soft to soft rock at a depth of approximately 1m.
- The soil profile in the AM area is notably shallower than that of the WRD materials area but is considered more consistent in material variation within the alluvium. The fine alluvium is generally a 1m thick horizon in both the AM and WRD areas. The WRD encounters the deeper profile of coarse alluvium and more frequent pedogenic soil development.
- No groundwater seepage was encountered in any of the test pits.

# 6.0 LABORATORY TESTING

Laboratory testing was carried out at Specialised Testing Laboratory on samples obtained during the geotechnical investigation. A summary of the laboratory results is presented in Appendix B4 and discussed below. The full results are contained in Appendix G. Triaxial tests are still ongoing due to laboratory backlog and will be issued separately as per client's request to not delay the final report.

The materials have been assessed according to material type and where necessary the variations within specific areas are referred to.

## 6.1 ALLUVIUM

The nature of alluvium is generally variable by type and distribution during deposition. Despite typical materials being observed and tested, it should be noted that variation within the layers is anticipated as coarse or fine lenses were encountered.

### 6.1.1 FINE ALLUVIUM

The fine alluvium is present across the site. It is described as a silty sand to sandy silt. The material is generally variable by grainsize within the deposited lenses. The silty sand generally comprises more than 40% fines (clay and silty) with varying clay percentage but generally low Plasticity Index (PI) values of less than 8 %. The USCS classification considers the material generally a clayey sand (SC) due to the high clay percentage and AASHTO class A-4. One sample (HLP-TP08) indicated high PI of 17 % grading as high plasticity silt (MH). The AASHTO maximum dry density (MDD) and optimum moisture content (OMC) of the SC material typically varies from 1963 kg/m$^3$ at 12 % to 2079 kg/m$^3$ at 9 %. The ML sample indicates MDD and OMC values as low as 1517 kg/m$^3$ at 23 %.

Coarser zones are encountered within the fine alluvium described as silty coarse sand or silty gravelly sand classifying as SM with low PI values and generally less than 30 % fines. The AASHTO classification generally indicates A-2-4 materials for the coarser zones. The AASHTO maximum dry density (MDD) and optimum moisture content (OMC) of the material vary from 2041 kg/m$^3$ at 8 % to 2119 kg/m$^3$ at 7 %.

The fine alluvium is anticipated to be corrosive towards steel and very highly aggressive towards concrete. It is considered generally low potential for expansiveness with specific gravity (SG) of 2.5 g/cm$^3$ to 2.7 g/cm$^3$.

Three samples were tested for remoulded permeability at 90 % Modified AASHTO compaction density to reveal permeability k-values in the order of x10$^{-7}$ m/s for the alluvium classified as SC and may become less permeable with as the fines increase to x10$^{-9}$ m/s for the MH soils described above.

### 6.1.2 COARSE ALLUVIUM

The coarse alluvium is present across the site and includes a sporadic basal pebble marker layer. It is described as a silty sandy gravel to coarse sandy gravel with varying amounts of gravel. The material is generally variable by grainsize within the deposited lenses. The silty sand/ silty sandy gravel generally comprises less than 45% fines (clay and silty) with varying clay percentage but generally low Plasticity Index (PI) values of less than 5 %. The USCS classification considers the material generally a clayey

sand (SC) to Gravel of low to medium plasticity (GP to GM). The coarse alluvium is classified as AASHTO class A-1, A-2 or A-4. The AASHTO maximum dry density (MDD) and optimum moisture content (OMC) of the SC to GM material typically varies from 1858 kg/m$^3$ at 13 % to 2204 kg/m$^3$ at 6 %. The material has a high variability according to the COTO classification ranging from G9 to G4 quality materials.

The coarse alluvium was not tested for corrosivity but is anticipated to be corrosive towards steel and very highly aggressive towards concrete as in the fine alluvium. It is considered low potential for expansiveness with specific gravity (SG) of 2.5 g/cm$^3$ to 2.6 g/cm$^3$.

Three samples were tested for remoulded permeability at 90 % Modified AASHTO compaction density to reveal permeability k-values in the order of x10$^{-7}$ m/s for the alluvium classified as SC and may more permeable gravels at x10$^{-6}$ m/s.

## 6.2 PEDOGENIC SOILS

### 6.2.1 CALCAREOUS/ CALCIFIED ALLUVIUM

Present across most of the site but not encountered in the Plant area. The pedogenic soils are at various phases of development from the weaker calcareous to stronger calcified alluvium comprising gravelly silty sand to gravelly sandy silt. It is noted that the fines content of the calcified alluvium is generally higher than that of calcareous alluvium.

The calcareous and calcified alluvium test results are within the limits of the fine alluvium, but the material typically grades as A-1 to A-2 material with one sample RD-TP08 indicating medium expansive silty sand (SM) of A-7 quality similar to that observed for HLP-TP08 discussed in Section 6.1.1 above.

The samples that were tested for remoulded permeability at 90 % Modified AASHTO compaction density to reveal permeability k-values in the order of x10$^{-6}$ m/s for the calcareous alluvium and x10$^{-7}$ m/s for the calcified alluvium.

### 6.2.2 FERRUGINOUS/ FERRIGINISED ALLUVIUM

The ferruginous and ferruginised alluvium is present across the site. Testing was carried out predominantly on samples obtained from the plant, SWD and WRD due to the frequency of materials encountered. The ferruginised alluvium is described as gravelly silty sand to silty sandy gravel classified as low expansive clayey sand to silty sand (SC - SM) of AASHTO A-2 in the gravel zones and A-4 in the sandy zones. The specific gravity (SG) was recorded as 2.5 g/cm$^3$ to 2.6 g/cm$^3$. The AASHTO maximum dry density (MDD) and optimum moisture content (OMC) of the SC sample was recorded at 2053 kg/m$^3$ at 7 %. The material has a low CBR strength likely due to the crushing of the poorly cemented ferricrete nodules and is thus classified as poorer than G9 according to COTO.

The ferruginised alluvium is anticipated to be corrosive towards steel and very highly aggressive towards concrete as in the fine alluvium.

One sample was tested for remoulded permeability at 90 % Modified AASHTO compaction density to reveal permeability k-value in the order of x10$^{-7}$ m/s similar to the alluvium described above.

The ferruginous alluvium sample tested indicates generally similar properties to those described for the ferruginised alluvium above but has a slightly higher PI (<10%) and classifies as A-6 material.

### 6.2.3 NODULAR AND HONEYCOMB CALCRETE ALLUVIUM

Pedocrete is present across most of the site but not encountered in the road and borrow areas. Samples were tested from the HLP and WRD of the nodular and honeycomb calcrete described as sandy silty gravel to silty sandy gravel which has similar properties, although more gravelly, to the calcareous alluvium. The nodular calcrete was tested for permeability values and indicates generally less permeable condition than those encountered in the alluvium generally and shows typical permeability values in the order of $x10^{-8}$ m/s but grading as typical G7 and G8 quality materials.

### 6.2.4 HARDPAN CALCRETE

Hardpan calcrete was only encountered in the HLP and WRD areas and is similar to the other pedogenic horizons. The hardpan calcrete classifies as generally a G6 quality material with MDD and OMC AASHTO values of 1651 kg/m$^3$ at 20%.

## 6.3 RESIDUAL GNEISS

The residual gneiss is present across most of the site but not encountered in the test pits along the new road, along the SWD and in the borrow area.

Where encountered the residual gneiss is often described as calcified or ferruginised silty gravelly sand with a fines content varying from 5 % to 34 % and is classified as clayey to silty sand (SC-SM) to silty gravel (GM, GP or GC).

The material is classified as A-1 or A-2 according to the AASHTO classification and as G7 Quality material according to COTO with AASHTO MDD and OMC of 1973 kg/m$^3$ and 11 %. One sample was tested for remoulded permeability at 90 % Modified AASHTO compaction density to reveal permeability k-value in the order of $x10^{-7}$ m/s similar to the alluvium described above.

## 6.4 GNEISS BEDROCK

The very soft rock gneiss present across the site which was excavatable was tested as well. The horizons are generally thin but indicate similar results to the residual soils derived from them. The fines content is less than 25% with PI values less than 5 %. The material is classified as clayey to silty sand (SC to SM) to silty gravel (GM) as typically AASHTO A-1 to A-2 and COTO G6 to G9 quality material. The very soft gneiss is anticipated to be corrosive towards steel and very highly aggressive towards concrete.

### 6.4.1 UNIAXIAL COMPRESSIVE STRENGTH (UCS)

According to (SAICE, Guidelines for Soil and Rock Logging in Southern Africa, 2002), very soft rock is expected to have uniaxial compressive strengths (USC) ranging between 1 MPa and 3 MPa while soft rock is between 3 MPa and 10 MPa.

Two core samples were tested for rock strength in the HLP. The first sample was obtained from borehole HLP-BH02 and the second from HLP-BH04, the results are presented in Table 6-1. Minor strength increase was noticed in very soft rock cores on desiccation and may be the reason for the over

estimation of rock strength of the sample obtained from HLP-BH2. Both HLP samples indicate soft rock conditions are encountered from a depth of 2.6 m.

**Table 6-1: UCS test results**

| Borehole No. | Sample ID | Depth (m) | General Rock Mass Description | Failing Load (kN) | Uniaxial Compressive Strength (UCS) (MPa) | Failure Description | Rock Hardness (SAICE, 2002) |
|---|---|---|---|---|---|---|---|
| HEAP LEACH PAD | | | | | | | |
| HLP-BH02 | C/10590 | 5.35-5.65 | Highly weathered, very soft rock gneiss | 22 | 8 | Normal failure | Soft Rock |
| HLP-BH04 | C/10593 | 2.66-2.86 | Highly weathered, soft rock gneiss | 21 | 7 | Normal failure | Soft Rock |
| SWD INLET | | | | | | | |
| SWD-BH01 | C/10575 | 2.04-2.26 | Very Soft Rock Gneiss | 22 | 8.0 | Normal | Soft Rock |
| SWD-BH01 | C/10577 | 3.14-3.48 | Medium Hard Rock Gneiss | 66 | 23.5 | Normal | Medium Hard Rock |
| SWD-BH02 | C/10580 | 7.96-8.16 | Soft Rock Gneiss | 96 | 33.5 | Normal | Hard Rock |
| SWD-BH03 | C/10582 | 3.82-4.13 | Soft to Medium Hard Rock Gneiss | 34 | 12.0 | Normal | Medium Hard Rock |
| SWD-BH05 | C/10586 | 9.69-9.93 | Medium Hard Rock Gneiss | 73 | 25.5 | Normal | Medium Hard to Hard Rock |

The samples taken in the SWD are logged as generally weaker rock mass than the tested results, specifically at SWD-BH02. This was noticed where logging of the core was carried out directly after drilling in a wet state leading to lower estimated rock parameters than during testing in the dry state. This is likely attributed to the alteration minerals present in the rock core.

## 6.5 SHEAR STRENGTH

The shear strength parameters of the soils on site were evaluated by shearbox testing. At the time of writing two triaxial tests on clayey samples were still ongoing. In the interim, indicative values are provided based on the material types as presented in Table 6-2 below.

**Table 6-2 Indicative shear strength parameters**

| Soil parameter | Fine alluvium | Coarse alluvium | Pedogenic horizons | Residual gneiss |
|---|---|---|---|---|
| Typical material classification | SC to MH | SC to GM | SC - SM | SC-SM, G |
| Maximum dry density (kg/m$^3$) | 1500 - 1970 | 1650 - 2000 | 1650 - 1970 | 1650 - 2000 |
| Cohesion (kPa) | 0 - 8 | 0 - 5 | 0 - 5 | 0 - 5 |
| Friction (degrees) | 28 - 32 | 30 - 38 | 30 - 34 | 30 - 38 |

The shearbox test results are generally inline with the upper bound parameters for the tested alluvium and residual gneiss. SWD-TP15 and WRD-TP35 indicated slightly higher values than anticipated, specifically the cohesion, this is attributed due to the fines component causing slight build up of excess pore water pressure.

WRD-TP04 indicated slightly higher values than anticipated, specifically the cohesion, this is attributed due to the “apparent” cohesion due to the sand interlock.

Triaxial tests are still ongoing due to laboratory backlog and will be issued separately as per client’s request to not delay the final report.

# 7.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

The following section comprises the geotechnical evaluation of the various areas and materials based on the material type, laboratory results and site observations. Recommendations are provided for founding, excavatability and re-use of materials for construction.

Note that a general comment for all areas requiring earth works – an adequate source of water supply will be required during the earth works for the various phases of construction.

## 7.1 HEAP LEACH PAD

### 7.1.1 DISCUSSION

The test pit and borehole data indicate that the majority of the HLP site is covered by 0.3 m to 1.0 m of very loose to medium dense, silty sand to sandy silt, fine alluvium. The fine alluvium is generally loose in the upper 0.3 m and occasionally loose conditions are encountered to a depth of 1.45 m. Fine alluvium may occasionally extend to a depth of 3.0 m generally in the western and north-western portion.

Below the fine alluvium, generally medium dense coarse alluvium, medium dense calcareous or medium dense to dense calcified alluvium is encountered. The coarse alluvium and calcareous alluvium typically extend to depths of 2.5 m below ground level. This sandy gravel coarse alluvium has a typical medium dense consistency. The calcified alluvium is generally encountered within the upper 1.8 m. The alluvium is generally ferruginous/calcareous silty sand with variable gravel in the center of the HLP towards the north to north-western portions and becomes medium dense to dense ferruginised/calcified silty sand (increasing consistency) north of the HLP site boundary.

The coarse alluvium includes a sparsely occurring pebble marker in places at the base of the coarse alluvium.

The transported horizon generally transitions to a thin medium dense to dense, silty sandy gravel, residual gneiss from 1.4 m typically along the western border of the HLP. The varying transition depths into residual soils are generally attributed to the weathering of the underlying undulating gneiss bedrock topography. The western boundary of the HLP comprises sporadic very soft rock gneiss encountered from 2.5 m below surface.

The test results indicate that the fine and calcareous alluvium at the HLP is corrosive towards steel and very highly aggressive towards concrete.

### 7.1.2 FOUNDING RECOMMENDATIONS

The total anticipated load exerted by the approximately 50 m high (1.8 km x 1,1 km area constructed in three phases) HLP will be approximately 1 MPa. Soft rock gneiss which is encountered at an undulating depth deeper than 3.0 m below surface has an allowable bearing capacity of more than 1MPa. The HLP earthworks (bottom of liner and drainage layer) required to create adequate drainage of the pad is anticipated to be a maximum height of up to 8 m above ground level in the north of the facility. Due to

the amount of excavation required to reach suitable in situ founding material, it is rather recommended to in situ densify the soils on site as part of the earthworks design as detailed below:

- Excavate to stockpile 0.5 m below surface extending 2m beyond the HLP footprint.
- Localised in situ rehabilitation may be required in loose pockets.
- Compact the excavation floor at 95% Modified AASHTO compaction at OMC using impact compaction. A trial section should be carried out to determine the optimum number of passes required.
- Backfill the excavation to founding level (top of HLP earthworks platform) in 200 mm layers using minimum G7 quality material compacted to 95% Modified AASHTO compaction at OMC using conventional compaction equipment. Should thicker backfill layers be required, trial compaction tests must be carried out.
- Plate load testing should be carried out on the backfill material to determine the expected settlements and the time for settlement of the fill.
- Place the drainage layer and liner as per design.

The laboratory results indicate that the fine alluvium has low permeability when compacted to 90% Modified AASHTO. This fine alluvium can be used as a low permeability layer, but it is not regarded as a suitable source for the clay liner itself due to the variability within the alluvium. The nodular calcrete and residual gneiss generally do not meet the required permeability for liner use.

The soils at the HLP site are corrosive towards steel and very highly aggressive towards concrete. Treatment of these soils with neutralising agents may be required.

### 7.1.3 EXCAVATABILITY

The average test pit refusal depth in the outer areas of the HLP is less that 1.4 m while the center portion test pits typically refuse between 1.4 m and 3.1 m on shallow bedrock or the presence of very dense soil.

The HLP generally experiences soft excavation conditions to a depth of at least 1 m below surface satisfying the recommendations above. Should deeper excavation be required, localised intermediate to hard excavation may be anticipated with depth.

## 7.2 HLP ANCILLARY STRUCTURES AND PONDS

For the purpose of evaluation based on the significant difference in design concept the HLP ancillary structures and ponds have been treated separately from the HLP and plant area. This includes the area along the southern boundary of the HLP (HLP-TP20, HLP-22 to 27 and BH03-HLP, BH04-HLP and BH01-Plant and BH04-Plant). The typical profile of the HLP Ponds at the southern boundary of the HLP indicates that firm to stiff and loose fine alluvium is present from surface to variable depths. Medium dense alluvium is typically encountered from a depth of 0.5 m to 1.2m below surface with a typical allowable bearing capacity of at least 100 kPa and shallow very soft rock transitioning to medium hard rock gneiss underlies the HLP ponds from a depth of 0.6 m but typically deeper than 1.4 m with allowable bearing capacity of more than 500 kPa.

Based on the field observations and laboratory results, the overburden is described as fine alluvium silty to clayey sands (USCS classification “SC” and “SM”) to coarse alluvium coarse sand s and gravelly sand (“GP-GM”) with low plasticity and have low potential expansiveness as well as a low

compressibility rating (Hazelton & Murphy, 2007). Minor calcareous development was observed in TP-24 and ferruginised alluvium is present in the vicinity.

According to the AASHTO Classification system, the alluvial soils classify as A-1 to A-2 quality soils.

### 7.2.1 FOUNDING RECOMMENDATIONS

Based on the typical profile it is recommended that any lightly loaded structures (limited to 100 kPa bearing pressure) may be founded on medium dense alluvium encountered varying from depths of 0.6m to 1.1 m below surface with minor ground preparation for the foundations. Moderately loaded structures (up to 500 kPa bearing pressure) may be founded on very soft gneiss bedrock at typical depths ranging from 1.2 m to 1.7 m. Founding of structures on soft to medium hard rock (up to 1 MPa bearing pressure) may be encountered as shallow as 0.6 m as seen in TP25-HLP but typically from a depth of 1.4m to deeper than 2m.

The HLP ponds are anticipated to be excavated to a depth of more than 5 m below ground level encountering soft to medium hard rock gneiss within the excavation. It is recommended to consider raising the floor level to reduce intermediate to hard rock excavation, if possible to 3-4m below ground level.

A liner preparation layer should be used above the rock excavation floor comprising the 2x 150 mm fine alluvium compacted to 95% Standard Proctor at OMC before lining of the pond due to the uneven rock surface, closely jointed nature of the rock, low Rock Quality Designation (RQD) and brecciation indicative of faulting observed in HLP-BH3.

It is recommended that the foundations be inspected by a suitably qualified geo-professional to ensure no significant variation is present and that founding conditions are achieved at the required depths.

### 7.2.2 EXCAVATABILITY

Based on the test pit and borehole data excavation is classified as soft to a typical depth of 1.8 m, thereafter, intermediate to hard excavation anticipated in the very soft to medium hard rock below.

## 7.3 PROCESSING PLANT

The typical profile of the processing plant indicates that medium dense alluvium is encountered from surface with a typical allowable bearing capacity of at least 100 kPa and shallow very soft gneiss bedrock underlies the plant area from a depth of 1.5 m below ground as encountered in TP30-HLP and BH1 to BH4-Plant. The excavator generally refused on a dense coarse alluvium or a dense ferruginised alluvium in the test pits that did not reach rock within the upper 1.9 m. It is expected that the dense soils overly the shallow bedrock (allowable bearing capacity of more than 500 kPa) below.

Based on the field observations and laboratory results, the alluvium is described as silty to clayey sands (USCS classification “SC” and “SM”) with low plasticity and have low potential expansiveness as well as a low compressibility rating (Hazelton & Murphy, 2007). The alluvium is occasionally ferruginised and minor ferricrete nodules and honeycomb development are encountered.

According to the AASHTO Classification system, the alluvial soils classify as A-2 to A-4 quality soils.

### 7.3.1 FOUNDING RECOMMENDATIONS

Based on the typical profile it is recommended that lightly loaded structures (limited to 100 kPa bearing pressure) may be founded on medium dense alluvium varying from surface with minor ground preparation required for the foundations. Moderately to heavy loaded structures (up to 500 kPa bearing pressure) may be founded on very soft rock gneiss bedrock at a depth of more than 1.5 m.

Heavy dynamic structures (e.g., crusher) may be founded on soft rock gneiss at a dynamic bearing pressure not exceeding 500 kPa. It is anticipated that suitable founding will be possible from a depth of 2 m below ground surface based on the results of Plant-BH3.

It is recommended that the foundations be inspected by a suitably qualified geo-professional to ensure no significant variation is present and that founding conditions are achieved at the required depths.

### 7.3.2 EXCAVATABILITY

Based on the test pits excavated at the plant area, refusal was generally encountered within the upper 1.9 m and are classified as soft excavation, thereafter, intermediate to hard excavation is anticipated in the rock below.

## 7.4 STORMWATER DIVERSION CHANNEL (SWD)

For the purpose of this evaluation, this section is divided into three sections, namely the inlet (west), channel (alignment length) and outlet (east) structures. The figure in Appendix A2 shows the position of the test pits and boreholes along the SWD structure.

The evaluation and recommendations are based on the data from the laboratory results of the tested materials, as well as the data from 26 test pits and 10 rotary core boreholes which are positioned along the proposed stormwater diversion channel area.

The results of the geophysical surveys correspond well with the observed profile in the test pits and boreholes at the SWD inlet (line 3) and outlet (line 7 and line 8). It is noted that the “clay” overburden horizon is likely the pedogenic horizons observed in the profile.

### 7.4.1 INLET

Based on the test pit (TP01-SWD to TP09-SWD and TP23-SWD) and borehole (BH01-SWD to BH05-SWD and BH10-SWD) data, fine alluvial soils occur generally from the surface to a maximum of 3.95 m. Coarse alluvium is generally below the fine alluvium with a maximum depth of 3.8 m. Pedogenic soils were sporadically encountered from 0.6 m within the alluvium. The residual gneiss was limited in occurrence at the river and was encountered below the transported and pedogenic soils above the bedrock at depths great than 2 m. The completely weathered gneiss zones were often described as a soil zone.
Gneiss bedrock was found in and along the river at shallow depths. The typical refusal depth at the inlet in the river course is approximately 3.5 m to dense residual gneiss/ hard rock gneiss. The test pits and boreholes on the flanks indicate that soft rock is typically encountered from a depth of 1.3 m to 3 m.
A possible fault breccia zone was encountered in SWD-BH2 from 10.34 m to 12.4 m while SWD-BH5 encountered medium hard rock with soft rock schistose bands.

Figure 7-1 shows the typical anticipated materials at various depths based on the test pit and borehole data. This does not denote the frequency of occurrence of a material type with depth. For more detailed material, depth, frequency of material types refers to Appendix B.

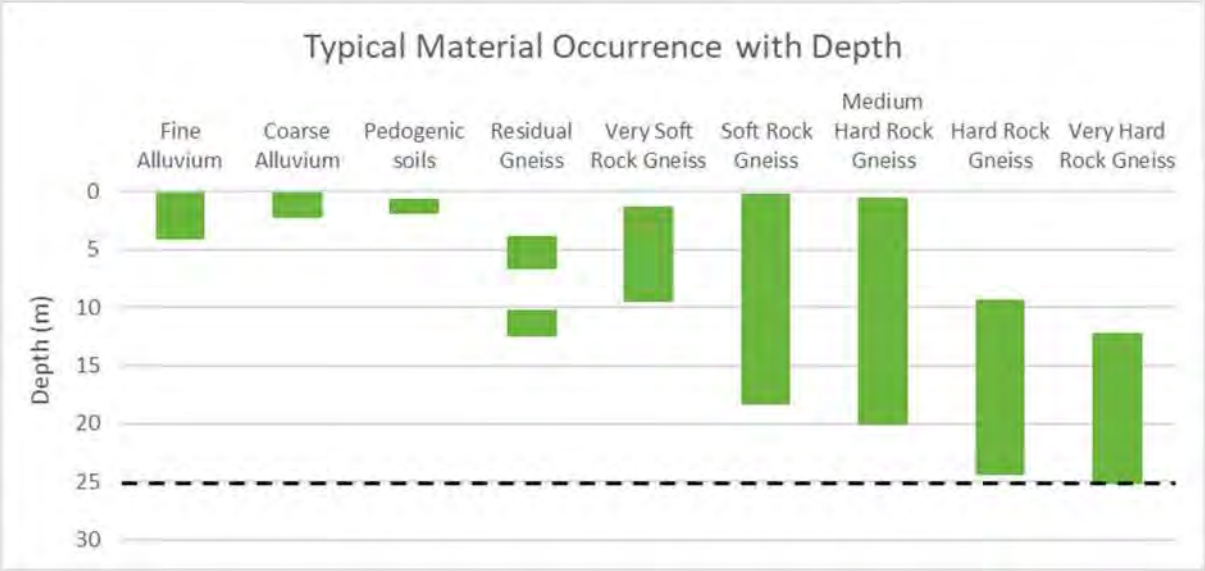



**Figure 7-1: Typical Material Occurrence with Depth – SWD – Inlet**

Groundwater was encountered in two test pits, TP04-SWD and TP05-SWD, from 1.5 m in boreholes BH01-SWD from 7.4 m, BH04-SWD from 14.6 m and BH05-SWD from 8.0m below ground.

The fine alluvial soils grade mainly as silty to clayey sands and have USCS classification of “SC” and “SM”. The fine alluvium also classifies as “A-2” and “A-4” based on the AASHTO classification system and has low potential expansiveness.

The ferruginised and the very soft rock gneiss both have similar soil characteristics grading clayey sand “SC” and “A-2”.

#### 7.4.1.1 FOUNDATION RECOMMENDATIONS

The following recommendations are made for the SWD inlet structure:

- Excavate to 0.5 m below the SWD embankment footprint.
- Further excavate the 3 m wide cut-off trench to refusal of the excavator and batter-back to safe slope angle of 1:1.5 (V:H).
- In situ compact the excavation floor 90% Modified AASHTO compaction density. Back fill in maximum 200 mm layers using the fine alluvium compacted to 90% Modified AASHTO compaction density at OMC.
- On the downstream side of the cut-off trench, backfill the upper 0.5 m with coarse alluvium to 90% Modified AASHTO compaction density to create a drainage layer as per design.
- Continue the embankment earth works as per the embankment design.

#### 7.4.1.2 EXCAVATABILITY

The river section is anticipated to experience soft excavations varying between 2.5 m and 3.9 m becoming intermediate to hard with depth. Loose soils cover the surface of the river area, and it is

recommended that the excavation walls be battered back at a safe slope of 1:2 (V:H). Seepage was also encountered in SWD-TP04 from 1.5 m indicating that dewatering of excavations should be considered.

The river flanks encounter soft excavation conditions in the upper 1.2 m, thereafter, becoming intermediate and hard excavation.

### 7.4.2 CHANNEL

The SWD channel was investigated by TP09-SWD to TP17-SWD and TP26-SWD as well as BH06-SWD and BH07-SWD. The test pits excavated through fine alluvium along the channel and generally indicate variable refusal depths in ferruginised or calcified alluvium most commonly between depths of 1.3 m and 4.4 m. The boreholes further indicate (very soft to medium hard) rock is encountered from 3 m to 7.6 m below ground level. There is no clear correlation with depth to refusal along the channel and variable conditions are anticipated along the route.

Figure 7-2 shows the potential materials at various depths based on the test pit and borehole data.

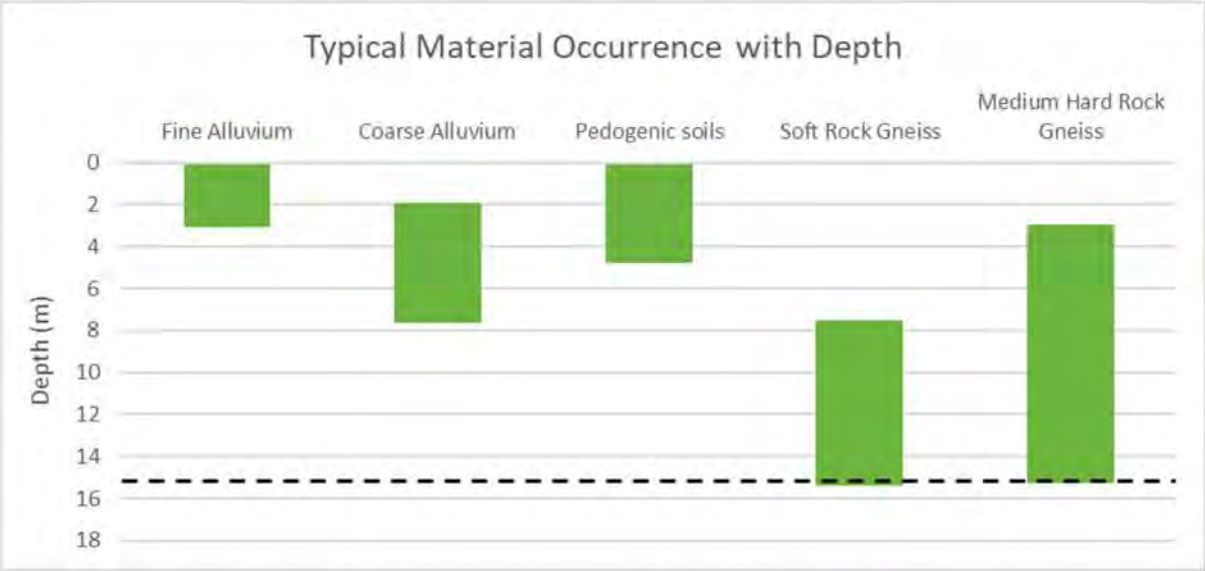



**Figure 7-2: Typical Material Occurrence with Depth – SWD – Channel**

The fine alluvial soils generally grade as silty sands and classify as “SC” and “A-4” based on the USCS and AASHTO classification systems. The material has low potential expansiveness and a “Good to Fair” compaction rating.

The calcified and ferruginised alluvium both classify as “SC” based on the USCS classification. Calcified alluvium grades as a gravelly sand and classifies as “A-2” while the ferruginised alluvium grades as a silty sand and classifies as “A-4”. Both materials have low potential expansiveness and a “Good to Fair” compaction ratio.

The sparsely encountered nodular ferricrete grades as a silty sandy gravel “GC” and “A-2” and has low potential for expansiveness.

#### 7.4.2.1 FOUNDATION RECOMMENDATIONS

Excavate the channel to invert level (up to 10 m below ground level as per hydraulic design) battered back to a safe slope angle of 1:3 (V:H).

It is anticipated that intermediate and hard excavation will be required for the bulk of the excavation. Where soils are encountered in the channel, the following is recommended:

- in situ rip and recompact the channel
- place rip-rap or suitable erosion protection
- monitor the channel following rainfall and flooding events and remediate the channel as required.

#### 7.4.2.2 EXCAVATABILITY

The excavatability conditions vary significantly along the channel area; however, the majority of the test pits were excavated to deeper than 2.5 m below the surface. It is anticipated that soft excavation conditions will be encountered to a depth of at least 1.1m below ground level and likely to a typical depth of 4 m. It is anticipated that intermediate and hard excavation will be encountered from a variable depth of 4m.

Groundwater was encountered only in test pit SWD-TP05 at 1.7 m below the surface. This test pit was dug in the river, and it is expected that groundwater mitigation measures may be required during construction.

### 7.4.3 OUTLET

The outlet area was investigated by TP20-SWD to TP24-SWD and BH08-SWD and BH09-SWD.

The boreholes drilled in the river course indicate soft rock encountered at 4.6 m to 6.8 m. The test pits excavated in the river course show refusal on coarse alluvium or soft rock to medium hard rock gneiss approximately 4.9 m.
The test pits on the flank refused at 1.1m on the southern flank and 4.3m on the northern flank in ferruginous alluvium. It is likely that the northern flank may have deeper alluvial soils. Soft conditions are anticipated above the refusal depth becoming intermediate to hard excavation from refusal and deeper.

Figure 7-3 shows the potential materials at various depths based on the test pit and borehole data.

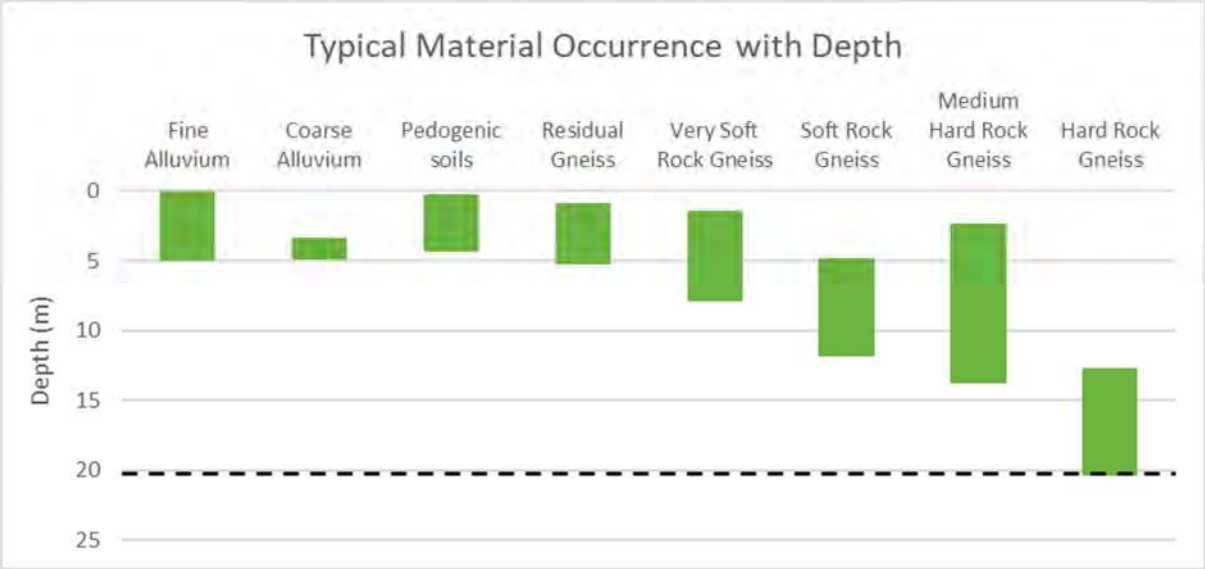



**Figure 7-3: Typical Material Occurrence with Depth – SWD – Outlet**

No groundwater was encountered in any of the test pits or boreholes drilled at the area of the SWD outlet.

#### 7.4.3.1 RECOMMENDATIONS

The outlet structure requires erosion protection and is anticipated to tie in with the level created in the SWD channel. In situ compaction with rip-rap or adequate erosion protection is recommended.

#### 7.4.3.2 EXCAVATABILITY

Based on the refusal depths of the test pit at the outlet area, it is expected that soft excavation conditions will be encountered from surface to 4 m in the river and from the surface to 2.5 m on the river flanks thereafter intermediate to hard excavation conditions are anticipated due to the presence of medium hard rock gneiss at depth.

### 7.4.4 VOLUME ASSESSMENT

The volumes assessment was based on the test pit and borehole data of the material at four sections along the SWD which include the inlet (Section 1), south-western portion of the channel until the bend (Section 2), from the bend towards the north-eastern portion of the channel (Section 3), from the north-eastern portion to the outlet of the channel (Section 4). Figure 7-4 presents the localities of the four sections along the SWD.




**Figure 7-4: Localities of the Four Sections Along the SWD**

**Table 7-1: Estimated Material Volumes at Section 1**

| Material | Approximate Area Coverage ($m^2$) | Approximate Layer Thickness (m) | Expected Volume ($m^3$) |
|---|---|---|---|
| Fine Alluvium | 22,300 | 0.4 – 4.0 | 9,200 – 92,000 |
| Coarse Alluvium | 22,300 | 0.3 – 1.2 | 6,500 – 27,500 |
| Pedogenic Soils | 22,300 | 0.7 – 0.8 | 16,000 – 18,000 |
| Residual Gneiss | 22,300 | 0.3 – 2.1 | 6,500 – 48,000 |
| Very Soft Rock Gneiss | 22,300 | 0.5 – 2.7 | 11,500 – 62,000 |
| Soft Rock Gneiss | 22,300 | 0.3 – 8.0 | 6,500 – 184,000 |
| Medium Hard Rock Gneiss | 22,300 | 2.5 – 13.7 | 57,500 – 315,000 |
| Hard Rock Gneiss | 22,300 | 1.2 – 9.4 | 27,500 – 216,000 |
| Very Hard Rock Gneiss | 22,300 | ± 5.8 | ± 133,0000 |

**Table 7-2: Estimated Material Volumes at Section 2**

| Material | Approximate Area Coverage ($m^2$) | Approximate Layer Thickness (m) | Expected Volume ($m^3$) |
|---|---|---|---|
| Fine Alluvium | 171,300 | 0.3 – 3.0 | 51,000 – 513,500 |
| Coarse Alluvium | 171,300 | ± 4.6 | ± 787,500 |
| Pedogenic Soils | 171,300 | 0.9 – 2.8 | 154,000 – 479,500 |
| Residual Gneiss | 171,300 | - | - |
| Very Soft Rock Gneiss | 171,300 | - | - |
| Soft Rock Gneiss | 171,300 | ± 7.7 | 1,319,000 |
| Medium Hard Rock Gneiss | 171,300 | - | - |
| Hard Rock Gneiss | 171,300 | - | - |
| Very Hard Rock Gneiss | 171,300 | - | - |

**Table 7-3: Estimated Material Volumes at Section 3**

| Material | Approximate Area Coverage ($m^2$) | Approximate Layer Thickness (m) | Expected Volume ($m^3$) |
|---|---|---|---|
| Fine Alluvium | 167,000 | 0.5 – 1.9 | 83,500 – 317,000 |
| Coarse Alluvium | 167,000 | 0.7 – 1.9 | 116,500 – 317,000 |
| Pedogenic Soils | 167,000 | 1.0 – 2.1 | 167,000 – 350,500 |
| Residual Gneiss | 167,000 | - | - |
| Very Soft Rock Gneiss | 167,000 | ± 1.3 | 217,000 |
| Soft Rock Gneiss | 167,000 | - | - |
| Medium Hard Rock Gneiss | 167,000 | 12.2 | 2,037,000 |
| Hard Rock Gneiss | 167,000 | - | - |
| Very Hard Rock Gneiss | 167,000 | - | - |

**Table 7-4: Estimated Material Volumes at Section 4**

| Material | Approximate Area Coverage ($m^2$) | Approximate Layer Thickness (m) | Expected Volume ($m^3$) |
|---|---|---|---|
| Fine Alluvium | 87,600 | 0.3 – 4.9 | 26,000 – 429,000 |
| Coarse Alluvium | 87,600 | ± 1.4 | 122,500 |
| Pedogenic Soils | 87,600 | 0.3 – 2.9 | 26,000 – 254,000 |
| Residual Gneiss | 87,600 | ± 0.5 | 43,500 |
| Very Soft Rock Gneiss | 87,600 | 0.9 – 2.6 | 78,500 – 227,500 |
| Soft Rock Gneiss | 87,600 | 0.1 – 4.0 | 8,500 – 350,000 |
| Medium Hard Rock Gneiss | 87,600 | 1.0 – 5.7 | 87,500 – 499,000 |
| Hard Rock Gneiss | 87,600 | 6.5 – 7.4 | 569,000 – 648,000 |
| Very Hard Rock Gneiss | 87,600 | - | - |

## 7.5 NEW ROAD (RD)

The evaluation and recommendations in this sub-section are based on the 16 excavated test pits of the 20 planned test pits for the new road. Four test pits (TP06-RD, TP17-RD, TP18-RD and TP19-RD) were inaccessible and thus not excavated in the western portion of the new road area.

Test pits TP02-RD, TP03-RD and TP16-RD were moved further downstream outside of the original neighbouring farm area to be excavated. This section will be divided into three subsections which will comprise the first two road-river crossings located near the south-western area of the RD site, the third and forth road-river crossings located on the north-eastern side of the RD site, and the road alignment between the river crossings. The structure coordinates and localities are indicated below in Table 7-5 and Figure 7-5, respectively.

**Table 7-5: Road-River Crossing Positions**

| Structure | Zone | Latitude/Northing | Longitude/Easting |
|---|---|---|---|
| Road-River Crossing 1 | 33 K | 7578647.06 m S | 800786.81 m E |
| Road-River Crossing 2 | 33 K | 7579935.53 m S | 801451.66 m E |
| Road-River Crossing 3 | 33 K | 7583486.00 m S | 806364.43 m E |
| Road-River Crossing 4 | 33 K | 7583366.36 m S | 806879.69 m E |




**Figure 7-5: Road-River Crossing areas of investigation for the new road**

### 7.5.1 CROSSINGS 1 AND 2

Laboratory results, as well as test pit data from test pits TP01-RD, TP02-RD, TP03-RD and TP16-RD were used to determine the expected foundation conditions for the structures at the river crossings at the south-western portion of the new road.

The test pits in this area refused on dense silty sand with varying gravel, alluvium to a depth of 3.9 m or in soft rock gneiss at a depth of 4.3 m in test pit TP02-RD which was dug in the middle of the river. It is expected that the rock hardness increases with depth. Figure 7-6 illustrates the typical materials encountered at various depths for this area is shown below.

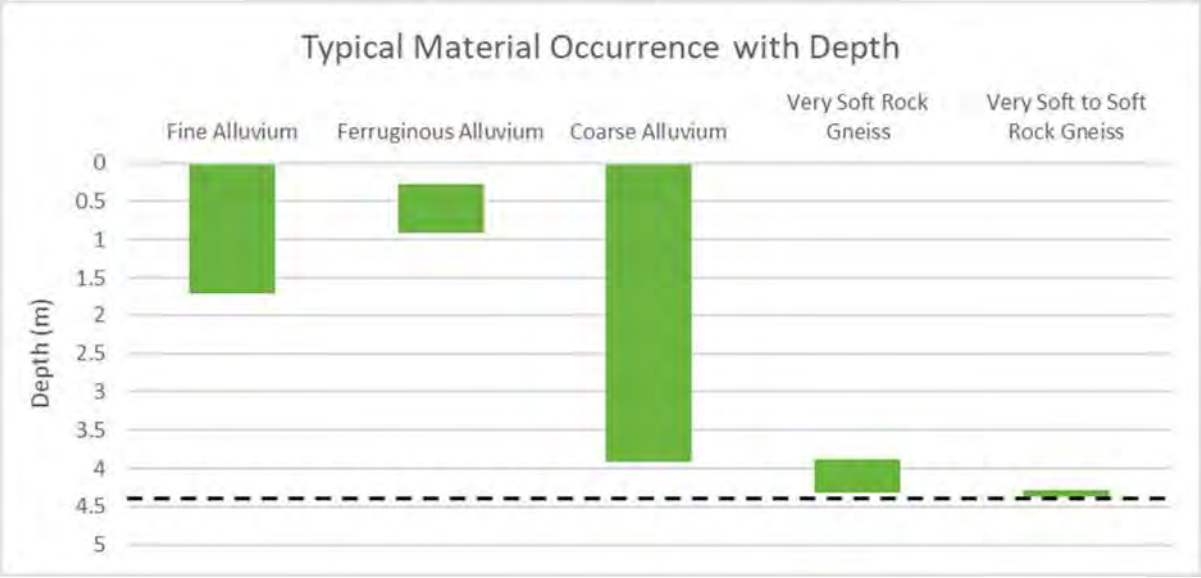



**Figure 7-6: Typical Material Occurrence with Depth – Crossings 1 & 2**

Based on the test pit data, the fine alluvium and ferruginous soils comprise loose to generally dense silty sand with occasional sub-angular to subrounded gravels with a typical allowable bearing capacity of 200 kPa.

The coarse alluvium as well as the very soft rock gneiss comprise mainly gravelly sands and classify both as “SC” and “A-2” according to the USCS and AASHTO classification systems. The potential expansiveness of both materials is low and has “Good to Fair” compaction ratings.

#### 7.5.1.1 FOUNDING RECOMMENDATIONS

It is recommended that founding of any bridge embankments be placed on at least dense soils not exceeding the allowable bearing capacity of 200 kPa at depths varying from 1.7 m to 4.3 m across the area. Foundation floors should be in situ compacted to at least 90% Modified AASHTO compaction density at OMC.

Seepage was encountered from a depth of 2.3 m below surface and dewatering measures should be considered during construction.

#### 7.5.1.2 EXCAVATABILITY

Based on the refusal depths of the test pits next to the river, it is anticipated that soft excavation conditions will be encountered to a depth of 1.7 m to 4.3 m becoming intermediate to hard with depth.

Test pit or trenched which will be dug in the river will not experience difficult excavation conditions due to the loose material. Collapse of excavation sidewalls and trench walls are expected during excavation in the upper horizons. It is recommended that the trench and excavation walls be benched or sloped at a safe slope angle of at least 1:2 (V:H).

### 7.5.2 CROSSINGS 3 AND 4

The data from test pit TP11-RD and TP13-RD and the laboratory results were used to evaluate the river crossing at points 3 and 4 of the RD site.

The soil profile near the river (TP11-RD) comprises medium dense to dense fine alluvium to a depth of 1.4 m while the soil profile always from the river towards the south comprises dense fine alluvium to 1.8 m, becoming calcareous to 2.6 m. The medium dense to dense pebble marker (coarse alluvium) extends to a depth of 4.0 m below surface whereafter very soft rock gneiss is encountered to 4.5 m before test pit refusal on soft rock. Figure 7-7 shows the typical materials at various depths for this area is shown below.

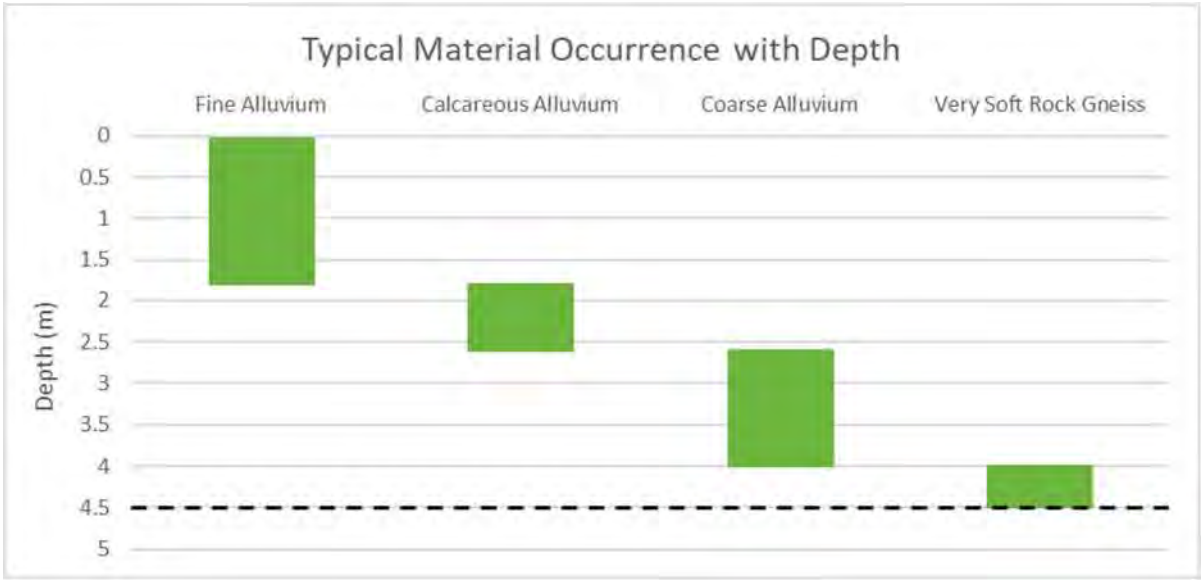



**Figure 7-7: Typical Material Occurrence with Depth – Crossings 3 & 4**

The silty sand coarse alluvium grades as USCS and AASHTO classification of “SC” and “A-4”. This material has low potential expansiveness and has a “Good to Fair” compaction rating (Hazelton & Murphy, 2007).

#### 7.5.2.1 FOUNDING RECOMMENDATIONS

Similar foundation conditions are present as at Crossing 1 and 2 as here in Crossing 3 and 4 and as such it is recommended that the bridge embankment foundations be founded on the dense alluvium or very soft rock gneiss with an allowable bearing capacity of at least 200 kPa.

Foundation floors should be in situ compacted to t least 90% Modified AASHTO compaction density at OMC.

#### 7.5.2.2 EXCAVATABILITY

Similar excavation conditions as Crossings 1 and 2 are expected at Crossings 3 and 4, with test pits or trenches next to the river being having soft excavation conditions to a depth varying from 1.4 m to 4.5 m.

Excavations walls in the river should also be benched or sloped at a safe slope angle of at least 1:2 (V:H) or battered back to support the excavation walls.

Dewatering of the excavation may be required during construction.

### 7.5.3 ROAD ALIGNMENT

The typical soil profile between the river crossings comprises mainly medium dense to dense, with occasional loose pockets of fine alluvium from surface down a depth of 4.3 m. Coarse alluvium from 0.3 m to 1.4 m or ferruginised alluvium from 0.3 m to 0.7 m is encountered below shallow fine alluvium. Medium dense becoming dense calcified alluvium was identified in test pit TP08-RD from 1.0 m down to 3.2 m.

Very soft rock gneiss was encountered only in test pit TP14-RD from 1.4 m down to 2.6 m after which the excavator refused on soft rock gneiss. Figure 7-8 shows the materials that are typically encountered with depth across this area.

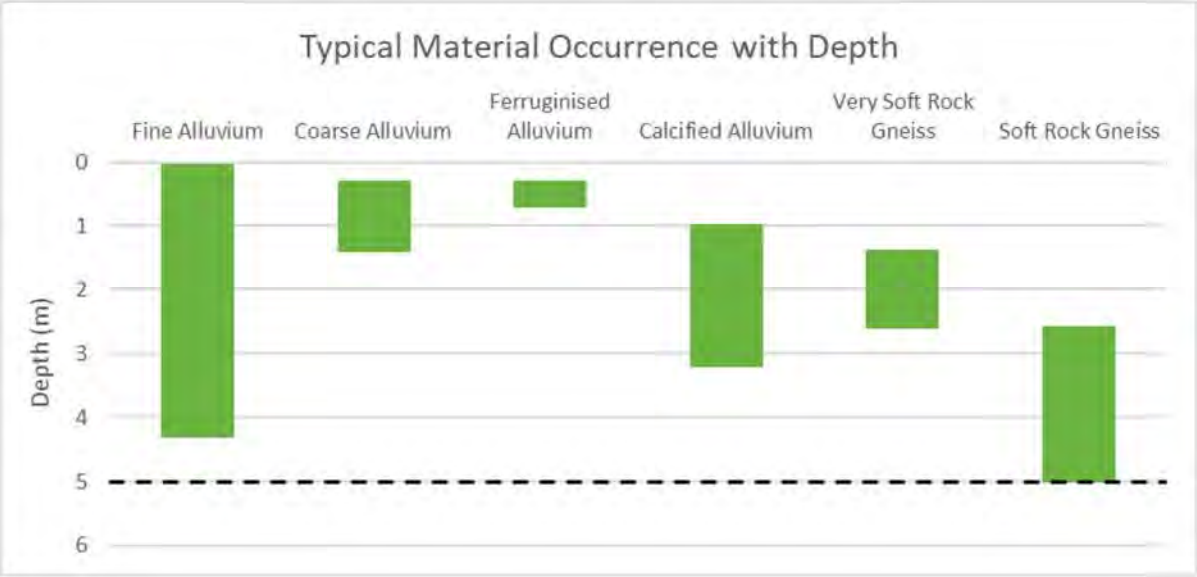



**Figure 7-8: Typical Material Occurrence with Depth – Road Route**

The fine and calcified alluvium grade mainly as silty or clayey sands with low gravel content in the coarse alluvial material. The fine alluvial soils comprise more than 60% sand and no gravel. The alluvium classifies as “SM” based on the USCS system; however, the fine alluvium classifies as “A-2” while the coarse alluvium classifies as “A-7” based on the AASHTO classification. The materials have a low potential expansiveness and low compressibility rating, as well as a “Good” compaction rating.

Very soft rock gneiss comprises mainly silty sandy gravel and classifies as a well graded gravel (GM) based on the USCS system. An AASHTO group of “A-2” was assigned to this material.

The plasticity index of the soils is generally below 10 %.

The compaction characteristics of the tested materials are summarised in the Table 7-6 below.

**Table 7-6: CBR Values of the Tested Samples Between the Road-River Crossings**

| Test Pit No. | Sample Depth (m) | Material | MDD (kg/m$^3$) | OMC (%) | CBR at MOD AASHTO Compaction | | | % Swell | COLTO |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 93% | 95% | 98% | | |
| TP04-RD | 0.6-2.9 | Fine Alluvium | 2041 | 8.1 | 32 | 46 | 81 | 0.1 | *G4** |
| TP08-RD | 1.0-3.2 | Calcified Alluvium | 1640 | 20 | 4 | 4 | 5 | 0.0 | NC |
| TP12-RD | 1.1-4.3 | Fine Alluvium | 2119 | 7.4 | 23 | 30 | 46 | 0.0 | G6 |
| TP14-RD | 1.4-2.6 | Very Soft Rock Gneiss | 2016 | 12.9 | 15 | 17 | 20 | 0.0 | G7 |

***Notes:***

1. *NC – Not Classifiable.*
2. *The G4 grading of TP04-RD is not considered representative of the material and is anticipated due to the uncharacteristic coarse portion of this sample.*

#### 7.5.3.1 UNPAVED WEARING COURSE FOR GRAVEL ROADS

The materials encountered on site have been further evaluated for re-use as unpaved wearing course according to THR20 [8] and the materials are plotted in Appendix B4 by material type. The classes of materials are briefly described below:

- Class A: Materials in this area generally perform satisfactorily but are finely graded and particularly prone to erosion by water: they should be avoided, if possible, especially on steep grades and sections with steep cross-falls and super-elevations. Most roads constructed from these materials perform satisfactorily but may require periodic labour-intensive maintenance over short lengths and have high gravel losses due to water erosion.
- Class B: These materials generally lack cohesion and are highly susceptible to the formation of loose material (ravelling) and corrugations. Regular maintenance is necessary if these materials are used, and the roughness is to be restricted to reasonable levels.

- Class C: Materials in this zone generally comprise fine, gap-graded gravels lacking adequate cohesion, resulting in ravelling and the production of loose material.
- Class D: Materials with a shrinkage product in excess of 365 tend to be slippery when wet.
- Class E: Materials in this zone perform well in general, provided the oversize material is restricted to the recommended limits.

The alluvium generally classifies as material that is erodible (Class A) and which ravels and corrugates (Class B). This has been seen on the unpaved roads on site. The alluvium also classifies to a lesser extent as slippery (Class D) and good for unpaved roads (Class E).

The pedogenic soils generally follow the same trend as the alluvium classifying as material that is erodible (Class A) and which ravels and corrugates (Class B). The pedogenic alluvium (calcareous/calcified/ferruginous/ ferruginised alluvium) further classifies to as slippery (Class D) and good for unpaved roads (Class E).

The residual gneiss soils generally follow the same trend as the alluvium classifying as material that is erodible (Class A) and which ravels and corrugates (Class B).

The very soft rock gneiss that was tested reveals material that is generally good for unpaved roads (Class E), but which ravel and corrugate (Class B).

The CBR values that were tested vary significantly within each material type typically from as low as 3% to 36% when compacted at 93% Modified AASHTO. The COTO classification generally varied from poorer than G9 to G6 quality material. Occasionally, high gravel content has shown G4 quality material which is not considered to be well represented.

#### 7.5.3.2 FOUNDING RECOMMENDATIONS

The road alignment soils are generally low plasticity soils that lack binding materials. The following is recommended:

- Excavate and spoil the upper 0.3 m organic layer.
- In situ rip and recompact the subgrade along the road alignment to 93% Modified AASHTO compaction at OMC to ensure a minimum CBR value of 7 %.
- Localised deeper compaction in loose zones is anticipated along the alignment.
- Founding of the surface wearing course on dense alluvium.
- Import a suitable surface wearing course placed as per road design.
- Ensure that the road is shaped to prevent ponding of water along the alignment and ensure that water is carried away.

#### 7.5.3.3 EXCAVATABILITY

Based on the test pit data soft excavations conditions are expected to a typical depth of 3.5 m thereafter intermediate and hard excavation conditions are expected with localised deeper excavation nearer the river areas.

## 7.6 WASTE ROCK DUMP (WRD)

The waste rock dump (WRD) area covers approximately 710 ha of the mine and is divided into two areas for the purpose of this section. The first area, namely Area A (579 ha), is located on the eastern portion of the site and the second area, Area B (130 ha), which is located between the HLP and SWD. The localities of Area A and Area B (outlined in yellow) is shown below in Figure 7-9.

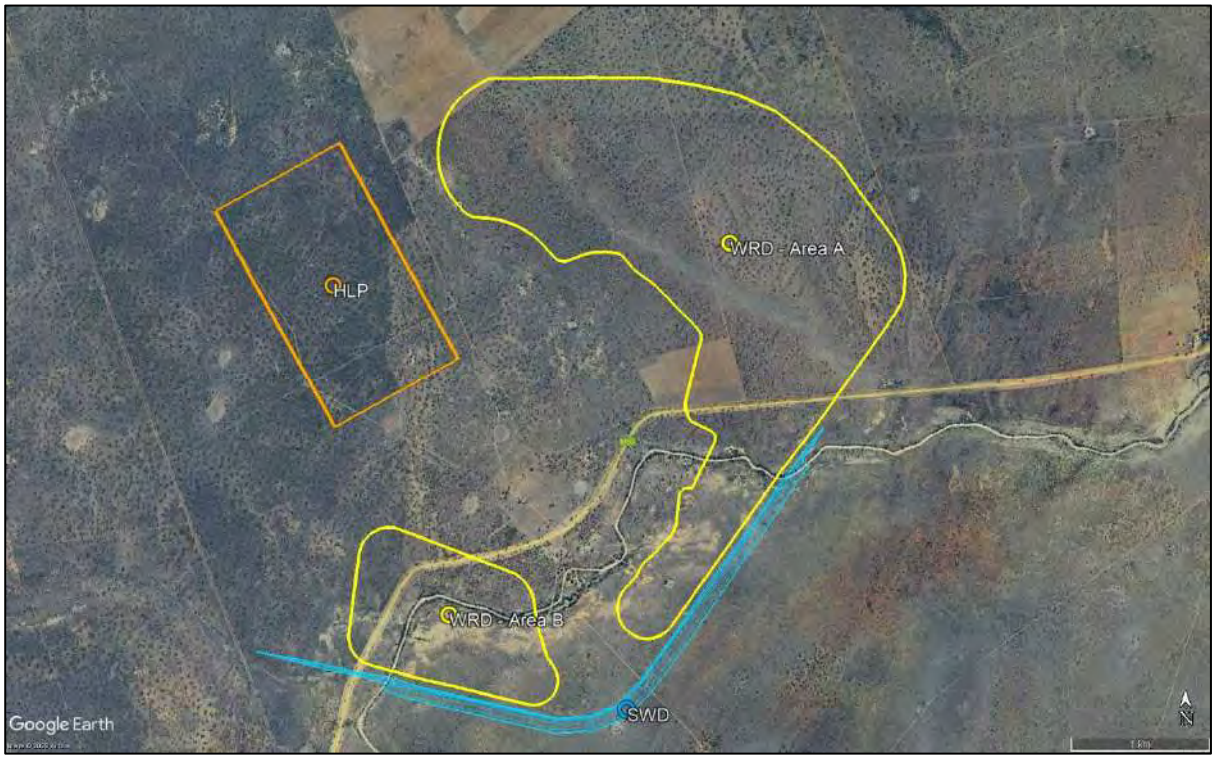



**Figure 7-9: WRD - Area A and Area B**

### 7.6.1 AREA A

The majority of Area A is covered with fine alluvium from the surface down to depths varying between 0.2 m and 1.6 m. A coarse alluvium occurs below this and extends generally between 1.1 m and 2.5 m below the surface. Deeper coarse alluvium (encountered to depths of 4.1 m) was recorded near the river area of Area A (WRD-TP17). It is anticipated that a downward coarsening trend is anticipated for the river area.

The alluvium often becomes ferruginous and calcareous with depth, which can be attributed to the existing drainage feature in the north running through Area A from the north-west to the south-east boundary of the WRD boundary joining the Black Nossob river at the new road crossings 3 and 4. The pedogenic soils was identified from as shallow as 0.6 m to as deep as about 5.0 m near the riverbed.

Hardpan calcrete was recorded in 6 test pits in the north to north-western portions of Area A and occurs from roughly 0.2 m down to 2.6 m. The depth and layer thickness of the hardpan calcrete varies significantly across the area of occurrence.

Residual gneiss is generally observed below the transported and pedogenic soils and was encountered from depths as shallow as 1.1 m down to as deep as 2.4 m below the surface. These residual soils mainly occur mainly in the eastern and central portions of Area A.

Very soft rock gneiss occurs either below the alluvial or pedogenic soils from as shallow as 0.5 m down to as deep as 2.9 m below ground level when encountered. Soft rock to medium hard rock follow with depth down to approximately 3.4 m below surface. Refusal often occurs above the rock surface in fine or calcified alluvium, or on hardpan calcrete.

Based on the laboratory results, the alluvium classifies as clayey sand to low plasticity clays (SC to CL) according to the USCS classification and as “A-2” and “A-6” according to the AASHTO classification system. This material has low potential expansiveness and a compaction rating of “Good to Fair” based on the USCS classification. The WRD soils range between silty clayey sands and sandy gravels.

The pedogenic soils comprise mainly of sandy gravel of varying grading (GC, GP and GM) based on the USCS and as “A-2” based on the AASHTO classification. This material has a low potential expansiveness and a “Good” compaction rating.

The residual gneiss is described as silty clayey sand (SC and A-2), with sand making up more than 60 % of the total texture. In addition, the potential expansiveness of the residual gneiss is low.

### 7.6.2 AREA B

The northern portion outside the WRD site boundary has alluvial soils occurring from the surface down to less than 2.0 m while the southern and eastern portions have deeper alluvial horizons generally to 3.0 m but occasionally as deep as 5.0 m. This alluvial material classifies as clayey sand (SC) based on the USCS system and as “A-4” and “A-6” according to the AASHTO classification system. This material also has a “Good to Fair” compaction rating and a low potential expansiveness.

Pedogenic soils (mainly calcified alluvium) occur along and south of the riverbed from as shallow as 0.3 m to 4.4 m. The thickness of the pedogenic horizon does vary but is generally thicker than 2.5 m in this area. The pedogenic soils comprise mainly of sandy gravel with minor variations such as silty and gravelly sands. The material classifies as GC, SC and SM according to the USCS classification system and “A-2” and “A-6” in the AASHTO system. The potential expansiveness of this material is low, and it has a “Good to Fair” compaction rating based on the USCS classification.

Residual gneiss was identified near the riverbed as well as slightly north of this area of the WRD. The depth of occurrence range generally between 1.2 m and 1.6 m with the exception of test pit TP1-WRD having residual material down to 3.5 m. This residual material is generally a sand with minor amounts of clay and silt, with the exception of test pit TP2-WRD grading as a sandy gravel. It is therefore expected that the residual material closer to the riverbed be slightly finer grained and become coarser further away from the riverbed. The USCS classification of the residual soils range between “SC” and “SM” for the finer graded soils and between “GP” and “GM” for the residual soils further away from the riverbed. The AASHTO group for the finer soils is “A-2” while the coarser soils are assigned an “A-1” classification.

Very soft rock occurs from approximately 1.3 m below surface and extends to 1.8 m after which it transitions to soft rock from 1.8 m. Test pit TP6-WRD has medium hard rock gneiss occurring from 4.3 m below surface and it is therefore expected that the transition between soft rock and medium hard rock may occur from 2.5 m and 4.0 m. The very soft to soft rock gneiss grades as a gravelly sand and has a USCS classification of “SC” and an AASHTO code of “A-2” assigned to the tested material.

### 7.6.3 RECOMMENDATIONS

The recommendations for the waste rock dump are to scarify the surface soils to remove the organic component. In situ rip and recompact to 90% Modified AASHTO compaction density at OMC. Place the waste rock with safe side slopes of no steeper than 1:2 (V:H).

### 7.6.4 EXCAVATABILITY

The test pits at and around Area A of the WRD generally refused at depths shallower than 2 m towards the north with slightly deeper test pits present near the center and southern portions. Softe excavation conditions are expected to depths of 2 m becoming intermediate to hard below.

The test pits at Area B and near the riverbed generally refused or terminated at depths between 3 m and 5 m.

It is therefore expected that excavation conditions near the riverbed will be “soft” to depths of 3.0 m thereafter intermediate and hard excavation conditions are expected.

## 7.7 POTENTIAL BORROW SOURCES

The identified potential borrow pit area is divided into two areas namely, Area A which is located south of the road and north of the river and Area B adjacent to the river on both sides. The approximate boundary of each area is highlighted in light blue in Figure 7-10 below. Note that the typical soil profile is described below for the whole AM site and not separately for Area A and Area B.




**Figure 7-10: Additional Material Source - Area A and Area B**

The borrow pit area comprises mainly alluvium from the surface down to 1.0 m below surface. The majority of the test pits refuse on this layer due to the dense soil consistency of this alluvium.

Where the test pits did not refuse on this dense fine alluvium, a 0.3 m coarse alluvium layer is seen underneath it. These alluvium layers often become ferruginous or calcareous with depth and may become calcified as seen in test pit AM-TP04.

Very soft rock gneiss is observed below the alluvium and pedogenic soils from approximately 1.0 m below surface which quickly transitions to soft rock where seen in the two test pits AM-TP2 and AM-TP4 in the west of Area A.

A prominent hardpan ferricrete outcrop was identified during the field investigation along the road on the western boundary of Area A. The size of the ferricrete outcrop is estimated at 8,800 m$^2$. The occurrence of the ferricrete outcrop is highlighted in orange in Figure 7-11 below.




**Figure 7-11: Ferricrete Outcrop at the AM site**

Based on the laboratory results, the fine alluvium comprises mainly silty to clayey sands, with fines component (clay and silt) greater than 40 %. The clay portions of these soils typically range between 19 % and 34 % with a plasticity index (PI) of less than 12 %. A USCS classification of “SC” was generally assigned to these alluvial soils and an AASHTO classification of “A-4”.

The coarse alluvium (pebble marker) comprises mainly sandy gravel with more nearly 50 % gravel. A USCS classification of “GC” and an AASHTO classification of “A-2” was assigned to this material.

The pedogenic material comprised of 75 % gravel and 21 % sand and was classified as poorly graded gravel (USCS classification: GP). The AASHTO classification of “A-1” was assigned to this material.

The gneiss bedrock comprising very soft rock comprised mainly clayey silty sand, with sand making up more than 70 % of the soil. The material is classified as non-plastic and has a low potential

expansiveness. A USCS classification of “SC” was assigned to this material, along with an AASHTO classification of “A-1”.

Where is was possible to excavate into the deeper, soft to medium hard rock gneiss, the laboratory results indicate that equal amounts (40%) of gravel and sand are present with a PI of 12 %. This material classifies as “SC” and “A-4” according to the USCS and AASHTO classifications, respectively.

### 7.7.1 VOLUME ASSESSMENT

The material volumes are estimated based on the area of occurrence and the layer thickness of each assessed material. Table 7-7 and Table 7-8 show the estimated volumes for the materials encountered at Area A and Area B, respectively.

**Table 7-7: Estimated Material Volumes at Potential Borrow Pit Area A**

| Material | Position | Approximate Area Coverage ($m^2$) | Approximate Layer Thickness (m) | Expected In Situ Volume ($m^3$) |
|---|---|---|---|---|
| Fine Alluvium | Area A | 379,500 | 0.3 – 0.7 | 113,500 – 265,500 |
| Coarse Alluvium | Area A | 379,500 | 0.2 – 0.3 | 75,500 – 113,500 |
| Pedogenic Soils | Area A | 379,500 | 0.1 – 0.8 | 37,500 – 303,500 |
| Very Soft Rock Gneiss | Area A | 379,500 | 0.2 – 0.3 | 75,500 – 113,500 |
| Soft Rock Gneiss | Area A | 379,500 | N/M | N/M |

***Notes:***

*1. N/M – Not measurable.*

*2. “-“ – Material not encountered.*

**Table 7-8: Estimated Material Volumes at Potential Borrow Pit Area B**

| Material | Position | Approximate Area Coverage ($m^2$) | Approximate Layer Thickness (m) | Expected In Situ Volume ($m^3$) |
|---|---|---|---|---|
| Fine Alluvium | Area B | 330,900 | 0.6 - 1.2 | 198,500 - 397,000 |
| Coarse Alluvium | Area B | 330,900 | - | N/M |
| Pedogenic Soils | Area B | 330,900 | ± 0.4 | ± 132,000 |
| Very Soft Rock Gneiss | Area B | 330,900 | - | N/M |
| Soft Rock Gneiss | Area B | 330,900 | - | N/M |

***Notes:***

*1. N/M - Not measurable.*

*2. "-" - Material not encountered.*

### 7.7.2 EXCAVATABILITY

The alluvial soils covering the surface of the potential borrow pit area has a dense soil consistency on which the excavator generally refused during the field investigation. Based on (SANS634, 2012), the excavation down to refusal depths, generally the upper 1.2 m, can generally be classified as “soft” while the conditions to refusal depth can be classified as “Intermediate to hard”.

“Soft” excavation conditions refer to material, which can be excavated efficiently using a back-acting excavator while “Intermediate” refers to material which can be removed using a back-acting excavator or that needs to be removed using pneumatic tools.

## 7.8 MATERIAL REUSE

The materials encountered across the site have been evaluated by type and discussed in the relevant sections. It should be noted that the variability within the soils on site is significant, owed both to the nature of the alluvium during its deposition causing fine or coarse lenses and due to the erratic nature of the pedogenic soils distribution both laterally and horizontally within the profile.

The materials on site are generally classified as clayey sands to gravels with varying CBR values. COTO classification generally varies between poorer than G9 and G6 quality materials classifying as A-1, A-2 and A-4 materials with occasional A-6 soils.

No distinct suitable borrow source of clay was identified during the investigation, although fine grained soils (classified SC and SM) occur throughout the site at various depths. The plasticity of the fine-grained soils is generally less than 10%.

The permeability of the materials when remoulded vary between $10^{-6}$ m/s and $10^{-8}$ m/s due to the generally fine-grained nature of the materials. The laboratory results indicate that the fine alluvium has a low permeability when compacted to 90% Modified AASHTO compaction density. This fine alluvium can be used for the construction of the clay liner preparation layer for the heap leach pad, since the permeability of such a material should typically be $1x10^{-8}$ m/s.

The reuse of soils for road construction has been discussed in Section 7.5.3.1 and is generally susceptible to erosion, ravelling and corrugation due to the low PI.

The alluvium can be reused as general fill during construction. The coarse alluvium and pebble marker is suitable material for the subgrade of roads, selected earthworks for foundation platforms and untreated road layers. The material can also be used for trench backfilling. The gravelly nature of the pedogenic soils as well as the residual gneiss make these materials suitable to be used as general fill, selected layers for foundation platforms, as well as subgrade and subbase material for road construction. The very soft to soft rock gneiss can also be used as subgrade and subbase for road construction. In addition, the very soft rock gneiss and the soft to medium hard rock has a “Good” compaction rating and can also be used as general fill material or as subgrade in road construction.

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# 9.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

Prepared: 

Christiaan Homan
Junior Engineering Geologist

Reviewed: 

Bronwen Klaas, Pr. Sci. Nat.
Senior Engineering Geologist

Approved: 

Dawid Mouton, Pr. Sci. Nat.
Technical Consultant

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Approval that this document adheres to Knight Piésold Quality Systems: ✓

# APPENDIX A

## Geotechnical Site investigation Program

Appendix A1

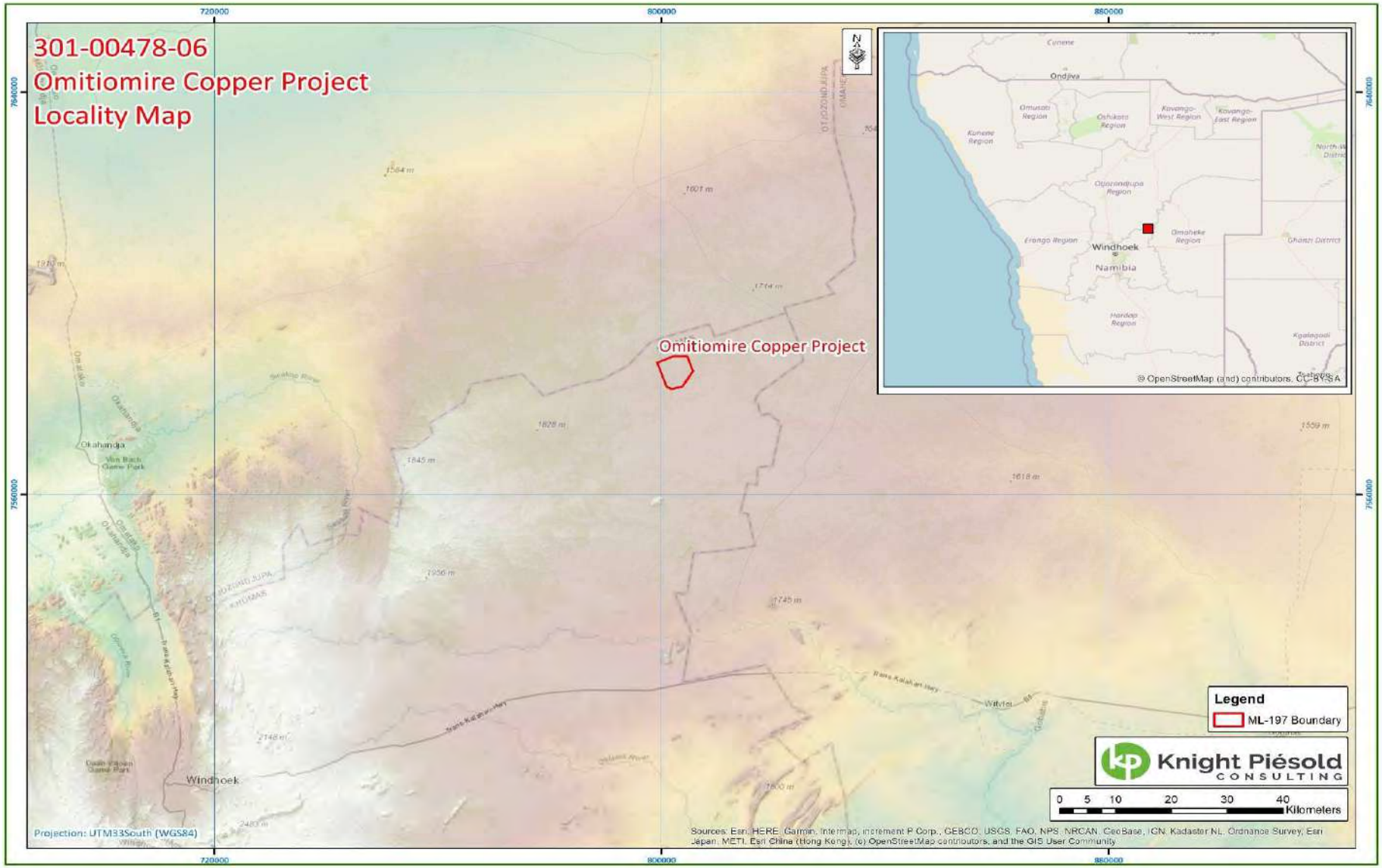
Site Locality Map

Appendix A2

Layout of Investigated Points

# APPENDIX A1

## Site Locality Map




| | |
|---|---|
| PROJECT NO. | WI 301-00478/06 |
| BY: | T Oosthuizen |
| CHECKED: | B Klaas |
| DRAWING DATE: | 30-Jun-23 |
| REVISION: | A |

Coordinate System: WGS 1984 UTM Zone 33S
Projection: Transverse Mercator
Datun: WGS 1984
Units: Meter

**Omitiomire Copper Project:**

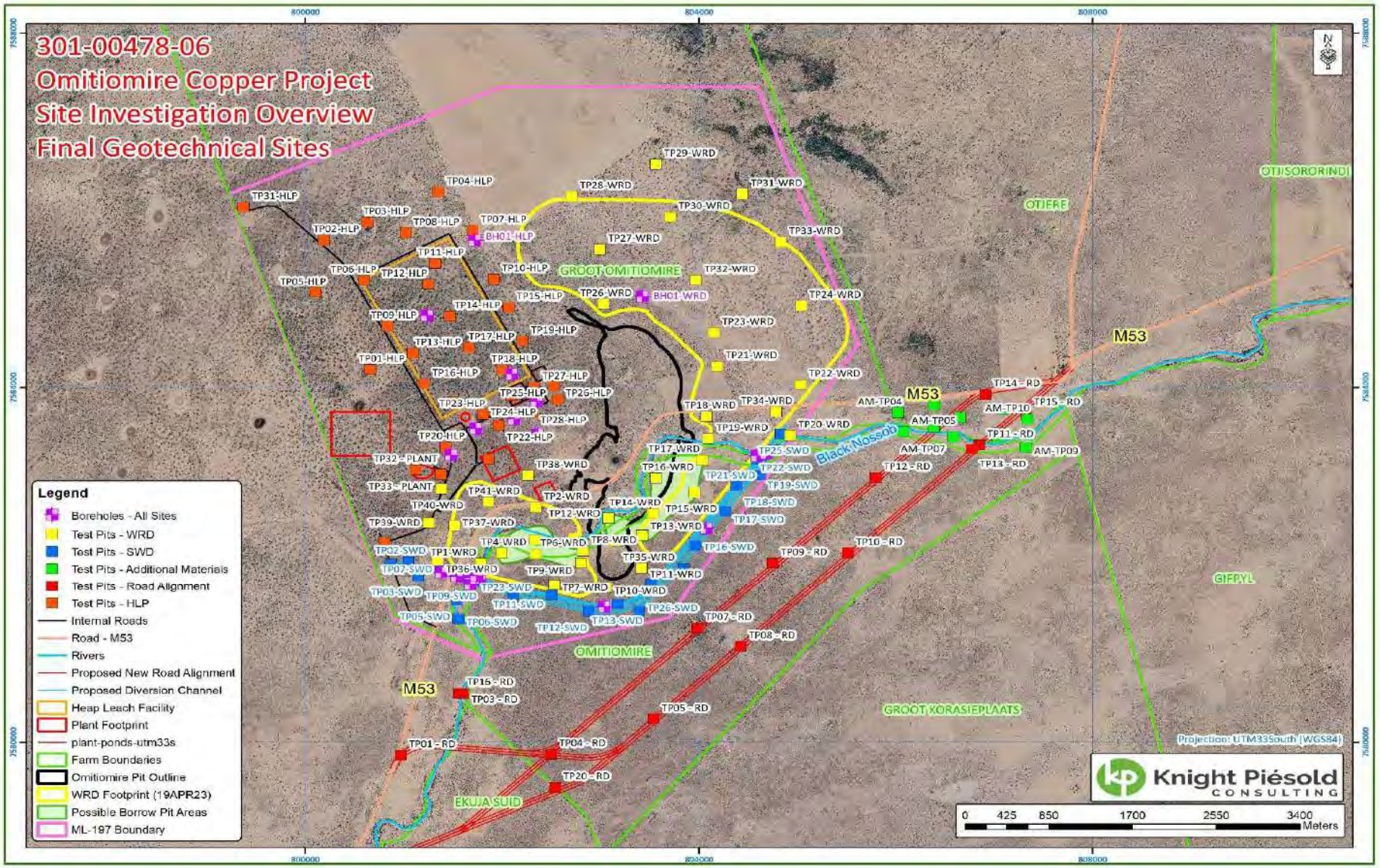
**Site Locality Map**

CLIENT:
Craton Mining and Exploration (Pty) Ltd

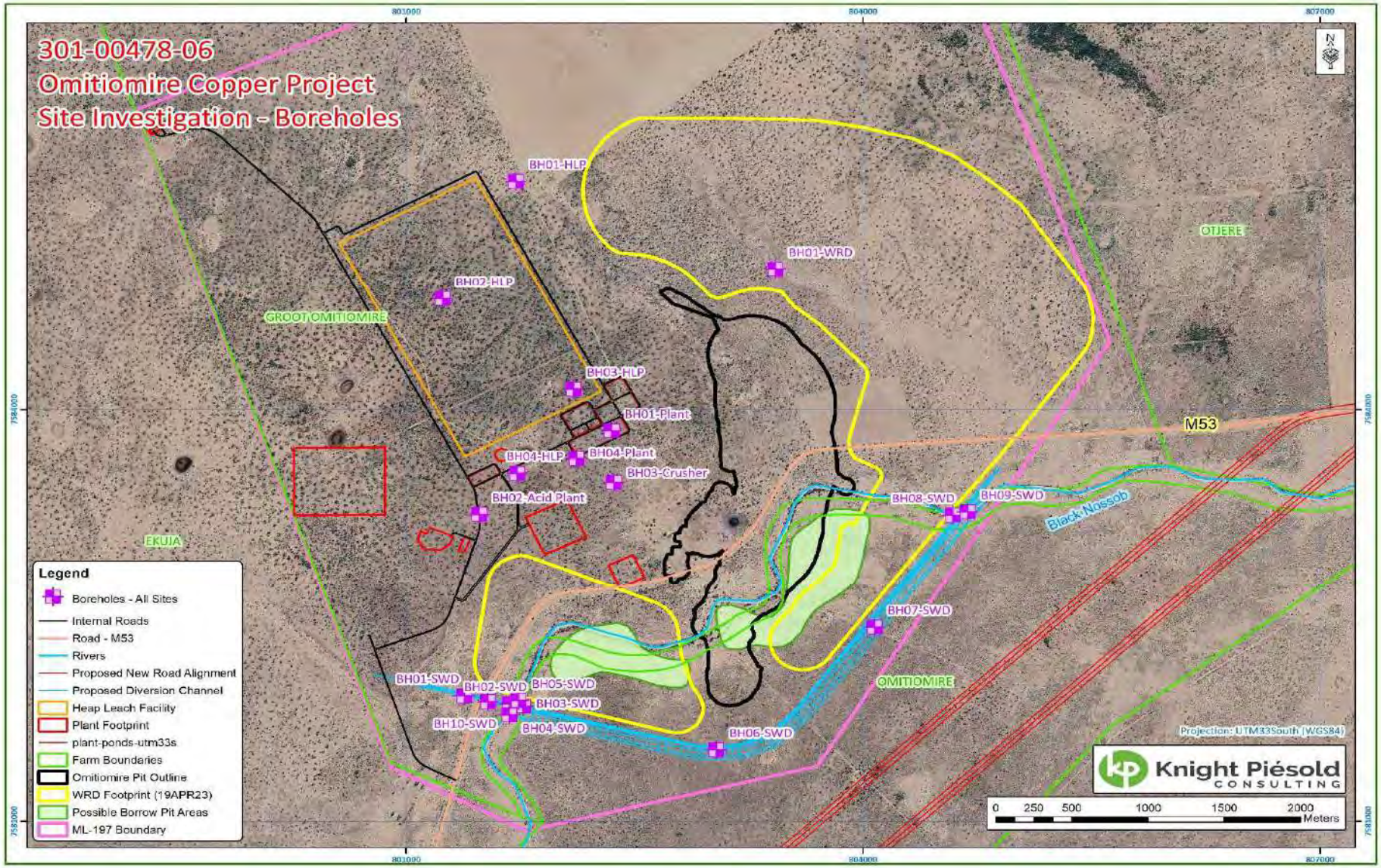
FIGURE NO:
A-1

# APPENDIX A2

## Layout of Investigated Points




| | | | |
|---|---|---|---|
| PROJECT NO. | WI 301-00478/06 | Coordinate System: WGS 1984 UTM Zone 33S<br>Projection: Transverse Mercator<br>Datun: WGS 1984<br>Units: Meter | **Omitiomire Copper Project:**<br>**Location of geotechnical boreholes & test pits - All sites** |
| BY: | T Oosthuizen | | |
| CHECKED: | B Klaas | | |
| DRAWING DATE: | 30-Jun-23 | | |
| REVISION: | A | | CLIENT: Craton Mining and Exploration (Pty) Ltd<br>FIGURE NO: A-2 |




| | |
|---|---|
| PROJECT NO. | WI 301-00478/06 |
| BY: | T Oosthuizen |
| CHECKED: | B Klaas |
| DRAWING DATE: | 30-Jun-23 |
| REVISION: | A |

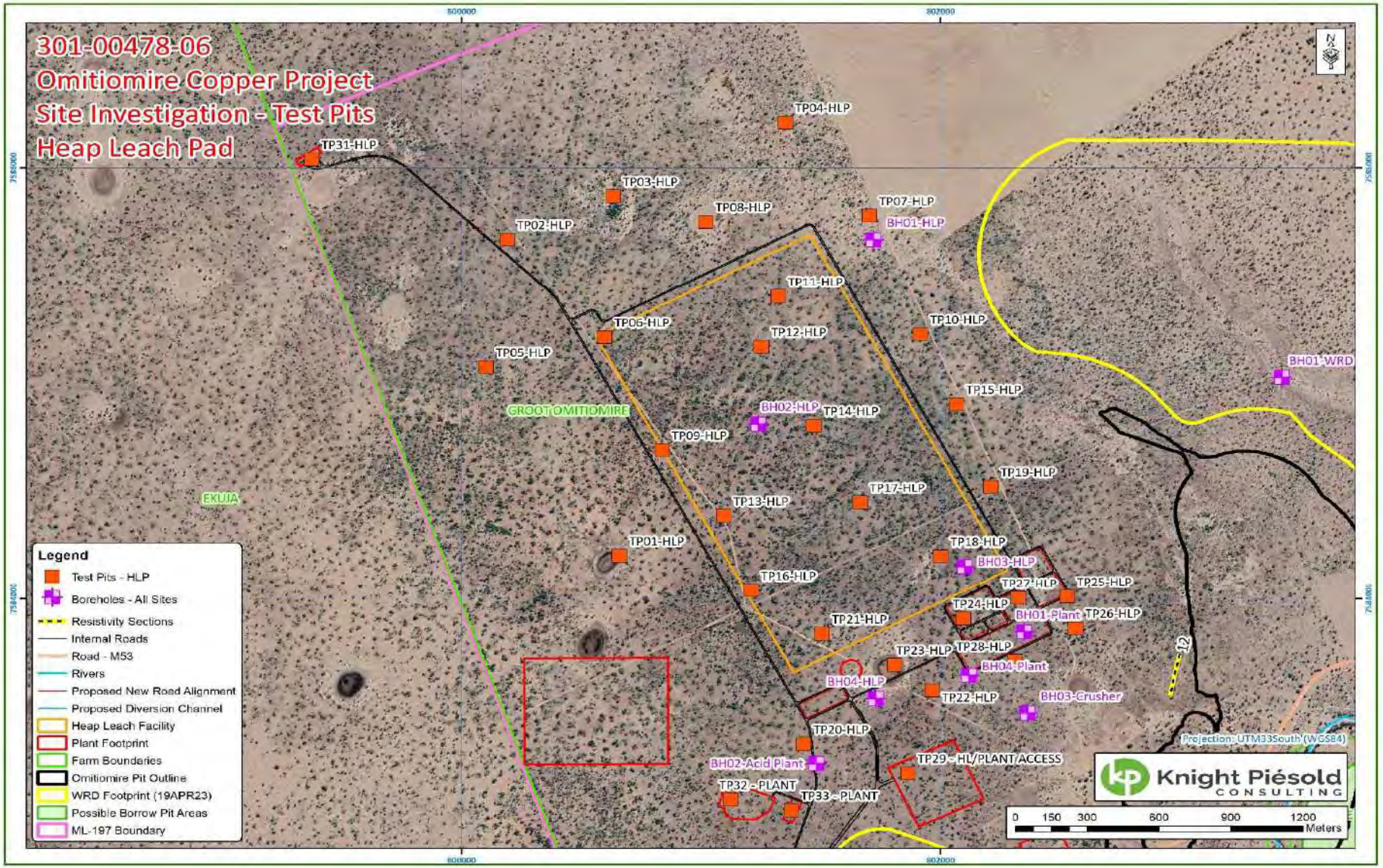
Coordinate System: WGS 1984 UTM Zone 33S
Projection: Transverse Mercator
Datun: WGS 1984
Units: Meter

**Omitiomire Copper Project:**

**Location of geotechnical boreholes - All sites**

CLIENT: Craton Mining and Exploration (Pty) Ltd

FIGURE NO: A-3



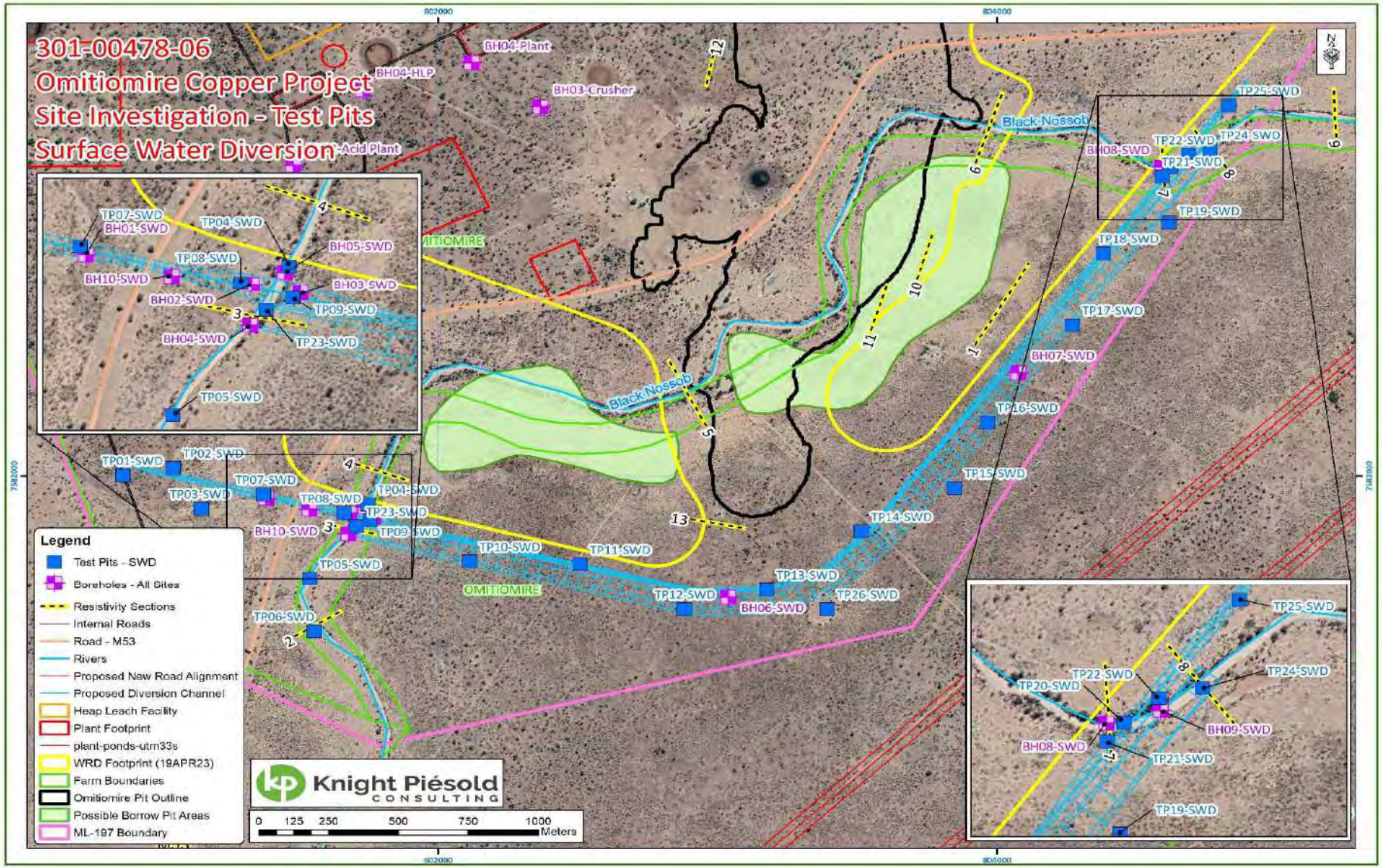

| | |
|---|---|
| PROJECT NO. | WI 301-00478/06 |
| BY: | T Oosthuizen |
| CHECKED: | B Klaas |
| DRAWING DATE: | 30-Jun-23 |
| REVISION: | A |

Coordinate System: WGS 1984 UTM Zone 33S
Projection: Transverse Mercator
Datum: WGS 1984
Units: Meter

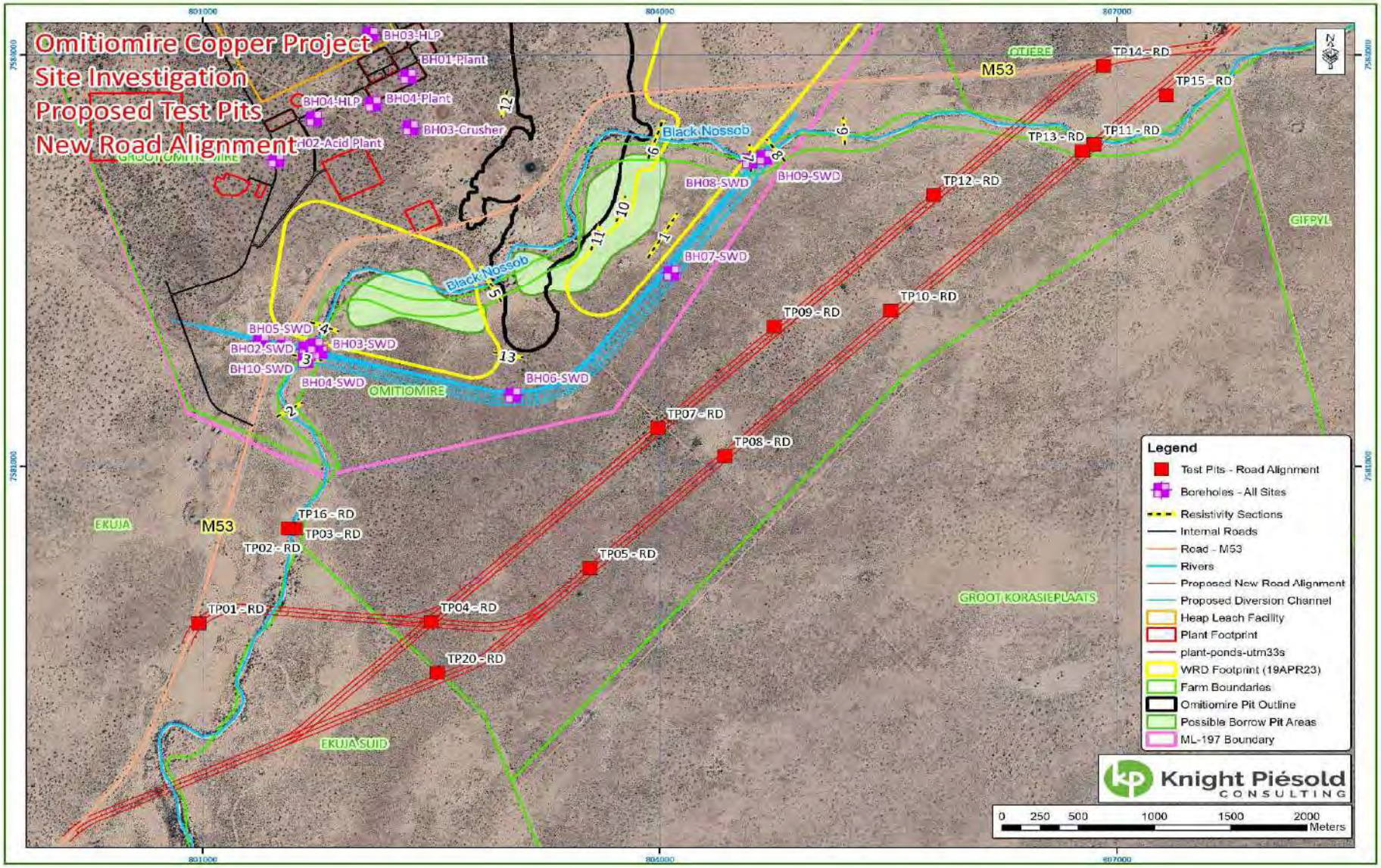
**Omitiomire Copper Project:**
**Layout of geotechnical boreholes and test pits - Heap Leach Pad (HLP) and Plant Area**

CLIENT: Craton Mining and Exploration (Pty) Ltd

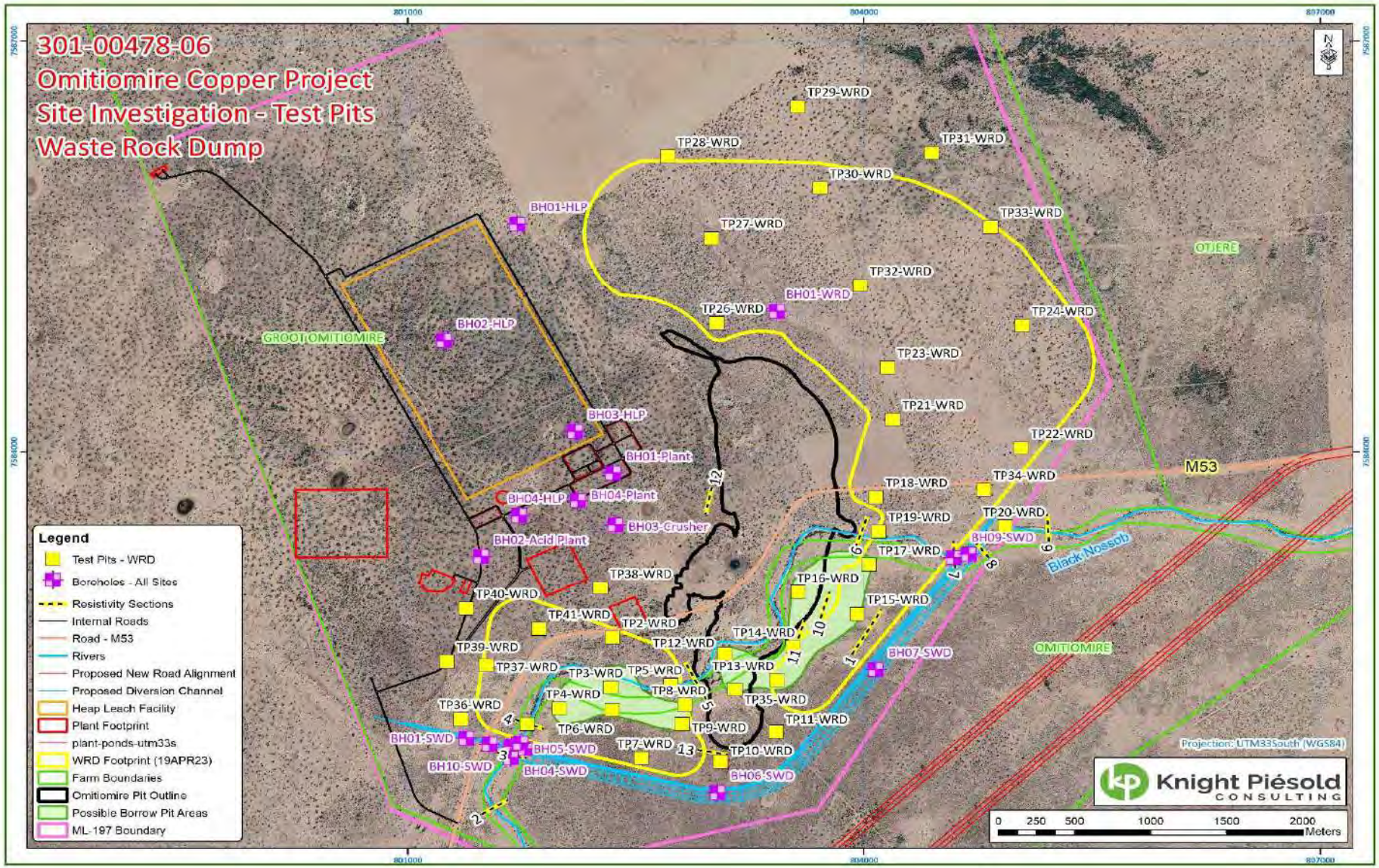
FIGURE NO: A-4



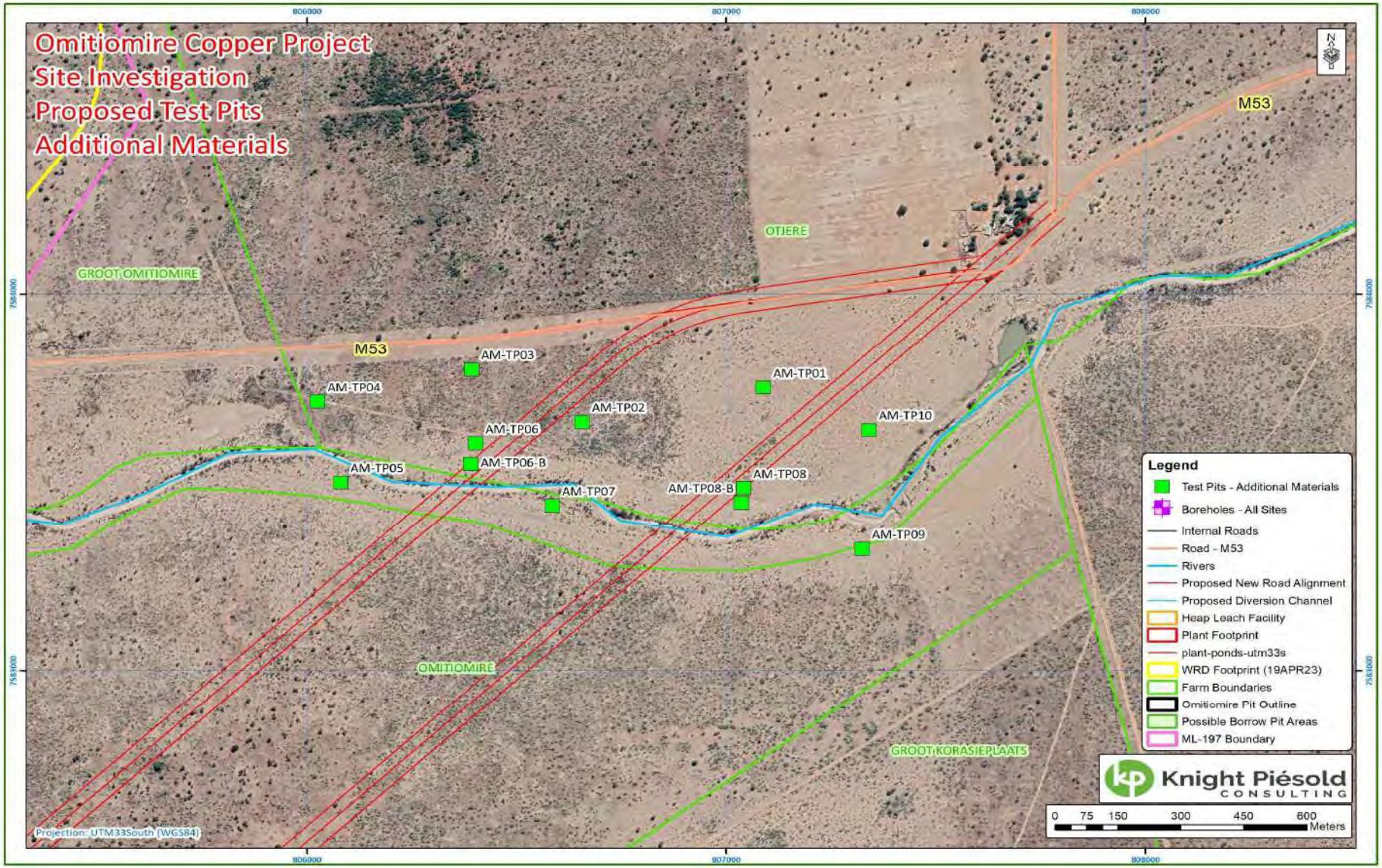

| | | | |
|---|---|---|---|
| PROJECT NO. | WI 301-00478/06 | Coordinate System: WGS 1984 UTM Zone 33S<br>Projection: Transverse Mercator<br>Datun: WGS 1984<br>Units: Meter | **Omitiomire Copper Project:**<br>**Layout of geotechnical boreholes and test pits - Stormwater Diversion Canal (SWD)** |
| BY: | T Oosthuizen | | |
| CHECKED: | B Klaas | | |
| DRAWING DATE: | 30-Jun-23 | | CLIENT: Craton Mining and Exploration (Pty) Ltd |
| REVISION: | A | | FIGURE NO: A-5 |




| | | | |
|---|---|---|---|
| PROJECT NO. | WI 301-00478/06 | Coordinate System: WGS 1984 UTM Zone 33S<br>Projection: Transverse Mercator<br>Datun: WGS 1984<br>Units: Meter | **Omitiomire Copper Project:**<br>**Layout of geotechnical test pits - Road diversion** |
| BY: | T Oosthuizen | | |
| CHECKED: | B Klaas | | |
| DRAWING DATE: | 30-Jun-23 | | |
| REVISION: | A | | CLIENT: Craton Mining and Exploration (Pty) Ltd<br>FIGURE NO: A-6 |




| | | | |
|---|---|---|---|
| PROJECT NO. | WI 301-00478/06 | Coordinate System: WGS 1984 UTM Zone 33S<br>Projection: Transverse Mercator<br>Datun: WGS 1984<br>Units: Meter | **Omitiomire Copper Project:**<br>**Layout of geotechnical boreholes and test pits - Waste Rock Dump (WRD)** |
| BY: | T Oosthuizen | | |
| CHECKED: | B Klaas | | |
| DRAWING DATE: | 30-Jun-23 | | |
| REVISION: | A | | CLIENT: Craton Mining and Exploration (Pty) Ltd<br>FIGURE NO: A-7 |




| | |
|---|---|
| PROJECT NO. | WI 301-00478/06 |
| BY: | T Oosthuizen |
| CHECKED: | B Klaas |
| DRAWING DATE: | 30-Jun-23 |
| REVISION: | A |

Coordinate System: WGS 1984 UTM Zone 33S
Projection: Transverse Mercator
Datun: WGS 1984
Units: Meter

**Omitiomire Copper Project:**
**Layout of geotechnical test pits - Additional Materials (AM)**

CLIENT: Craton Mining and Exploration (Pty) Ltd

FIGURE NO: A-8

# APPENDIX B

## Summary Tables for Soil Profiles, Borehole Logs, SPT Test Results and Laboratory Test Results

Appendix B1

Summary Table of Test Pit Logs

Appendix B2

Summary Table of Rotary Core Boreholes

Appendix B3

Summary Table of SPT Test Results

Appendix B4

Summary Table of Laboratory Test Results

# APPENDIX B1

## Summary of Test Pits

Knight Piésold CONSULTING

**APPENDIX B1.1**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF HEAP LEACH PAD AND PROCESSING PLANT TEST PIT PROFILES**

| STRUCTURE ID. | TEST PIT No. | AS BUILT COORDINATES UTM 33K | | TOTAL DEPTH (m) | THICKNESS OF LAYER (m) | | | | | | | | | | | GROUNDWATER LEVEL (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Transported soils | | Pedogenic soils | | | | | Residual Soil | Bedrock | | | |
| | | X-COORD | Y-COORD | | Fine Alluvium | Coarse Alluvium | Ferruginous/ *Ferruginised Alluvium | Calcareous/ *Calcified Alluvium | Nodular/ *Honeycomb Ferricrete | Nodular/ *Honeycomb Calcrete | Hardpan Calcrete | Gneiss | Very Soft Rock | Soft Rock | Medium Hard Rock | |
| Heap Leach Pad (HLP) | TP01-HLP | 800659.00 | 7584200.00 | 1.20 + R | 0.30 - 1.20 + R | 0 - 0.30 | - | - | - | - | - | - | - | - | - | - |
| | TP02-HLP | 800189.00 | 7585668.00 | 1.50 + R | 0 - 0.60 | - | 0.60 - 1.50 + R | - | - | - | - | - | - | - | - | - |
| | TP03-HLP | 800632.00 | 7585869.00 | 3.10 + R | 0 - 0.80 | 0.80 - 2.30 | - | - | - | - | - | 2.30 - 3.10 | 3.10 + R | - | - | - |
| | TP04-HLP | 801350.85 | 7586209.65 | 1.35 + R | 0 - 0.30 | - | - | *0.30 - 1.10 | - | 1.10 - 1.35 *1.35 + R | | - | - | - | - | - |
| | TP05-HLP | 800101.00 | 7585074.00 | 1.60 + R | 0 - 1.40 | - | 1.40 - 1.60 + R | - | - | - | - | - | - | - | - | - |
| | TP06-HLP | 800597.01 | 7585212.77 | 1.80 + R | 0 - 0.25 | - | - | *0.25 - 1.50 | - | - | - | 1.50 - 1.80 + R | - | - | - | - |
| | TP07-HLP | 801701.70 | 7585778.61 | 0.70 + R | 0 - 0.70 | - | - | - | - | - | 0.70 + R | - | - | - | - | - |
| | TP08-HLP | 801019.00 | 7585750.00 | 1.85 + R | 0 - 1.35 | - | - | *1.35 - 1.85 + R | - | - | - | - | - | - | - | - |
| | TP09-HLP | 800837.00 | 7584690.00 | 3.15 + R | 0 - 0.60 | 2.10 - 2.70 | - | 0.60 - 2.10 | - | - | - | - | 2.70 - 3.15 | 3.15 + R | - | - |
| | TP10-HLP | 801915.33 | 7585227.33 | 1.50 + R | 0 - 0.30 | - | *1.25 - 1.50 + R | *0.30 - 1.25 | - | - | - | - | - | - | - | - |
| | TP11-HLP | 801321.00 | 7585404.00 | 1.35 + R | 0 - 0.40 | - | - | 0.40 - 1.15 *1.15 - 1.35 + R | - | - | - | - | - | - | - | - |
| | TP12-HLP | 801251.02 | 7585169.08 | 1.60 + R | 0 - 0.30 | - | - | 0.30 - 1.40 *1.40 - 1.60 +R | - | - | - | - | - | - | - | - |
| | TP13-HLP | 801093.27 | 7584385.61 | 3.00 + R | 0 - 0.30 | 2.25 - 2.50 | - | 0.30 - 2.25 | - | - | - | - | 2.50 - 3.00 | 3.00 + R | - | - |
| | TP14-HLP | 801470.07 | 7584802.62 | 2.05 + R | 0 - 0.30 | 1.45 - 1.65 | - | 0.30 - 1.45 | - | - | - | 1.65 - 2.05 + R | - | - | - | - |
| | TP15-HLP | 802066.00 | 7584902.00 | 2.05 + R | 0 - 0.35 | 1.65 - 1.80 | *1.80 - 2.05 + R | *0.35 - 1.65 | - | - | - | - | - | - | - | - |
| | TP16-HLP | 801209.00 | 7584039.00 | 3.00 + R | 0 - 2.30 | 2.30 - 2.50 | - | - | - | - | - | 2.50 - 3.00 | 3.00 + R | - | - | - |
| | TP17-HLP | 801663.45 | 7584447.86 | 2.35 + R | 0 - 0.35 | - | *2.15 - 2.35 + R | 0.35 - 1.75 *1.75 - 2.15 | - | - | - | - | - | - | - | - |
| | TP18-HLP | 802000.00 | 7584198.00 | 3.15 + R | 0 - 1.10 | - | - | *1.10 - 1.40 | - | - | - | 1.40 - 2.10 | 2.10 - 3.15 | 3.15 + R | - | - |
| | TP19-HLP | 802208.97 | 7584520.16 | 1.70 + R | 0 - 0.40 | - | - | *0.40 - 1.70 + R | - | - | - | - | - | - | - | - |
| | TP20-HLP | 801428.00 | 7583326.00 | 1.80 + R | 0 - 1.40 | 1.40 - 1.60 | - | - | - | - | - | - | 1.60 - 1.80 | 1.80 + R | - | - |
| | TP21-HLP | 801505.04 | 7583835.86 | 1.45 + R | 0 - 0.50 | | 1.10 - 1.45 + R | *0.50 - 1.10 | - | - | - | - | - | - | - | - |
| | TP22-HLP | 801964.23 | 7583574.80 | 2.25 + R | 0 - 1.80 | 1.80 - 2.05 | - | - | - | - | - | - | 2.05 - 2.25 | 2.25 + R | - | - |
| | TP23-HLP | 801808.00 | 7583693.00 | 0.80 + R | 0 - 0.80 + R | - | - | - | - | - | - | - | - | - | - | - |
| | TP24-HLP | 802094.00 | 7583908.00 | 2.10 + R | 0 - 0.80 | 1.20 - 1.75 | - | 0.80 - 1.20 | - | - | - | - | 1.75 - 2.10 | 2.10 + R | - | - |
| | TP25-HLP | 802527.33 | 7584011.03 | 0.85 + R | 0 - 0.65 | - | - | - | - | - | - | - | - | | 0.85 + R | - |
| | TP26-HLP | 802563.00 | 7583862.00 | 1.95 + R | 0 - 1.10 | 1.10 - 1.40 | - | - | - | - | - | - | 1.40 - 1.95 | 1.95 + R | - | - |
| | TP27-HLP | 802323.97 | 7584004.09 | 1.40 + R | 0 - 1.05 | 1.05 - 1.20 | - | - | - | - | - | - | 1.20 - 1.40 | 1.40 + R | - | - |
| | TP28-HLP | 802309.00 | 7583711.00 | 1.30 + R | 0 - 0.40 | - | *0.40 - 1.30 + R | - | - | - | - | - | - | - | - | - |
| | TP31-HLP | 799373.00 | 7586039.00 | 1.30 + R | 0 - 0.60 | 0.60 - 1.20 | - | - | - | - | - | - | 1.20 - 1.30 | 1.30 + R | - | - |
| Plant | TP29 - HL/PLANT ACCESS | 801863.00 | 7583191.00 | 1.90 + R | 0.0 - 1.70 | 1.70 - 1.90 | - | - | *1.90 + R | - | - | - | - | - | - | - |
| | TP30 - HL/PLANT ACCESS | 800808.00 | 7582253.00 | 1.90 + R | 0.0 - 1.30 | 1.30 - 1.50 | - | - | - | - | - | - | - | 1.50 - 1.90 | 1.90 + R | - |
| | TP32 - PLANT | 801124.00 | 7583069.00 | 1.70 + R | 0 - 0.70 | 0.70 - 1.00 | *1.00 - 1.70 | - | 1.70 + R | - | - | - | - | - | - | - |
| | TP33 - PLANT | 801376.00 | 7583021.00 | 1.40 + R | 0 - 1.00 | - | *1.00 - 1.40 + R | - | - | - | - | - | - | - | - | - |

**NOTES:**
1. R = REFUSAL.
2. + = MATERIAL CONTINUES AS ABOVE.
3. TEST PIT COORDINATES INDICATED IN WGS 84 UTM 33S AS BUILT.

| REV | DATE | DESCRIPTION | PREPD | REVD |
|---|---|---|---|---|
| A | 2023/05/31 | ISSUED WITH LETTER | SY | BK |

Knight Piésold CONSULTING

**APPENDIX B1.2**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF STORMWATER DIVERSION CHANNEL TEST PIT PROFILES**

| STRUCTURE ID. | TEST PIT No. | AS BUILT COORDINATES UTM 33K | | TOTAL DEPTH (m) | THICKNESS OF LAYER (m) | | | | | | | | | GROUNDWATER LEVEL (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Transported Soil | | Pedogenic Soil | | | Residual Soil | Gneiss Bedrock | | | |
| | | X-COORD | Y-COORD | | Fine Alluvium | Coarse Alluvium | Ferruginous/ *Ferruginised Alluvium | Calcareous/ *Calcified Alluvium | Nodular Ferricrete/ * Nodular Calcrete/ **Honeycomb Calcrete | Gneiss | Very Soft Rock | Soft Rock | Medium Hard Rock | |
| Stormwater Diversion Channel (SWD) Inlet | TP01-SWD | 800870.00 | 7582003.00 | 0.60 + R | - | 0 - 0.30 | - | - | - | - | - | 0.30 - 0.60 | 0.60 + R | - |
| | TP02-SWD | 801050.00 | 7582033.00 | 1.50 + R | 0 - 0.70 | - | - | *0.70 - 1.50 | **1.50 + R | - | - | - | - | - |
| | TP03-SWD | 801151.00 | 7581871.00 | 1.80 + R | 0 - 0.60 | - | - | 0.60 - 1.80 + R | - | - | - | - | - | - |
| | TP04-SWD | 801747.00 | 7581888.00 | 3.90 + R | 0 - 3.90 | - | - | - | - | 3.90 + R | - | - | - | 1.50 |
| | TP05-SWD | 801539.00 | 7581592.00 | 3.80 + R | 0 - 2.00 | 2.00 - 3.80 | - | - | - | - | - | - | 3.80 + R | 1.70 |
| | TP06-SWD | 801555.00 | 7581382.00 | 1.95 + R | 0 - 1.60 | - | *1.60 - 1.95 + R | - | - | - | - | - | - | - |
| | TP07-SWD | 801373.00 | 7581928.00 | 1.90 + R | 0 - 0.40 | 0.40 - 1.40 | - | - | - | - | 1.40 - 1.90 | 1.9 + R | - | - |
| | TP08-SWD | 801661.00 | 7581854.00 | 1.40 + R | 0 - 0.70 | - | *0.70 - 1.40 + R | - | - | - | - | - | - | - |
| | TP09-SWD | 801754.00 | 7581825.00 | 1.20 + R | 0 - 1.20 + R | - | - | - | - | - | - | - | - | - |
| | TP23-SWD | 801706.00 | 7581801.00 | 2.50 + R | 0 - 2.50 | - | - | - | - | - | - | - | 2.50 + R | - |
| Stormwater Diversion Channel (SWD) Channel | TP10-SWD | 802111.00 | 7581662.00 | 3.20 + R | 0 - 0.35 | - | *0.35 - 1.20 *2.10 - 3.00 | - | 1.20 - 2.10 *3.00 - 3.20 + R | - | - | - | - | - |
| | TP11-SWD | 802507.00 | 7581650.00 | 1.40 + R | 0 - 0.30 | - | *0.30 - 1.40 + R | - | - | - | - | - | - | - |
| | TP12-SWD | 802880.00 | 7581470.00 | 4.70+ | 0 - 0.50 | - | *0.50 - 3.00 | *3.00 - 4.70+ | - | - | - | - | - | - |
| | TP13-SWD | 803174.00 | 7581550.00 | 4.40+ | 0 - 0.45 | - | *0.45 - 1.60 | *1.60 - 4.40+ | - | - | - | - | - | - |
| | TP14-SWD | 803514.00 | 7581781.00 | 1.35 + R | 0 - 1.35 | - | *1.35 + R | - | - | - | - | - | - | - |
| | TP15-SWD | 803848.00 | 7581953.00 | 2.50 + R | 0 - 0.50 | - | 0.50 - 2.50 + R | - | - | - | - | - | - | - |
| | TP16-SWD | 803965.00 | 7582214.00 | 2.80 + R | - | 2.10 - 2.80 + R | 0 - 2.10 | - | - | - | - | - | - | - |
| | TP17-SWD | 804269.00 | 7582600.00 | 2.50 + R | 0 - 1.30 | - | *1.30 - 2.50 + R | - | - | - | - | - | - | - |
| | TP18-SWD | 804380.00 | 7582887.00 | 0.90 + R | 0 - 0.90 | - | - | - | - | - | - | - | - | - |
| | TP26-SWD | 803392.00 | 7581470.00 | 4.20 + R | 0 - 1.90 | - | - | *1.90 - 2.90 | - | - | 2.90 - 4.20 | 4.20 + R | - | - |
| Stormwater Diversion Channel (SWD) Outlet | TP19-SWD | 804615.00 | 7583010.00 | 2.40 + R | 0 - 1.00 | - | 1.00 - 1.40 *1.40 - 2.40 + R | - | - | - | - | - | - | - |
| | TP20-SWD | 804622.00 | 7583230.00 | 4.80 + R | 0 - 3.40 | 3.40 - 4.80 | - | - | - | - | - | - | 4.80 + R | - |
| | TP21-SWD | 804592.00 | 7583193.00 | 1.10 + R | 0 - 0.30 | - | *0.30 - 1.10 + R | - | - | - | - | - | - | - |
| | TP22-SWD | 804685.00 | 7583279.00 | 4.30 + R | 0 - 1.40 | - | *1.40 - 4.30 + R | - | - | - | - | - | - | - |
| | TP24-SWD | 804762.00 | 7583299.00 | 4.95 + R | 0 - 4.90 | - | - | - | - | - | - | 4.90 - 4.95 | 4.95 + R | - |
| | TP25-SWD | 804829.00 | 7583474.00 | 2.40 + R | 0 - 0.65 | - | - | - | *0.65 - 0.95 | 0.95 - 1.50 | 1.50 - 2.40 | - | 2.40 + R | - |

**NOTES:**
1. R = REFUSAL.
2. TEST PIT COORDINATES INDICATED IN WGS 84 UTM 33S AS BUILT.

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 2023/05/31 | ISSUED WITH LETTER | SY | BK |

**APPENDIX B1.3**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF NEW ROAD TEST PIT PROFILES**

| STRUCTURE ID. | TEST PIT No. | AS BUILT COORDINATES UTM 33K | | TOTAL DEPTH (m) | THICKNESS OF LAYER (m) | | | | | | GROUNDWATER LEVEL (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Transported soils | | Pedogenic soils | | Bedrock | | |
| | | X-COORD | Y-COORD | | Fine Alluvium | Coarse Alluvium | Ferruginous/ *Calcareous Alluvium | Calcified Alluvium | Very Soft Rock | Soft Rock | |
| New Road | TP01 - RD | 800971.00 | 7579851.00 | 0.90 + R | 0 - 0.30 | - | 0.30 - 0.90 + R | - | - | - | - |
| | TP02 - RD | 801584.00 | 7580544.00 | 4.30 + R | - | 0 - 3.90 | - | - | 3.90 - 4.30 + R | - | 2.30 |
| | TP03 - RD | 801605.00 | 7580544.00 | 1.70 + R | 0 - 1.70 + R | - | - | - | - | - | - |
| | TP04 - RD | 802497.00 | 7579862.00 | 2.90 + R | 0 - 2.90 + R | - | - | - | - | - | - |
| | TP05 - RD | 803541.00 | 7580258.00 | 3.70 + R | 0 - 3.70 + R | - | - | - | - | - | - |
| | TP07 - RD | 803985.00 | 7581279.00 | 2.80 + R | 0 - 2.80 + R | - | - | - | - | - | - |
| | TP08 - RD | 804425.00 | 7581074.00 | 3.20 + R | 0 - 1.00 | - | - | 1.00 - 3.20 + R | - | - | - |
| | TP09 - RD | 804750.00 | 7582018.00 | 3.40 + R | 0 - 3.40 + R | - | - | - | - | - | - |
| | TP10 - RD | 805515.00 | 7582133.00 | 2.80 + R | 0 - 2.80 + R | - | - | - | - | - | - |
| | TP11 - RD | 806850.00 | 7583349.00 | 1.40 + R | 0 - 1.40 + R | - | - | - | - | - | - |
| | TP12 - RD | 805797.00 | 7582981.00 | 4.30 + R | 0 - 4.30 + R | - | - | - | - | - | - |
| | TP13 - RD | 806772.00 | 7583302.00 | 4.50 + | 0 - 1.80 | 2.60 - 4.00 | *1.80 - 2.60 | - | 4.00 - 4.50 + | - | - |
| | TP14 - RD | 806913.00 | 7583919.00 | 2.60 + R | 0 - 0.30 | 0.30 - 1.40 | - | - | 1.40 - 2.60 | 2.60 + R | - |
| | TP15 - RD | 807325.00 | 7583709.00 | 0.70 + R | 0 - 0.30 | - | 0.30 - 0.70 + R | - | - | - | - |
| | TP16 - RD | 801561.00 | 7580548.00 | 1.40 + R | 0 - 1.40 + R | - | - | - | - | - | - |
| | TP20 - RD | 802541.00 | 7579491.00 | 2.50 + R | 0 - 2.50 + R | - | - | - | - | - | - |

**NOTES:**
1. R = REFUSAL.
2. TEST PIT COORDINATES INDICATED IN WGS 84 UTM 33S AS BUILT.
3. TP06-RD, TP17-RD TP18-RD, TP19-RD WERE NOT EXCAVATED DUE TO ACCESS CONSTRAINTS.

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 2023/05/31 | ISSUED WITH LETTER | SY | BK |

Knight Piésold CONSULTING

**APPENDIX B1.4**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF WASTE ROCK DUMP TEST PIT PROFILES**

| STRUCTURE ID. | TEST PIT No. | AS BUILT COORDINATES UTM 33K | | TOTAL DEPTH (M) | THICKNESS OF LAYER (m) | | | | | | | | | | | GROUNDWATER LEVEL (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Transported | | Pedogenic | | | | | Residual Soil | Bedrock | | | |
| | | X-COORD | Y-COORD | | Fine Alluvium | Coarse Alluvium | Ferruginous/ *Ferruginised Alluvium | Calcified Alluvium | Nodular Calcrete | Honeycomb Calcrete/* Ferricrete | Hardpan Calcrete | Gneiss | Very Soft Rock | Soft Rock | Medium Hard Rock | |
| Waste Rock Dump (WRD) | TP1-WRD | 801782.00 | 7582015.00 | 3.50 + R | 0 - 3.50 | - | - | - | - | - | - | 3.50 + R | - | - | - | 1.40 |
| | TP2-WRD | 802343.00 | 7582645.00 | 1.80 + R | 0 - 1.20 | 1.20 - 1.40 | - | - | - | - | - | 1.40 - 1.60 | 1.60 - 1.80 | 1.80 + R | - | - |
| | TP3-WRD | 802332.80 | 7582281.00 | 3.30 + R | 0 - 0.30 | - | - | 0.80 - 3.30 + R | - | - | - | - | - | - | - | |
| | TP4-WRD | 801993.39 | 7582129.46 | 2.40 + R | 0 - 0.40 & 1.50 - 2.40 + R | - | - | 0.40 - 1.50 | - | - | - | - | - | - | - | - |
| | TP5-WRD | 802728.00 | 7582301.00 | 3.60 + R | 0 - 0.90 | - | 0.90 - 2.10 | 2.10 - 3.60 + R | - | - | - | - | - | - | - | - |
| | TP6-WRD | 802341.11 | 7582119.35 | 4.30 + R | - | 0 - 0.45 | *0.45 - 2.35 | 3.10 - 4.30 | 2.35 - 3.10 | - | - | - | - | - | 4.30 + R | - |
| | TP7-WRD | 802532.00 | 7581769.00 | 0.80 + R | 0 - 0.80 + R | - | - | - | - | - | - | - | - | - | - | - |
| | TP8-WRD | 802820.40 | 7582154.58 | 1.70 + R | 0 - 0.60 | - | - | 0.60 - 1.70 + R | - | - | - | - | - | - | - | - |
| | TP9-WRD | 802802.00 | 7582018.00 | 1.80 + R | 0 - 0.80 | 0.80 - 1.80+R | - | - | - | - | - | - | - | - | - | - |
| | TP10-WRD | 803055.00 | 7581743.00 | 4.40 + | 0 - 4.00 | - | - | 4.00 - 4.40+ | - | - | - | - | - | - | - | - |
| | TP11-WRD | 803420.00 | 7581961.00 | 3.70 + R | 0 - 0.30 | - | *0.30 - 1.50 | 2.70 - 3.70 + R | 1.50 - 2.70 | - | - | - | - | - | - | - |
| | TP12-WRD | 803082.00 | 7582525.00 | 1.80 + R | 0 - 1.00 | 1.00 - 1.20 | - | - | - | - | - | 1.20 - 1.30 | 1.30 - 1.80 | - | 1.80 + R | - |
| | TP13-WRD | 803424.70 | 7582333.22 | 3.40 + R | 0 - 1.10 | 1.40 - 3.10 | - | 1.10 - 1.40 | - | - | - | - | 3.10 - 3.40 | 3.40 + R | - | |
| | TP14-WRD | 803530.99 | 7582575.57 | 4.90+ | - | 2.80 - 4.90+ | 0.00 - 0.80 *0.80 - 2.80 | | - | - | - | - | - | - | - | |
| | TP15-WRD | 803953.75 | 7582815.05 | 3.60 + R | 0 - 0.70 | - | - | 0.70 - 3.60 + R | - | - | - | - | - | - | - | |
| | TP16-WRD | 803563.99 | 7582976.05 | 5.00 + | 0 - 0.50 | - | - | 1.80 - 5.00 + | 0.50 - 1.80 | - | - | - | - | - | - | |
| | TP17-WRD | 804031.00 | 7583179.00 | 4.10 + R | 0 - 0.90 | 3.60 - 4.10 + R | - | - | 0.90 - 3.60 | - | - | - | - | - | - | |
| | TP18-WRD | 804076.74 | 7583671.36 | 2.20 + R | 0 - 1.60 | - | - | - | 1.60 - 2.20 | - | 2.20 + R | - | - | - | - | - |
| | TP19-WRD | 804095.95 | 7583420.70 | 1.40 + R | 0 - 0.30 | - | *0.30 - 1.40 + R | - | - | - | - | - | - | - | - | - |
| | TP20-WRD | 804927.00 | 7583457.00 | 2.70 + R | 0 - 0.50 | - | - | - | - | - | - | - | 0.50 - 2.70 | - | 2.70 + R | - |
| | TP21-WRD | 804187.03 | 7584237.04 | 3.10 + R | 0 - 0.90 | - | - | - | 1.10 - 3.00 | - | - | - | 0.90 - 1.10 | - | 3.00 - 3.10 + R | - |
| | TP22-WRD | 805033.00 | 7584029.00 | 1.20 + R | 0 - 1.20 | - | - | - | - | - | - | - | - | - | - | - |
| | TP23-WRD | 804153.99 | 7584615.84 | 1.50 + R | 0 - 0.85 | - | - | - | - | - | 0.85 - 1.50 + R | - | - | - | - | - |
| | TP24-WRD | 805039.00 | 7584921.00 | 1.30 + R | 0 - 1.00 | 1.00 - 1.30 | *1.30 + R | - | - | - | - | - | - | - | - | - |
| | TP26-WRD | 803030.00 | 7584941.00 | 2.60 + R | 0 - 1.00 | 1.00 - 1.20 | - | - | - | - | 1.20 - 2.60 + R | - | - | - | | - |
| | TP27-WRD | 802994.92 | 7585563.53 | 0.25 + R | 0 - 0.25 | - | - | - | - | - | 0.25 + R | - | - | - | - | - |
| | TP28-WRD | 802706.77 | 7586159.95 | 1.20 + R | 0 - 0.45 | - | - | - | 0.45 - 1.20 | 1.20 + R | | | | | | - |
| | TP29-WRD | 803562.23 | 7586522.25 | 2.90 + R | 0 - 1.25 | - | - | - | 1.25 - 1.60 | | | 1.60 - 2.07 | 2.07 - 2.90 | | 2.90 + R | - |
| | TP30-WRD | 803710.59 | 7585929.08 | 1.55 + R | 0 - 1.25 | 1.25 - 1.40 | - | - | - | - | - | - | - | 1.40 - 1.55 | 1.55 + R | - |
| | TP31-WRD | 804445.00 | 7586187.00 | 1.40 + R | 0 - 0.60 | 0.60 - 1.20 | - | - | - | *1.20 - 1.40 + R | - | - | - | - | - | - |
| | TP32-WRD | 803973.00 | 7585217.00 | 1.45 + R | 0 - 1.15 | - | - | - | - | - | 1.15 - 1.45 + R | - | - | - | - | - |
| | TP33-WRD | 804832.00 | 7585645.00 | 1.30 + R | 0 - 1.10 | 1.10 - 1.20 | - | - | - | - | - | 1.20 - 1.30+R | - | - | - | - |
| | TP34-WRD | 804786.59 | 7583725.60 | 3.55 + R | 0 - 1.00 | - | - | - | 1.00 - 2.35 | 2.35 - 3.55 + R | - | - | - | - | - | - |
| | TP35-WRD | 803149.00 | 7582266.00 | 4.10 + | 0 - 0.90 | 1.30 - 2.50 | 2.50 - 4.10+ | 0.90 - 1.30 | - | - | - | - | - | - | - | - |
| | TP36-WRD | 801345.00 | 7582051.00 | 1.60 + R | 0 - 0.60 | - | *0.60 - 1.60 + R | - | - | - | - | - | - | - | - | - |
| | TP37-WRD | 801515.00 | 7582442.00 | 2.70 + R | 0 - 0.90 | 0.90 - 1.10 | - | - | - | - | - | 1.10 - 2.40 | - | 2.40 - 2.70 | 2.70 + R | - |
| | TP38-WRD | 802264.00 | 7583006.00 | 1.30 + R | 0 - 1.00 | 1.00 - 1.20 | - | - | - | - | - | 1.20 - 1.30 | | 1.30 + R | - | - |
| | TP39-WRD | 801254.00 | 7582470.00 | 1.50 + R | 0 - 0.60 | - | *0.60 - 1.40 | - | - | - | 1.40 - 1.50 + R | - | - | - | - | - |
| | TP40-WRD | 801382.00 | 7582856.00 | 2.10 + R | 0 - 1.40 | 1.40 - 1.60 | - | - | - | - | - | 1.60 - 1.90 | - | - | 1.90 - 2.10 + R | - |
| | TP41-WRD | 801860.00 | 7582706.00 | 1.20 + R | 0 - 0.70 | 0.70 - 1.20 + R | - | - | - | - | - | - | - | - | - | - |

**NOTES:**
1. R = REFUSAL.
2. + = MATERIAL CONTINUES AS ABOVE.
3. TEST PIT COORDINATES INDICATED IN WGS 84 UTM 33S AS BUILT.
4. TP25-WRD WAS NOT EXCAVATED DUE TO ACCESS CONSTRAINTS.

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 2023/05/31 | ISSUED WITH LETTER | SY | BK |

**APPENDIX B1.5**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF ADDITIONAL MATERIAL SOURCES TEST PIT PROFILES**

| STRUCTURE ID. | TEST PIT No. | AS BUILT COORDINATES UTM 33K | | TOTAL DEPTH (M) | THICKNESS OF LAYER (m) | | | | | | | GROUNDWATER LEVEL (M) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Transported | | Pedogenic | | | Bedrock | | |
| | | X-COORD | Y-COORD | | Fine Alluvium | Coarse Alluvium | Ferruginous Alluvium | Calcareous Alluvium | Calcified Alluvium | Very Soft Rock | Soft Rock | |
| Additional Materials (AM) | AM-TP01 | 807088.00 | 7583751.00 | 0.60 + R | 0 - 0.40 | - | 0.40 -0.60 + R | - | - | - | - | - |
| | AM-TP02 | 806656.00 | 7583660.00 | 1.10 + R | 0 - 0.70 | 0.70 - 0.90 + R | - | - | - | 0.90 - 1.10 | 1.10 + R | - |
| | AM-TP03 | 806392.00 | 7583799.00 | 1.00 + R | 0 - 0.70 | 0.70 - 1.00 + R | 1.00 + R | - | - | - | - | - |
| | AM-TP04 | 806025.00 | 7583714.00 | 1.50 + R | - | 0.00 - 0.30 | - | 0.30 - 1.10 | 1.10 - 1.20 + R | 1.20 - 1.50 | 1.50 + R | - |
| | AM-TP05 | 806080.00 | 7583500.00 | 1.20 + R | 0 - 1.20 | - | - | - | - | - | - | - |
| | AM-TP06 | 806402.00 | 7583603.00 | 1.00 + R | 0 - 1.00 + R | - | - | - | - | - | - | - |
| | AM-TP06-B | 806390.00 | 7583549.00 | 1.00 + R | 0 - 1.00 + R | - | - | - | - | - | - | - |
| | AM-TP07 | 806585.00 | 7583438.00 | 1.10 + R | 0 - 1.10 + R | - | - | - | - | - | - | - |
| | AM-TP08 | 807041.00 | 7583485.00 | 0.60 + R | 0 - 0.60 + R | - | - | - | - | - | - | - |
| | AM-TP08-B | 807035.00 | 7583446.00 | 0.70 + R | 0 - 0.70 + R | - | - | - | - | - | - | - |
| | AM-TP09 | 807324.00 | 7583323.00 | 1.10 + R | 0 - 0.70 | - | 0.70 - 1.10 + R | - | - | - | - | - |
| | AM-TP10 | 807340.00 | 7583639.00 | 0.80 + R | 0 - 0.80 + R | - | - | - | - | - | - | - |

**NOTES:**
1. R = REFUSAL.
2. TEST PIT COORDINATES INDICATED IN WGS 84 UTM 33S AS BUILT.

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 2023/05/31 | ISSUED WITH LETTER | SY | BK |

# APPENDIX B2

## Summary of Boreholes

**APPENDIX B2**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF BOREHOLE LOGS**

| STRUCTURE ID. | Borehole No. | AS BUILT COORDINATES | | PLANNED DRILL DEPTH (M) | ACTUAL DRILL DEPTH (M) | THICKNESS OF LAYERS (m) | | | | | | | | | | GROUNDWATER LEVEL (*PERCHED) (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | UTM 33S | | | | Transported Soils | | Pedogenic Soils | | Residual Soil | Bedrock Gneiss (*with Pegmatite Zones) | | | | | |
| | | X-COORD | Y-COORD | | | Fine Alluvium | Coarse Alluvium | Calcareous/*Calcified/** Powdery calcrete Alluvium | Hardpan Calcrete | Gneiss | Very Soft Rock | Soft Rock | Medium Hard Rock | Hard Rock | Very Hard Rock | |
| Stormwater Diversion Channel (SWD) Inlet | BH01-SWD | 801384.00 | 7581911.00 | 20.00 | 24.27 | 0 - 1.85 | - | - | | | 1.85 - 3.0<br>'5.50 - 8.20 | 11.25 - 14.85 | 3.00 - 5.50<br>'8.2 - 11.25 | 14.85 - 24.27+ | - | 7.4 |
| | BH02-SWD | 801681.00 | 7581852.00 | 20.00 | 25.11 | 0 - 1.05 | 1.05 - 2.08 | - | - | 2.08 - 2.34<br>'10.34 - 12.40 | - | 2.34 - 10.34<br>'12.40 - 18.20 | - | 18.20 - 19.35 | 19.35 - 25.11+ | - |
| | BH03-SWD | 801768.00 | 7581835.00 | 20.00 | 20.23 | 0 - 1.33 | - | - | - | - | 7.83 - 9.35 | 1.33 - 2.20 | 2.2-7.83 | 9.35 - 12.30 | 12.30 - 20.23+ | - |
| | BH04-SWD | 801678.00 | 7581770.00 | 20.00 | 21.03 | 0 - 2.20 | - | - | - | 2.20 - 2.95<br>'4.52 - 6.60 | - | 2.95 - 4.52<br>'6.60 - 10.80 | 10.80 - 15.50 | 15.50 - 21.03+ | - | 14.60 |
| | BH05-SWD | 801740.00 | 7581876.00 | 20.00 | 20.01 | 0 - 3.95 | - | - | - | 3.95 - 5.35 | 5.35 -6.30 | - | 6.30 - 20.01+ | - | - | 8.05 |
| | BH10-SWD | 801538.00 | 7581868.00 | 10.00 | 10.44 | 0 - 0.80 | 0.80 - 2.00 | - | - | 2.00 - 3.30 | - | - | 3.30 - 10.44+ | | | - |
| Stormwater Diversion Channel (SWD) Channel | BH06-SWD | 803037.82 | 7581516.63 | 15.00 | 15.26 | 0 - 3.00 | 3.00 - 7.60 | - | - | - | - | 7.60 - 15.26+ | - | - | - | - |
| | BH07-SWD | 804077.00 | 7582410.00 | 15.00 | 15.22 | 0 - 1.10 | 1.10 - 3.00 | - | - | - | - | - | 3.00 - 15.22+ | - | - | - |
| Stormwater Diversion Channel (SWD) Outlet | BH08-SWD | 804591.00 | 7583229.00 | 20.00 | 20.23 | 0 - 4.60 | - | - | - | - | - | 4.60 - 7.97 | 7.97 - 13.70 | *'13.70 - 20.23+ | - | - |
| | BH09-SWD | 804688.00 | 7583254.00 | 20.00 | 20.23 | 0 - 4.70 | - | - | - | 4.70 - 5.17 | 5.17 - 7.80 | 7.80 - 11.76 | 11.76 - 12.80 | 12.80 - 20.23+ | - | - |
| Waste Rock Dump (WRD) | BH01-WRD | 803426.00 | 7585025.00 | 25.00 | 20.28 | 0 - 0.19 | - | **'0.19 - 0.84<br>'1.50 - 3.54 | 0.84 - 1.50 | 3.54 - 4.80<br>'5.47 - 7.75 | 4.80 - 7.75 | - | 7.75 - 14.35 | 14.35 - 20.28+ | - | - |
| Processing Plant | BH01-Plant | 802349.95 | 7583844.14 | 25.00 | 25.05 | 0 - 1.75 | - | *'1.75 - 2.00 | - | - | 2.00 - 2.5 | 9.14 - 10.97<br>'20.67 - 25.05+ | 2.5 - 9.14<br>'10.97 - 20.67 | - | - | - |
| | BH02-Acid Plant | 801481.43 | 7583235.41 | 25.00 | 25.16 | 0 - 1.02 | - | - | - | 1.02 - 1.52<br>'2.60 - 3.90 | 1.52 - 2.60 | 3.90 - 5.25 | 5.25 - 11.95<br>'22.92 - 25.16+ | 11.95 - 22.92 | - | - |
| | BH03-Crusher | 802365.16 | 7583468.49 | 25.00 | 25.00 | 0 - 1.27 | 1.27 - 1.78 | - | - | - | 14.90 - 16.33 | 1.78 - 6.35 | 6.35 - 12.60 | 12.60 - 14.90<br>'16.33 - 25.00+ | - | *5.7 |
| | BH04-Plant | 802119.00 | 7583643.00 | 10.00 | 10.09 | 0 - 1.70 | - | - | - | - | - | - | 1.70 - 5.10<br>6.30 - 10.09+ | 5.10 - 6.30 | - | - |
| Heap Leach Pad | BH01-HLP | 801721.00 | 7585666.00 | 20.00 | 20.07 | 0 - 0.69 | - | 0.69 - 3.00 | 3.00 - 4.03 | 4.03 - 6.18 | - | *'6.18 - 18.30 | 18.30 - 20.07+ | - | - | *7.4 |
| | BH02-HLP | 801240.00 | 7584810.00 | 20.00 | 20.08 | 0 - 3.00 | - | - | - | 3.00 - 3.20 | 3.20 - 7.90 | 7.90 - 11.65 | 11.65 - 20.08+ | - | - | - |
| | BH03-HLP | 802101.00 | 7584148.00 | 20.00 | 20.13 | 0 - 1.30 | - | 1.30 - 1.95 | - | - | - | 1.95 - 8.20 | 8.20 - 20.13+ | | | 6.30 |
| | BH04-HLP | 801731.00 | 7583536.00 | 20.00 | 20.23 | 0 - 1.05 | - | 1.05 - 1.70 | - | 1.70 - 2.00 | | 2.00 - 4.51 | 4.51 - 20.23+ | - | - | - |

**NOTES:**
1. + = PROFILE CONTINUES AS ABOVE
2. ALL DEPTH MEASUREMENTS ARE TAKEN WITH RESPECT TO GROUND SURFACE LEVEL.
3. BOREHOLE COORDINATES INDICATED IN WGS 84 UTM 33S.

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 5/31/2023 | ISSUED WITH LETTER | SY | BK |

# APPENDIX B3

## Summary of SPT Results

**APPENDIX B3**

**CRATON MINING AND EXPLORATION (PTY) LTD**
**OMITIOMIRE COPPER PROJECT**

**OMITIOMIRE COPPER PROJECT - FEASIBILTY LEVEL GEOTECHNICAL INVESTIGATION**
**SUMMARY OF STANDARD PENETRATION TEST RESULTS**

Print Sep/18/23 7:26:52

| BH | DEPTH | BLOWS PER 75MM PENETRATION | | | | | | N-VALUE | DRILLERS MATERIAL DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|
| SWD-BH01 | 1.80 | 10 | 13 | 11 | 11 | 8 | R | R | Brown fine sand/pebbles |
| SWD-BH02 | 1.87 | 11 | 11 | 11 | 17 | 50 | R | R | Light brown fine sand/pebbles |
| SWD-BH04 | 1.95 | 1 | 1 | 2 | 2 | 2 | 3 | 9 | Light brown fine sand |
| SWD-BH05 | 1.95 | 1 | 1 | 1 | 1 | 2 | 3 | 7 | Light brown sand and clay |
| | 3.45 | 4 | 3 | 2 | 2 | 2 | 2 | 8 | Light brown sand and clay |
| | 3.65 | 2 | 1 | 1 | 50 | R | | R | Clay and pebbles |
| SWD-BH06 | 1.95 | 4 | 7 | 7 | 9 | 10 | 11 | 37 | Red sand |
| | 3.19 | 8 | 40 | 45 | 50 | R | | R | Red sand with pebbles |
| SWD-BH08 | 1.95 | 2 | 3 | 2 | 3 | 3 | 5 | 13 | Dark brown sand and clay |
| | 3.45 | 1 | 2 | 2 | 2 | 3 | 3 | 10 | Dark brown sand and clay |
| SWD-BH09 | 1.95 | 1 | 1 | 1 | 2 | 2 | 3 | 8 | Dark brown sand |
| | 3.79 | 1 | 2 | 3 | 3 | 4 | 3 | 13 | Dark brown sand |
| SWD-BH10 | 1.95 | 5 | 10 | 15 | 16 | 21 | 28 | >50 | Yellow sand |
| | 3.15 | 18 | 29 | 50 | R | | | R | Light brown sand and clay |
| HLP-BH02 | 0.45 | 1 | 1 | 1 | 2 | 2 | 2 | 7 | Dark brown sand |
| | 1.95 | 2 | 2 | 1 | 2 | 3 | 4 | 10 | Dark brown sand |
| HLP-BH03 | 0.45 | 1/3 | 1/3 | 1/3 | 1 | 1 | 2 | 4 | Red dark brown sand |
| | 1.65 | 15 | 22 | 50 | R | | | R | Red dark brown sand |
| HLP-BH04 | 0.45 | 1 | 2 | 4 | 5 | 5 | 6 | 20 | Dark brown sand |
| | 1.88 | 4 | 5 | 4 | 10 | 20 | R | R | Dark brown sand and pebbles |
| PLANT-BH01 | 0.45 | 1 | 1 | 2 | 2 | 5 | 5 | 14 | Red sand |
| | 1.75 | 9 | 12 | 16 | 20 | 50 | R | R | Clay and weathered rock |
| PLANT-BH02 | 1.52 | 25 | 50 | R | | | | R | Weathered soft rock |
| PLANT-BH03 | 0.45 | 1 | 1 | 1 | 2 | 2 | 3 | 8 | Red sand |
| | 1.78 | 7 | 16 | 16 | 30 | 50 | R | R | Red sand and pebbles |
| PLANT-BH04 | 1.70 | 12 | 19 | 16 | 50 | R | | R | Light brown sand and pebbles |

**NOTES:**
1. R = REFUSAL

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 2022/04/21 | ISSUED WITH LETTER | SSYF | BK |

# APPENDIX B4

## Summary Laboratory Test Results

Knight Piésold CONSULTING

**APPENDIX B4.1**
**GEOTECHNICAL INVESTIGATION FOR HEAP LEACH PAD, WASTE ROCK DUMP, STORMWATER DIVERSION, PLANT & POTENTIAL BORROW PIT**
**SUMMARY OF SOIL LABORATORY TEST RESULTS**

| STRUCTURE ID. | SAMPLE | | Material Description | Material Origin | GRADING (%) | | | | ATTERBERG LIMITS (%) | | | | GM | PE | USCS | AASHTO | SG (g/cm³) | STANDARD PROCTOR | | MOD AASHTO COMPACTION | | CBR % | | | % Swell | COLTO | TRIAXIAL TEST (CU) | | SHEAR BOX TEST Remoulded to 90% MDD Mod AASHTO | | BASSON INDEXT TEST | | | | | Coefficient of Permeability (m/s) at 90% Mod AASHTO / **at 93% Proctor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Test Pit No. | Depth (m) | | | Gravel | Sand | Silt | Clay | LL | PI (0.425m m) | LS | PI (Whole Sample) | | | | | | MDD (kg/m³) | OMC (%) | MDD (kg/m³) | OMC (%) | 93 | 95 | 98 | | | Internal Friction Angle (ϕ') | Cohesion (kPa) | Internal Friction Angle (ϕ') | Cohesion (kPa) | Leaching Corrosion (LSCI) | Spalling Corrosion (SCSI) | Overall Agressiveness ($N_a$) | Corrosivity Index | Basson Index | |
| Heap Leach Pad (HLP) | HLP-TP03 | 0.8-2.3 | Yellowish brown to khaki, silty sandy gravel, calcified coarse alluvium | Alluvium | 62 | 25 | 11 | 2 | 27 | 12 | 6.0 | 3.0 | 2.31 | Low | GC | A-2-6 (0) | 2.608 | - | - | 1858 | 13.7 | 27 | 33 | 45 | 0.0 | G8 | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP05 | 0.0-1.1 | Orange to reddish brown, clayey silty sand, fine alluvium | Alluvium | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3201 | 1 | 3202 | Corrosive | Very High | - |
| | HLP-TP08 | 0.65-1.35 | Brown, clayey sandy silt. Fine Alluvium | Alluvium | 2 | 38 | 46 | 14 | 56 | 22 | 10.0 | 17.0 | 0.68 | Medium | MH | A-7-5 (12) | 2.492 | - | - | 1517 | 23.3 | <3 | <3 | <3 | 0.1 | NC | - | - | - | - | - | - | - | - | - | 9.26E-09 |
| | HLP-TP24 | 1.2-1.75 | Brown, sandy silty gravel. Coarse Alluvium. | Alluvium | 50 | 41 | 5 | 4 | - | 1 | 0.0 | 0.0 | 2.20 | Low | GP-GM | A-1-a (0) | 2.564 | - | - | 2138 | 6.5 | 25 | 45 | 107 | 0.1 | G4 | - | - | - | - | - | - | - | - | - | 2.19E-06 |
| | HLP-TP26 | 0.0-1.1 | Pale brown to brown, sandy silt. Fine Alluvium. | Alluvium | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 32 | 9 | - | - | - | - | - | - |
| | HLP-TP13 | 0.3-2.25 | Light brown to brown, gravelly silty fine sand. Calcareous Alluvium. | C Alluvium | 0 | 73 | 17 | 10 | - | 1 | 0.0 | 1.0 | 1.00 | Low | SM | A-2-4 (0) | 2.620 | - | - | 2054 | 7.3 | 28 | 38 | 60 | 0.0 | G6 | - | - | - | - | 3305 | 5 | 3310 | Corrosive | Very High | - |
| | HLP-TP24 | 0.8-1.2 | Brown, gravelly sandy silt. Calcareous Alluvium. | C Alluvium | 24 | 57 | 11 | 8 | - | 1 | 0.0 | 1.0 | 1.54 | Low | SM | A-2-4 (0) | 2.609 | 2085 | 6.7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **1.51E-06 |
| | HLP-TP20 | 1.6-1.8 | Completely weathered, white speckled to streaked black stained khaki to orange, very soft rock, gneiss | Gneiss | 23 | 66 | 7 | 4 | 28 | 8 | 2.5 | 2.0 | 2.04 | Low | SW-SC | A-1-b (0) | 2.566 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP04 | 1.1-1.35 | Light brown blotched wihite, sandy silty gravel. Nodular Calcrete. | Nodular Calcrete | 60 | 24 | 11 | 5 | 28 | 11 | 4.0 | 3.0 | 2.22 | Low | GC | A-2-6 (1) | 2.617 | - | - | 1994 | 10.7 | 11 | 16 | 29 | 0.0 | G8 | - | - | - | - | - | - | - | - | - | 1.50E-08 |
| | HL/PA-TP29 | 1.7-1.9 | Yellowish brown to khaki, silty sandy gravel, ferruginised pebble marker | Pebble marker | 50 | 36 | 7 | 7 | 19 | 6 | 2.0 | 2.0 | 2.12 | Low | GC-GM | A-1-a (0) | 2.619 | - | - | 2204 | 6.3 | 29 | 40 | 64 | 0.0 | G6 | - | - | - | - | - | - | - | - | - | 7.78E-06 |
| | HLP-TP03 | 2.3-3.1 | Khaki to white streaked to banded black, silty sandy gravel to silty gravelly sand, calcified residual gneiss | Residual Gneiss | 49 | 40 | 10 | 1 | 25 | 5 | 2.5 | 1.0 | 2.19 | Low | GC-GM | A-1-a (0) | 2.601 | - | - | 1974 | 11 | 16 | 21 | 33 | 0.1 | G7 | - | - | - | - | 37 | 6 | - | - | - | 3.92E-07 |
| Plant | Plant-TP32 | 0.0-0.7 | Brown to orange brown, clayey silty coarse sand, fine alluvium | Alluvium | 0 | 71 | 21 | 8 | - | 1 | 0.0 | 1.0 | 0.97 | Low | SM | A-2-4 (0) | 2.609 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Plant-TP32 | 0.7-1.0 | Orange to yellowish brown, clayey silty sand to coarse sand with gravels, coarse alluvium | Alluvium | 0 | 55 | 19 | 26 | 21 | 6 | 2.0 | 5.0 | 0.82 | Low | SC-SM | A-4 (2) | 2.515 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Plant-TP32 | 1.0-1.7 | Orange brown mottled to blotched red and dark grey and black, silty gravelly sand, ferruginised alluvium | F Alluvium | 0 | 53 | 17 | 30 | 25 | 7 | 2.5 | 5.0 | 0.84 | Low | SC | A-4 (3) | 2.538 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| New Road (RD) | RD-TP02 | 1.2-2.8 | Brown to greyish brown, silty clayey sand with minor cobbles to boulders, coarse alluvium | Alluvium | 27 | 60 | 6 | 7 | 28 | 11 | 3.5 | 2.0 | 2.08 | Low | SC | A-2-6 (0) | 2.609 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | RD-TP04 | 0.6-2.9 | Reddish brown, clayey silty coarse sand with traces of gravel, fine alluvium | Alluvium | 0 | 66 | 19 | 15 | - | 1 | 0.0 | 1.0 | 0.83 | Low | SM | A-2-4 (0) | 2.637 | - | - | 2041 | 8.1 | 32 | 46 | 81 | 0.1 | G4 | - | - | - | - | - | - | - | - | - | - |
| | RD-TP12 | 1.1-4.3 | Reddish brown slightly stained brown, clayey silty gravelly sand with minor fine gravel, fine alluvium | Alluvium | 0 | 70 | 15 | 15 | - | 1 | 0.0 | 1.0 | 0.96 | Low | SM | A-2-4 (0) | 2.648 | - | - | 2119 | 7.4 | 23 | 30 | 46 | -0.1 | G6 | - | - | - | - | - | - | - | - | - | - |
| | RD-TP08 | 1.0-3.2 | White to yellowish brown, silty gravelly sand, calcified alluvium | C Alluvium | 8 | 46 | 34 | 12 | 48 | 20 | 7.5 | 14.0 | 0.95 | Medium | SM | A-7-5 (5) | 2.411 | - | - | 1640 | 20 | 4 | 4 | 5 | 0.0 | NC | - | - | - | - | - | - | - | - | - | - |
| | RD-TP02 | 3.9-4.3 | Completely weathered, white streaked black and gold, very soft rock, biotite gneiss | Gneiss | 31 | 53 | 11 | 5 | 29 | 7 | 2.5 | 2.0 | 1.96 | Low | SC | A-2-4 (0) | 2.673 | - | - | 1940 | 9.2 | 8 | 11 | 20 | 0.0 | G9 | - | - | - | - | - | - | - | - | - | - |
| | RD-TP14 | 1.4-2.6 | Completely weathered, dark grey streaked white stained orange, very soft rock, ferruginised biotite gneiss | Gneiss | 39 | 36 | 20 | 5 | 34 | 9 | 3.5 | 4.0 | 1.83 | Low | GM | A-2-4 (0) | 2.604 | - | - | 2016 | 12.9 | 15 | 17 | 20 | 0.0 | G7 | - | - | - | - | - | - | - | - | - | - |
| | RD-TP13 | 2.6-4.0 | Yellowish brown with scattered red, white and black mottles, clayey gravelly silty fine sand with minor gravels, slightly calcified pebble marker | Pebble marker | 5 | 57 | 33 | 5 | 27 | 9 | 4.5 | 7.0 | 0.95 | Low | SC | A-4 (1) | 2.669 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Stormwater Diversion Channel (SWD) | SWD-TP02 | 0.0-0.7 | Brown mottled black , gravelly silty sand, fine alluvium | Alluvium | 0 | 68 | 20 | 12 | - | 3 | 1.0 | 2.0 | 0.95 | Low | SM | A-2-4 (0) | 2.586 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP15 | 0.5-2.5 | Orange brown stained red, clayey silty fine gravelly sand, fine alluvium | Alluvium | 0 | 60 | 20 | 20 | 20 | 8 | 4.0 | 6.0 | 0.88 | Low | SC | A-4 (0) | 2.628 | - | - | 2055 | 9.7 | 11 | 11 | 12 | 0.0 | G8 | - | - | - | - | 33 | 14 | - | - | - | 3.57E-07 |
| | SWD-TP23 | 1.2-2.5 | Dark reddish brown, sandy silty clay. Fine Alluvium | Alluvium | 1 | 46 | 23 | 30 | 23 | 8 | 2.5 | 7.0 | 0.63 | Low | SC | A-4 (4) | 2.654 | - | - | - | - | - | - | - | - | - | Pending | | - | - | - | - | - | - | - | - |
| | SWD-TP17 | 1.3-2.2 | Olive brown mottled white stained orange, gravelly silty fine sand. Calcified Alluvium. | C Alluvium | 19 | 58 | 17 | 6 | 38 | 16 | 5.5 | 7.0 | 1.61 | Low | SC | A-2-6 (1) | 2.615 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP08 | 1.0-1.4 | Dark reddish brown speckled white, silty sandy gravel. Ferruginized Alluvium. | F Alluvium | 16 | 65 | 15 | 4 | 31 | 15 | 5.0 | 6.0 | 1.72 | Low | SC | A-2-6 (1) | 2.557 | - | - | 2053 | 7.3 | <3 | <3 | 4 | 0.3 | NC | - | - | - | - | - | - | - | - | - | 4.59E-07 |
| | SWD-TP19 | 1.4-2.4 | Yellowish brown mottled black stained red, clayey silty gravelly sand with trace gravels, ferruginised alluvium | F Alluvium | 1 | 53 | 18 | 28 | 25 | 8 | 2.0 | 7.0 | 0.72 | Low | SC | A-4 (1) | 2.645 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1040 | 5 | 1046 | Corrosive | High to Very High | - |
| | SWD-TP07 | 1.4-1.9 | Completely weathered, green speckled to streaked black, white and gold, very soft rock, biotite gneiss | Gneiss | 25 | 55 | 11 | 9 | 32 | 12 | 3.5 | 5.0 | 1.77 | Low | SC | A-2-6 (1) | 2.736 | - | - | 2174 | 7.2 | 12 | 19 | 40 | 0.0 | G8 | - | - | - | - | 1068 | 3 | 1071 | Corrosive | High to Very High | - |
| | SWD-TP10 | 1.2-2.10 | Reddish brown mottled white, silty sandy gravel. Nodular Ferricrete. | Nodular Ferricrete | 41 | 27 | 21 | 11 | 29 | 12 | 6.0 | 6.0 | 1.62 | Low | GC | A-2-6 (1) | 2.629 | - | - | 1875 | 14.9 | 3 | 4 | 6 | 0.0 | NC | - | - | - | - | - | - | - | - | - | - |
| Waste Rock Dump (WRD) | WRD-TP01 | 1.4-3.5 | Dark reddish brown, silty sandy clay. Fine Alluvium. | Alluvium | 0 | 60 | 17 | 23 | 23 | 9 | 2.5 | 7.0 | 0.81 | Low | SC | A-4 (1) | 2.624 | - | - | 2035 | 9.3 | <3 | <3 | 5 | 0.0 | NC | Pending | | - | - | - | - | - | - | - | - | - |
| | WRD-TP04 | 1.5-2.4 | Orange brown, gravelly silty sand. Alluvium. | Alluvium | 4 | 53 | 28 | 15 | 29 | 12 | 2.5 | 9.0 | 0.84 | Low | SC | A-6 (3) | 2.641 | - | - | 1963 | 12 | 5 | 5 | 7 | 0.1 | NC | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP14 | 2.8-4.9 | Pale yellow brown, silty sandy gravel and cobbles. Coarse Alluvium. | Alluvium | 37 | 45 | 11 | 7 | 29 | 11 | 4.0 | 4.0 | 1.98 | Low | SC | A-2-6 (0) | 2.616 | - | - | 2071 | 9.5 | 7 | 8 | 8 | 0.0 | G9 | - | - | - | - | - | - | - | - | - | - | 7.44E-07 |
| | WRD-TP15 | 0.0-0.7 | Brown, sandy clayey silt. Fine Alluvium. | Alluvium | 3 | 35 | 27 | 35 | 33 | 16 | 7.0 | 14.0 | 0.57 | Low | CL | A-6 (7) | 2.619 | 1628 | 14.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP04 | 0.4-1.5 | Pale brown mottled white, gravelly sandy silt. Calcified Alluvium. | C Alluvium | 2 | 70 | 24 | 4 | 25 | 6 | 2.5 | 5.0 | 1.04 | Low | SC-SM | A-2-4 (0) | 2.502 | - | - | 1975 | 11 | <3 | 3 | 6 | 0.1 | NC | - | - | - | - | 29 | 13 | - | - | - | - | 1.19E-07 |
| | WRD-TP26 | 1.2-2.6 | White speckled to mottled black and brown, silty sandy gravel, hardpan calcrete | Calcrete | 58 | 22 | 9 | 11 | 31 | 9 | 3.0 | 2.0 | 2.24 | Low | GC | A-2-4 (0) | 2.588 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP35 | 2.5-4.1 | Yellow brown, sandy silt. Ferruginous Alluvium. | F Alluvium | 35 | 6 | 21 | 20 | 32 | 13 | 6.0 | 10.0 | 0.92 | Low | SC | A-6 (2) | 2.647 | - | - | 1946 | 11.2 | <3 | <3 | 3 | 0.1 | NC | - | - | - | - | 28 | 18 | - | - | - | - | - |
| | WRD-TP39 | 1.4-1.5 | Khaki stained brown to black, silty gravelly sand to silty sandy gravel, ferruginised alluvium | F Alluvium | 22 | 61 | 13 | 4 | 36 | 10 | 3.5 | 4.0 | 1.79 | Low | SM | A-2-4 (0) | 2.596 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP37 | 2.4-2.7 | Completely to highly weathered, white speckled black stained orange, gneiss | Gneiss | 39 | 49 | 11 | 1 | 23 | 8 | 4.0 | 2.0 | 2.05 | Low | SC | A-2-4 (0) | 2.655 | - | - | 2010 | 10.8 | 11 | 14 | 21 | 0.1 | G8 | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP32 | 1.15-1.45 | Pale brown blotched white, sandy silt with abundant calcrete nodules and cobbles. Honeycomb Calcrete. | Honeycomb Calcrete | 56 | 27 | 12 | 5 | 24 | 8 | 3.0 | 2.0 | 2.15 | Low | GC | A-2-4 (0) | 2.602 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP16 | 0.5-1.8 | Pale brown speckled white, sandy silty gravel. Nodular Calcrete. | Nodular Calcrete | 74 | 16 | 8 | 2 | 30 | 11 | 4.0 | 2.0 | 2.47 | Low | GP-GC | A-2-6 (0) | 2.614 | - | - | 1869 | 14.5 | 17 | 19 | 24 | 0.2 | G7 | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP37 | 0.9-1.1 | Yellowish brown mottled white and black, silty sandy gravel, calcified pebble marker | Pebble marker | 10 | 48 | 32 | 10 | 37 | 13 | 6.5 | 8.0 | 1.14 | Low | SC | A-4 (2) | 2.518 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP02 | 1.4-1.6 | White to grey mottled black stained orange, silty gravelly sand, calcified reworked residual gneiss | Residual Gneiss | 58 | 37 | 2 | 3 | - | 1 | 0.0 | 0.0 | 2.49 | Low | GP-GM | A-1-a (0) | 2.635 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP33 | 1.2-1.3 | Dark brown mottled orange and black, clayey silty coarse sand, slightly ferruginised reworked residual biotite gneiss | Residual Gneiss | 0 | 66 | 13 | 21 | 22 | 8 | 3.0 | 6.0 | 1.00 | Low | SC | A-2-4 (0) | 2.634 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP37 | 1.1-2.4 | Yellowish brown mottled black and white, gravelly silty sand, reworked residual gneiss | Residual Gneiss | 8 | 68 | 21 | 3 | 24 | 6 | 3.0 | 4.0 | 1.31 | Low | SC-SM | A-2-4 (0) | 2.648 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP23 | 0.85-1.50 | Pale brown blotched white, hardpan calcrete. | Hardpan Calcrete | 63 | 29 | 6 | 2 | 35 | 9 | 4.0 | 2.0 | 2.41 | Low | GP-GM | A-2-4 (0) | 2.543 | - | - | 1651 | 19.9 | 36 | 42 | 54 | 0.0 | G6 | - | - | - | - | - | - | - | - | - | - | - |

**NOTES:**

1. LL - LIQUID LIMIT; 2. PI - PLASTICITY INDEX; 3. LS - LINEAR SHRINKAGE; 4. GM - GRADING MODULUS 5. PE - POTENTIAL EXPANSIVENESS; 6. USCS - UNIFIED SOIL CLASSIFICATION SYSTEM 7. MDD - MAXIMUM DRY DENSITY 8. OMC - OPTIMUM MOISTURE CONTENT; 9. CBR - CALIFORNIA BEARING RATIO; 10. KPA - KILOPASCAL; 11. AASHTO - AMERICAN ASSOCIATION STATE HIGHWAY TRANSPORT OFFICIALS; 12. K-VALUE - HYDRALIC CONDUCTIVITY; 13. NC - NOT CLASSIFIABLE.

| A | 8-1-2023 | ISSUED WITH LETTER | SY | RK |
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| REV | DATE | DESCRIPTION | PREPD | REVD |

Knight Piésold CONSULTING

**APPENDIX B4.2**
**GEOTECHNICAL INVESTIGATION FOR HEAP LEACH PAD, WASTE ROCK DUMP, STORMWATER DIVERSION, PLANT & POTENTIAL BORROW PIT**
**SUMMARY OF SOIL LABORATORY TEST RESULTS**

| STRUCTURE ID. | SAMPLE | | Material Description | Material Origin | GRADING (%) | | | | | ATTERBERG LIMITS (%) | | | | GM | PE | USCS | AASHTO | SG (g/cm³) | STANDARD PROCTOR | | MOD AASHTO COMPACTION | | CBR % | | | % Swell | COLTO | TRIAXIAL TEST (CU) | | SHEAR BOX TEST | | BASSON INDEXT TEST | | | | | Coefficient of Permeability (m/s) at 90% Mod AASHTO / **at 93% Proctor |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Test Pit No. | Depth (m) | | | Gravel | Sand | Silt | Clay | %fines | LL | PI (0.425mm) | LS | PI (Whole Sample) | | | | | | MDD (kg/m³) | OMC (%) | MDD (kg/m³) | OMC (%) | 93 | 95 | 98 | | | Internal Friction Angle (ϕ') | Cohesion (kPa) | Internal Friction Angle (ϕ') | Cohesion (kPa) | Leaching Corrosion (LSCI) | Spalling Corrosion (SCSI) | Overall Agressiveness ($N_a$) | Corrosivity Index | Basson Index | |
| | AM-TP01 | 0.4-0.6 | Brown stained orange brown mottled black, clayey silty sand, slightly ferruginised fine alluvium | Fine Alluvium | 0 | 52 | 14 | 34 | **48** | 26 | 10 | 4 | **8.0** | 0.69 | Low | SC | A-4 (0) | 2.528 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | AM-TP02 | 0.0-0.7 | Reddish brown, clayey silty sand with traces of subangular to subrounded fine gravel, fine alluvium | Fine Alluvium | 1 | 53 | 22 | 24 | **46** | 26 | 9 | 3 | **7.0** | 0.74 | Low | SC | A-4 (0) | 2.697 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | AM-TP05 | 0.0-0.6 | Brown, clayey silty sand, fine alluvium | Fine Alluvium | 0 | 59 | 22 | 19 | **41** | 19 | 5 | 3 | **5.0** | 0.67 | Low | SC-SM | A-4 (0) | 2.741 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | AM-TP06 | 0.4-1.0 | Reddish brown, clayey silty sand with traces of subangular to subrounded gravel to fine gravel, fine alluvium | Fine Alluvium | 0 | 57 | 21 | 22 | **43** | 22 | 7 | 3 | **6.0** | 0.75 | Low | SC | A-4 (0) | 2.652 | - | - | 2079 | 9.2 | 5 | 9 | 18 | 0.0 | G9 | - | - | - | - | - | - | - | - | - | 1.29E-07 |
| | AM-TP08-B | 0.5-0.7 | Dark brown with orange staining, clayey silty sand, fine alluvium | Fine Alluvium | 0 | 52 | 19 | 29 | **48** | 25 | 9 | 4 | **8.0** | 0.69 | Low | SC | A-4 (0) | 2.620 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP05 | 0.0-1.1 | Orange to reddish brown, clayey silty sand, fine alluvium | Fine Alluvium | - | - | - | - | | - | - | - | **-** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 3201 | 1 | 3202 | Corrosive | Very High | - |
| | HLP-TP08 | 0.65-1.35 | Brown, clayey sandy silt. Fine Alluvium | Fine Alluvium | 2 | 38 | 46 | 14 | **60** | 56 | 22 | 10.0 | **17.0** | 0.68 | Medium | MH | A-7-5 (12) | 2.492 | - | - | 1517 | 23.3 | <3 | <3 | <3 | 0.1 | NC | - | - | - | - | - | - | - | - | - | 9.26E-09 |
| | HLP-TP26 | 0.0-1.1 | Pale brown to brown, sandy silt. Fine Alluvium. | Fine Alluvium | - | - | - | - | | - | - | - | **-** | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 32 | 9 | - | - | - | - |
| | Plant-TP32 | 0.0-0.7 | Brown to orange brown, clayey silty coarse sand, fine alluvium | Fine Alluvium | 0 | 71 | 21 | 8 | **29** | - | 1 | 0.0 | **1.0** | 0.97 | Low | SM | A-2-4 (0) | 2.609 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | RD-TP04 | 0.6-2.9 | Reddish brown, clayey silty coarse sand with traces of gravel, fine alluvium | Fine Alluvium | 0 | 66 | 19 | 15 | **34** | - | 1 | 0.0 | **1.0** | 0.83 | Low | SM | A-2-4 (0) | 2.637 | - | - | 2041 | 8.1 | 32 | 46 | 81 | 0.1 | G4 | - | - | - | - | - | - | - | - | - | - |
| | RD-TP12 | 1.1-4.3 | Reddish brown slightly stained brown, clayey silty gravelly sand with minor fine gravel, fine alluvium | Fine Alluvium | 0 | 70 | 15 | 15 | **30** | - | 1 | 0.0 | **1.0** | 0.96 | Low | SM | A-2-4 (0) | 2.648 | - | - | 2119 | 7.4 | 23 | 30 | 46 | -0.1 | G6 | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP02 | 0.0-0.7 | Brown mottled black , gravelly silty sand, fine alluvium | Fine Alluvium | 0 | 68 | 20 | 12 | **32** | - | 3 | 1.0 | **2.0** | 0.95 | Low | SM | A-2-4 (0) | 2.586 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP15 | 0.5-2.5 | Orange brown stained red, clayey silty fine gravelly sand, fine alluvium | Fine Alluvium | 0 | 60 | 20 | 20 | **40** | 20 | 8 | 4.0 | **6.0** | 0.88 | Low | SC | A-4 (0) | 2.628 | - | - | 2055 | 9.7 | 11 | 11 | 12 | 0.0 | G8 | - | - | 37 | 6 | - | - | - | - | - | 3.57E-07 |
| | SWD-TP23 | 1.2-2.5 | Dark reddish brown, sandy silty clay. Fine Alluvium | Fine Alluvium | 1 | 46 | 23 | 30 | **53** | 23 | 8 | 2.5 | **7.0** | 0.63 | Low | SC | A-4 (4) | 2.654 | - | - | - | - | - | - | - | - | - | Pending | | - | - | - | - | - | - | - |
| | WRD-TP01 | 1.4-3.5 | Dark reddish brown, silty sandy clay. Fine Alluvium. | Fine Alluvium | 0 | 60 | 17 | 23 | **40** | 23 | 9 | 2.5 | **7.0** | 0.81 | Low | SC | A-4 (1) | 2.624 | - | - | 2035 | 9.3 | <3 | <3 | 5 | 0.0 | NC | Pending | | - | - | - | - | - | - | - | - |
| | WRD-TP04 | 1.5-2.4 | Orange brown, gravelly silty sand. Alluvium. | Fine Alluvium | 4 | 53 | 28 | 15 | **43** | 29 | 12 | 2.5 | **9.0** | 0.84 | Low | SC | A-6 (3) | 2.641 | - | - | 1963 | 12 | 5 | 5 | 7 | 0.1 | NC | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP15 | 0.0-0.7 | Brown, sandy clayey silt. Fine Alluvium. | Fine Alluvium | 3 | 35 | 27 | 35 | **62** | 33 | 16 | 7.0 | **14.0** | 0.57 | Low | CL | A-6 (7) | 2.619 | 1628 | 14.0 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP03 | 0.8-2.3 | Yellowish brown to khaki, silty sandy gravel, calcified coarse alluvium | Coarse Alluvium | 62 | 25 | 11 | 2 | **13** | 27 | 12 | 6.0 | **3.0** | 2.31 | Low | GC | A-2-6 (0) | 2.608 | - | - | 1858 | 13.7 | 27 | 33 | 45 | 0.0 | G8 | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP24 | 1.2-1.75 | Brown, sandy silty gravel. Coarse Alluvium. | Coarse Alluvium | 50 | 41 | 5 | 4 | **9** | - | 1 | 0.0 | **0.0** | 2.20 | Low | GP-GM | A-1-a (0) | 2.564 | - | - | 2138 | 6.5 | 25 | 45 | 107 | 0.1 | G4 | - | - | - | - | - | - | - | - | - | 2.19E-06 |
| | Plant-TP32 | 0.7-1.0 | Orange to yellowish brown, clayey silty sand to coarse sand with gravels, coarse alluvium | Coarse Alluvium | 0 | 55 | 19 | 26 | **45** | 21 | 6 | 2.0 | **5.0** | 0.82 | Low | SC-SM | A-4 (2) | 2.515 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | RD-TP02 | 1.2-2.8 | Brown to greyish brown, silty clayey sand with minor cobbles to boulders, coarse alluvium | Coarse Alluvium | 27 | 60 | 6 | 7 | **13** | 28 | 11 | 3.5 | **2.0** | 2.08 | Low | SC | A-2-6 (0) | 2.609 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP14 | 2.8-4.9 | Pale yellow brown, silty sandy gravel and cobbles. Coarse Alluvium. | Coarse Alluvium | 37 | 45 | 11 | 7 | **18** | 29 | 11 | 4.0 | **4.0** | 1.98 | Low | SC | A-2-6 (0) | 2.616 | - | - | 2071 | 9.5 | 7 | 8 | 8 | 0.0 | G9 | - | - | - | - | - | - | - | - | - | 7.44E-07 |
| | AM-TP03 | 0.7-1.0 | Reddish brown, clayey silty sandy gravel with cobbles, ferruginised / calcified pebble marker | Pebble marker | 49 | 36 | 7 | 8 | **15** | 23 | 8 | 3.5 | **2.0** | 2.23 | Low | GC | A-2-4 (0) | 2.658 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | HL/PA-TP29 | 1.7-1.9 | Yellowish brown to khaki, silty sandy gravel, ferruginised pebble marker | Pebble marker | 50 | 36 | 7 | 7 | **14** | 19 | 6 | 2.0 | **2.0** | 2.12 | Low | GC-GM | A-1-a (0) | 2.619 | - | - | 2204 | 6.3 | 29 | 40 | 64 | 0.0 | G6 | - | - | - | - | - | - | - | - | - | 7.78E-06 |
| | RD-TP13 | 2.6-4.0 | Yellowish brown with scattered red, white and black mottles, clayey gravelly silty fine sand with minor gravels, slightly calcified pebble marker | Pebble marker | 5 | 57 | 33 | 5 | **38** | 27 | 9 | 4.5 | **7.0** | 0.95 | Low | SC | A-4 (1) | 2.669 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP37 | 0.9-1.1 | Yellowish brown mottled white and black, silty sandy gravel, calcified pebble marker | Pebble marker | 10 | 48 | 32 | 10 | **42** | 37 | 13 | 6.5 | **8.0** | 1.14 | Low | SC | A-4 (2) | 2.518 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP13 | 0.3-2.25 | Light brown to brown, gravelly silty fine sand. Calcareous Alluvium. | Calcareous Alluvium | 0 | 73 | 17 | 10 | **27** | - | 1 | 0.0 | **1.0** | 1.00 | Low | SM | A-2-4 (0) | 2.620 | - | - | 2054 | 7.3 | 28 | 38 | 60 | 0.0 | G6 | - | - | - | - | 3305 | 5 | 3310 | Corrosive | Very High | - |
| | HLP-TP24 | 0.8-1.2 | Brown, gravelly sandy silt. Calcareous Alluvium. | Calcareous Alluvium | 24 | 57 | 11 | 8 | **19** | - | 1 | 0.0 | **1.0** | 1.54 | Low | SM | A-2-4 (0) | 2.609 | 2085 | 6.7 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | **1.51E-06 |
| | AM-TP04 | 0.3-1.1 | Reddish brown, clayey silty sandy gravel, calcareous alluvium | Calcareous Alluvium | 75 | 21 | 2 | 2 | **4** | - | 1 | 0 | **0.0** | 2.57 | Low | GP | A-1-a (0) | 2.624 | - | - | 2149 | 6.5 | 92 | 105 | 129 | 0.0 | G4 | - | - | - | - | - | - | - | - | - | 1.01E-06 |
| | RD-TP08 | 1.0-3.2 | White to yellowish brown, silty gravelly sand, calcified alluvium | Calcified Alluvium | 8 | 46 | 34 | 12 | **46** | 48 | 20 | 7.5 | **14.0** | 0.95 | Medium | SM | A-7-5 (5) | 2.411 | - | - | 1640 | 20 | 4 | 4 | 5 | 0.0 | NC | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP17 | 1.3-2.2 | Olive brown mottled white stained orange, gravelly silty fine sand. Calcified Alluvium. | Calcified Alluvium | 19 | 58 | 17 | 6 | **23** | 38 | 16 | 5.5 | **7.0** | 1.61 | Low | SC | A-2-6 (1) | 2.615 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP04 | 0.4-1.5 | Pale brown mottled white, gravelly sandy silt. Calcified Alluvium. | Calcified Alluvium | 2 | 70 | 24 | 4 | **28** | 25 | 6 | 2.5 | **5.0** | 1.04 | Low | SC-SM | A-2-4 (0) | 2.502 | - | - | 1975 | 11 | <3 | 3 | 6 | 0.1 | NC | - | - | 33 | 14 | - | - | - | - | - | 1.19E-07 |
| | HLP-TP04 | 1.1-1.35 | Light brown blotched wihite, sandy silty gravel. Nodular Calcrete. | Nodular Calcrete | 60 | 24 | 11 | 5 | **16** | 28 | 11 | 4.0 | **3.0** | 2.22 | Low | GC | A-2-6 (1) | 2.617 | - | - | 1994 | 10.7 | 11 | 16 | 29 | 0.0 | G8 | - | - | - | - | - | - | - | - | - | 1.50E-08 |
| | WRD-TP16 | 0.5-1.8 | Pale brown speckled white, sandly silty gravel. Nodular Calcrete. | Nodular Calcrete | 74 | 16 | 8 | 2 | **10** | 30 | 11 | 4.0 | **2.0** | 2.47 | Low | GP-GC | A-2-6 (0) | 2.614 | - | - | 1869 | 14.5 | 17 | 19 | 24 | 0.2 | G7 | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP10 | 1.2-2.10 | Reddish brown mottled white, silty sandy gravel. Nodular Ferricrete. | Nodular Ferricrete | 41 | 27 | 21 | 11 | **32** | 29 | 12 | 6.0 | **6.0** | 1.62 | Low | GC | A-2-6 (1) | 2.629 | - | - | 1875 | 14.9 | 3 | 4 | 6 | 0.0 | NC | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP32 | 1.15-1.45 | Pale brown blotched white, sandy silt with abundant calcrete nodules and cobbles. Honeycomb Calcrete. | Honeycomb Calcrete | 56 | 27 | 12 | 5 | **17** | 24 | 8 | 3.0 | **2.0** | 2.15 | Low | GC | A-2-4 (0) | 2.602 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP23 | 0.85-1.50 | Pale brown blotched white, hardpan calcrete. | Hardpan Calcrete | 63 | 29 | 6 | 2 | **8** | 35 | 9 | 4.0 | **2.0** | 2.41 | Low | GP-GM | A-2-4 (0) | 2.543 | - | - | 1651 | 19.9 | 36 | 42 | 54 | 0.0 | G6 | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP26 | 1.2-2.6 | White speckled to mottled black and brown, silty sandy gravel, hardpan calcrete | Hardpan Calcrete | 58 | 22 | 9 | 11 | **20** | 31 | 9 | 3.0 | **2.0** | 2.24 | Low | GC | A-2-4 (0) | 2.588 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | Plant-TP32 | 1.0-1.7 | Orange brown mottled to blotched red and dark grey and black, silty gravelly sand, ferruginised alluvium | Ferruginised Alluvium | 0 | 53 | 17 | 30 | **47** | 25 | 7 | 2.5 | **5.0** | 0.84 | Low | SC | A-4 (3) | 2.538 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP08 | 1.0-1.4 | Dark reddish brown speckled white, silty sandy gravel. Ferruginized Alluvium. | Ferruginised Alluvium | 16 | 65 | 15 | 4 | **19** | 31 | 15 | 5.0 | **6.0** | 1.72 | Low | SC | A-2-6 (1) | 2.557 | - | - | 2053 | 7.3 | <3 | <3 | 4 | 0.3 | NC | - | - | - | - | - | - | - | - | - | 4.59E-07 |
| | SWD-TP19 | 1.4-2.4 | Yellowish brown mottled black stained red, clayey silty gravelly sand with trace gravels, ferruginised alluvium | Ferruginised Alluvium | 1 | 53 | 18 | 28 | **46** | 25 | 8 | 2.0 | **7.0** | 0.72 | Low | SC | A-4 (1) | 2.645 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1040 | 5 | 1046 | Corrosive | High to Very High | - |
| | WRD-TP39 | 1.4-1.5 | Khaki stained brown to black, silty gravelly sand to silty sandy gravel, ferruginised alluvium | Ferruginised Alluvium | 22 | 61 | 13 | 4 | **17** | 36 | 10 | 3.5 | **4.0** | 1.79 | Low | SM | A-2-4 (0) | 2.596 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP35 | 2.5-4.1 | Yellow brown, sandy silt. Ferruginous Alluvium. | Ferruginous Alluvium | 35 | 6 | 21 | 20 | **41** | 32 | 13 | 6.0 | **10.0** | 0.92 | Low | SC | A-6 (2) | 2.647 | - | - | 1946 | 11.2 | <3 | <3 | 3 | 0.1 | NC | - | - | 29 | 13 | - | - | - | - | - | - |
| | HLP-TP03 | 2.3-3.1 | Khaki to white streaked to banded black, silty sandy gravel to silty gravelly sand, calcified residual gneiss | Residual Gneiss | 49 | 40 | 10 | 1 | **11** | 25 | 5 | 2.5 | **1.0** | 2.19 | Low | GC-GM | A-1-a (0) | 2.601 | - | - | 1974 | 11 | 16 | 21 | 33 | 0.1 | G7 | - | - | 28 | 18 | - | - | - | - | - | 3.92E-07 |
| | WRD-TP02 | 1.4-1.6 | White to grey mottled black stained orange, silty gravelly sand, calcified reworked residual gneiss | Residual Gneiss | 58 | 37 | 2 | 3 | **5** | - | 1 | 0.0 | **0.0** | 2.49 | Low | GP-GM | A-1-a (0) | 2.635 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP33 | 1.2-1.3 | Dark brown mottled orange and black, clayey silty coarse sand, slightly ferruginised reworked residual biotite gneiss | Residual Gneiss | 0 | 66 | 13 | 21 | **34** | 22 | 8 | 3.0 | **6.0** | 1.00 | Low | SC | A-2-4 (0) | 2.634 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | WRD-TP37 | 1.1-2.4 | Yellowish brown mottled black and white, gravelly silty sand, reworked residual gneiss | Residual Gneiss | 8 | 68 | 21 | 3 | **24** | 24 | 6 | 3.0 | **4.0** | 1.31 | Low | SC-SM | A-2-4 (0) | 2.648 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | AM-TP02 | 0.9-1.1 | Completely weathered, dark grey streaked white to reddish brown, soft to medium hard rock, biotite gneiss. | Gneiss | 40 | 40 | 12 | 8 | **20** | 32 | 12 | 6 | **4.0** | 2.01 | Low | SC | A-4 (1) | 2.629 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | AM-TP04 | 1.2-1.5 | Completely to highly weathered, white speckled to streaked black stained orange, very soft rock, biotite gneiss | Gneiss | 2 | 77 | 14 | 7 | **21** | - | 1 | 0.0 | **0.0** | 1.52 | Low | SM | A-1-b (0) | 2.571 | - | - | 2020 | 8.8 | 18 | 28 | 51 | 0.0 | G6 | - | - | - | - | - | - | - | - | - | - |
| | HLP-TP20 | 1.6-1.8 | Completely weathered, white speckled to streaked black stained khaki to orange, very soft rock, gneiss | Gneiss | 23 | 66 | 7 | 4 | **11** | 28 | 8 | 2.5 | **2.0** | 2.04 | Low | SW-SC | A-1-b (0) | 2.566 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| | RD-TP02 | 3.9-4.3 | Completely weathered, white streaked black and gold, very soft rock, biotite gneiss | Gneiss | 31 | 53 | 11 | 5 | **16** | 29 | 7 | 2.5 | **2.0** | 1.96 | Low | SC | A-2-4 (0) | 2.673 | - | - | 1940 | 9.2 | 8 | 11 | 20 | 0.0 | G9 | - | - | - | - | - | - | - | - | - | - |
| | RD-TP14 | 1.4-2.6 | Completely weathered, dark grey streaked white stained orange, very soft rock, ferruginised biotite gneiss | Gneiss | 39 | 36 | 20 | 5 | **25** | 34 | 9 | 3.5 | **4.0** | 1.83 | Low | GM | A-2-4 (0) | 2.604 | - | - | 2016 | 12.9 | 15 | 17 | 20 | 0.0 | G7 | - | - | - | - | - | - | - | - | - | - |
| | SWD-TP07 | 1.4-1.9 | Completely weathered, green speckled to streaked black, white and gold, very soft rock, biotite gneiss | Gneiss | 25 | 55 | 11 | 9 | **20** | 32 | 12 | 3.5 | **5.0** | 1.77 | Low | SC | A-2-6 (1) | 2.736 | - | - | 2174 | 7.2 | 12 | 19 | 40 | 0.0 | G8 | - | - | - | - | 1068 | 3 | 1071 | Corrosive | High to Very High | - |
| | WRD-TP37 | 2.4-2.7 | Completely to highly weathered, white speckled black stained orange, gneiss | Gneiss | 39 | 49 | 11 | 1 | **12** | 23 | 8 | 4.0 | **2.0** | 2.05 | Low | SC | A-2-4 (0) | 2.655 | - | - | 2010 | 10.8 | 11 | 14 | 21 | 0.1 | G8 | - | - | - | - | - | - | - | - | - | - |

**NOTES:**

1. LL - LIQUID LIMIT; 2. PI - PLASTICITY INDEX; 3. LS - LINEAR SHRINKAGE; 4. GM - GRADING MODULUS 5. PE - POTENTIAL EXPANSIVENESS; 6. USCS - UNIFIED SOIL CLASSIFICATION SYSTEM 7. MDD - MAXIMUM DRY DENSITY 8. OMC - OPTIMUM MOISTURE CONTENT; 9. CBR - CALIFORNIA BEARING RATIO; 10. KPA - KILOPASCAL; 11. AASHTO - AMERICAN ASSOCIATION STATE HIGHWAY TRANSPORT OFFICIALS; 12. K-VALUE - HYDRALIC CONDUCTIVITY; 13. NC - NOT CLASSIFIABLE.

| REV | DATE | DESCRIPTION | BY PREPD | BY REVD |
|---|---|---|---|---|
| A | 8/1/2023 | ISSUED WITH LETTER | | |

**APPENDIX B4**

**CRATON MINING AND EXPLORATION (PTY) LTD**

**HEAP LEACH PAD AND PONDS FEASIBILITY DESIGN**
**GEOTECHNICAL INVESTIGATION FOR HEAP LEACH PAD, WASTE ROCK DUMP, STORMWATER DIVERSION & PLANT**
**SUMMARY OF ROCK LABORATORY TEST RESULTS**

| STRUCTURE ID. | SAMPLE | | Rock Description | Uniaxial Compressive Strength (UCS) | | Point Load Index Test | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Borehole No. | Depth (m) | | UCS (MPa) | Failure Type | Type | Orientation | Failure Load P | $I_{s\,(50)}$ (MPa) | Estimated UCS (MPa) |
| Stormwater Diversion Channel (SWD) | SWD-BH01 | 2.04 - 2.26 | Highly to completely weathered, dark brown with red iron oxide staining, very soft rock, granitic gneiss | 8.0 | normal | - | - | - | - | - |
| | | 2.39 - 2.51 | Highly to completely weathered, dark brown with red iron oxide staining, very soft rock, granitic gneiss | - | - | a | p | 0.97 | 0.48 | 12.01 |
| | | | | | | d | p | 1.09 | 0.50 | 12.51 |
| | | 3.14 - 3.48 | Moderately to slightly weathered, light brown speckled black and grey mottled white, medium hard rock, gneiss | 23.5 | normal | a | p | 1.14 | 1.03 | 25.53 |
| | | | | | | d | p | 1.09 | 0.84 | 20.79 |
| | | 3.36 - 3.95 | Moderately to slightly weathered, light brown speckled black and grey mottled white, medium hard rock, gneiss | - | - | a | p | 1.14 | 1.57 | 39.02 |
| | | | | | | d | p | 1.09 | 1.08 | 26.83 |
| | SWD-BH02 | 2.84 - 2.98 | Highly to moderately weathered, brown to grey speckled black banded white, soft to medium hard rock, gneiss | - | - | a | p | 1.04 | 0.92 | 22.87 |
| | | | | | | d | p | 1.08 | 0.47 | 11.59 |
| | | 7.96 - 8.16 | Moderately weathered, grey to brown streaked yellow and white, soft rock, gneiss | 33.5 | normal | - | - | - | - | - |
| | | 8.16 - 8.35 | Moderately weathered, grey to brown streaked yellow and white, soft rock, gneiss | - | - | a | p | 1.05 | 1.15 | 28.67 |
| | | | | | | d | p | 1.09 | 1.01 | 24.87 |
| | SWD-BH03 | 3.82 - 4.13 | Moderately weathered, grey speckled black and white, soft to medium hard rock, gneiss | 12.0 | normal | a | p | 1.04 | 0.88 | 21.86 |
| | | | | | | d | p | 1.09 | 0.48 | 11.92 |
| | SWD-BH04 | 3.71 - 3.88 | Moderately weathered, grey speckled black streaked white, soft to medium hard rock, gneiss | - | - | a | p | 1.13 | 4.91 | 120.83 |
| | | | | | | d | p | 1.08 | 0.18 | 4.55 |
| | | 8.23 - 8.39 | Moderately weathered, grey speckled black streaked white, soft to medium hard rock, gneiss | - | - | a | p | 1.06 | 4.07 | 100.76 |
| | | | | | | d | p | 1.09 | 1.64 | 40.62 |
| | SWD-BH05 | 5.88 - 6.02 | Highly to completely weathered, dark grey to dark brown speckled black, very soft rock, gneiss | - | - | a | p | 1.07 | 0.49 | 12.23 |
| | | | | | | d | p | 1.09 | 0.10 | 2.58 |
| | | 9.69 - 9.93 | Highly to moderately weathered, grey to brown speckled black streaked white, medium hard rock, gneiss | 25.5 | normal | a | p | 0.96 | 1.74 | 43.36 |
| | | | | | | d | p | 1.09 | 0.61 | 15.14 |
| | SWD-BH08 | 5.07 - 5.21 | Highly weathered, grey to brown speckled black streaked white, soft rock, gneiss | - | - | a | p | 1.03 | 0.73 | 17.86 |
| | | | | | | d | p | 1.07 | 0.19 | 4.63 |
| Heap Leach Pad (HLP) | HLP-BH01 | 6.18 - 6.31 | Highly weathered, brown banded red speckled black streaked white, soft rock, gneiss | - | - | a | p | 0.96 | 0.39 | 9.67 |
| | | | | | | d | p | 1.09 | 0.15 | 3.67 |
| | HLP-BH01 | 8.35 - 8.60 | Highly weathered, brown banded red speckled black streaked white, soft rock, gneiss | - | - | a | p | 1.04 | 0.62 | 15.31 |
| | | | | | | d | p | 1.08 | 0.49 | 12.05 |
| | HLP-BH02 | 5.35 - 5.65 | Highly to completely weathered, brown to grey, banded white, very soft rock gneiss | 8.0 | normal | a | p | 1.02 | 0.35 | 8.73 |
| | | | | | | d | p | 1.09 | 0.19 | 4.80 |
| | HLP-BH03 | 2.27 - 2.41 | Highly weathered, brown to green speckled black streaked white, soft rock, gneiss | - | - | a | p | 0.95 | 0.19 | 4.72 |
| | | | | | | d | p | 1.09 | 0.11 | 2.61 |
| | HLP-BH03 | 3.73 - 3.93 | Highly weathered, brown to green speckled black streaked white, soft rock, gneiss | - | - | a | p | 1.11 | 0.41 | 10.12 |
| | | | | | | d | p | 1.09 | 0.3 | 7.43 |
| | HLP-BH04 | 2.66 - 2.86 | Highly weathered, brown to grey speckled black streaked white, soft rock, gneiss | 7.0 | normal | - | - | - | - | - |
| | HLP-BH04 | 5.19 - 5.35 | Moderately weathered, grey speckled black streaked white, medium hard rock, gneiss | - | - | a | p | 1.04 | 0.68 | 16.97 |
| | | | | | | d | p | 1.09 | 0.31 | 7.75 |
| Plant Area (PLT) | PLT-BH01 | 2.80 - 9.00 | Slightly weathered, grey speckled black streaked white, medium hard rock, granitic gneiss | - | - | a | p | 1.14 | 1.67 | 41.27 |
| | | | | | | d | p | 1.09 | 1.58 | 39.13 |
| | PLT-BH02 | 4.73 - 4.94 | Highly weathered, brown to grey, soft rock, gneiss | - | - | a | p | 1.05 | 0.54 | 13.41 |
| | | | | | | d | p | 1.08 | 0.28 | 6.94 |
| | PLT-BH02 | 8.09 - 8.37 | Moderately weathered, light brown to grey speckled black and streaked white, medium hard rock, granitic gneiss | 42.0 | normal | a | p | 1.14 | 4.04 | 100.56 |
| | PLT-BH03 | 1.78 - 1.98 | Completely weathered, yellow brown speckled black, calcified soft rock, gneiss | - | - | a | p | 1.08 | 0.48 | 14.06 |
| | | | | | | d | p | 1.27 | 0.58 | 16.89 |
| | PLT-BH03 | 6.33 - 6.55 | Moderately weathered, dark grey to green speckled black streaked whit, medium hard rock, gneiss | 10.5 | normal | a | p | 0.98 | 1.65 | 40.84 |
| | | | | | | d | p | 1.09 | 0.81 | 20.09 |
| Waste Rock Dump (WRD) | WRD-BH01 | 1.12 - 1.35 | Pale brown blotched white, hardpan calcrete of soft rock strength | 5.0 | normal | - | - | - | - | - |
| | WRD-BH01 | 5.13 - 5.30 | Highly weathered, brown to grey speckled black streaked white, soft rock, gneiss | - | - | a | p | 0.97 | 0.22 | 5.48 |
| | | | | - | - | d | p | 1.09 | 0.27 | 6.73 |
| | WRD-BH01 | 7.75 - 7.88 | Slightly weathered to moderately weathered, dark brown to grey streaked and banded white, medium hard rock, gneiss | - | - | a | p | 1.06 | 0.13 | 3.24 |

**NOTES:**

1. D = DIAMETRICAL LOADING; 2. A = AXIAL LOADING; 3. UCS = UNIAXIAL COMPRESSIVE STRENGTH; 4, P = PERPENDICULAR.

| REV | DATE | DESCRIPTION | PREP'D | REV'D |
|---|---|---|---|---|
| A | 8/1/2023 | ISSUED WITH LETTER | SY | BK |

## Evaluation of unpaved wearing course materials according to THR20

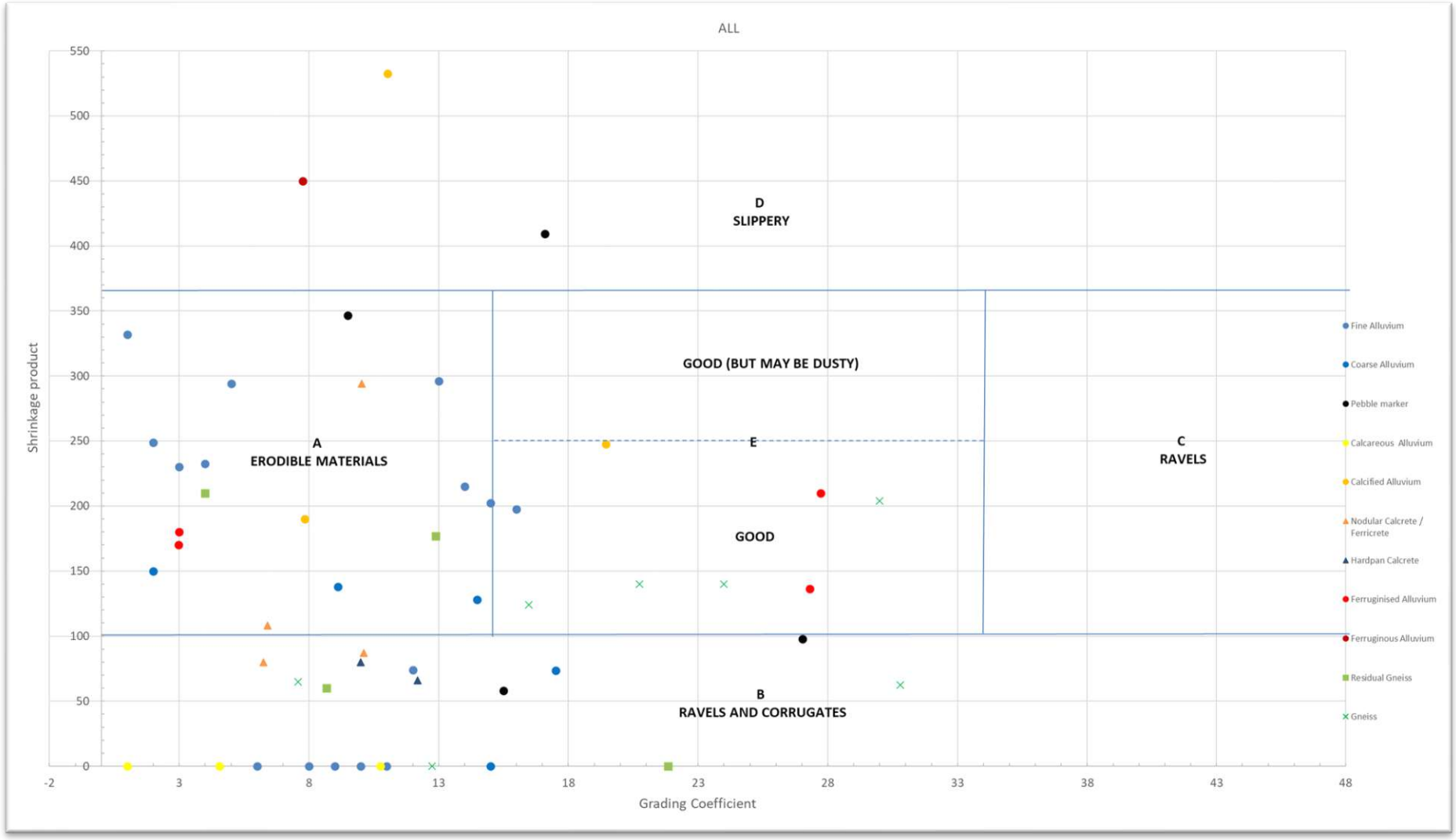



*Figure 1 Evaluation of all materials unpaved wearing course according to THR20*

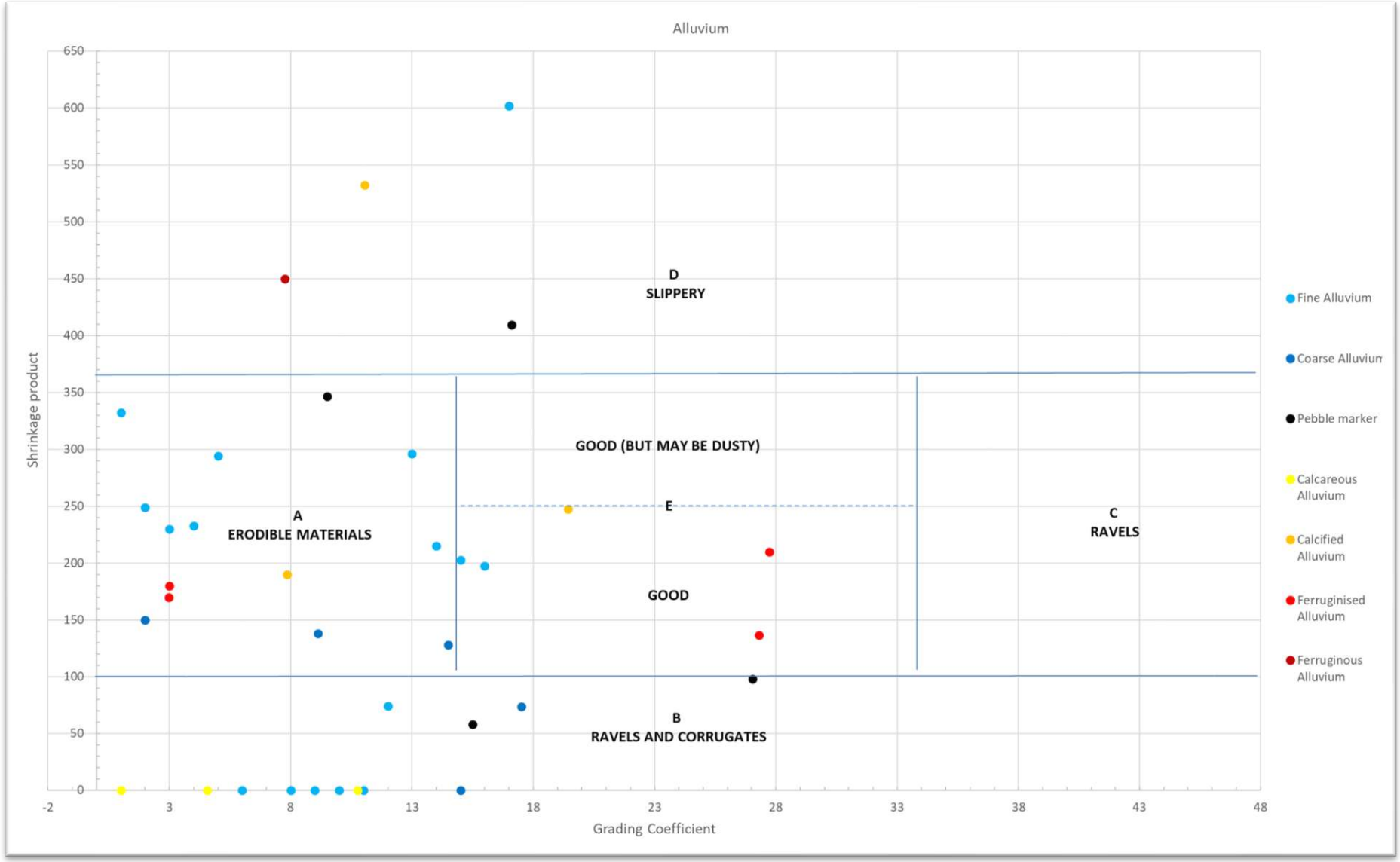



*Figure 2 Evaluation of alluvium materials unpaved wearing course according to THR20*

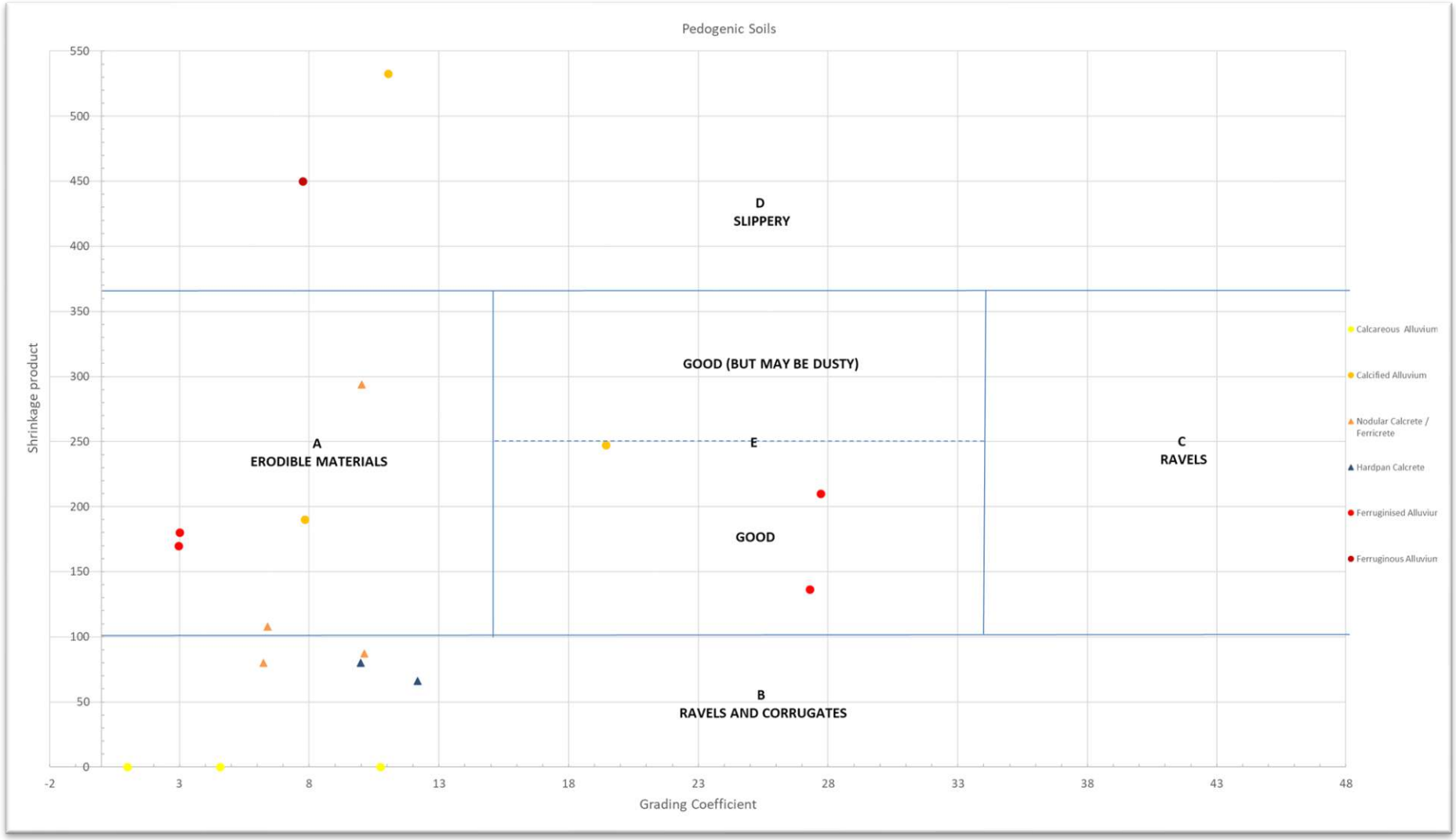



*Figure 3 Evaluation of pedogenic materials unpaved wearing course according to THR20*

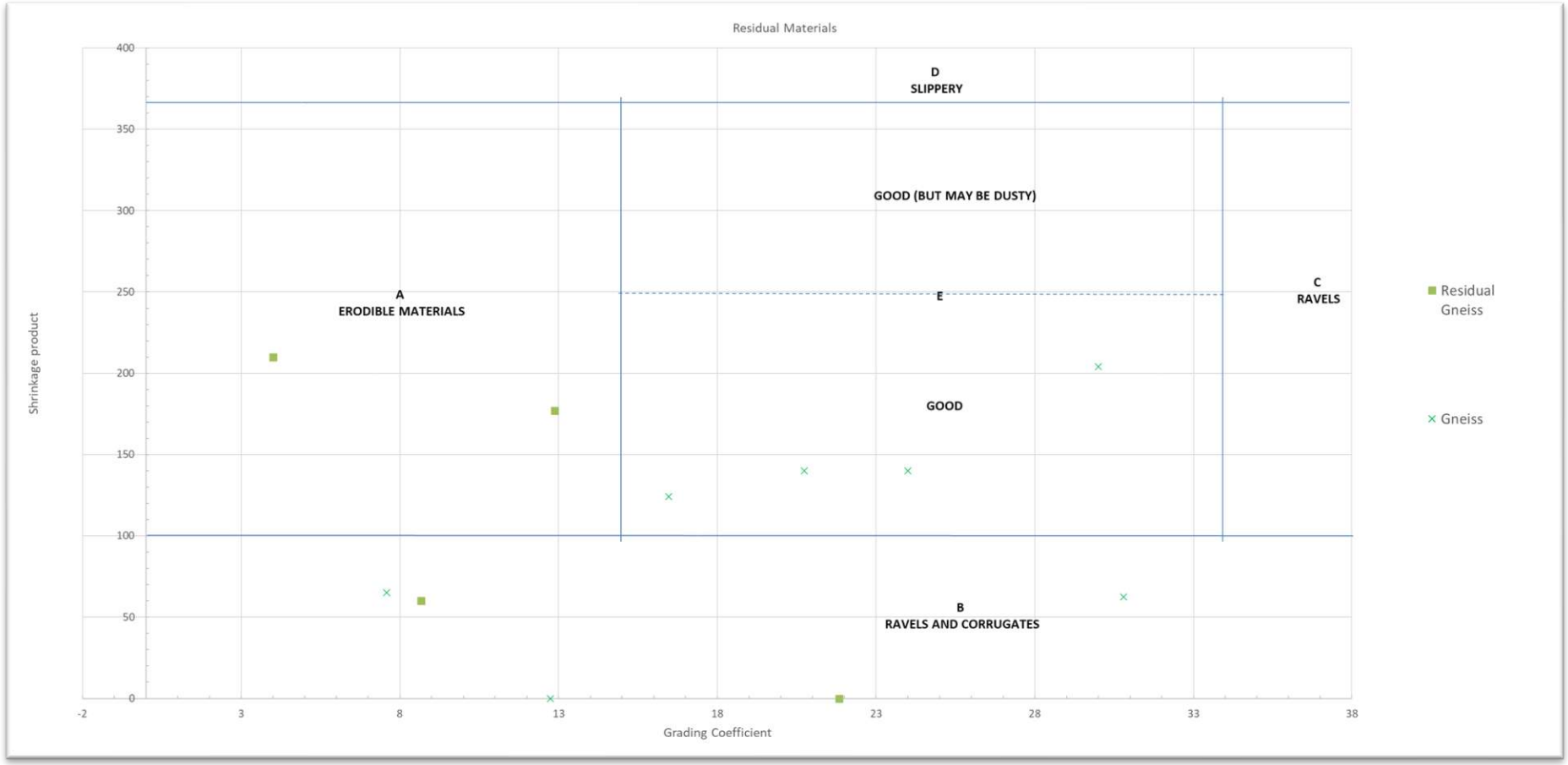



*Figure 4 Evaluation of residual and very soft rock materials unpaved wearing course according to THR20*

# APPENDIX C

## Test Pit and Borehole Logs

Appendix C1

Test Pit Profiles

Appendix C2

Boreholes Logs

# APPENDIX C1

## Test Pit Profiles

Knight Piésold CONSULTING

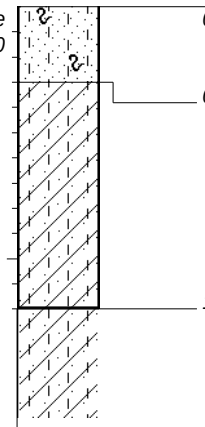
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP01
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Slightly moist, grey streaked yellow, loose, pinholed, silty SAND, with fine roots. Coarse **ALLUVIUM**. |
| 0.30 | Slightly moist, dark greyish brown mottled to blotched yellow, stiff, shattered with a blocky structure, sandy silty CLAY. Fine **ALLUVIUM**. |
| 1.20 | EOH: Termination of excavator due to slow excavation on CLAY. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 22 May 2023
*DATE :* 22 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800659
*Y-COORD :* 7584200

*HOLE No:* HLP-TP01

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

Knight Piésold CONSULTING

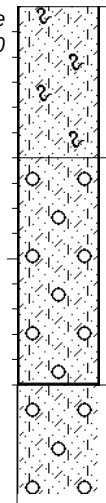
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP02
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry to slightly moist, reddish orange brown, medium dense, pinholed, clayey silty SAND, with abundant fine roots. Fine **ALLUVIUM**. |
| 0.60 | Dry to slightly moist, yellowish brown speckled to occasionally mottled black stained orange, dense, intact to pinholed, clayey gravelly silty SAND. Ferruginous **ALLUVIUM**.<br>Note:<br>1. Ferricrete nodules present (<5mm diameter). |
| 1.50 | EOH: Terminated near confined refusal, due to very slow excavation on material as above. Material rippable. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 23 May 2023
*DATE :* 23 May 2023

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800189
*Y-COORD :* 7585668

*HOLE No:* HLP-TP02

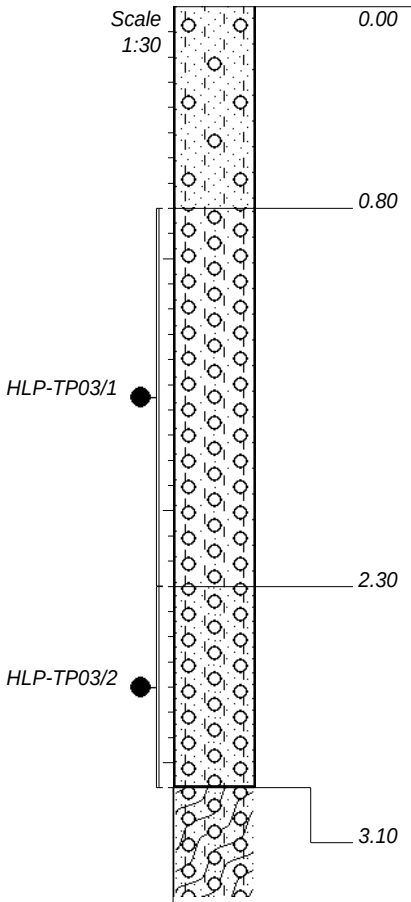
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP03
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry to slightly moist, yellowish brown mottled brown, medium dense, intact to slightly pinholed, gravelly silty SAND. Fine **ALLUVIUM**.

*0.80*

Dry to slightly moist, yellowish brown to khaki slight reddish brown pockets, dense, intact, silty sandy GRAVEL, with minor cobbles. Calcified coarse **ALLUVIUM**.

Note:
1. Calcrete nodules present (<20mm diameter).
2. Cobbles comprise sub-angular to subrounded quartz.

*2.30*

Dry to slightly moist, khaki to white streaked to banded black with pockets of reddish brown, medium dense to dense, relict jointing and gneissic banding with intact pockets, silty sandy GRAVEL to silty gravelly SAND. Calcified **RESIDUAL GNEISS**, with pockets of completely weathered gneiss (biotite gneiss).

Note:
1. Calcrete nodules present (<15mm).

*3.10*

EOH: Refusal of excavator on material as above, but dense, tending to completely weathered, very soft rock biotite GNEISS.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample HLP-TP03/1 taken from 0.8m--2.3m.
4) Disturbed sample HLP-TP03/2 taken from 2.3m--3.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 22 May 2023
*DATE :* 22 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800632
*Y-COORD :* 7585869

*HOLE No:* HLP-TP03

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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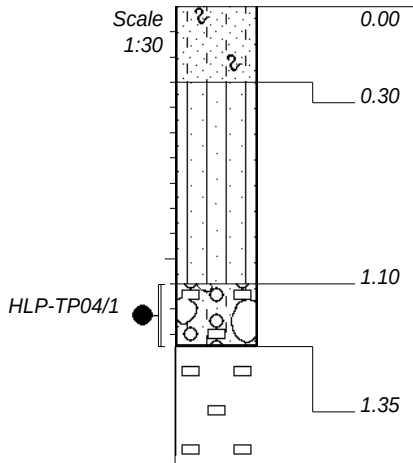
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP04
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, reddish brown, very loose, intact, silty fine to medium SAND, with roots. Fine **ALLUVIUM**.

Slightly moist, dark brown to reddish brown mottled white, weakly to moderately cemented, medium dense, sandy SILT, with scattered traces of calcrete nodules. Calcified **ALLUVIUM**.

Slightly moist, light brown blotched white, medium dense, sandy silty GRAVEL, comprising abundant calcrete nodules and cobbles. **NODULAR CALCRETE** tending to **HONEYCOMB CALCRETE**.

EOH: Refusal of excavator on very strongly cemented, HONEYCOMB CALCRETE of medium hard rock consistency.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample HLP-TP04/1 taken at 1.1m--1.35m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801350.85
*Y-COORD :* 7586209.65

*HOLE No:* HLP-TP04

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

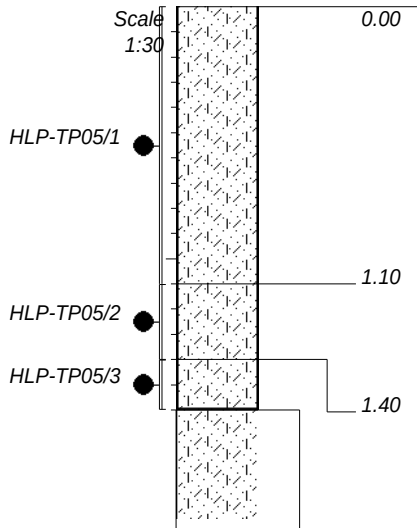
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP05
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| *0.00* | Dry, orange to reddish brown, medium dense, pinholed, clayey silty SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Abundant roots present at top 200mm. |
| *1.10* | Dry, yellowish brown, medium dense to dense, intact to pinholed, clayey silty SAND, with traces of sub-angular to subrounded quartz fine gravel. Fine **ALLUVIUM**. |
| *1.40* | Dry, dark greyish brown mottled black mottled to blotched yellow to orange, dense, intact to slightly honeycombed, clayey silty SAND, with traces of sub-angular to subrounded quartz gravel. Ferruginous **ALLUVIUM**.<br>Note:<br>1. Ferricrete nodules present (<7mm diameter). |
| *1.60* | EOH: Terminated near confined refusal, due to very slow excavation on material as above, but dense. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample HLP-TP05/1 taken from 0.0m--1.1m.
4) Disturbed sample HLP-TP05/2 taken from 1.1m--1.4m.
5) Disturbed sample HLP-TP05/3 taken from 1.4m--1.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 23 May 2023
*DATE :* 23 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800101
*Y-COORD :* 7585074

*HOLE No:* HLP-TP05

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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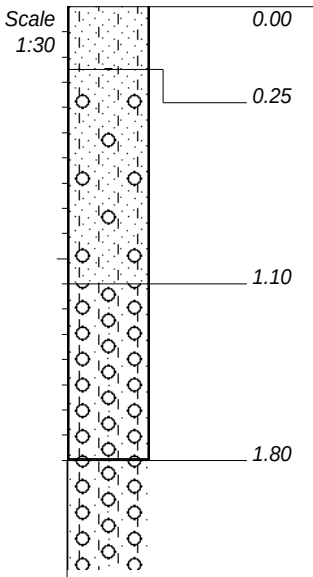
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP06
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| *0.00* | Dry, light brown, loose becoming medium dense, intact, silty fine SAND. Fine **ALLUVIUM**. |
| *0.25* | Slightly moist, light brown to pale brown, medium dense to dense, weakly to moderately cemented, gravelly silty fine SAND. Calcified **ALLUVIUM**. |
| *1.10* | Slightly moist, light brown stained iron oxide, dense, sandy silty medium to coarse GRAVEL. Calcareous **RESIDUAL GNEISS**. |
| *1.80* | EOH: Refusal of excavator on very dense calcareous RESIDUAL GNEISS. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20 May 2023
*DATE :* 20 May 2023

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 800597.01
*Y-COORD :* 7585212.77

*HOLE No:* HLP-TP06

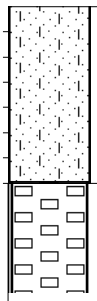
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP07
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00* Dry, reddish brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.

*0.70* EOH: Refusal of excavator on slightly moist, pale brown blotched white, very strongly cemented, HARDPAN CALCRETE of medium hard rock consistency.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801701.70
*Y-COORD :* 7585778.61

*HOLE No:* HLP-TP07

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

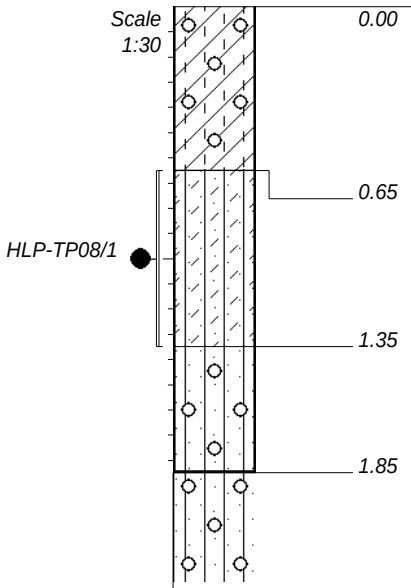
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP08
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist to moist, dark brown, firm, blocky shattered, gravelly silty CLAY. Fine **ALLUVIUM**.<br>Note:<br>1. Gravel comprises minor calcrete nodules, with subrounded fine to medium quartz. |
| 0.65 | Slightly moist, brown, firm, clayey sandy silt. Fine **ALLUVIUM**. |
| 1.35 | Slightly moist, pale brown, dense to very dense, moderately to strongly cemented, gravelly sandy silt. Calcified **ALLUVIUM**. |
| 1.85 | EOH: Refusal of excavator on very dense, very strongly cemented, calcified ALLUVIUM of soft rock strength. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample HLP-TP08/1 taken at 0.65m--1.35m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801019.00
*Y-COORD :* 7585750.00

*HOLE No:* HLP-TP08

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

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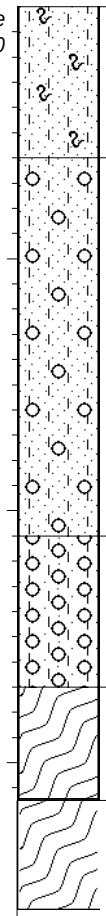
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP09
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry, light brown, very loose, intact, silty fine SAND, with plant roots. Fine **ALLUVIUM**. |
| 0.60 | Slightly moist, light reddish brown, medium dense, intact, gravelly silty fine SAND. Calcareous **ALLUVIUM**. |
| 2.10 | Slightly moist, brown stained iron oxide, medium dense, matrix supported, sandy silty abundant sub-angular fine coarse quartz GRAVEL. Coarse **ALLUVIUM** (Pebble marker.) |
| 2.70 | Grey to brown streaked white, completely weathered, medium grained, very soft rock GNEISS. |
| 3.15 | EOH: Refusal of excavator on highly weathered, medium grained, soft rock GNEISS. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20 May 2023
*DATE :* 20 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 800837.00
*Y-COORD :* 7584690.00

*HOLE No:* HLP-TP09

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

D079 E Mouton

dotPLOT 7022 PBpH7

Knight Piésold CONSULTING

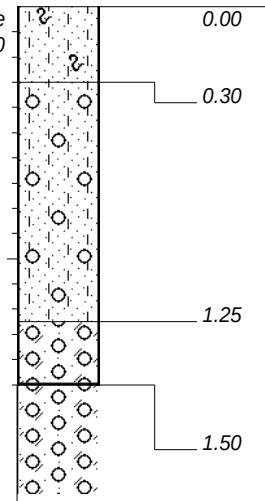
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP10
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| 0.00 | Slightly moist, light brown, very loose to loose, intact, silty fine to medium SAND, with plant roots. Fine **ALLUVIUM**. |
| 0.30 | Slightly moist, light brown, medium dense to dense, intact, poorly to moderately cemented, gravelly silty fine to medium SAND. Calcified **ALLUVIUM**. |
| 1.25 | Slightly moist, dark brown stained orange, moderately cemented, sandy clayey subrounded fine to medium GRAVEL. Ferruginised **ALLUVIUM** of soft rock strength. |
| 1.50 | EOH: Refusal of excavator on strongly cemented, ferruginised ALLUVIUM of soft to medium hard rock strength. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801915.33
*Y-COORD :* 7585227.33

*HOLE No:* HLP-TP10

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

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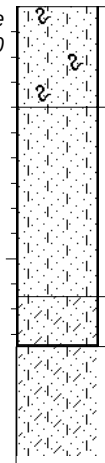
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP11
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Slightly moist, light brown, loose, intact, silty fine SAND, with plant roots. Fine **ALLUVIUM**. |
| 0.40 | Slightly moist, light brown, medium dense, silty fine to medium SAND. Calcareous **ALLUVIUM**. |
| 1.15 | Slightly moist, light orange brown, very dense, moderately cemented, clayey silty fine SAND. Calcified **ALLUVIUM** of soft rock strength. |
| 1.35 | EOH: Refusal of excavator on very dense, strongly cemented, calcified ALLUVIUM. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801321.00
*Y-COORD :* 7585404.00

*HOLE No:* HLP-TP11

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

Knight Piésold CONSULTING

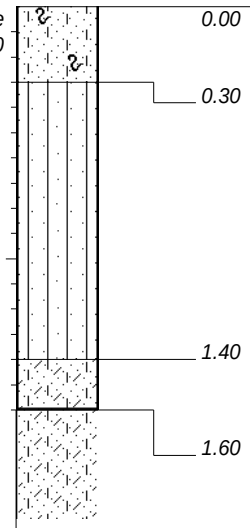
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP12
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| 0.00 | Slightly moist, light brown, loose, intact, silty fine SAND, with plant roots. Fine **ALLUVIUM**. |
| 0.30 | Slightly moist, light brown, firm, intact, sandy SILT. Calcareous **ALLUVIUM**. |
| 1.40 | Slightly moist, light orange brown, moderately cemented, dense, clayey silty fine SAND. Calcified **ALLUVIUM**. |
| 1.60 | EOH: Refusal of excavator on very dense, strongly cemented, calcified **ALLUVIUM**. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801251.02
*Y-COORD :* 7585169.08

*HOLE No:* HLP-TP12

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

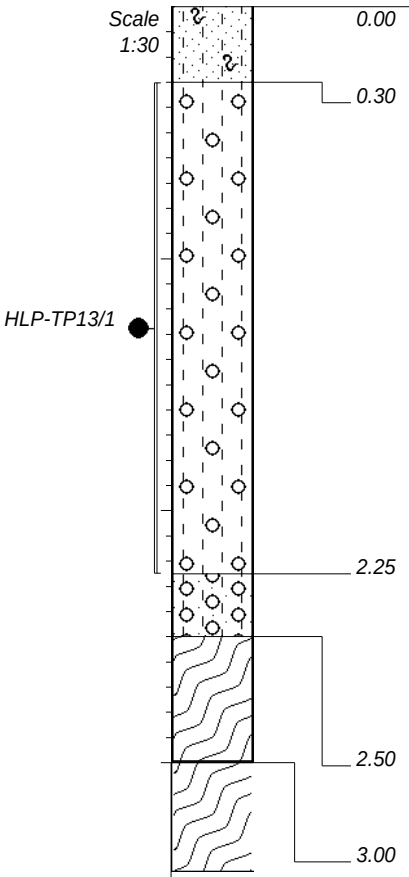
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP13
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.30: Dry, light brown, loose, intact, silty fine SAND, with plant roots. Fine **ALLUVIUM**.

0.30 – 2.25: Slightly moist, light brown to brown, medium dense, intact, gravelly silty fine SAND> Calcareous **ALLUVIUM**.

2.25 – 2.50: Slightly moist, brown stained iron oxide, dense, matrix supported, sandy silty GRAVEL, comprising fine to medium, subrounded to sub-angular quartz. Coarse **ALLUVIUM**.
Note:
1. Traces of ferricrete nodules.

2.50 – 3.00: Grey to brown streaked and banded white, completely weathered, very soft rock GNEISS.

EOH: Refusal of excavator on highly weathered, soft rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample HLP-TP13/1 taken at 0.3m--2.25m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20 May 2023
*DATE :* 20 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801093.27
*Y-COORD :* 7584385.61

*HOLE No:* HLP-TP13

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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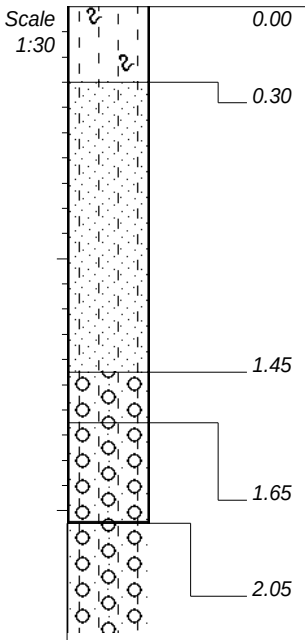
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP14
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist, light brown, very loose, intact, silty fine AND, with roots. Fine **ALLUVIUM**.

Slightly moist, light brown, loose to medium dense, silty medium SAND. Calcareous **ALLUVIUM**.

Slightly moist, brown stained iron oxide, medium dense, matrix supported, sandy silty GRAVEL, comprising abundant subangular fine to coarse quartz gravel. Coarse **ALLUVIUM**.

Dark brown stained iron oxide, dense, silty sandy subangular fine grained GRAVEL. **RESIDUAL GNEISS**.

EOH: Refusal of excavator on very dense **RESIDUAL GNEISS**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No Disturbed samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801470.07
*Y-COORD :* 7584802.62

*HOLE No:* HLP-TP14

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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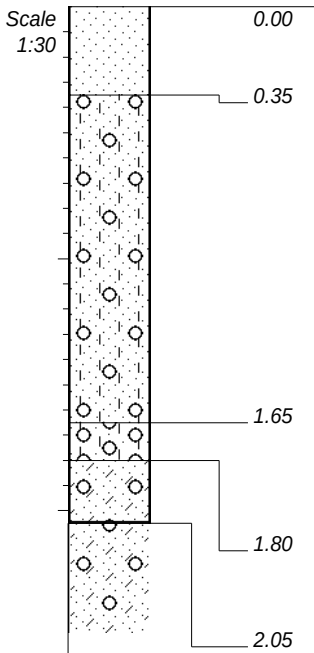
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP15
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, light brown, very loose, intact, silty fine SAND. Fine **ALLUVIUM**.

Slightly moist, light brown, medium dense to dense, poorly to moderately cemented, gravelly silty fine to medium SAND. Calcified **ALLUVIUM**.

Slightly moist, brown stained iron oxide, medium dense, matrix supported, silty sandy GRAVEL, comprising abundant medium sub-angular quartz gravel. Coarse **ALLUVIUM**.

Slightly moist, dark brown stained orange, dense, moderately cemented, gravelly clayey medium SAND. Ferruginised **ALLUVIUM**.

EOH: Refusal of excavator on very dense, strongly cemented, ferruginised **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No Disturbed samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802066.00
*Y-COORD :* 7584902.00

*HOLE No:* HLP-TP15

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

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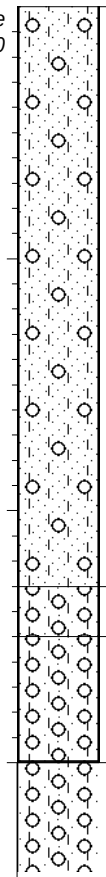
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP16
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Slightly moist, orange brown slightly speckled white and black, dense, intact to slightly pinholed, fine gravelly silty SAND. **ALLUVIUM**.<br>Note:<br>1. Abundant roots present at top 200mm of layer. |
| 2.30 | |
| | Slightly moist, orange brown slightly spekled white to mottled black, dense, intact to slightly pinholed, silty sandy GRAVEL, with minor cobbles. Gravel and cobbles comprise sub-angular to subrounded whitish grey quartz. **PEBBLE MARKER**.<br>Note:<br>1. Ferricrete nodules present (<6mm). |
| 2.50 | |
| | Slightly moist, grey to white speckled to mottled black stained orange, dense, relict jointing, silty sandy GRAVEL. Ferruginised **RESIDUAL GNEISS**.<br>Note:<br>1. Occasional ferricrete nodules present (<4mm). |
| 3.00 | |
| | EOH: Refusal of excavator on material as above, but dense to very dense consistency. Residual soil tending to completely weathered GNEISS. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 22 May 2023
*DATE :* 22 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801209
*Y-COORD :* 7584039

*HOLE No:* HLP-TP16

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

Knight Piésold CONSULTING

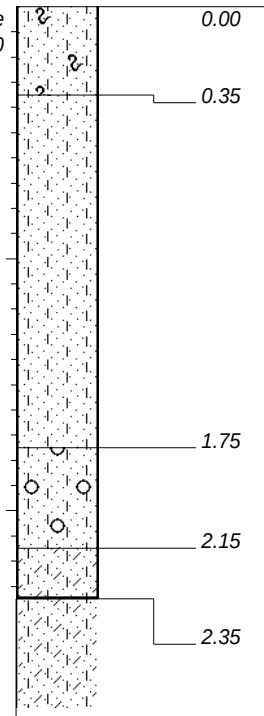
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP17
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| 0.00 | Dry to slightly moist, light brown, loose, silty fine to medium SAND, with roots. Fine **ALLUVIUM**. |
| 0.35 | Slightly moist, pale brown, medium dense, intact, silty fine SAND. Calcareous **ALLUVIUM**. |
| 1.75 | Slightly moist, pale brown, dense to very dense, moderately cemented, gravelly silty SAND. Calcified **ALLUVIUM**. |
| 2.15 | Slightly moist, brown stained iron oxide, dense, moderately to strongly cemented, clayey silty medium SAND. Ferruginised **ALLUVIUM**. |
| 2.35 | EOH: Refusal of excavator on very dense, strongly cemented, ferruginised **ALLUVIUM**. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No Disturbed samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 19 May 2023
*DATE :* 19 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801663.45
*Y-COORD :* 7584447.86

*HOLE No:* HLP-TP17

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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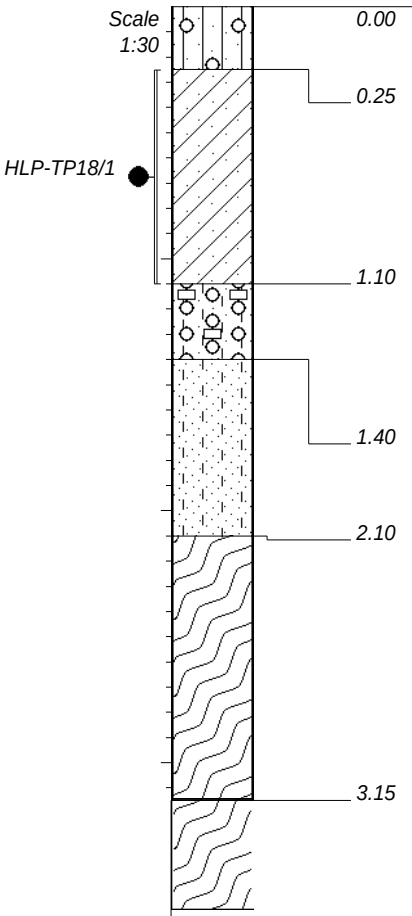
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP18
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist, brown, soft, shattered, gravelly sandy SILT. Fine **ALLUVIUM**. |
| 0.25 | Slightly moist, dark brown, firm, slickensided, sandy CLAY. Fine **ALLUVIUM**.<br>Note:<br>1. Traces of subrounded medium quartz gravel. |
| 1.10 | Slightly moist, light brown mottled white, medium dense to dense, poorly to moderately cemented, sandy silty GRAVEL, comprising abundant calcrete nodules and subrounded to sub-angular medium to coarse quartz gravel. Calcified **ALLUVIUM**. |
| 1.40 | Slightly moist, light brown to dark grey, medium dense, intact, silty SAND. **RESIDUAL GNEISS**. |
| 2.10 | Light brown to grey, completely weathered, medium grained, extremely soft to very soft rock GNEISS. |
| 3.15 | EOH: Refusal of excavator on highly weathered, medium grained, soft rock GNEISS. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample HLP-TP18/1 taken at 0.25m--1.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802000.00
*Y-COORD :* 7584198.00

*HOLE No:* HLP-TP18

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

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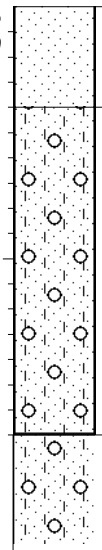
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP19
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00*

Dry to slightly moist, light orange brown, loose, intact, silty fine SAND. **ALLUVIUM**.

*0.40*

Slightly moist, light brown speckled white, medium dense becoming dense, moderately cemented, gravelly silty SAND. Calcified **ALLUVIUM** of very soft to soft rock strength.

*1.70*

EOH: Refusal of excavator on very dense, very strongly cemented, calcified **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802208.97
*Y-COORD :* 7584520.16

*HOLE No:* HLP-TP19

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

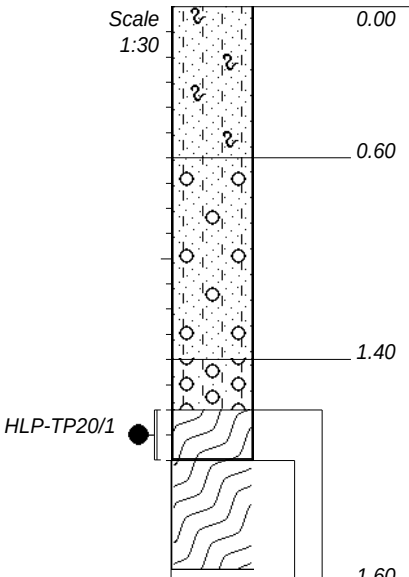
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP20
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Dry, brown, medium dense, intact to slightly pinholed, silty SAND, with fine roots. Fine **ALLUVIUM**. |
| 0.60 | Dry yellowish brown speckled black, medium dense, intact to slightly pinholed, silty fine gravelly SAND. Fine **ALLUVIUM**. |
| 1.40 | Dry, yellowish brown to khaki brown stained orange yellow mottled black, medium dense to dense, matrix supported, silty sandy GRAVEL, comprising subrounded to rounded gravel of mixed origin. Ferruginised **PEBBLE MARKER**.<br>Note:<br>1. Ferricrete nodules present (20mm). |
| 1.60 | Completely weathered, white speckled to streaked black stained khaki and orange, medium to coarse grained, gneissic banding, moderately jointed, very soft rock GNEISS.<br>Note:<br>1. Slightly ferruginised. |
| 1.80 | EOH: Refusal of excavator on material as above, but highly to moderately weathered, soft to medium hard rock biotite GNEISS. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample HLP-TP20/1 taken from 1.6m--1.8m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 23 May 2023
*DATE :* 23 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801428
*Y-COORD :* 7583326

*HOLE No:* HLP-TP20

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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Knight Piésold CONSULTING

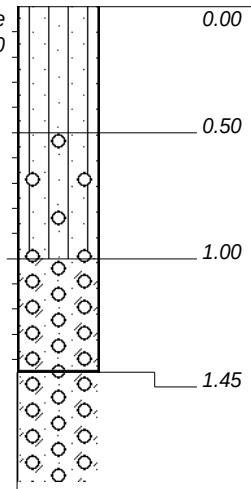
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP21
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| 0.00 | Dry, brown to light brown, soft to firm, intact, sandy SILT, with traces of plant roots. **ALLUVIUM**. |
| 0.50 | Slightly moist, grey to brown, firm to stiff, moderately cemented, gravelly sandy SILT. Calcified **ALLUVIUM** of very soft rock strength. |
| 1.00 | Slightly moist, grey to brown, dense, moderately cemented, sandy clayey abundant, sub-angular, medium to coarse GRAVEL. Ferruginised **ALLUVIUM**. |
| 1.45 | EOH: Refusal of excavator on very dense, ferruginised **ALLUVIUM**. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20 May 2023
*DATE :* 20 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801505.04
*Y-COORD :* 7583835.86

*HOLE No:* HLP-TP21

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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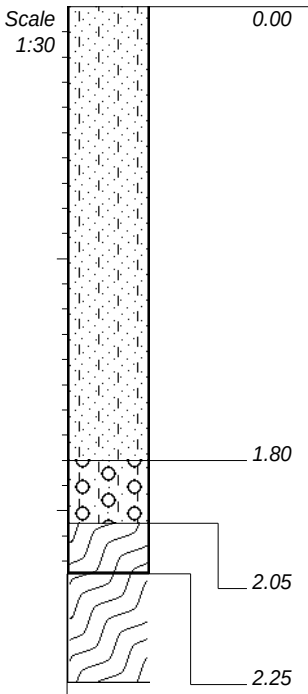
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP22
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, light brown, loose to medium dense, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Presence of plant roots to a depth of 300mm.

Dry, brown stained iron oxide, medium dense, matrix supported, sandy silty GRAVEL, comprising abundant fine to medium, sub-angular quartz gravel. Coarse **ALLUVIUM**. (Pebble marker.)

Brown to grey speckled black streaked white, completely to highly weathered, very soft to soft rock GNEISS.

EOH: Refusal of excavator on highly weathered, brown to grey streaked white, soft to medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No Disturbed samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20 May 2023
*DATE :* 20 May 2023

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801964.23
*Y-COORD :* 7583574.80

*HOLE No:* HLP-TP22

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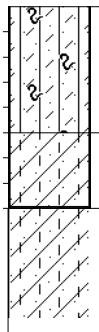
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP23
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00 Dry, dark brown, soft to firm, fissured, clayey sandy SILT, with abundant plant roots. Fine **ALLUVIUM**.

0.50 Slightly moist, dark brown, firm to stiff, shattered, silty sandy CLAY. Fine **ALLUVIUM**.

Note:

1. Scattered traces of subrounded to sub-angular medium quartz gravel.

0.80 EOH: Refusal of excavator on very stiff material as above.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No Disturbed samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20 May 2023
*DATE :* 20 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801808.00
*Y-COORD :* 7583693.00

*HOLE No:* HLP-TP23

*TYPE SET BY :* EM
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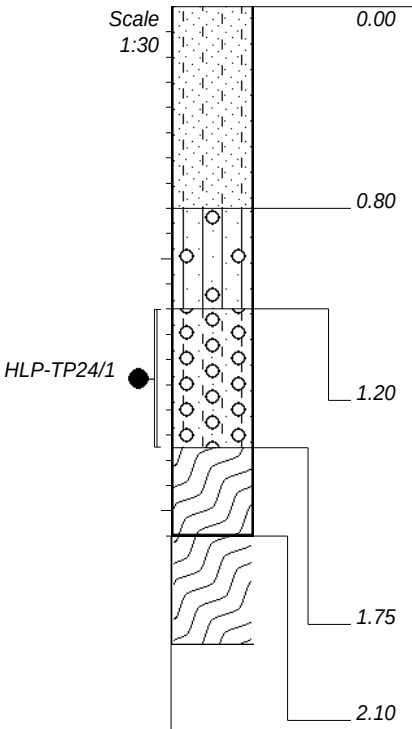
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP24
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.80: Slightly moist, light brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.

0.80 – 1.20: Slightly moist, pale brown, firm, poorly cemented, gravelly sandy SILT. Calcareous **ALLUVIUM**.
Note:
1. Gravel comprises coarse subrounded to sub-angular, fine to medium grained quartz.

1.20 – 1.75: Slightly moist, brown, medium dense, matrix supported, sandy silty abundant subrounded to sub-angular, medium to coarse grained, quartz GRAVEL. Coarse **ALLUVIUM**. (Pebble marker.)
Notes:
1. Minor scattered cobbles at base of strata.
2. Traces of ferricrete nodules.

1.75 – 2.10: Brown to grey, completely to highly weathered, medium grained, very soft to soft rock GNEISS.

2.10: EOH: Refusal of excavator on brown to grey, highly weathered, medium grained, soft rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed samples HLP-TP24/1 taken at 1.2m--1.75m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802094.00
*Y-COORD :* 7583908.00

*HOLE No:* HLP-TP24

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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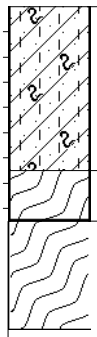
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP25
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00* Slightly moist to dry, brown to dark brown, firm, shattered, sandy silty CLAY, with roots. Fine **ALLUVIUM**.

*0.65* Grey to brown, highly to completely weathered, very closely jointed, medium grained, soft rock GNEISS.

*0.85* EOH: Refusal of excavator on medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802527.33
*Y-COORD :* 7584011.03

*HOLE No:* HLP-TP25

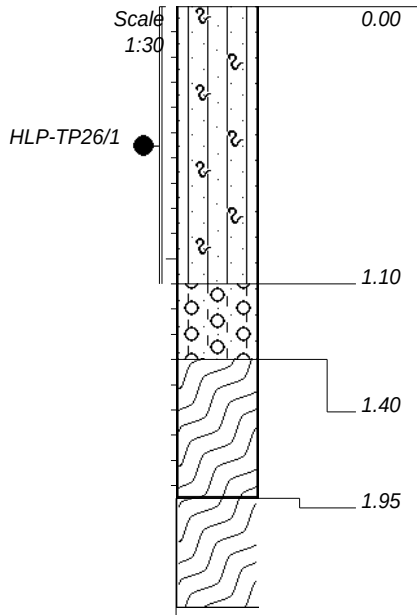
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP26
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, pale brown to brown, firm, fissured, sandy SILT, with roots. Fine **ALLUVIUM**.

Slightly moist, brown mottled iron oxide, medium dense, matrix supported, silty sandy GRAVEL, comprising medium, subrounded to sub-angular quartz GRAVEL. Coarse **ALLUVIUM**. (Pebble Marker.)

Brown to grey speckled and streaked white, completely weathered, medium grained, very soft rock GNEISS.

EOH: Refusal of excavator on brown to grey, completely weathered, medium grained, soft to medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample HLP-TP26/1 taken at 0.0m--1.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802563.00
*Y-COORD :* 7583862.00

*HOLE No:* HLP-TP26

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

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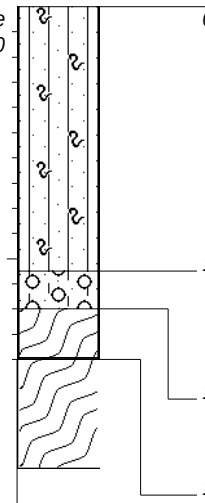
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP27
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| 0.00 | Slightly moist, light brown to brown, soft becoming firm with depth, shattered, sandy SILT, with plant roots. Fine **ALLUVIUM**. |
| 1.05 | Slightly moist, brown stained iron oxide, medium dense, matrix supported, silty sandy GRAVEL, comprising abundant fine to medium, subrounded to sub-angular quartz GRAVEL. Coarse **ALLUVIUM**. (Pebble Marker.) |
| 1.20 | Brown grey speckled and streaked white, completely weathered, medium grained, very soft rock GNEISS. |
| 1.40 | EOH: Refusal of excavator on brown to grey, completely weathered, soft rock GNEISS. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 18 May 2023
*DATE :* 18 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802323.97
*Y-COORD :* 7584004.09

*HOLE No:* HLP-TP27

*TYPE SET BY :* EM
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*DATE :* 04/07/2023 13:44
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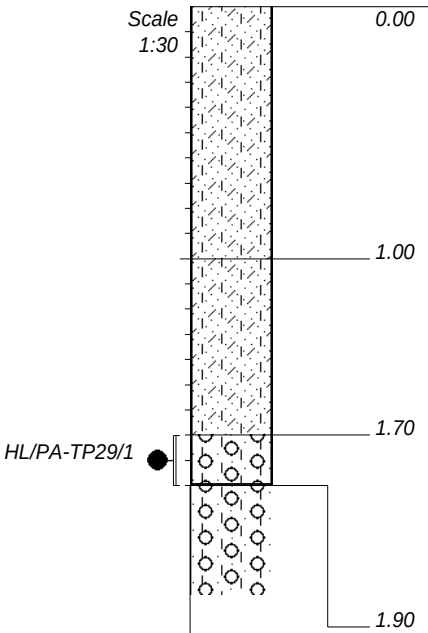
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HL/PA-TP29
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 1.00: Dry, brown, medium dense, intact with horizon slightly honeycomb in upper 100mm, clayey silty coarse SAND. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots present.

1.00 – 1.70: Dry, yellowish brown speckled black, medium dense, intact to slightly pinholed, clayey silty SAND, with minor coarse sand to fine gravel. Fine **ALLUVIUM**.

1.70 – 1.90: Dry, yellowish brown to khaki blotched black slightly stained orange, dense, matrix supported, silty sandy GRAVEL, with trace to minor subrounded cobbles of quartz. Ferruginous **PEBBLE MARKER**.
Note:
1. Ferruginisation at nodular to honeycomb stage, very weakly cemented.

1.90: EOH: Refusal of excavator on material as above, but cementation stronger. **HONEYCOMB FERRICRETE**.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Scattered small termite mounds near test pit.
4) Disturbed sample HL/PA-TP29/1 taken from 1.7m--1.9m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 23 May 2023
*DATE :* 23 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801863
*Y-COORD :* 7583191

*HOLE No:* HL/PA-TP29

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
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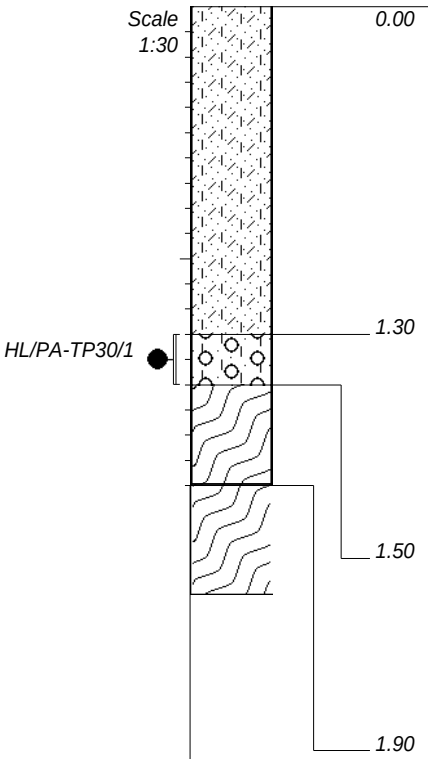
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HL/PA-TP30
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 1.30: Dry, brown, medium dense, pinholed, clayey silty SAND, with minor sub-angular to subrounded fine gravel of mixed origin. Fine **ALLUVIUM**.
Note:
1. Scattered roots present.

1.30 – 1.50: Dry brown mottled black slightly stained red, dense, matrix supported, silty sandy GRAVEL, with abundant sub-angular to subrounded cobbles to boulders of quartz. **PEBBLE MARKER**.
Note:
1. Ferricrete nodules present (<40mm).
2. Very undulating horizon.

1.50 – 1.90: Highly weathered, white speckled to streaked black stained orange, medium to coarse grained, gneissic banding, widely to very widely jointed, soft rock GNEISS.
Note:
1. Very undulating horizon.

1.90: EOH: Refusal of excavator on material as above, but moderately weathered, medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample HL/PA-TP30/1 taken from 1.3m--1.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 25 May 2023
*DATE :* 25 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800808
*Y-COORD :* 7582253

*HOLE No:* HL/PA-TP30

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:44*
*TEXT : ..51\PROFILES\PKFHLPTP.TXT*

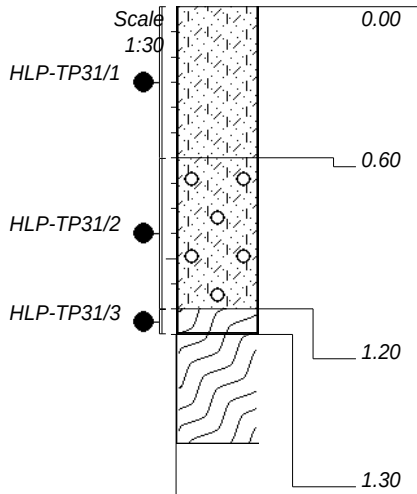
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* HLP-TP31
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.60: Dry, brown to yellowish brown, medium dense, pinholed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Fine roots present.

0.60 – 1.20: Dry, dark greyish brown mottled yellow and orange, dense, intact, clayey silty gravelly SAND, with minor subrounded gravel of mixed origin. Ferruginised coarse **ALLUVIUM**.
Note:
1. Ferricrete nodules present.

1.20 – 1.30: Highly weathered with pockets of completely weathered, whitish grey speckled to banded black speckled gold, medium to coarse grained, gneissic banding, moderately jointed, very soft rock GNEISS.

1.30: EOH: Refusal of excavator on material as above, but moderately weathered.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample HLP-TP31/1 taken from 0.0m--0.6m.
4) Disturbed sample HLP-TP31/2 taken from 0.6m--1.2m.
5) Disturbed sample HLP-TP31/3 taken from 1.2m--1.3m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 23 May 2023
*DATE :* 23 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0809373
*Y-COORD :* 7586039

*HOLE No:* HLP-TP31

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:44
*TEXT :* ..51\PROFILES\PKFHLPTP.TXT

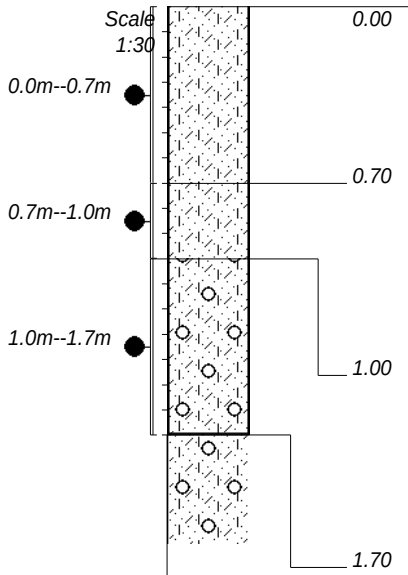
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* Plant-TP32
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown to orange brown, medium dense, intact to pinholed, clayey silty coarse SAND. Fine **ALLUVIUM**.
Note:
1. Roots present at top 200mm.

Dry, orange to yellowish brown, medium dense to dense with depth, pinholed, clayey silty fine to coarse SAND, with minor fine gravel. Coarse **ALLUVIUM**.
Note:
1. Scattered fine roots present.

Dry, orange brown mottled to blotched red and dark grey slightly mottled black, dense, intact to pinholed, clayey silty gravelly SAND. Ferruginised **ALLUVIUM**.
Note:
1. Ferricrete nodules present (<20mm).

EOH: Refusal of excavator due to slow excavation on material as above, but more dense/cemented. Nodular ferruginised **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Sample Plant-TP32/1 taken from 0.0m--0.7m.
4) Sample Plant-TP32/2 taken from 0.7m--1.0m.
5) Sample Plant-TP32/3 taken from 1.0m--1.7m.

*CONTRACTOR :*
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :*
*DATE :* 24 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801124
*Y-COORD :* 7583069

*HOLE No:* Plant-TP32

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 10/07/2023 12:40
*TEXT :* ..\PROFILES\PKFPLANTTP.TXT

Knight Piésold CONSULTING

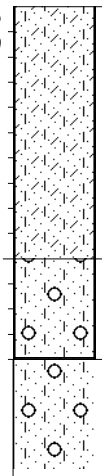
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* Plant-TP33
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00 Dry, orange brown, medium dense to dense with depth, intact to pinholed, clayey silty SAND with coarse sand to fine gravel. Fine **ALLUVIUM**.
Note:
1. Roots present at top 200mm.

1.00 Dry, brown mottled black blotched orange slightly speckled white, dense, pinholed to honeycombed, fine gravelly silty SAND. Ferruginised **ALLUVIUM**.

1.40 EOH: Refusal of excavator due to slow excavation on material as above, but more ferruginised, dense. Ferruginised **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

*CONTRACTOR :*
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* Chris Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :*
*DATE :* 24 May 2023

*DATE :* 10/07/2023 12:40
*TEXT :* ..\PROFILES\PKFPLANTTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801376
*Y-COORD :* 7583021

*HOLE No:* Plant-TP33

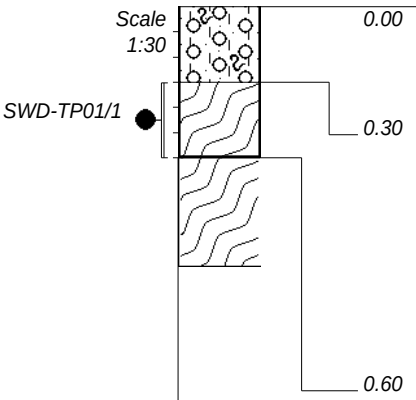
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP01
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, dense, matrix supported, silty sandy GRAVEL, with minor sub-angular to subrounded quartz cobbles. Coarse **COLLUVIUM**, with roots. Interpreted as surface pebble marker.

Highly weathered, white speckled and streaked black stained orange, medium to coarse grained, gneissic banding, closely jointed, soft to medium hard rock with depth, GNEISS.
Note:
1 Very undulating horizon.
2. Brown, clayey silty sand infilling on joints, <2mm thick with occasional pockets in places.

EOH: Refusal of excavator on material as above, but moderately weathered, medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP01/1 taken at 0.3m--0.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 25 May 2023
*DATE :* 25 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800870
*Y-COORD :* 7582003

*HOLE No:* SWD-TP01

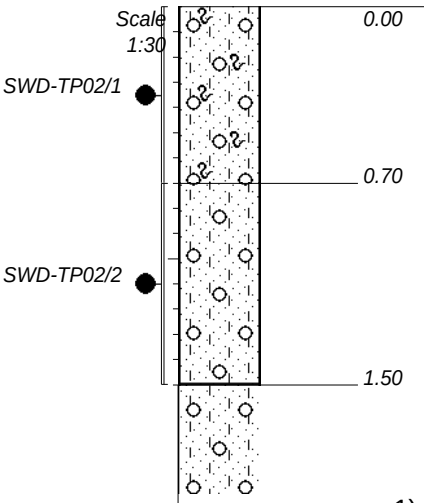
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP02
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown occasional mottled black, dense, intact, gravelly silty SAND with roots, with occasional thick roots throughout horizon. Fine **ALLUVIUM**.

Dry, yellowish brown streaked to blotched white and occasionally black, medium dense to dense, intact, gravelly silty SAND, with calcrete nodules (<20mm), with honeycomb formation in places, very weakly to weakly cemented. Calcified **ALLUVIUM**.

EOH: Refusal of excavator on material as above, moderately cemented.

NOTES

1) No groundwater seepage encountered.
2) Sidewalls stable.
3) Disturbed sample SWD-TP02/1 taken at 0.0m--0.7m.
4) Disturbed sample SWD-TP02/2 taken at 0.7m--1.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 24 May 2023
*DATE :* 24 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801049
*Y-COORD :* 7582030

*HOLE No:* SWD-TP02

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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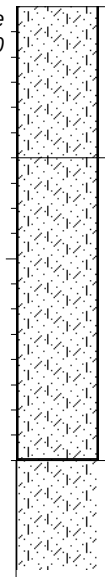
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP03
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry, dark brown, dense, intact to blocky, clayey silty SAND to coarse sand. Fine **ALLUVIUM**. |
| 0.60 | Dry, dark brown to green brown slightly mottled yellow speckled to mottled white, dense, pinholed, clayey silty SAND, with trace fine gravel of mixed origin. Fine **ALLUVIUM**.<br>Note:<br>1. Calcrete nodules present (<10mm). |
| 1.80 | EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly more dense. |

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 24 May 2023
*DATE :* 24 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801151
*Y-COORD :* 7581871

*HOLE No:* SWD-TP03

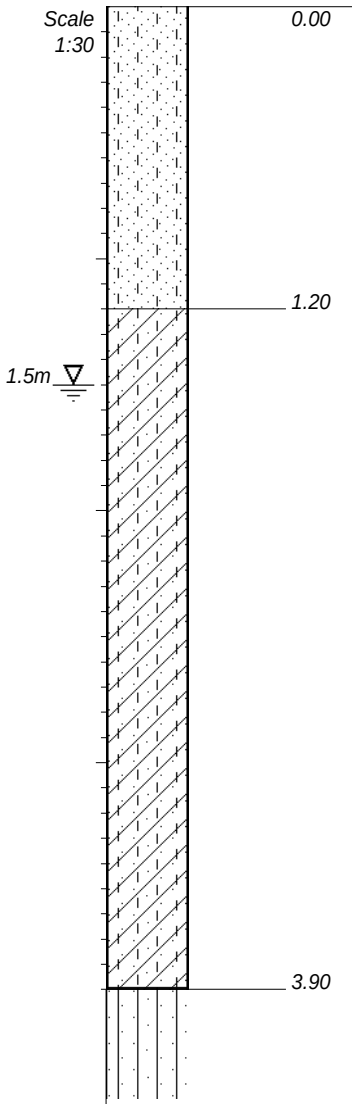
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP04
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 1.20: Moist, light brown, very loose, intact, silty coarse SAND. Fine **ALLUVIUM**.
Note:
1. Scattered minor subrounded fine to medium quartz gravel.

1.20 – 3.90: Moist, dark reddish brown, firm, slickensided, sandy silty CLAY. Fine **ALLUVIUM**.

3.90: EOH: Refusal of excavator on brown to grey, very stiff sandy SILT. **RESIDUAL GNEISS**.

NOTES

1) Perched groundwater table encountered at 1.5m.
2) Sidewalls stable.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801747
*Y-COORD :* 7581888

*HOLE No:* SWD-TP04

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

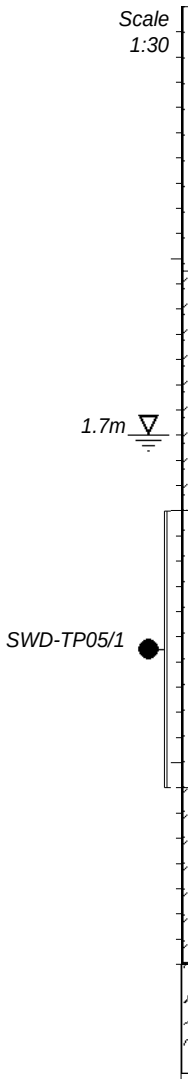
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP05
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist, light brown, very loose, intact, silty medium SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Isolated traces of subrounded fine to medium quartz gravel. |
| 1.05 | Moist, brown, very loose, intact, clayey silty medium to coarse SAND. Fine **ALLUVIUM**. |
| 2.00 | Wet, dark grey, medium dense, intact, silty sandy GRAVEL, comprising abundant subrounded fine to coarse quartz gravel, with traces of cobbles and boulders. Coarse **ALLUVIUM**. |
| 3.10 | Wet, brown mottled yellow, medium dense, intact, clayey sandy GRAVEL, comprising abundant subrounded coarse quartz gravel, with traces of cobbles and boulders. Coarse **ALLUVIUM** (Pebble Marker). |
| 3.80 | EOH: Refusal of excavator on highly weathered, medium grained, medium hard rock GNEISS. |

NOTES

1) Perched groundwater table encountered at 1.7m.
2) Severe collapse of sidewalls.
3) Disturbed sample SWD-TP05/1 taken at 2.0m--3.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801539
*Y-COORD :* 7581592

*HOLE No:* SWD-TP05

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 07/07/2023 14:15*
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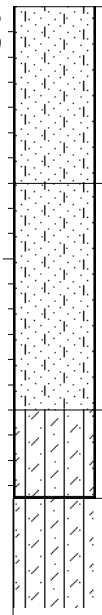
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP06
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00* Dry to slightly moist, light brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.

Note:
1. Traces of plant roots.

*0.70* Dry, brown, medium dense, intact, silty fine SAND. Fine **ALLUVIUM**.

*1.60* Slightly moist, dark reddish brown, medium dense to dense, intact, moderately cemented, clayey sandy SILT. Ferruginised **ALLUVIUM**.

*1.95* EOH: Refusal of excavator on material as above.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801555
*Y-COORD :* 7581382

*HOLE No:* SWD-TP06

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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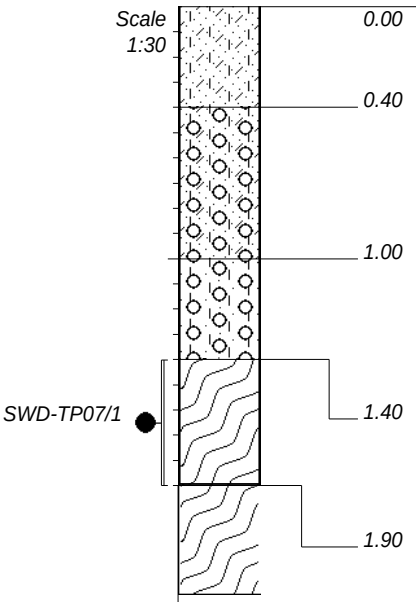
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP07
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, dark brown, dense, intact to blocky, clayey silty SAND to coarse sand. Fine **ALLUVIUM**.

Dry, dark brown speckled white, dense, intact to slightly pinholed, clayey silty SAND, with abundant fine to medium GRAVEL. Gravel comprises sub-angular to subrounded gravel of mixed origin. Coarse **ALLUVIUM**.

Dry, brown to green brown slightly mottled yellow, white and black, medium dense to dense, matrix supported, silty sandy GRAVEL, with traces of sub-angular to subrounded cobbles to boulders of gneiss and quartz. **PEBBLE MARKER**.

Completely weathered, green speckled to streaked black and white and gold, slightly streaked orange, medium to coarse grained, gneissic banding, extremely closely jointed, very soft rock biotite GNEISS.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but highly weathered, soft rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP07/1 taken at 1.4m--1.9m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 24 May 2023
*DATE :* 24 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* k33 0801373
*Y-COORD :* 7581928

*HOLE No:* SWD-TP07

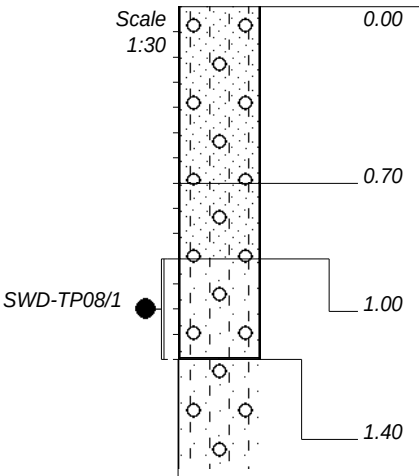
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP08
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, light brown, medium dense, intact, gravelly silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Traces of plant roots.

Slightly moist, reddish brown, dense, intact, poorly to moderately cemented, gravelly silty fine to medium SAND. Ferruginised **ALLUVIUM** of very soft to soft rock strength.

Slightly moist, dark reddish brown speckled white, medium dense to dense, intact, moderately cemented, silty sandy fine to medium sub-angular quartz gravel

EOH: Refusal of excavator on very dense ferruginised **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP08/1 taken at 1.0m--1.4m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801661
*Y-COORD :* 7581854

*HOLE No:* SWD-TP08

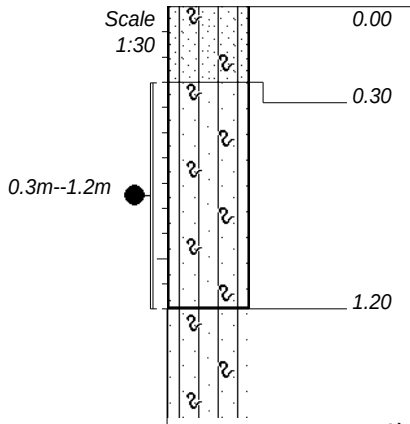
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP09
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, pale brown, loose, intact, fine sandy SILT / silty fine SAND, with medium to fine plant roots. **ALLUVIUM**.

Slightly moist, pale brown, stiff, intact, slightly gravelly sandy SILT, with fine plant roots. **ALLUVIUM**.

EOH: Refusal of excavator in stiff material as above.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample taken from 0.3m--1.2m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 10 May 2023
*DATE :* 10 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801754
*Y-COORD :* 7581825

*HOLE No:* SWD-TP09

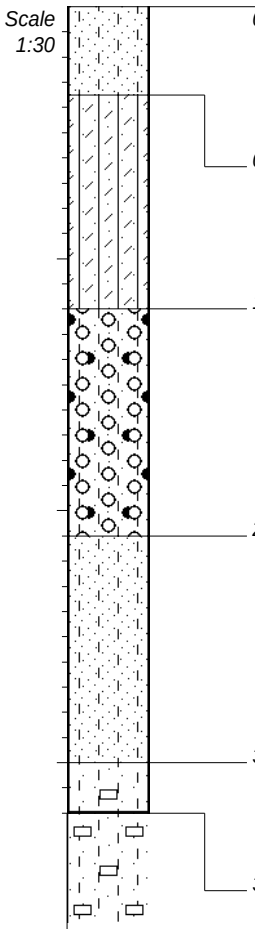
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP10
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.35: Slightly moist, reddish brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Minor to traces of plant roots.

0.35 – 1.20: Slightly moist, dark reddish brown, firm, shattered, moderately cemented, clayey sandy SILT. Ferruginised **ALLUVIUM**.

1.20 – 2.10: Slightly moist, reddish brown mottled white, medium dense, matrix supported, silty sandy GRAVEL, comprising abundant ferricrete nodules of soft rock strength. **NODULAR FERRICRETE**.

2.10 – 3.00: Slightly moist, reddish brown mottled white, dense, intact, moderately cemented, silty fine SAND, with traces of ferricrete nodules of soft rock strength. Ferruginised **ALLUVIUM**.

3.00 – 3.20: Slightly moist, orange brown blotched white, dense, matrix supported, silty sandy abundant CALCRETE NODULES of medium hard rock strength. **NODULAR CALCRETE**.

3.20: EOH: Refusal of excavator on very dense, NODULAR CALCRETE.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802111
*Y-COORD :* 7581662

*HOLE No:* SWD-TP10

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

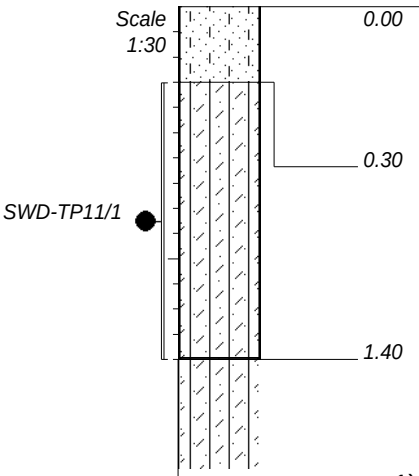
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP11
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Dry, red to orange brown, loose, intact, silty fine to medium SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Traces of plant roots. |
| 0.30 | Slightly moist, dark reddish brown, firm, fissured, clayey sandy SILT. Ferruginised **ALLUVIUM**. |
| 1.40 | EOH: Refusal of excavator on very stiff, ferruginised ALLUVIUM. |

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP11/1 taken at 0,3m--1.4m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802507
*Y-COORD :* 7581650

*HOLE No:* SWD-TP11

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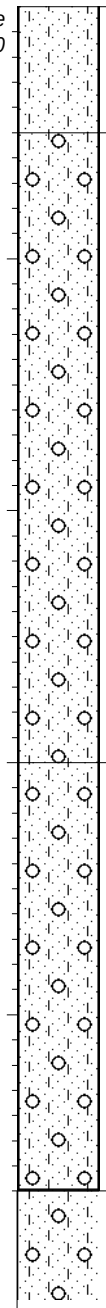
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP12
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Slightly moist, reddish brown, very loose, intact, silty fine SAND. Fine **ALLUVIUM**. |
| | Note: |
| | 1. Traces of plant roots. |
| 0.50 | |
| | Slightly moist, dark reddish brown, intact, moderately cemented, gravelly silty medium SAND. Ferruginised **ALLUVIUM**. |
| 3.00 | |
| | Slightly moist, pale brown to off-white, medium dense to dense, moderately cemented, gravelly silty medium to coarse SAND. Calcified **ALLUVIUM**. |
| 4.70 | |
| | EOH: No refusal of excavator, maximum reach on material as above. |

NOTES

1) No groundwater seepage encountered.
2) Sidewalls stable.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802880
*Y-COORD :* 7581470

*HOLE No:* SWD-TP12

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

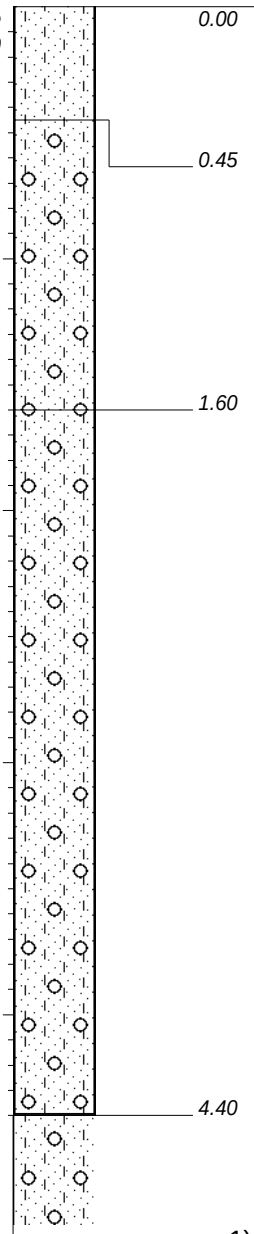
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP13
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Slightly moist, reddish brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Traces of plant roots.

*0.45*

Slightly moist, dark reddish brown, medium dense becoming dense, intact, gravelly silty fine to medium SAND. Ferruginised **ALLUVIUM**.

*1.60*

Slightly moist, pink brown, poorly to moderately cemented, gravelly silty SAND. Calcified **ALLUVIUM** of very soft to soft rock strength.

*4.40*

EOH: Refusal of excavator on calcified ALLUVIUM.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803174
*Y-COORD :* 7581550

*HOLE No:* SWD-TP13

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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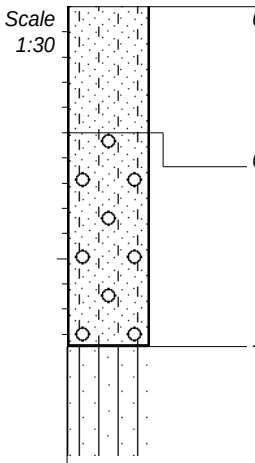
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP14
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, reddish brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Traces of plant roots up to a depth of 300mm.

Slightly moist, reddish brown, medium dense, intact, gravelly silty medium to coarse SAND. Ferruginised **ALLUVIUM**.
Note:
1. Gravel comprises fine sub-angular to subrounded quartz.

EOH: Refusal of excavator on slightly moist, dark reddish brown, stiff, blocky shattered, sandy SILT. Ferruginised **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803514
*Y-COORD :* 7581781

*HOLE No:* SWD-TP14

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

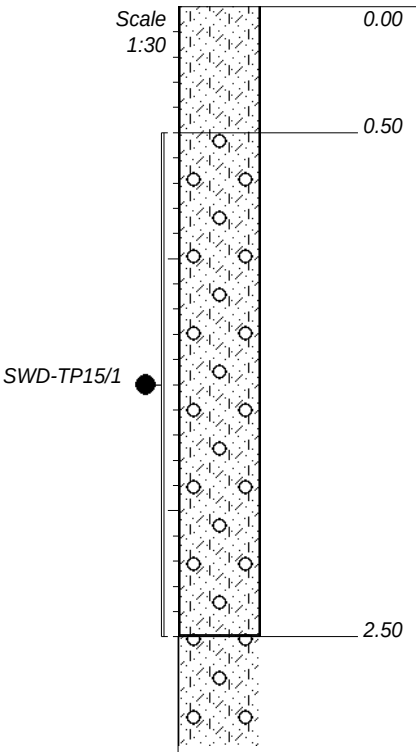
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP15
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry, brown, medium dense, intact to occasionally pinholed and honeycombed, clayey silty coarse SAND. Fine **ALLUVIUM**.

*0.50*

Dry, orange brown slightly stained red, dense with occasional medium dense pockets, pinholed, clayey silty medium SAND, with minor to abundant sub-angular to subrounded brown fine gravel of quartz. Fine **ALLUVIUM**.

Note:

1. Seemingly a presence of ferruginisation, hence reddish staining and denser consistency.

*2.50*

EOH: Terminated near confined refusal, due to very slow excavation on material as above. Material rippable.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP15/1 taken at 0.5m--2.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 25 May 2023
*DATE :* 25 May 2023

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0803848
*Y-COORD :* 7581953

*HOLE No:* SWD-TP15

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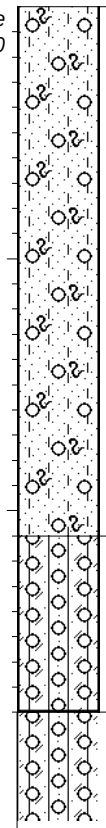
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP16
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00 Slightly moist, orange brown, medium dense, intact, gravelly silty SAND, with plant roots. Ferruginous **ALLUVIUM**.

2.10 Slightly moist, green brown to orange brown, medium dense becoming very dense with depth, intact, clast supported, silty sandy GRAVEL. Gravel comprises sub-angular to subrounded quartz gravel in clayey silt matrix, up to >200mm diameter angular fragments. Coarse **ALLUVIUM**.

2.80 EOH: Refusal (effective) of excavator in very dense material as above.

PLEASE CHECK THIS HOLE. I DON?T UNDERSTAND WHAT YOU WANT. ALSO CH TO ASK BK?

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 11 May 2023
*DATE :* 11 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803965
*Y-COORD :* 7582214

*HOLE No:* SWD-TP16

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

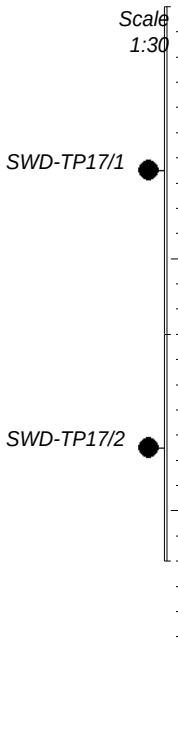
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP17
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Slightly moist, brown, loose becoming dense at 0.2m, intact, silty fine SAND. **ALLUVIUM**.

*1.30*

Slightly moist, olive brown mottled white and stained orange, medium dense becoming dense, intact, gravelly silty fine SAND. Gravel comprises poor to moderately developed calcrete nodules with very soft to soft rock strength. Calcified and ferruginous **ALLUVIUM**.

*2.50*

EOH: Refusal (effective) of excavator in dense material as above.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample SWD-TP17/1 taken from 0.0m--1.3m.
4) Disturbed sample SWD-TP17/2 taken from 1.3m--2.2m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 11 May 2023
*DATE :* 11 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804269
*Y-COORD :* 7582600

*HOLE No:* SWD-TP17

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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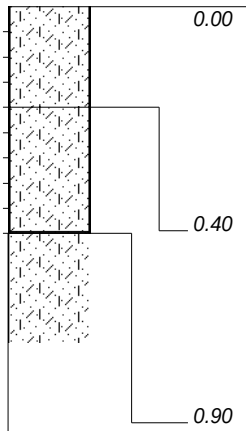
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP18
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.40: Dry, brown to dark brown, medium dense to dense, intact to slightly pinholed to honeycombed openings, clayey silty coarse SAND, with trace fine gravel, comprising sub-angular to subrounded brown quartz. Fine **ALLUVIUM**.
Note:
1. Roots present at top 100mm.

0.40 – 0.90: Dry, dark brown with slight orange to red staining, dense, intact but breaks in a blocky manner, clayey silty SAND, with traces of coarse sand. Fine **ALLUVIUM**.
Note:
1. Seemingly very slightly ferruginised.

EOH: Terminated due to very slow excavation on material as above, but slightly denser. Interpreted as slightly more ferruginised.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 26 May 2023
*DATE :* 26 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0804380
*Y-COORD :* 7582887

*HOLE No:* SWD-TP18

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

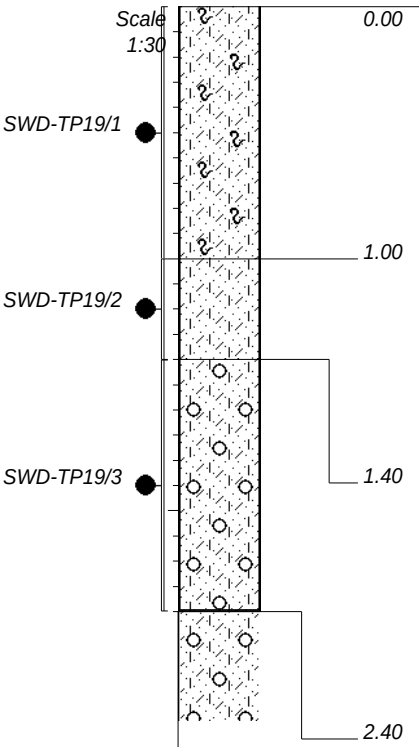
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP19
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 1.00: Dry, brown to reddish brown, medium dense, intact to occasionally pinholed to honeycombed openings, clayey silty SAND, with roots present throughout horizon. Fine **ALLUVIUM**.

1.00 – 1.40: Dry, yellowish brown with occasional mottled black, dense, intact to slightly pinholed, clayey silty SAND, with trace sub-angular to subrounded gravel to cobbles of gneiss and quartz. Fine **ALLUVIUM**.
Note:
1. Occasional ferricrete nodules present.
2. Horizon slightly ferruginised.

1.40 – 2.40: Dry, yellowish brown mottled black slightly stained red, medium dense, intact to honeycombed, clayey silty gravelly SAND, with trace sub-angular to subrounded gravel of quartz. Ferruginous **ALLUVIUM**.
Notes:
1. Ferricrete nodules present.
2. Ferruginisation between nodular to honeycombed ferricrete, which is weakly cemented.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly more ferruginised. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Sidewalls stable.
3) Disturbed sample SWD-TP19/1 taken at 0.0m--1.0m.
4) Disturbed sample SWD-TP19/2 taken at 1.0m--1.4m.
5) Disturbed sample SWD-TP19/3 taken at 1.4m--2.4m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 26 May 2023
*DATE :* 26 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0804615
*Y-COORD :* 7583010

*HOLE No:* SWD-TP19

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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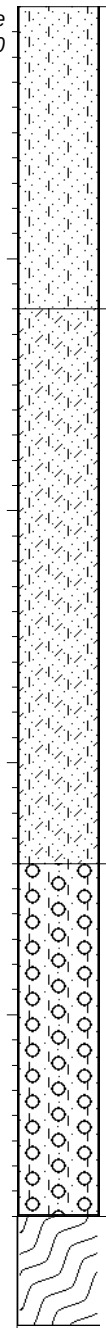
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP20
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00 Moist, light brown speckled white, very loose, intact, silty medium to coarse SAND. Fine **ALLUVIUM**.

1.20 Moist, dark brown stained orange, medium dense, inysvy, clayey silty fine SAND. Fine **ALLUVIUM**.

3.40 Moist, dark brown, medium dense, matrix supported, silty sandy GRAVEL, comprising abundant subrounded fine to coarse quartz gravel, with minor cobbles and boulders. Coarse **ALLUVIUM**. (Pebble marker.)

4.80 EOH: Refusal of excavator on completely weathered, grey to brown streaked white, medium grained, soft to medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804622
*Y-COORD :* 7583230

*HOLE No:* SWD-TP20

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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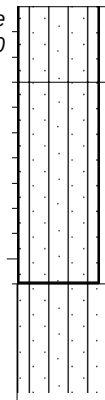
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP21
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00* Dry, brown, firm, fissured, sandy SILT. Fine **ALLUVIUM**.
Note:
1. Traces of plant roots.

*0.30* Dry, dark brown, moderately to strongly cemented, blocky shattered, sandy SILT. Ferruginised **ALLUVIUM**.

*1.10* EOH: Refusal of excavator on strongly cemented, ferruginised ALLUVIUM of soft rock strength.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804592
*Y-COORD :* 7583193

*HOLE No:* SWD-TP21

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

Knight Piésold CONSULTING

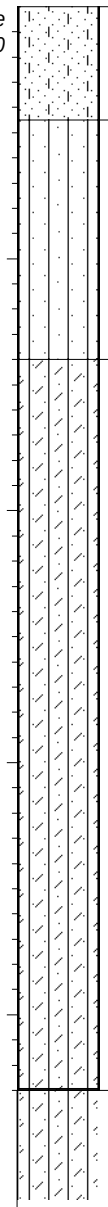
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP22
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00* Dry, brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Traces of plant roots.

*0.45* Slightly moist, dark brown, firm, shattered, sandy SILT. Fine **ALLUVIUM**.

*1.40* Slightly moist, dark reddish brown, firm to stiff, moderately cemented, blocky shattered, clayey sandy SILT. Ferruginised **ALLUVIUM**.

*4.30* EOH: Refusal of excavator on very stiff, strongly cemented, ferruginised ALLUVIUM of soft rock strength.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804685
*Y-COORD :* 7583279

*HOLE No:* SWD-TP22

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

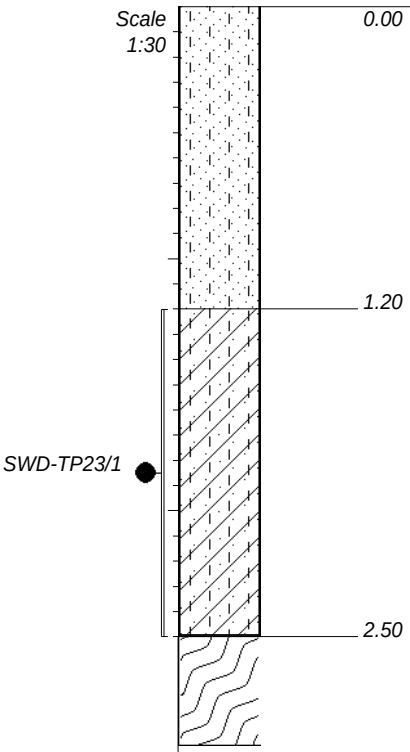
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP23
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, light brown, very loose, intact, silty fine to medium SAND. Fine **ALLUVIUM**.

Slightly moist, dark reddish brown, firm, fissured, sandy silty CLAY. Fine **ALLUVIUM**.

EOH: Refusal of excavator on highly weathered, medium grained, medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP23/1 taken at 1.2m--2.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801706
*Y-COORD :* 7581801

*HOLE No:* SWD-TP23

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

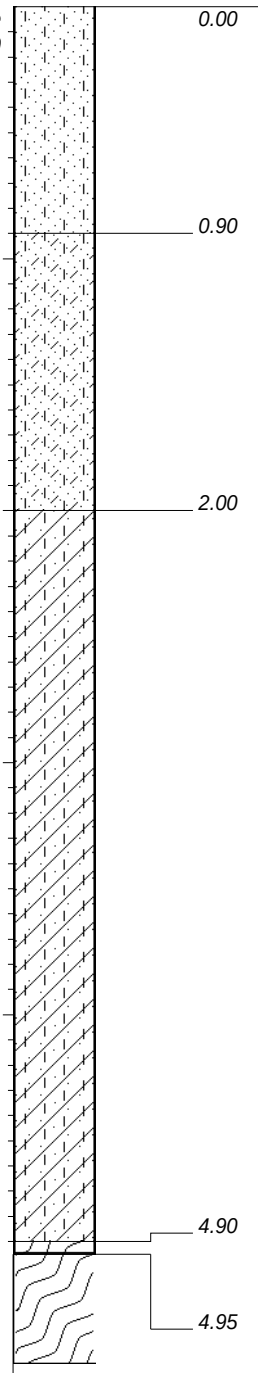
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP24
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.90: Slightly moist, light brown speckled white, very loose, intact, silty medium to coarse SAND. Fine **ALLUVIUM**.
Note:
1. Minor medium subrounded quartz gravel.

0.90 – 2.00: Moist, dark brown, medium dense, intact, clayey silty SAND. Fine **ALLUVIUM**.

2.00 – 4.90: Moist, dark brown, firm, fissured, sandy silty CLAY. Fine **ALLUVIUM**.

4.90 – 4.95: Grey to brown streaked white, completely to highly weathered, soft rock GNEISS.

4.95: EOH: Refusal of excavator on medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.
2) Collapse of sidewalls from 0.00m to 0.9m.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804762
*Y-COORD :* 7583299

*HOLE No:* SWD-TP24

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
*TEXT :* ..51\PROFILES\PKFSWDTP.TXT

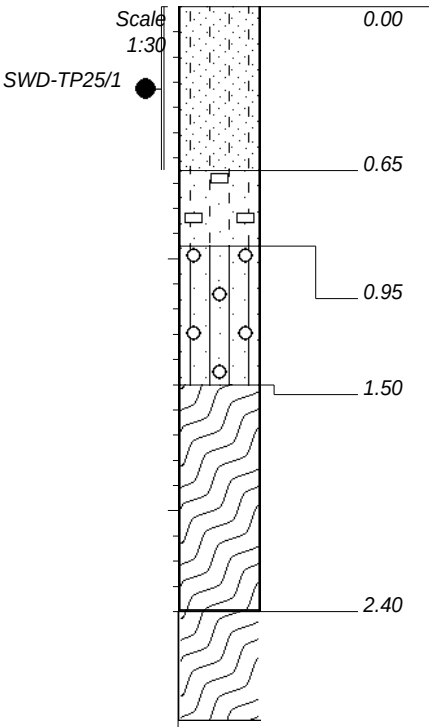
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP25
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, dark brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Traces of plant roots.

Slightly moist, pale brown mottled white, medium dense, matrix supported, silty sandy abundant CALCRETE NODULES of soft rock strength. **NODULAR CALCRETE**.

Slightly moist, grey blotched white, medium dense, intact, gravelly sandy SILT. Calcareous **RESIDUAL GNEISS**.

Highly weathered, grey to brown streaked white, medium grained, very soft to soft rock GNEISS.

EOH: Refusal of excavator on highly weathered, grey to brown, medium grained, medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample SWD-TP25/1 taken at 0.0m--0.65m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804829
*Y-COORD :* 7583474

*HOLE No:* SWD-TP25

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:15
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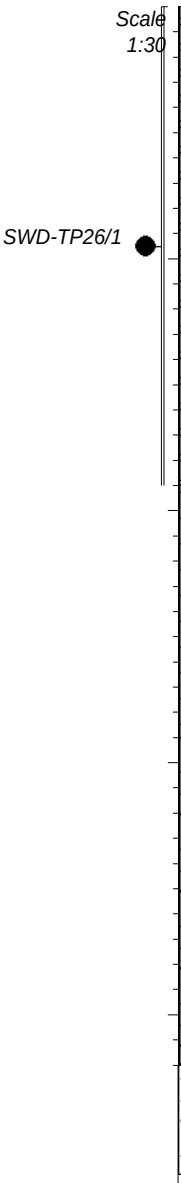
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* SWD-TP26
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Moist, dark grey to dark brown, soft to firm, slickensided, sandy silty CLAY. Fine **ALLUVIUM**.

*1.90*

Slightly moist, pale brown speckled white, dense, poorly cemented, intact, gravelly silty SAND. Calcified **ALLUVIUM**.

*2.90*

Completely weathered, brown speckled black streaked white, medium grained, very soft rock GNEISS.

*4.20*

EOH: Refusal of excavator on highly weathered, soft rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) Disturbed sample SWD-TP26/1 taken at 0.0m--1.9m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 16 May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803392
*Y-COORD :* 7581470

*HOLE No:* SWD-TP26

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 07/07/2023 14:15*
*TEXT : ..51\PROFILES\PKFSWDTP.TXT*

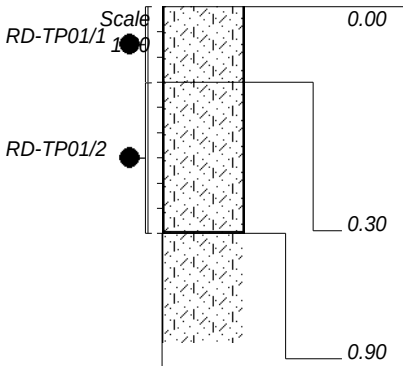
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP01
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist, brown, medium dense, pinholed, clayey silty SAND, with trace angular to sub-angular, fine grained gravel of quartz. Fine **ALLUVIUM**.
Notes:
1. Scattered fine roots present at top 200mm.
2. Thick roots present throughout (20mm diameter).

Dry to slightly moist, brown to dark brown stained orange, dense, intact to slightly pinholed and slight shattered, clayey silty SAND, with trace angular to sub-angular fine gravel. Slightly ferruginised fine **ALLUVIUM**.

EOH: Refusal of excavator on material as above, but slightly more dense and ferruginised. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample RD-TP01/1 taken at 0.0m--0.3m.
4) Disturbed sample RD-TP01/2 taken at 0.3m--0.9m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0800971
*Y-COORD :* 7579851

*HOLE No:* RD-TP01

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:52*
*TEXT : ..P51\PROFILES\PKFRDTP.TXT*

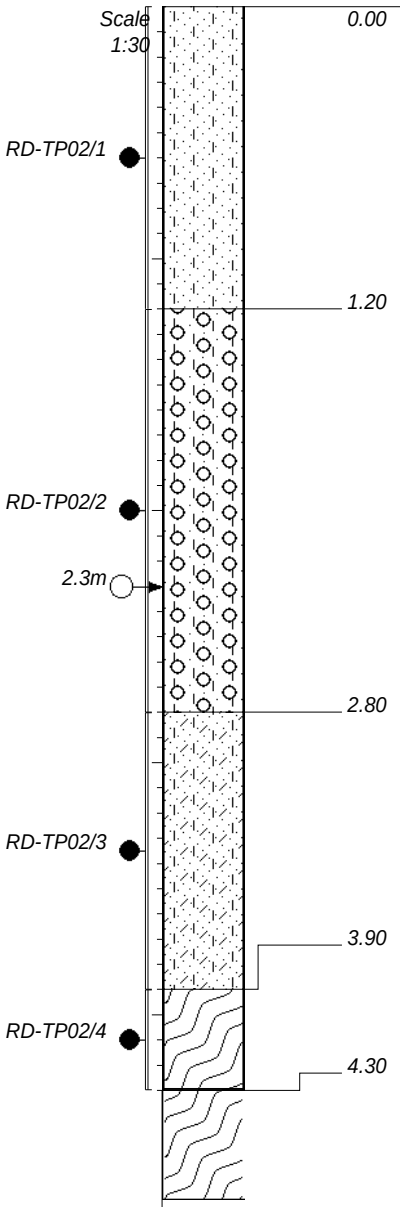
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP02
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist, light brown, very loose to loose, bedded, silty SAND, with traces of subrounded gravel to cobbles of white and brown quartz. **ALLUVIUM**.<br>Note:<br>1. Scattered fence wires present in top layer. |
| 1.20 | Wet, brown to greyish brown, loose to medium dense, intact, silty sandy GRAVEL, with trace subrounded brown and white cobbles to boulders (<250mm). Coarse **ALLUVIUM**. |
| 2.80 | Very moist to wet, brown to greenish brown, loose to medium dense, intact to honeycombed, silty clayey SAND, with minor subrounded brown to white gravel to cobbles of quartz. Coarse **ALLUVIUM**.<br>Notes:<br>1. Has significantly more fines than previous horizon. |
| 3.90 | Completely weathered, white streaked black and gold, medium to coarse grained, gneiss foliation, closely to moderately jointed, very soft rock, biotite GNEISS. |
| 4.30 | EOH: Terminated near confined refusal and due to slight collapse of sidewalls. As above, but completely to highly weathered, very soft to soft rock GNEISS. |

NOTES

1) Groundwater seepage encountered at 2.3m at 0.5 litre/minute.
2) Slightly unstable sidewalls.
3) Disturbed sample RD-TP02/1 taken at 0.0m--1.2m.
4) Disturbed sample RD-TP02/2 taken at 1.2m--2.8m.
5) Disturbed sample RD-TP02/3 taken at 2.8m--3.9m.
6) Disturbed sample RD-TP02/4 taken at 3.9m--4.3m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 30 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801584
*Y-COORD :* 7580544

*HOLE No:* RD-TP02

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

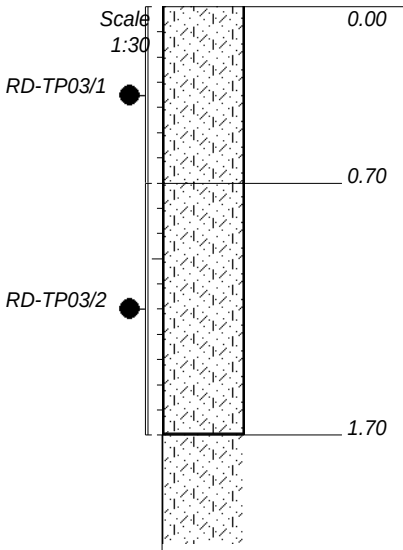
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP03
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 — Dry to slightly moist, brown, medium dense, pinholed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots at top 200mm, with larger roots throughout.

0.70 — Dry to slightly moist, brown to dark brown, dense, pinholed to honeycombed, clayey silty SAND, with trace angular to sub-angular brown quartz fine gravel. Fine **ALLUVIUM**.

1.70 — EOH: Terminated near confined refusal, due to very slow excavation on material as above, but denser.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample RD-TP03/1 taken at 0.0m--0.7m.
4) Disturbed sample RD-TP03/2 taken at 0,7m--1.7m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 29 May 2023
*DATE :* 29 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801605
*Y-COORD :* 7580544

*HOLE No:* RD-TP03

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
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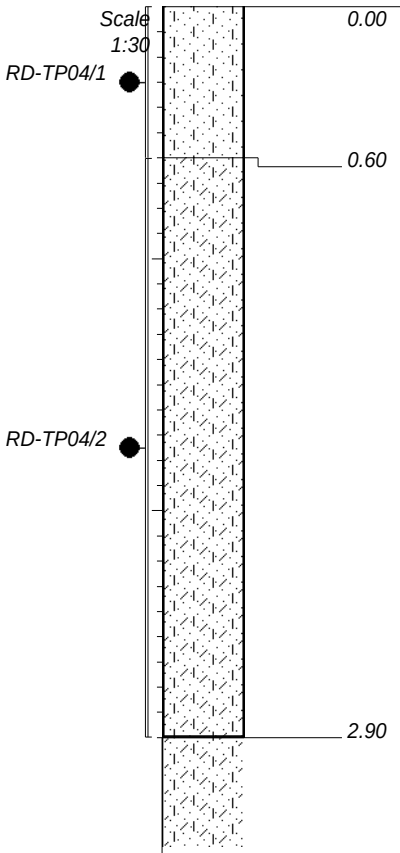
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP04
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense, pinholed to slightly honeycombed, silty SAND, with trace of coarse sand. Fine **ALLUVIUM**.
Notes:
1. Roots present at upper 300mm.

Dry, reddish brown, dense, pinholed, clayey silty SAND, with trace fine angular to subrounded brown gravel of quartz. Fine **ALLUVIUM**.
Note:
1. Scattered white angular medium to coarse gravel of quartz present.

EOH: Termination near confined refusal due to very slow excavation on material as above, but slightly more dense.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample RD-TP04/1 taken at 0.0m--0.6m.
4) Disturbed sample RD-TP04/2 taken at 0.6m--2.9m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 30 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0802497
*Y-COORD :* 7579862

*HOLE No:* RD-TP04

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

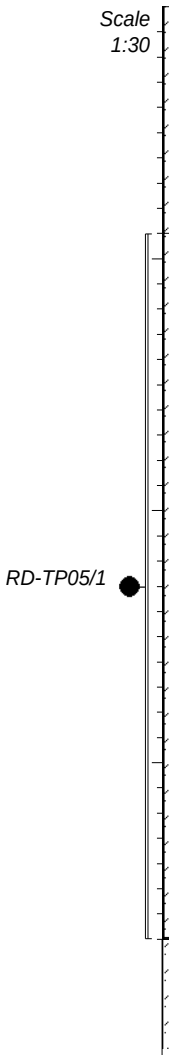
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP05
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry to slightly moist, brown, loose, intact to slightly honeycombed, clayey silty SAND. Fine **ALLUVIUM**.
Notes:
1. Roots present at top 200mm.

*0.90*

Dry to slightly moist, orange to reddish brown, medium dense to dense with depth, intact to slightly pinholed, clayey silty SAND, with traces of angular to subrounded brown fine gravel and scattered fine roots. Fine **ALLUVIUM**.

*3.70*

EOH: Terminated due to very slow excavation on material as above.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP05/1 taken at 0.9m--3.7m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 30 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 08033541
*Y-COORD :* 7580258

*HOLE No:* RD-TP05

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
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Knight Piésold CONSULTING

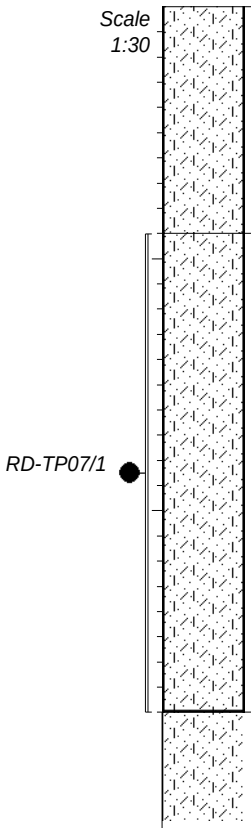
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP07
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*




*0.00*

Dry, brown, medium dense with loose pockets, intact to pinholed with scattered honeycomb openings (<3mm), clayey silty SAND. Fine **ALLUVIUM**.

Note:

1. Scattered roots with occasional thick roots.

*0.90*

Dry, yellowish brown becoming orange brown, medium dense to dense, intact to slightly pinholed, clayey silty SAND, with traces sub-angular to subrounded to occasionally angular fine gravel of quartz. Fine **ALLUVIUM**.

*2.80*

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP07/1 taken at 0.9m--2.8m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 29 May 2023
*DATE :* 29 May 2023

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0803985
*Y-COORD :* 7581279

*HOLE No:* RD-TP07

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

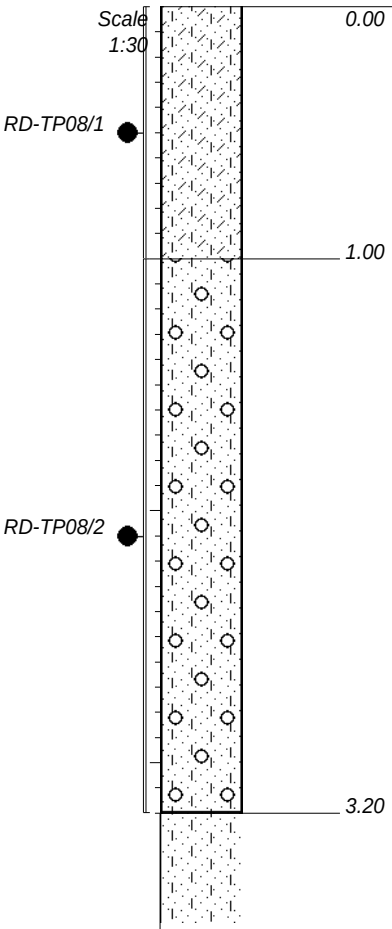
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP08
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry to slightly moist, dark brown, dense with medium dense pockets, intact to pinholed but breaks in a blocky manner, clayey silty SAND. Fine **ALLUVIUM**.

*1.00*

Dry, white to yellowish brown with depth, medium dense to dense with depth, intact to slightly pinholed, silty gravelly SAND. Calcified **ALLUVIUM**.

Note:

1. Calcrete is nodular and very weak to weakly cemented. Cementation decreases with depth.
2. Occasional nodules of material from upper horizon present.

*3.20*

EOH: Terminated due to very slow excavation on dry, yellowish brown, slightly stained orange, dense, intact to pinholed with occasional honeycomb openings, silty SAND. Slightly calcified **ALLUVIUM**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP08/1 taken at 0.0m--1.0m.

4) Disturbed sample RD-TP08/2 taken at 1.0m--3.2m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 29 May 2023
*DATE :* 29 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0804425
*Y-COORD :* 7581074

*HOLE No:* RD-TP08

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

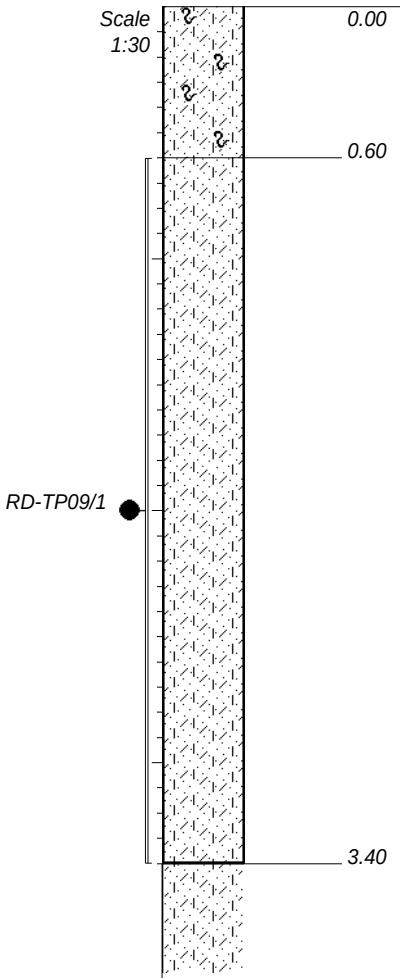
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP09
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense, intact to pinholed with scattered honeycomb openings (<3mm), clayey silty SAND, with roots. Fine **ALLUVIUM**.

Dry, yellowish brown becoming orange brown, medium dense to dense, intact to slightly pinholed, clayey silty SAND, with traces of fine grained nodules. Fine **ALLUVIUM**.

Notes:

1. Band (<100mm) of seemingly ferricrete nodules (<50mm) present near 3.2m in north-eastern sidewall of test pit.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP09/1 taken at 0.6m--3.4m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 29 May 2023
*DATE :* 29 May 2023

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0804750
*Y-COORD :* 7582018

*HOLE No:* RD-TP09

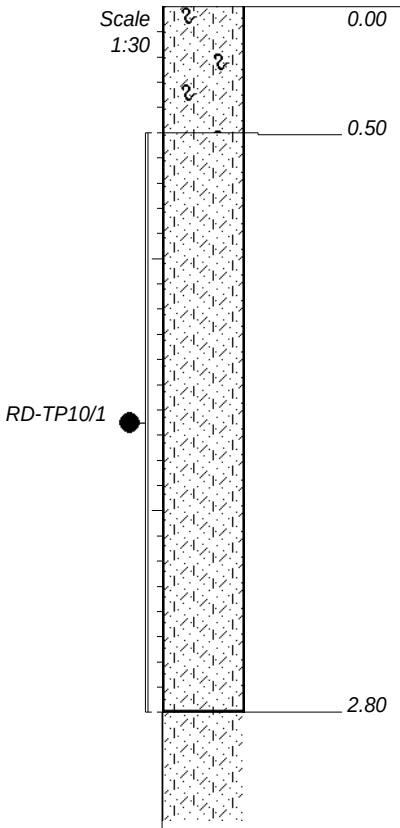
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP10
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense, intact to pinholed with scattered honeycomb openings (<3mm), clayey silty SAND, with roots with occasional thick roots. Fine **ALLUVIUM**.

Dry, yellowish brown becoming orange brown, medium dense to dense, intact to slightly pinholed, clayey silty SAND. Fine **ALLUVIUM**.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP10/1 taken at 0.5m--2.8m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 29 May 2023
*DATE :* 29 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0805515
*Y-COORD :* 7582133

*HOLE No:* RD-TP10

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:52*
*TEXT : ..P51\PROFILES\PKFRDTP.TXT*

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

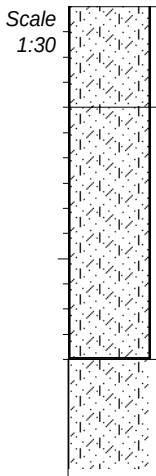
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP11
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist, brown to dark brown, medium dense to dense, intact to pinholed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots with occasional larger roots.

Dry to slightly moist, dark brown, dense, pinholed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Animal burrow in northern sidewall.

EOH: Terminated due to very slow excavation on material as above, but slightly more dense.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 27 May 2023
*DATE :* 27 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0806850
*Y-COORD :* 7583349

*HOLE No:* RD-TP11

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

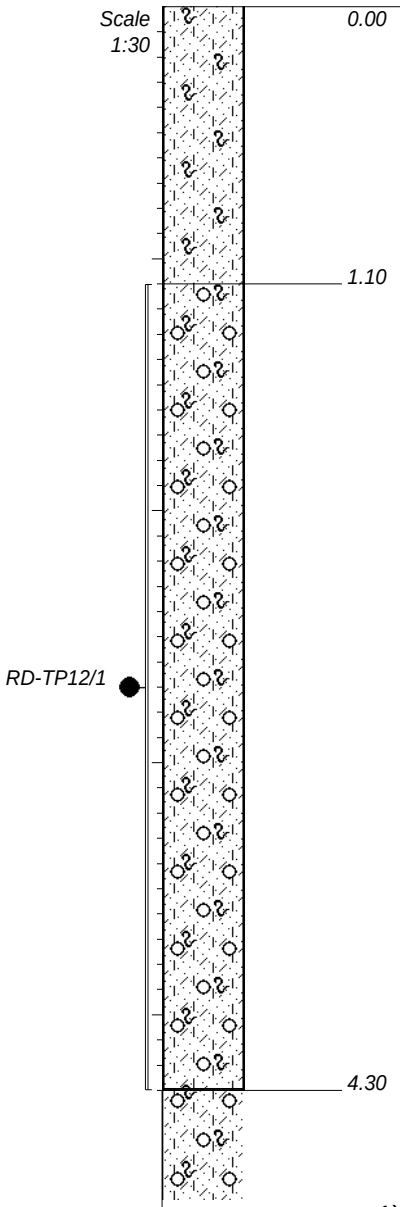
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP12
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry, reddish brown slightly stained brown, loose to medium dense, intact to pinholed, clayey silty SAND to clayey silty coarse SAND, with minor fine gravel to trace medium gravel. Gravel comprises sub-angular to subrounded quartz, and roots to occasional thick roots.. Fine **ALLUVIUM**.

*1.10*

As above, but reddish brown stained mottled black, dense, clayey gravelly SAND, with minor fine gravel and scattered fine roots. Fine **ALLUVIUM**.

*4.30*

EOH: Terminated due to very slow excavation on material as above.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP12/1 taken at 1.1m--4.3m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 27 May 2023
*DATE :* 27 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0805797
*Y-COORD :* 7582981

*HOLE No:* RD-TP12

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

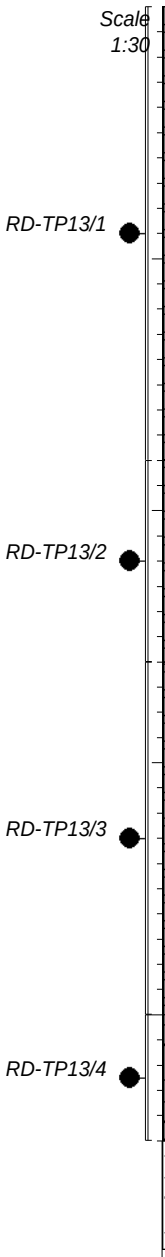
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP13
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Dry to slightly moist, brown with scattered white mottling, dense, intact to pinholed, clayey silty SAND, with traces of fine sub-angular to subrounded gravel of quartz. Fine **ALLUVIUM**.<br>Note:<br>1. Scattered roots present.<br>2. Termite nest encountered at 500mm. |
| 1.80 | Dry, yellowish brown mottled to blotched white, dense, intact to pinholed, clayey silty SAND to clayey silty coarse sand. Fine **ALLUVIUM**.<br>Note:<br>1. Calcrete nodules present (<40mm). Very weakly to weakly cemented and between nodular to slightly honeycomb stage. |
| 2.60 | Dry to slightly moist, yellowish brown with scattered red, white and black mottles, medium dense with dense pockets, pinholed, clayey gravelly silty fine SAND, with minor sub-angular to subrounded gravel of quartz. Slightly calcareous **PEBBLE MARKER**. |
| 4.00 | Completely weathered, dark grey streaked white slightly stained orange, fine to medium grained, no visible joints but breaks in a platy manner along bands, gneissic banding, very soft rock, biotite GNEISS, with slight residual biotite gneiss pockets.<br>Note:<br>1. Very undulating horizon. |
| 4.50 | EOH: Terminated near maximum reach on material as above. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample RD-TP13/1 taken at 0.0m--1.8m.
4) Disturbed sample RD-TP13/2 taken at 1.8m--2.6m.
5) Disturbed sample RD-TP13/3 taken at 2.6m--4.0m.
6) Disturbed sample RD-TP13/4 taken at 4.0m--4.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 27 May 2023
*DATE :* 27 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0806772
*Y-COORD :* 7583302

*HOLE No:* RD-TP13

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

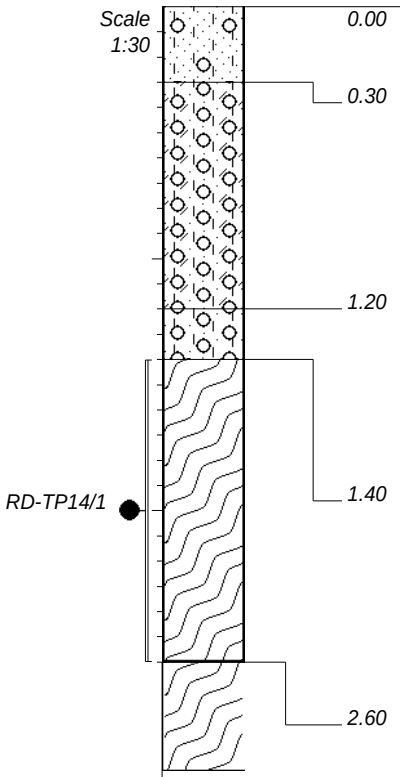
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP14
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.30: Dry, reddish brown, dense, intact to slightly pinholed, gravelly silty SAND, with trace sub-angular to subrounded gravel of quartz. Fine **ALLUVIUM**.

0.30 – 1.20: Dry, reddish brown to dark reddish brown, dense, clayey silty sandy fine GRAVEL. Gravel comprises sub-angular to subrounded with occasional angular quartz. Coarse **ALLUVIUM**.

1.20 – 1.40: Dry to slightly moist, reddish brown mottled black stained yellow, dense, matrix supported, silty sandy GRAVEL, with trace sub-angular to subrounded cobbles of quartz. Ferruginised **PEBBLE MARKER**.
Note:
1. Ferricrete nodules present (<15mm).

1.40 – 2.60: Completely weathered, dark grey streaked white stained orange, fine to medium grained, gneissic banding, extremely to very closely jointed, very soft rock, biotite GNEISS, with pockets of ferruginised residual gneiss present.
Note:
1. Horizon shows distinct signs of folding. Very undulating horizon.

2.60: EOH: Refusal of excavator on material as above, but highly to moderately weathered, soft to medium hard rock biotite GNEISS. Material breaks in platy manner.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample RD-TP14/1 taken at 1.4m--2.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 27 May 2023
*DATE :* 27 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0806913
*Y-COORD :* 7583919

*HOLE No:* RD-TP14

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

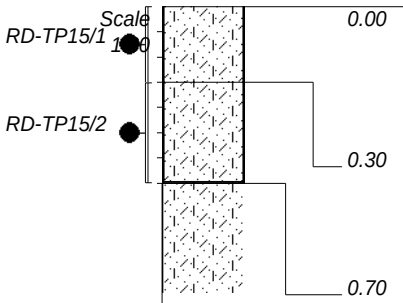
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP15
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense, intact to pinholed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Ant nests present in upper soils.

Dry, brown to dark brown slightly stained orange and red, dense, intact to pinholed with scattered openings (<2mm), clayey silty SAND. Slightly ferruginised **ALLUVIUM**.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly more dense and ferruginised. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample RD-TP15/1 taken at 0.0m--0.3m.
4) Disturbed sample RD-TP15/2 taken at 0.3m--0.7m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 27 May 2023
*DATE :* 27 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0807324
*Y-COORD :* 7583709

*HOLE No:* RD-TP15

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

Knight Piésold CONSULTING

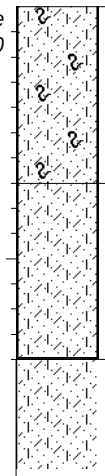
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP16
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00 Slightly moist, brown, dense, intact to pinholed to honeycombed, clayey silty SAND, with roots present throughout. Fine **ALLUVIUM**.

0.70 Dry to slightly moist, brown to dark brown, dense, pinholed to honeycombed, clayey silty SAND, with traces of white to brown sub-angular to subrounded quartz gravel to fine grained. Fine **ALLUVIUM**.

1.40 EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 30 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801561
*Y-COORD :* 7580548

*HOLE No:* RD-TP16

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

D079 E Mouton

dotPLOT 7022 PBpH7

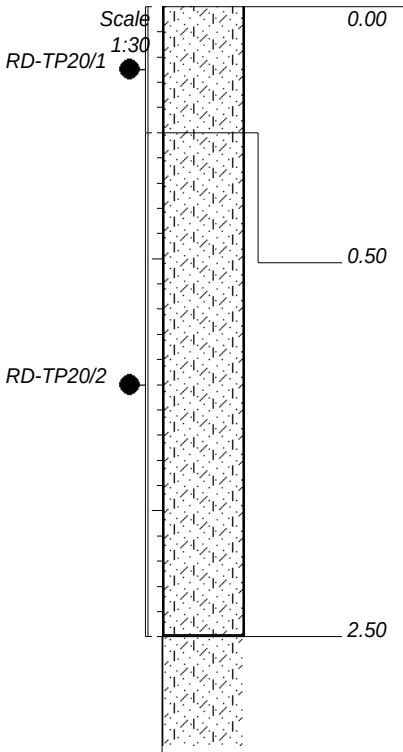
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* RD-TP20
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist with upper 100mm moist, brown, loose to medium dense, intact to occasionally pinholed to honeycombed, clayey silty SAND, with trace angular to sub-angular brown fine gravel of quartz. Fine **ALLUVIUM**.
Note:
1. Roots present in top 300mm.
2. Horizon moisture possibly affected by rain from previous evening.

Dry to slightly moist, reddish brown, medium dense with dense pockets, intact to pinholed, clayey silty SAND, with traces of angular to sub-angular brown to white fine gravel of quartz. Fine **ALLUVIUM**.
Note:
1. Scattered roots present.
2. Scattered thick roots (<30mm diameter) present in top 500mm.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample RD-TP20/1 taken at 0.0m--0.5m.
4) Disturbed sample RD-TP20/2 taken at 0.5m--2.5m.
5) Rained previous evening on site.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol Fr220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 27 May 2023
*DATE :* 27 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0802541
*Y-COORD :* 7589491

*HOLE No:* RD-TP20

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:52
*TEXT :* ..P51\PROFILES\PKFRDTP.TXT

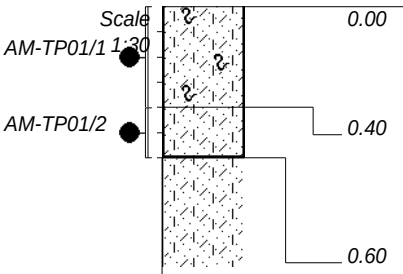
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP01
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist, brown to dark brown, medium dense, pinholed with occasional root channel openings, clayey silty SAND, with roots. Fine **ALLUVIUM**.

Dry to slightly moist, brown with orange brown staining mottled black, dense, pinholed to slightly honeycombed and material breaks in a blocky manner, clayey silty SAND. Slightly ferruginised fine **ALLUVIUM**.

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample AM-TP01/1 taken at 0.0m--0.4m.

4) Disturbed sample AM-TP01/2 taken at 0.4m--0.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Simon
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0807088
*Y-COORD :* 7583751

*HOLE No:* AM-TP01

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:47*
*TEXT : ..P51\PROFILES\PKFAMTP.TXT*

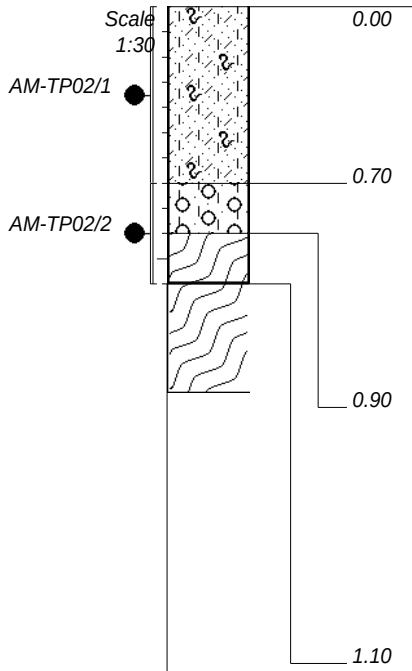
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP02
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.70: Dry to slightly moist, reddish brown, dense, pinholed, clayey silty SAND, with traces of angular to sub-angular fine gravel of quartz, with thick roots. Fine **ALLUVIUM**.

0.70 – 0.90: Dry to slightly moist, reddish brown slightly mottled black stained orange, medium dense, matrix supported, silty sandy GRAVEL, with trace sub-angular white quartz cobbles. Slightly ferruginised **PEBBLE MARKER**.
Note:
1. Horizon undulating, with variable thickness.

0.90 – 1.10: Completely weathered with highly weathered pockets, dark grey streaked white to reddish brown stained orange and black, extremely closely jointed, fine to medium grained, gneissic banding, very soft rock with soft to medium hard rock pockets, biotite GNEISS.
Notes:
1. Material is ferruginised and breaks in a platy manner.
2. Horizon undulating.

1.10: EOH: Refusal of excavator on material as above, but highly weathered, soft to medium hard rock, ferruginised biotite GNEISS.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample AM-TP02/1 taken at 0.0m--0.7m.
4) Disturbed sample AM-TP02/2 taken at 0.7m--1.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806656
*Y-COORD :* 7583660

*HOLE No:* AM-TP02

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:47
*TEXT :* ..P51\PROFILES\PKFAMTP.TXT

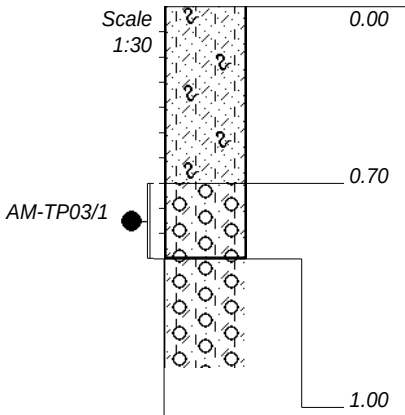
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP03
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry to slightly moist, reddish brown, medium dense to dense with depth, pinholed, clayey silty coarse SAND, with traces of angular to sub-angular fine gravel of quartz, with roots. Fine **ALLUVIUM**.

*0.70*

Dry to slightly moist, reddish brown with white quartz mottled black, dense, matrix supported, clayey silty sandy GRAVEL, with trace sub-angular cobbles of greyish white quartz. Ferruginised **PEBBLE MARKER**, with traces of calcrete.
Note:
1. Ferricrete nodules present (<20mm).

*1.00*

EOH: Refusal of excavator on material as above, but denser due to stronger cementation. Ferruginised / calcified **PEBBLE MARKER**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample AM-TP03/1 taken at 0.7m--1.0m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806392
*Y-COORD :* 7583799

*HOLE No:* AM-TP03

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:47
*TEXT :* ..P51\PROFILES\PKFAMTP.TXT

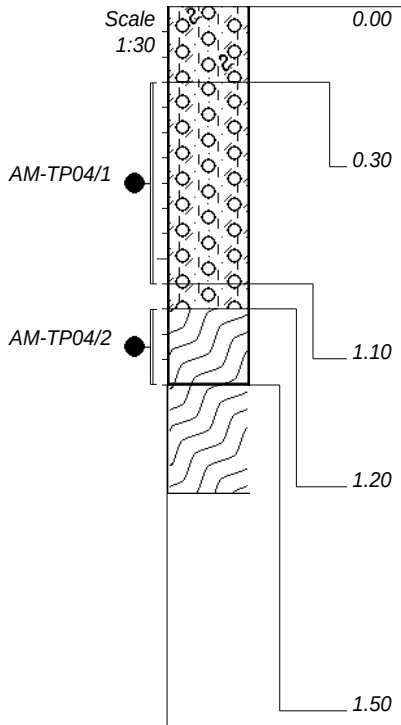
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP04
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| *0.00* | Dry to slightly moist, brown to reddish brown, medium dense to dense, pinholed with open root channels, clayey silty sandy GRAVEL, with minor sub-angular to subrounded cobbles of quartz, with roots. Coarse **ALLUVIUM**. |
| *0.30* | Dry to slightly moist, reddish brown blotched khaki, dense, matrix supported, clayey silty sandy GRAVEL, with minor sub-angular to subrounded cobbles of quartz. Calcareous **ALLUVIUM**.<br>Note:<br>1. Calcrete nodules present (<60mm). |
| *1.10* | As above, but silty sandy GRAVEL, with minor sub-angular to subrounded white to purple orange dark grey quartz cobbles. Calcified **PEBBLE MARKER**. |
| *1.20* | Completely to highly weathered, white speckled to streaked black stained orange, medium to coarse grained, gneissic banding, closely jointed, very soft rock biotite GNEISS.<br>Notes:<br>1. Brown clayey silty sand infilling (<5mm to pockets). Prominent feldspar pockets in places (<40mm). |
| *1.50* | EOH: Refusal of excavator on material as above, but highly weathered, soft rock biotite GNEISS. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample AM-TP04/1 taken at 0.3m--1.1m.
4) Disturbed sample AM-TP04/2 taken at 1.2m--1.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806025
*Y-COORD :* 7583714

*HOLE No:* AM-TP04

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:47
*TEXT :* ..P51\PROFILES\PKFAMTP.TXT

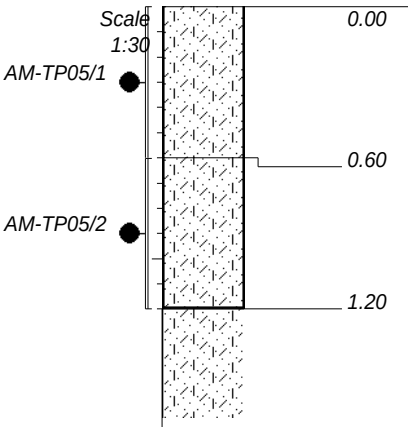
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP05
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, brown, medium dense with dense pockets, pinholed to occasionally honeycombed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Roots present at top 300mm.

Slightly moist, brown mottled dark brown, dense, intact to pinholed with occasional honeycombed openings but breaks in a blocky manner, clayey silty SAND. Fine **ALLUVIUM**.

EOH: Terminated due to very slow excavation on material as above, but slightly more dense.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample AM-TP05/1 taken at 0.0m--0.6m.
4) Disturbed sample AM-TP05/2 taken at 0.6m--1.2m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806080
*Y-COORD :* 7583500

*HOLE No:* AM-TP05

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:47*
*TEXT : ..P51\PROFILES\PKFAMTP.TXT*

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

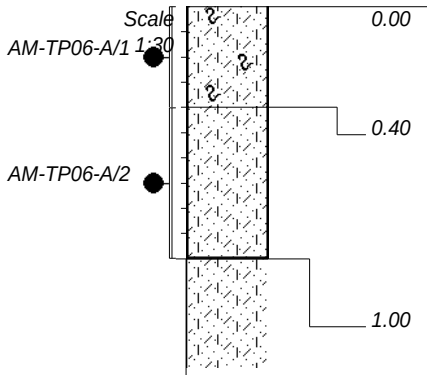
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP06-A
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist, brown, medium dense, pinholed with occasional open root channels, clayey silty SAND, with traces of angular to sub-angular fine gravel of quartz, with roots. Fine **ALLUVIUM**.

Dry to slightly moist, reddish brown, dense, pinholed to honeycombed, clayey silty coarse SAND, with trace sub-angular to subrounded brown to white fine gravel of quartz. Fine **ALLUVIUM**.
Note:
1. Scattered roots present.

EOH: Terminated due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample AM-TP06-A/1 taken at 0.0m--0.4m.
4) Disturbed sample AM-TP06-A/2 taken at 0.4m--1.0m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806402
*Y-COORD :* 7583603

*HOLE No:* AM-TP06-A

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:47*
*TEXT : ..P51\PROFILES\PKFAMTP.TXT*

Knight Piésold CONSULTING

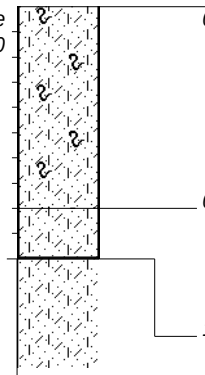
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP06-B
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00*

Dry, brown, medium dense to dense, pinholed with scattered openings (>2mm), clayey silty SAND, with roots. Fine **ALLUVIUM**.

*0.80*

Dry to slightly moist, dark brown mottled orange red, dense, pinholed with very slightly polished surfaces and material breaks in a blocky manner, clayey silty SAND. Fine **ALLUVIUM**.

*1.00*

EOH: Terminated due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806389
*Y-COORD :* 7583550

*HOLE No:* AM-TP06-B

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:47*
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*D079 E Mouton*

*dotPLOT 7022 PBpH7*

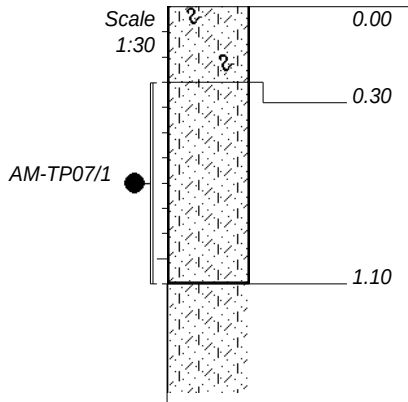
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP07
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry, brown, medium dense to dense, intact to pinholed, clayey silty SAND, with fine roots. Fine **ALLUVIUM**.

*0.30*

Dry to slightly moist, dark brown, dense, pinholed and slickensided and material breaks in a blocky manner, clayey silty SAND. Fine **ALLUVIUM**.

*1.10*

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample AM-TP07/1 taken at 0.3m--1.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 30 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0806585
*Y-COORD :* 7583438

*HOLE No:* AM-TP07

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:47
*TEXT :* ..P51\PROFILES\PKFAMTP.TXT

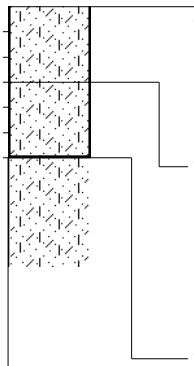
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP08-A
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown slightly stained orange, dense with medium dense pockets, intact to pinholed, clayey silty coarse SAND. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots present.

Dry to slightly moist, brown to dark brown, dense, pinholed and material breaks in a blocky manner, clayey silty SAND, with traces of angular to sub-angular coarse sand of quartz. Fine **ALLUVIUM**.
Note:
1. Scattered roots present.

EOH: Terminated due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0807041
*Y-COORD :* 7583485

*HOLE No:* AM-TP08-A

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:47
*TEXT :* ..P51\PROFILES\PKFAMTP.TXT

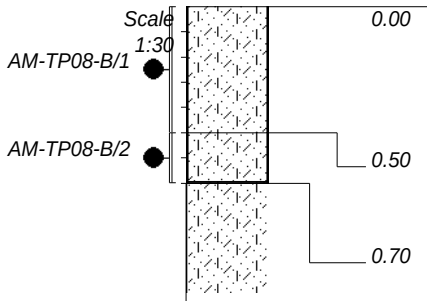
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP08-B
*Sheet 1 of 1*

*JOB:* 3010047806




Moist, brown to dark brown, medium dense, pinholed to blocky, silty clayey SAND. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots present.

Moist, dark brown with orange staining, dense, intact to pinholed, clayey silty SAND. Fine **ALLUVIUM**.

EOH: Terminated due to very slow excavation in material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Sample AM-TP08-B/1 taken at 0.0m--0.5m.

4) Sample AM-TP08-B/2 taken at 0.5m--0.7m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0807035
*Y-COORD :* 7583446

*HOLE No:* AM-TP08-B

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 04/07/2023 13:47
*TEXT :* ..P51\PROFILES\PKFAMTP.TXT

D079 E Mouton

dotPLOT 7022 PBpH7

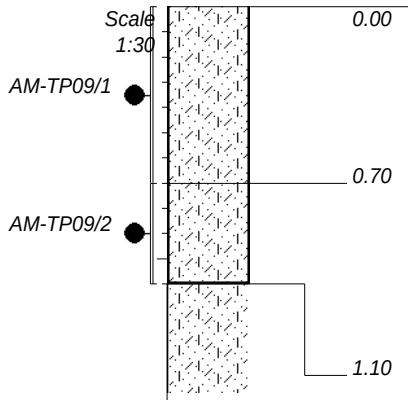
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP09
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense with dense pockets, pinholed to honeycombed and breaks in a blocky manner, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Slightly undulating horizon.

Slightly moist to moist, brown mottled orange and black, dense, pinholed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Seemingly very slightly ferruginised.
2. Ferricrete nodules present (<3mm).

EOH: Terminated due to very slow excavation on material as above, but denser. Material rippable.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample AM-TP09/1 taken from 0.0m--0.7m.
4) Disturbed sample AM-TP09/2 taken from 0.7m--1.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0807324
*Y-COORD :* 7583323

*HOLE No:* AM-TP09

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:47*
*TEXT : ..P51\PROFILES\PKFAMTP.TXT*

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

Knight Piésold CONSULTING

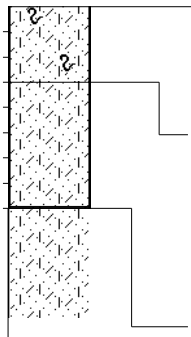
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* AM-TP10
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00*

Dry, brown, medium dense to dense with depth, pinholed and breaks in a blocky manner, clayey silty SAND, with traces of coarse sand of quartz, and roots. Fine **ALLUVIUM**.

*0.30*

Dry to slightly moist, brown to dark brown, dense, pinholed, clayey silty SAND, with trace of coarse sand to fine gravel of sub-angular to subrounded quartz. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots present.

*0.80*

EOH: Terminated near confined refusal, due to very slow excavation on material as above, but slightly denser. Material rippable.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Lovol FR220D
*DRILLED BY :* Joseph Hosain
*PROFILED BY :* Chris Homan

*INCLINATION :* Vertical
*DIAM :* 1200
*DATE :* 31 May 2023
*DATE :* 31 May 2023

*COORDINATE SYSTEM :* UTM,WGS84(33K)
*X-COORD :* 0807340
*Y-COORD :* 7583630

*HOLE No:* AM-TP10

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 04/07/2023 13:47*
*TEXT : ..P51\PROFILES\PKFAMTP.TXT*

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

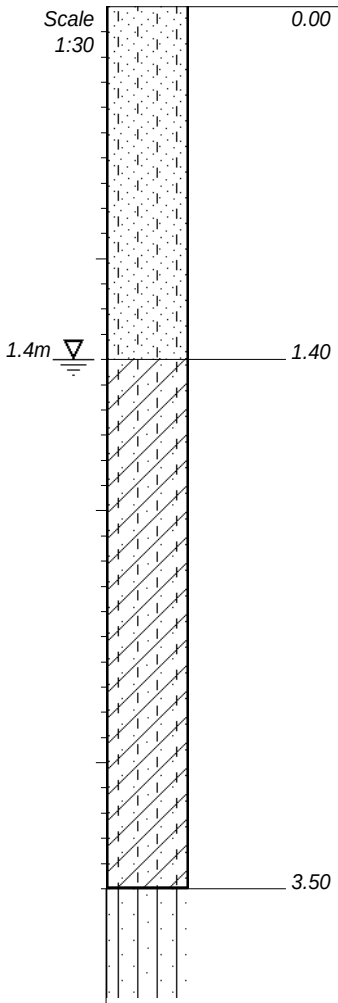
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP01
*Sheet 1 of 1*

*JOB:* 3010047806




Moist, light brown, very loose, intact, silty medium to coarse SAND. Fine **ALLUVIUM**.
Note:
1. Traces of subrounded medium grained quartz gravel.

Moist to wet, dark reddish brown, firm, slickensided, silty sandy CLAY. Fine **ALLUVIUM**.

EOH: Refusal of excavator on brown to grey, very stiff, sandy SILT. **RESIDUAL GNEISS**.

NOTES

1) Perched groundwater table encountered at 1.4m.
2) Severe collapse of sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 13 May 2023
*DATE :* 13 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801782.00
*Y-COORD :* 7582015.00

*HOLE No:* WRD-TP01

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 07/07/2023 14:24*
*TEXT : ..51\PROFILES\PKFWRDTP.TXT*

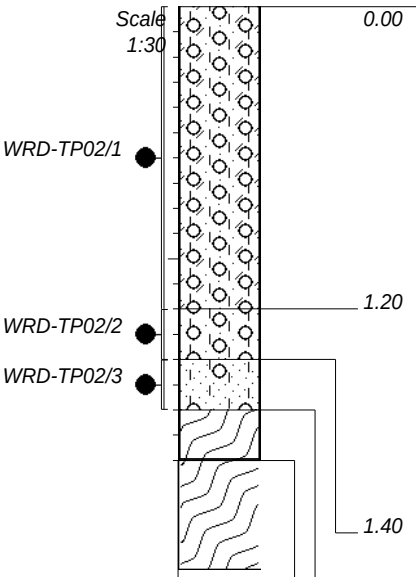
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP02
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Dry, reddish brown becoming yellowish brown with depth, medium dense, pinholed, clayey silty sandy fine GRAVEL, with sub-angular to subrounded brown gravel of quartz. Coarse **ALLUVIUM**. |
| 1.20 | Dry, brown mottled black blotched white stained orange, dense, matrix supported, silty sandy GRAVEL, with trace sub-angular to subrounded cobbles and boulders of quartz, ferruginised and calcified **PEBBLE MARKER**.<br>Note:<br>1. Ferricrete nodules present (<20mm). |
| 1.40 | Dry, white to grey mottled black stained orange, dense, intact, silty gravelly SAND, with trace sub-angular to subrounded quartz gravel. Reworked calcified **RESIDUAL GNEISS**.<br>Note:<br>1. Ferricrete nodules present (<10mm). |
| 1.60 | Completely weathered, white speckled to streaked black stained orange, medium to coarse grained, gneissic banding, widely jointed, very soft rock biotite GNEISS. |
| 1.80 | EOH: Refusal of excavator on highly to moderately weathered, soft rock biotite GNEISS. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP02/1 taken at 0.0m--1.2m.
4) Disturbed sample WRD-TP02/2 taken at 1.2m--1.4m.
5) Disturbed sample WRD-TP02/3 taken at 1.4m--1.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 26 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0802343
*Y-COORD :* 7582645

*HOLE No:* WRD-TP02

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

Knight Piésold CONSULTING

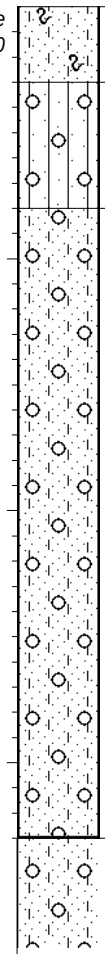
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP03
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Slightly moist, pale brown, loose, intact, silty fine SAND, with plant roots and biotic voids. **ALLUVIUM**. |
| 0.30 | Slightly moist, pale brown speckled white, firm to stiff, intact, gravelly sandy SILT. Gravel comprises weakly to moderately well cemented calcrete nodules and up to 40mm diameter angular quartz. Calcified **ALLUVIUM**. |
| 0.80 | Slightly moist becoming dry, pale orange brown, firm to stiff with loose pockets, intact, gravelly silty SAND. Ferruginous and irregularly calcified **ALLUVIUM**. |
| 3.30 | EOH: Refusal of excavator in material as above, but becoming very stiff (before teeth change). |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.
4) Excavator teeth are not sharp causing premature refusal.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 10 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 80233280
*Y-COORD :* 7582281.00

*HOLE No:* WRD-TP03

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

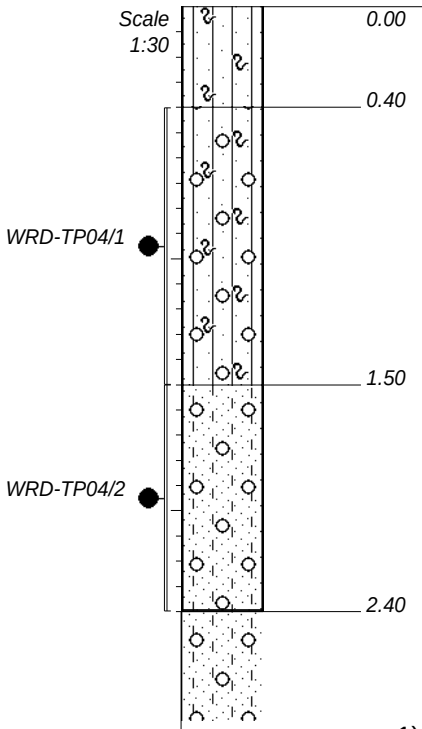
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP04
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist, pale brown, firm, shattered, slightly gravelly sandy SILT, with plant roots. **ALLUVIUM**. |
| 0.40 | Slightly moist to dry, pale brown mottled white, stiff, intact, gravelly (calcrete nodules) fine to medium sandy SILT, with plant roots. Calcified **ALLUVIUM**. |
| 1.50 | Slightly moist, orange brown, medium dense with dense pockets, intact, gravelly silty SAND. **ALLUVIUM**, with pockets and lenses of very fine grained laminated deposits and coarse grained sand pockets. |
| 2.40 | EOH: Refusal of excavator in dense material as above. |

NOTES

1) No groundwater seepage encountered.
2) No further penetration by excavator (before teeth change).
3) Disturbed samples WRD-TP04/1 taken from 0.4m--1.5m.
4) Disturbed samples WRD-TP04/2 taken from 1.5m--2.4m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 10 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 801993.39
*Y-COORD :* 7582129.46

*HOLE No:* WRD-TP04

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

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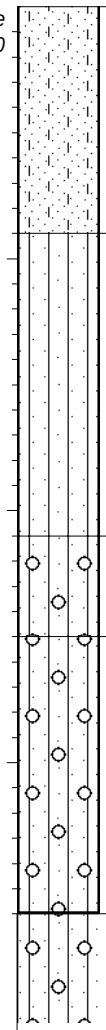
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP05
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| *0.00* | Slightly moist, brown, loose to medium dense, intact, silty fine SAND. Fine **ALLUVIUM**. |
| *0.90* | Slightly moist, dark reddish brown, firm, fissured, sandy silt. Ferruginous **ALLUVIUM**.<br>Note:<br>1. Bands of clay lenses. |
| *2.10* | Slightly moist, pale brown to off-white, stiff, moderately to strongly cemented, gravelly sandy SILT. Calcified **ALLUVIUM**. |
| *2.50* | Slightly moist, pale brown to off-white, dense to very dense, strongly to very strongly cemented, gravelly sandy SILT. Calcified **ALLUVIUM**. |
| *3.60* | EOH: Refusal of excavator on very strongly cemented, very dense, calcified ALLUVIUM of soft rock strength. |

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 13 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802728.00
*Y-COORD :* 7582301.00

*HOLE No:* WRD-TP05

Knight Piésold CONSULTING

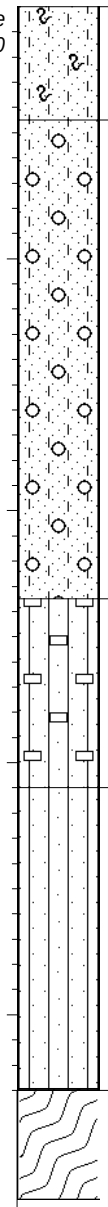
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP06
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry, reddish brown, loose, intact, silty fine SAND, with traces calcrete nodules of soft rock strength, plant roots. **ALLUVIUM**. |
| 0.45 | Slightly moist, dark reddish brown, dense, poorly cemented, gravelly silty SAND. Ferruginised **ALLUVIUM**.<br>Note:<br>1. Minor to traces of scattered ferricrete nodules of soft rock strength. |
| 2.35 | Slightly moist, pale brown mottled white, stiff, moderately cemented, sandy SILT, with abundant calcrete nodules of medium hard rock strength. **NODULAR CALCRETE**. |
| 3.10 | Slightly moist, pale brown mottled white, stiff, moderately cemented, sandy SILT. Calcified **ALLUVIUM**.<br>Note:<br>1. Traces of calcrete nodules of medium hard rock strength. |
| 4.30 | EOH: Refusal of excavator on moderately weathered, grey streaked white, medium grained, medium hard rock GNEISS. |

NOTES

1) No groundwater seepage encountered.
2) Sidewalls stable.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 13 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802341.11
*Y-COORD :* 7582119.35

*HOLE No:* WRD-TP06

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 07/07/2023 14:24*
*TEXT : ..51\PROFILES\PKFWRDTP.TXT*

Knight Piésold CONSULTING

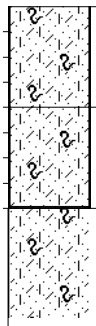
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP07
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00*

Dry, brown, medium dense to dense with depth, intact with scattered openings, clayey silty SAND, with roots. Fine **ALLUVIUM**.

*0.40*

Dry, brown to dark brown, dense, intact but breaks in a blocky nature, clayey silty coarse SAND, with very fine roots. Fine **ALLUVIUM**.

*0.80*

EOH: Terminated due to very slow excavation on material as above, but tending to very dense.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 26 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0802532
*Y-COORD :* 7581769

*HOLE No:* WRD-TP07

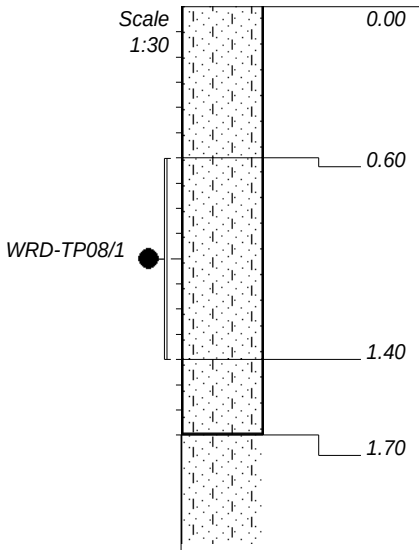
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP08
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, pale brown, loose to medium dense, intact, slightly gravelly silty SAND. **ALLUVIUM**.
Note:
Gravel up to 50mm diameter rounded gneiss fragments.

Slightly moist, pale brown speckled white, medium dense, intact, silty fine SAND, with minor fine calcrete gravel. Calcified **ALLUVIUM**

Slightly moist, pale orange brown, medium dense becoming dense, silty SAND. Ferruginous and calcified **ALLUVIUM**.

EOH: Refusal of excavator in dense material as above.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP08/1 taken from 0.6m--1.4m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 10 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802820.40
*Y-COORD :* 7582154.58

*HOLE No:* WRD-TP08

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

Knight Piésold CONSULTING

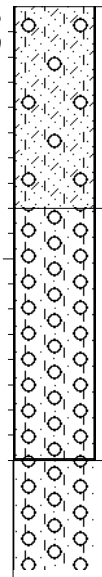
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP09
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



*0.00*

Dry, brown, dense, pinholed, clayey gravelly silty SAND. Fine **ALLUVIUM**.
Notes:
1. Roots present in top 100mm.
2. Horizon becomes slightly calcified towards the base, including honeycombed.

*0.80*

Dry, brown mottled to blotched white and black, slightly stained orange, dense, matrix supported, silty sandy GRAVEL, with sub-angular to subrounded gravel of quartz and calcrete, weakly cemented. Slightly calcified coarse **ALLUVIUM**.
Note:
1 Ferricrete nodules present (<10mm).

*1.80*

EOH: Refusal due to very slow excavation on material as above, but stronger calcified and weakly to moderately cemented.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 26 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0802802
*Y-COORD :* 7582018

*HOLE No:* WRD-TP09

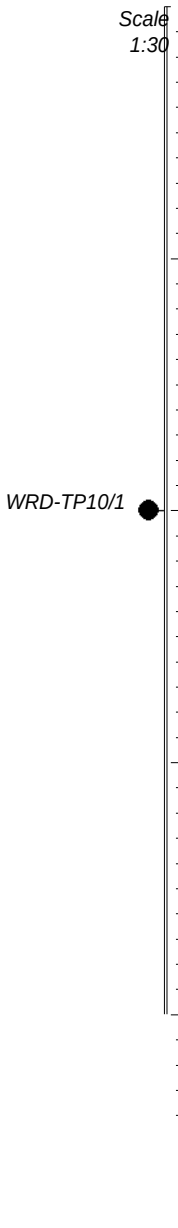
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP10
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Slightly moist, orange to reddish brown, medium dense becoming dense, intact, silty fine SAND. Fine **ALLUVIUM**.

Notes:
1. Presence of plant roots up to 400mm.
2. Scattered traces of subrounded to sub-angular fine to medium quartz gravel.

*4.00*

Slightly moist, pale brown to orange brown, very stiff, fissured, moderately to strongly cemented, gravelly sandy SILT. Calcified **ALLUVIUM**.

*4.40*

EOH: No refusal of excavator, maximum reach in material as above.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample WRD-TP10/1 taken at 0.0m--4.0m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 16 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803055.00
*Y-COORD :* 7581743.00

*HOLE No:* WRD-TP10

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

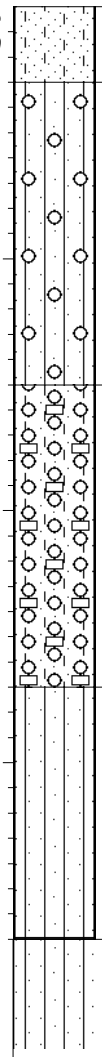
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP11
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Dry, brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**. |
| 0.30 | Slightly moist, dark reddish brown, soft, fissured, moderately cemented, gravelly sandy SILT. Ferruginised **ALLUVIUM**. |
| 1.50 | Slightly moist, pale brown to off-white, medium dense, sandy silty GRAVEL, comprising calcrete nodules of soft rock strength. **NODULAR CALCRETE**. |
| 2.70 | Slightly moist, pale brown to off-white, stiff, moderately to strongly cemented, shattered, sandy SILT, with minor calcrete nodules. Calcified **ALLUVIUM**. |
| 3.70 | EOH: Refusal of excavator on very stiff, strongly cemented, calcified ALLUVIUM. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 16 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803420.00
*Y-COORD :* 7581961.00

*HOLE No:* WRD-TP11

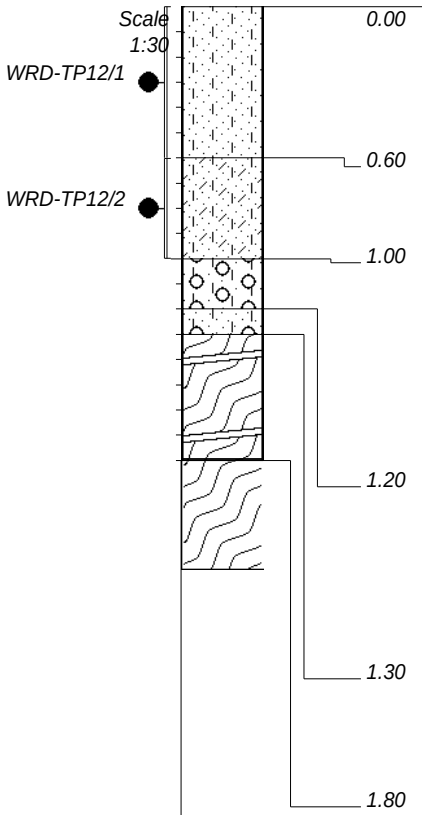
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP12
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.60: Dry to slightly moist, light brown, very loose, medium bedded, silty SAND. **ALLUVIUM**.
Note:
1. Roots present in top 200mm.

0.60 – 1.00: Dry to slightly moist, dark brown, medium dense, intact to root voided, clayey silty SAND. **ALLUVIUM**.

1.00 – 1.20: Dry to slightly moist, brown, slightly speckled white stained orange, medium dense to dense, matrix supported, silty sandy GRAVEL, with trace sub-angular to subrounded cobbles of quartz. Slightly ferruginous **PEBBLE MARKER**.
Note:
1. Occasional ferricrete nodules present.

1.20 – 1.30: Dry, white to grey mottled black stained orange, dense, intact, silty gravelly SAND, with trace sub-angular to subrounded quartz gravel. Reworked ferruginised **RESIDUAL GNEISS**.
Note:
1. Ferricrete nodules present (<10mm).

1.30 – 1.80: Completely to highly weathered, white speckled to streaked black stained orange, medium to coarse grained, gneissic bands, widely jointed, very soft to soft rock with pockets of medium hard rock, biotite GNEISS.

1.80: EOH: Refusal of excavator on highly to moderately weathered, medium hard rock biotite GNEISS.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP12/1 taken at 0.0m--0.6m.
4) Disturbed sample WRD-TP12/2 taken at 0.6m--1.0m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 26 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0803082
*Y-COORD :* 7582525

*HOLE No:* WRD-TP12

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 07/07/2023 14:24*
*TEXT : ..51\PROFILES\PKFWRDTP.TXT*

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

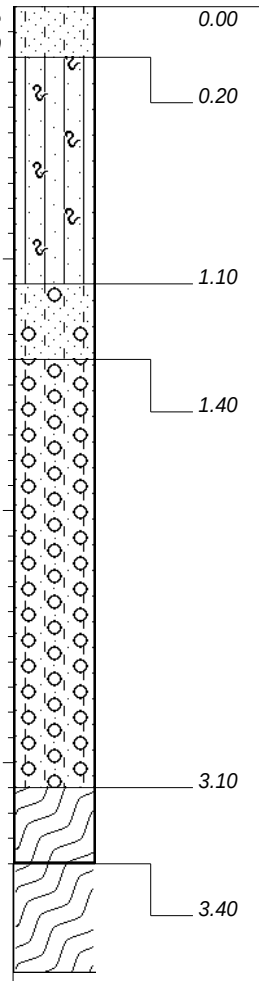
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP13
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, brown, loose to medium dense, intact, slightly gravelly silty SAND. **ALLUVIUM**.

Slightly moist, pale orange brown, stiff, shattered/blocky, fine sandy SILT, with plant roots. **ALLUVIUM**.

Slightly moist, pale brown, loose to medium dense, intact, gravelly silty SAND. Gravel comprises calcrete nodules and sub-angular to subrounded quartz gravel. Calcified **ALLUVIUM**.

Slightly moist, pale orange brown, medium dense, intact and bedded, clast supported, silty sandy GRAVEL, with pockets of loose gravelly SAND-SILT. Gravel comprises sub-angular to rounded quartz and gneiss gravel and small cobbles up to 60mm diameter. Coarse **ALLUVIUM**.
Note:
Significant gravel increase from 2.4m.

Highly weathered, grey speckled black and white and gold stained orange along joints, very closely jointed, gneissic, very soft rock becoming soft rock granitic GNEISS with depth.

EOH: Refusal of excavator on soft rock tending to medium hard rock granitic GNEISS.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Test pit sidewall depths differ.
4) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 11 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803424.70
*Y-COORD :* 7582333.22

*HOLE No:* WRD-TP13

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

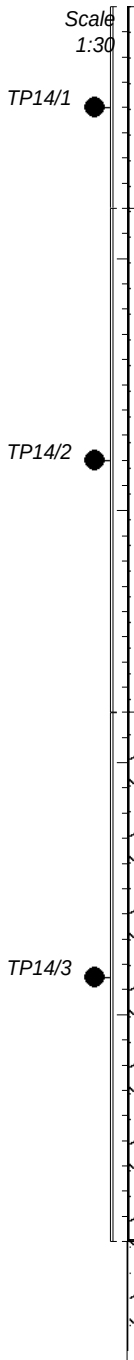
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP14
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 — Slightly moist, pale brown, loose to medium dense, intact, silty SAND, with plant roots. Ferruginous **ALLUVIUM**.

0.80 — Slightly moist, pale brown speckled white, medium dense, intact, slightly gravelly silty SAND. Calcareous **ALLUVIUM**.
Note:
Gravel bands vary in density and comprise irregular to subrounded calcrete nodules (poor to moderately cemented) and sub-angular to subrounded quartz gravel.

2.80 — Slightly moist, pale yellow brown, loose to occasionally medium dense, intact, silty fine to medium sandy GRAVEL and COBBLES, comprising sub-angular to subrounded quartz gravel. Coarse **ALLUVIUM**.

4.90 — EOH: No refusal of excavator, but maximum reach in material as above.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed samples TP14/1 taken from 0.0m--0.8m.
4) Disturbed samples TP14/2 taken from 0.8m--2.8m.
5) Disturbed samples TP14/3 taken from 2.8m--4.9m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 11 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803530.99
*Y-COORD :* 7582575.57

*HOLE No:* WRD-TP14

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

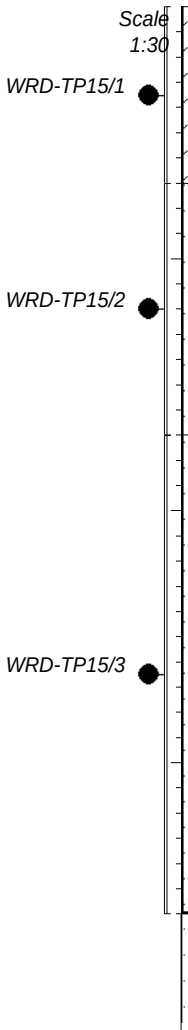
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP15
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Slightly moist, brown, stiff, shattered/blocky, slightly sandy clayey SILT, with plant roots. **ALLUVIUM**.

*0.70*

Slightly moist, brown speckled white, dense, intact, gravelly silty fine SAND, with plant roots. Calcified **ALLUVIUM**.

*1.70*

Slightly moist to dry, pale orange brown speckled white, medium dense becoming very dense with depth, intact, gravelly silty fine SAND. Gravel comprises calcrete nodules. Calcified and ferruginous **ALLUVIUM**.

*3.60*

EOH: Refusal of excavator in very dense material as above.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed samples WRD-TP15/1 taken from 0.0m--0.7m.
4) Disturbed sample WRD-TP15/2 taken from 0.7m--1.7m.
5) Disturbed samples WRD-TP15/3 taken from 1.7m--3.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 11 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803953.75
*Y-COORD :* 7582815.05

*HOLE No:* WRD-TP15

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

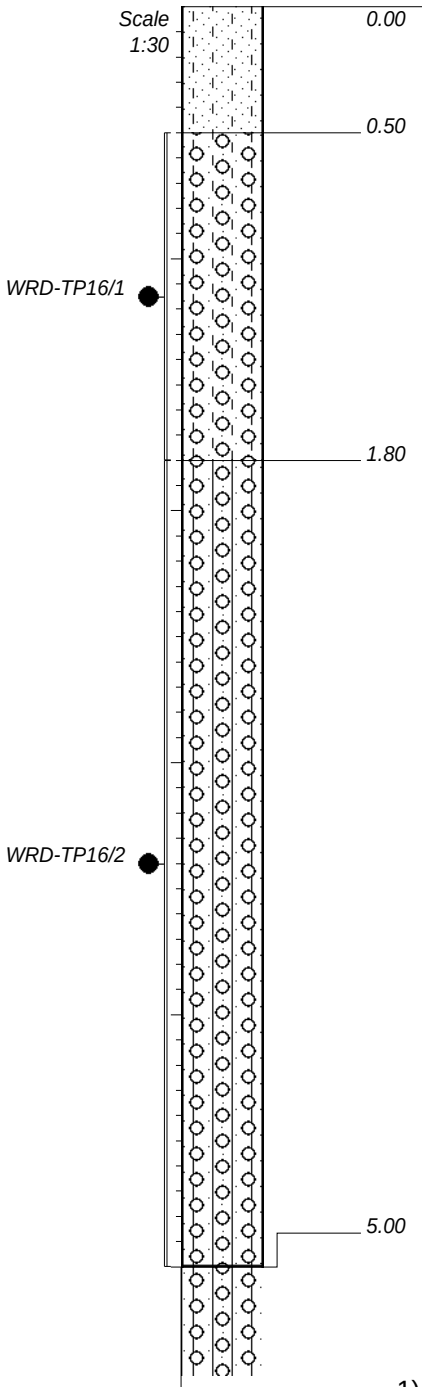
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP16
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Slightly moist, brown, medium dense, intact, silty fine SAND. **ALLUVIUM**.

*0.50*

Slightly moist, pale brown speckled white, dense, intact, fine sandy silty GRAVEL, comprising calcrete and silcrete nodules. Calcrete comprises very soft rock consistency nodules and cobbles. Calcified **ALLUVIUM**.
Note:
Sloping contact with above and variable depth throughout test pit.

*1.80*

Grading from material as above, becoming dry to slightly moist, cream brown to orange brown, soft, fine sandy SILT. Calcified and silicified **ALLUVIUM**.

*5.00*

EOH: No refusal of excavator in material as above, but maximum reach in dense to very dense silcrete lenses.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed samples WRD-TP16/1 taken from 0.5m--1.8m.
4) Disturbed samples WRD-TP16/2 taken from 1.8m--5.0m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 11 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803563.99
*Y-COORD :* 7582976.05

*HOLE No:* WRD-TP16

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
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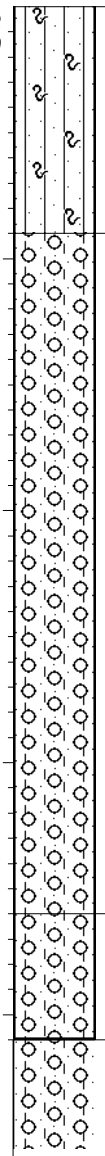
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP17
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist, brown, firm, intact, fine sandy SILT, with plant roots. **ALLUVIUM**. |
| 0.90 | Slightly moist, pale yellow brown speckled white, medium dense becoming loose to medium dense with depth, intact, fine sandy silty GRAVEL. **NODULAR and HONEYCOMB CALCRETE** in alluvium matrix. |
| 3.60 | Slightly moist, pale brown, medium dense, with silicified dense lens, intact, fine sandy silty GRAVEL. Gravel comprises sub-angular to rounded quartz gravel and small cobbles up to 60mm diameter. Coarse **ALLUVIUM**. |
| 4.10 | EOH: No refusal of excavator on very dense lenses of coarse **ALLUVIUM**, as above. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 11 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804031.00
*Y-COORD :* 7583179.00

*HOLE No:* WRD-TP17

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
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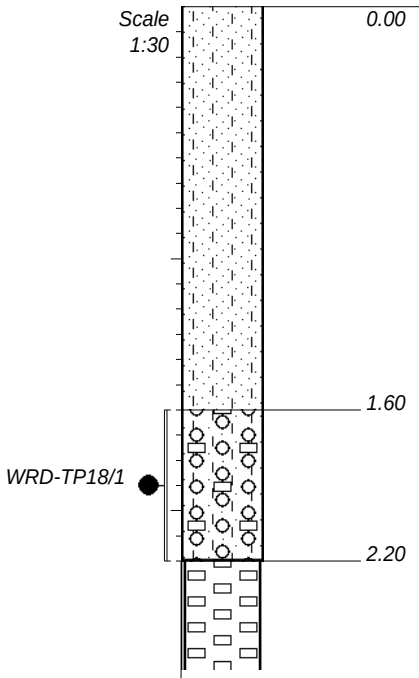
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP18
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 — Dry, red to brown, loose to medium dense, intact, silty fine SAND. Fine **ALLUVIUM**.

1.60 — Slightly moist, light brown blotched white, medium dense, intact, sandy silty GRAVEL, comprising abundant calcrete nodules of soft to medium hard rock strength. **NODULAR CALCRETE**.

2.20 — EOH: Refusal of excavator on light brown blotched white, strongly cemented, HARDPAN CALCRETE of medium hard rock strength.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed samples WRD-TP18/1 taken at 1.6m--2.2m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 13 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804076.74
*Y-COORD :* 7583671.36

*HOLE No:* WRD-TP18

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
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Knight Piésold CONSULTING

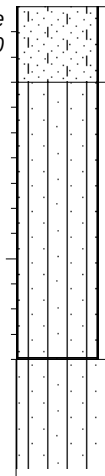
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP19
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00* Dry, brown, loose, intact, silty fine SAND. Fine **ALLUVIUM**.

*0.30* Dry, dark brown, stiff, moderately cemented, blocky, shattered, sandy SILT. Ferruginised hardpan **ALLUVIUM**.

*1.40* EOH: Refusal of excavator on very strongly cemented, ferruginised ALLUVIUM.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 13 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804095.95
*Y-COORD :* 7583420.70

*HOLE No:* WRD-TP19

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
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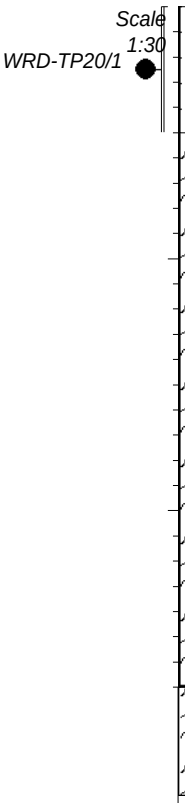
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP20
*Sheet 1 of 1*

*JOB:* 3010047806




Slightly moist, light brown speckled white, loose, silty medium to coarse SAND. Fine **ALLUVIUM**.

Completely weathered, grey to brown streaked white, medium to coarse grained, very soft to soft rock GNEISS.
Note:
1. Lenses of gravelly sandy silt, completely weathered gneiss.

EOH: Refusal of excavator on highly weathered, medium grained, medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Collapse of sidewalls at 0.0m to 0.5m.

3) Disturbed samples WRD-TP20/1 taken at 0.0m--0.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 16 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804927.00
*Y-COORD :* 7583457.00

*HOLE No:* WRD-TP20

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

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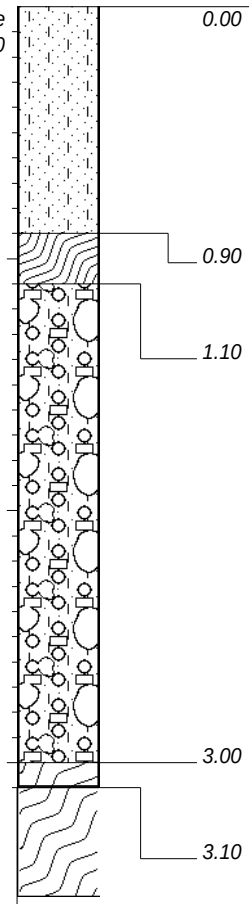
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP21
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



| | |
|---|---|
| 0.00 | Dry, reddish brown, loose to medium dense, intact, silty fine to medium SAND. Fine **ALLUVIUM**. |
| | Note:<br>1. Traces of sub-angular quartz gravel.<br>2. Presence of roots up to a depth of 0.3m.<br>3. Abundant medium to coarse gravel at base of strata. |
| 0.90 | Moderately weathered, dark grey speckled white, medium grained, very soft to soft rock AMPHIBOLITE. |
| 1.10 | Slightly moist, pale brown mottled white, medium dense becoming dense, intact, sandy silty GRAVEL, comprising abundant calcrete nodules and cobbles of medium hard rock strength. **NODULAR CALCRETE**. |
| 3.00 | Moderately weathered, dark grey speckled and streaked white, medium grained, medium hard rock GNEISS. |
| 3.10 | EOH: Refusal of excavator on material as above. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804187.03
*Y-COORD :* 7584237.04

*HOLE No:* WRD-TP21

*TYPE SET BY : EM*
*SETUP FILE : KPTP8.SET*

*DATE : 07/07/2023 14:24*
*TEXT : ..51\PROFILES\PKFWRDTP.TXT*

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

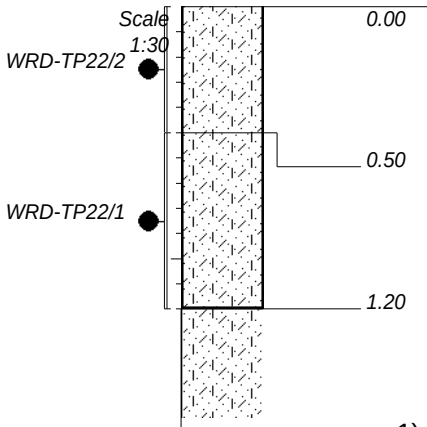
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP22
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, dark brown, medium dense, intact to root voided, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Roots present in top 100mm.

Dry, dark brown speckled white, dense, root voided, clayey silty SAND, with traces of coarse sand. Fine **ALLUVIUM**.

EOH: Terminated due to very slow excavation on material as above.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP22/1 taken at 0.5m--1.2m.
4) Disturbed sample WRD-TP22/2 taken at 0.0m--0.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0805033
*Y-COORD :* 75824029

*HOLE No:* WRD-TP22

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

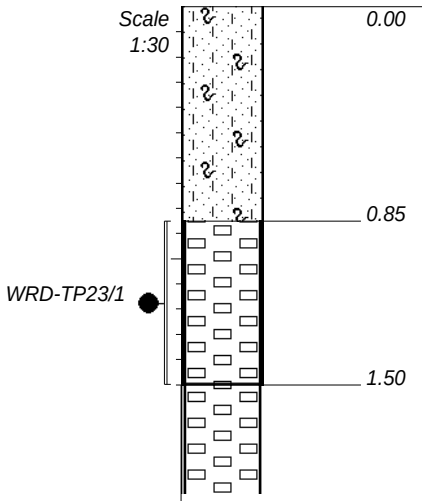
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP23
*Sheet 1 of 1*

*JOB:* 3010047806




Dry to slightly moist, dark brown, loose to medium dense, intact, silty fine SAND. Fine **ALLUVIUM**.

Notes:
1. Presence of plant roots.

Slightly moist, pale brown blotched white, moderately to strongly cemented, HARDPAN CALCRETE of very soft to soft rock strength.

EOH: Refusal of excavator on strongly to very strongly cemented, HARDPAN CALCRETE of medium hard rock strength.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed samples WRD-TP23/1 taken at 0.85m--1.50m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804153.99
*Y-COORD :* 7584615.84

*HOLE No:* WRD-TP23

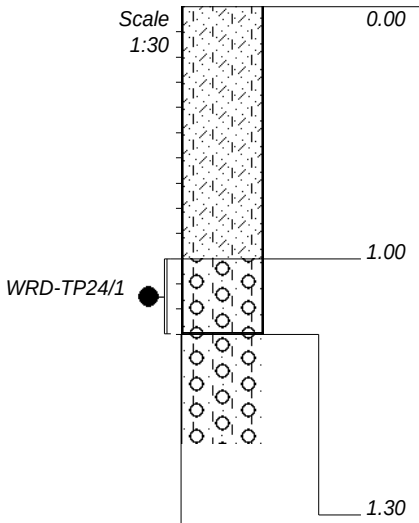
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP24
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, reddish brown to orange brown with depth, loose to medium dense, clayey silty coarse SAND. Fine **ALLUVIUM**.

Dry, reddish brown to brown mottled black and white, dense, matrix supported, silty sandy GRAVEL, with minor grey sub-angular to subrounded cobbles of quartz. Ferruginous **PEBBLE MARKER**.

Notes:

1. Ferricrete nodules present (<30mm) with calcrete nodules (<10mm).
2. Some degree of nodular to honeycomb ferricrete present of weakly cementation.

EOH: Refusal of excavator on material as above, but dense and moderately to strongly cemented. Ferruginised **PEBBLE MARKER**.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample WRD-TP24/1 taken at 1.0m--1.3m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 25 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0805039
*Y-COORD :* 7584921

*HOLE No:* WRD-TP24

D079 E Mouton

dotPLOT 7022 PBpH7

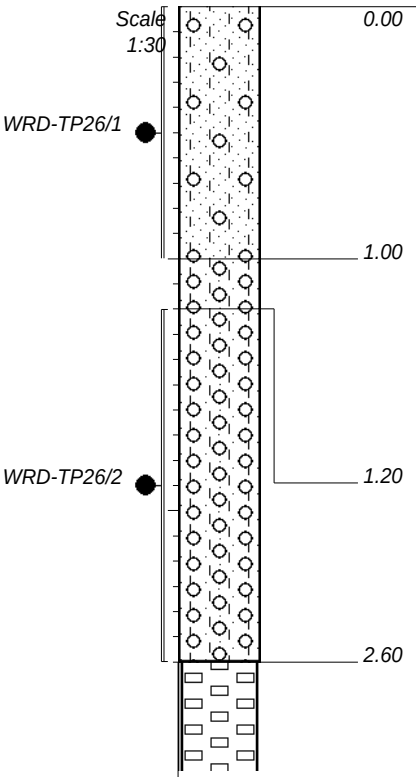
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP26
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry, dark brown, medium dense, intact to slightly pinholed, fine gravelly silty SAND. Fine **ALLUVIUM**.
Note:
1. Fine roots present near top 200mm.

*1.00*

Dry, brown in yellowish brown mottled black and occasionally white, medium dense, matrix supported, silty sandy GRAVEL, with minor coarse gravel, comprising sub-angular to subrounded quartz. **PEBBLE MARKER**
Note:
1. Ferricrete nodules present (<20mm).
2. Very undulating horizon.

*1.20*

Dry, white speckled to mottled black and brown, dense, intact, moderately cemented, silty sandy GRAVEL. Calcified **RESIDUAL GNEISS**.

*2.60*

EOH: Refusal of excavator on material as above, but moderately to strongly cemented, tending to HARDPAN CALCRETE.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP26/1 taken at 0.0m--1.0m.
4) Disturbed sample WRD-TP26/2 taken at 1.2m--2.6m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 25 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0803030
*Y-COORD :* 7584941

*HOLE No:* WRD-TP26

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

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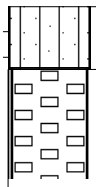
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP27
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00

0.25

Slightly moist, dark brown, soft, shattered, sandy SILT. **ALLUVIUM**.

EOH: Refusal of excavator on light brown stained white, strongly cemented, HARDPAN CALCRETE, of medium hard rock consistency.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802994.92
*Y-COORD :* 7585563.53

*HOLE No:* WRD-TP27

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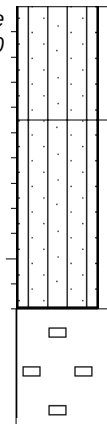
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP28
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Slightly moist, dark brown, soft to firm, shattered, sandy SILT. **ALLUVIUM**. |
| 0.45 | Slightly moist, pale brown blotched white, sandy SILT, matrix supported, with abundant calcrete nodules and COBBLES of medium hard rock consistency. **NODULAR CALCRETE**.<br>Note:<br>1. Traces of calcrete boulders of hard rock consistency at base of strata. |
| 1.20 | EOH: Refusal of excavator on pale brown stained white, strongly cemented, HONEYCOMB CALCRETE, of medium hard rock consistency. |

NOTES

1) No groundwater seepage encountered.

2) Collapse of sidewalls at 0.45m to 0.8m.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 802706.77
*Y-COORD :* 7586159.95

*HOLE No:* WRD-TP28

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

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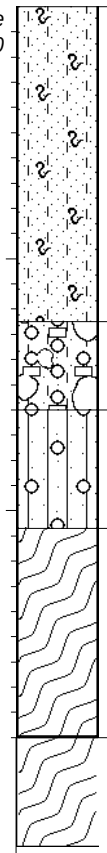
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP29
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



0.00 Slightly moist, brown, loose, intact, silty fine to medium SAND, with plant roots. Fine **ALLUVIUM**.

1.25 Slightly moist, light brown to off-white, medium dense, sandy silty GRAVEL, comprising calcrete nodules and cobbles of soft rock strength. **NODULAR CALCRETE**, tending to **HONEYCOMB CALCRETE**.

1.60 Slightly moist, grey stained white, firm to stiff, intact, poorly to moderately cemented, gravelly sandy SILT. Calcified **RESIDUAL GNEISS**.
Note:
1. Minor to trace calcrete nodules of soft rock strength.

2.07 Completely weathered, grey to brown streaked white, medium grained, very soft rock GNEISS.

2.90 EOH: Refusal of excavator on completely to highly weathered, medium grained, medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Sidewalls stable.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803562.23
*Y-COORD :* 7586522.25

*HOLE No:* WRD-TP29

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

Knight Piésold CONSULTING

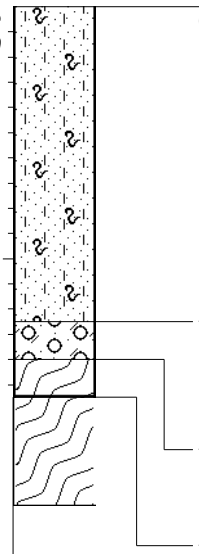
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP30
*Sheet 1 of 1*

*JOB:* 3010047806

*Scale 1:30*



*0.00*

Dry, reddish brown, medium dense, intact, silty fine to medium SAND, with plant roots. Fine **ALLUVIUM**.
Note:
1. Traces of clay lenses at the base of strata.

*1.25*

Slightly moist, dark reddish brown speckled white, dense, intact, clayey sandy abundant fine to medium grained, subrounded to sub-angular quartz GRAVEL. Coarse **ALLUVIUM**.

*1.40*

Completely weathered, dark brown to grey streaked white, medium grained, soft rock GNEISS.

*1.55*

EOH: Refusal of excavator on completely weathered, brown to grey streaked white, medium grained, soft to medium hard rock GNEISS.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803710.59
*Y-COORD :* 7585929.08

*HOLE No:* WRD-TP30

*D079 E Mouton*

*dotPLOT 7022 PBpH7*

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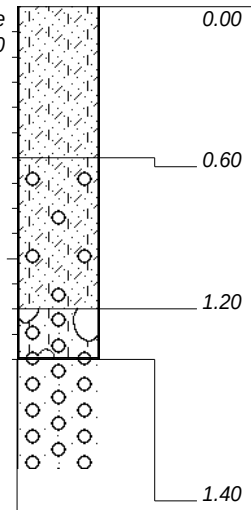
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP31
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry, brown to orange brown, loose, intact, clayey silty SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Fine roots present at top 200mm. |
| 0.60 | Dry to slightly moist, yellowish brown slightly stained orange, medium dense, intact, clayey silty gravelly SAND. Coarse **ALLUVIUM**. |
| 1.20 | Dry, khaki brown mottled to blotched black, dense, silty sandy GRAVEL, with abundant sub-angular to subrounded brown to orange cobbles of quartz. Ferruginous **PEBBLE MARKER**.<br>Note:<br>1. Traces of moderately cemented honeycomb ferricrete present. |
| 1.40 | EOH: Refusal of excavator in dry, orange brown mottled to blotched black and red, dense, strongly cemented, sandy GRAVEL. **HONEYCOMB** to **HARDPAN FERRICRETE** of medium hard rock consistency. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 25 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0804445
*Y-COORD :* 7586187

*HOLE No:* WRD-TP31

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

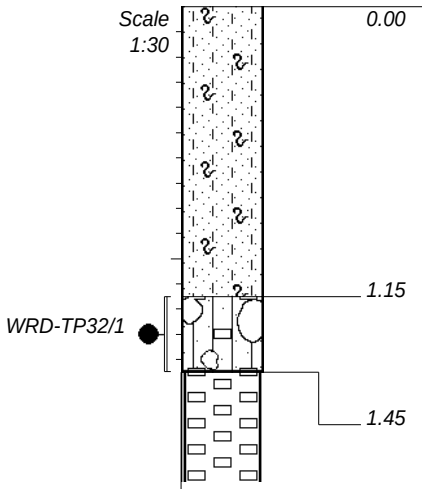
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP32
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, reddish brown, loose becoming medium dense, intact, silty fine SAND. Fine **ALLUVIUM**.
Note:
1. Presence of plant roots.

Slightly moist, pale brown blotched white, stiff, broken, moderately to strongly cemented, sandy SILT matrix, with calcrete nodules, cobble fragments of medium hard rock consistency. **HARDPAN CALCRETE**.

EOH: Refusal of excavator on very strongly cemented, HARDPAN CALCRETE of medium hard rock consistency.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample WRD-TP32/1 taken at 1.15m--1.45m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 17 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803973.00
*Y-COORD :* 7585217.00

*HOLE No:* WRD-TP32

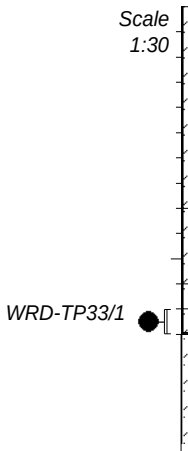
Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP33
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| *0.00* | Dry, reddish brown, <u>medium dense</u>, intact and root voided, clayey silty coarse SAND, with trace sub-angular to subrounded brown quartz fine gravel. Fine **ALLUVIUM**. |
| *0.80* | Dry, orange to yellowish brown, <u>medium dense</u>, intact and root voided, clayey silty coarse SAND. Fine **ALLUVIUM**. |
| *1.10* | Dry, khaki brown, <u>medium dense</u>, matrix supported, silty gravelly SAND, with trace sub-angular to subrounded gravel and cobbles of quartz. Ferruginous **PEBBLE MARKER**.<br><u>Note</u>:<br>1. Scattered ferricrete nodules present (<10mm). |
| *1.20* | Dry, dark brown mottled orange and black, <u>dense</u>, pinholed, clayey silty coarse SAND. Slightly ferruginous reworked **RESIDUAL BIOTITE GNEISS**. |
| *1.30* | EOH: Terminated due to very slow excavation on material as above. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample WRD-TP33/1 taken at 1.2m--1.3m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 25 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0804832
*Y-COORD :* 7585645

*HOLE No:* WRD-TP33

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

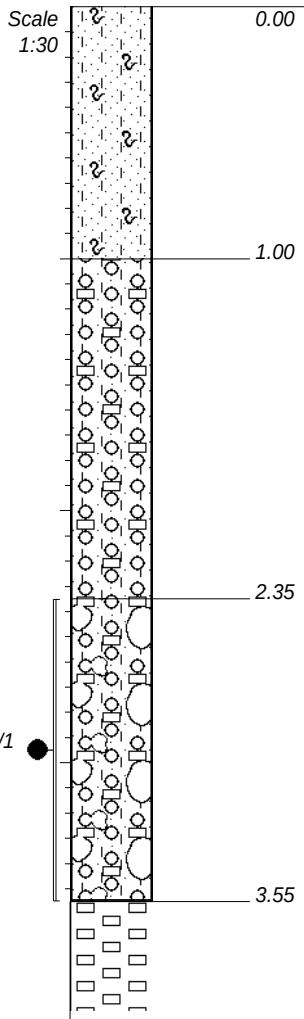
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP34
*Sheet 1 of 1*

*JOB:* 3010047806




*0.00*

Dry, reddish brown, medium dense, intact, silty fine SAND, with plant roots. Fine **ALLUVIUM**.
Note:
1. Minor occurrences of clay lenses.

*1.00*

Slightly moist, pale brown blotched white medium dense, intact, sandy silty GRAVEL, comprising calcrete nodules of medium hard rock consistency. **NODULAR CALCRETE**.

*2.35*

Slightly moist, pale brown blotched white, medium dense to dense, moderately cemented, sandy silty GRAVEL, comprising calcrete nodules and cobbles of medium hard consistency. **HONEYCOMB CALCRETE**.

*3.55*

EOH: Refusal of excavator on strongly cemented HONEYCOMB CALCRETE of medium hard rock consistency.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed samples WRD-TP34/1 taken at 2.35m--3.55m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* S YaFrance

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 16 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 804786.59
*Y-COORD :* 7583725.60

*HOLE No:* WRD-TP34

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

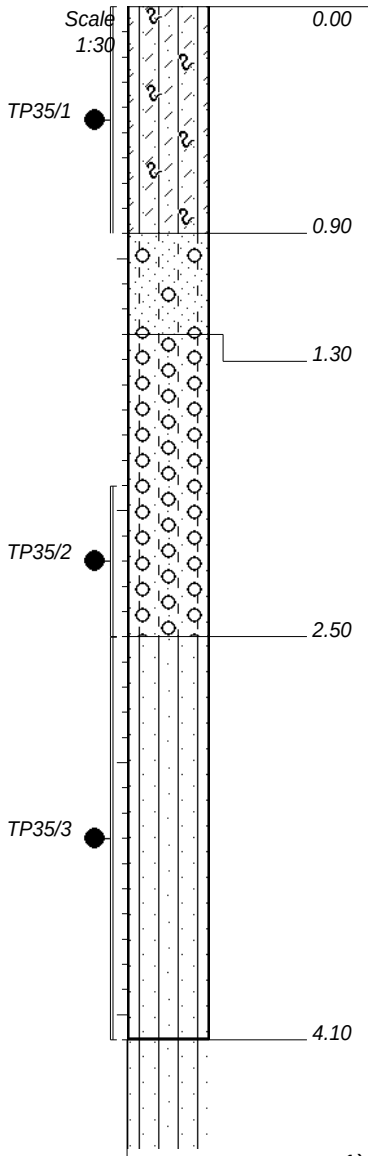
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP35
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| 0.00 | Slightly moist, reddish brown, stiff, blocky shattered, clayey sandy SILT, with medium to fine plant roots. **ALLUVIUM**. |
| 0.90 | Slightly moist, reddish brown speckled white, dense, intact, gravelly silty fine SAND. Gravel comprises sub-angular quartz and sub-angular to subrounded calcrete nodules. Calcified **ALLUVIUM**. |
| 1.30 | Slightly moist, brown, medium dense, intact, silty sandy GRAVEL. Gravel comprises sub-angular to subrounded quartz gravel up to 10mm diameter. Coarse **ALLUVIUM**. |
| 2.50 | Slightly moist, yellow brown, very stiff with stiff pockets, intact, fine sandy SILT. Ferruginous **ALLUVIUM**. |
| 4.10 | EOH: No refusal of excavator, but end of reach in material as above. |

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample TP35/1 taken from 0.0m--0.9m.
4) Disturbed sample TP35/2 taken from 1.9m--2.5m.
5) Disturbed sample TP35/3 taken from 2.5m--4.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* B Klaas

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 10 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 803149.00
*Y-COORD :* 7582266.00

*HOLE No:* WRD-TP35

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

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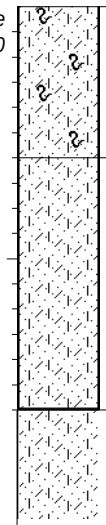
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP36
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry, dark brown, dense, pinholed to honeycombed with open root channels, clayey silty medium to coarse SAND, with roots. Fine **ALLUVIUM**.<br>Note:<br>1. Coarse sand comprises quartz. |
| 0.60 | Dry, dark brown speckled to mottled white occasionally stained orange, dense, root voided, clayey silty coarse SAND, with traces of sub-angular to subrounded quartz gravel. Slightly ferruginised fine **ALLUVIUM**. |
| 1.60 | EOH: Terminated due to very slow excavation on material as above. Ferruginised **ALLUVIUM**. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No sample taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801345
*Y-COORD :* 7582051

*HOLE No:* WRD-TP36

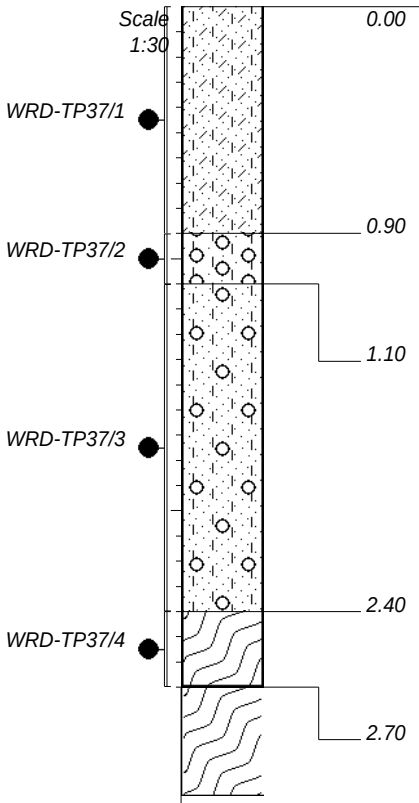
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP37
*Sheet 1 of 1*

*JOB:* 3010047806




0.00 – 0.90: Dry, dark brown, dense, blocky to slightly honeycombed, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Scattered fine roots present.

0.90 – 1.10: Dry, yellowish brown mottled white and black, medium dense, matrix supported, silty sandy GRAVEL, comprising calcrete nodules (<20mm). Calcified **PEBBLE MARKER**.

1.10 – 2.40: Dry, yellowish brown occasionally mottled black and white, slightly stained orange, medium dense, intact, gravelly silty SAND, with trace coarse gravel, comprising subrounded gravel of quartz. Reworked **RESIDUAL GNEISS**.

2.40 – 2.70: Completely to highly weathered with depth, white speckled black occasional stained orange, medium to coarse grained, gneissic banding to massive, very closely jointed, very soft to soft rock with depth, GNEISS.

EOH: Refusal of excavator on material as above, but moderately weathered, soft to medium hard rock.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP37/1 taken at 0.0m--0.9m.
4) Disturbed sample WRD-TP37/2 taken at 0.9m--1.1m.
5) Disturbed sample WRD-TP37/3 taken at 1.1m--2.4m.
6) Disturbed sample WRD-TP37/4 taken at 2.4m--2.7m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801515
*Y-COORD :* 7582442

*HOLE No:* WRD-TP37

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

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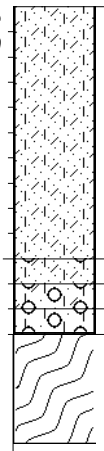
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP38
*Sheet 1 of 1*

*JOB:* 3010047806

Scale 1:30



| | |
|---|---|
| 0.00 | Dry, brown mottled black and red to base, medium dense to dense with depth, intact to pinholed, clayey silty SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Scattered fine roots present at top of layer.<br>2. Ferricrete nodules present at base (<10mm). |
| 1.00 | Dry, dark greyish brown mottled black blotched yellow to orange, dense, intact to slightly shattered and blocky, clayey gravelly silty SAND. Coarse **ALLUVIUM**.<br>Note:<br>1. Ferricrete nodules present (<25mm). |
| 1.10 | Dry, brown stained orange mottled black, dense, matrix supported, clayey silty sandy GRAVEL. Gravel comprises sub-angular to subrounded quartz and minor ferricrete nodules. **PEBBLE MARKER**. |
| 1.20 | Dry, grey to white occasionally brown speckled to mottled black stained yellowish orange, dense, intact and banded, silty sandy GRAVEL. Reworked **RESIDUAL BIOTITE GNEISS**, with pockets of highly weathered gneiss. |
| 1.30 | EOH: Excavation terminated due to very slow excavation in highly weathered, dark grey stained orange, medium to coarse grained, gneissic banded, extremely closely jointed, soft rock biotite GNEISS. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) No samples taken.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801515
*Y-COORD :* 7582442

*HOLE No:* WRD-TP38

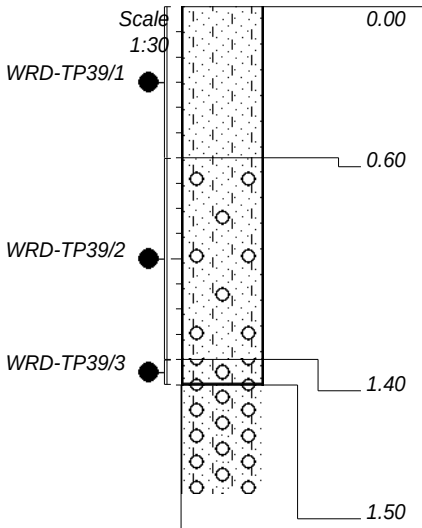
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP39
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense, intact, silty SAND to silty coarse sand. Fine **ALLUVIUM**.
Note:
1. Roots present at top 150mm.

Dry, brown to yellowish brown slightly stained orange, dense, intact, silty fine gravelly SAND. Ferruginous **ALLUVIUM**.
Notes:
1. Ferruginisation increases with depth.
2. Scattered ferricrete nodules present near base (<10mm).
3. Occasional thick roots present.

Dry, khaki stained brown to black, dense to very dense, shattered to blocky structure, silty gravelly SAND to silty sandy gravel. **HARDPAN CALCRETE / FERRICRETE**.

EOH: Refusal of excavator on material as above, but very dense.

NOTES

1) No groundwater seepage encountered.
2) Stable sidewalls.
3) Disturbed sample WRD-TP39/1 taken from 0.0m--0.6m.
4) Disturbed sample WRD-TP39/2 taken from 0.6m--1.4m.
5) Disturbed sample WRD-TP39/3 taken from 1.4m--1.5m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801254
*Y-COORD :* 7582470

*HOLE No:* WRD-TP39

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

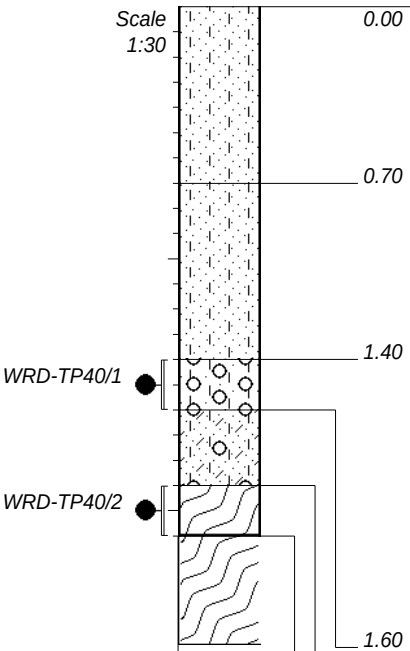
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP40
*Sheet 1 of 1*

*JOB:* 3010047806




| | |
|---|---|
| *0.00* | Dry, brown to orange brown, medium dense, intact to slightly pinholed, silty fine SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Scattered fine roots present at top 500mm. |
| *0.70* | Dry, yellowish brown, medium dense, pinholed, silty coarse SAND. Fine **ALLUVIUM**. |
| *1.40* | Dry, yellowish brown slightly stained orange mottled black, medium dense, matrix supported, silty sandy GRAVEL, with minor cobbles and boulders. **PEBBLE MARKER**.<br>Notes:<br>1. Cobbles and boulders comprise sub-angular and subrounded quartz (<250mm).<br>2. Ferricrete nodules present (<20mm).<br>3. Very undulating horizon. |
| *1.60* | Dry, greyish brown to whitish pink stained orange mottled black, dense, intact, clayey silty gravelly SAND. Reworked **RESIDUAL GNEISS**.<br>Notes:<br>1. Gravel and cobbles comprise sub-angular to subrounded quartz from above.<br>2. Ferricrete nodules present (<20mm). |
| *1.90* | Moderately weathered with highly weathered bands, white to pink speckled to streaked black stained orange and brown, fine to medium grained, gneissic banded, very closely jointed, soft becoming medium hard rock with depth, GNEISS. |
| *2.10* | EOH: Refusal of excavator on material as above, but moderately weathered, medium hard rock. |

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample WRD-TP40/1 taken from 1.4m--1.6m.

4) Disturbed sample WRD-TP40/2 taken from 1.9m--2.1m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801382
*Y-COORD :* 7582856

*HOLE No:* WRD-TP40

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

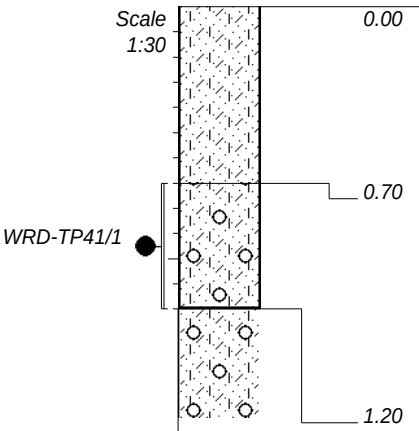
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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

*HOLE No:* WRD-TP41
*Sheet 1 of 1*

*JOB:* 3010047806




Dry, brown, medium dense to dense with depth, intact and root voided, clayey silty SAND, with traces to minor fine gravel of quartz. Fine **ALLUVIUM**.
Note:
1. Fine gravel comprises sub-angular to subrounded quartz.

Dry, dark brown stained orange mottled black speckled to mottled white, dense, intact and root voided, silty clayey gravelly SAND. Coarse **ALLUVIUM**.
Notes:
1. Ferricrete (<7mm) and calcrete nodules (<6mm) present.
3. Occasional thick roots present.

EOH: Terminated due to very slow excavation on material as above.

NOTES

1) No groundwater seepage encountered.

2) Stable sidewalls.

3) Disturbed sample WRD-TP41/1 taken from 0.7m--1.2m.

*CONTRACTOR :* Sandworx
*MACHINE :* : Excavator FR220D
*DRILLED BY :* Joseph
*PROFILED BY :* C Homan

*TYPE SET BY :* EM
*SETUP FILE :* KPTP8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* May 2023
*DATE :* 24 May 2023

*DATE :* 07/07/2023 14:24
*TEXT :* ..51\PROFILES\PKFWRDTP.TXT

*COORDINATE SYSTEM :* UTM, WGS84 (33K)
*X-COORD :* 0801860
*Y-COORD :* 7582706

*HOLE No:* WRD-TP41

# APPENDIX C2

## Borehole Logs

**HOLE No:** HLP-BH01
***Sheet 1 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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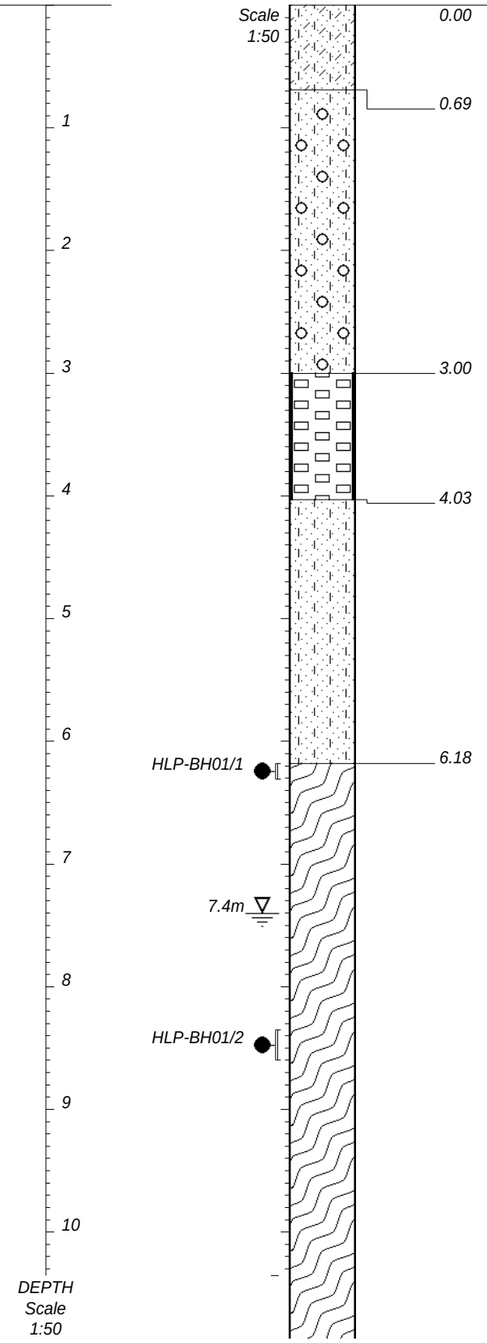
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH01
***Sheet 1 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.71 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 2.00 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 3.00 | 90 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.13 | 92 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.68 | 89 | 0 | 0 | NA |
| | | | | | | | | | | 6.18 | 97 | 0 | 0 | NA |
| | | | | | | | | | | 6.89 | 100 | 100 | 61 | 10 |
| | | | | | | | | | | 7.68 | 100 | 100 | 33 | 14 |
| | | | | | | | | | | 9.18 | 100 | 100 | 71 | 5 |
| | | | | | | | | | | 10.66 | 100 | 100 | 49 | 11 |




Dark brown, silty clayey fine SAND, with fine scattered angular gravel at the base of the layer. Fine **ALLUVIUM**.

Pale brown blotched white, poorly cemented, gravelly silty fine to medium SAND. Calcareous **ALLUVIUM**.
Note:
1. Chunks of calcrete nodules and cobbles of soft rock consistency at 1.2m to 1.5m and 2.4m to 2.55m.

Pale brown mottled white, moderately to strongly cemented, HARDPAN CALCRETE of medium hard rock consistency.

Orange brown speckled black, silty SAND. **RESIDUAL GNEISS**.
Note:
1. Completely weathered extremely soft rock zone at 4.40m to 4.55m and 5.00m to 5.10m.

Highly weathered, brown banded red speckled black streaked white, soft rock tending to medium hard rock GNEISS.
Notes:
1. Hydrothermal veining from 6.30m to 13.35m.
2. Reddish colour due to induration of hydrothermal fluid.
3. Possible healed shear zone.

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**GEOTECHNICAL INVESTIGATION**

HOLE No: HLP-BH01
Sheet 2 of 3

JOB: 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | IF | 10-20 | 1<br>2<br>3 | 0-10<br>20-30<br>40 | VCJ<br>CJ-MJ<br>WJ | RJ<br>RJ<br>RJ | Silt<br>Silt<br>Silt | 1<br>1-2<br><1 | 12.18 | 94 | 94 | 62 | 9 |
| | | | | | | | | | | 13.68 | 100 | 100 | 71 | 8 |
| | | | | | | | | | | 15.18 | 100 | 97 | 18 | 17 |
| | | | | | | | | | | 16.68 | 100 | 100 | 29 | 15 |
| MG | GF | VIF | 10-20 | 1<br>2<br>3 | 0-10<br>30<br>50-60 | VCJ<br>NM<br>CJ-MJ | RJ<br>RJ<br>RJ | Silt<br>Silty sand<br>FeOx | 1<br>1-2<br><1 | 17.36 | 100 | 88 | 51 | 10 |
| | | | | | | | | | | 18.18 | 93 | 93 | 37 | 11 |
| MG | GF | IF | 5 | 1<br>2 | 0-10<br>20 | CJ<br>VCJ | RJ<br>RJ | FeOx<br>Silt | <1<br><1 | 19.68 | 100 | 100 | 75 | 10 |
| | | | | | | | | | | 20.07 | 100 | 100 | 64 | 7 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

15.95

Moderately weathered, grey to brown speckled black banded white, soft rock GNEISS.

Notes:
1. Weak/very soft rock zone at 16.45m to 16.51m.
2. 40mm thick quartz veins intruded along fabric.
3. From 17.00m to 18.30m brecciated shear zone.

18.30

Slightly weathered, dark grey speckled black banded white, medium hard rock GNEISS becoming coarse grained and altered with depth.

20.07

NOTES

1) Perched water table encountered at 7.4m.

**HOLE No:** HLP-BH01
**Sheet 3 of 3**

**JOB:** 3010047806

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH01
**Sheet 3 of 3**

**JOB:** 3010047806

2) NA: Not applicable.

3) NM: Not measurable.

4) Sample HLP-BH01/1 taken at 6.18m--6.31m.

5) Sample HLP-BH01/2 taken at 8.35m--8.60m.

| *Grain Size* | *Rock Fabric* | *Fabric Spac (mm)* | *Fabric Inc (deg)* | *Joint Set No.* | *Joint Inc (Deg)* | *Joint Spac* | *Micro Rough-ness* | *Joint Filling* | *Fill Thickness (mm)* | *Depth (m)* | *Mat recov %* | *Rock recov %* | *RQD %* | *Frac Freq No/m* | *DEPTH Scale 1:50* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

*CONTRACTOR :*
*MACHINE :* Sullivan HD
*DRILLED BY :*
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPBHCOO8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 20-24 April 2023
*DATE :* 24 April 2023

*DATE :* 03/07/2023 12:28
*TEXT :* ..51\PROFILES\PKFHLPBH.TXT

*COORDINATE SYSTEM :* WGS84 UTM 33S
*X-COORD :* 801721
*Y-COORD :* 7585666

**HOLE No:** HLP-BH01

**HOLE No:** HLP-BH02
**Sheet 1 of 3**

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH02
**Sheet 1 of 3**

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.45 | SPT | N=7 | | |
| | | | | | | | | | | 0.84 | 92 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.95 | SPT | N=10 | | |
| | | | | | | | | | | 2.00 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 3.00 | 95 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.44 | 100 | 37 | 18 | 5 |
| MG | GF | IF | 10 | 1 | 0-10 | CJ | RJ | Silt | <1 | 6.03 | 100 | 97 | 75 | 7 |
| | | | | | | | | | | 7.58 | 100 | 97 | 74 | 9 |
| MG-CG | GF | VIF | 10 | 1 | 0-10 | CJ | RJ | Silt | <1 | 9.13 | 100 | 95 | 85 | 8 |
| | | | | | | | | | | 10.67 | 100 | 100 | 90 | 4 |

DEPTH Scale 1:50

Scale 1:50

HLP-BH02/1

0.00 — Reddish brown, silty fine SAND. Fine **ALLUVIUM**.
Notes:
1. SPT indicates loose to medium dense consistency.
2. From 2.75m to 3.00m abundant sub-angular medium grained quartz gravel and cobble fragments.

3.20 — Brown to grey speckled black and white, silty SAND. **RESIDUAL GNEISS.**

3.85 — Highly weathered, brown to grey banded white, very soft rock GNEISS.
Notes:
1. Minor to traces of quartz veins.
2. Fractures mainly along quartz veins.

7.90 — Moderately weathered, brown to grey speckled black banded white, soft to medium hard rock GNEISS.
Note:
1. Completely weathered, very soft to extremely soft rock zone at 11.15m to 11.20m.

**HOLE No:** HLP-BH02
***Sheet 2 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH02
***Sheet 2 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 12.17 | 100 | 100 | 95 | 4 |
| | | | | | | | | | | 13.67 | 100 | 100 | 91 | 3 |
| | | | | | | | | | | 15.17 | 99 | 99 | 85 | 5 |
| MG-CG | MF-GF | NM | NM | 1<br>2 | 0-10<br>40 | CJ-MJ<br>VCJ | RJ<br>RJ | Silt<br>Silt | 1-2<br>1-2 | 16.67 | 100 | 100 | 86 | 5 |
| | | | | | | | | | | 18.17 | 86 | 86 | 63 | 8 |
| | | | | | | | | | | 19.43 | 100 | 100 | 93 | 2 |
| | | | | | | | | | | 20.08 | 100 | 98 | 98 | 0 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

11.65

Slightly weathered, grey speckled black banded white, medium hard to hard rock granitic GNEISS.

Notes:

1. From 12.60m to 12.91m highly weathered soft rock zone.
2. Thick pegmatite inclusion from 13.15m to 14.65m.
3. Highly fractured from 17.60m to 17.85m.

20.08

NOTES

1) NA: Not applicable.

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: HLP-BH02
Sheet 3 of 3

JOB: 3010047806

2) NM: Not measurable.

3) Sample HLP-BH02/1 taken at 5.35m--5.65m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR :
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 25-26 April 2023
DATE : 26 April 2023

DATE : 03/07/2023 12:28
TEXT : ..51\PROFILES\PKFHLPBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 801240
Y-COORD : 7584810

HOLE No: HLP-BH02

**HOLE No:** HLP-BH03
**Sheet 1 of 3**

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH03
**Sheet 1 of 3**

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.45 | SPT | N=4 | | |
| | | | | | | | | | | 0.84 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.65 | SPT | N=Ref | | |
| | | | | | | | | | | 2.00 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 3.28 | 100 | 79 | 9 | 13 |
| MG | GF | IF | 70-80 | 1<br>2<br>3 | 0-10<br>20<br>80-90 | VCJ<br>CJ<br>VWJ | RJ<br>RJ<br>RJ | Clayey silt<br>Silt<br>Calcite | 1-2<br>1<br>2 | 4.68 | 96 | 89 | 33 | 9 |
| | | | | | | | | | | 6.18 | 100 | 97 | 47 | 9 |
| | | | | | | | | | | 7.62 | 100 | 97 | 28 | 17 |
| | | | | | | | | | | 9.16 | 99 | 94 | 58 | 8 |
| | | | | | | | | | | 10.68 | 64 | 54 | 24 | 5 |

DEPTH Scale 1:50

Scale 1:50

HLP-BH03/1

HLP-BH03/2

0.00

Reddish brown, silty SAND. Fine **ALLUVIUM**.

Notes:
1. Traces of subrounded fine to medium quartz gravel from 0.85m to 1.3m.
2. SPT indicates loose consistency.

1.30

Brown to off-white, silty sandy subangular to surrounded medium grained GRAVEL. Calcareous **ALLUVIUM**.

Note:
1. SPT indicates very dense consistency.

1.95

Highly weathered, brown to green speckled black streaked white, soft rock GNEISS, brecciated in places with indication of shearing. Interpreted as fault/shear zone.

Notes:
1. Thick quartz vein at 2.60m to 3.00m.
2. Completely weathered, very soft rock zone from 5.30m to 5.20m and 5.95m to 6.15m.
3. Near-vertical joint at 6.69m to 6.9m.
4. From 2.92m to 3.28 and 7.12m to 7.623m highly fractured.

8.20

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

**HOLE No:** HLP-BH03
*Sheet 2 of 3*

**JOB:** 3010047806

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | IF | 80 | 1<br>2<br>3 | 0-10<br>70<br>80-90 | CJ<br>WJ<br>MJ | RJ<br>RJ<br>RJ | FeOx & Silt<br>Clean<br>Silt | <1<br>-<br><1 | 11.40 | 100 | 100 | 38 | 14 |
| | | | | | | | | | | 12.73 | 68 | 45 | 44 | 3 |
| | | | | | | | | | | 13.68 | 100 | 83 | 33 | 15 |
| | | | | | | | | | | 15.18 | 100 | 98 | 60 | 9 |
| MG | GF | IF | 10 | 1<br>2<br>3<br>4 | 0-10<br>45<br>60<br>30 | VCJ-CJ<br>CJ<br>NM<br>VCJ | RJ<br>RJ<br>RJ<br>RJ | FeOx & Silt<br>Silt<br>Silty sand<br>FeOx | <1<br><1<br>1<br><1 | 16.66 | 100 | 99 | 57 | 10 |
| | | | | | | | | | | 18.16 | 100 | 93 | 63 | 7 |
| MG | GF | IF | 80 | 1<br>2 | 0-10<br>70 | VCJ<br>WJ | RJ<br>RJ | Silt<br>Silt | <1<br><1 | 19.24 | 100 | 87 | 19 | 18 |
| | | | | | | | | | | 20.13 | 100 | 96 | 17 | 12 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

14.80

Moderately weathered, brown to grey streaked white, medium hard rock GNEISS.

Notes:
1. Core loss of 0.64m from 9.16m to 10.68m. Presumed to be due to washing out of fines.
2. Completely weathered, friable, pitted, extremely soft rock zone at 10.40m to 10.65m.
3. From 11.40m to 11.75m; 12.96m to 13.05m; and 13.10m to 13.24m highly broken zone.
4. Near vertical joint at 12.44m to 12.51m.

Slightly weathered, grey speckled black streaked and banded white, medium hard rock GNEISS, with brecciated rock in places, interpreted as shear zone.

17.56

Highly weathered, grey speckled black streaked white, medium hard rock GNEISS.

Note:
1. Breccia development at 17.56m to 17.65m and 19.40m to 19.52m.
2. Highly to completely weathered, very soft rock zone at 17.97m to 18.16m; 19.10m to 19.24m and 19.95m to 20.13m.

20.13

NOTES
1) NA: Not applicable.

HOLE No: HLP-BH03
Sheet 3 of 3

JOB: 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**GEOTECHNICAL INVESTIGATION**

HOLE No: HLP-BH03
Sheet 3 of 3

JOB: 3010047806

2) NM: Not measurable.

3) Sample HLP-BH03/1 taken at 2.27m--2.41m.

4) Sample HLP-BH03/2 taken at 3.73m--3.93m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR :
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 26-27 April 2023
DATE : 23 April 2023

DATE : 03/07/2023 12:28
TEXT : ..51\PROFILES\PKFHLPBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 802101
Y-COORD : 7584148

HOLE No: HLP-BH03

**HOLE No:** HLP-BH04
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

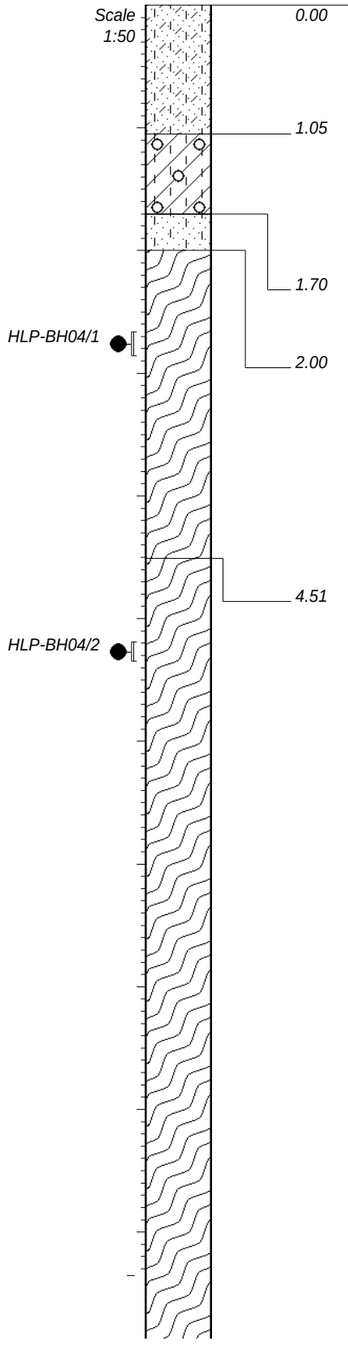
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH04
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.45 | SPT | N=20 | | |
| | | | | | | | | | | 0.84 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.88 | SPT | N=Ref | | |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.00 | 100 | 0 | 0 | NA |
| MG | GF | VIF | 0-10 | 1 | 0-10 | VCJ | RJ | Sand | 1-2 | 3.00 | 97 | 93 | 21 | 19 |
| | | | | | | | | | | 4.58 | 75 | 54 | 0 | 15 |
| MG | GF | VIF | 5 | 1<br>2 | 0-10<br>90 | VCJ-CJ<br>NM | RJ<br>RJ | Silt<br>Silty SAND | 1-2<br>2-3 | 6.15 | 100 | 100 | 41 | 12 |
| | | | | | | | | | | 7.67 | 100 | 100 | 45 | 13 |
| | | | | | | | | | | 9.17 | 100 | 100 | 66 | 8 |
| | | | | | | | | | | 10.67 | 100 | 100 | 29 | 14 |

DEPTH Scale 1:50




Dark brown, silty clayey fine SAND. Fine **ALLUVIUM**.

Light brown to yellow brown, gravelly silty CLAY. Calcareous **ALLUVIUM**.
Note:
1. Gravel occurs as minor subrounded fine to medium quartz.

Dark brown to grey, silty fine to medium SAND. **RESIDUAL GNEISS**.

Highly weathered, brown to grey speckled black streaked white, soft rock GNEISS.
Note:
1. From 4.05m to 4.4m completely weathered extremely soft rock zone. Interpreted as silty fine to medium sand (residual gneiss).

Moderately weathered, grey speckled black streaked white, medium hard rock GNEISS.
Notes:
1. From 4.58m to 10.60m minor to abundant quartz veins.
2. Long near-vertical joint from 9.50m to 10.57m.
3. Completely weathered extremely soft zone from 11.1m to 11.18m. Interpreted as silty sand (residual gneiss).

**HOLE No:** HLP-BH04
*Sheet 2 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** HLP-BH04
*Sheet 2 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 12.17 | 100 | 95 | 60 | 9 |
| | | | | | | | | | | 13.67 | 100 | 100 | 55 | 9 |
| | | | | | | | | | | 15.20 | 100 | 98 | 49 | 10 |
| MG | GF | IF-VIF | 10-20 | 1<br>2<br>3 | 0-10<br>20<br>40 | VCJ-CJ<br>CJ<br>VWJ | RJ<br>RJ<br>RJ | Silt<br>Silt<br>FeOx | 1-3<br>1<br><1 | 16.74 | 100 | 100 | 66 | 9 |
| | | | | | | | | | | 18.23 | 97 | 95 | 70 | 10 |
| | | | | | | | | | | 19.73 | 93 | 79 | 35 | 11 |
| | | | | | | | | | | 20.23 | 100 | 100 | 74 | 16 |

DEPTH Scale 1:50

11.52

Slightly weathered, grey speckled black, streaked and banded white, medium hard rock GNEISS.

Notes:

1. Pegmatite vein at 12.40m to 12.70m and at 17.20m to 17.50m.
2. From 19.11m to 19.60m and 19.65m to 19.70m completely weathered very soft to extremely soft rock zone.

20.23

NOTES

1) NA: Not applicable.

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: HLP-BH04
Sheet 3 of 3

JOB: 3010047806

2) NM: Not measurable.

3) Sample HLP-BH04/1 taken at 2.66m--2.86m.

4) Sample HLP-BH04/2 taken at 5.19m--5.35m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR :
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 28-29 April 2023
DATE : 28-29 April 2023

DATE : 03/07/2023 12:28
TEXT : ..51\PROFILES\PKFHLPBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 801731
Y-COORD : 7583536

HOLE No: HLP-BH04

**HOLE No:** Plant-BH01
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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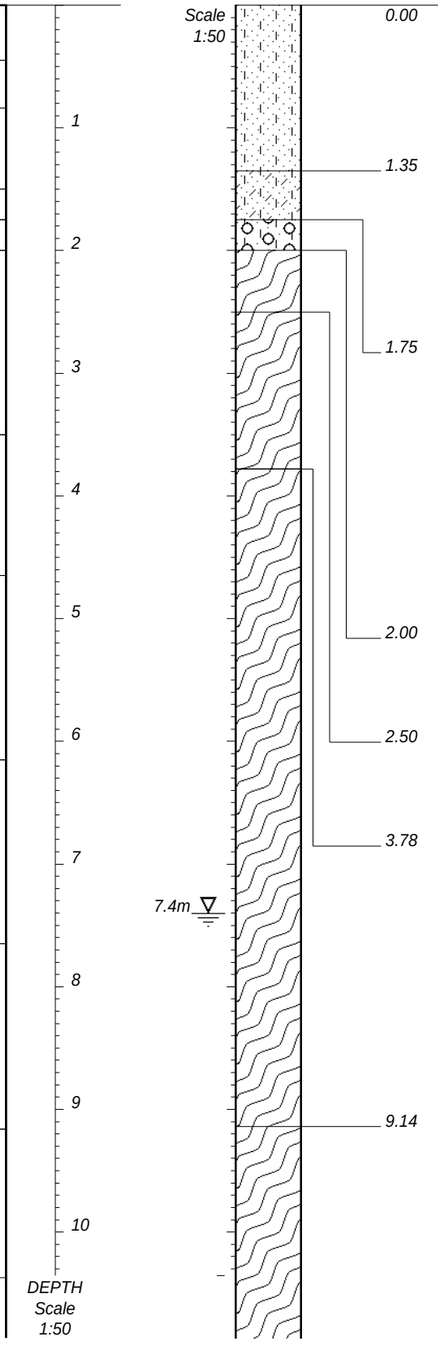
**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH01
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.45 | SPT | N=14 | | |
| | | | | | | | | | | 0.84 | 90 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 97 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.75 | SPT | N=Ref | | |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.00 | 88 | 0 | 0 | NA |
| MG | GF | NM | NM | 1 | 0-10 | VCJ | RJ | Silty sand | 2-3 | 3.50 | 91 | 91 | 31 | 15 |
| MG-CG | GF-MF | NM | NM | 1<br>2 | 0-10<br>20 | VCJ<br>CJ | RJ<br>RJ | Silty sand<br>Silty sand | 1-2<br>2 | 4.65 | 97 | 97 | 63 | 7 |
| MG-CG | GF-MF | NM | NM | 1<br>2 | 0-10<br>30 | CJ-MJ<br>NM | RJ<br>RJ | FeOx & Silt<br>Silt | 1<br><1 | 6.15 | 100 | 99 | 90 | 4 |
| | | | | | | | | | | 7.65 | 97 | 97 | 95 | 3 |
| | | | | | | | | | | 9.16 | 100 | 100 | 98 | 3 |
| MG | GF | IF | 10-20 | 1<br>2 | 0-10<br>20 | VCJ<br>VCJ | RJ<br>RJ | Silty sand<br>Sand | 1<br>1 | 10.65 | 100 | 99 | 19 | 15 |




Light brown to orange brown, silty medium SAND. Fine **ALLUVIUM**.
Note:
1. SPT indicates medium dense consistency.

Light brown to orange brown, silty clayey fine to medium SAND. **ALLUVIUM**.
Note:
1. SPT indicates very dense consistency.

Light brown blotched white, poorly to moderately cemented, silty sandy abundant fine to medium GRAVEL. Calcified **ALLUVIUM**.
Note:
1. Gravel comprises fragments of hardpan calcrete of soft rock consistency with abundant sub-angular to subrounded quartz gravel.

Highly to completely weathered, brown speckled black, very soft to soft rock granitic GNEISS.

Moderately weathered, grey speckled black and white banded white, medium hard rock granitic GNEISS.

Slightly weathered, grey speckled black streaked white, medium hard rock granitic GNEISS.

Moderately weathered, dark grey to brown speckled black and white, soft rock GNEISS.

**HOLE No:** Plant-BH01
***Sheet 2 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH01
***Sheet 2 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG-CG | GF-MF | NM | NM | 1<br>2 | 0-10<br>20-30 | VCJ-MJ<br>CJ-MJ | RJ<br>RJ | Silt<br>Silt | 1<br>1 | 12.15 | 100 | 100 | 81 | 7 |
| | | | | | | | | | | 13.65 | 100 | 100 | 76 | 6 |
| | | | | | | | | | | 15.15 | 100 | 100 | 84 | 7 |
| | | | | | | | | | | 16.65 | 98 | 98 | 71 | 8 |
| | | | | | | | | | | 18.15 | 100 | 91 | 72 | 5 |
| | | | | | | | | | | 19.65 | 100 | 97 | 73 | 7 |
| | | | | | | | | | | 21.15 | 67 | 67 | 17 | 13 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

10.97

Slightly weathered, grey speckled black and white streaked white, medium hard rock granitic GNEISS.

Notes:

1. Pegmatite veins from 13.00m to 13.56m; 16.66m to 17.01m and 19.00m to 19.19m.
2. Highly broken zone at 17.05m to17.20m.
3. Core loss due to pulverizing spinning of loose core at end of run (19.65m to 21.15m.)

20.67

**HOLE No:** Plant-BH01
*Sheet 3 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

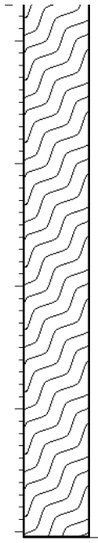
**HOLE No:** Plant-BH01
*Sheet 3 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | VHF | 70-80 | 1<br>2<br>3 | 0-10<br>10-20<br>45 | VCJ-CJ<br>CJ<br>MJ | RJ<br>RJ<br>RJ | Silty sand<br>Silt<br>Silt | <1<br><1<br>1 | 22.58 | 100 | 100 | 48 | 11 |
| | | | | | | | | | | 24.08 | 99 | 99 | 79 | 7 |
| | | | | | | | | | | 25.05 | 100 | 100 | 68 | 7 |

DEPTH Scale 1:50

21
22
23
24
25



Slightly weathered with moderately weathered zones associated with closely jointed zones, grey speckled black banded white, soft rock becoming medium hard rock GNEISS.
Note:
1. Core loss of 0.67m at 20.39m to 21.06m due to washing out of fines.

NOTES

1) Perched water table encountered at 7.4m.

2) NA: Not applicable.

3) NM: Not measurable.

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 2 May 2023
DATE : 3 May 2023

DATE : 07/07/2023 14:19
TEXT : ..\PROFILES\PKFPLANTBH.TXT

COORDINATE SYSTEM :
X-COORD : 802350
Y-COORD : 7583844

**HOLE No:** Plant-BH01

**HOLE No:** Plant-BH02
***Sheet 1 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH02
***Sheet 1 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.54 | 93 | 0 | 0 | NA |
| | | | | | | | | | | 1.02 | 100 | 8 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 42 | 42 | 8 |
| | | | | | | | | | | 1.52 | SPT | N=Ref | | |
| MG | GF | NM | NM | 1<br>2 | 0-10<br>30 | VCJ<br>VCJ | RJ<br>RJ | Silt<br>Silty sand | <1<br>1 | 2.12 | 92 | 72 | 23 | 13 |
| | | | | | | | | | | 2.47 | 86 | 86 | 37 | 10 |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.01 | 100 | 18 | 6 | 4 |
| MG | GF | NM | NM | 1 | 0-10 | CJ | RJ | Silt | <1 | 4.43 | 76 | 76 | 0 | 19 |
| MG-CG | GF-MF | NM | NM | 1 | 0-10 | VCJ-CJ | RJ | Silty sand | 1-2 | 5.93 | 100 | 100 | 73 | 8 |
| | | | | | | | | | | 7.50 | 99 | 97 | 49 | 12 |
| | | | | | | | | | | 9.03 | 97 | 93 | 75 | 8 |
| | | | | | | | | | | 10.40 | 100 | 100 | 64 | 11 |

DEPTH Scale 1:50: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

Scale 1:50

| | |
|---|---|
| 0.00 | Dark brown to brown, silty sandy CLAY, with scattered medium gravel at the base. Fine **ALLUVIUM**. |
| 1.02 | Dark brown to grey mottled orange, silty fine SAND. **RESIDUAL GNEISS**. |
| 1.52 | Completely weathered, brown to grey speckled black and white, <u>very soft</u> rock GNEISS. |
| 2.60 | Light brown speckled white, silty fine SAND. **RESIDUAL GNEISS**.<br><u>Note</u>:<br>1. Traces of subrounded quartz cobble and coarse gravel fragments. |
| 3.90 | Highly weathered, brown to grey, <u>soft</u> rock GNEISS.<br><u>Note</u>:<br>1. Quartz vein from 4.74m to 4.78m. |
| 5.25 | Moderately weathered, light brown to grey speckled black and streaked white, <u>medium hard</u> rock granitic GNEISS.<br><u>Notes</u>:<br>1. Highly fractured from 6.25m to 6.42m and 8.55m to 8.65m.<br>2. 45 degrees quartz vein at 6.95m.<br>3. From 11.46m to 11.56m highly weathered soft rock zone. |

**HOLE No:** Plant-BH02
***Sheet 2 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH02
***Sheet 2 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CG | MF-GF | NM | NM | 1<br>2<br>3<br>4 | 0-10<br>30-40<br>50-60<br>70 | CJ<br>MJ<br>CJ-MJ<br>NM | RJ<br>RJ<br>RJ<br>RJ | Silty & clean<br>Calcite<br>Calcite<br>FeOx | <1<br>1-2<br>1-2<br><1 | 11.98 | 97 | 97 | 41 | 12 |
| | | | | | | | | | | 13.50 | 100 | 100 | 80 | 6 |
| | | | | | | | | | | 14.60 | 97 | 97 | 75 | 9 |
| | | | | | | | | | | 15.27 | 100 | 100 | 90 | 6 |
| | | | | | | | | | | 16.49 | 100 | 91 | 53 | 6 |
| | | | | | | | | | | 17.99 | 100 | 100 | 81 | 5 |
| | | | | | | | | | | 19.49 | 100 | 100 | 97 | 1 |
| | | | | | | | | | | 20.73 | 99 | 99 | 78 | 4 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

11.95

Slightly weathered to unweathered, light grey to light brown speckled white and pink streaked black, hard to very hard rock granitic GNEISS, interpreted as a partially healed shear zone.

Notes:
1. Highly broken zone at 16.31m to 16.49m.
2. Rock mass improves with depth.

**HOLE No:** Plant-BH02
**Sheet 3 of 3**

**JOB:** 3010047806

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

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**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH02
**Sheet 3 of 3**

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 20.93 | 100 | 100 | 100 | 0 |
| | | | | | | | | | | 22.27 | 100 | 100 | 93 | 2 |
| | | | | | | | | | | 23.10 | 100 | 78 | 78 | 2 |
| CG | MF-GF | NM | NM | 1<br>2 | 0-10<br>30 | VCJ<br>VCJ | RJ<br>RJ | Calcite & FeOx<br>Calcite & FeOx | 1<br>1 | 24.59 | 85 | 62 | 27 | 5 |
| | | | | | | | | | | 25.16 | 100 | 100 | 56 | 9 |

DEPTH Scale 1:50

21
22
23
24
25

22.92
25.16

Moderately weathered, light brown to light grey speckled pink, white and black, medium hard rock granitic GNEISS.
Note:
1. Breccia zone from 22.95m to 23.10m and 23.85m to 24.28m.
2. Abundant calcite filled fractures.

NOTES
1) No groundwater seepage encountered.
2) NA: Not applicable.
3) NM: Not measurable.

*CONTRACTOR :* RA Longstaff
*MACHINE :* Sullivan HD
*DRILLED BY :*
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPBHCOO8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 4-6 May 2023
*DATE :* 5-6 May 2023

*DATE :* 07/07/2023 14:19
*TEXT :* ..\PROFILES\PKFPLANTBH.TXT

*COORDINATE SYSTEM :* WGS 84 UTM 33S
*X-COORD :* 801481.43
*Y-COORD :* 7583235.41

**HOLE No:** Plant-BH02

**HOLE No:** Plant-BH03
**Sheet 1 of 3**

**JOB:** 3010047806

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

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**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

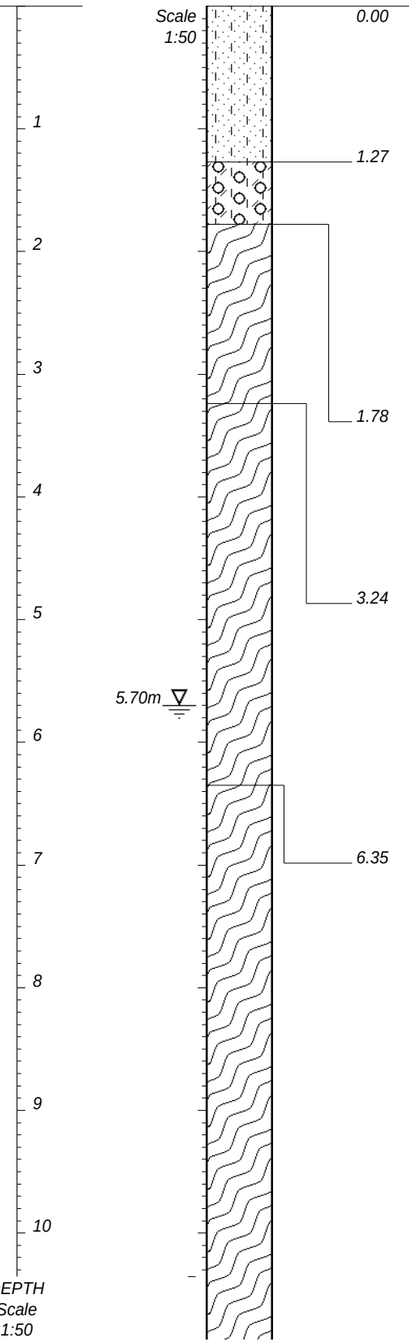
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH03
**Sheet 1 of 3**

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.45 | SPT | N=8 | | |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.78 | SPT | N=Ref | | |
| | | | | | | | | | | 2.00 | 100 | 100 | 68 | 5 |
| MG-CG | GF | VIF | 10-20 | 1<br>2 | 0-10<br>20 | CJ<br>CJ | RJ<br>RJ | Silty sand<br>Silty sand | 1-2<br>2 | 3.51 | 99 | 95 | 62 | 7 |
| MG | GF | VIF | 10-20 | 1<br>2 | 0-10<br>20-30 | VCJ<br>MJ | RJ<br>RJ | FeOx & Silt<br>Silty sand | 1-2<br><1 | 4.63 | 100 | 80 | 0 | 22 |
| | | | | | | | | | | 6.13 | 71 | 68 | 11 | 13 |
| MG | GF | VIF-IF | 10-20 | 1<br>2<br>3 | 0-10<br>40<br>70-80 | VCJ-CJ<br>VWJ<br>VWJ | RJ<br>RJ<br>RJ | FeOx & silt<br>Silt<br>Clean | 1-2<br><1<br>- | 7.61 | 100 | 100 | 75 | 9 |
| | | | | | | | | | | 9.13 | 100 | 97 | 39 | 15 |
| | | | | | | | | | | 10.63 | 100 | 99 | 45 | 12 |

*DEPTH Scale 1:50*




Reddish brown, silty fine to medium SAND. **ALLUVIUM**.
Note:
1. SPT indicates loose consistency.

Reddish brown to orange brown, silty clayey fine to medium, sub-angular to subrounded quartz GRAVEL. **ALLUVIUM**.
Notes:
1. Scattered traces of subrounded cobble fragments.
2. SPT indicates very dense consistency.

Completely weathered becoming highly weathered with depth, yellow brown speckled black, soft rock GNEISS.
Note:
1. Highly friable and pitted.

Highly weathered, brown streaked white stained red, soft rock GNEISS.
Note:
1. Highly fractured zone from 3.51m to 4.63m.
2. Completely weathered, extremely soft rock at 4.46m to 4.63m. Interpreted as silty sandy gravel (residual gneiss).

Moderately weathered, dark grey to green speckled black streaked white, medium hard rock GNEISS.
Notes:
1. From 8.67m to 8.90m and 9.61m to 9.71m highly weathered very soft rock zone.
2. Significant pyrite mineralization along foliation.

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH03
*Sheet 2 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 12.13 | 100 | 99 | 35 | 16 |
| MG | GF | VIF | 10 | 1<br>2 | 0-10<br>70 | VCJ-MJ<br>VCJ | RJ<br>RJ | Clean<br>FeOx | -<br><1 | 13.63 | 97 | 97 | 31 | 14 |
| | | | | | | | | | | 15.13 | 100 | 98 | 71 | 8 |
| MG | GF | VIF | 10 | 1<br>2<br>3 | 0-10<br>20<br>70-80 | VCJ<br>CJ<br>VWJ | RJ<br>RJ<br>RJ | Silt<br>Silt<br>Silty sand | 1<br>1-2<br>1 | 16.63 | 100 | 87 | 15 | 17 |
| | | | | | | | | | | 18.13 | 100 | 100 | 61 | 7 |
| | | | | | | | | | | 19.63 | 100 | 100 | 56 | 2 |
| | | | | 1<br>2 | 0-10<br>90 | CJ-MJ<br>WJ | RJ<br>RJ | Clean<br>Calcite | -<br>1 | 21.13 | 96 | 95 | 72 | 8 |

*DEPTH Scale 1:50*

11
12
13
14
15
16
17
18
19
20

12.60

Slightly weathered to unweathered, dark grey speckled black streaked white, hard rock GNEISS.

14.90

Highly to completely weathered, grey to brown banded white, very soft to soft rock GNEISS.

Notes:
1. Highly fractured from 15.37m to 16.21m.
2. Silt zone at 15.30m to 15.37m.
2. Highly fractured from 15.37m to 16.21m.
3. Higher mica content.

16.33

Slightly weathered to unweathered, dark grey speckled black banded white, hard rock GNEISS.

Notes:
1. Near vertical joint from 16.36m to 16.80m; 17.65m to 17.90m; 17.96m to 18.80m and 22.38m to 22.98m.
2. Moderately to highly weathered, interlayered medium hard rock zone at 20.32m to 20.55m.
3. Pegmatite vein from 21.62m to 21.75m and 23.87m to 23.99m.
4. Pyrite mineralization at 20.15m to 20.50m.

**HOLE No:** Plant-BH03
***Sheet 3 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH03
***Sheet 3 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | IF | 80 | 3 | 20 | CJ | RJ | Silt | <1 | | | | | |
| | | | | 4 | 70 | NM | RJ | Calcite | 1-2 | | | | | |
| | | | | | | | | | | 22.63 | 100 | 100 | 75 | 5 |
| | | | | | | | | | | 24.13 | 100 | 100 | 70 | 5 |
| | | | | | | | | | | 25.00 | 97 | 97 | 97 | 2 |

DEPTH Scale 1:50

21
22
23
24
25

25.00

NOTES

1) Perched groundwater table encountered at 5.70m.

2) NA: Not applicable.

3) NM: Not measurable.

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 4-6 May 2023
DATE : 5-6 May 2023

DATE : 07/07/2023 14:19
TEXT : ..\PROFILES\PKFPLANTBH.TXT

COORDINATE SYSTEM : WGS 84 UTM 33S
X-COORD : 802365.16
Y-COORD : 7583468.49

**HOLE No:** Plant-BH03

D079 E Mouton

dotPLOT 7022 PBpH7

**HOLE No:** Plant-BH04
*Sheet 1 of 2*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

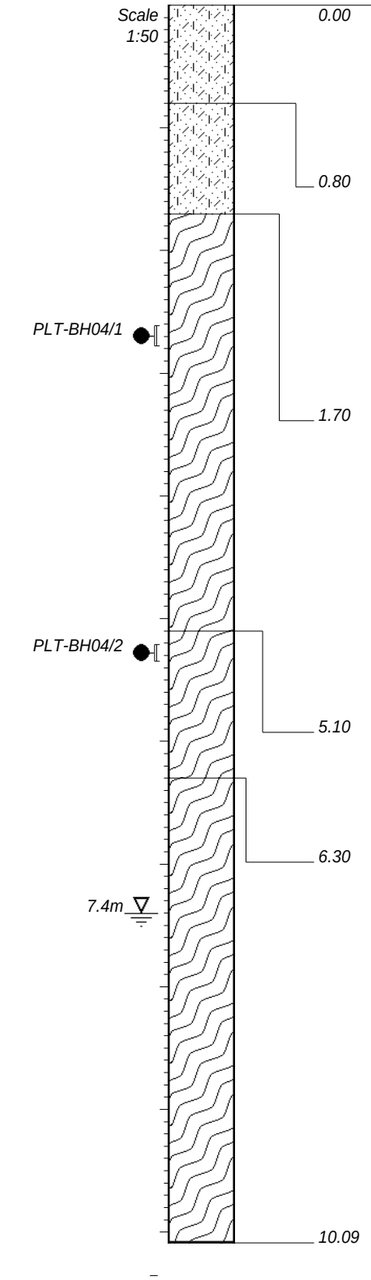
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** Plant-BH04
*Sheet 1 of 2*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 92.00 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100.00 | 0 | - | NA |
| | | | | | | | | | | 1.70 | SPT1 | N=Ref | | |
| MG-CG | GF | IF | 20-40 | 1<br>2 | 10-20<br>30-40 | CJ<br>MJ | RJ<br>RJ | Chl + FeOx<br>FeOx | <1<br><1 | 2.00 | 100.00 | 100 | 0 | 23 |
| | | | | | | | | | | 3.54 | 88.00 | 88 | 55 | 10 |
| | | | | | | | | | | 4.78 | 98.00 | 98 | 63 | 8 |
| MG-CG | MF-GF | IF-VIF | 10-20 | 1<br>2 | 10-20<br>40-60 | VCJ-CJ<br>MJ | SJ<br>RJ | Cl.Silt & FeOx<br>FeOx | <2<br><1 | 6.28 | 100.00 | 100 | 59 | 22 |
| MG-CG | GF | IF-VIF | 10-30 | 1<br>2 | 20-30<br>50-60 | CJ<br>MJ-WJ | RJ<br>RJ | Chl + FeOx<br>FeOx | <1<br><1 | 7.78 | 100 | 100 | 67 | 17 |
| | | | | | | | | | | 9.28 | 87 | 87 | 64 | 9 |
| | | | | | | | | | | 10.09 | 94 | 94 | 36 | 19 |

DEPTH Scale 1:50




Brown, clayey silty SAND. Fine **ALLUVIUM**.
Notes:
1. Scattered fine roots present.
2. Minor core loss due to washing out of soft soils.

Orange brown mottled light brown and black, clayey silty SAND, with traces of sub-angular fine gravel to subrounded cobbles of quartz. Ferruginised fine **ALLUVIUM**.
Note:
1. Ferricrete nodules present (<15mm).

Highly to moderately weathered in places, white to light brown banded greenish brown speckled black and slightly stained orange to light green, closely to moderately jointed, soft to medium hard rock biotite GNEISS.
Note:
1. Completely to moderately weathered zone near upper 300mm.
2. Minor core loss due to washing out of finer material between joints.

Moderately weathered, white streaked to banded yellowish light brown, very closely to closely jointed, hard to very hard rock GNEISS.

Moderately to highly weathered in places, white to grey banded greenish brown speckled to streaked black and maroon, closely jointed, soft to medium hard rock with hard in places, biotite GNEISS.
Notes:
1. Brecciated zones present at 6.3m to 6.4m and 7.7m to 8.0m.
2. Green to brown staining on joints.

HOLE No: Plant-BH04
Sheet 2 of 2

JOB: 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**
**PLANT SITE**

**GEOTECHNICAL INVESTIGATION**

HOLE No: Plant-BH04
Sheet 2 of 2

JOB: 3010047806

NOTES

1) Perched water table encountered at 7.4m.
2) NA: Not applicable.
3) NM: Not measurable.
4) Sample PLT-BH04/1 taken at 2.61m--2.78m.
5) Sample PLT-BH04/2 taken at 5.21m--5.35m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : Chris Homan

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE :
DATE : 1 June 2023

DATE : 07/07/2023 14:19
TEXT : ..\PROFILES\PKFPLANTBH.TXT

COORDINATE SYSTEM : UTM,WGS84(33K)
X-COORD : 802119
Y-COORD : 7583643

HOLE No: Plant-BH04

**HOLE No:** SWD-BH01
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH01
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.72 | 97 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 92 | 0 | 0 | NA |
| | | | | | | | | | | 1.80 | SPT | N=Ref | | |
| MG-CG | MF | NM | NM | 1<br>2 | 0-10<br>20 | VCJ-CJ<br>CJ | RJ<br>RJ | Silt<br>Silty sand | 1-2<br>1-2 | 3.00 | 90 | 75 | 75 | 11 |
| | | | | | | | | | | 3.50 | 100 | 75 | 40 | 10 |
| MG-CG | MF | NM | NM | 1<br>2<br>3 | 0-10<br>20-30<br>40-50 | CJ<br>WJ<br>WJ | RJ<br>RJ<br>RJ | Silty sand<br>Silty sand<br>Silt | 2-5<br>1-2<br>2 | 4.32 | 100 | 100 | 78 | 7 |
| | | | | | | | | | | 5.11 | 96 | 96 | 86 | 4 |
| | | | | | | | | | | 5.60 | 87 | 87 | 51 | 9 |
| MG | GF | IF | 80 | 1<br>2 | 0-10<br>40-50 | VCJ-CJ<br>WJ | RJ<br>RJ | Sand<br>Silt | 1-2<br>2 | 6.88 | 100 | 100 | 80 | 10 |
| | | | | | | | | | | 8.09 | 99 | 99 | 44 | 11 |
| MG | GF | IF | 85 | 1<br>2 | 0-10<br>80-90 | VCJ-CJ<br>NM | RJ<br>RJ | Sand<br>Silt | 2<br>1-2 | 9.57 | 100 | 100 | 74 | 9 |

DEPTH Scale 1:50

Scale 1:50

SWD-BH01/1
SWD-BH01/2
SWD-BH01/3
SWD-BH01/4

7.4m ▽

0.00 Dark brown, gravelly silty fine to medium SAND. **ALLUVIUM**.
Note:
1. Gravel comprises subrounded medium to coarse quartz with cobble fragments.

1.85 Highly weathered, dark brown with red iron oxide staining, very soft rock granitic GNEISS.
Note:
1. Extremely soft rock zone at 2.22m to 2.37m. Interpreted as silty sand (residual Gneiss)

2.80 Moderately weathered, light brown speckled black and grey mottled white, medium hard rock GNEISS.
Note:
1. Thin 10mm zone of silty sand at 4.08m to 4.09m.

5.50 Highly weathered, pale brown speckled black and white, very soft to soft rock granitic GNEISS.
Notes:
1. From 7.00m to 7.50m highly broken zone.
2. Thick pegmatite vein from 7.50m to 7.72m.

8.20 Slightly to moderately weathered, brown speckled black and white, medium hard rock GNEISS.
Notes:
1. Near vertical joint at 10.00m to 10.10m.
2. Minor quartz veins from 10.85m to 11.05m.

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH01
Sheet 2 of 3

JOB: 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 11.06 | 100 | 100 | 52 | 11 |
| MG | GF | IF | 10-30 | 1<br>2<br>3<br>4 | 0-10<br>20-30<br>40-50<br>70 | VCJ-CJ<br>VCJ-CJ<br>CJ<br>NM | RJ<br>RJ<br>RJ<br>RJ | Silty sand<br>Silt<br>Stained & Silt<br>Stained | 1<br>2<br>1-3<br>1 | 12.50 | 100 | 100 | 61 | 8 |
| | | | | | | | | | | 14.03 | 99 | 99 | 54 | 9 |
| | | | | | | | | | | 15.50 | 95 | 95 | 71 | 8 |
| | | | | | | | | | | 16.76 | 100 | 100 | 83 | 6 |
| | | | | | | | | | | 18.60 | 100 | 100 | 84 | 4 |
| | | | | | | | | | | 20.09 | 100 | 100 | 89 | 3 |
| MG-CG | MF-GF | NM | NM | 1<br>2<br>3<br>4 | 0-10<br>30-40<br>40-50<br>80-90 | CJ-MJ<br>VWJ<br>WJ<br>WJ | RJ<br>RJ<br>RJ<br>RJ | Clean<br>Silt<br>Silt & stained<br>Silt | -<br>2-3<br>1<br>1 | | | | | |

DEPTH Scale 1:50

11.25

Highly weathered, brown speckled black banded white, soft rock GNEISS.

14.85

Slightly weathered to unweathered, grey speckled black mottled white, hard to very hard rock granitic GNEISS.

Note:

1. Moderately fractured from 23.00m to 23.70m.
2. Completely weathered zone at 22.85m to 22.92m.

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH01
Sheet 3 of 3

JOB: 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 21.39 | 100 | 100 | 100 | 2 |
| | | | | | | | | | | 22.82 | 100 | 100 | 100 | 0 |
| | | | | | | | | | | 24.27 | 88 | 88.00 | 55 | 8 |

DEPTH Scale 1:50

21
22
23
24

24.27

NOTES

1) Perched water table encountered at 7.4m.
2) NA: Not applicable.
3) NM: Not measurable.
4) Sample SWD-BH01/1 taken at 2.04m--2.26m.
5) Sample SWD-BH01/2 taken at 2.39m--2.51m.
6) Sample SWD-BH01/3 taken at 3.14m--3.48m.
7) Sample SWD-BH01/4 taken at 3.36m--3.95m.

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 13-15 May 2023
DATE : 14-15 May 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 801384
Y-COORD : 7581911

HOLE No: SWD-BH01

**HOLE No:** SWD-BH02
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH02
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.74 | 64 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 67 | 0 | 0 | NA |
| | | | | | | | | | | 1.87 | SPT | SPT=Ref | | |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.00 | 100 | 0 | 0 | NA |
| MG | GF | IF | 10-20 | 1<br>2 | 5-10<br>40-50 | VCJ-CJ<br>MJ | RJ<br>RJ | Silt<br>Silt | 1<br>1-2 | 3.00 | 92 | 84 | 27 | 10 |
| | | | | | | | | | | 4.54 | 99 | 84 | 50 | 11 |
| | | | | | | | | | | 6.07 | 98 | 98 | 59 | 10 |
| | | | | | | | | | | 7.60 | 100 | 97 | 63 | 9 |
| MG | GF | IF | 10-20 | 1 | 0-10 | VCJ-CJ | RJ | Silt | 1-3 | 8.81 | 94 | 92 | 52 | 14 |
| | | | | | | | | | | 10.34 | 100 | 100 | 36 | 12 |

DEPTH Scale 1:50

Scale 1:50

SWD-BH02/1

SWD-BH02/2

SWD-BH02/3

0.00 Dark brown, clayey silty SAND, displaying shrinkage cracks. **ALLUVIUM**.

1.05 Dark brown to red, clayey sandy GRAVEL. Coarse **ALLUVIUM**.

Notes:
1. Gravel is subrounded to sub-angular fine to medium grained quartz.
2. SPT refusal possibly caused by presence of gravel.
3. Core loss of 0.25m from 1.05m to 1.50m. Presumed to be due to washing out of fines.

2.08 Dark brown to grey speckled black and white, silty SAND. **RESIDUAL GNEISS**.

Note:
1. On desiccation material increases in strength to very soft to soft rock, described as completely to highly weathered, grey speckled black and white, medium grained, very closely jointed, very soft to soft rock gneiss.

2.34 Highly to moderately weathered, brown to grey speckled black banded white, soft to medium hard rock GNEISS.

Notes:
1. Quartz vein from 3.35m to 3.39m.
2. Completely weathered, extremely soft rock zone at 3.35m to 3.50m; 4.80m to 4.88m; and 5.51m to 5.54m, tending to residual gneiss.
3. Thick pegmatite vein from 7.30m to 7.50m.

7.90 Moderately weathered, grey to brown streaked yellow and white, soft rock GNEISS.

10.34

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH02
*Sheet 2 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 11.88 | 27 | 6 | 0 | 12 |
| | | | | | | | | | | 12.64 | 100 | 100 | 26 | 8 |
| | | | | | | | | | | 13.61 | 96 | 93 | 43 | 12 |
| | | | | | | | | | | 15.11 | 87 | 83 | 15 | 17 |
| MG | GF | IF | 20-30 | 1 | 5-10 | VCJ | RJ | Silt | <1 | 16.61 | 100 | 100 | 43 | 11 |
| | | | | | | | | | | 18.11 | 96 | 93 | 40 | 15 |
| MG | MF-GF | NM | NM | 1<br>2<br>3 | 0-10<br>20-30<br>80-90 | VCJ<br>CJ<br>NM | RJ<br>RJ<br>RJ | Stained<br>Stained<br>Clean | <1<br><1<br>- | 18.54 | 100 | 100 | 26 | 19 |
| | | | | | | | | | | 19.61 | 100 | 98 | 87 | 6 |
| | | | | | | | | | | 21.11 | 100 | 97 | 97 | 2 |

DEPTH Scale 1:50

11
12
13
14
15
16
17
18
19
20

12.40

Dark brown speckled white, gravelly sandy silt. **RESIDUAL GNEISS**.

Moderately weathered, brown to grey speckled black banded white, soft to medium hard rock GNEISS.

Note:

1. Completely weathered, extremely soft rock zone from 14.55m to 14.82m; 16.44m to 16.52m; and 16.98m to 17.03m, with core loss attributed to washing out of residual soil in these zones.

18.20

Slightly weathered, grey speckled black and white, hard rock granitic GNEISS.

Note:

1. Near vertical joint from 18.29m to 18.40m.

19.35

Unweathered, grey speckled black and white, very hard rock granitic GNEISS.

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH02
*Sheet 3 of 3*

*JOB:* 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG-CG | MF-GF | NM | NM | 1 | 0-10 | MJ-WJ | RJ | Stained | <1 | 22.53 | 100 | 100 | 98 | 1 |
| | | | | | | | | | | 24.11 | 100 | 100 | 100 | 1 |
| | | | | | | | | | | 25.11 | 100 | 100 | 100 | 0 |

DEPTH Scale 1:50

21
22
23
24
25

25.11

NOTES

1) NA: Not applicable.
2) NM: Not measurable.
3) Sample SWD-BH02/1 taken at 2.84m--2.98m.
4) Sample SWD-BH02/2 taken at 7.96m--8.16m.
5) Sample SWD-BH02/3 taken at 8.16m--8.35m.

*CONTRACTOR :* RA Longstaff
*MACHINE :* Sullivan HD
*DRILLED BY :*
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPBHCOO8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 17 April 2023
*DATE :* 18 April 2023

*DATE :* 07/07/2023 14:21
*TEXT :* ..51\PROFILES\PKFSWDBH.TXT

*COORDINATE SYSTEM :* WGS84 UTM 33S
*X-COORD :* 801681
*Y-COORD :* 7581852

**HOLE No:** SWD-BH02

**HOLE No:** SWD-BH03
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

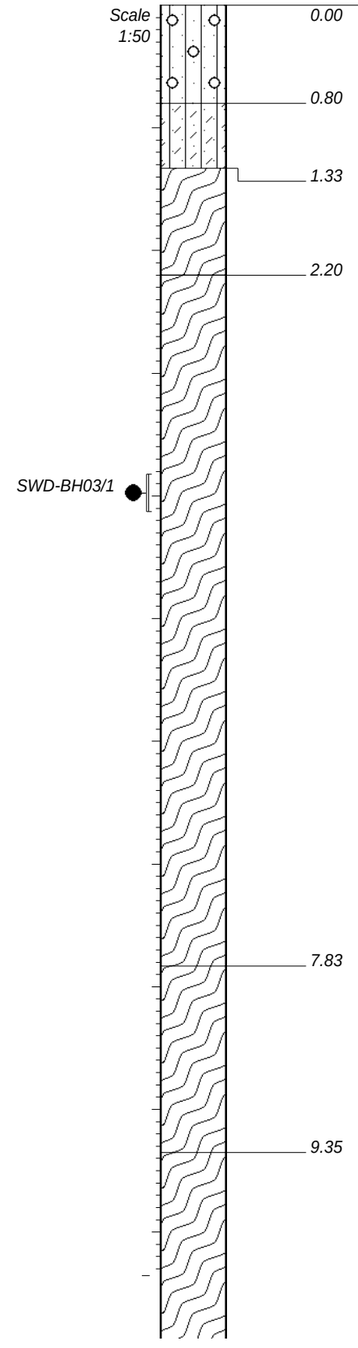
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH03
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.74 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 0 | 0 | NA |
| MG | GF | - | - | 1 | 0-10 | VCJ-CJ | RJ | Silt | 1 | 2.05 | 100 | 100 | 55 | 9 |
| MG | GF | VIF | 10-20 | 1<br>2 | 0-10<br>70 | VCJ-CJ<br>NM | RJ<br>RJ | Silt + Sand<br>FeOx & Calcite | 1<br>2 | 3.54 | 100 | 97 | 67 | 11 |
| | | | | | | | | | | 4.79 | 93 | 93 | 70 | 8 |
| | | | | | | | | | | 6.30 | 96 | 92 | 58 | 11 |
| | | | | | | | | | | 7.35 | 84 | 70 | 10 | 13 |
| MG | GF | VIF | 10-20 | 1<br>2 | 0-10<br>60 | CJ<br>NM | RJ<br>RJ | Silt<br>FeOx | 1<br><1 | 8.85 | 100 | 98 | 41 | 13 |
| | | | | | | | | | | 10.40 | 98 | 98 | 45 | 14 |

DEPTH Scale 1:50




0.00 — Brown, gravelly sandy silt. Fine **ALLUVIUM**.

0.80 — Orange brown, sandy clayey SILT. **ALLUVIUM**.

1.33 — Completely weathered, brown to grey banded white, soft rock GNEISS.

2.20 — Highly to moderately weathered, brown to grey streaked white, medium hard rock with zones of soft rock GNEISS.

Notes:
1. Highly broken zone from 6.20m to 6.97m.
2. Core loss from 6.30m to 7.35m due to washing out of fines.

7.83 — Completely weathered, dark grey to dark brown with mottled orange joints, very soft to soft rock GNEISS.

Note:
1. Clay zone at 7.83m to 7.85m.

9.35 — Slightly weathered, grey speckled black streaked white, hard rock granitic GNEISS.

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

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**OMITIOMIRE COPPER PROJECT**

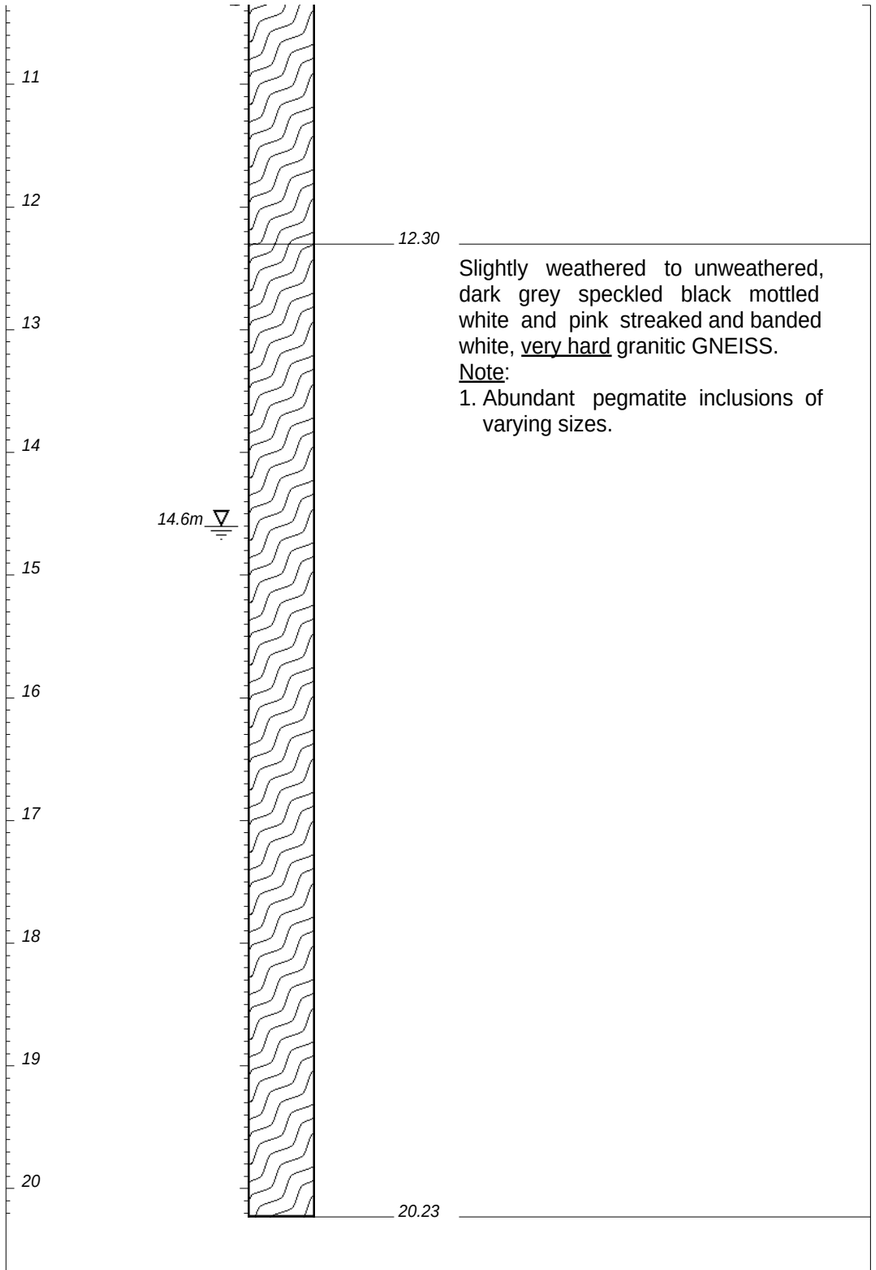
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH03
*Sheet 2 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | VIF-IF | 10-20 | 1<br>2 | 0-10<br>40 | VCJ-CJ<br>NM | RJ<br>RJ | Pyrite<br>FeOx & Calcite | <1<br><1 | 11.95 | 100 | 100 | 41 | 14 |
| | | | | | | | | | | 13.50 | 100 | 100 | 83 | 8 |
| | | | | | | | | | | 15.05 | 100 | 99 | 85 | 6 |
| MG-CG | GF | IF | 10-20 | 1<br>2<br>3 | 0-10<br>30<br>65 | CJ-MJ<br>VCJ<br>CJ | RJ<br>RJ<br>RJ | Silt & Clean<br>FeOx<br>Clean | <1<br><1<br>- | 16.55 | 100 | 100 | 99 | 5 |
| | | | | | | | | | | 18.10 | 99 | 99 | 85 | 5 |
| | | | | | | | | | | 18.40 | 100 | 100 | 33 | 7 |
| | | | | | | | | | | 19.75 | 100 | 100 | 73 | 7 |
| | | | | | | | | | | 20.23 | 100 | 100 | 85 | 4 |

*DEPTH Scale 1:50*




Slightly weathered to unweathered, dark grey speckled black mottled white and pink streaked and banded white, very hard granitic GNEISS.

Note:

1. Abundant pegmatite inclusions of varying sizes.

HOLE No: SWD-BH03
Sheet 3 of 3

JOB: 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH03
Sheet 3 of 3

JOB: 3010047806

NOTES

1) Perched water table encountered at 14.6m.
2) NA: Not applicable.
3) NM: Not measurable.
4) Sample SWD-BH03/1 taken at 3.82m--4.13m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : 90 deg
DIAM :
DATE : 9-10 May 2023
DATE : 10-11 May 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 801768
Y-COORD : 7581835

HOLE No: SWD-BH03

**HOLE No:** SWD-BH04
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

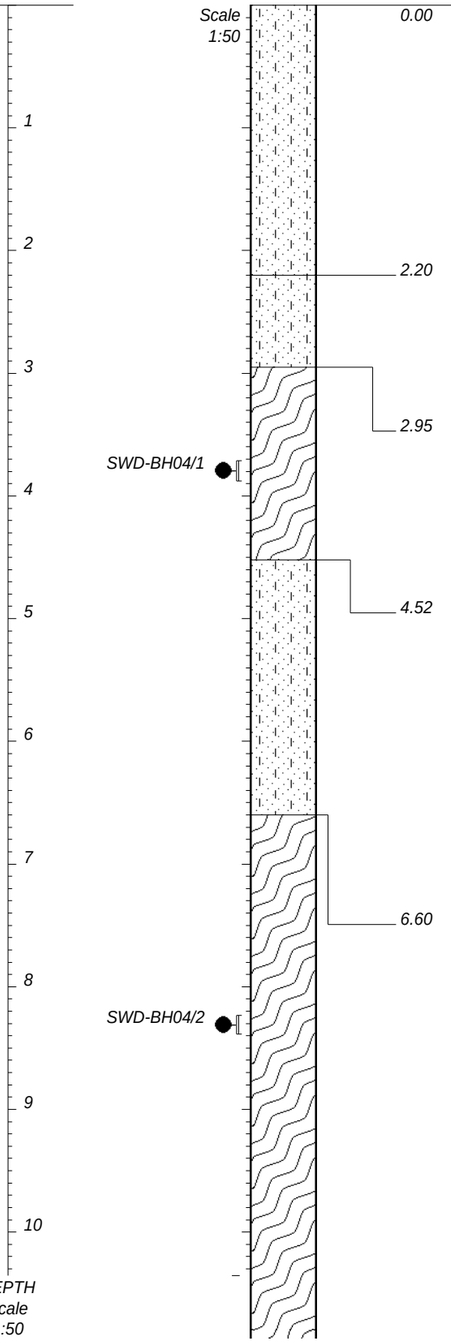
**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH04
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 41 | 0 | 0 | NA |
| | | | | | | | | | | 1.95 | SPT | N=9 | | |
| | | | | | | | | | | 2.00 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.68 | 96 | 0 | 0 | NA |
| | | | | | | | | | | 3.06 | 100 | 29 | 29 | 0 |
| MG | GF | IF | 10-30 | 1<br>2<br>3 | 5-10<br>40<br>50-60 | VCJ<br>WJ<br>CJ | RJ<br>RJ<br>RJ | FeOx<br>Silty sand<br>FeOx | <1<br>1-2<br><1 | 4.63 | 100 | 83 | 27 | 13 |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 5.94 | 65 | 0 | 0 | 0 |
| | | | | | | | | | | 6.63 | 100 | 0 | 0 | 0 |
| MG | GF | IF | 0-20 | 1<br>2 | 0-10<br>80-90 | CJ<br>CJ | RJ<br>RJ | Sand<br>FeOx & Silt | 1<br>2-3 | 7.63 | 100 | 100 | 31 | 11 |
| | | | | | | | | | | 9.03 | 100 | 100 | 23 | 19 |
| | | | | | | | | | | 10.54 | 100 | 100 | 40 | 12 |




0.00 — Brown, silty fine to medium grained SAND. Fine **ALLUVIUM**.

2.20 — Brown to grey, silty fine to medium grained SAND. **RESIDUAL GNEISS**.
Note:
1. Cobble sized fragments at 2.44m to 2.58m.

2.95 — Moderately weathered, grey speckled black and white, soft to medium hard rock GNEISS.
Note:
1. Highly broken zone from 3.06m to 3.20m.

4.52 — Grey to brown, silty fine to medium SAND. **RESIDUAL GNEISS**.
Notes:
1. From 4.72m to 4.84m and 5.38m to 5.52m alternating zones of extremely soft to very soft rock gneiss.
2. Core loss of 0.46m from 4.63m to 5.94m, due to washing out of fines.
3. Near vertical joint from 8.34m to 8.84m.

6.60 — Moderately weathered, grey speckled black streaked white, soft to medium hard rock GNEISS.
Notes:
1. From 6.90m to 7.94m; 8.13m to 8.20m; 8.75m to 9.09m and 9.90m to 10.74m alternating zones of completely weathered extremely soft to very soft rock gneiss.
2. Pegmatite vein from 9.09m to 9.90m.

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |



| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | IF | 20-30 | 1<br>2<br>3 | 0-10<br>70<br>80-90 | VCJ-CJ<br>NM<br>VWJ | RJ<br>SJ<br>RJ | Silt<br>Clayey silt<br>FeOx & Silt | 1<br>1<br>2-3 | 12.01 | 100 | 100 | 78 | 8 |
| | | | | | | | | | | 13.56 | 96 | 96 | 30 | 15 |
| | | | | | | | | | | 15.05 | 100 | 100 | 56 | 10 |
| | | | | | | | | | | 15.56 | 100 | 100 | 54 | 10 |
| MG | GF | IF | 10-20 | 1<br>2 | 0-10<br>70-80 | VCJ-CJ<br>VWJ | RJ<br>SJ | Silt<br>Calcite | 1<br>2-3 | 16.57 | 100 | 100 | 100 | 1 |
| | | | | | | | | | | 17.98 | 97 | 95 | 67 | 9 |
| | | | | | | | | | | 19.53 | 100 | 100 | 34 | 13 |
| | | | | | | | | | | 21.03 | 100 | 100 | 68 | 7 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

14.6m ▽

*10.80*

Moderately to slightly weathered, grey speckled black streaked white, medium hard rock granitic GNEISS.

Notes:

1. Near vertical joint at 12.85m to 13.20m.
2. Highly broken zone at 13.30m to 13.40m and 14.55m to 14.60m.

*15.50*

Slightly weathered to unweathered, grey speckled black banded white, hard to very hard rock GNEISS.

Notes:

1. From 16.57m to 16.60m completely weathered extremely soft rock zone. Interpreted as silty sand (residual gneiss).
2. Near vertical joint at 16.70m to 17.00m; 18.15m to 18.49m and 20.12m to 20.35m.
3. Highly broken zone from 19.36m to 19.53m.

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH04
*Sheet 3 of 3*

*JOB:* 3010047806

21

21.03

NOTES

1) Perched water table encountered at 14.6m.
2) NA: Not applicable.
3) NM: Not measurable.
4) Sample SWD-BH04/1 taken at 3.71m--3.88m.
5) Sample SWD-BH04/2 taken at 8.23m--8.39m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

*CONTRACTOR :* RA Longstaff
*MACHINE :* Sullivan HD
*DRILLED BY :*
*PROFILED BY :* S YaFrance

*TYPE SET BY :* EM
*SETUP FILE :* KPBHCOO8.SET

*INCLINATION :* Vertical
*DIAM :*
*DATE :* 12 May 2023
*DATE :* 12 May 2023

*DATE :* 07/07/2023 14:21
*TEXT :* ..51\PROFILES\PKFSWDBH.TXT

*COORDINATE SYSTEM :* WGS84 UTM 33S
*X-COORD :* 801678
*Y-COORD :* 7581770

**HOLE No:** SWD-BH04

**HOLE No:** SWD-BH05
***Sheet 1 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH05
***Sheet 1 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 98 | 0 | 0 | NA |
| | | | | | | | | | | 1.95 | SPT | N=7 | | |
| | | | | | | | | | | 2.00 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 3.00 | 84 | 0 | 0 | NA |
| | | | | | | | | | | 3.45 | SPT | N=8 | | |
| | | | | | | | | | | 3.65 | SPT | N=Ref | | |
| | | | | | | | | | | 4.14 | 96 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.64 | 98 | 0 | 0 | NA |
| | | | | | | | | | | 5.41 | 100 | 0 | 0 | NA |
| FG-MG | GF | IF | 0-10 | 1 | 0-10 | CJ | RJ | Silt | <1 | 6.14 | 100 | 88 | 82 | 5 |
| | | | | | | | | | | 7.44 | 100 | 100 | 48 | 12 |
| | | | | | | | | | | 9.03 | 94 | 91 | 31 | 11 |
| | | | | | | | | | | 10.53 | 100 | 100 | 55 | 5 |

DEPTH Scale 1:50

Scale 1:50

SWD-BH05/1

8.05m

SWD-BH05/2

0.00 — Brown speckled white, gravelly silty medium to coarse SAND. Fine **ALLUVIUM**.

1.09 — Brown to dark brown, silty sandy CLAY. Fine **ALLUVIUM**.
Notes:
1. SPT indicates soft consistency.
2. Scattered traces of subrounded to rounded medium grained quartz gravel.

3.95 — Brown to dark grey, sandy SILT. **RESIDUAL GNEISS**.
Note:
1. Quartz veins at 4.78m to 4.80m.

5.35 — Highly to completely weathered, dark grey to dark brown speckled black, very soft rock GNEISS.

6.30 — Moderately weathered, grey to brown speckled black streaked white, medium hard rock GNEISS.
Notes:
1. Near vertical joint at 11.24m to 11.50m.
2. Highly broken zone from 15.30m to 15.42m.
3. Pegmatite veins at 12.96 to 13.21m.

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH05
*Sheet 2 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | VIF | 10-20 | 1<br>2<br>3 | 0-10<br>60<br>80-90 | CJ<br>WJ<br>VWJ | RJ<br>RJ<br>RJ | Silty sand<br>FeOx & Calcrete<br>FeOx | 1<br><1<br><1 | 12.08 | 100 | 100 | 50 | 10 |
| | | | | | | | | | | 13.61 | 100 | 100 | 29 | 13 |
| | | | | | | | | | | 15.14 | 92 | 92 | 65 | 10 |
| MG | GF | VIF | 10-20 | 1<br>2 | 0-10<br>20 | CJ<br>VCJ-CJ | RJ<br>RJ | Silt<br>Silt | 1<br>1 | 16.64 | 100 | 88 | 56 | 11 |
| | | | | | | | | | | 18.14 | 95 | 85 | 60 | 10 |
| | | | | | | | | | | 19.64 | 100 | 92 | 83 | 5 |
| | | | | | | | | | | 20.01 | 100 | 100 | 100 | 5 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

15.62

Slightly weathered, grey to brown speckled black streaked white, medium hard rock GNEISS.

Notes:

1. Completely weathered extremely soft rock zones at 16.64m to 16.70m; 17.00m to 17.08m and 1.89m to 18.93m.
2. Interpreted as residual gneiss, comprising dark brown silty sand.

20.01

NOTES

1) Perched water table encountered at 8.05m.

HOLE No: SWD-BH05
Sheet 3 of 3

JOB: 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH05
Sheet 3 of 3

JOB: 3010047806

2) NA: Not applicable.

3) NM: Not measurable.

4) Sample SWD-BH05/1 taken at 5.88m--6.02m.

5) Sample SWD-BH05/2 taken at 9.69m--9.93m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 20-22 May 2023
DATE : 21-22 May 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 801740
Y-COORD : 7581876

HOLE No: SWD-BH05

**HOLE No:** SWD-BH06
*Sheet 1 of 2*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH06
*Sheet 1 of 2*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 86 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 0 | - | NA |
| | | | | | | | | | | 1.95 | SPT1 | N=37 | | |
| | | | | | | | | | | 2.00 | 100 | 0 | - | NA |
| | | | | | | | | | | 3.00 | 64 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 3.19 | SPT2 | N=Ref | | |
| | | | | | | | | | | 3.75 | 100 | 0 | - | NA |
| | | | | | | | | | | 4.05 | 100 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.76 | 100 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.26 | 100 | 11 | 0 | NM |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 7.76 | 75 | 17 | 0 | NM |
| | | | | | | | | | | 8.29 | 100 | 100 | 28 | 28 |
| | | | | | | | | | | 9.26 | 100 | 100 | 15 | 19 |
| | | | | | | | | | | 10.76 | 100 | 100 | 70 | 13 |

DEPTH Scale 1:50

Scale 1:50

| | |
|---|---|
| 0.00 | Dark brown, clayey silty coarse SAND. Fine **ALLUVIUM**.<br>Note:<br>1. Slight core loss due to washing out of fines. |
| 0.80 | Orange brown to brown with depth, clayey silty SAND to clayey silty coarse SAND, with traces of sub-angular to subrounded, fine grained gravel of quartz. Fine **ALLUVIUM**. |
| 3.00 | Red to brown, silty coarse SAND. **ALLUVIUM**.<br>Note:<br>1. Material is predominantly coarse sand of quartz of is coarser than layers above. |
| 3.70 | Red to brown, clayey silty coarse SAND, with minor sub-angular to subrounded gravel and cobbles of quartz. Coarse **ALLUVIUM**.<br>Notes:<br>1. Dark red, clayey silty sand with minor sub-angular quartz gravel, alluvium band between 3.90m and 4.10m.<br>2. Material very intact in core box. |
| 6.30 | Light red to brown, clayey silty SAND, with traces of subrounded white gravel and cobbles of quartz with depth. Coarse **ALLUVIUM**.<br>Notes:<br>1. Material slumps after placing in core tray.<br>2. Gravel and cobbles stained dark red on surfaces. |
| 7.60 | |

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH06
Sheet 2 of 2

JOB: 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG-CG | GF | IF | 30-50 | 1<br>2 | 20-30<br>40-50 | CJ<br>MJ | RJ<br>RJ | FeOx & Chl<br>FeOx | <1<br><1 | 12.26 | 100 | 100 | 80 | 9 |
| | | | | | | | | | | 13.76 | 100 | 100 | 56 | 17 |
| | | | | | | | | | | 15.27 | 99 | 99 | 85 | 10 |

DEPTH Scale 1:50

11
12
13
14
15
15.26

Highly to moderately weathered with depth, grey banded greenish brown to dark grey speckled black to green and stained orange on joints, closely to moderately jointed, soft to medium hard rock with depth, with pockets of very soft rock biotite GNEISS.

Notes:

1. Completely weathered zone present throughout zone at 8.10m to 8.30m; 12.80m to 13.00m; 14.10m to 14.20m; 14.57m to 14.67m.
2. Tends to migmatite in places, from below 13.20m with distinct ptygmatic folding.

NOTES

1) NA: Not applicable.

2) NM: Not measurable.

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : May 2023
DATE : 1 June 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 803037.82
Y-COORD : 7581516.63

HOLE No: SWD-BH06

**HOLE No:** SWD-BH07
*Sheet 1 of 2*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

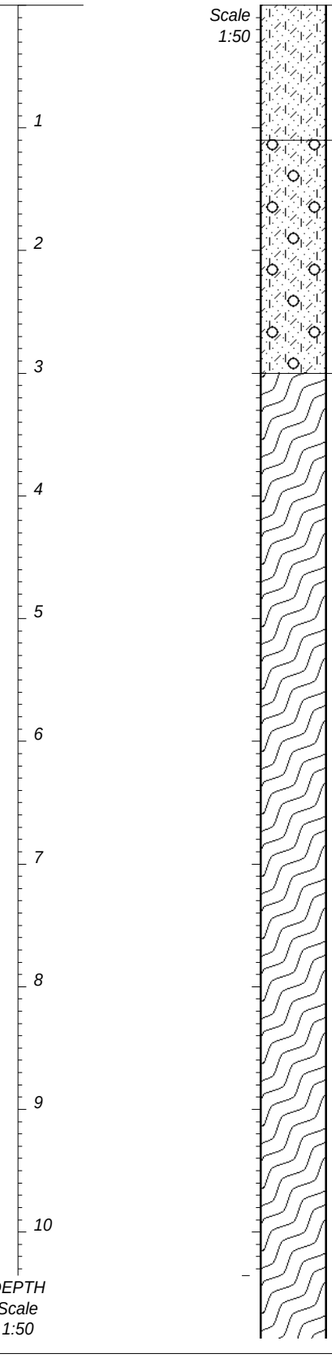
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH07
*Sheet 1 of 2*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 81 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 0 | - | NA |
| | | | | | | | | | | 2.00 | 100 | 0 | - | NA |
| | | | | | | | | | | 3.00 | 97 | 0 | - | NA |
| MG-CG | GF | IF-VIF | 20-30 | 1<br>2 | 20-30<br>40-50 | VCJ-CJ<br>MJ | SJ<br>RJ | FeOx & Chl & mica<br>FeOx & Chl & mica | <1<br><1 | 4.50 | 83 | 69 | 14 | 13 |
| | | | | | | | | | | 6.05 | 100 | 100 | 54 | 14 |
| | | | | | | | | | | 7.55 | 100 | 100 | 71 | 15 |
| | | | | | | | | | | 9.05 | 100 | 100 | 75 | 13 |
| | | | | | | | | | | 10.60 | 100 | 100 | 81 | 12 |

*DEPTH Scale 1:50*




Dark reddish brown, clayey silty SAND, with traces of coarse sand. Fine **ALLUVIUM**.
Notes:
1. Scattered fine roots present.
2. Minor core loss due to washing out of softer soils and fines.

Reddish brown becoming yellowish brown occasionally mottled black, clayey gravelly silty coarse SAND, with minor subrounded gravel to cobbles of quartz. Coarse **ALLUVIUM**.
Notes:
1. Zone is strongly ferruginised.
2. Black and orange staining on cobble surfaces.
3. Minor core loss due to washing out of fines.

Moderately weathered becoming slightly weathered from 12.50m, white banded grey and light brown speckled and streaked black with orange and light green staining on joints, closely to moderately jointed, medium hard to hard rock with depth, biotite GNEISS.
Notes:
1. Rock breaks mostly along shallow dipping very distinct gneissic bands.
2. Quartz gravel present at top of layer. Interpreted as contamination from above.

**HOLE No:** SWD-BH07
*Sheet 2 of 2*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

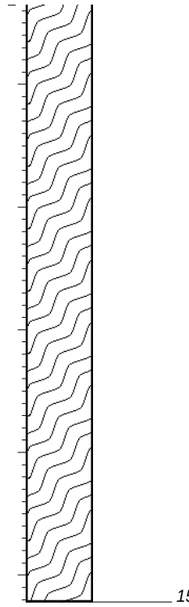
**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH07
*Sheet 2 of 2*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | 12.15 | 100 | 100 | 70 | 13 |
| | | | | | | | | | | 13.75 | 98 | 98 | 62 | 9 |
| | | | | | | | | | | 15.22 | 100 | 100 | 83 | 8 |

DEPTH Scale 1:50




NOTES

1) NA: Not applicable.

2) NM: Not measurable.

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance
TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 2023
DATE : 1 June 2023
DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 804077
Y-COORD : 7582410

**HOLE No:** SWD-BH07

**HOLE No:** SWD-BH08
*Sheet 1 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH08
*Sheet 1 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 71 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.95 | SPT | N=13 | | |
| | | | | | | | | | | 2.00 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 3.00 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 3.45 | SPT | N=10 | | |
| | | | | | | | | | | 4.19 | 91 | 0 | 0 | NA |
| | | | | | | | | | | 4.78 | 100 | 0 | 0 | NA |
| MG | GF | IF | 10-20 | 1 | 0-10 | VCJ-CJ | RJ | Silt | 1-2 | 5.50 | 65 | 65 | 27 | 14 |
| | | | | | | | | | | 6.24 | 99 | 99 | 19 | 23 |
| | | | | | | | | | | 7.77 | 92 | 76 | 39 | 10 |
| | | | | | | | | | | 9.30 | 100 | 100 | 59 | 12 |
| | | | | | | | | | | 10.80 | 96 | 93 | 59 | 11 |

DEPTH Scale 1:50

Scale 1:50

SWD-BH08/1

*0.00*

Light brown speckled white, silty medium to coarse SAND. Fine **ALLUVIUM**.

*1.20*

Dark brown, silty clayey medium to coarse SAND. Fine **ALLUVIUM**.

*2.90*

Brown, clayey silty medium to coarse SAND. Fine **ALLUVIUM**.

Note:

1. Traces of coarse gravel and cobble fragments at 3.99m to 4.25m.

*4.60*

Highly weathered, grey to brown speckled black streaked white, soft rock GNEISS.

Notes:

1. Completely weathered extremely soft rock zone from 6.94m to 7.09m. Interpreted as silty sand (residual gneiss).
2. Clay zone (completely weathered mafic zone) at 7.31m to 7.34m.

*7.97*

Moderately weathered, grey speckled black streaked white, medium hard rock GNEISS.

Notes:

1. From 12.59m to 12.97m thick pegmatite inclusion.
2. Highly weathered very soft rock zone at 13.55m to 13.73m.

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF -schistose
GF -gneissose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grain
CG -coarse grain

JOINT SPACING
VCJ-very close spacg
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ-very wide spacng

JOINT ROUGHNESS
SLJ-slickensided
SJ -smooth
RJ -rough

JOINT SHAPE
CUR-curvilinear
PLA-planar
UND-undulating
STE-stepped
IRR-irregular

ROCK HARDNESS
EHR-extremely hard rock
VHR-very hard rock
HR -hard rock
MHR-medium hard rock
SR -soft rock
VSR-very soft rock

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

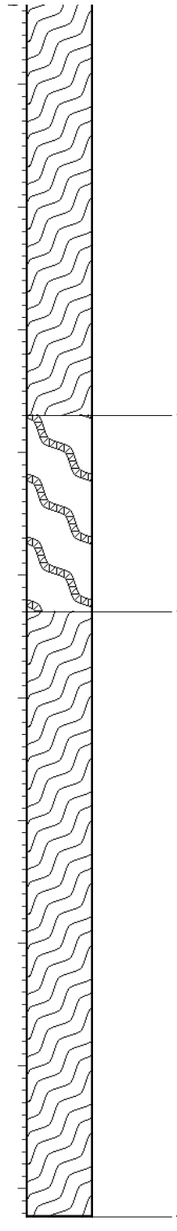
HOLE No: SWD-BH08
Sheet 2 of 3

JOB: 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | IF | 80 | 1<br>2<br>3 | 0-10<br>20<br>60-70 | CJ<br>CJ<br>WJ | RJ<br>RJ<br>RJ | Sand<br>Silt<br>FeOx | 1<br><1<br><1 | | | | | |
| | | | | | | | | | | 12.30 | 97 | 97 | 51 | 11 |
| | | | | | | | | | | 13.80 | 97 | 93 | 47 | 11 |
| CG-VCG | MF | NM | NM | 1 | 30-40 | CJ | RJ | Silt | 3 | 14.55 | 100 | 85 | 13 | 20 |
| | | | | | | | | | | 15.30 | 95 | 51 | 0 | NM |
| MG | GF | IF | 10-20 | 1<br>2<br>3 | 0-10<br>20<br>80 | CJ<br>CJ<br>CJ | RJ<br>RJ<br>RJ | Clean<br>Silt<br>FeOx | -<br><1<br><1 | 16.80 | 97 | 97 | 68 | 8 |
| | | | | | | | | | | 18.30 | 100 | 99 | 64 | 10 |
| | | | | | | | | | | 19.80 | 100 | 100 | 65 | 8 |
| | | | | | | | | | | 20.23 | 100 | 100 | 28 | 16 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20



13.70

Slightly weathered, white mottled pink, hard rock PEGMATITE, with brecciation in places resembling shearing.
Note:
1. Highly fractured.

15.30

Slightly weathered to unweathered, grey speckled black streaked and banded white, hard rock GNEISS.
Note:
1. Thick pegmatite band from 16.15m to 16.55m.

20.23

NOTES
1) NA: Not applicable.

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH08
Sheet 3 of 3

JOB: 3010047806

2) NM: Not measurable.

3) Sample SWD-BH08/1 taken at 5.07m--5.21m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 15-16 May 2023
DATE : 15-16 May 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 804591
Y-COORD : 7583229

HOLE No: SWD-BH08

**HOLE No:** SWD-BH09
***Sheet 1 of 3***

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH09
***Sheet 1 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.50 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 1.95 | SPT | N=8 | | |
| | | | | | | | | | | 2.09 | 71 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.56 | 96 | 0 | 0 | NA |
| | | | | | | | | | | 3.34 | 68 | 0 | 0 | NA |
| | | | | | | | | | | 3.79 | SPT | N=13 | | |
| | | | | | | | | | | 4.30 | 90 | 0 | 0 | NA |
| | | | | | | | | | | 4.84 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.30 | 88 | 73 | 1 | 4 |
| MG | GF | NM | NM | 1<br>2 | 0-10<br>80 | CJ<br>NM | RJ<br>RJ | Silt<br>Silt | 1<br>1 | 7.80 | 83 | 62 | 15 | 8 |
| | | | | | | | | | | 9.24 | 99 | 99 | 77 | 2 |
| MG | GF | IF | 0-20 | 1<br>2 | 10<br>30 | VCJ-CJ<br>CJ | RJ<br>RJ | Silt<br>Silt | 1<br>1-2 | 10.80 | 100 | 100 | 62 | 10 |

DEPTH Scale 1:50

Scale 1:50

**0.00** Light brown, silty medium to coarse SAND. Fine **ALLUVIUM**.
Note:
1. Coarse subrounded gravel.
2. Cobble fragments at base of strata.

**1.35** Brown, clayey silty fine to medium SAND. Fine **ALLUVIUM**.
Note:
1. Traces of subrounded fine to medium quartz gravel.

**4.70** Dark brown speckled black and white, gravelly silty coarse SAND. **RESIDUAL GNEISS**.

**5.17** Highly weathered, dark brown speckled black and white, very soft rock GNEISS.
Note:
1. From 6.20m to 6.30m and 7.60m to 7.80m extremely soft rock zone, recovered as silty sand (residual gneiss).

**7.80** Highly weathered, brown to grey speckled black streaked white, soft rock GNEISS.
Note:
1. Very soft rock zone from 10.47m to 10.80m.

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH09
Sheet 2 of 3

JOB: 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | IF | 0-20 | 1<br>2 | 10<br>30 | VCJ-CJ<br>CJ | RJ<br>RJ | FeOx<br>Clean | <1<br>- | 12.30 | 100 | 98 | 73 | 10 |
| | | | | | | | | | | 13.03 | 100 | 100 | 59 | 14 |
| | | | | | | | | | | 13.80 | 99 | 99 | 99 | 4 |
| MG-CG | GF | IF | 10-20 | 1<br>2 | 10<br>20 | CJ-MJ<br>CJ-MJ | RJ<br>RJ | Clean<br>Clean | -<br>- | 15.30 | 99 | 99 | 99 | 3 |
| | | | | | | | | | | 16.80 | 100 | 100 | 95 | 7 |
| | | | | | | | | | | 18.30 | 100 | 100 | 93 | 5 |
| | | | | | | | | | | 19.80 | 100 | 100 | 97 | 4 |
| | | | | | | | | | | 20.23 | 100 | 100 | 100 | 1 |

DEPTH Scale 1:50

11
12
13
14
15
16
17
18
19
20

11.76

Slightly weathered, grey streaked and banded white, medium hard rock GNEISS
1. Pyrite mineralisation at 12.10m to 12.20m.

12.80

Unweathered, dark grey speckled black streaked and banded white, hard to very hard rock GNEISS.
Note:
1. Quartz vein at 13.90 to 14.10m and 16.65m to 16.84m.

20.23

NOTES
1) NA: Not applicable.

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

HOLE No: SWD-BH09
Sheet 3 of 3

JOB: 3010047806

2) NM: Not measurable.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 13-15 May 2023
DATE : 15 May 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 804688
Y-COORD : 7583254

HOLE No: SWD-BH09

**HOLE No:** SWD-BH10
*Sheet 1 of 2*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

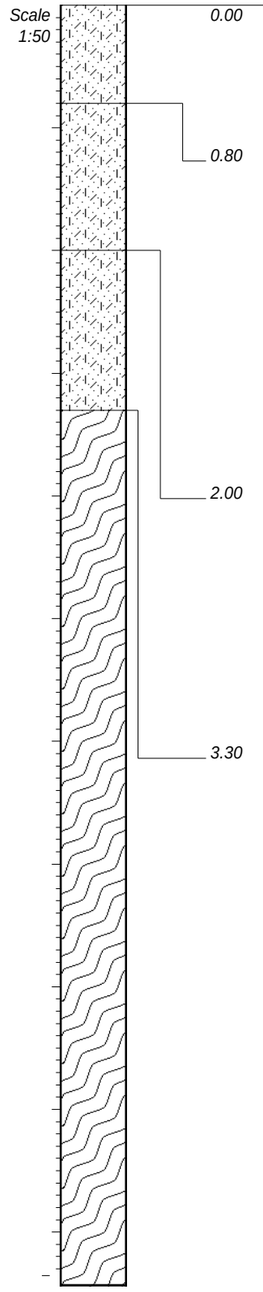
**HOLE No:** SWD-BH10
*Sheet 1 of 2*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 71 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 71 | 12 | 0 | NM |
| | | | | | | | | | | 1.95 | SPT1 | N=Ref | | |
| | | | | | | | | | | 2.00 | 100 | 0 | - | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 3.00 | 59 | 0 | - | NA |
| | | | | | | | | | | 3.15 | SPT2 | N=Ref | - | NA |
| MG-CG | GF | IF-VIF | 0-10 | 1<br>2<br>3 | 10-30<br>40-50<br>80-90 | CJ-MJ<br>MJ<br>WJ | SJ<br>RJ<br>RJ | Silty sand + mica<br>FeOx & Chl & mica<br>FeOx & mica & Chl | <2<br><1<br><1 | 4.34 | 92 | 67 | 0 | 24 |
| | | | | | | | | | | 5.88 | 94 | 94 | 27 | 19 |
| | | | | | | | | | | 7.34 | 100 | 100 | 45 | 14 |
| | | | | | | | | | | 8.89 | 99 | 99 | 19 | 22 |
| | | | | | | | | | | 10.44 | 99 | 99 | 29 | 23 |

DEPTH Scale 1:50

Scale 1:50




Brown, clayey silty SAND. Fine **ALLUVIUM**.
Note:
1. Core loss due to washing out of fines.

Brown to light yellowish brown, clayey silty coarse SAND to clayey silty SAND, with minor sub-angular to subrounded gravel to cobbles of quartz. Coarse **ALLUVIUM**.
Notes:
1. Prominent coarse sand zone from 0.80m to 1.20m.
2. Prominent gravel zone from 1.40m to 1.50m.
3. Minor core loss due to washing out of fines between coarser material.

Light brown to orange brown, clayey fine grained silty coarse SAND. Reworked **RESIDUAL BIOTITE GNEISS**.
Notes:
1. Quartz gravel present near top of zone. Interpreted as contamination.
2. Abundant core loss due to washing out of fines.

Moderately weathered with highly weathered zones, white speckled and streaked black stained light brown, pink and light green, closely jointed, medium hard rock with pockets of very soft to soft rock biotite GNEISS.
Notes:
1. Completely to highly weathered, very soft to soft rock pockets occur mainly near joints.
2. Completely weathered, very soft rock present from 3.80m to 4.00m.
3. Minor core loss due to washing out of fines in more weathered areas.

**HOLE No:** SWD-BH10
*Sheet 2 of 2*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

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**OMITIOMIRE COPPER PROJECT**

**GEOTECHNICAL INVESTIGATION**

**HOLE No:** SWD-BH10
*Sheet 2 of 2*

**JOB:** 3010047806

10.44

NOTES
1) NA: Not applicable.
2) NM: Not measurable.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : June 2023
DATE : 1 June 2023

DATE : 07/07/2023 14:21
TEXT : ..51\PROFILES\PKFSWDBH.TXT

COORDINATE SYSTEM : WGS84 UTM 33S
X-COORD : 801538
Y-COORD : 7581868

**HOLE No:** SWD-BH10

**HOLE No:** WRD-BH01
***Sheet 1 of 3***

**JOB:** 3010047806

*ROCK FABRIC*
*MF -massive*
*BF -bedded*
*FF -foliated*
*CF -cleaved*
*SF -schistose*
*GF -gneissose*
*LF -laminated*

*GRAIN SIZE*
*FG -fine grained*
*MG -medium grain*
*CG -coarse grain*

*JOINT SPACING*
*VCJ-very close spacg*
*CJ -close spacing*
*MJ -medium spacing*
*WJ -wide spacing*
*VWJ-very wide spacng*

*JOINT ROUGHNESS*
*SLJ-slickensided*
*SJ -smooth*
*RJ -rough*

*JOINT SHAPE*
*CUR-curvilinear*
*PLA-planar*
*UND-undulating*
*STE-stepped*
*IRR-irregular*

*ROCK HARDNESS*
*EHR-extremely hard rock*
*VHR-very hard rock*
*HR -hard rock*
*MHR-medium hard rock*
*SR -soft rock*
*VSR-very soft rock*

Knight Piésold CONSULTING

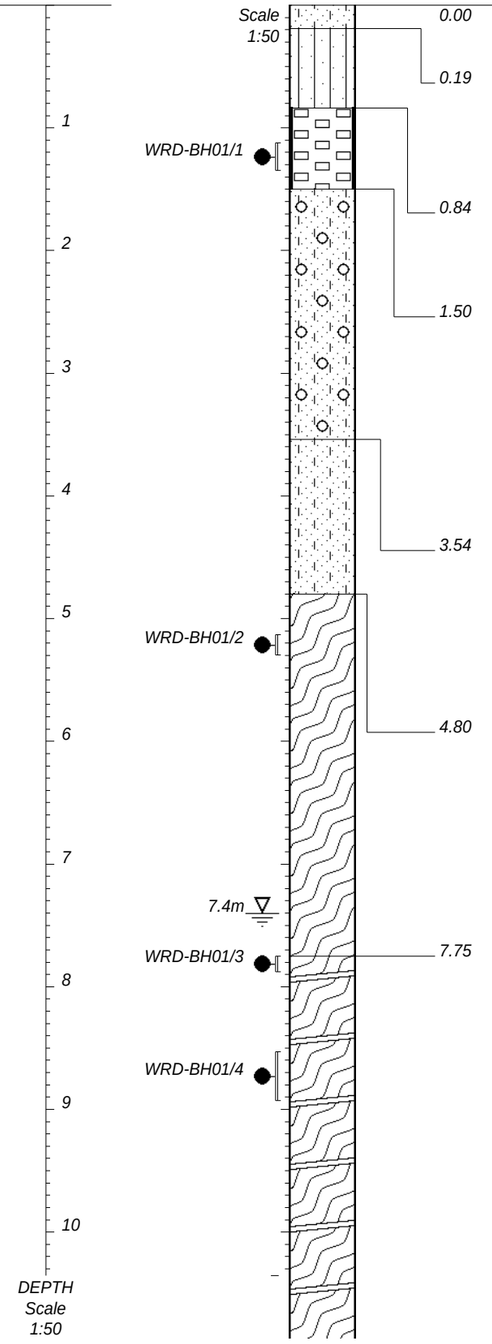
**OMITIOMIRE COPPER PROJECT**
**WASTE ROCK DUMP**

GEOTECHNICAL INVESTIGATION

**HOLE No:** WRD-BH01
***Sheet 1 of 3***

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 0.84 | 98 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 1.50 | 100 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.00 | 98 | 0 | 0 | NA |
| NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 3.49 | 77 | 0 | 0 | NA |
| MG | GF | IF | 20 | 1 | 0-10 | CJ | RJ | Silty sand | <1 | 4.75 | 100 | 0 | 0 | NA |
| MG | NM | NM | NM | NM | NM | NM | NM | NM | NM | 5.47 | 100 | 76 | 49 | 7 |
| | | | | | | | | | | 6.25 | 100 | 0 | 0 | NA |
| | | | | | | | | | | 6.97 | 99 | 28 | 19 | 3 |
| | | | | | | | | | | 7.75 | 99 | 0 | 0 | NA |
| | | | | | | | | | | 8.23 | 100 | 100 | 27 | 10 |
| | | | | | | | | | | 9.25 | 100 | 100 | 71 | 9 |
| | | | | | | | | | | 10.75 | 100 | 91 | 48 | 9 |




Dark brown, silty fine SAND. Fine **ALLUVIUM**.

Pale brown to off-white, sandy SILT. **POWDERY CALCRETE**.
Note:
1. Traces of calcrete nodules.

Pale brown blotched white, moderately cemented, HARDPAN CALCRETE of soft rock strength.

Brown mottled white, gravelly silty fine to medium SAND. Calcareous **ALLUVIUM**.
Note:
1. Traces of scattered calcrete nodules.
2. Hardpan calcrete zone at 3.03m to 3.27m and 3.45m to 3.54m.

Grey to brown speckled black and white, silty medium SAND. **RESIDUAL GNEISS**.
Note:
1. Calcified residual gneiss zone at 4.25m to 4.40m.

Generally completely weathered, brown to grey speckled black streaked white, very soft rock GNEISS, mostly recovered as fine silty sand with scattered angular gravel, resembling residual soil.

Moderately weathered, dark brown to grey streaked and banded white, medium hard rock GNEISS, with very soft rock bands.
Note:
1. Completely weathered very soft rock zone at 9.80m to 9.95m; 10.10m to 10.22m and 10.60m to 10.70m.
2. Highly broken at 13.90m to 14.01m.

**HOLE No:** WRD-BH01
*Sheet 2 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**
**WASTE ROCK DUMP**

GEOTECHNICAL INVESTIGATION

**HOLE No:** WRD-BH01
*Sheet 2 of 3*

**JOB:** 3010047806

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MG | GF | VIF-IF | 10-20<br>10-20 | 1<br>2 | 0-10<br>20 | VCJ-CJ<br>VCJ-CJ | RJ<br>RJ | Sand<br>Sand | 1-2<br>2-3 | 12.25 | 99 | 99 | 80 | 7 |
| | | | | | | | | | | 13.75 | 94 | 94 | 63 | 11 |
| | | | | | | | | | | 15.25 | 100 | 92 | 53 | 9 |
| MG | GF | VIF-IF | 10-20<br>10-20 | 1<br>2 | 0-10<br>30 | CJ-MJ<br>CJ-MJ | RJ<br>RJ | Clean<br>Stained | -<br><1 | 16.75 | 97 | 97 | 84 | 5 |
| | | | | | | | | | | 18.25 | 100 | 100 | 97 | 5 |
| | | | | | | | | | | 19.75 | 100 | 100 | 85 | 6 |
| | | | | | | | | | | 20.28 | 91 | 91 | 91 | 0 |

DEPTH Scale 1:50

11 12 13 14 15 16 17 18 19 20

14.35

Slightly weathered to unweathered, dark grey speckled black streaked and banded white, hard to very hard rock GNEISS.

20.28

**HOLE No:** WRD-BH01
*Sheet 3 of 3*

**JOB:** 3010047806

| ROCK FABRIC | GRAIN SIZE | JOINT ROUGHNESS | ROCK HARDNESS |
|---|---|---|---|
| MF -massive | FG -fine grained | SLJ-slickensided | EHR-extremely hard rock |
| BF -bedded | MG -medium grain | SJ -smooth | VHR-very hard rock |
| FF -foliated | CG -coarse grain | RJ -rough | HR -hard rock |
| CF -cleaved | | | MHR-medium hard rock |
| SF -schistose | JOINT SPACING | JOINT SHAPE | SR -soft rock |
| GF -gneissose | VCJ-very close spacg | CUR-curvilinear | VSR-very soft rock |
| LF -laminated | CJ -close spacing | PLA-planar | |
| | MJ -medium spacing | UND-undulating | |
| | WJ -wide spacing | STE-stepped | |
| | VWJ-very wide spacng | IRR-irregular | |

Knight Piésold CONSULTING

**OMITIOMIRE COPPER PROJECT**
**WASTE ROCK DUMP**

GEOTECHNICAL INVESTIGATION

**HOLE No:** WRD-BH01
*Sheet 3 of 3*

**JOB:** 3010047806

NOTES

1) Perched water table encountered at 7.4m.
2) NA: Not applicable.
3) NM: Not measurable.
4) Sample WRD-BH01/1 taken at 1.12m--1.35m.
5) Sample WRD-BH01/2 taken at 5.13m--5.30m.
6) Sample WRD-BH01/3 taken at 7.75m--7.88m.
7) Sample WRD-BH01/4 taken at 8.53m--8.93m.

| Grain Size | Rock Fabric | Fabric Spac (mm) | Fabric Inc (deg) | Joint Set No. | Joint Inc (Deg) | Joint Spac | Micro Rough-ness | Joint Filling | Fill Thickness (mm) | Depth (m) | Mat recov % | Rock recov % | RQD % | Frac Freq No/m | DEPTH Scale 1:50 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

CONTRACTOR : RA Longstaff
MACHINE : Sullivan HD
DRILLED BY :
PROFILED BY : S YaFrance

TYPE SET BY : EM
SETUP FILE : KPBHCOO8.SET

INCLINATION : Vertical
DIAM :
DATE : 8-9 May 2023
DATE : 10 May 2023

DATE : 03/07/2023 12:26
TEXT : ..51\PROFILES\PKFWRDBH.TXT

COORDINATE SYSTEM : WGS84 UTM33K
X-COORD : 803426
Y-COORD : 7585025

**HOLE No:** WRD-BH01

# APPENDIX D

## Photographs of Test Pits and Borehole Cores

Appendix D1

Test Pit Photographs

Appendix D2

Boreholes Core Photographs

# APPENDIX D1

## Test Pit Photographs

# STORMWATER DIVERSION CHANNEL



**Plate 1: Typical soil profile at SWD-TP04.**



**Plate 2: Shallow excavator refusal at SWD-TP08 on ferrugenized alluvium of soft rock strength.**



**Plate 3: Northerly view of excavations underway at SWD-TP11.**



**Plate 4: Zoomed in view of ferrugenized soils at SWD-TP11.**



**Plate 5: Shallow refusals encountered on soft rock gneiss at SWD-TP25.**



**Plate 6: Rehabilitation of SWD-TP26 within low-lying clay pans.**

# HEAP LEACH PAD



**Plate 7: Refusal at HLP-TP06 on very dense residual gneiss.**



**Plate 8: Matrix supported pebble marker with ferricrete nodules at HLP-TP09.**

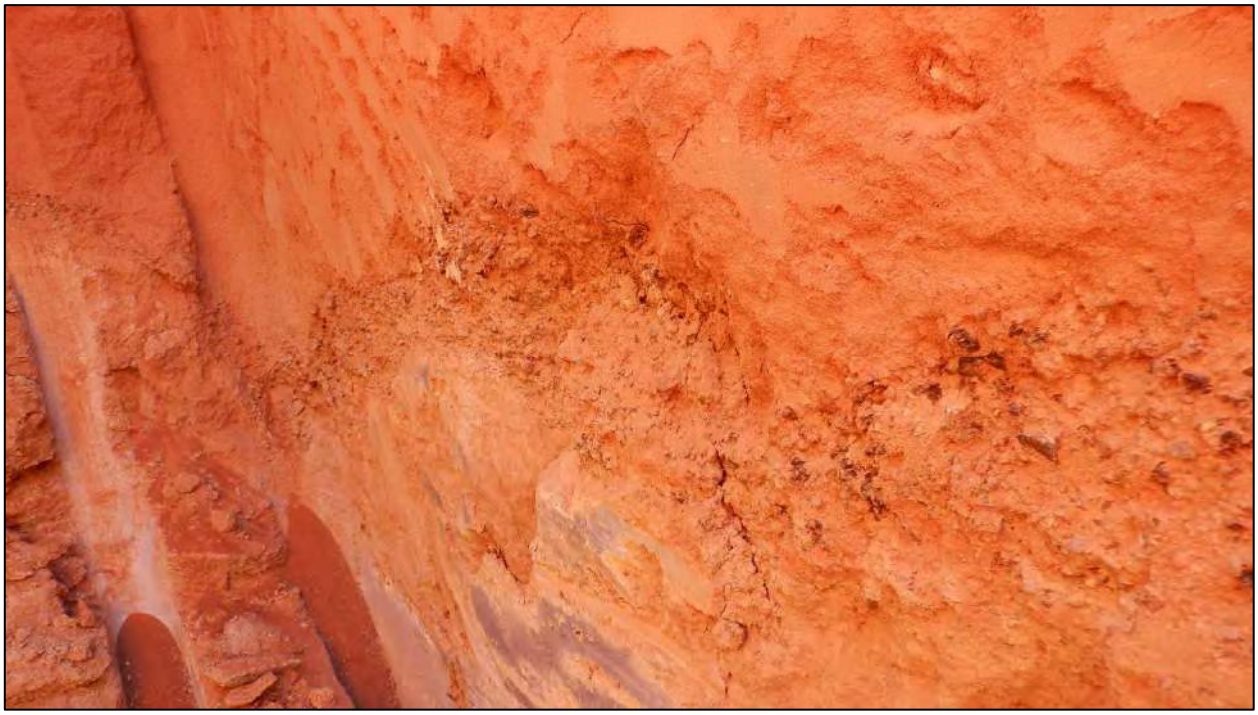


**Plate 9: Thin undulating pebble marker observed at HLP-TP13.**



**Plate 10: Typical soil profile at HLP-TP24.**



**Plate 11: Typical soil profile at HLP-TP26.**



**Plate 12: Shallow excavator refusal on ferrugenized alluvium at HLP-TP28.**

# WASTE ROCK DUMP (WRD)



**Plate 13: View of soil profile and shallow water table at WRD-TP01.**



**Plate 14: Macro-instability of test pit sidewalls at WRD-TP01.**



**Plate 15: Typical pedogenic profile with refusal on medium hard rock gneiss.**



**Plate 16: Shallow refusal on soft rock gneiss WRD-TP20.**



**Plate 17: Presence of folding at WRD-TP20.**



**Plate 18: Shallow refusal on hardpan calcrete of soft rock strength at WRD-TP23.**



**Plate 19: Typical soil profile at WRD-TP29.**



**Plate 20: WRD-TP34 exposing well developed nodular calcrete horizon.**



**Plate 21: Zoomed in view of well-developed calcrete nodules of soft rock strength.**



**Plate 22: Ongoing sampling activities at WRD-TP34.**

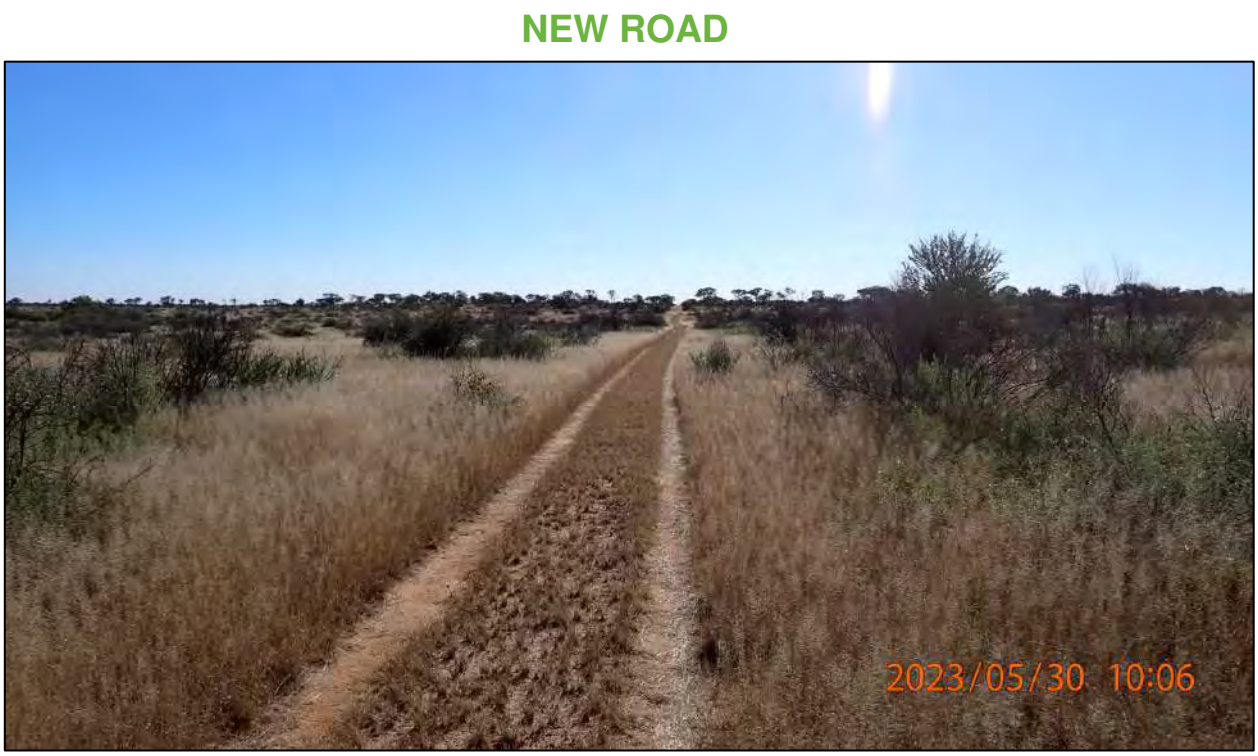



**Plate 23: Existing farm roads in the vicinity of RD-TP01.**




**Plate 24: Fine alluvium at RD-TP01.**




**Plate 25: Rehabilitated RD-TP02.**




**Plate 26: Typical soil profile at RD-TP06 and RD-TP12.**




**Plate 27: Typical soil profile at RD-TP16 and RD-TP20.**

# POTENTIAL BORROW SOURCES




**Plate 28: Excavations underway at AM-TP01.**




**Plate 29: Steeply dipping gneiss outcrops.**




**Plate 30: Access roads observed within the vicinity of the identified borrow area.**




**Plate 30: Typical profile west of the potential borrow area.**




**Plate 31: Clayey silty sand material recovered from AM-TP06B.**




**Plate 32: Typical fine alluvial soils overlying ferruginous alluvium.**

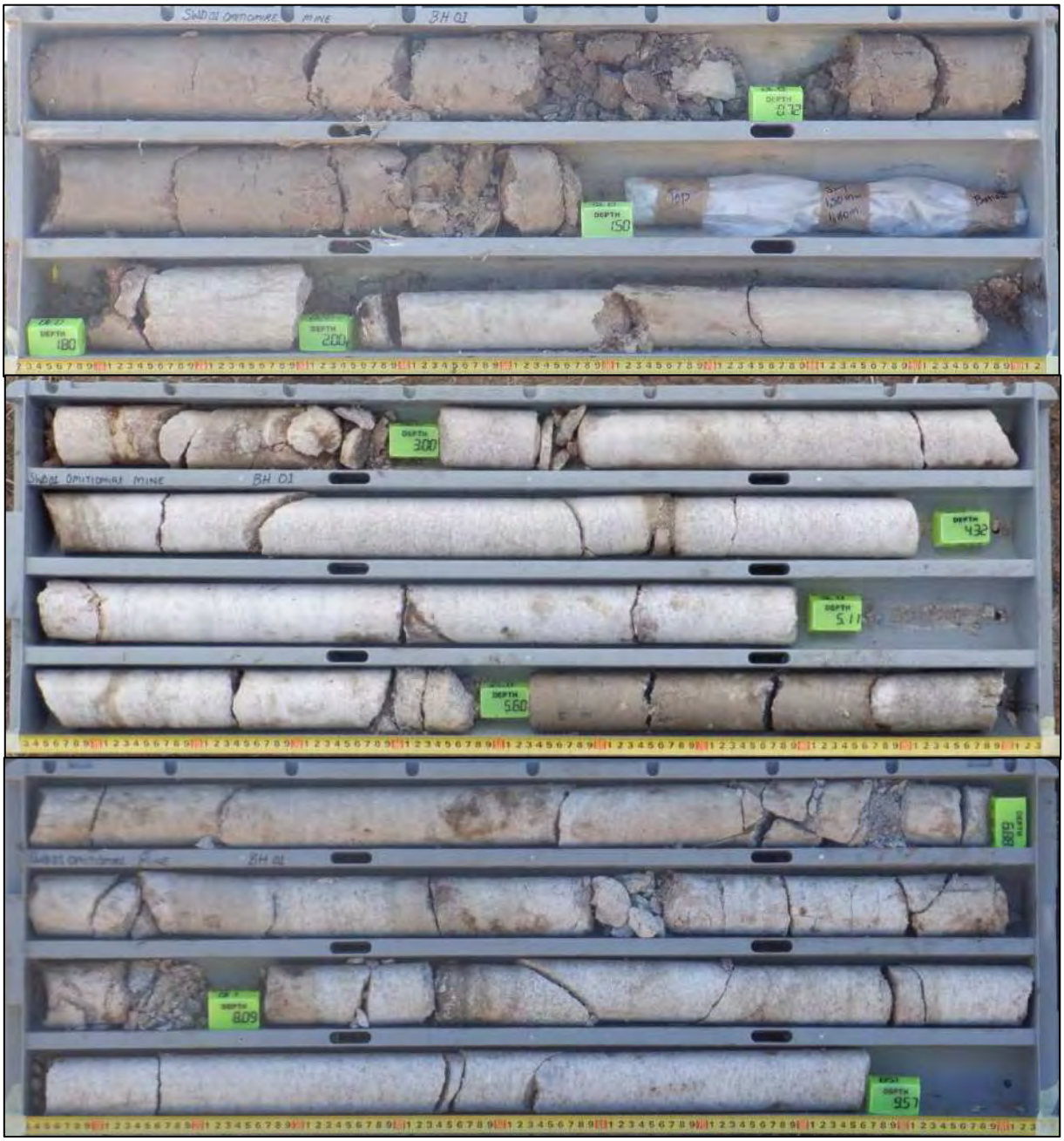
# APPENDIX D2

## Borehole Core Photographs

# STORMWATER DIVERSION CHANNEL

**BH01-SWD**

0 – 24.27m




BH 01
DEPTH 14.06
DEPTH 13.50
DEPTH 14.03
DEPTH 15.50
DEPTH 16.75
BH 01
DEPTH 18.60
DEPTH 20.09
BH 01
DEPTH 21.39
DEPTH 22.82

**BH02-SWD**

0 – 25.11m




DEPTH
12.64
DEPTH
13.6
DEPTH
15.11
DEPTH
15.61
DEPTH
18.11
DEPTH
18.54
DEPTH
19.61
DEPTH
22.53
DEPTH
25.11

**BH03-SWD**

0 – 20.23m




OMITIOMIRE
SWD.BH03
Box 5
DEPTH
6.55
DEPTH
18.10
DEPTH
19.75
DEPTH
30.23

**BH04-SWD**

0 – 21.03m




OMITIOMIRE BH04-SWD
DEPTH 10.54
DEPTH 12.01
DEPTH 13.54
OMITIOMIRE BH04-SWD
DEPTH 15.05
DEPTH 15.56
DEPTH 16.57
OMITIOMIRE BH04-SWD
DEPTH 17.98
DEPTH 19.53
OMITIOMIRE BH04-SWD
DEPTH 21.03

## BH05-SWD

0 – 20.01m




OMITIOMIRE BH05-SWD Box 4 of
DEPTH 10.53
DEPTH 12.08
OMITIOMIRE BH05-SWD Box 5 of
DEPTH 15.24
OMITIOMIRE BH05-SWD Box 6 of 6
DEPTH 18.24
DEPTH 19.54
DEPTH 20.0

**BH06-SWD**

0 – 15.26m

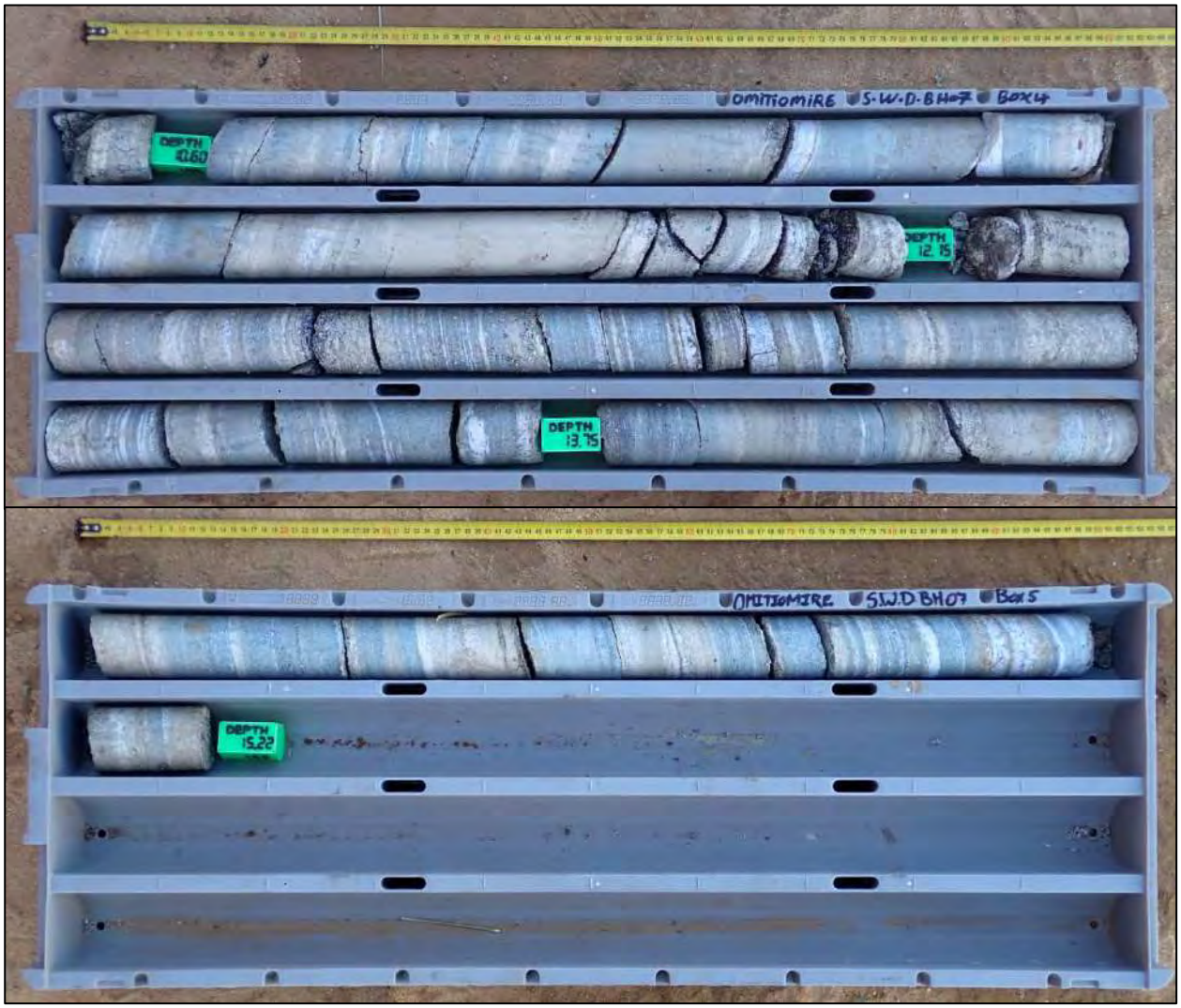



OMITIOMIRE
S.W.DBH06
Box 4
DEPTH 12.26
DEPTH 13.76
DEPTH 15.26

**BH07-SWD**

0m – 15.22m




OMITIOMIRE S.W.D-BH07 BOX4
DEPTH 12.15
DEPTH 13.75
OMITIOMIRE S.W.D BH07 Box 5
DEPTH 15.22

**BH08-SWD**

0m – 20.01m




OMITIOMIRE S·W·D·B H·8 Box 4
DEPTH 10.80
DEPTH 12.30
DEPTH 13.80
OMITIOMIRE S·W·D·B H·8 Box 5
DEPTH 14.55
DEPTH 15.30
DEPTH 16.80
OMITIOMIRE S·W·D·B H·8 Box 6
DEPTH 18.30
DEPTH 19.80
DEPTH 20.23

**BH09-SWD**

0 – 20.23m

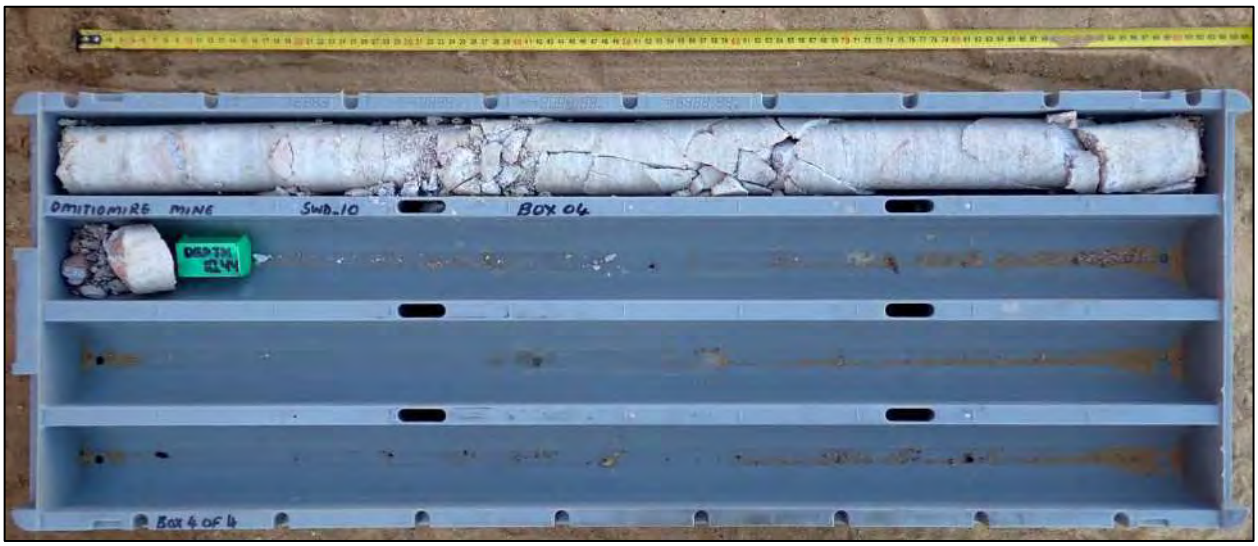



OMITIOMIRE S.W.D BH09 Box4
DEPTH 10.80
DEPTH 12.30
DEPTH 13.03
OMITIOMIRE S.W.D-B H09 BOX5
DEPTH 13.80
DEPTH 15.30
DEPTH 16.80
OMITIOMIRE S.W.D-B H09 Box6
DEPTH 18.30
DEPTH 19.80
DEPTH 20.23

**BH10-SWD**

0 – 20.09m




OMITIOMIRE MINE
SWB-10
BOX 04
Box 4 of 4

# HEAP LEACH PAD

**BH01-HLP**

0 – 20.07m

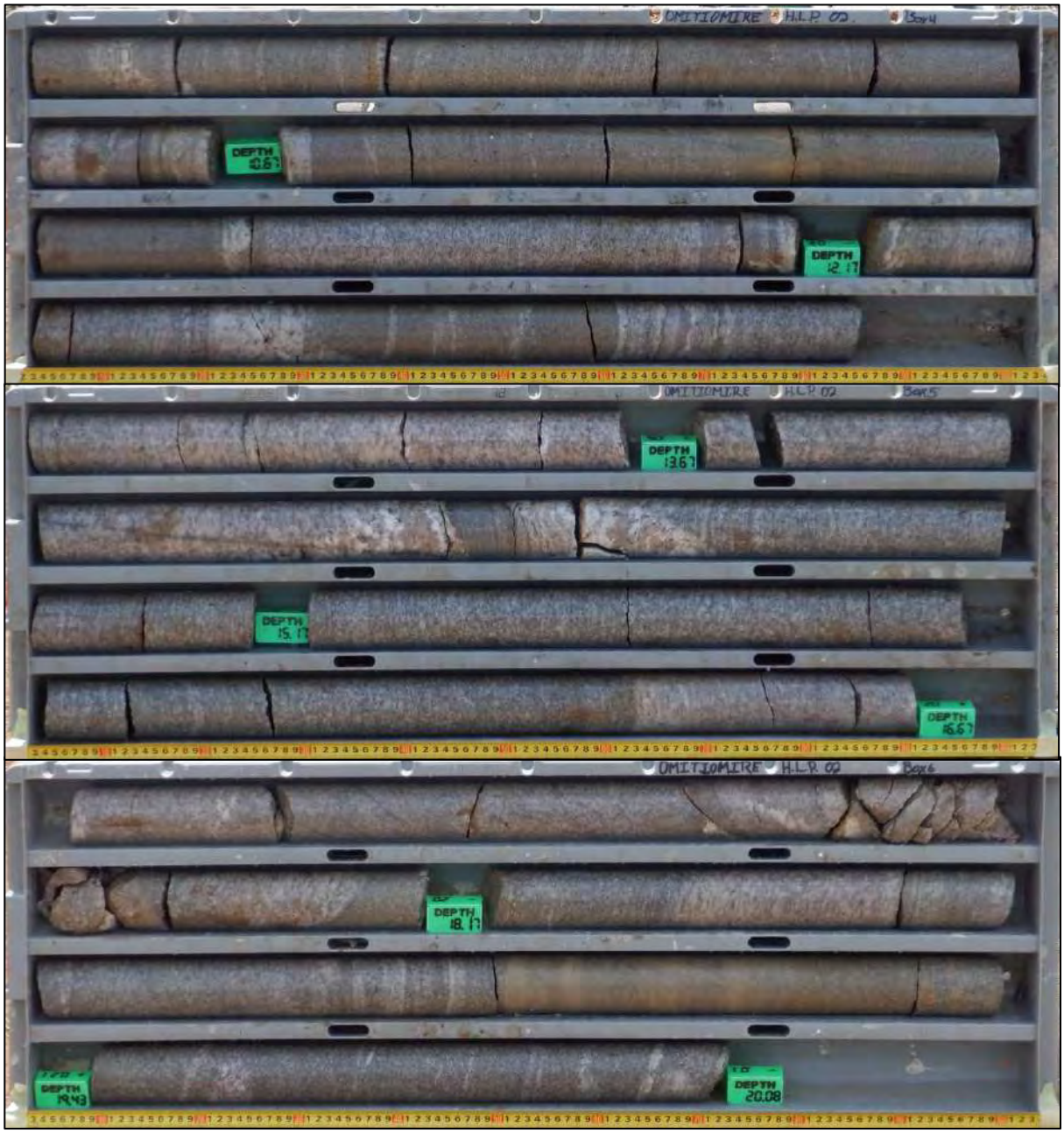



OMITIOMIRE H.L.P.01
DEPTH 12.18
OMITIOMIRE H.L.P.01
DEPTH 13.68
DEPTH 15.18
OMITIOMIRE H.L.P.01
DEPTH 17.36
DEPTH 18.18
DEPTH 19.68

**BH02-HLP**

0 – 20.08m




OMITIOMIRE H.L.P. 02 Box4
DEPTH 10.67
DEPTH 12.17
OMITIOMIRE H.L.P. 02 Box5
DEPTH 13.67
DEPTH 15.17
DEPTH 16.67
OMITIOMIRE H.L.P. 02 Box6
DEPTH 18.17
DEPTH 19.43
DEPTH 20.08

**BH03-HLP**

0 – 20.13m




OMITIOMIRE HLP03 Box 4
DEPTH 10.68
DEPTH 11.40
DEPTH 12.73
DEPTH 13.68
OMITIOMIRE HLP03 Box 5
DEPTH 15.18
DEPTH 16.65
OMITIOMIRE HLP03 Box 6
DEPTH 18.15
DEPTH 19.24
DEPTH 20.13

**BH04-HLP**

0.– 20.23m




OMITIOMIRE H.L.P 04 Box4
DEPTH 12.17
OMITIOMIRE H.L.P 04 Box5
DEPTH 13.67
DEPTH 13.20
DEPTH 16.74
OMITIOMIRE H.L.P 04 Box6
DEPTH 18.23
DEPTH 19.73
DEPTH 20.23

# PROCESSING PLANT

**BH01-Plant**

0 – 25.05m




OMITIOMIRE P.L.T 01 Box 4
DEPTH 10.65
DEPTH 12.15
OMITIOMIRE P.L.T 01 Box 5
DEPTH 13.65
DEPTH 15.15
DEPTH 16.55
OMITIOMIRE P.L.T 01 Box 6
DEPTH 18.15
DEPTH 19.65
DEPTH 21.15
OMITIOMIRE P.L.T 01
DEPTH 22.58
DEPTH 24.08
DEPTH 25.05

**BH02-Plant**

0 – 25.16m




OMITIOMIRE P.L.T.02 Box4
DEPTH 10.40
DEPTH 13.50
OMITIOMIRE P.L.T.02 Box5
DEPTH 15.21
DEPTH 5.49
OMITIOMIRE PLT02 Box6
DEPTH 17.99
DEPTH 19.49
DEPTH 20.13

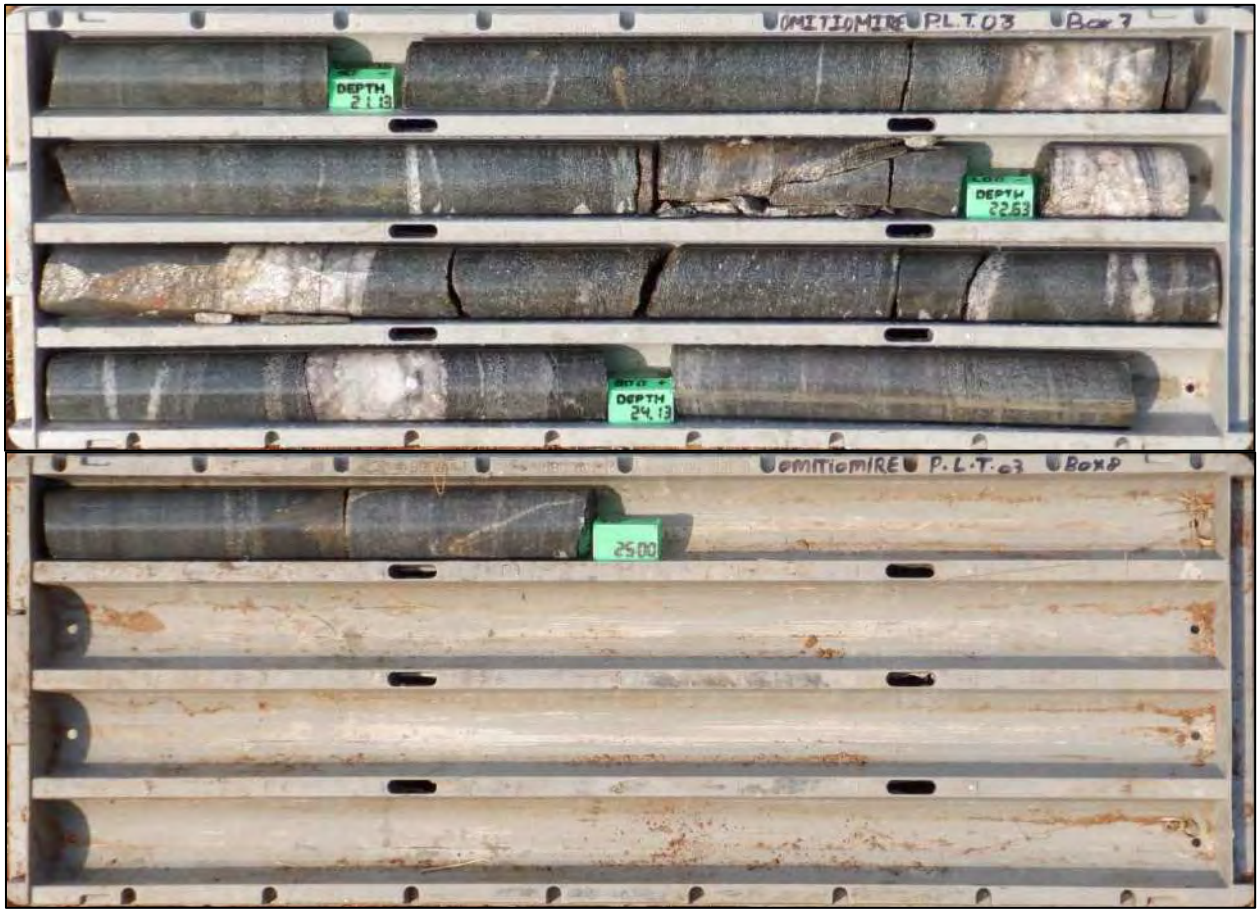

OMITIOMIRE PLT02
DEPTH 20.93
DEPTH 22.27
DEPTH 23.10
DEPTH 24.59
OMITIOMIRE PLT02
DEPTH 25.15

**BH03-Plant**

0– 25.00m




OMITIOMIRE P.L.T03 Box 4
DEPTH 10.63
DEPTH 12.13
OMITIOMIRE P.L.T03 Box 5
DEPTH 13.63
DEPTH 15.13
DEPTH 16.63
OMITIOMIRE P.L.T03 Box 6
DEPTH 12.13
DEPTH 19.63


OMITIOMIRE P.L.T.03 Box 7
DEPTH
21.8
DEPTH
22.63
DEPTH
24.13
OMITIOMIRE P.L.T.03 Box 8
25.00

**BH04 – Plant**

0 – 10.09m

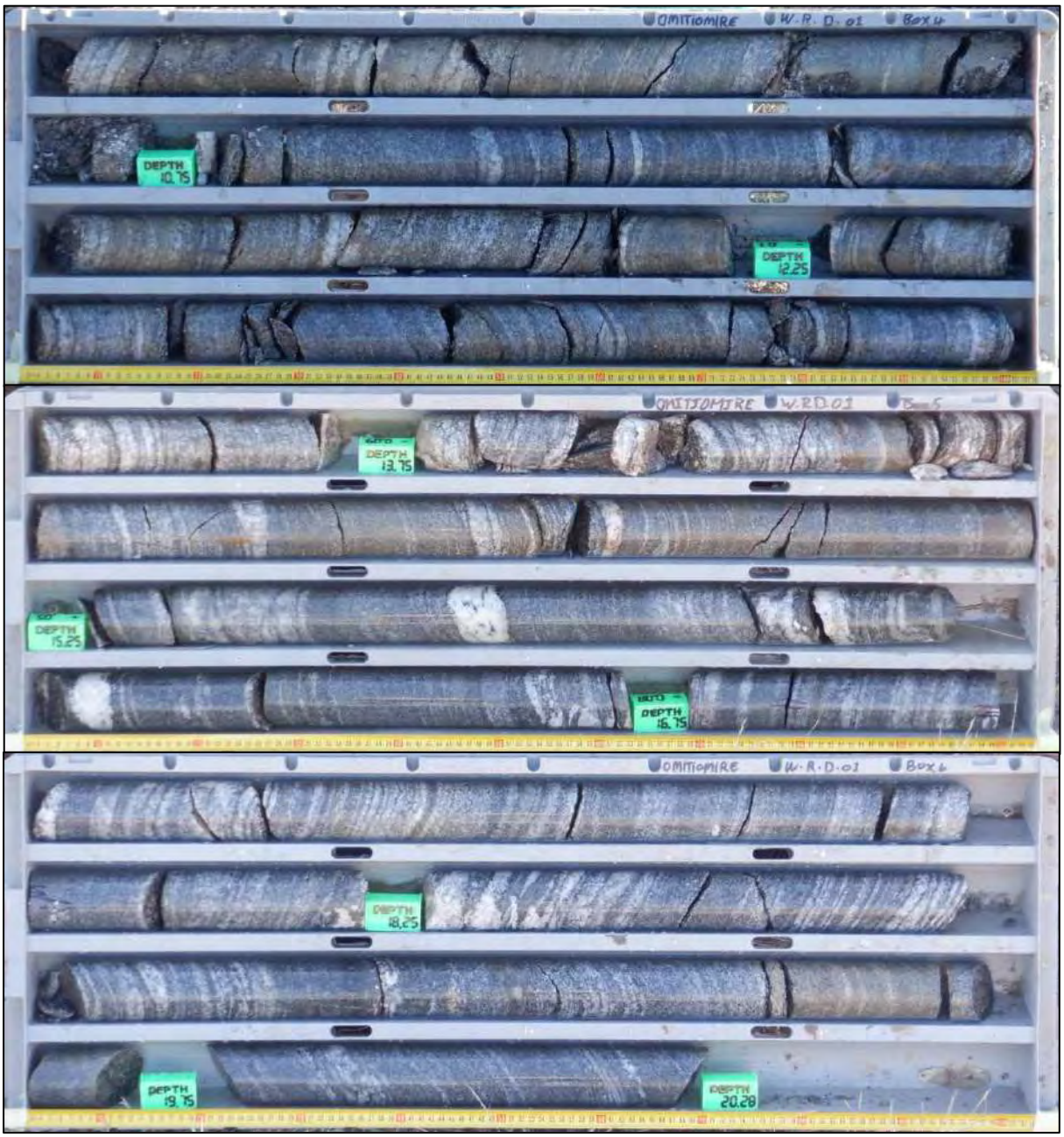


# WASTE ROCK DUMP (WRD)

**BH01-WRD**

0 – 20.28m




OMITIOMIRE W.R.D.01 Box 4
DEPTH 10.75
DEPTH 12.25
OMITIOMIRE W.R.D.01
DEPTH 13.75
DEPTH 15.25
DEPTH 16.75
OMITIOMIRE W.R.D.01 Box 6
DEPTH 18.25
DEPTH 19.75
DEPTH 20.28

# APPENDIX E

## Terminologies and Conventions used in Soil and Rock Logging

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# LIST OF BASIC SOIL DESCRIPTORS

## CHARACTERISTIC COLOUR PATTERN / FEATURE

| *Term* | *Description* |
|---|---|
| Speckled | Very small patches of colour, < 2mm. |
| Mottled | Irregular patches of colour, 2 - 6mm. |
| Blotched | Large irregular patches of colour, 6 - 20mm. |
| Banded | Approximately parallel bands of varying colour, describe thickness / spacing. |
| Streaked | Randomly oriented streaks of colour, describe thickness / spacing. |
| Stained | Local colour variations associated with discontinuity surfaces. |

## CONSISTENCY OF GRANULAR SOILS

| *Consistency* | *Description* | *Typical Dry Density ($kg/m^3$)* | *Saturated SPT Blow Counts, N* |
|---|---|---|---|
| Very loose | Crumbles easily when scraped with geological pick. | < 1450 | < 4 |
| Loose | Small resistance to penetration by sharp end of geological pick. | 1450 - 1600 | 4 - 10 |
| Medium dense | Considerable resistance to penetration by sharp end of geological pick. | 1600 - 1750 | 10 - 30 |
| Dense | Very high resistance to penetration of sharp end of geological pick, requires many blows of pick for excavation. | 1750 - 1925 | 30 - 50 |
| Very dense | High resistance to repeated blows of geological pick, requires power tools for excavation. | > 1925 | > 50 |

## CONSISTENCY OF COHESIVE SOILS

| *Consistency* | *Description* | *UCS* | *Saturated SPT Blow Counts, N* | |
|---|---|---|---|---|
| | | | Sensitive soils | Insensitive soils |
| Very soft | Pick head can easily be pushed in to the shaft of handle, easily moulded by fingers. | < 50 kPa | < 2 | < 5 |
| Soft | Easily penetrated by thumb, sharp end of pick can be pushed in 30 to 40mm, moulded with some pressure. | 50 - 125 kPa | 2 - 4 | 5 - 10 |
| Firm | Indented by thumb with effort, sharp end of pick pushed in up to 10mm, very difficult to mould with fingers, can just be penetrated with ordinary hand spade. | 125 - 250 kPa | 4 - 8 | 10 - 25 |
| Stiff | Penetrated by thumb nail, slight indentation produced by pushing pick point into soil, cannot be moulded by fingers, requires hand pick for excavation. | 250 - 500 kPa | 8 - 15 | 25 - 50 |
| Very stiff | Indented by thumb nail with difficulty, slight indentation produced by blow of pick point, requires power tools for excavation. | 0.5 - 1 MPa | 15 - 20 | 50 - 80 |

## STRUCTURE

| *Term* | *Description* |
|---|---|
| Intact | Structureless, no structure identified. |
| Fissured | Soil contains discontinuities which may be open or closed, stained or unstained, and of variable origin. |
| Slickensided | This term qualifies other terms to describe discontinuity surfaces which are smooth or glossy and possible striated. |
| Shattered | Very closely to extremely closely spaced discontinuities resulting in gravel sized soil fragments which are usually stiff to very stiff and difficult to break down through moulding by fingers. |
| Micro-shattered | As above, but sand-sized fragments. |
| Stratified / laminated / foliated / etc | These and other accepted geological terms may be used to describe sedimentary structures in transposed soils as well as relict structures in residual soils. |
| Pinhole | Pinhole-sized voids or pores (up to say 2mm) which may require a hand lens to identify. |
| Honeycombed | Similar to pinhole but voids and pores > 2mm, pore size may be specified in mm. |
| Matrix-supported | Clasts supported by matrix. |
| Clast-supported | Clasts touching, matrix may or may not be present. |

## PARTICLE SIZE CLASSES (MIT CLASSIFICATION)

| *Grain size (mm)* | *Classification* | *Field Identification* |
|---|---|---|
| < 0.002 | Clay | Feels sticky or soapy, soils hands, shiny when wet. |
| 0.002 - 0.06 | Silt | Chalky feel on teeth, when dry rubs off hands, dilatent. |
| 0.06 - 0.2 | Fine sand | Gritty feel on teeth. |
| 0.2 - 0.6 | Medium sand | Observed with naked eye. |
| 0.6 - 2 | Coarse sand | Observed with naked eye. |
| 2 - 6 | Fine gravel | Observed with naked eye. |
| 6 - 20 | Medium gravel | Observed with naked eye. |
| 20 - 60 | Coarse gravel | Observed with naked eye. |
| 60 - 200 | Cobbles | Observed with naked eye. |
| > 200 | Boulders | Observed with naked eye. |

## ORIGINS OF TRANSPORTED SOILS IN SOUTHERN AFRICA

| *Origin* | *Agency of Transportation* | *Problems that can be Expected* |
|---|---|---|
| Littoral and mobile dune sands | Waves, current and tides | Collapsible fabric; instability of dredged marine deposit excavations; high soluble salt content; variable carbonate cementation. |
| Estuarine and deltaic | Tidal rivers depositing into saline water | Compressibility; variability; sensitivity; quick sand; high soluble salt content. |
| Talus (coarse colluvium) | Gravity | Slope instability. |
| Silty or clayey hillwash (fine colluvium) | Sheetwash | Expansive characteristics; compressibility; dispersive characteristics. |
| Aeolian deposits | Wind | Collapsible fabric; mobile (dunes); poor compaction characteristics. |
| Sandy soils of mixed origin | Sheetwash, wind, termites | Collapsible fabric; dispersive characteristics; compressibility, subject to flooding. |
| Alluvium | Streams | Expansive characteristics; dispersive characteristics; compressibility, subject to flooding. |
| Lacustrine | Streams depositing in lakes, pans or vleis | Compressibility; expansive characteristics; high soluble salt content. |

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# LIST OF BASIC ROCK DESCRIPTORS

## CHARACTERISTIC COLOUR PATTERN / FEATURE

| *Term* | *Description* |
|---|---|
| Speckled | Very small patches of colour, < 2mm. |
| Mottled | Irregular patches of colour, 2 - 6mm. |
| Blotched | Large irregular patches of colour, 6 - 20mm. |
| Banded | Approximately parallel bands of varying colour, describe thickness / spacing. |
| Streaked | Randomly oriented streaks of colour, describe thickness / spacing. |
| Stained | Local colour variations associated with discontinuity surfaces. |

## GRAIN SIZE

| *Abbreviation* | *Description* | *Size (mm)* | *Explanatory notes* |
|---|---|---|---|
| vFG | Very fine grained | < 0.2 | Individual grains cannot be seen with a hand lens (x10 magnification). |
| FG | Fine grained | 0.2 - 0.6 | Grains not visible to the naked eye, visible as individual grains under hand lens. |
| MG | Medium grained | 0.6 - 2.0 | Grains clearly visible under hand lens, just visible to the naked eye. |
| CG | Coarse grained | 2.0 - 6.0 | Grains clearly visible to the naked eye. |
| vCG | Very coarse grained | > 6.0 | Grains measurable. |

## FABRIC TYPE

| *Abbreviation* | *Description* |
|---|---|
| BAF | Banded |
| BF | Bedded |
| CF | Cleaved |
| FBF | Flow banded |
| FF | Foliated |
| GF | Gneissic |
| LF | Laminated |
| MF | Massive |
| SF | Schistose |

## FABRIC SPACING

| *Abbreviation* | *Description* | *Spacing* |
|---|---|---|
| VTF | Very thickly | > 2m |
| TF | Thickly | 0.6 - 2m |
| MEF | Medium | 0.2 - 0.6m |
| HF | Thinly | 60mm - 0.2m |
| VHF | Very thinly | 20 - 60mm |
| IF | Intensely | 6 - 20mm |
| VIF | Very intensely | < 6mm |

## DEGREE OF WEATHERING

| *Abbreviation* | *Description* | *Extent of Intact Rock Discoloration* | *Fracture Condition* | *Fracture Surface Characteristics* | *Original Texture* | *Grain Boundary Condition* |
|---|---|---|---|---|---|---|
| UW | Unweathered / fresh | None | Closed or discoloured | Unchanged or may be stained | Preserved | Tight |
| SW | Slightly weathered | < 20% of fracture spacing on both sides of fracture | May contain thin filling of altered material | Stained or partial discoloration | Preserved | Tight |
| MW | Moderately weathered | > 20% of fracture spacing on both sides of fracture | May contain filling of altered material | Partial to complete discoloration, not friable except in poorly cemented rocks | Preserved | Partial opening |
| HW | Highly weathered | Throughout | - | Friable and usually pitted | Mainly preserved | Partial separation |
| CW | Completely weathered | Throughout | - | Resembles a soil | Partly preserved | Complete separation |

## ROCK HARDNESS FIELD CLASSIFICATION

| *Abbreviation* | *Description* | *Range of UCS (MPa)* | *Explanatory notes* |
|---|---|---|---|
| Soil | - | < 1 | Soil description in terms of ***M***oisture / ***C***olour / ***C***onsistency / ***S***tructure / ***S***oil Type / ***O***rigin / ***O***ther Features / ***W***ater. |
| ESR | Extremely soft | 0.25 - 1.0 | Indented by thumbnail (should also be described as a soil on log sheet). |
| VSR | Very soft | 1 - 3 | Crumbles under firm blows with sharp end of geological pick, can be pared/peeled with a knife. |
| SR | Soft | 3 - 10 | Shallow indentations of 2 to 4mm under firm blows with sharp end of geological pick, can just be scraped with a knife. |
| MHR | Medium hard | 10 - 25 | Handheld specimen breaks / fractures with firm blow of geological pick, specimen cannot be scraped or pared with a knife. |
| HR | Hard | 25 - 70 | Handheld specimen requires more than one blow with geological pick before breaking / fracturing. |
| VHR | Very hard | 70 - 200 | Specimen requires many blows with geological pick before breaking / fracturing. |
| EHR | Extremely hard | > 200 | Specimen can only be chipped under firm blows of geological hammer. |

## JOINT SPACING

| *Abbreviation* | *Description for Joints, Faults or Other Fractures* | *Spacing* |
|---|---|---|
| EWJ | Extremely widely | > 6m |
| VWJ | Very widely | > 2m / 2 - 6m |
| WJ | Widely | 0.6 - 2m |
| MJ | Moderately | 0.2 - 0.6m |
| CJ | Closely | 60mm - 0.2m |
| VCJ | Very closely | 20 - 60mm |
| ECJ | Extremely closely | < 20mm |

## JOINT MICRO-ROUGHNESS

| *Abbreviation* | *Description* | |
|---|---|---|
| SLJ | Slickensided | |
| SJ | Smooth | |
| RJ | Rough | |

## JOINT MICRO-SHAPE

**(i.t.o. surface expression over < 100mm length)**

| *Abbreviation* | *Description* |
|---|---|
| CUR | Curvilinear |
| PLA | Planar |
| UND | Undulating |
| STE | Stepped |
| IRR | Irregular |

## INFILL THICKNESS

| *Abbreviation* | *Description* | *Infill Thickness* |
|---|---|---|
| CT | Closed | 0mm |
| VT | Very tight | 0 - 0.1mm |
| T | Tight | 0.1 - 0.25mm |
| PO | Partly open | 0.25 - 0.5mm |
| O | Open | 0.5 - 2.5mm |
| MW | Moderately wide | 2.5 - 10mm |
| W | Wide | 10 - 25mm |
| VW | Very wide | 25mm - 10cm |
| EW | Extremely wide | 10cm - 1m |
| C | Cavernous | > 1m |

**Notes :**

If more than 25mm, give actual thickness.

If more than 25mm, append photo(s).

## INFILL TYPE

| *Abbreviation* | *Description* | *Explanatory notes* |
|---|---|---|
| NF | None | |
| STF | Staining only | |
| *Non-softening sheared material, e.g. calcite* | | |
| NFF | Fine | |
| NMF | Medium | |
| NCF | Coarse | |
| *Soft sheared material, e.g. talc* | | |
| SFF | Fine | |
| SMF | Medium | |
| SCF | Coarse | |
| *Gouge description (if* | | |
| TG | Thick gouge | Gouge thickness < amplitude |
| VTG | Very thick gouge | Gouge thickness > amplitude of irregularities |

**Unified Soil Classification System Descriptors (Hazelton & Murphy, 2007)**

| USCS Group | Group Descriptor |
|---|---|
| **GW** | Well-graded gravels, gravel-sand mixtures, little or no fines. |
| **GP** | Poorly graded gravels, gravel-sand mixtures, little or no fines. |
| **GM** | Silty gravels, poorly graded gravel-sand-silt mixtures. |
| **GC** | Clayey gravels, poorly graded gravel-sand-clay mixtures. |
| **SW** | Well-graded sands, gravelly sands, little or no fines. |
| **SP** | Poorly graded sands, gravelly sands, little or no fines. |
| **SM** | Silty sands, poorly graded sand-silt mixtures. |
| **SC** | Clayey sands, poorly graded sand-clay mixtures. |
| **ML** | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with slight plasticity. |
| **CL** | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays. |
| **OL** | Organic silts and organic silt-clays of low plasticity. |
| **MH** | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts. |
| **CH** | Inorganic clays of high plasticity, fat clays. |
| **OH** | Organic clays of medium to high plasticity. |
| **PT** | Peat and other highly organic soils. |

**AASHTO Classification System Descriptors (ASTM D3282-15, 2019)**

| AASHTO Group | General Material Classification | % passing 2.00 mm | % passing 0.425 mm | % passing 0.075 mm | Liquid Limit (LL) | Plasticity Index (PI) | Significant Constituents | Rating as Subgrade |
|---|---|---|---|---|---|---|---|---|
| **A-1-a** | Granular | ≤ 50% | ≤ 30% | ≤ 15% | - | ≤ 6 | Stone fragments, gravel and sand | Excellent to good |
| **A-1-b** | Granular | - | ≤ 50% | ≤ 25% | - | ≤ 6 | Stone fragments, gravel and sand | Excellent to good |
| **A-3** | Granular | - | ≥ 51% | ≤ 10% | - | N.P. | Fine sand | Excellent to good |
| **A-2-4** | Granular | - | - | ≤ 35% | ≤ 40 | ≤ 10 | Silty or clayey gravel and sand | Excellent to good |
| **A-2-5** | Granular | - | - | ≤ 35% | ≥ 41 | ≤ 10 | Silty or clayey gravel and sand | Excellent to good |
| **A-2-6** | Granular | - | - | ≤ 35% | ≤ 40 | ≥ 11 | Silty or clayey gravel and sand | Excellent to good |
| **A-2-7** | Granular | - | - | ≤ 35% | ≥ 41 | ≥ 11 | Silty or clayey gravel and sand | Excellent to good |
| **A-4** | Silt-Clay | - | - | ≥ 36% | ≤ 40 | ≤ 10 | Silty soils | Fair to poor |
| **A-5** | Silt-Clay | - | - | ≥ 36% | ≥ 41 | ≤ 10 | Silty soils | Fair to poor |
| **A-6** | Silt-Clay | - | - | ≥ 36% | ≤ 40 | ≥ 11 | Clayey soils | Fair to poor |
| **A-7-5** | Silt-Clay | - | - | ≥ 36% | ≥ 41 | ≥ 11 | Clayey soils | Fair to poor |
| **A-7-6** | Silt-Clay | - | - | ≥ 36% | ≥ 41 | ≥ 11 | Clayey soils | Fair to poor |

***Notes:***

*1. PI of subgroup A-7-5 is less or equal than the LL – 30.*

*2. PI of subgroup A-7-6 is greater than the LL – 30.*

*3. N.P. – Non-plastic.*

# APPENDIX F

## Geophysical Testing Report

**GREGORY SYMONS GEOPHYSICS**

**23 Schanzen St**

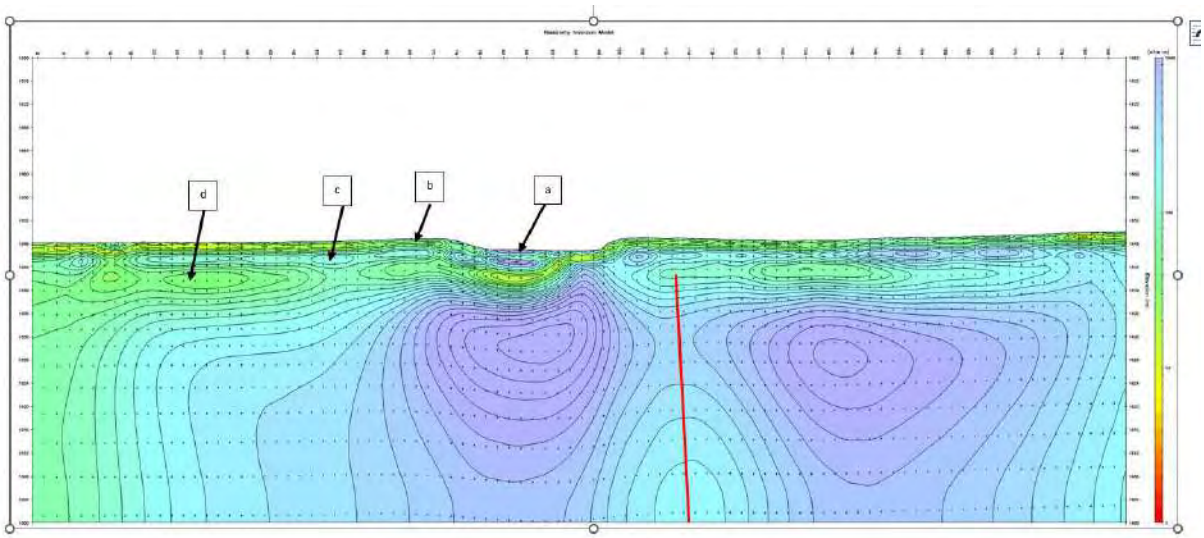
**Klein Windhoek, Namibia**

**P.O. Box 90438, Klein Windhoek, Namibia**

**Tel +264-(0)61-225292** **Cell +264-(0)81-1280030**

**Fax +264-(0)61-225317** **e-mail: gsymons@geonamibia.net**

# Field and Interpretational Report: Electrical Resistivity Tomography Survey undertaken for Knight Piésold Consulting.




*Electrical Resistivity Tomography (ERT) results from Line 9 at Omitiomire. The overburden can be divided into a, a sandy horizon in channel, b, a clayey horizon in floodplain and c, a sandy horizon in floodplain. Horizon d is interpreted as weathered basement. Vertical faulting is marked by the red line which appears to be underneath the horizontal Kalahari overburden layers within the basement.*

**Report Prepared for** Knight Piésold Consulting.
**Report Prepared by:** D-J Adams and G Symons
**Gregory Symons Geophysics**
**March 2023**

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**Appendix 1: Electrical Resistivity Tomography 2D Inversion Sections.**
**Appendix 2: Data Archive**

# 1. Introduction

This report summarizes details of the Electrical Resistivity Tomography (ERT) survey conducted for Knight Piésold Consulting by Gregory Symons Geophysics (GSG) at Omitiomire, northwest of Gobabis, in Omaheke region, Namibia.

The client requested 13 lines for the survey, which we completed over 14 days. Using the above-mentioned geophysical method, we surveyed the 13 lines as indicated on the location map (Figure 1) below. The survey started on the 3rd of March 2023, and we completed it on the 14th of March, 2023. In the report folder with this report is a comprehensive time sheet in Excel.

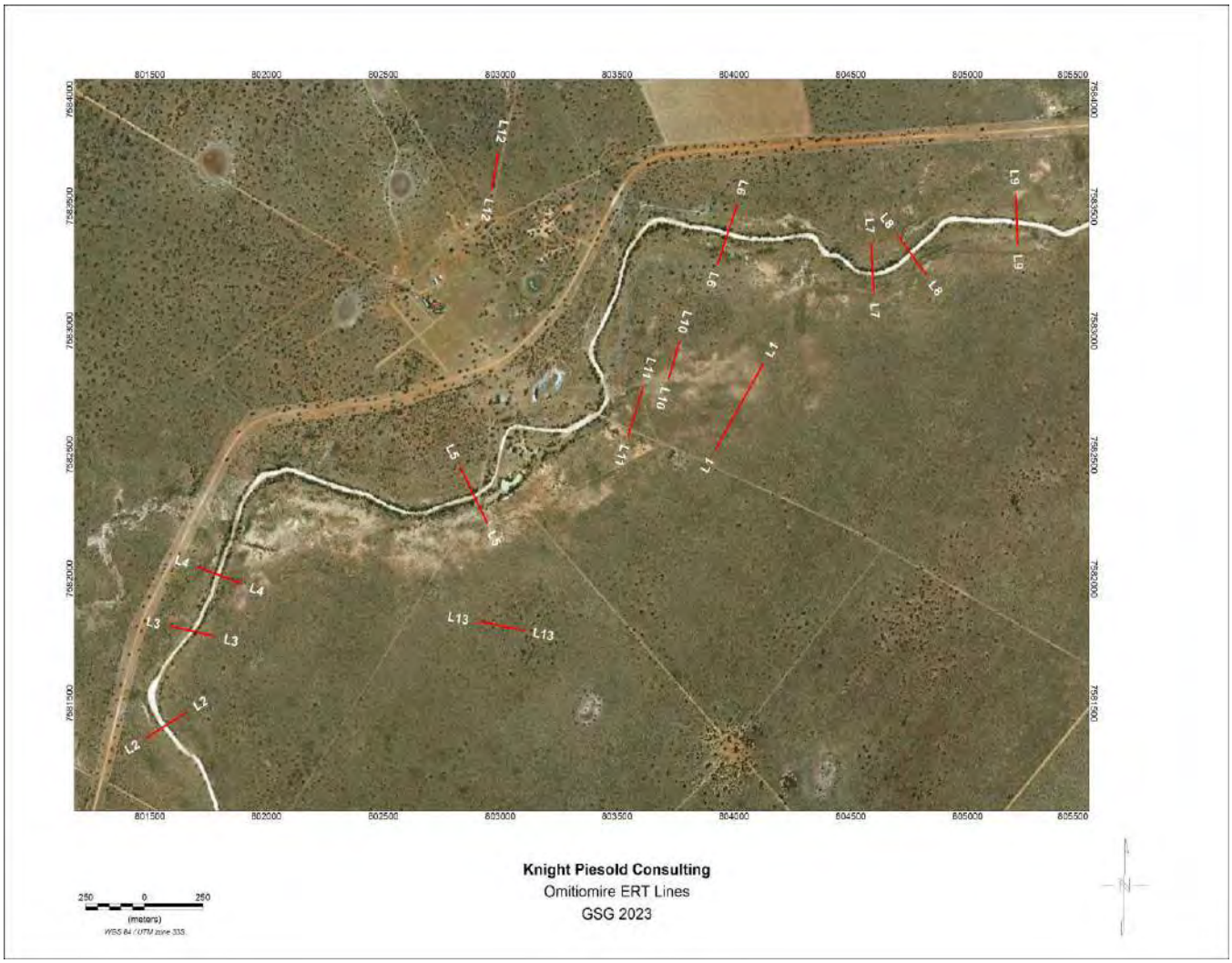



***Figure 1**: A map showing the thirteen ERT lines surveyed at Omitiomire.*

# 2. Electrical Resistivity Tomography Method

In the Electrical Resistivity Tomography (ERT) method, we inject a current (AB) into the ground and measure a voltage (MN). From this, we can derive a resistivity at a certain point below the surface. In Figure 2 below we show the relationship between AB and MN and the plotting point for the resistivity below the surface.

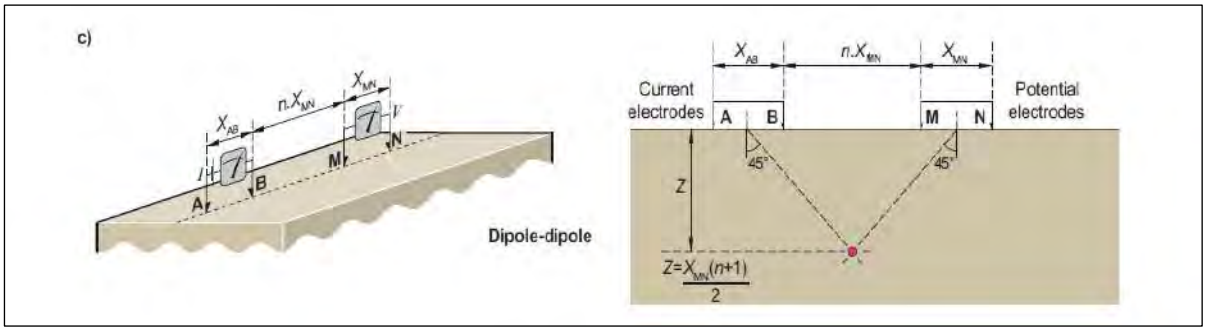



***Figure 2**: Diagram showing AB injection electrode, MN measurement electrodes and the plotting point.*

By arranging 96 electrodes spaced regularly along a line, we can select different combinations of AB and MN to generate numerous subsurface plotting points, as indicated in Figure 3 below. In this example, we have the 96 electrodes spaced 5 m apart, generating 1031 subsurface resistivity measurements.

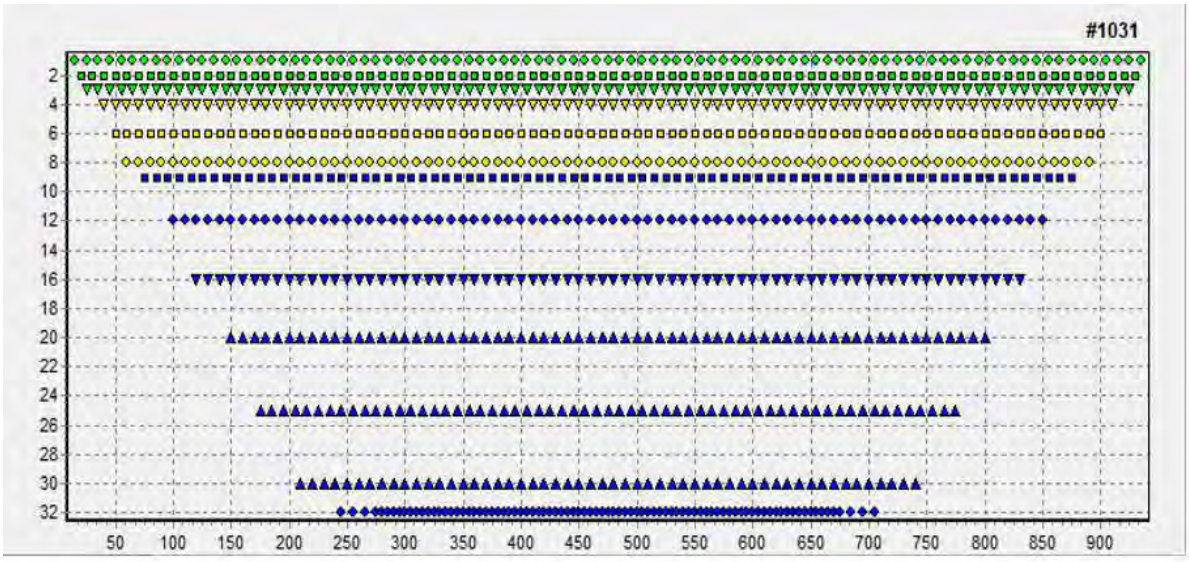



***Figure 3:** Diagram showing the multiplicity of ERT resistivity measurements below a 1km (960m) line section using 96 electrodes and 5 m station spacing.*

Traditional dipole-dipole measurements would typically yield only about 200 subsurface measurements. With the ERT and the additional 5-fold increase in subsurface data, we can:

- Model overburden and shallow features well.
- Detect vertical features below overburden such as faults and fractures.

- Have a better depth of investigation than traditional dipole-dipole measurements due large AB/MN offsets.

# 3. Equipment and Personnel

## 3.1 Equipment

- DGPS Trimble R2 System,
- Syscal R2 resistivity system, comprising the R2 Syscal receiver, battery powered transmitter, multiplexer box and all related wires and electrodes.
- Two double cab bakkies and a land cruiser.

## 3.2 Personnel

- David-John Adams, Phillip Nauyoma, Hilton Stern, and Cecil Murangi with field assistants for data acquisition,
- Gregory Symons, Neville Brown, and David-John Adams (Geophysicists) for data processing, reporting, client liaison and QC.

# 4. Surveys Specifications, Data Reduction and Processing

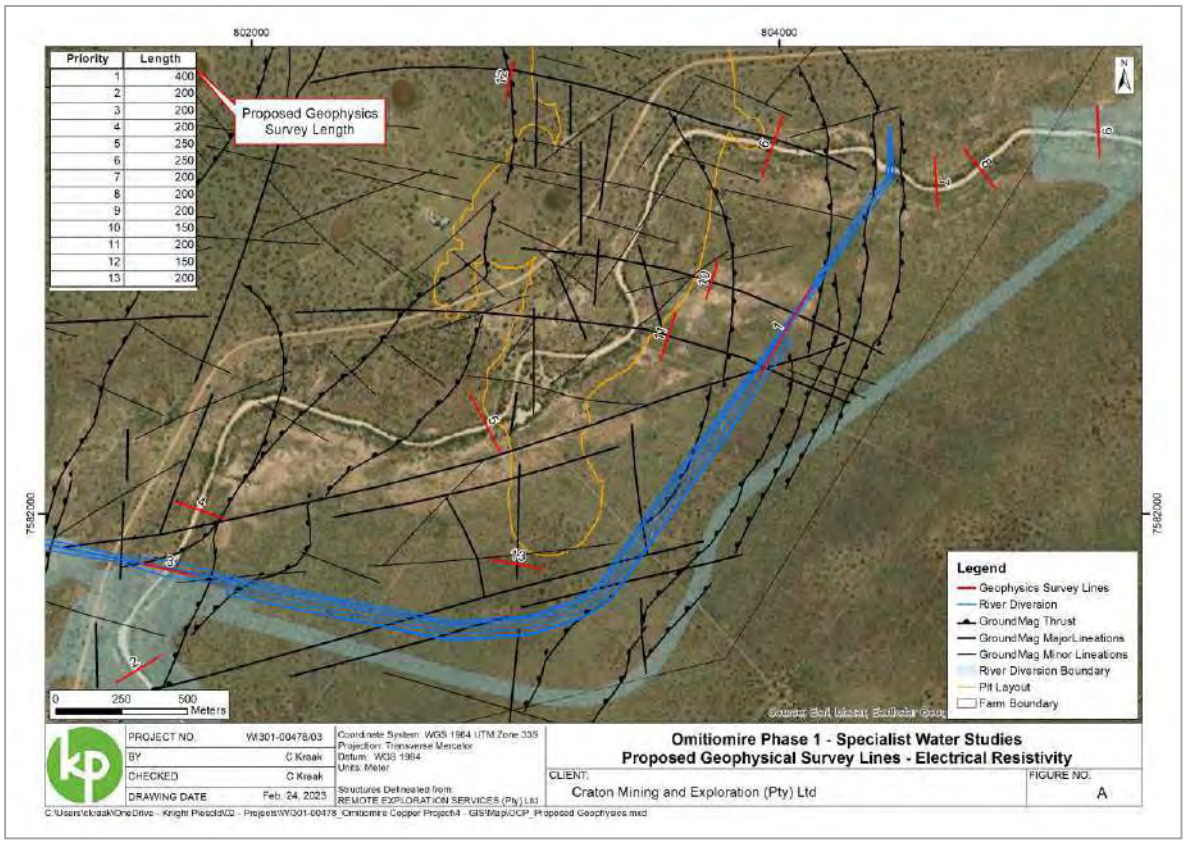



***Figure 4**: Map Showing position of Lines relative to pit outline, faulting derived from Aeromagnetic Interpretation, and position of current and possible future channel/s to the river.*

The survey was collected using the following parameters:

- Station Spacings: 2m on all lines except for Lines 5 and 6 where 3 m was used. We also collected repeat data on Line 1 at a 4 m dipole spacing.
- Line lengths: 400, 250, 200, 150 m.
- Number of Electrodes: 96 electrodes.
- Number of Multi-node boxes: 6 of which each had 16 electrodes connected to it and one connecter cable that connects each box to the resistivity meter.
- The data was processed with the Iris Software (ProsysII) to examine the pseudo section in the field and to convert the data in a suitable format (*.dat).
- The data was then imported to software provided by ZONGE where invalid data was pruned, DGPS data coordinates and elevations were merged with the resistivity data, and a resistivity depth inversion section produced. In Appendix 1, the resistivity depth inversions are presented with the measured and calculated pseudo-sections.

# 5. Interpretation

The inverted resistivity depth section shows the following features:

- A maximum of 3 overburden layers are observed. This stratigraphy is defined as (a) a top sandy resistive layer, followed by (b), a conductive clay bearing layer and (c) a deeper resistive sandy layer.
- Below this overburn we consistently appear to find weathered conductive basement which changes at depth to resistive fresh rock.
- In places we see vertical to sub-vertical conductive features in the weathered and fresh basement indicative of vertical faulting. The vertical faulting appears to not penetrate the overburden. Clear faulting is indicated in red while more tentative faulting is indicted in black.
- Figure 4 above shows a structural interpretation of the area based on an aeromagnetic interpretation. Thrust faults are purported to be bringing in the Cu mineralization and are typically “old” (late Damaran 480-500 My). We would not expect to see these faults in the resistivity data and in general this is the case with the current resistivity data set. Vertical faulting in a N/S and E/W direction is related to Cretaceous and late Karroo tectonics which appears to be detected by the resistivity as conductive water bearing faults and fractures. Overburden is Kalahari aged with no or little evidence of faulting. The resistive layers may be related to windblown Kalahari. The conductive overburden layer appears to be associated with the Nossob River and could be related to flood events where the Nossob River has overflown its banks and deposited more clay like lithologies on the flood plain.

In Figures 5 to 17 below, the above interpretation scheme is implemented onto each of the resistivity lines.

**Interpretation of Individual Lines**

Resistivity Depth Sections are presented below. The following features are highlighted:

- Overburden stratigraphy as defined into units belonging to the Kalahari a) sandy, b) clayey, c) sandy.
- Weathered basement d).
- Faulting divided into clear faulting (red) and tentative faulting (black).

**Line1**, spacing = 4m, length = 400m

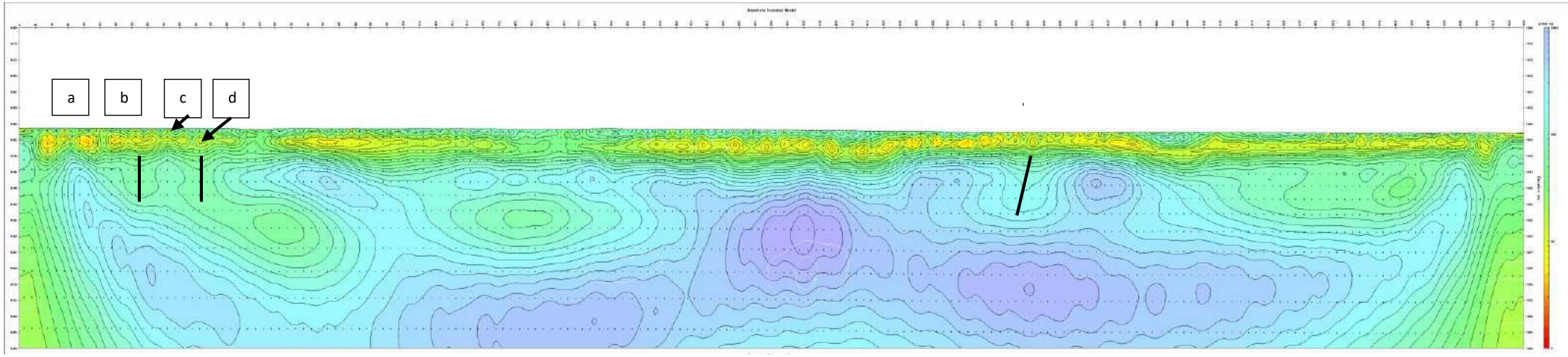



***Figure 5:*** Showing

Faulting at stations: 32 (1), 48 (1), and 256 (1)

Weathered and Overburden units (d) and (c) present.

**Line2**, spacing = 2m, length = 200m

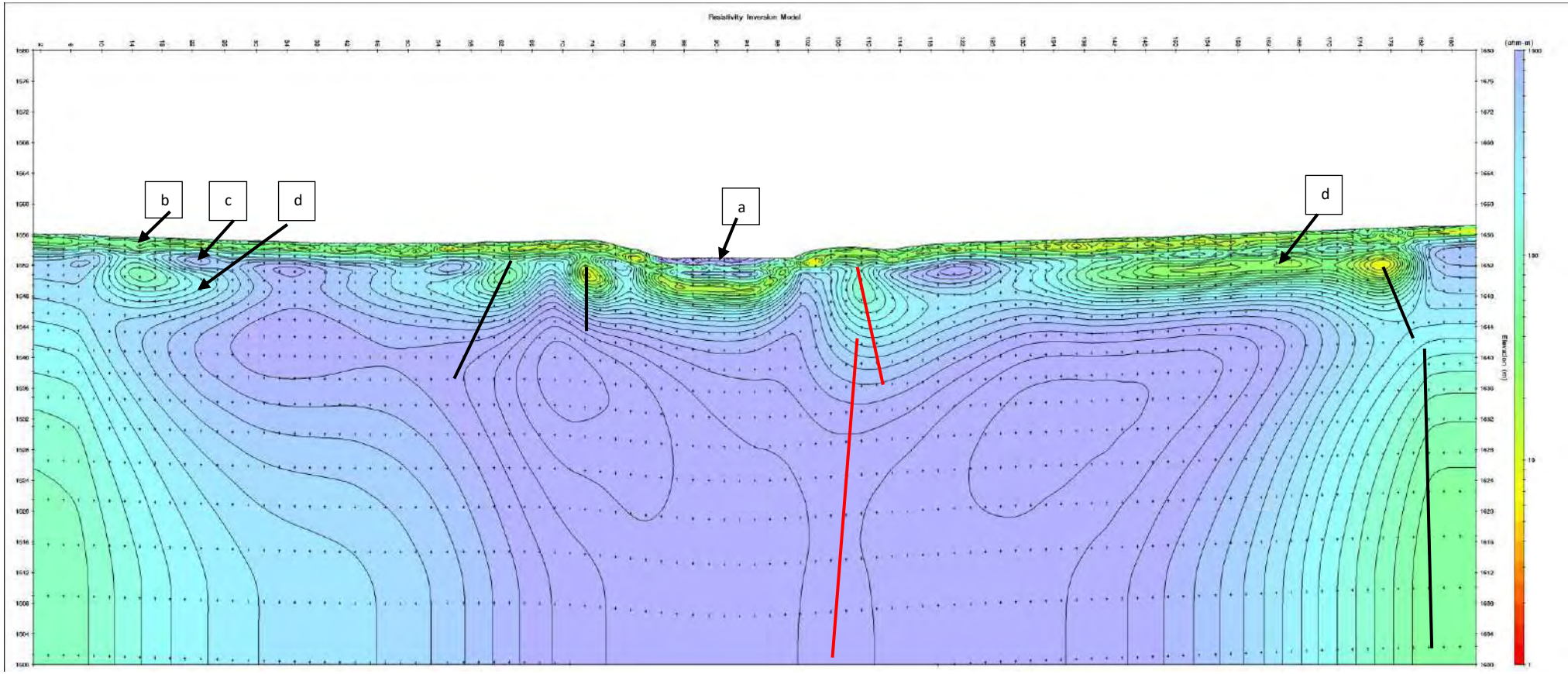



***Figure 6:*** Showing

Faulting at stations: 62(1), 72(1), 110(2), 178(1)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line3**, spacing = 2m, length = 200m

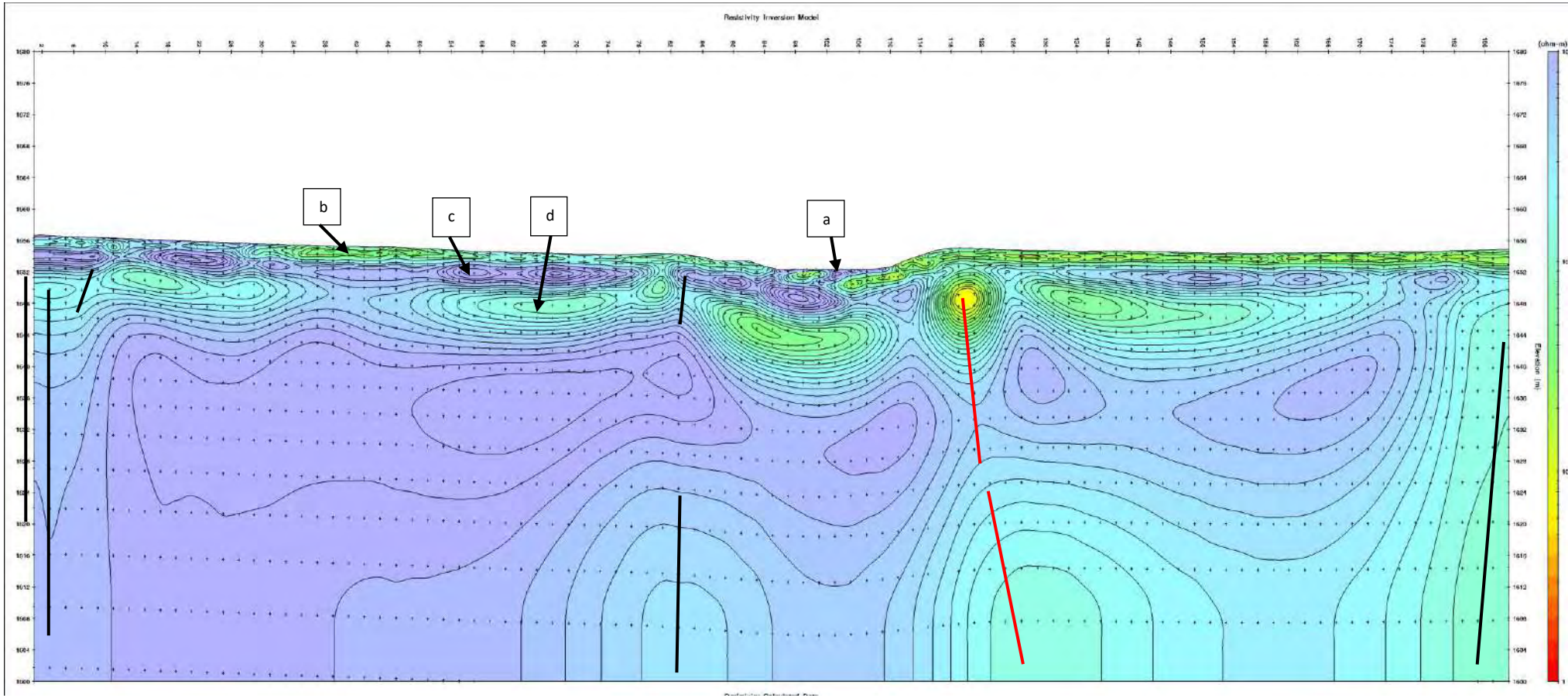



***Figure 7:*** Showing

Faulting at stations: 6(1), 82(1), 120(2), 188(1)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line4**, spacing = 2m, length = 200m

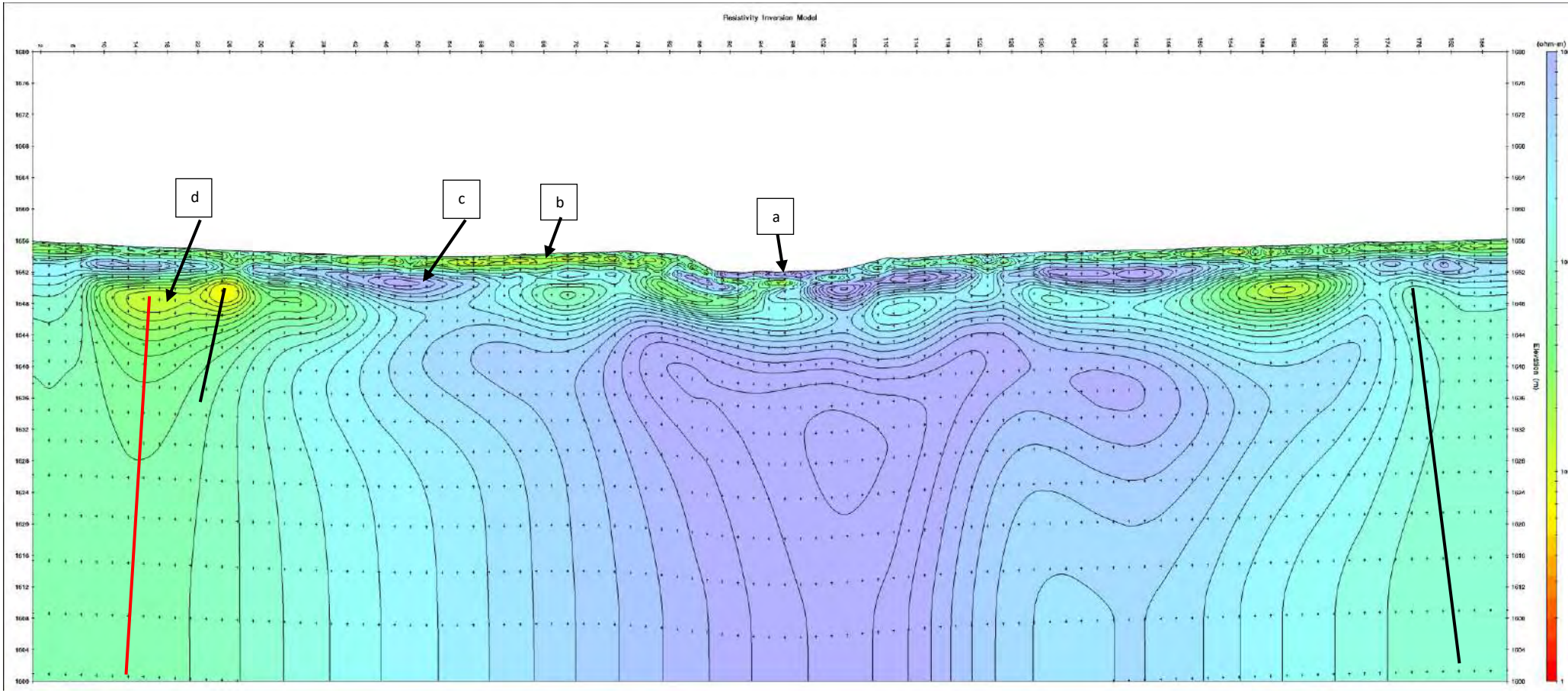



***Figure 8***: Showing

Faulting at stations: 14(2), 22(1), 178(1)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line5**, spacing = 3m, length = 250m

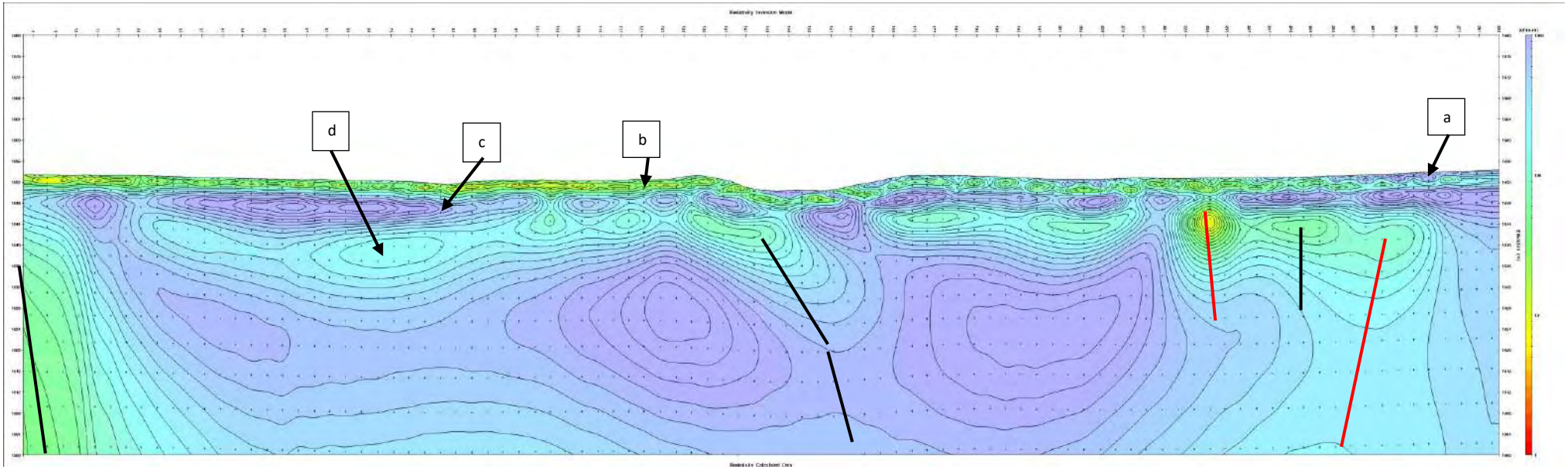



***Figure 9:*** Showing

Faulting at stations: 5(1), 143(1), 229(2), 247(1), 262(2)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line6**, spacing = 3m, length = 250m

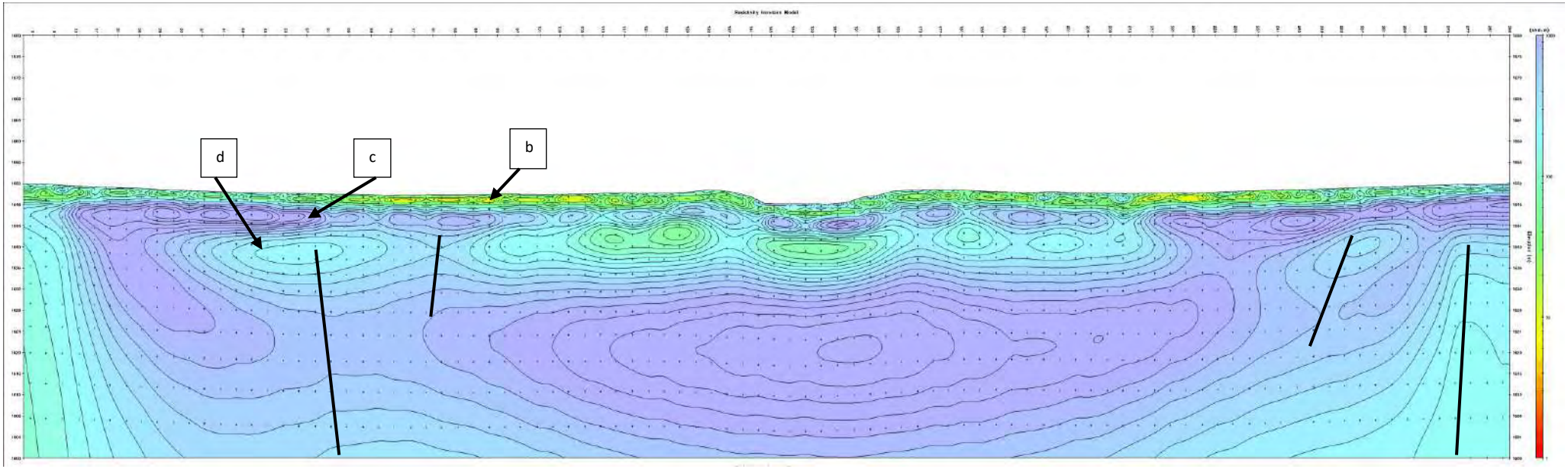



***Figure 10:*** Showing

Faulting at stations: 57(1), 81(1), 253(1), 277(1)

Weathered and Overburden units (d), (c), and (b) present.

**Line7**, spacing = 2m, length = 200m

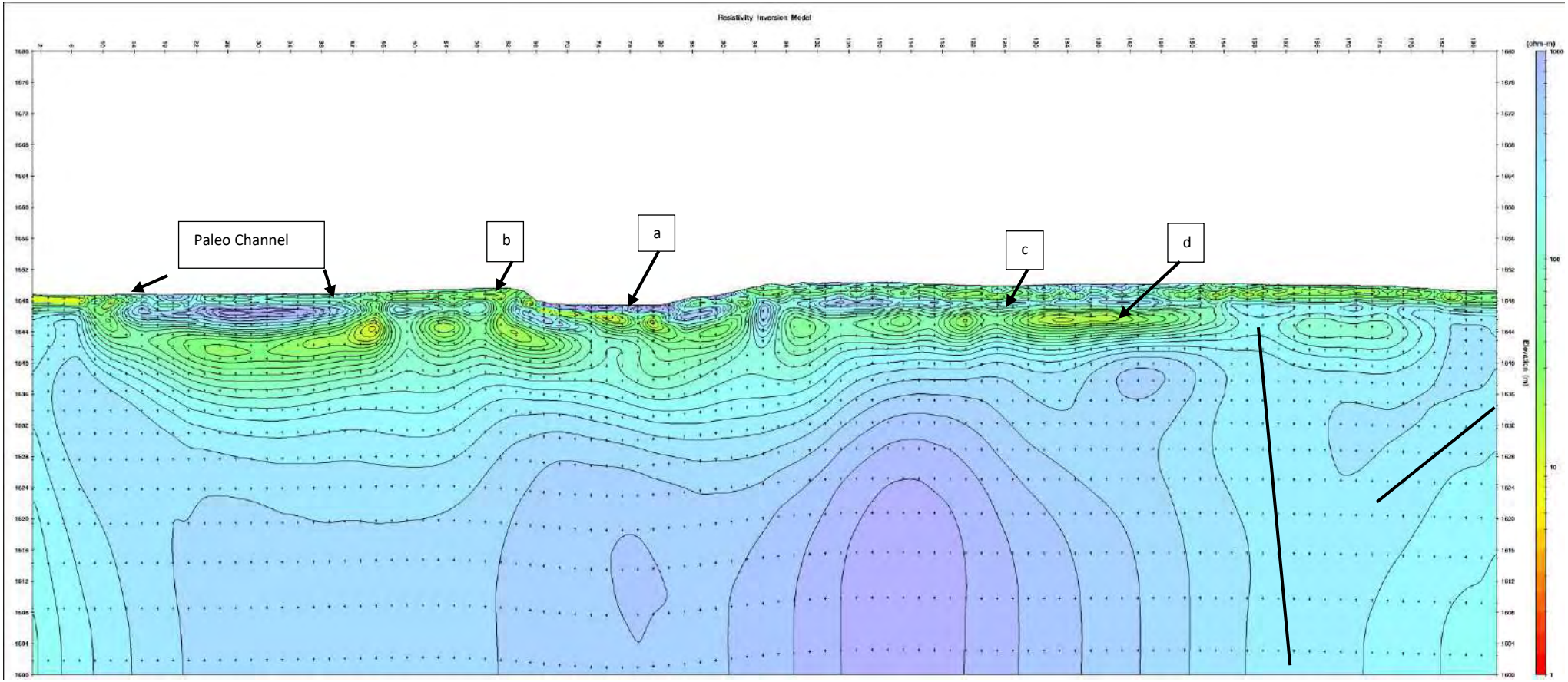



***Figure 11:*** Showing

Faulting at stations: 157 (1)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line8**, spacing = 2m, length = 200m

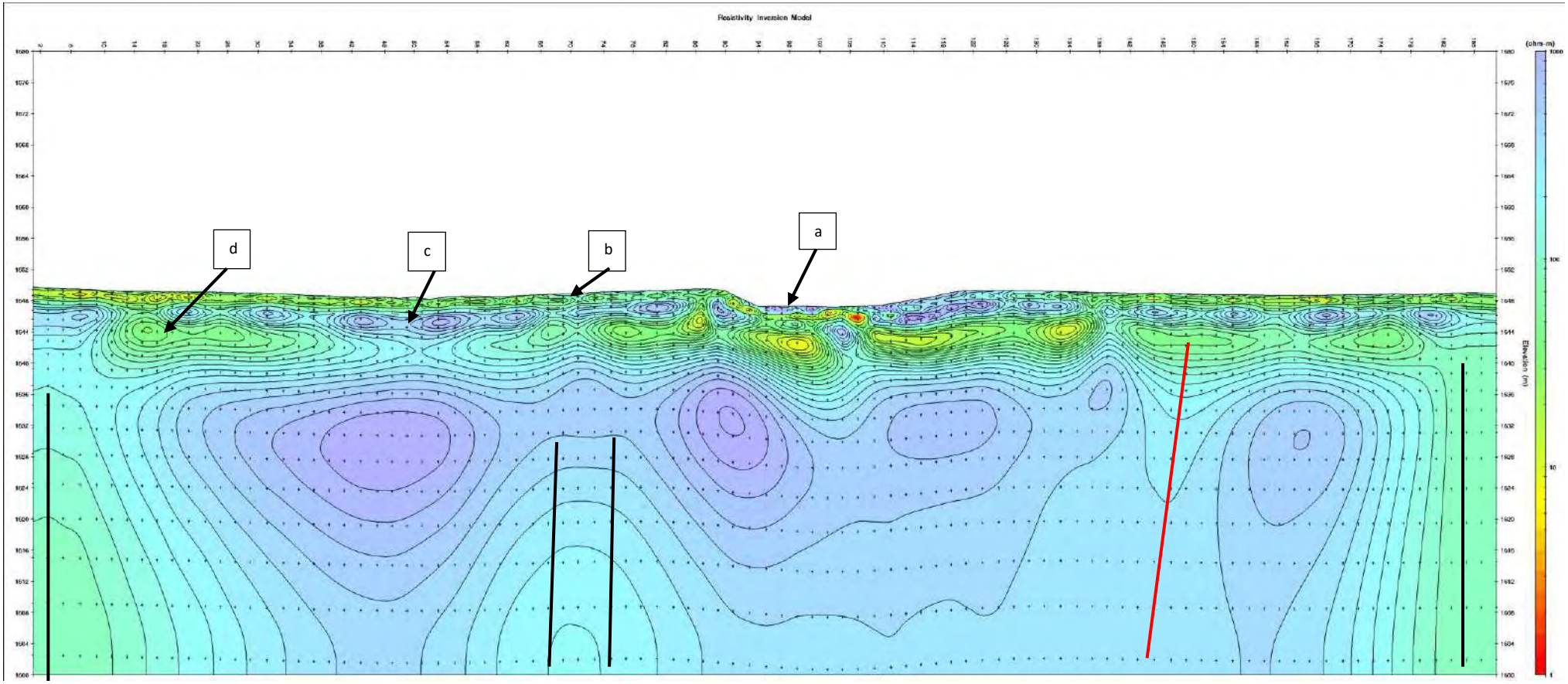



***Figure 12:*** Showing

Faulting at stations: 3 (1), 68 (1), 74 (1), 148 (2), 184(1)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line9**, spacing = 2m, length = 200m

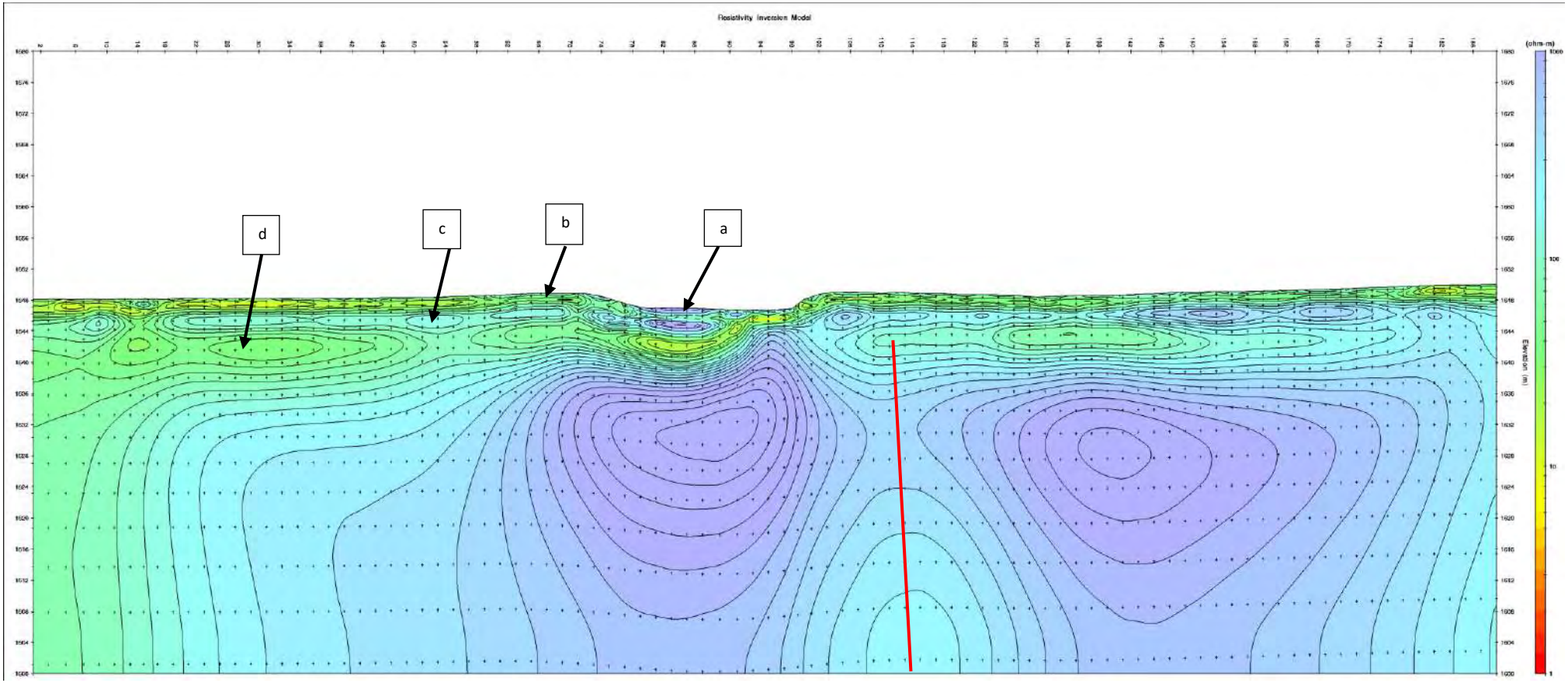



***Figure 13:*** Showing

Faulting at stations: 110(2)

Weathered and Overburden units (d), (c), (b) and (a) present.

**Line10**, spacing = 2m, length = 150m

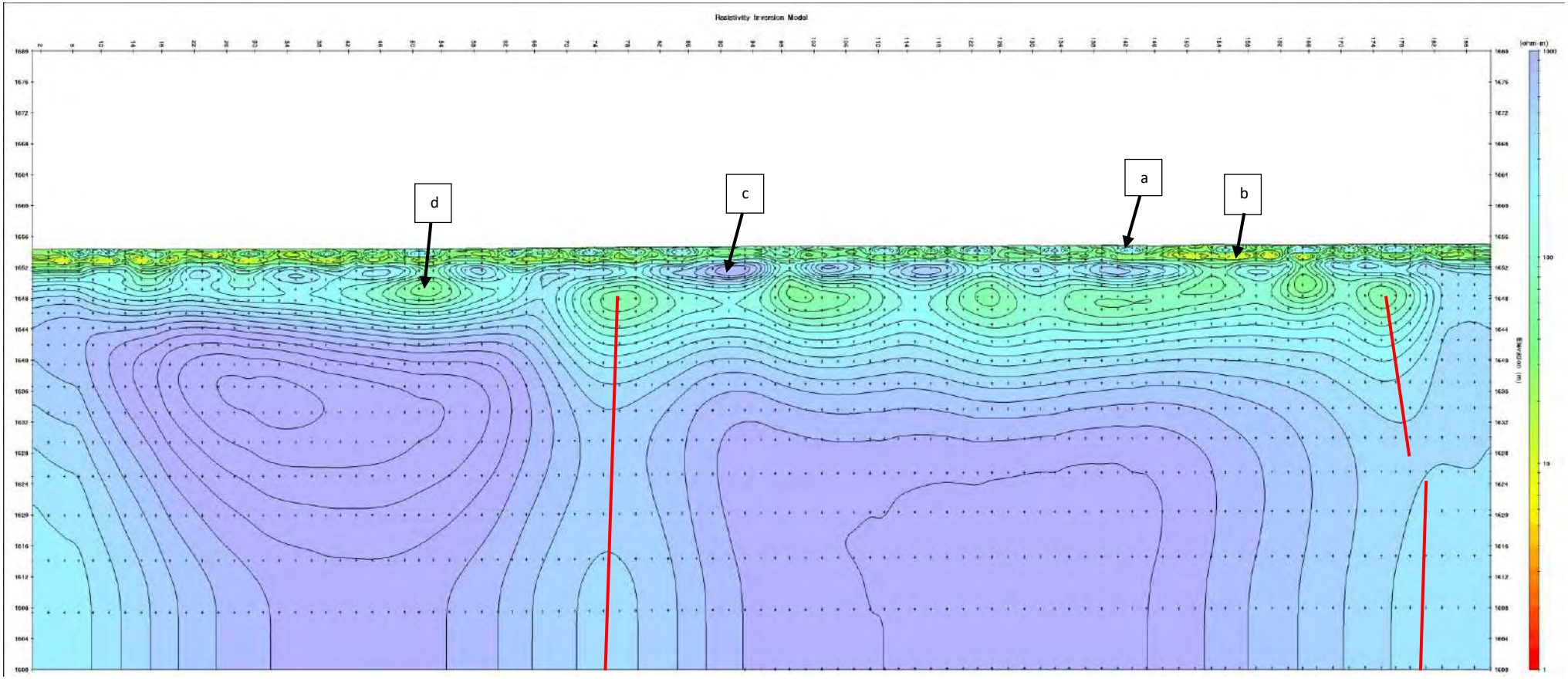



***Figure 14:*** Showing

Faulting at stations: 77(2), 176(2)

Weathered and Overburden units (d), (c), and (a) present.

**Line11**, spacing = 2m, length = 200m

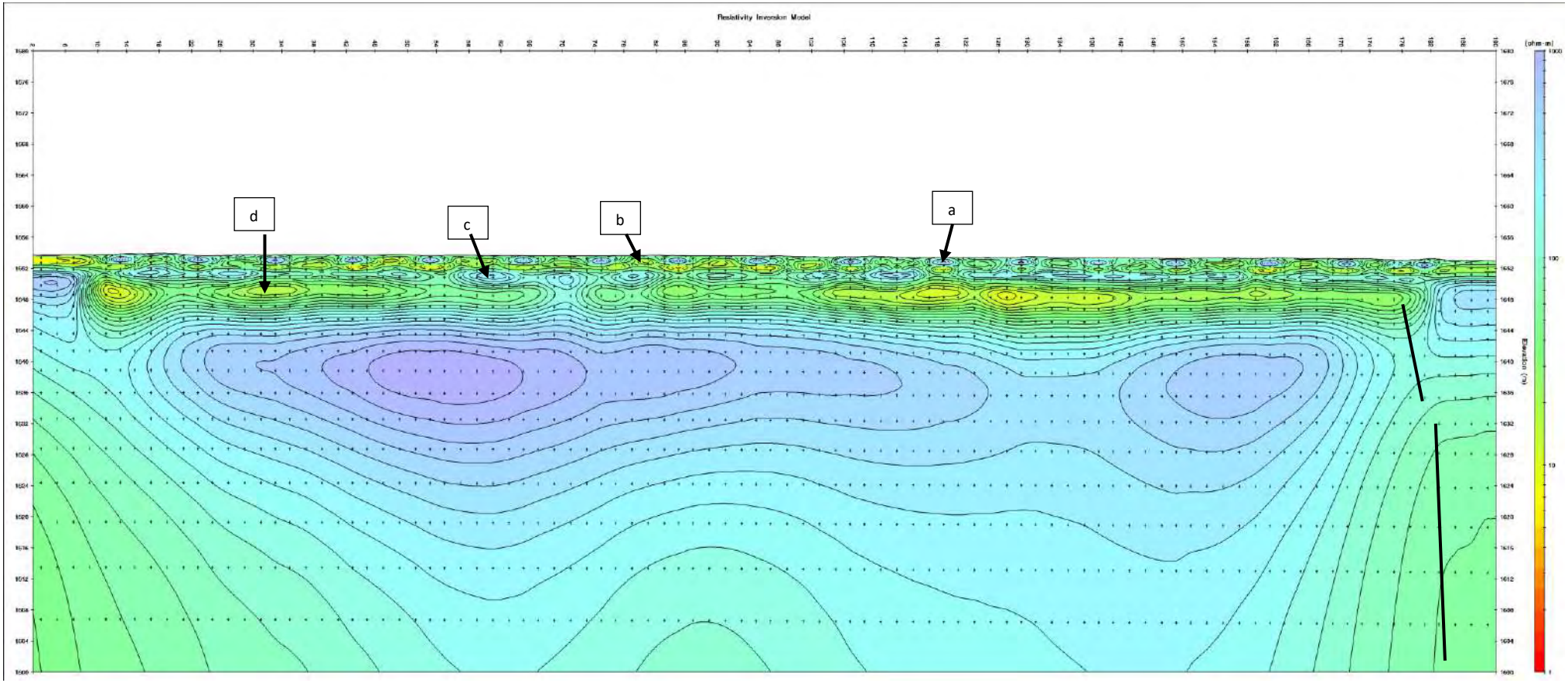



***Figure 15:*** Showing

Faulting at stations: 178(1)

Weathered and Overburden units (d), (c), and (a) present.

**Line12**, spacing = 2m, length = 150m

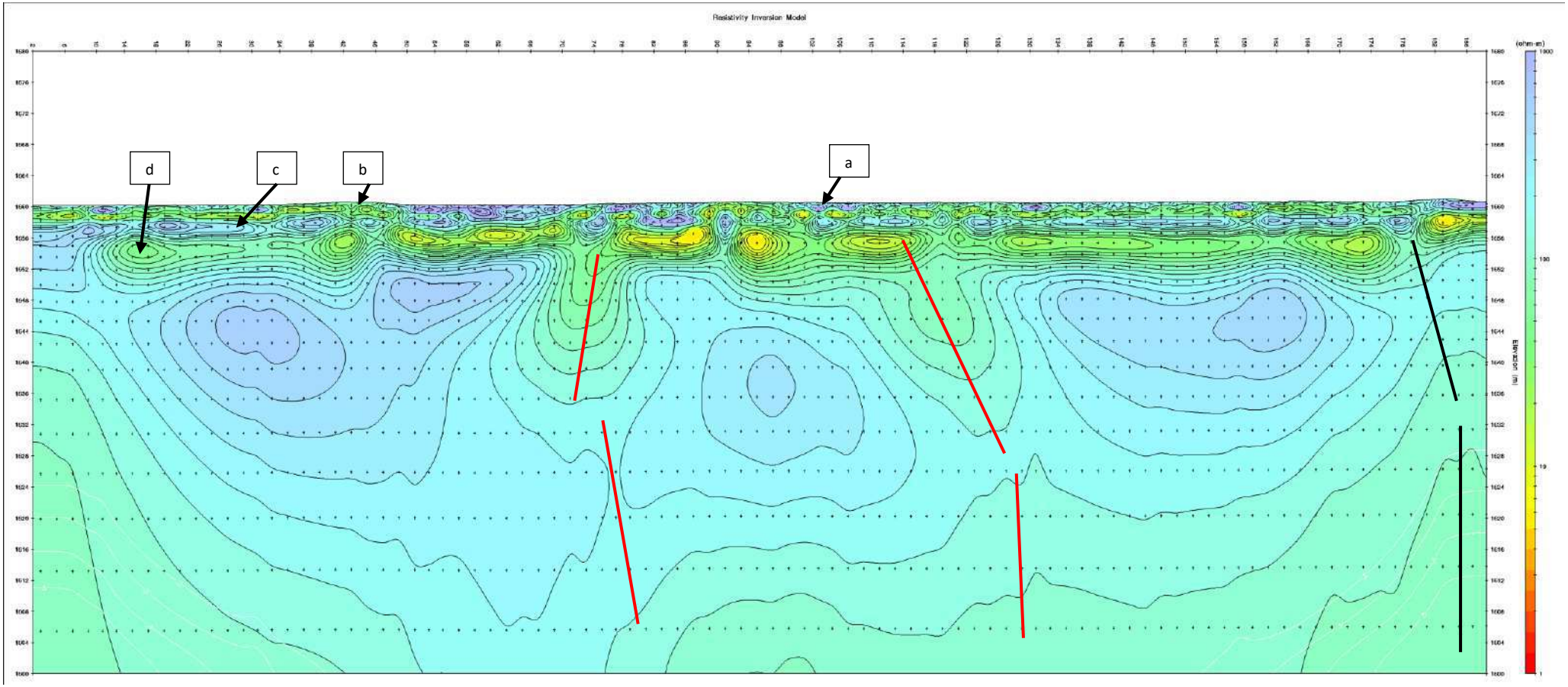



***Figure 16***: Showing

Faulting at stations: 74(2), 114(2), 178(1)

Weathered and Overburden units (d), (c), and (a) present.

**Line13**, spacing = 2m, length = 200m

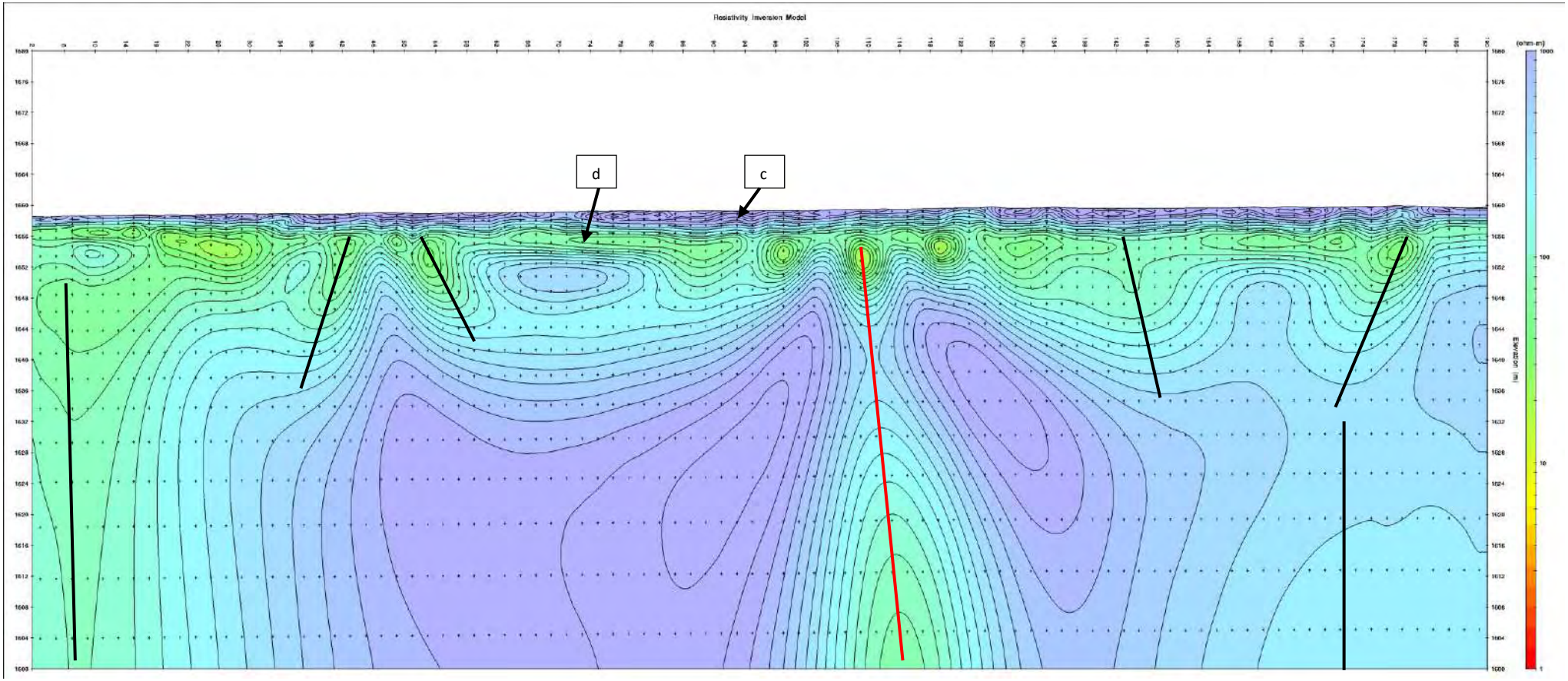



***Figure 17:*** Showing

Faulting at stations: 6(1), 42(1), 52(1), 108(2), 142(1), 180(1)

Weathered and Overburden units (d) and (c) present.

In Figure 18 below we show the interpreted faults from the resistivity data overlain onto the aeromagnetic fault interpretation.

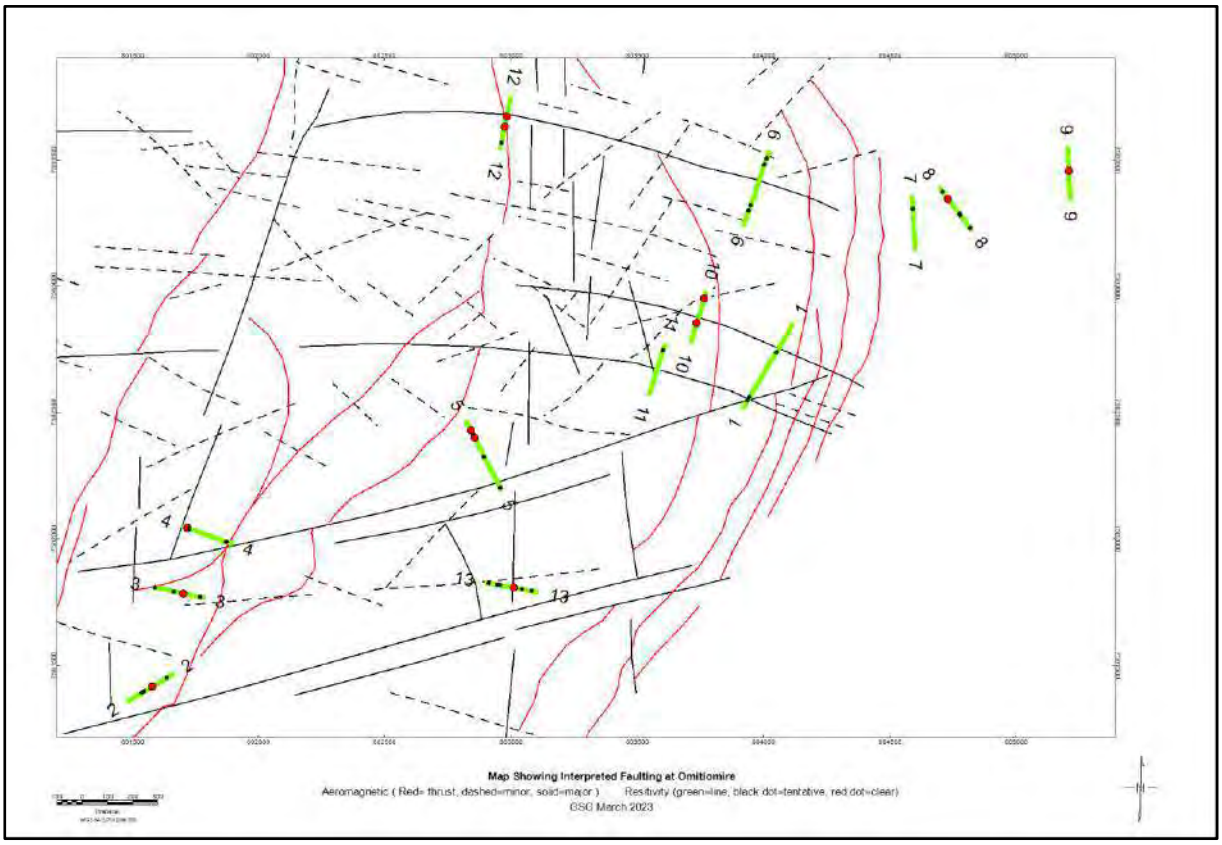



***Figure 18:*** *This Figure shows the resistivity lines in green with interpreted faults (red dot = clear fault, black dot = tentative fault) overlain onto aeromagnetic lineaments and faults.*

Table 1 below details the top position of all faults interpreted above.

**Table1 Giving Position and Classification of Faults (2= clear, 1= tentative)**

| Line | Line | Station | Easting | Northing | Elevation | Mark |
|---|---|---|---|---|---|---|
| L1 | 1 | 32 | 803935.714 | 7582548.374 | 1654.881 | 1 |
| L1 | 1 | 48 | 803943.655 | 7582562.251 | 1654.811 | 1 |
| L1 | 1 | 256 | 804051.586 | 7582740.021 | 1653.922 | 1 |
| L2 | 2 | 62 | 801537.401 | 7581392.809 | 1655.018 | 1 |
| L2 | 2 | 72 | 801545.994 | 7581398.061 | 1655.332 | 1 |
| L2 | 2 | 110 | 801578.469 | 7581417.581 | 1654.217 | 2 |
| L2 | 2 | 178 | 801636.920 | 7581452.683 | 1656.891 | 1 |
| L3 | 3 | 6 | 801590.365 | 7581809.515 | 1656.473 | 1 |
| L3 | 3 | 82 | 801664.492 | 7581793.448 | 1654.292 | 1 |
| L3 | 3 | 120 | 801701.212 | 7581785.456 | 1655.011 | 2 |
| L3 | 3 | 188 | 801767.768 | 7581771.843 | 1654.851 | 1 |
| L4 | 4 | 14 | 801718.221 | 7582043.958 | 1655.256 | 2 |
| L4 | 4 | 22 | 801725.668 | 7582041.312 | 1655.007 | 1 |
| L4 | 4 | 178 | 801871.949 | 7581988.970 | 1655.831 | 1 |
| L5 | 5 | 6 | 802956.323 | 7582203.160 | 1653.391 | 1 |

| Line | Line | Station | Easting | Northing | Elevation | Mark |
|---|---|---|---|---|---|---|
| L5 | 5 | 144 | 802892.140 | 7582325.361 | 1650.425 | 1 |
| L5 | 5 | 228 | 802855.418 | 7582400.767 | 1652.807 | 2 |
| L5 | 5 | 246 | 802847.442 | 7582416.943 | 1652.960 | 1 |
| L5 | 5 | 261 | 802840.451 | 7582430.191 | 1653.488 | 2 |
| L7 | 7 | 156 | 804590.057 | 7583306.515 | 1650.193 | 1 |
| L8 | 8 | 4 | 804817.748 | 7583230.576 | 1649.570 | 1 |
| L8 | 8 | 68 | 804778.943 | 7583281.525 | 1648.801 | 1 |
| L8 | 8 | 74 | 804775.455 | 7583286.338 | 1649.106 | 1 |
| L8 | 8 | 148 | 804730.517 | 7583344.823 | 1648.917 | 2 |
| L8 | 8 | 184 | 804708.645 | 7583373.431 | 1648.977 | 1 |
| L9 | 9 | 110 | 805209.109 | 7583456.612 | 1648.842 | 2 |
| L10 | 10 | 76 | 803735.145 | 7582856.130 | 1654.578 | 2 |
| L10 | 10 | 176 | 803765.165 | 7582951.791 | 1655.019 | 2 |
| L11 | 11 | 178 | 803601.863 | 7582746.873 | 1653.049 | 1 |
| L13 | 13 | 6 | 802909.977 | 7581827.520 | 1658.585 | 1 |
| L13 | 13 | 42 | 802945.444 | 7581821.024 | 1658.838 | 1 |
| L13 | 13 | 52 | 802955.332 | 7581819.224 | 1658.942 | 1 |
| L13 | 13 | 108 | 803010.498 | 7581809.196 | 1659.442 | 2 |
| L13 | 13 | 142 | 803043.997 | 7581803.238 | 1659.598 | 1 |
| L13 | 13 | 180 | 803081.411 | 7581796.278 | 1659.881 | 1 |

# 6. Conclusions and recommendations

***Conclusions***

- Faults interpreted form the ERT resistivity sections indicated in red are confidently interpretated as faults or fractures that may contain or transport water.
- In the top 0-8m we see a clear Kalahari stratigraphy consisting of windblown or reiver sediment. The stratigraphic succession is an upper resistive sandy layer, a middle conductive clayey layer, and a lower resistive sandy layer.
- Basement rocks below the overlying Kalahari appear to be weathered in places and more conductive.
- The Kalahari succession in this area appears to be influenced by episodic flooding of the Nossob River into its flood plain.

***Recommendations***

- Faults marked in red are recommended as possible candidates that may carry or conduct ground water.
- When planning a pit, shallow Kalahari conductive and more clayey sediments should be borne in mind as a potential mining hazard. As this is a very shallow unit, earth moving machinery may get bogged down during rainy periods where these sediments are present. Secondly this material although shallow may show a tendency to collapse into the pit during rainy periods. Care is advised in pit and pit access road planning.

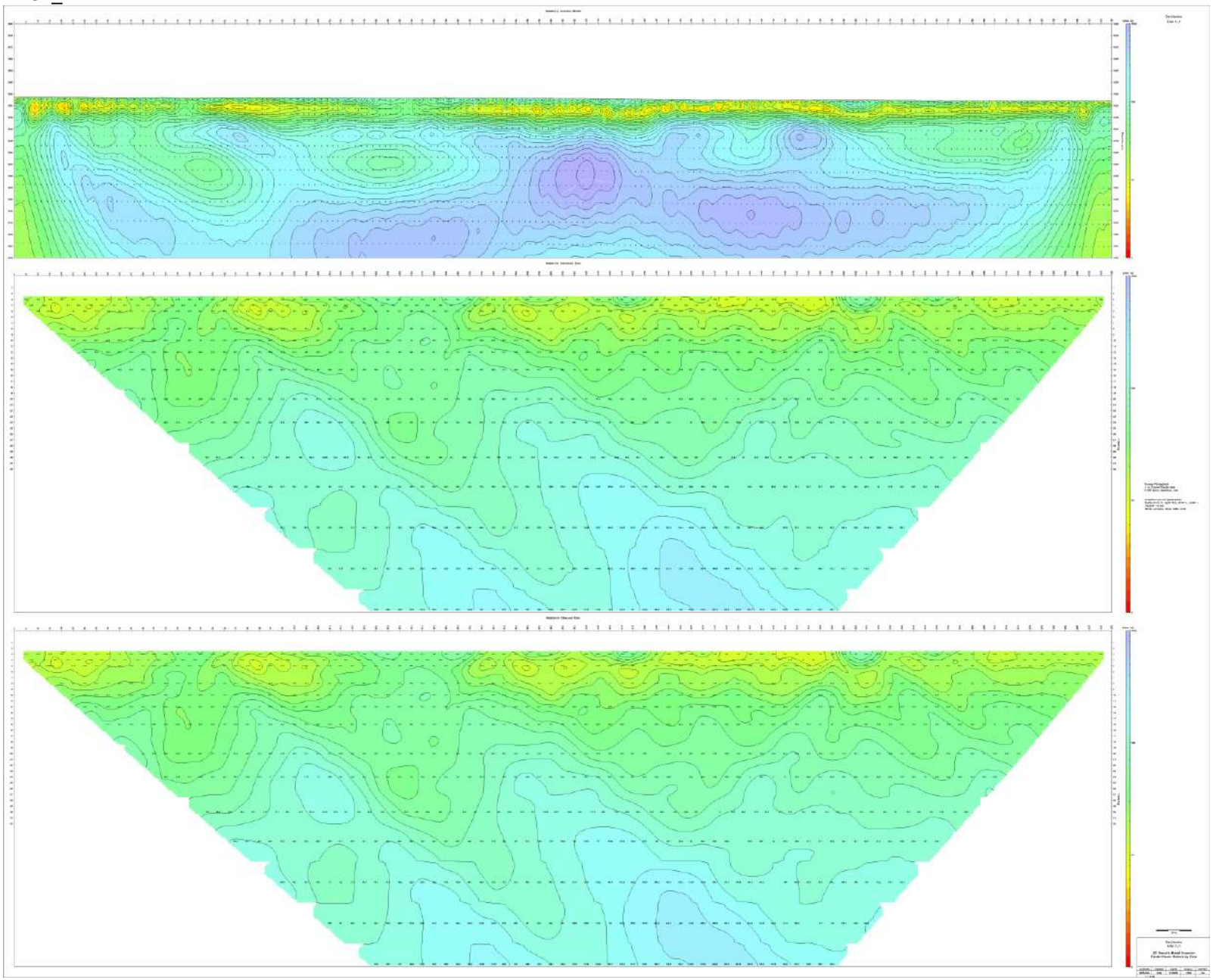
# 7. Acknowledgements

We thank Knight Piésold Consulting and all related parties for all the support rendered to us during this survey. Craton Mining and exploration is thanked for the camping accommodation.

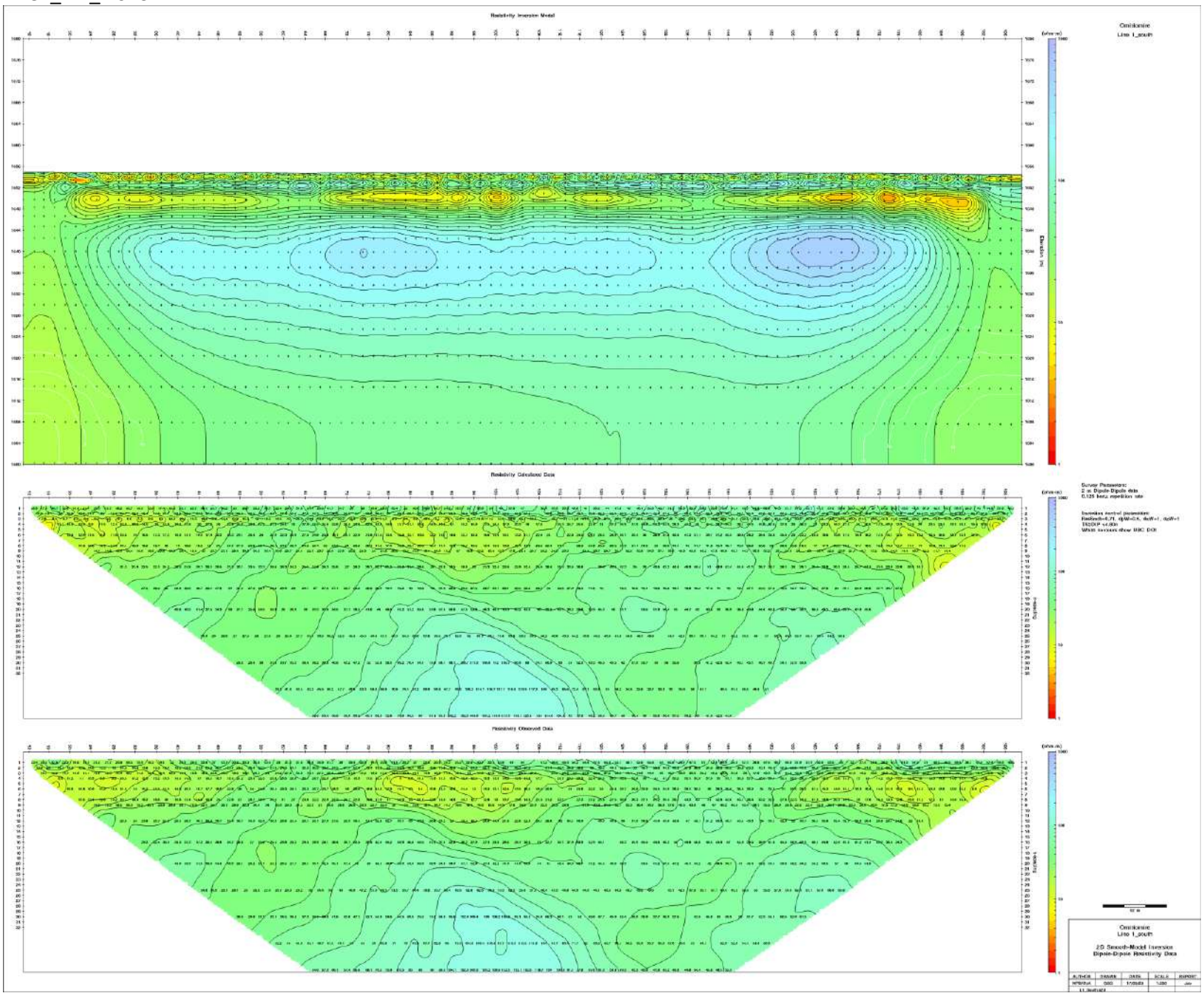
G Symons, D-J Adams
(Geophysicists)
March 2023.

# Appendix 1: Electrical Resistivity Tomography 2D Inversion Sections

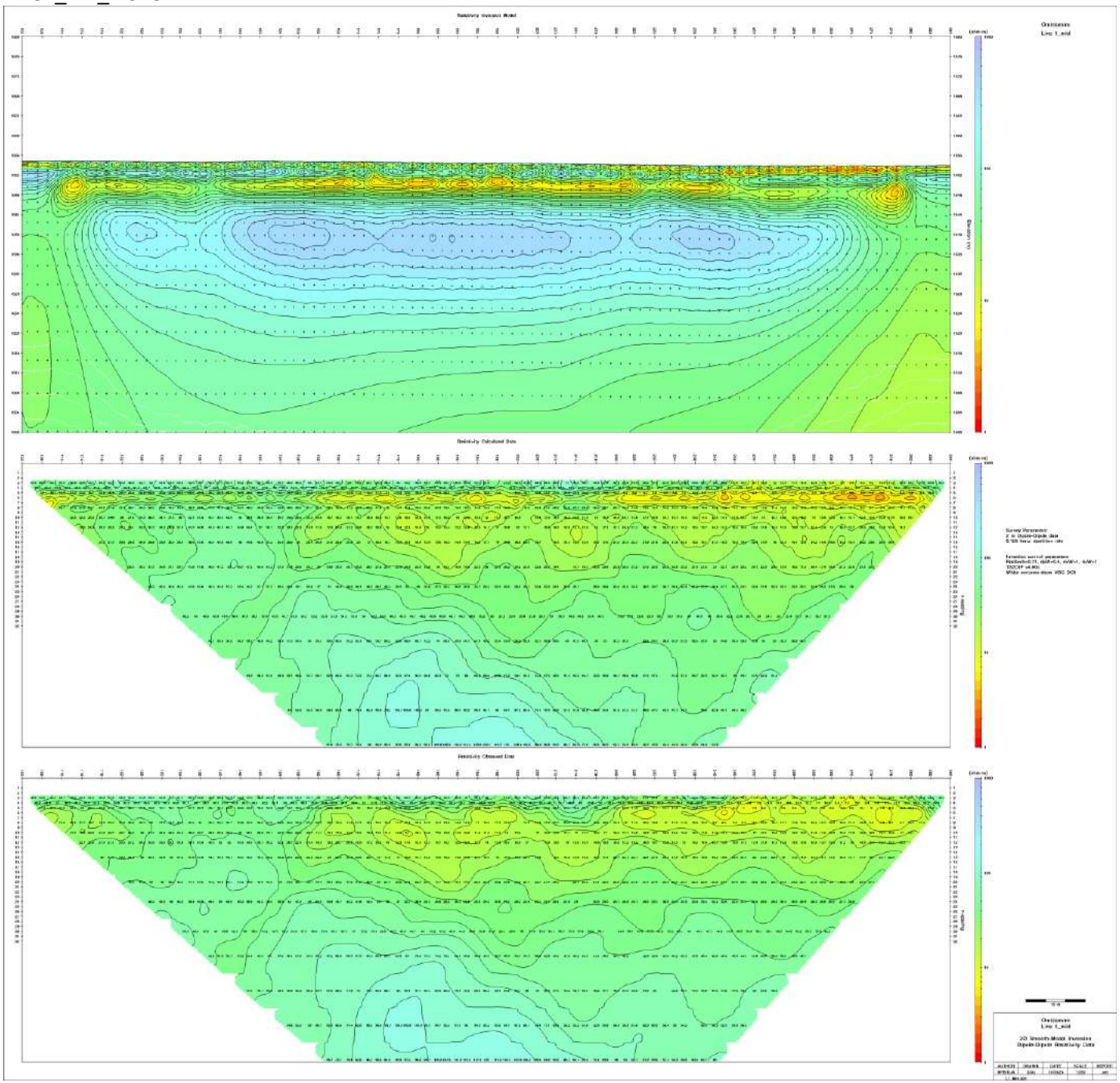
Line1_4m



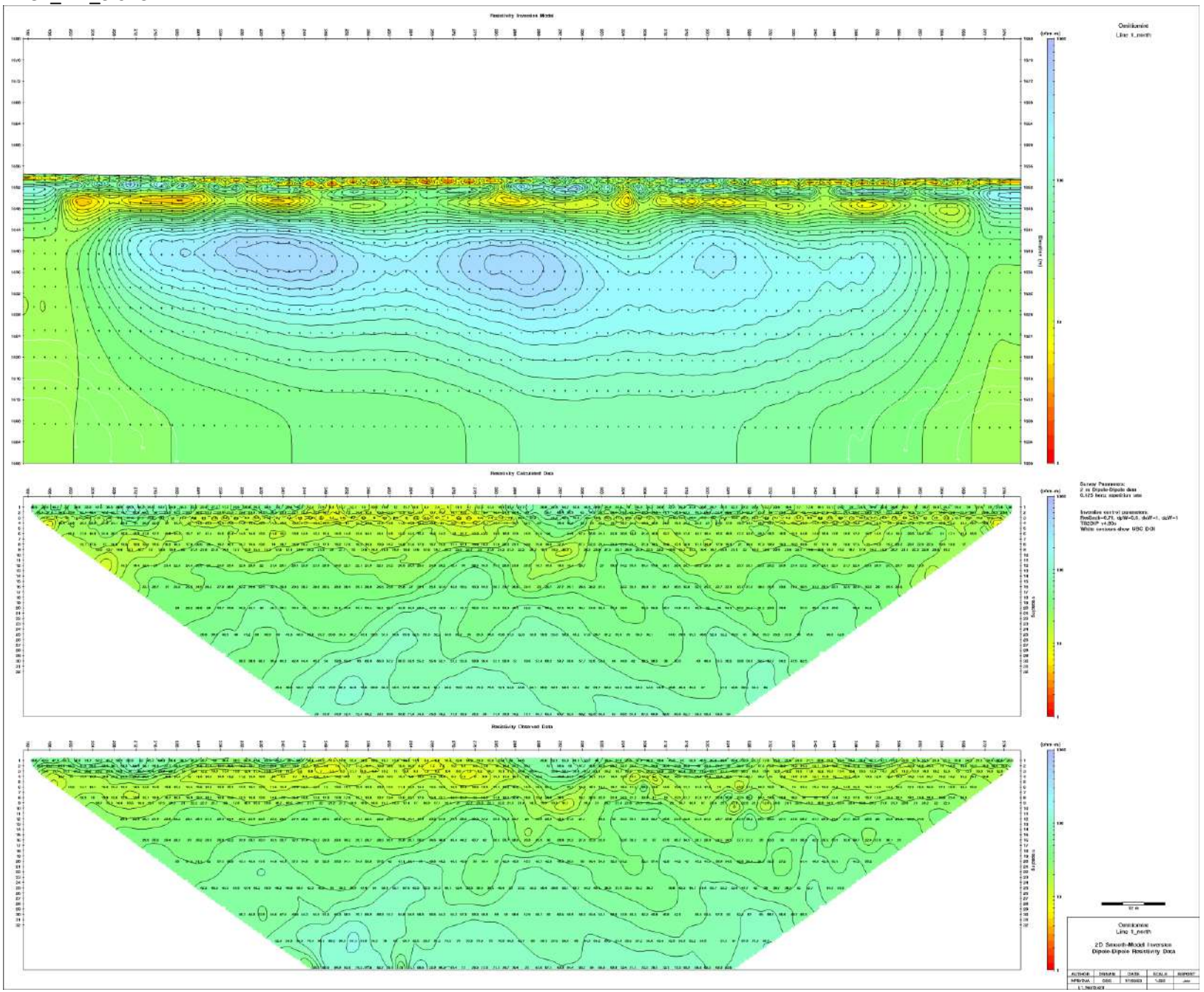
Line1_2m_1 of 3



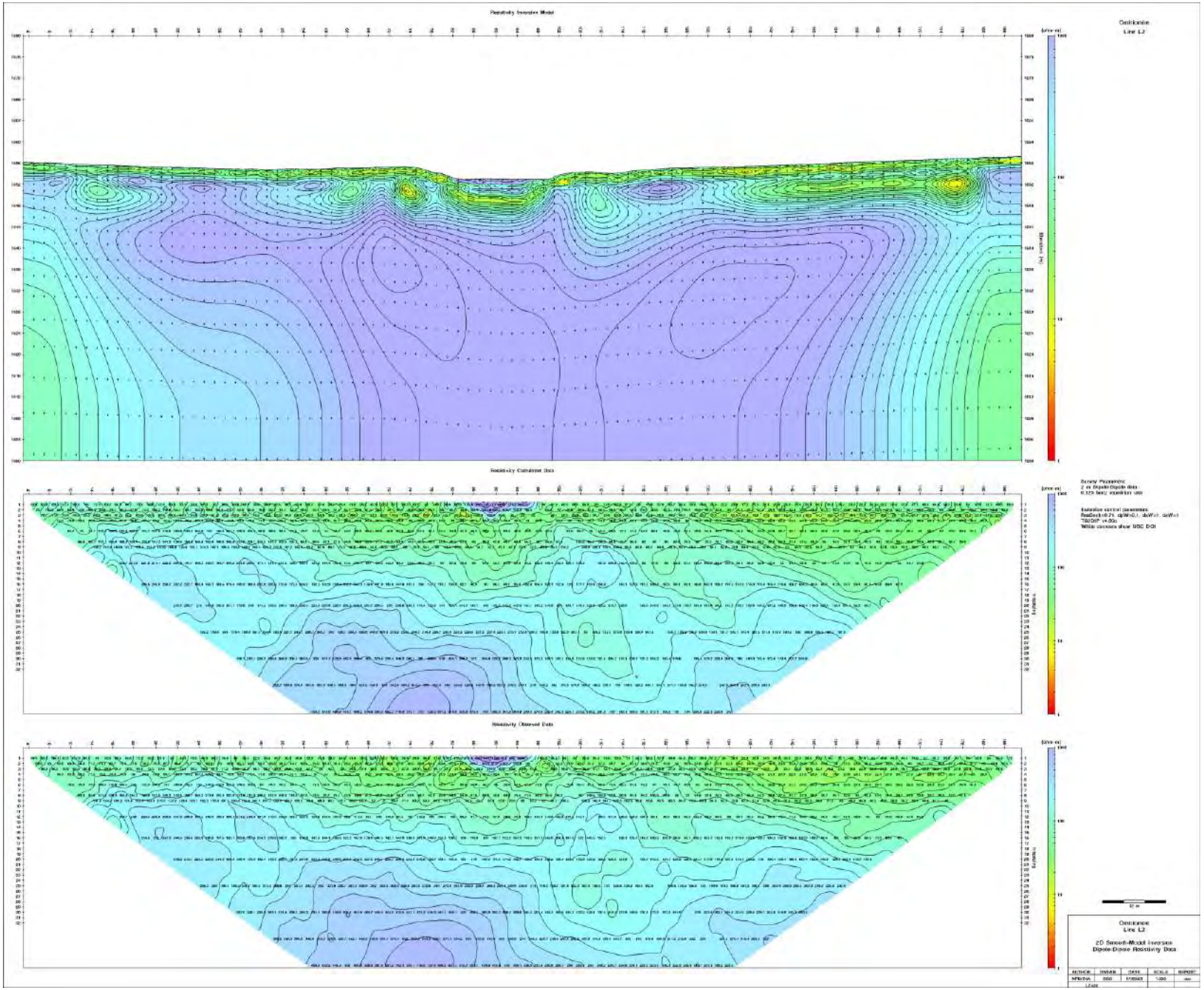
Line1_2m_2 of 3



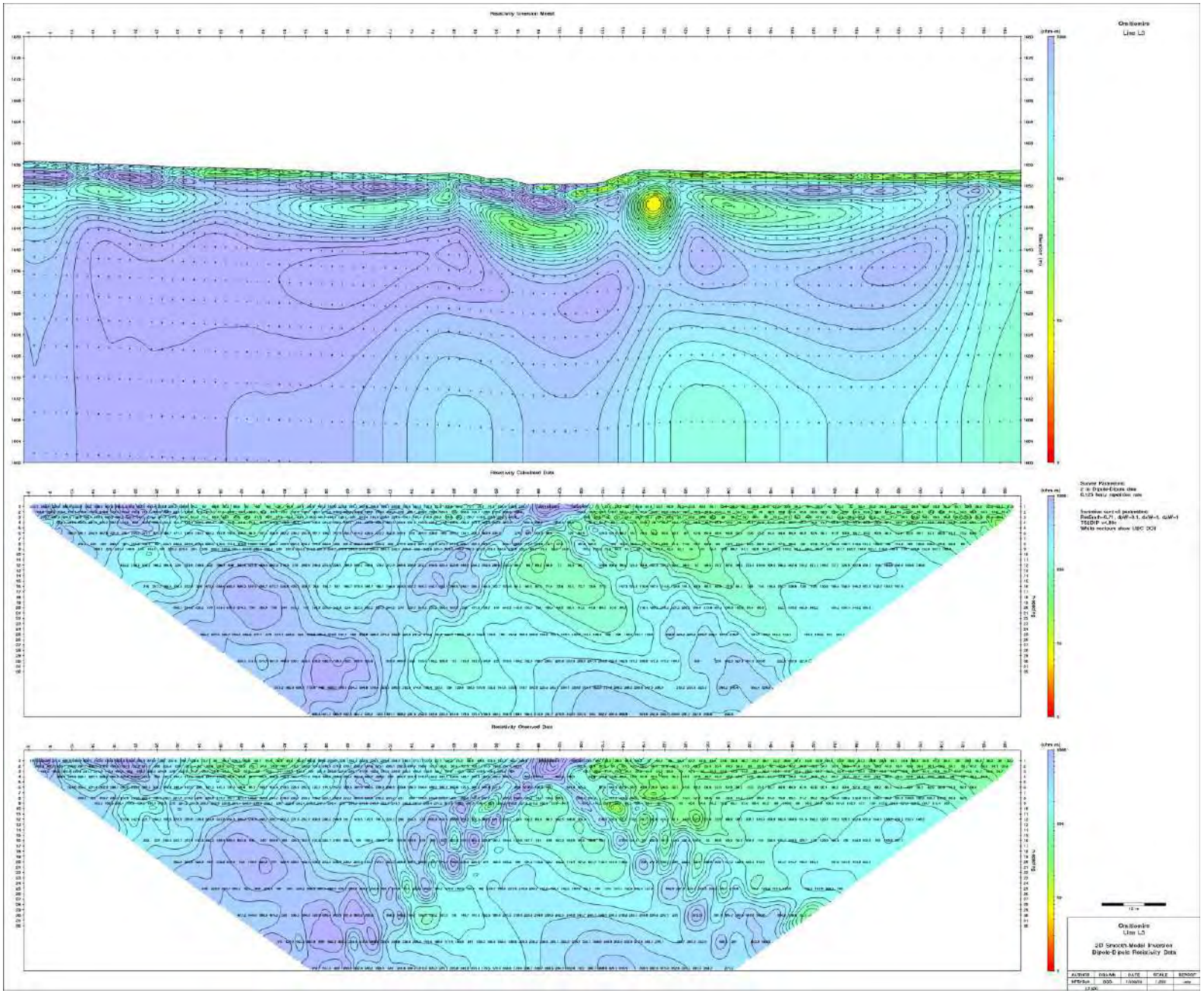
Line1_2m_3 of 3



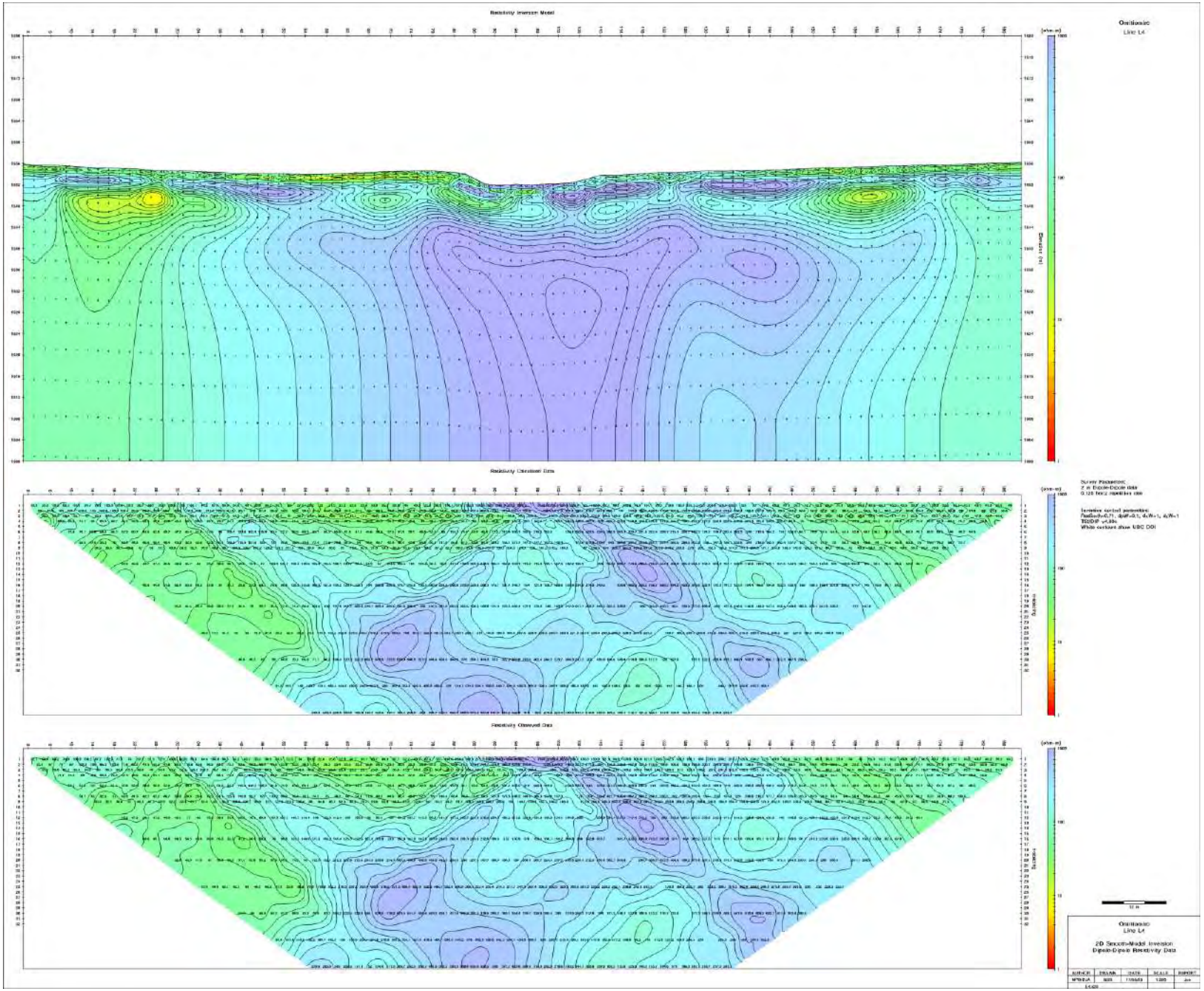
Line2


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Survey Parameters
Inversion control parameters
Observation
Line L2
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

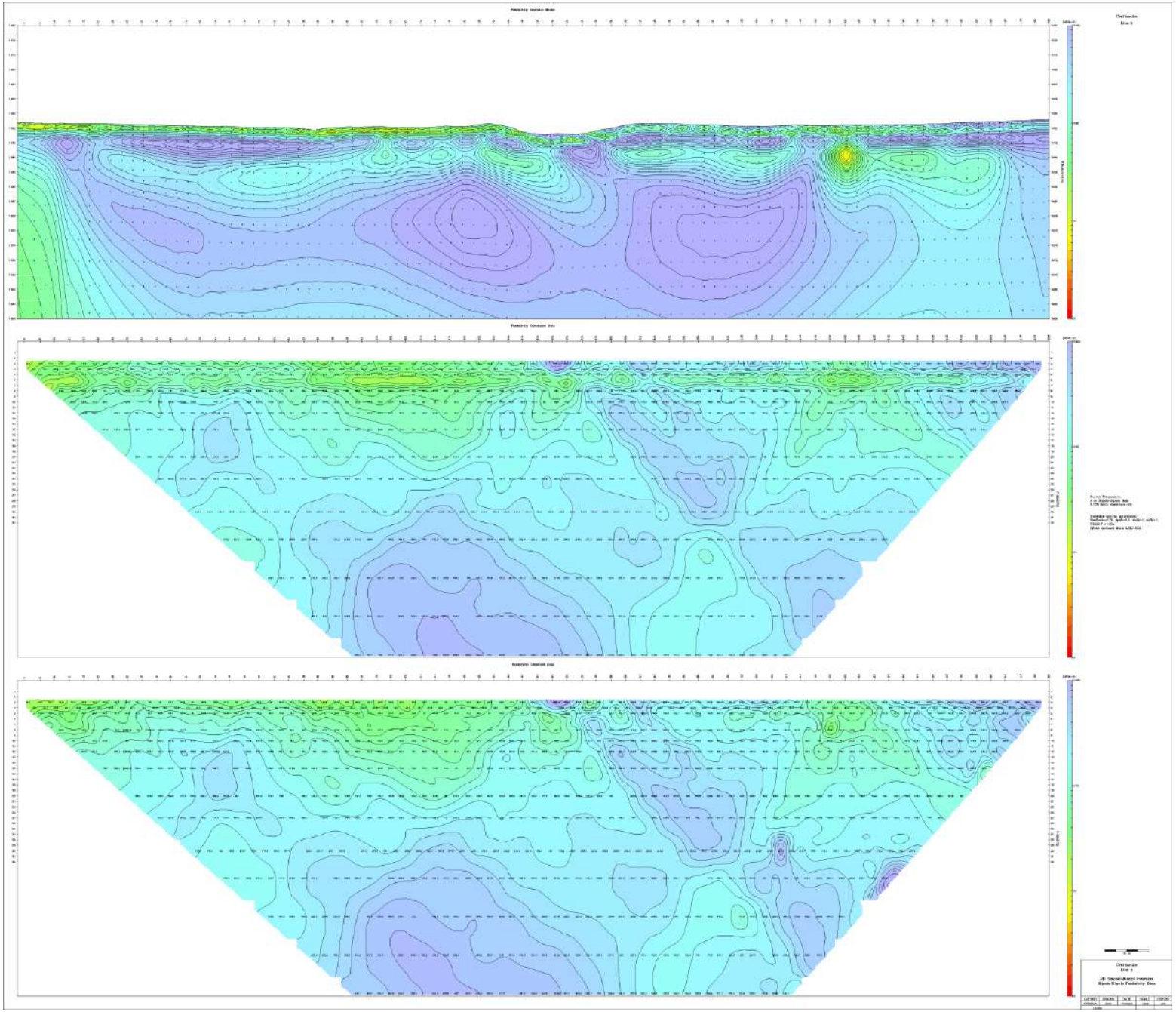
Line3


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Onitsonira
Line L3
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

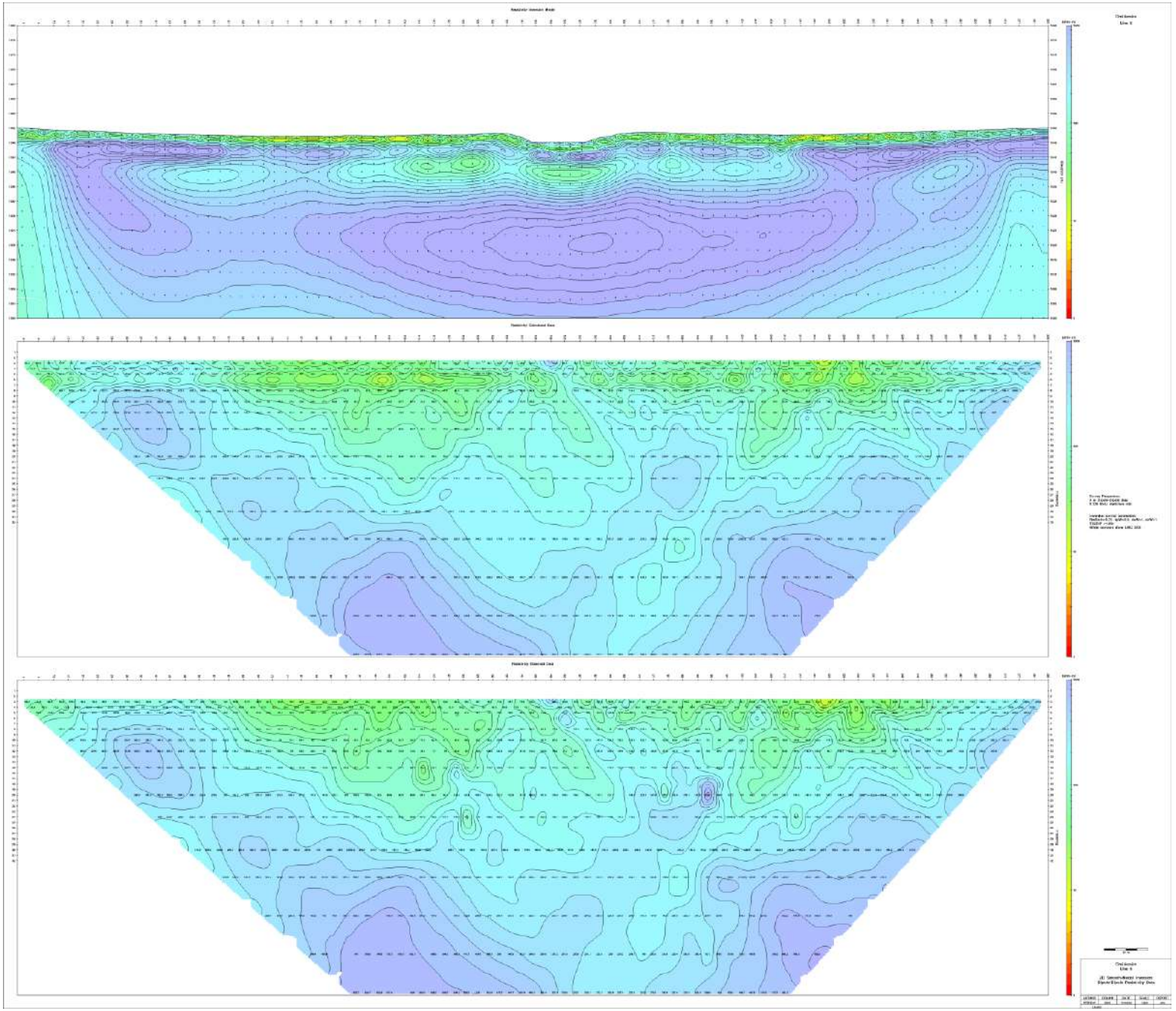
Line4


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Orathionic
Line L4
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

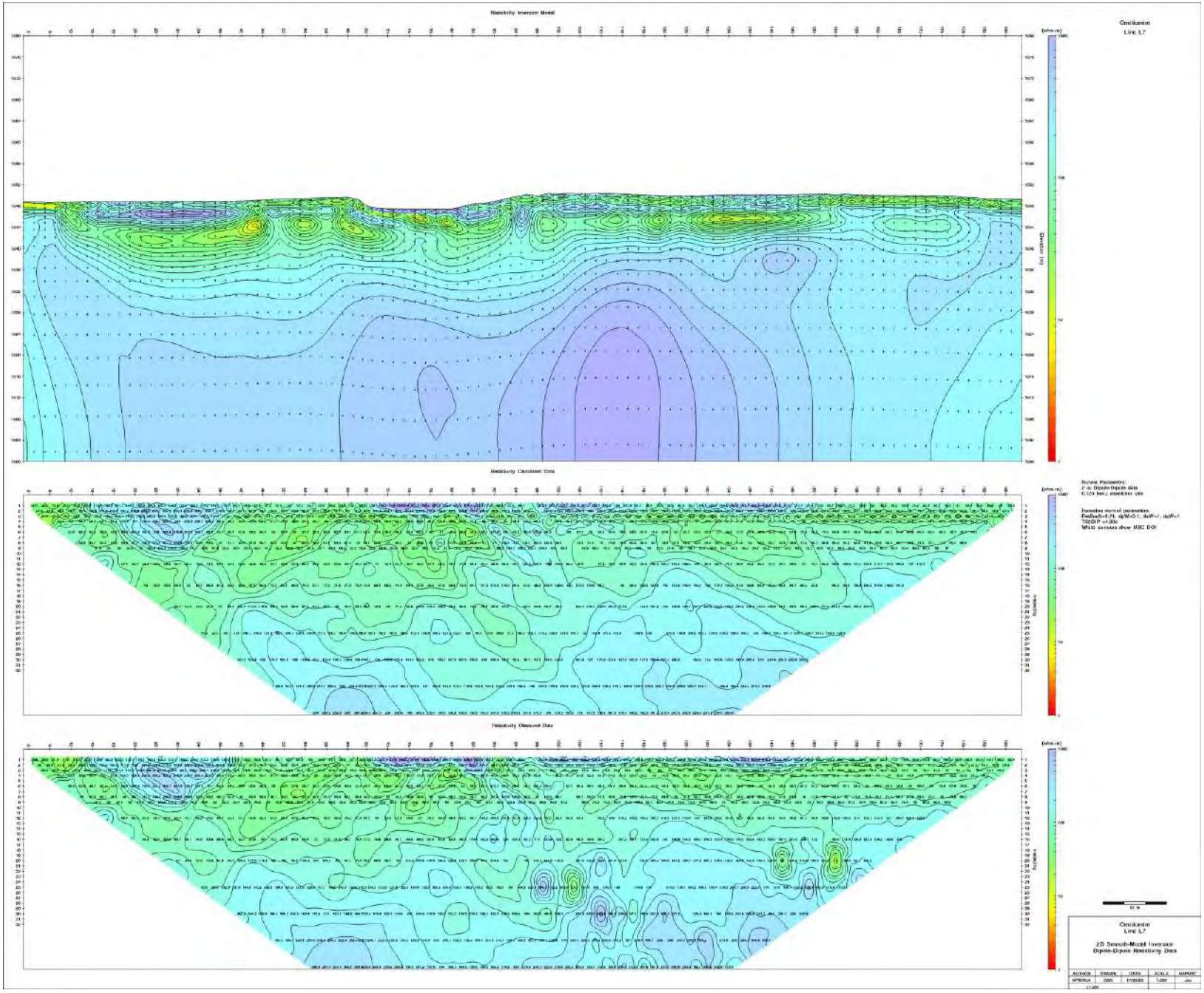
Line5



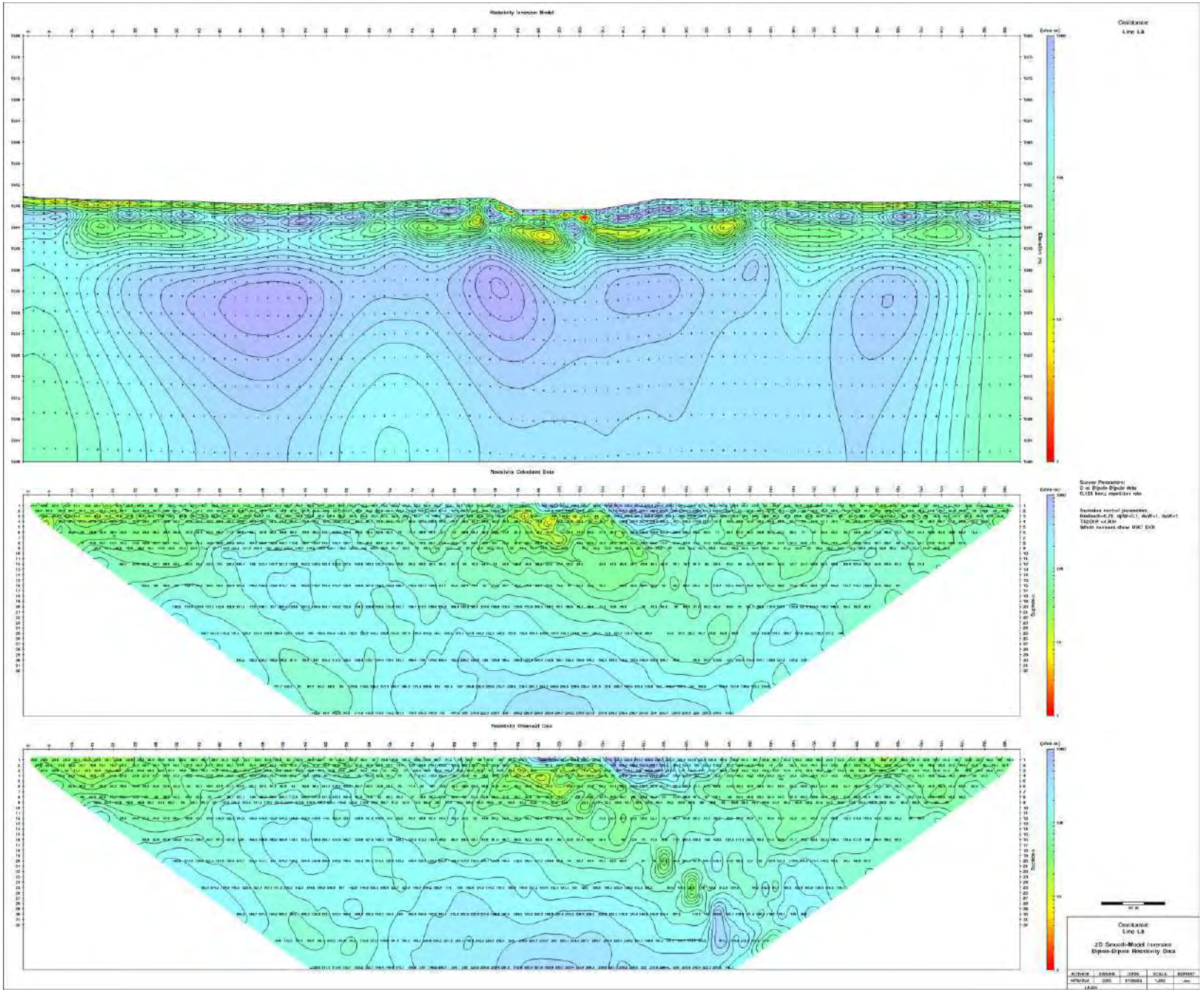
Line6



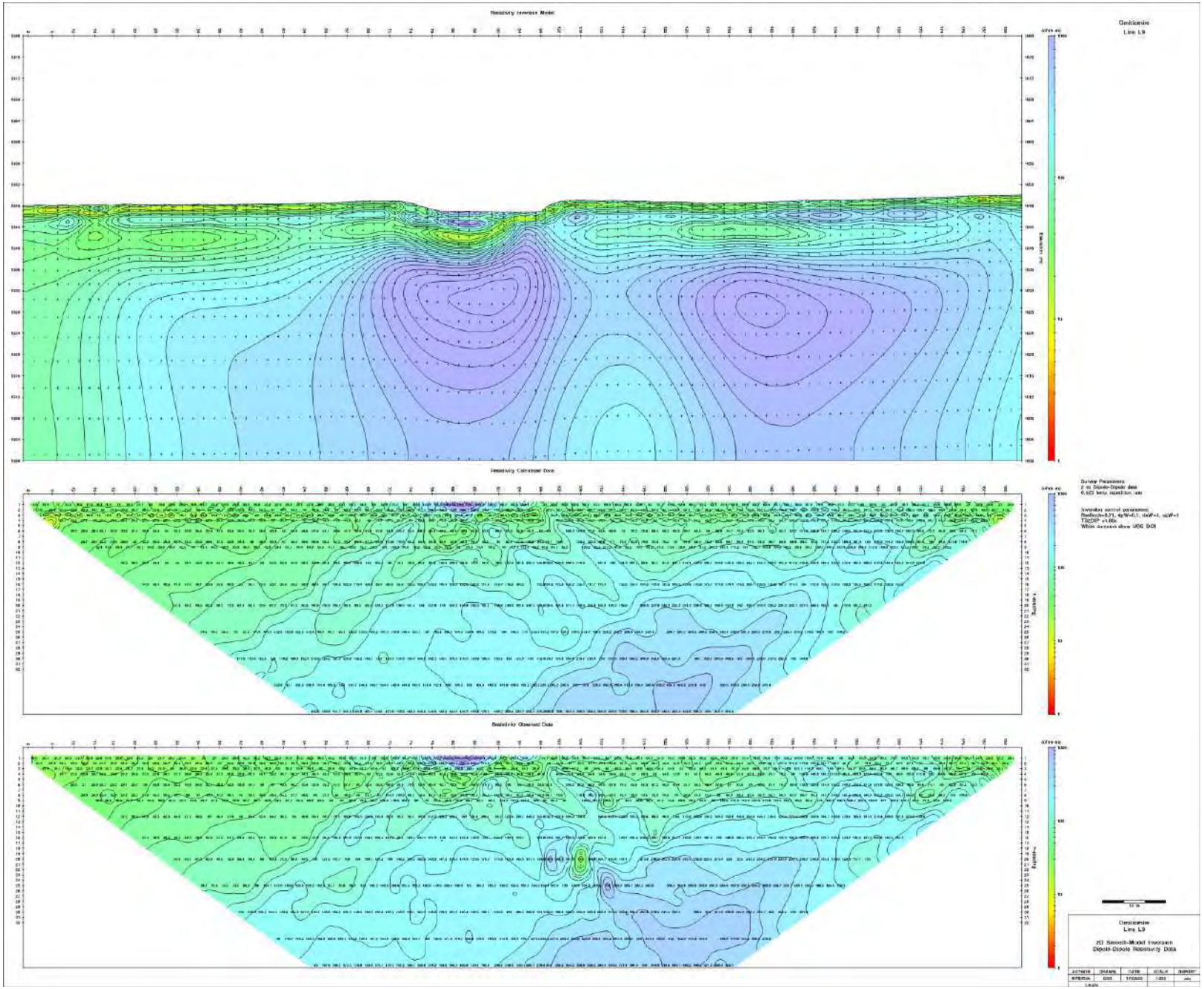
Line7


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Omilkamini
Line L7
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

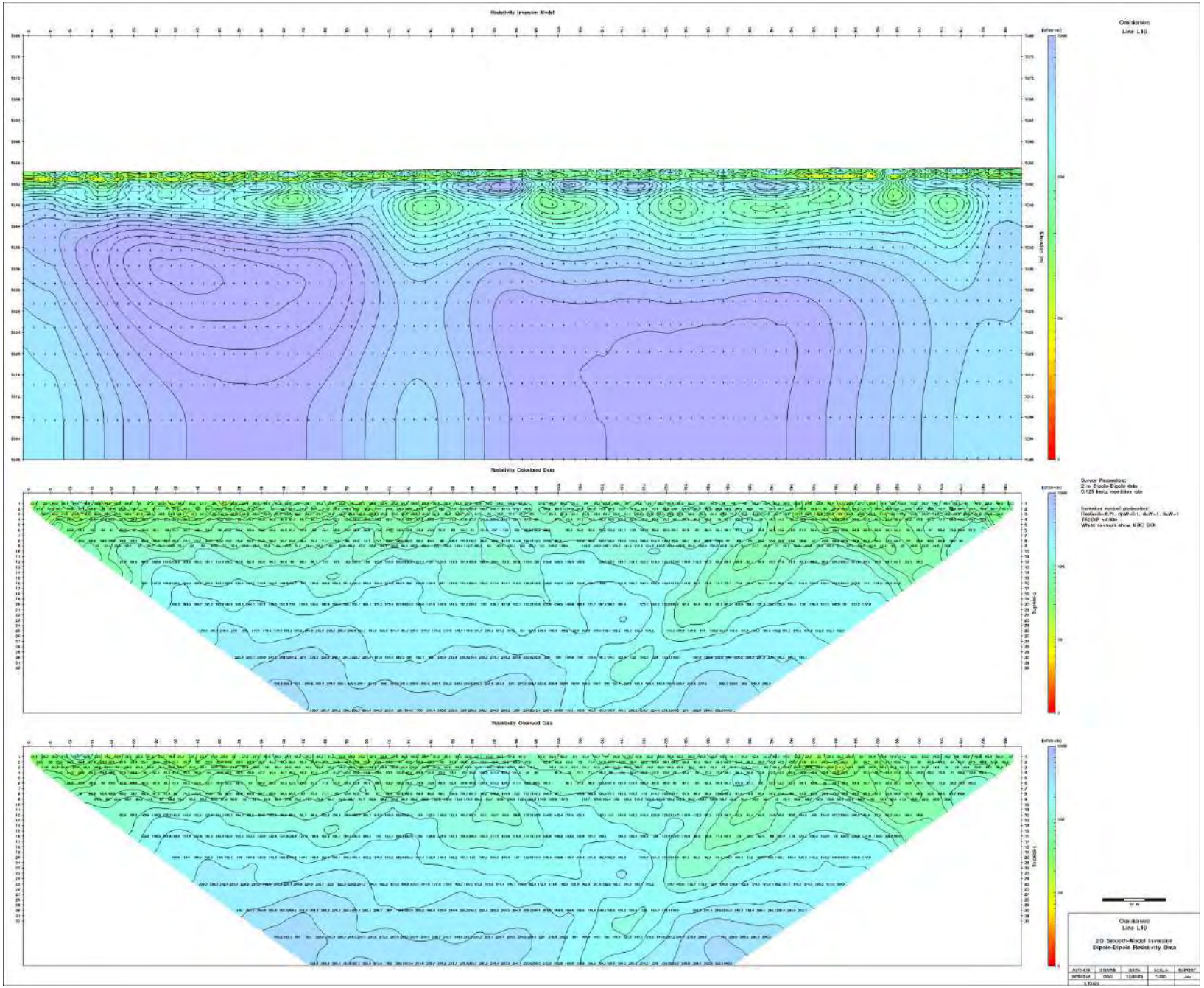
Line8


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Survey Parameters:
2-m Dipole-Dipole data
0.125 hertz repetition rate
Inversion control parameters:
Robust=X,Y; dpW=0.1, dxW=1, dzW=1
TOL=1.0 =1.4(3)
Which harvest show RMS DOI
Orobilanon
Line L8
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

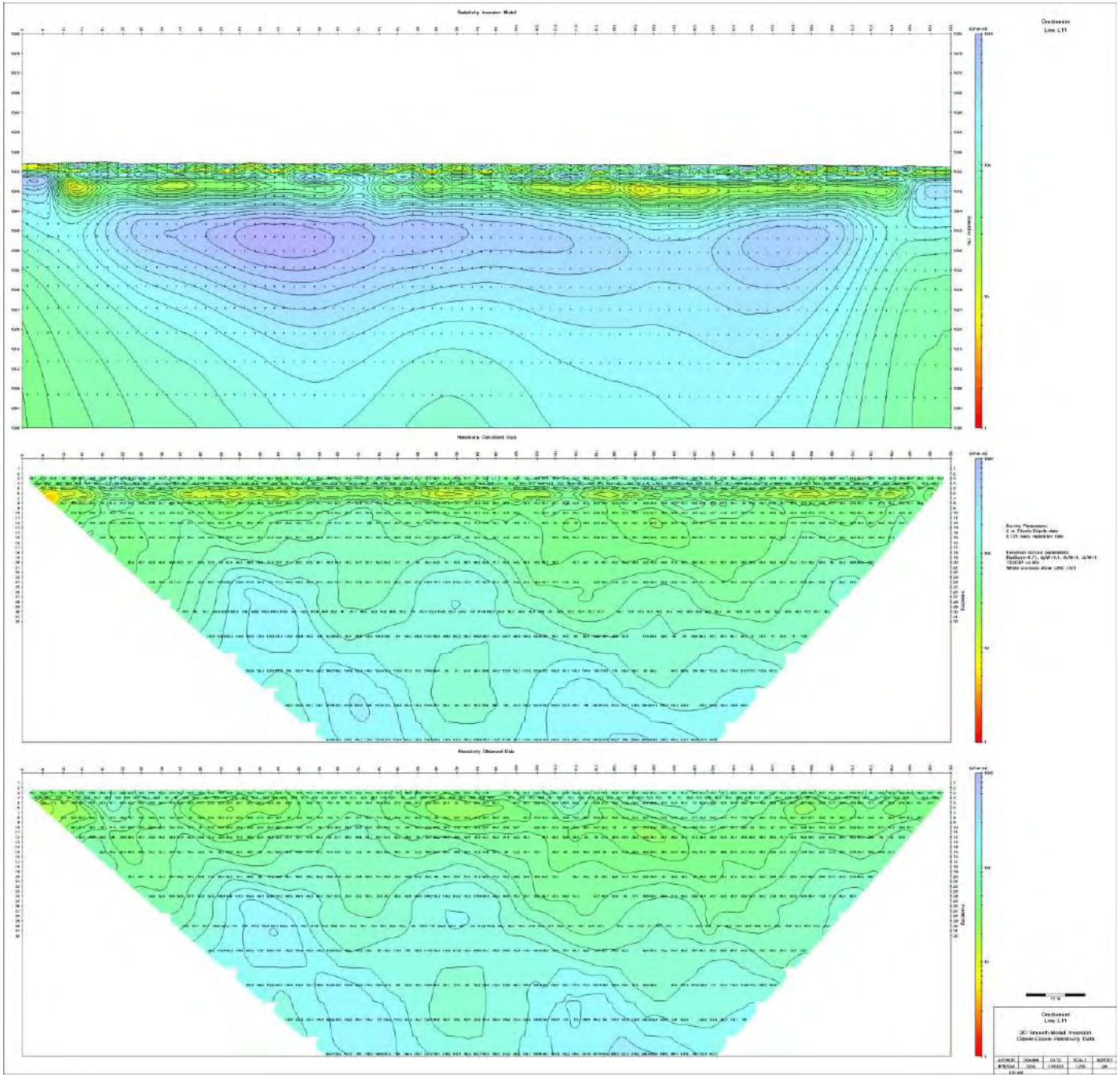
Line9


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Dandaleithe
Line L9
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

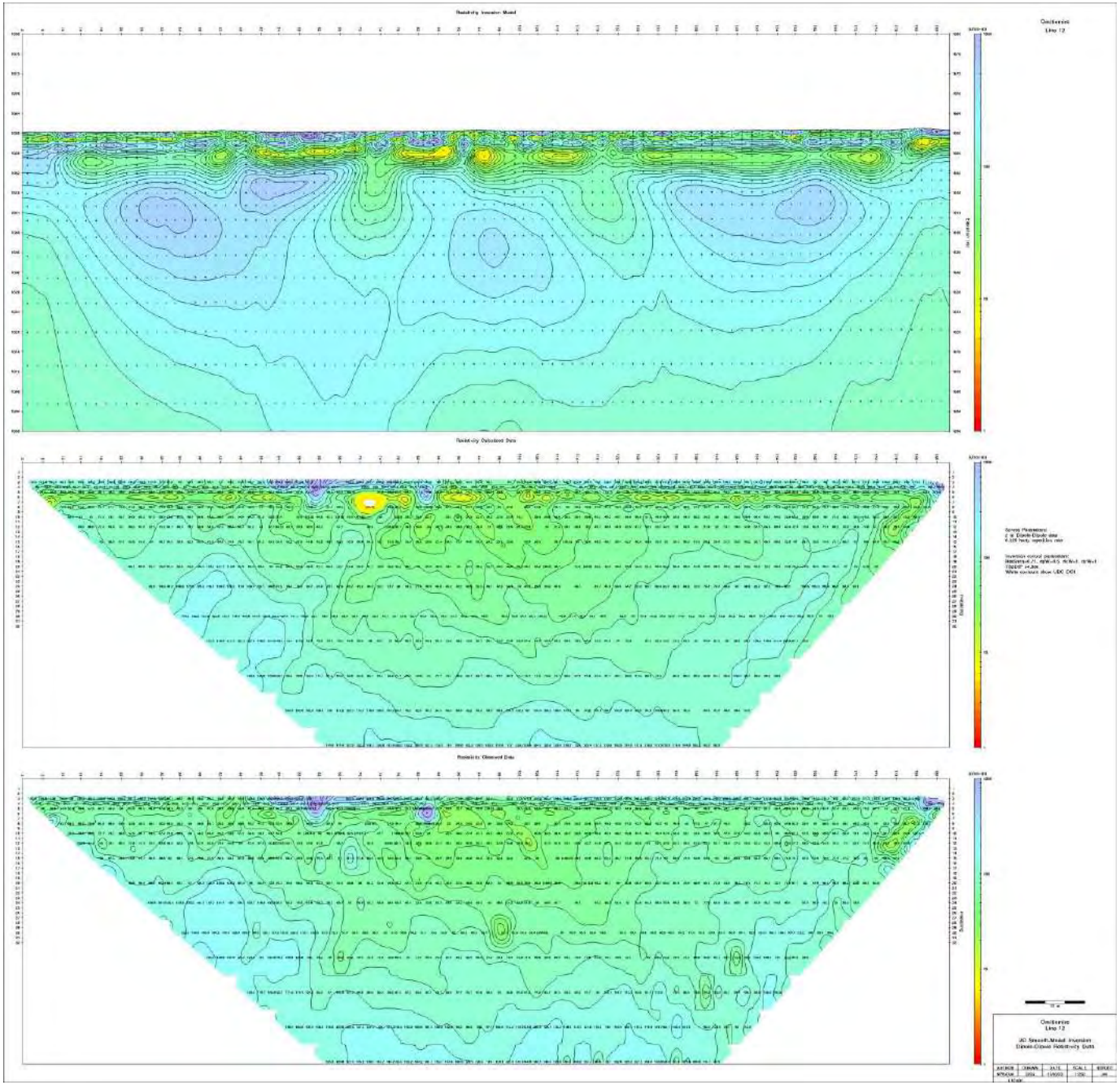
Line10


Resistivity Inversion Model
Resistivity Calculated Data
Resistivity Observed Data
Survey Parameters:
2 m Dipole-Dipole data
0.125 hertz repetition rate
Omiskanie
Line L10
2D Smooth-Model Inversion
Dipole-Dipole Resistivity Data

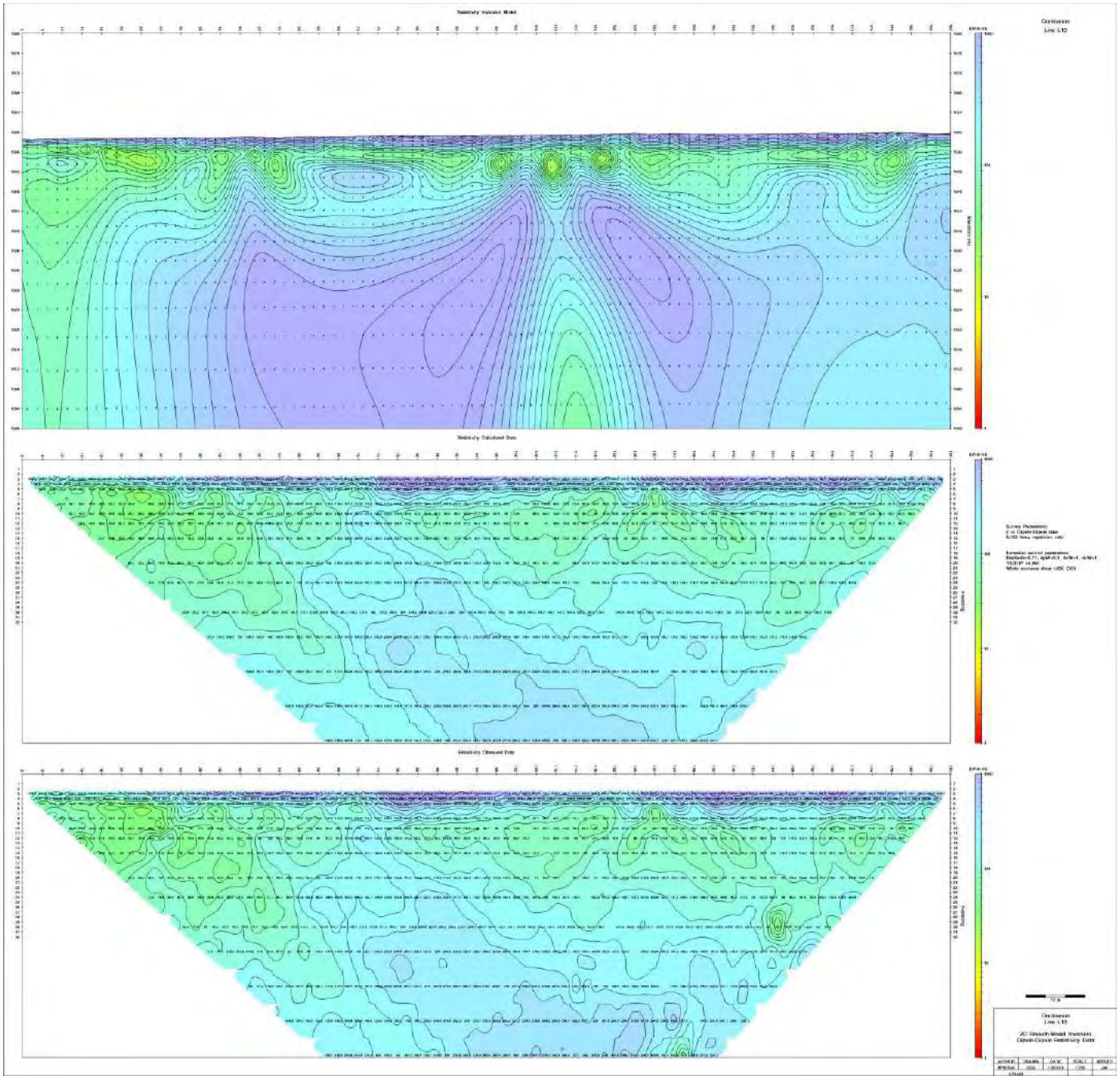
Line11



Line12



Line13



# Appendix 2: Data Archive

GSG organized an archive of all data as follows:

- Report: A folder with this report as a word document, a timesheet Excel document, and a PNGs folder with all the Maps for the three Surveys,
- Resistivity: A folder with all raw and processed Electrical Resistivity Tomography Data. Each line is presented, the most important files being the PNG, map and Geosoft *.grd files which give the inverted resistivity results.

# APPENDIX G

## Laboratory Test Results

# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Potential Borrow Sources **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1612 **Page no :** 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10394** | **S/10395** | **S/10396** | **S/10399** | **S/10402** | **S/10405** |
| | Chainage | | | | | | |
| | Position (from LHS) | AM-TP01 | AM-TP02 | AM-TP05 | AM-TP06 | AM-TP08-B | AM-TP04 |
| | Depth sampled (mm) | 400-600 | 0-700 | 0-600 | 400-1000 | 500-700 | 300-1100 |
| | Sample description | Brown stained orange brown mottled black, clayey silty sand, slightly ferruginised fine alluvium | Reddish brown, clayey silty sand with traces of subangular to subrounded fine gravel, fine alluvium | Brown, clayey silty sand, fine alluvium | Reddish brown, clayey silty sand with traces of subangular to subrounded gravel to fine gravel, fine alluvium | Dark brown with orange staining, clayey silty sand, fine alluvium | Reddish brown, clayey silty sandy gravel, calcareous alluvium |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | Scalping | Scalping |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | | | 100 |
| | 53,0 mm | | | | | | 88 |
| | 37,5 mm | | | | | | 80 |
| | 26,5 mm | | | | | | 64 |
| | 19,0 mm | | 100 | | | | 50 |
| | 13,2 mm | | 99 | | | 100 | 41 |
| | 4,75 mm | 100 | 99 | 100 | 100 | 100 | 25 |
| | 2,00 mm | 100 | 97 | 100 | 99 | 99 | 21 |
| | 0,425 mm | 83 | 83 | 92 | 83 | 84 | 18 |
| | 0,075 mm | 48 | 46 | 41 | 43 | 48 | 4 |
| | Grading Modulus (GM) | 0.69 | 0.74 | 0.67 | 0.75 | 0.69 | 2.57 |
| Atterberg Limits | Liquid Limit (LL) | 26 | 26 | 19 | 22 | 25 | |
| | Plasticity Index (PI) | 10 | 9 | 5 | 7 | 9 | 1 |
| | Linear Shrinkage (LS) | 4.0 | 3.0 | 2.5 | 2.5 | 3.5 | |
| Mod AASHTO & CBR values | CBR @ 100 % | | | | 29 | | 147 |
| | CBR @ 98 % | | | | 18 | | 129 |
| | CBR @ 95 % | | | | 9 | | 105 |
| | CBR @ 93 % | | | | 5 | | 92 |
| | CBR @ 90 % | | | | <3 | | 75 |
| | Swell @ 100 % | | | | 0.0 | | 0.0 |
| | Mod AASHTO (kg/m$^3$) | | | | 2079 | | 2149 |
| | O.M.C. (%) | | | | 9.2 | | 6.5 |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | | | 90.0% Mod AASHTO @ OMC | | 90.0% Mod AASHTO @ OMC |
| | Permeabilty cm/s | | | | 1.29 E-05 | | 1.01 E-04 |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Note 1: In the case of G6 and G7 material with a large coarse fraction, Maximum Pi = 3GM+10

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

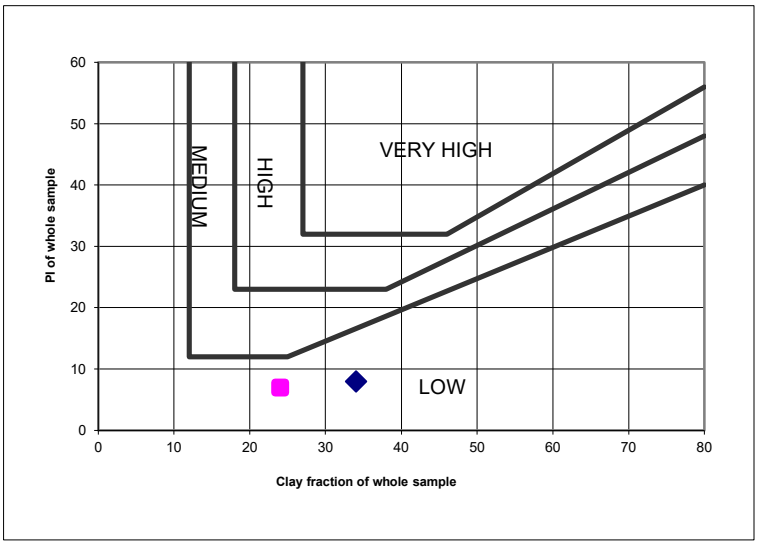
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

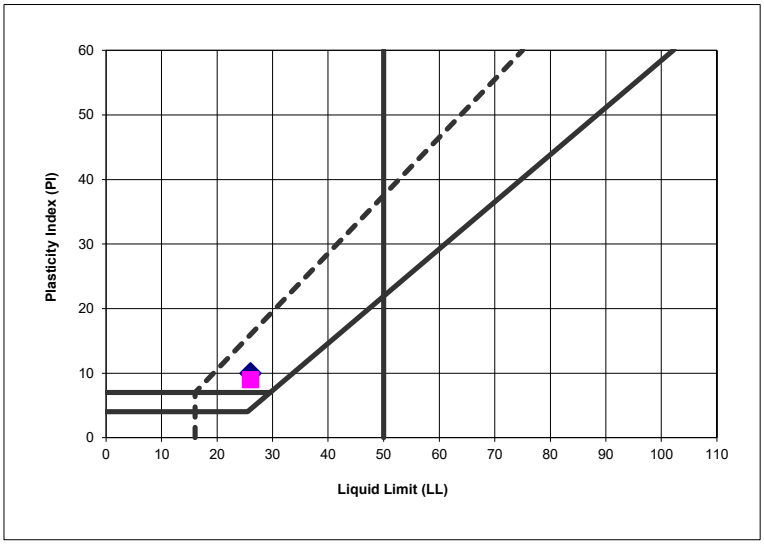
Project: Omitiomire | Sampling Date: 23-Jun-23

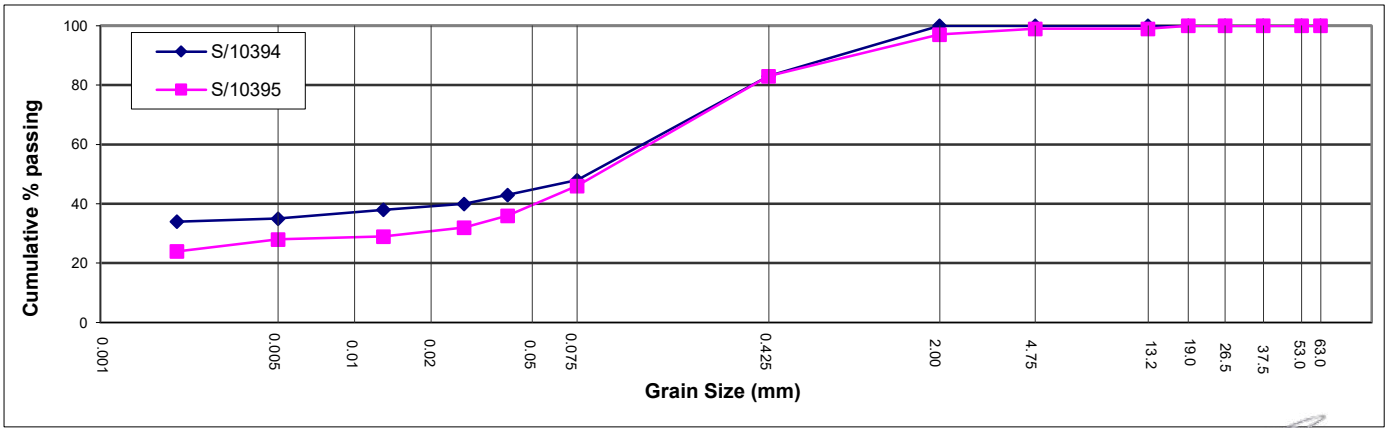
| Sample No. | S/10394 | S/10395 |
|---|---|---|
| Report No. | SG23/1612 | |
| Depth (mm) | 400-600 | 0-700 |
| Position | AM-TP01 | AM-TP02 |
| Material description | Clayey sand | Clayey sand |
| Moisture (%) | | |
| SG | 2.528 | 2.697 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | 100 |
| 13.2 mm | | 99 |
| 4.75 mm | 100 | 99 |
| 2.00 mm | 100 | 97 |
| 0.425 mm | 83 | 83 |
| 0.075 mm | 48 | 46 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 43 | 36 |
| 0.027 mm | 40 | 32 |
| 0.013 mm | 38 | 29 |
| 0.005 mm | 35 | 28 |
| 0.002 mm | 34 | 24 |
| % Clay (<0.002 mm) | 34 | 24 |
| % Silt (<0.075, >0.002 mm) | 14 | 22 |
| % Sand (<4.75, >0.075 mm) | 52 | 53 |
| % Gravel (> 4.75 mm) | 0 | 1 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 26 | 26 |
| Plasticity Index (-0.425) | 10 | 9 |
| Linear Shrinkage (%) | 4.0 | 3.0 |
| PI of whole sample | 8 | 7 |
| Grading Modulus | 0.69 | 0.74 |
| TRB Classification | A-4 (0) | A-4 (0) |
| Unified Classification | SC | SC |

### Potential Expansiveness




### Plasticity Chart



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

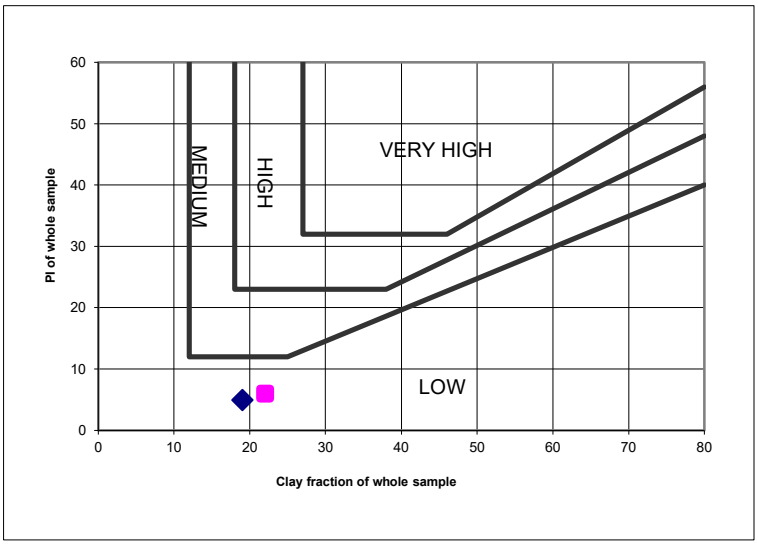
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

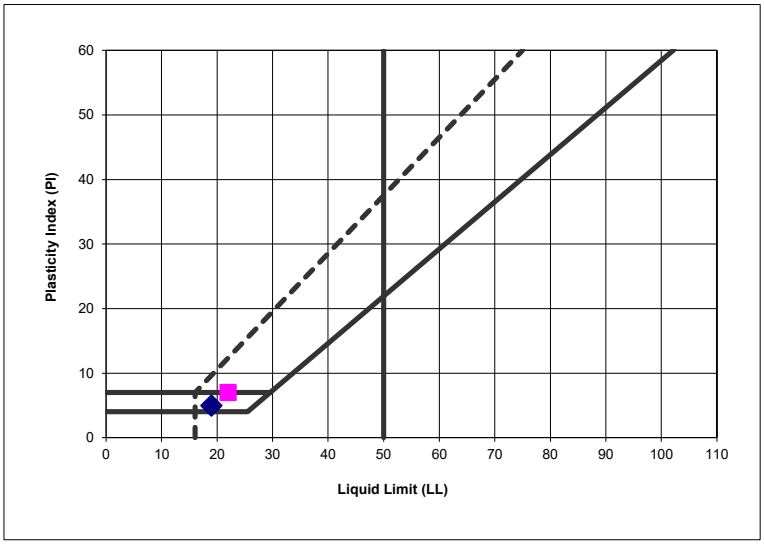
Project: Omitiomire | Sampling Date: 23-Jun-23

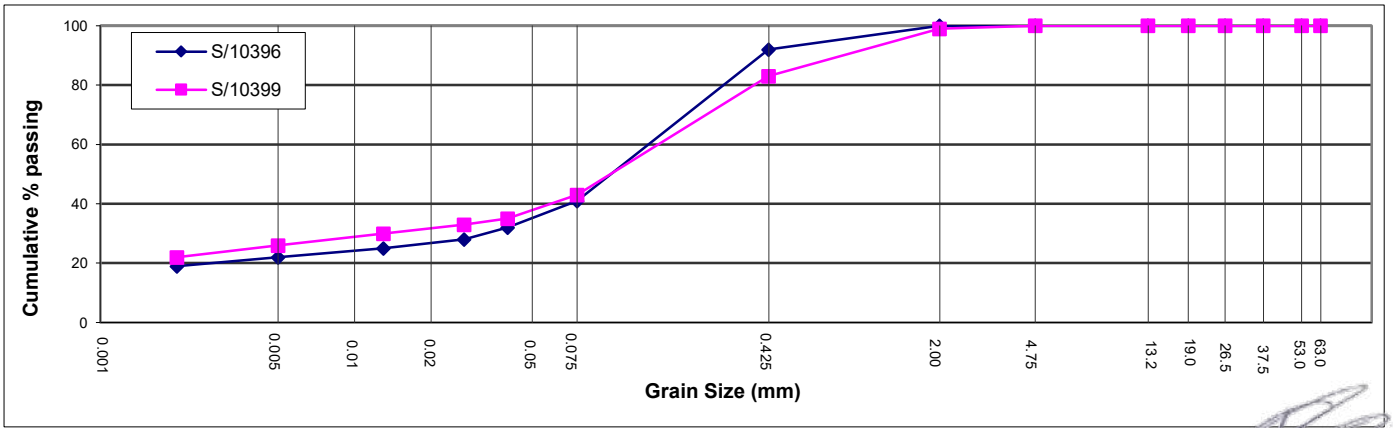
| Sample No. | S/10396 | S/10399 |
|---|---|---|
| Report No. | SG23/1612 | |
| Depth (mm) | 0-600 | 400-1000 |
| Position | AM-TP05 | AM-TP06 |
| Material description | Silty, clayey sand | Clayey sand |
| Moisture (%) | | |
| SG | 2.741 | 2.652 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | |
| 13.2 mm | | |
| 4.75 mm | 100 | 100 |
| 2.00 mm | 100 | 99 |
| 0.425 mm | 92 | 83 |
| 0.075 mm | 41 | 43 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 32 | 35 |
| 0.027 mm | 28 | 33 |
| 0.013 mm | 25 | 30 |
| 0.005 mm | 22 | 26 |
| 0.002 mm | 19 | 22 |
| % Clay (<0.002 mm) | 19 | 22 |
| % Silt (<0.075, >0.002 mm) | 22 | 21 |
| % Sand (<4.75, >0.075 mm) | 59 | 57 |
| % Gravel (> 4.75 mm) | 0 | 0 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 19 | 22 |
| Plasticity Index (-0.425) | 5 | 7 |
| Linear Shrinkage (%) | 2.5 | 2.5 |
| PI of whole sample | 5 | 6 |
| Grading Modulus | 0.67 | 0.75 |
| TRB Classification | A-4 (0) | A-4 (0) |
| Unified Classification | SC-SM | SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

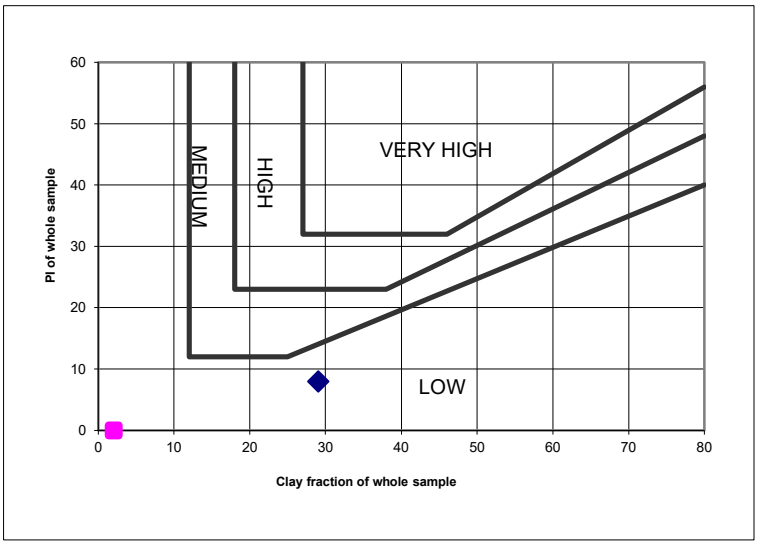
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

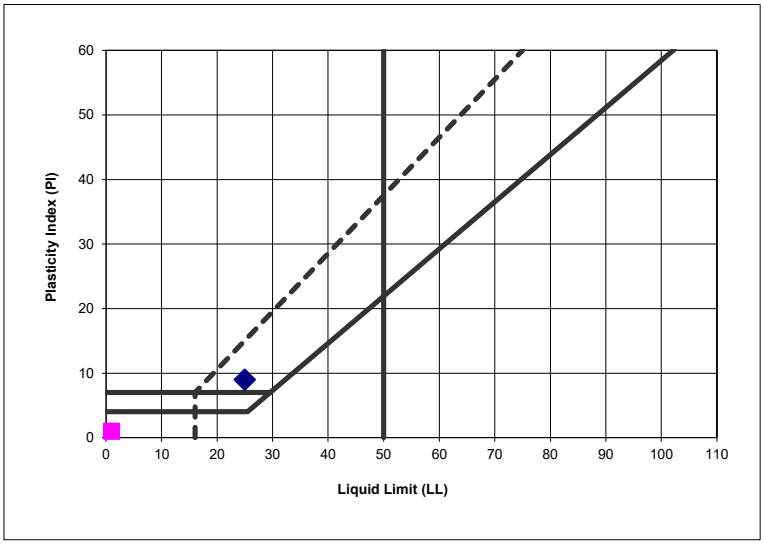
Project: Omitiomire | Sampling Date: 23-Jun-23

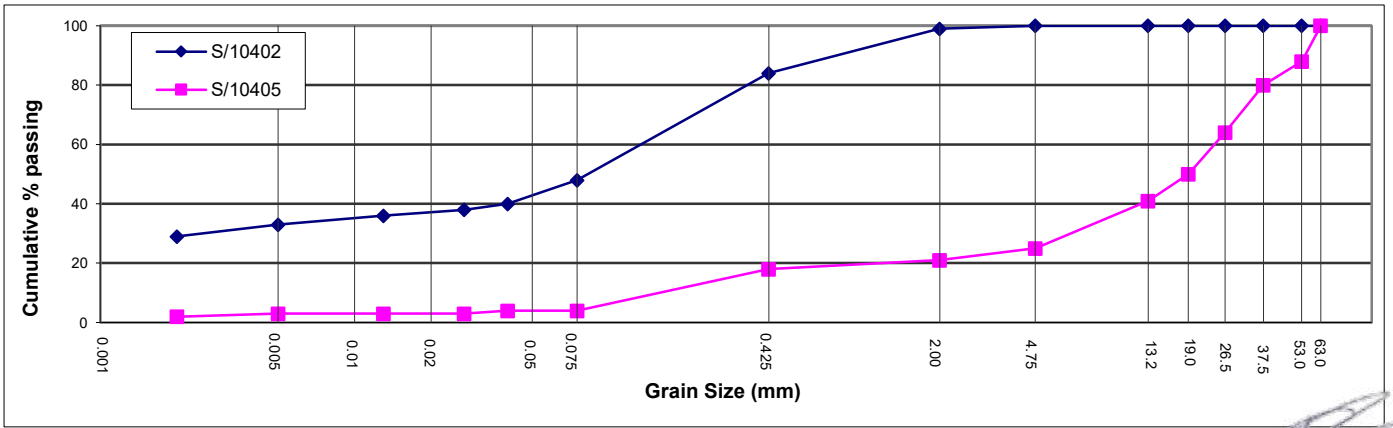
| Sample No. | S/10402 | S/10405 |
|---|---|---|
| Report No. | SG23/1612 | |
| Depth (mm) | 500-700 | 300-1100 |
| Position | AM-TP08-B | AM-TP04 |
| Material description | Clayey sand | Poorly graded gravel with sand |
| Moisture (%) | | |
| SG | 2.620 | 2.624 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | 100 |
| 53.0 mm | | 88 |
| 37.5 mm | | 80 |
| 26.5 mm | | 64 |
| 19.0 mm | | 50 |
| 13.2 mm | 100 | 41 |
| 4.75 mm | 100 | 25 |
| 2.00 mm | 99 | 21 |
| 0.425 mm | 84 | 18 |
| 0.075 mm | 48 | 4 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 40 | 4 |
| 0.027 mm | 38 | 3 |
| 0.013 mm | 36 | 3 |
| 0.005 mm | 33 | 3 |
| 0.002 mm | 29 | 2 |
| % Clay (<0.002 mm) | 29 | 2 |
| % Silt (<0.075, >0.002 mm) | 19 | 2 |
| % Sand (<4.75, >0.075 mm) | 52 | 21 |
| % Gravel (> 4.75 mm) | 0 | 75 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 25 | |
| Plasticity Index (-0.425) | 9 | 1 |
| Linear Shrinkage (%) | 3.5 | 0.0 |
| PI of whole sample | 8 | 0 |
| Grading Modulus | 0.69 | 2.57 |
| TRB Classification | A-4 (0) | A-1-a (0) |
| Unified Classification | SC | GP |

### Potential Expansiveness




### Plasticity Chart



# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Potential Borrow Sources **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1612 **Page no :** 5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10406** | **S/10407** | **S/10408** | | | |
| | Chainage | | | | | | |
| | Position (from LHS) | AM-TP02 | AM-TP04 | AM-TP03 | | | |
| | Depth sampled (mm) | 900-1100 | 1200-1500 | 700-1000 | | | |
| | Sample description | Completely weathered, dark grey streaked white to reddish brown, soft to | Completely to highly weathered, white speckled to streaked | Reddish brown, clayey silty sandy gravel with cobbles, ferruginised / | | | |
| | Method of Preparation used | Scalping | Scalping | Scalping | | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | | | |
| | 53,0 mm | | | 100 | | | |
| | 37,5 mm | 100 | | 96 | | | |
| | 26,5 mm | 95 | | 87 | | | |
| | 19,0 mm | 90 | | 77 | | | |
| | 13,2 mm | 84 | 100 | 71 | | | |
| | 4,75 mm | 60 | 98 | 51 | | | |
| | 2,00 mm | 45 | 87 | 34 | | | |
| | 0,425 mm | 34 | 40 | 28 | | | |
| | 0,075 mm | 20 | 21 | 15 | | | |
| | Grading Modulus (GM) | 2.01 | 1.52 | 2.23 | | | |
| Atterberg Limits | Liquid Limit (LL) | 32 | | 23 | | | |
| | Plasticity Index (PI) | 12 | 1 | 8 | | | |
| | Linear Shrinkage (LS) | 6.0 | | 3.5 | | | |
| Mod AASHTO & CBR values | CBR @ 100 % | | 76 | | | | |
| | CBR @ 98 % | | 51 | | | | |
| | CBR @ 95 % | | 28 | | | | |
| | CBR @ 93 % | | 18 | | | | |
| | CBR @ 90 % | | 10 | | | | |
| | Swell @ 100 % | | 0.0 | | | | |
| | Mod AASHTO (kg/m$^3$) | | 2020 | | | | |
| | O.M.C. (%) | | 8.8 | | | | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Note 1: In the case of G6 and G7 material with a large coarse fraction, Maximum Pi = 3GM+10

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

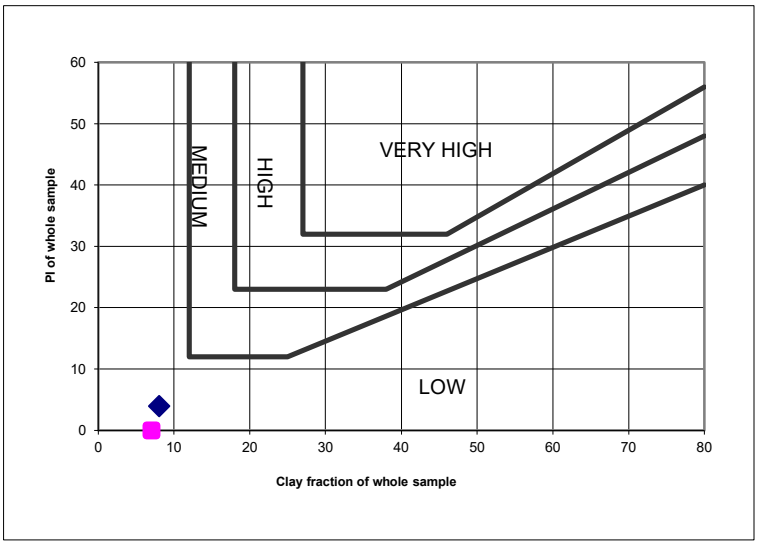
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

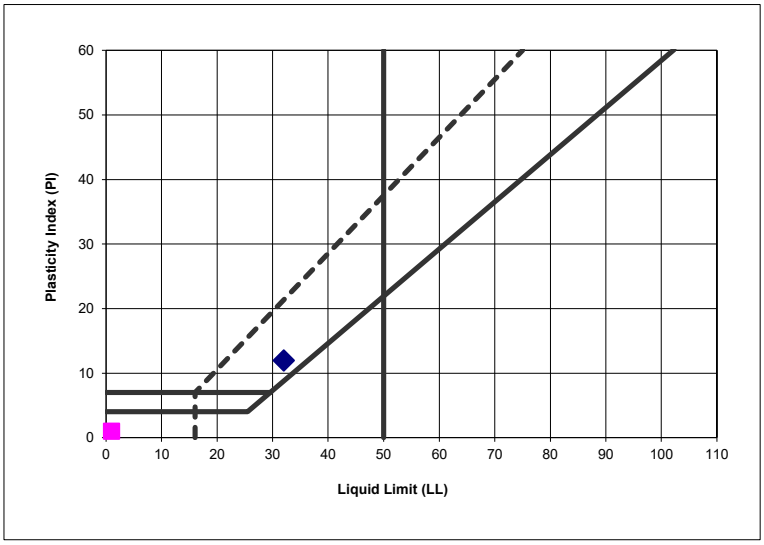
Project: Omitiomire | Sampling Date: 23-Jun-23

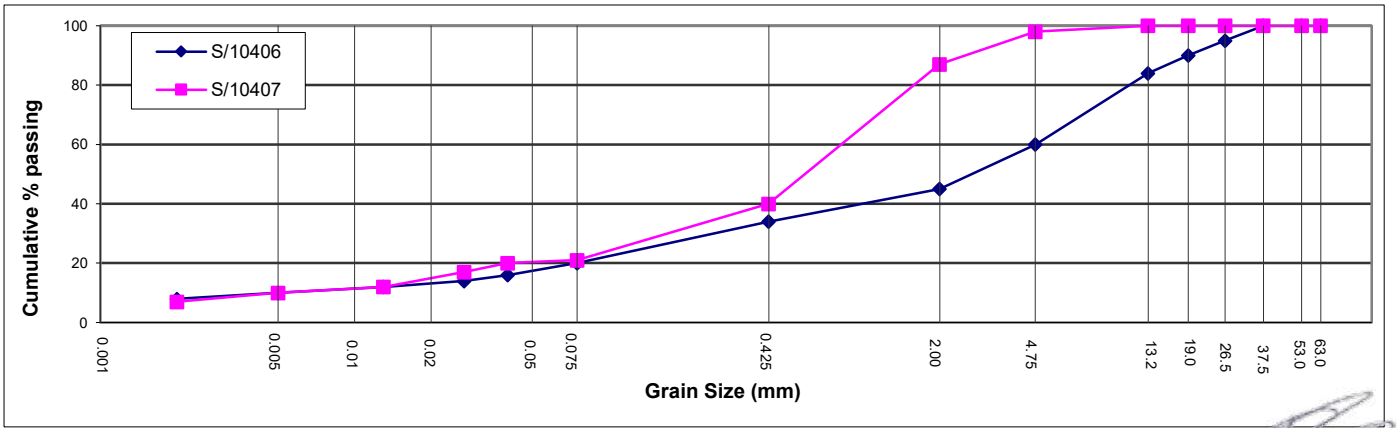
| Sample No. | S/10406 | S/10407 |
|---|---|---|
| Report No. | SG23/1612 | |
| Depth (mm) | 900-1100 | 1200-1500 |
| Position | AM-TP02 | AM-TP04 |
| Material description | Clayey sand with gravel | Silty sand |
| Moisture (%) | | |
| SG | 2.629 | 2.571 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | 100 | |
| 26.5 mm | 95 | |
| 19.0 mm | 90 | |
| 13.2 mm | 84 | 100 |
| 4.75 mm | 60 | 98 |
| 2.00 mm | 45 | 87 |
| 0.425 mm | 34 | 40 |
| 0.075 mm | 20 | 21 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 16 | 20 |
| 0.027 mm | 14 | 17 |
| 0.013 mm | 12 | 12 |
| 0.005 mm | 10 | 10 |
| 0.002 mm | 8 | 7 |
| % Clay (<0.002 mm) | 8 | 7 |
| % Silt (<0.075, >0.002 mm) | 12 | 14 |
| % Sand (<4.75, >0.075 mm) | 40 | 77 |
| % Gravel (> 4.75 mm) | 40 | 2 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 32 | |
| Plasticity Index (-0.425) | 12 | 1 |
| Linear Shrinkage (%) | 6.0 | 0.0 |
| PI of whole sample | 4 | 0 |
| Grading Modulus | 2.01 | 1.52 |
| TRB Classification | A-4 (1) | A-1-b (0) |
| Unified Classification | SC | SM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

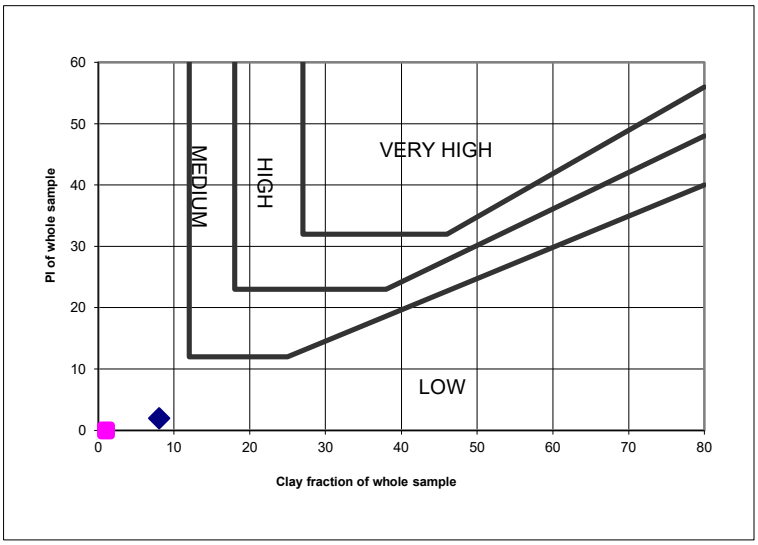
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

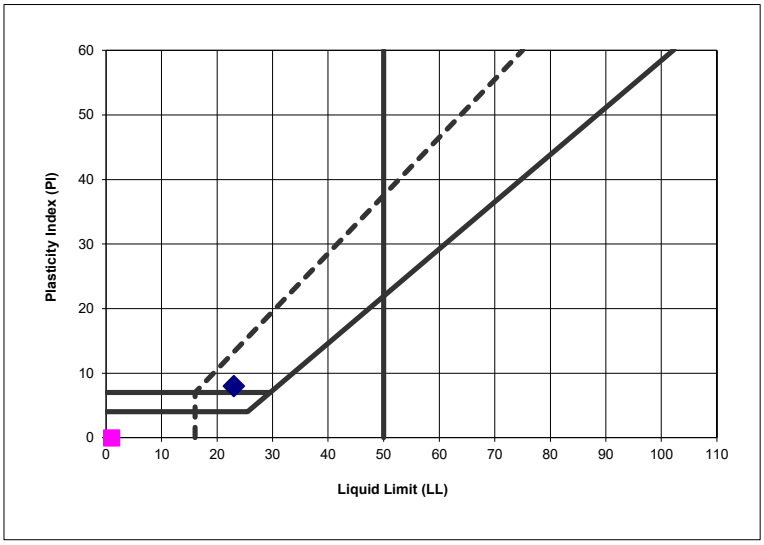
Project: Omitiomire | Sampling Date: 23-Jun-23

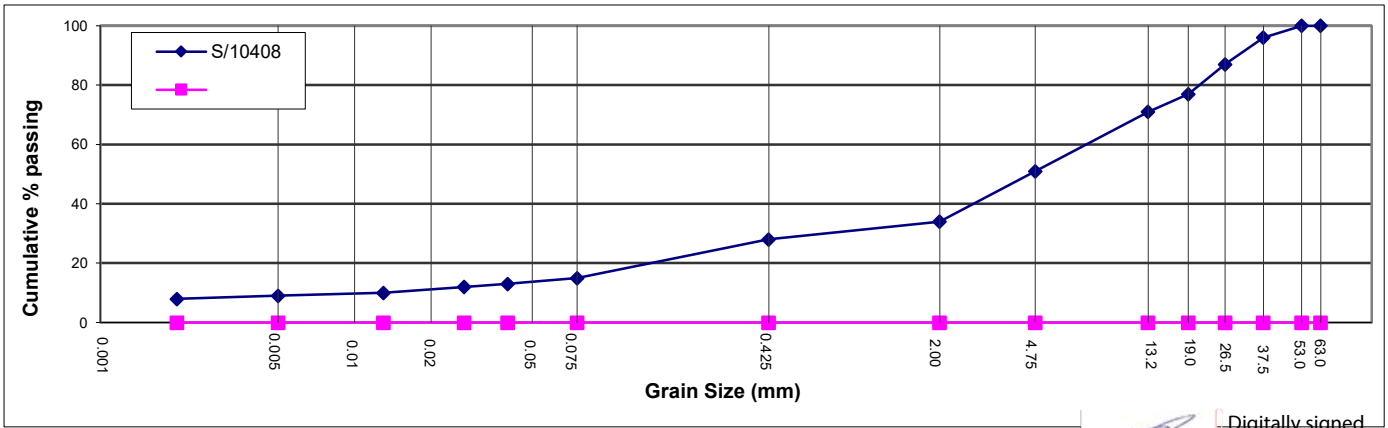
| Sample No. | S/10408 | |
|---|---|---|
| Report No. | SG23/1612 | |
| Depth (mm) | 700-1000 | |
| Position | AM-TP03 | |
| Material description | Clayey gravel with sand | |
| Moisture (%) | | |
| SG | 2.658 | |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | 100 | |
| 37.5 mm | 96 | |
| 26.5 mm | 87 | |
| 19.0 mm | 77 | |
| 13.2 mm | 71 | |
| 4.75 mm | 51 | |
| 2.00 mm | 34 | |
| 0.425 mm | 28 | |
| 0.075 mm | 15 | |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 13 | |
| 0.027 mm | 12 | |
| 0.013 mm | 10 | |
| 0.005 mm | 9 | |
| 0.002 mm | 8 | |
| % Clay (<0.002 mm) | 8 | |
| % Silt (<0.075, >0.002 mm) | 7 | |
| % Sand (<4.75, >0.075 mm) | 36 | |
| % Gravel (> 4.75 mm) | 49 | |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 23 | |
| Plasticity Index (-0.425) | 8 | |
| Linear Shrinkage (%) | 3.5 | |
| PI of whole sample | 2 | |
| Grading Modulus | 2.23 | |
| TRB Classification | A-2-4 (0) | |
| Unified Classification | GC | |

**Potential Expansiveness**




**Plasticity Chart**






Digitally signed by Jaco Strydom
Date: 2023.08.17 15:44:17 +02'00'

# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Heap Leach Pad (HLP) **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1616 **Page no :** 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10409** | **S/10412** | **S/10414** | **S/10418** | **S/10419** | **S/10421** |
| | Chainage | | | | | | |
| | Position (from LHS) | HLP-TP03 | HLP-TP08 | HLP-TP24 | HLP-TP13 | HLP-TP24 | HLP-TP20 |
| | Depth sampled (mm) | 800-2300 | 650-1350 | 1200-1750 | 300-2250 | 800-1200 | 1600-1800 |
| | Sample description | Yellowish brown to khaki, silty sandy gravel, calcified coarse alluvium | Brown, clayey sandy silt. Fine Alluvium | Brown, sandy silty gravel. Coarse Alluvium. | Light brown to brown, gravelly silty fine sand. Calcareous Alluvium. | Brown, gravelly sandy silt. Calcareous Alluvium. | Completely weathered, white speckled to streaked black stained khaki to orange, very soft rock, gneiss |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | Scalping | Scalping |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | 89 | | | | 100 | |
| | 53,0 mm | 66 | | 100 | | 88 | |
| | 37,5 mm | 66 | | 83 | | 85 | |
| | 26,5 mm | 57 | | 73 | | 80 | |
| | 19,0 mm | 48 | 100 | 68 | | 79 | 100 |
| | 13,2 mm | 45 | 98 | 63 | | 79 | 97 |
| | 4,75 mm | 38 | 98 | 50 | 100 | 76 | 77 |
| | 2,00 mm | 33 | 95 | 43 | 99 | 74 | 60 |
| | 0,425 mm | 23 | 77 | 28 | 74 | 53 | 25 |
| | 0,075 mm | 13 | 60 | 9 | 27 | 19 | 11 |
| | Grading Modulus (GM) | 2.31 | 0.68 | 2.20 | 1.00 | 1.54 | 2.04 |
| Atterberg Limits | Liquid Limit (LL) | 27 | 56 | | | | 28 |
| | Plasticity Index (PI) | 12 | 22 | 1 | 1 | 1 | 8 |
| | Linear Shrinkage (LS) | 6.0 | 10.0 | | | | 2.5 |
| Mod AASHTO & CBR values | CBR @ 100 % | 55 | 4 | 191 | 81 | | |
| | CBR @ 98 % | 45 | <3 | 107 | 60 | | |
| | CBR @ 95 % | 33 | <3 | 45 | 38 | | |
| | CBR @ 93 % | 27 | <3 | 25 | 28 | | |
| | CBR @ 90 % | 20 | <3 | 11 | 18 | | |
| | Swell @ 100 % | 0.0 | 0.1 | 0.1 | 0.0 | | |
| | Mod AASHTO (kg/m$^3$) | 1858 | 1517 | 2138 | 2054 | | |
| | O.M.C. (%) | 13.7 | 23.3 | 6.5 | 7.3 | | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | 90.0% Mod AASHTO @ OMC | 90.0% Mod AASHTO @ OMC | | 93.0% Proctor @ OMC | |
| | Permeabilty cm/s | | 9.26 E-07 | 2.19 E-04 | | 1.51 E-04 | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Note 1: In the case of G6 and G7 material with a large coarse fraction, Maximum Pi = 3GM+10

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## Namibia Technical Services cc

### SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Heap Leach Pad (HLP) **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1616 **Page no :** 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10419** | | | | | |
| | Chainage | | | | | | |
| | Position (from LHS) | HLP-TP24 | | | | | |
| | Depth sampled (mm) | 800-1200 | | | | | |
| | Sample description | Brown, gravelly sandy silt. Calcareous Alluvium. | | | | | |
| | Method of Preparation used | | | | | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | 100 | | | | | |
| | 53,0 mm | 88 | | | | | |
| | 37,5 mm | 85 | | | | | |
| | 26,5 mm | 80 | | | | | |
| | 19,0 mm | 79 | | | | | |
| | 13,2 mm | 79 | | | | | |
| | 4,75 mm | 76 | | | | | |
| | 2,00 mm | 74 | | | | | |
| | 0,425 mm | 53 | | | | | |
| | 0,075 mm | 19 | | | | | |
| | Grading Modulus (GM) | 1.54 | | | | | |
| Atterberg Limits | Liquid Limit (LL) | | | | | | |
| | Plasticity Index (PI) | 1 | | | | | |
| | Linear Shrinkage (LS) | 0.0 | | | | | |
| Mod AASHTO & CBR values | CBR @ 100 % | | | | | | |
| | CBR @ 98 % | | | | | | |
| | CBR @ 95 % | | | | | | |
| | CBR @ 93 % | | | | | | |
| | CBR @ 90 % | | | | | | |
| | Swell @ 100 % | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| Proctor | Proctor MDD (kg/m³) | 2085 | | | | | |
| | O.M.C. (%) | 6.7 | | | | | |
| Chem. | pH | | | | | | |
| | Conductivity (Sm$^{-1}$) | | | | | | |

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

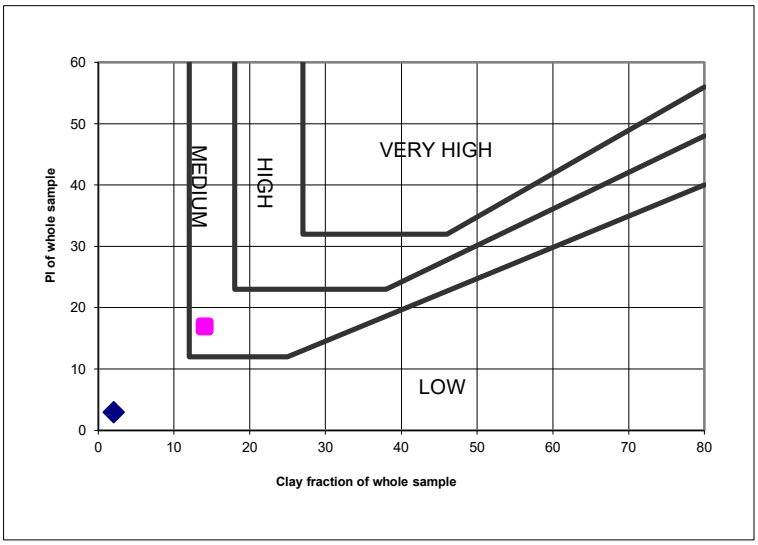
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

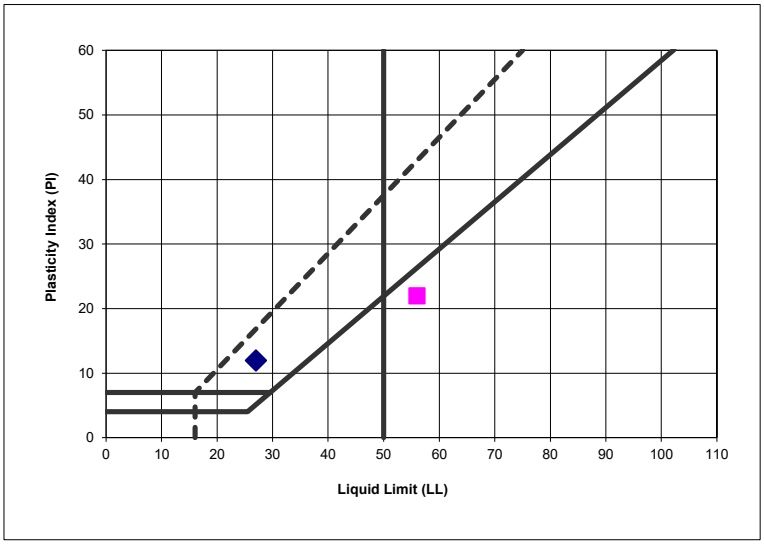
Project: Omitiomire | Sampling Date: 23-Jun-23

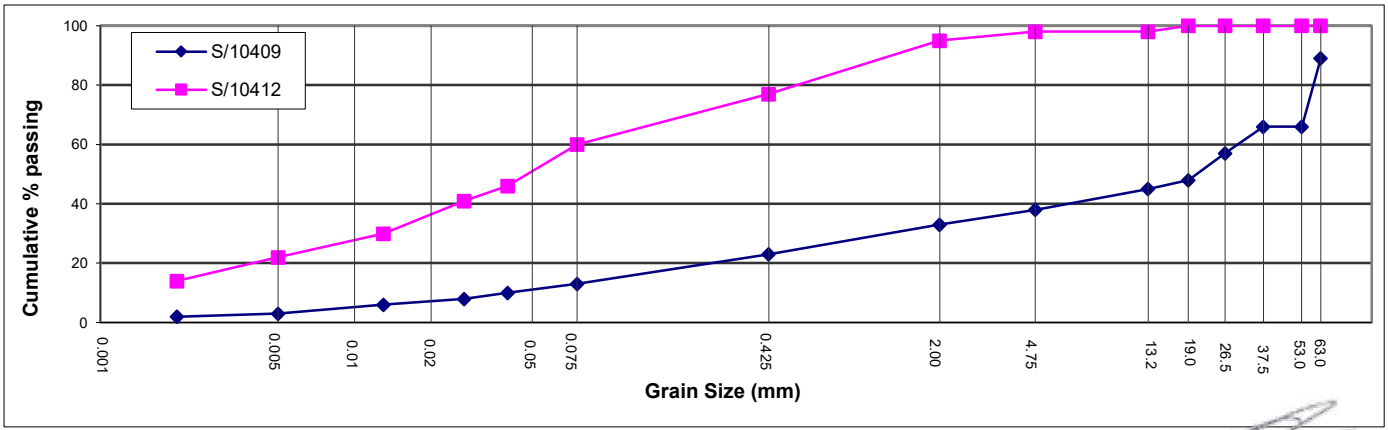
| Sample No. | S/10409 | S/10412 |
|---|---|---|
| Report No. | SG23/1616 | |
| Depth (mm) | 800-2300 | 650-1350 |
| Position | HLP-TP03 | HLP-TP08 |
| Material description | Clayey gravel with sand | Sandy elastic silt |
| Moisture (%) | | |
| SG | 2.608 | 2.492 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 89 | |
| 53.0 mm | 66 | |
| 37.5 mm | 66 | |
| 26.5 mm | 57 | |
| 19.0 mm | 48 | 100 |
| 13.2 mm | 45 | 98 |
| 4.75 mm | 38 | 98 |
| 2.00 mm | 33 | 95 |
| 0.425 mm | 23 | 77 |
| 0.075 mm | 13 | 60 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 10 | 46 |
| 0.027 mm | 8 | 41 |
| 0.013 mm | 6 | 30 |
| 0.005 mm | 3 | 22 |
| 0.002 mm | 2 | 14 |
| % Clay (<0.002 mm) | 2 | 14 |
| % Silt (<0.075, >0.002 mm) | 11 | 46 |
| % Sand (<4.75, >0.075 mm) | 25 | 38 |
| % Gravel (> 4.75 mm) | 62 | 2 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 27 | 56 |
| Plasticity Index (-0.425) | 12 | 22 |
| Linear Shrinkage (%) | 6.0 | 10.0 |
| PI of whole sample | 3 | 17 |
| Grading Modulus | 2.31 | 0.68 |
| TRB Classification | A-2-6 (0) | A-7-5 (12) |
| Unified Classification | GC | MH |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

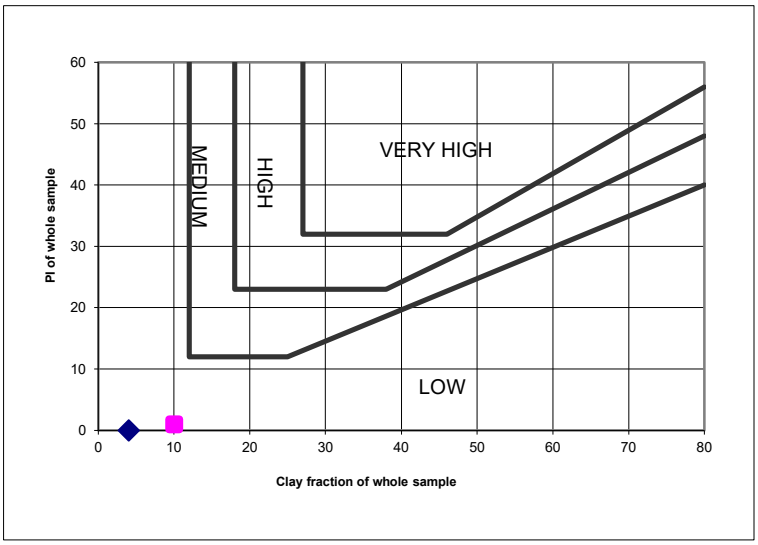
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

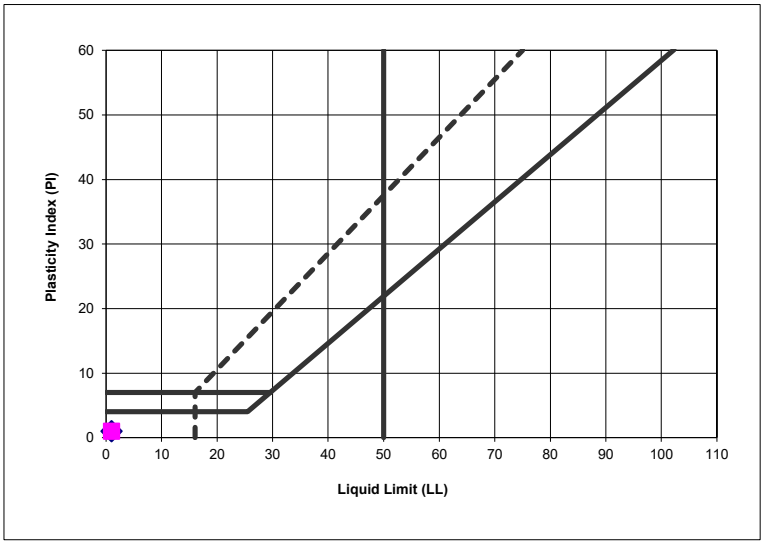
Project: Omitiomire | Sampling Date: 23-Jun-23

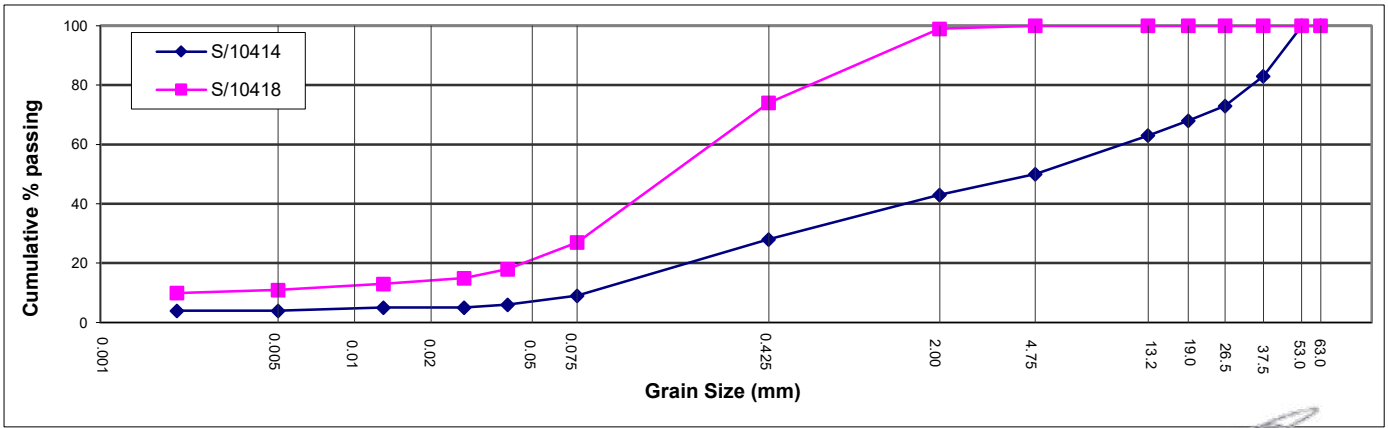
| Sample No. | S/10414 | S/10418 |
|---|---|---|
| Report No. | SG23/1616 | |
| Depth (mm) | 1200-1750 | 300-2250 |
| Position | HLP-TP24 | HLP-TP13 |
| Material description | Poorly graded gravel with silt and sand | Silty sand |
| Moisture (%) | | |
| SG | 2.564 | 2.620 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | 100 | |
| 37.5 mm | 83 | |
| 26.5 mm | 73 | |
| 19.0 mm | 68 | |
| 13.2 mm | 63 | |
| 4.75 mm | 50 | 100 |
| 2.00 mm | 43 | 99 |
| 0.425 mm | 28 | 74 |
| 0.075 mm | 9 | 27 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 6 | 18 |
| 0.027 mm | 5 | 15 |
| 0.013 mm | 5 | 13 |
| 0.005 mm | 4 | 11 |
| 0.002 mm | 4 | 10 |
| % Clay (<0.002 mm) | 4 | 10 |
| % Silt (<0.075, >0.002 mm) | 5 | 17 |
| % Sand (<4.75, >0.075 mm) | 41 | 73 |
| % Gravel (> 4.75 mm) | 50 | 0 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | | |
| Plasticity Index (-0.425) | 1 | 1 |
| Linear Shrinkage (%) | 0.0 | 0.0 |
| PI of whole sample | 0 | 1 |
| Grading Modulus | 2.20 | 1.00 |
| TRB Classification | A-1-a (0) | A-2-4 (0) |
| Unified Classification | GP-GM | SM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

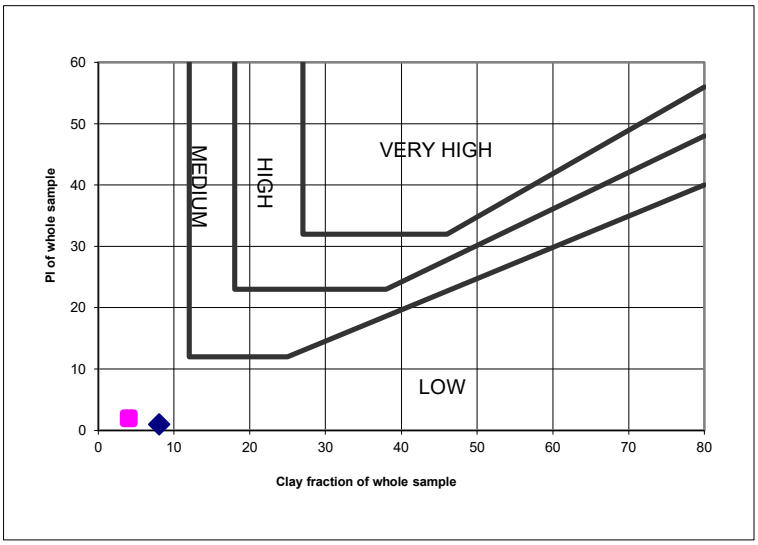
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

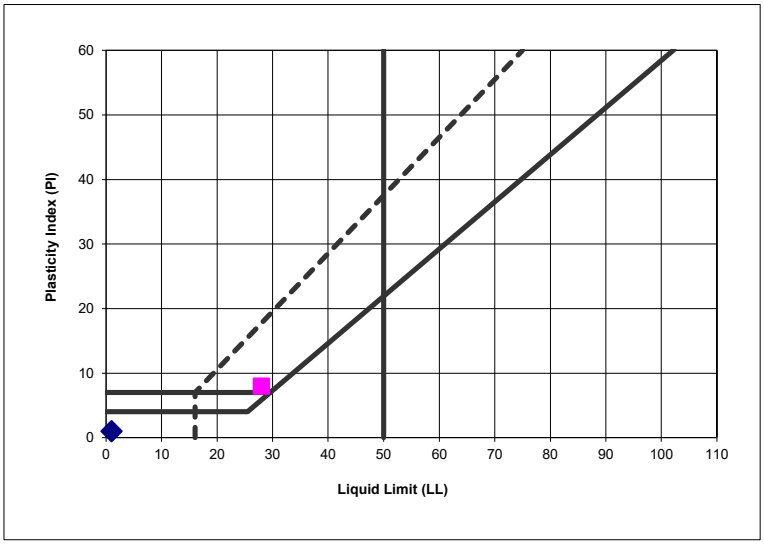
Project: Omitiomire | Sampling Date: 23-Jun-23

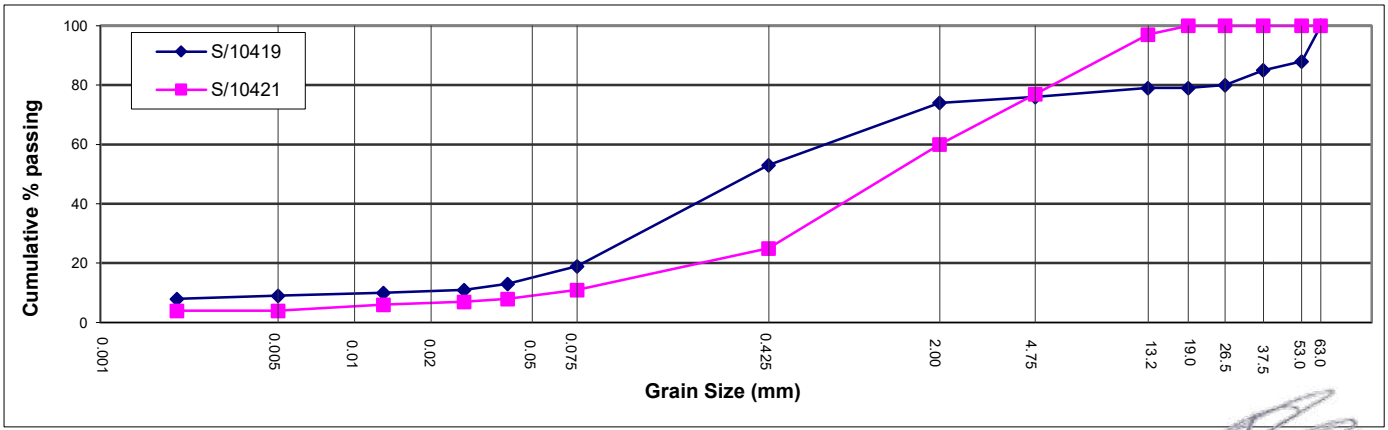
| Sample No. | S/10419 | S/10421 |
|---|---|---|
| Report No. | SG23/1616 | |
| Depth (mm) | 800-1200 | 1600-1800 |
| Position | HLP-TP24 | HLP-TP20 |
| Material description | Silty sand with gravel | Well graded sand with clay and gravel |
| Moisture (%) | | |
| SG | 2.609 | 2.566 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 100 | |
| 53.0 mm | 88 | |
| 37.5 mm | 85 | |
| 26.5 mm | 80 | |
| 19.0 mm | 79 | 100 |
| 13.2 mm | 79 | 97 |
| 4.75 mm | 76 | 77 |
| 2.00 mm | 74 | 60 |
| 0.425 mm | 53 | 25 |
| 0.075 mm | 19 | 11 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 13 | 8 |
| 0.027 mm | 11 | 7 |
| 0.013 mm | 10 | 6 |
| 0.005 mm | 9 | 4 |
| 0.002 mm | 8 | 4 |
| % Clay (<0.002 mm) | 8 | 4 |
| % Silt (<0.075, >0.002 mm) | 11 | 7 |
| % Sand (<4.75, >0.075 mm) | 57 | 66 |
| % Gravel (> 4.75 mm) | 24 | 23 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | | 28 |
| Plasticity Index (-0.425) | 1 | 8 |
| Linear Shrinkage (%) | 0.0 | 2.5 |
| PI of whole sample | 1 | 2 |
| Grading Modulus | 1.54 | 2.04 |
| TRB Classification | A-2-4 (0) | A-1-b (0) |
| Unified Classification | SM | SW-SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Heap Leach Pad (HLP) **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1616 **Page no :** 6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10423** | **S/10424** | **S/10426** | | | |
| | Chainage | | | | | | |
| | Position (from LHS) | HLP-TP04 | HL/PA-TP29 | HLP-TP03 | | | |
| | Depth sampled (mm) | 1100-1350 | 1700-1900 | 2300-3100 | | | |
| | Sample description | Light brown blotched wihite, sandy silty gravel. Nodular Calcrete. | Yellowish brown to khaki, silty sandy gravel, ferruginised pebble marker | Khaki to white streaked to banded black, silty sandy gravel to silty gravelly sand, calcified residual gneiss | | | |
| | Method of Preparation used | Scalping | Scalping | Scalping | | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | 85 | 100 | 90 | | | |
| | 53,0 mm | 64 | 92 | 70 | | | |
| | 37,5 mm | 55 | 85 | 68 | | | |
| | 26,5 mm | 51 | 76 | 63 | | | |
| | 19,0 mm | 47 | 67 | 60 | | | |
| | 13,2 mm | 45 | 61 | 58 | | | |
| | 4,75 mm | 40 | 50 | 51 | | | |
| | 2,00 mm | 35 | 45 | 46 | | | |
| | 0,425 mm | 27 | 29 | 24 | | | |
| | 0,075 mm | 16 | 14 | 11 | | | |
| | Grading Modulus (GM) | 2.22 | 2.12 | 2.19 | | | |
| Atterberg Limits | Liquid Limit (LL) | 28 | 19 | 25 | | | |
| | Plasticity Index (PI) | 11 | 6 | 5 | | | |
| | Linear Shrinkage (LS) | 4.0 | 2.0 | 2.5 | | | |
| Mod AASHTO & CBR values | CBR @ 100 % | 43 | 87 | 44 | | | |
| | CBR @ 98 % | 29 | 64 | 33 | | | |
| | CBR @ 95 % | 16 | 40 | 21 | | | |
| | CBR @ 93 % | 11 | 29 | 16 | | | |
| | CBR @ 90 % | 6 | 18 | 10 | | | |
| | Swell @ 100 % | 0.0 | 0.0 | 0.1 | | | |
| | Mod AASHTO (kg/m$^3$) | 1994 | 2204 | 1974 | | | |
| | O.M.C. (%) | 10.7 | 6.3 | 11.0 | | | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | 90.0% Mod AASHTO @ OMC | 90.0% Mod AASHTO @ OMC | 90.0% Mod AASHTO @ OMC | | | |
| | Permeabilty cm/s | 1.50 E-06 | 7.78 E-04 | 3.92 E-05 | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Note 1: In the case of G6 and G7 material with a large coarse fraction, Maximum Pi = 3GM+10

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

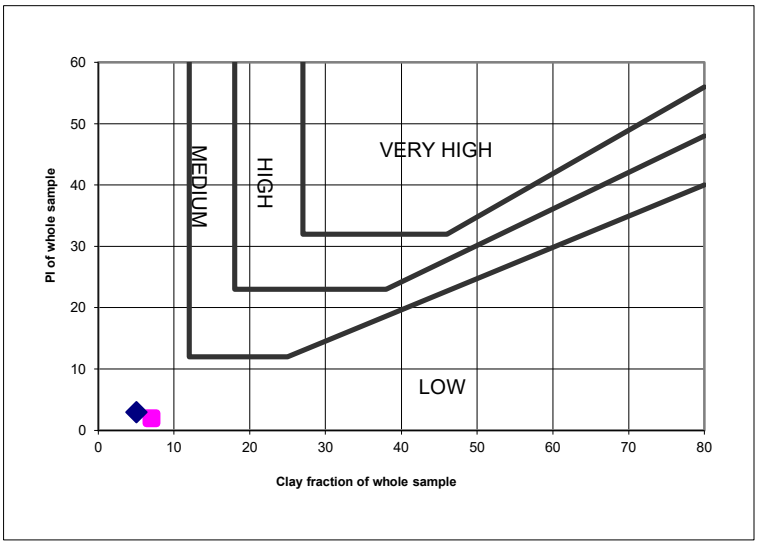
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

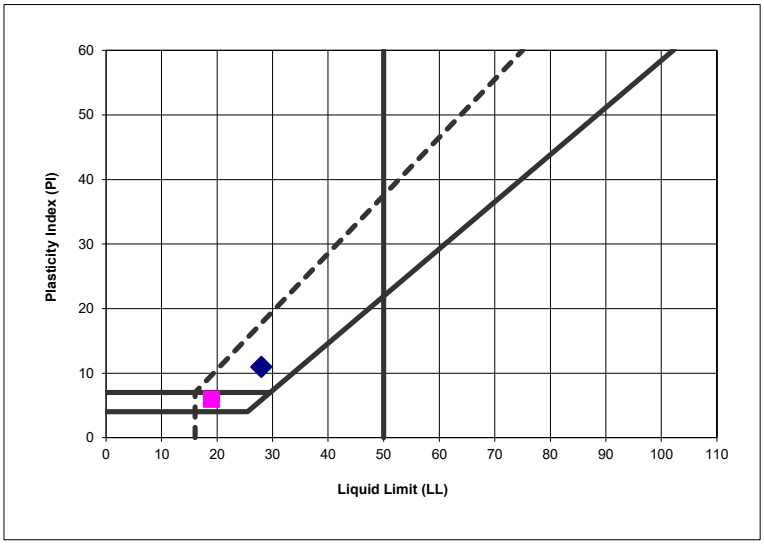
Project: Omitiomire | Sampling Date: 23-Jun-23

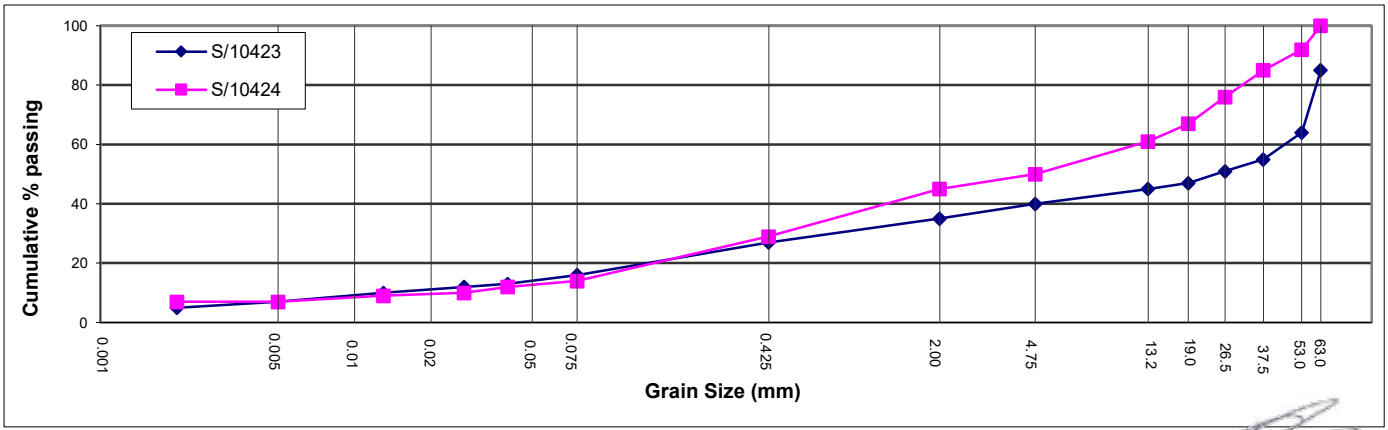
| Sample No. | S/10423 | S/10424 |
|---|---|---|
| Report No. | SG23/1616 | |
| Depth (mm) | 1100-1350 | 1700-1900 |
| Position | HLP-TP04 | HL/PA-TP29 |
| Material description | Clayey gravel with sand | Silty, clayey gravel with sand |
| Moisture (%) | | |
| SG | 2.617 | 2.619 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 85 | 100 |
| 53.0 mm | 64 | 92 |
| 37.5 mm | 55 | 85 |
| 26.5 mm | 51 | 76 |
| 19.0 mm | 47 | 67 |
| 13.2 mm | 45 | 61 |
| 4.75 mm | 40 | 50 |
| 2.00 mm | 35 | 45 |
| 0.425 mm | 27 | 29 |
| 0.075 mm | 16 | 14 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 13 | 12 |
| 0.027 mm | 12 | 10 |
| 0.013 mm | 10 | 9 |
| 0.005 mm | 7 | 7 |
| 0.002 mm | 5 | 7 |
| % Clay (<0.002 mm) | 5 | 7 |
| % Silt (<0.075, >0.002 mm) | 11 | 7 |
| % Sand (<4.75, >0.075 mm) | 24 | 36 |
| % Gravel (> 4.75 mm) | 60 | 50 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 28 | 19 |
| Plasticity Index (-0.425) | 11 | 6 |
| Linear Shrinkage (%) | 4.0 | 2.0 |
| PI of whole sample | 3 | 2 |
| Grading Modulus | 2.22 | 2.12 |
| TRB Classification | A-2-6 (1) | A-1-a (0) |
| Unified Classification | GC | GC-GM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

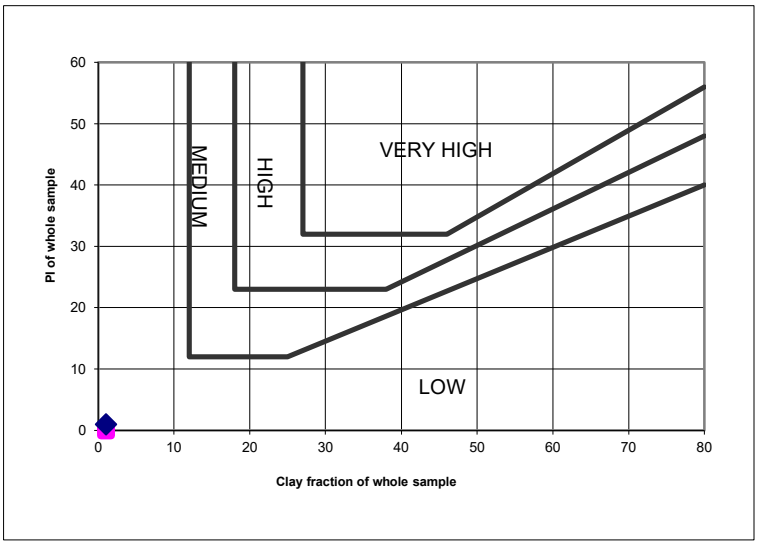
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

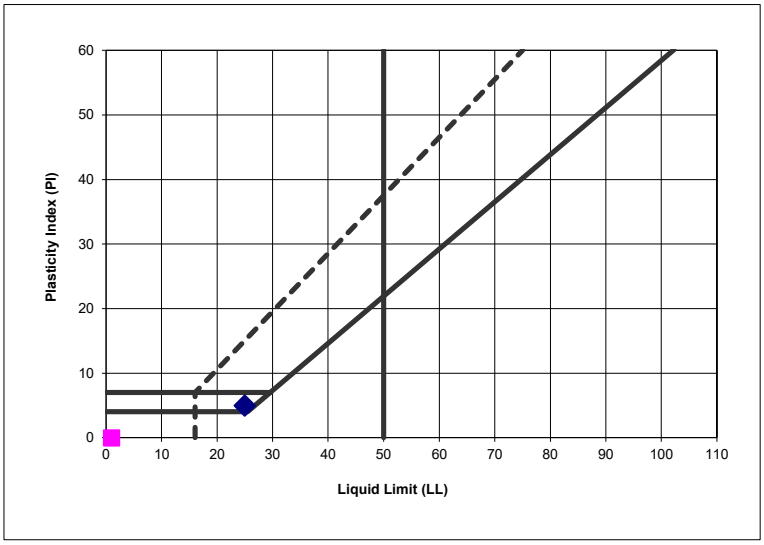
Project: Omitiomire | Sampling Date: 23-Jun-23

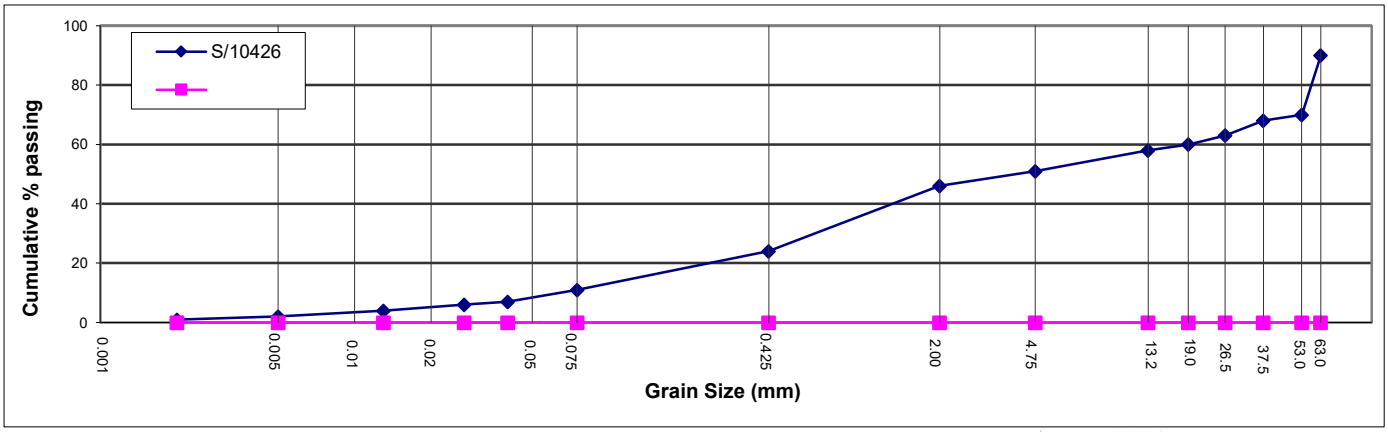
| Sample No. | S/10426 | |
|---|---|---|
| Report No. | SG23/1616 | |
| Depth (mm) | 2300-3100 | |
| Position | HLP-TP03 | |
| Material description | Silty, clayey gravel with sand | |
| Moisture (%) | | |
| SG | 2.601 | |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 90 | |
| 53.0 mm | 70 | |
| 37.5 mm | 68 | |
| 26.5 mm | 63 | |
| 19.0 mm | 60 | |
| 13.2 mm | 58 | |
| 4.75 mm | 51 | |
| 2.00 mm | 46 | |
| 0.425 mm | 24 | |
| 0.075 mm | 11 | |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 7 | |
| 0.027 mm | 6 | |
| 0.013 mm | 4 | |
| 0.005 mm | 2 | |
| 0.002 mm | 1 | |
| % Clay (<0.002 mm) | 1 | |
| % Silt (<0.075, >0.002 mm) | 10 | |
| % Sand (<4.75, >0.075 mm) | 40 | |
| % Gravel (> 4.75 mm) | 49 | |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 25 | |
| Plasticity Index (-0.425) | 5 | |
| Linear Shrinkage (%) | 2.5 | |
| PI of whole sample | 1 | |
| Grading Modulus | 2.19 | |
| TRB Classification | A-1-a (0) | |
| Unified Classification | GC-GM | |

**Potential Expansiveness**




**Plasticity Chart**






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# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

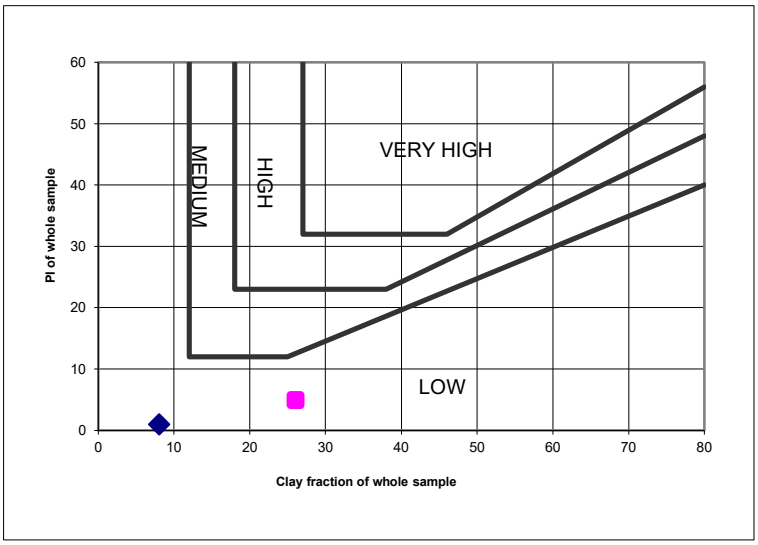
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

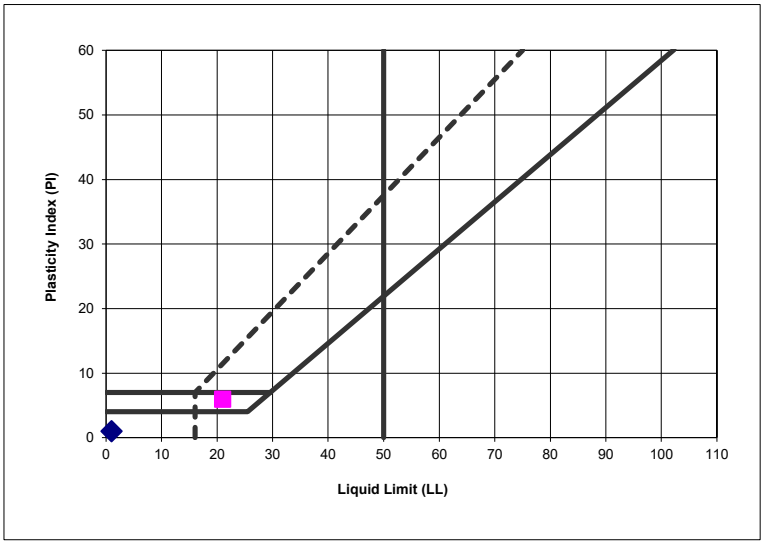
Project: Omitiomire | Sampling Date: 23-Jun-23

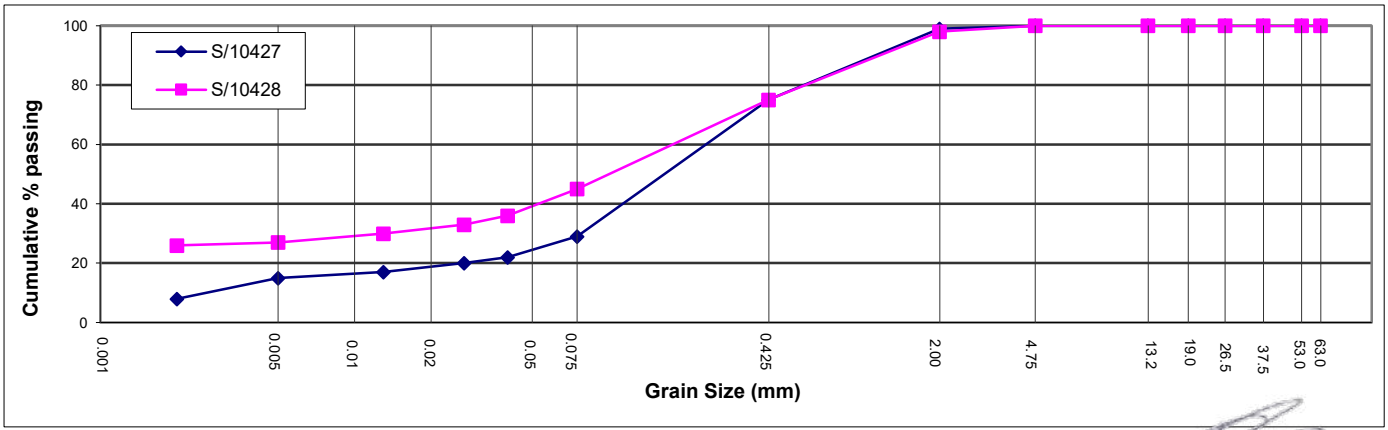
| Sample No. | S/10427 | S/10428 |
|---|---|---|
| Report No. | SG23/1617 | |
| Depth (mm) | 0-700 | 700-1000 |
| Position | Plant-TP32 | Plant-TP32 |
| Material description | Silty sand | Silty clayey sand |
| Moisture (%) | | |
| SG | 2.609 | 2.515 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | |
| 13.2 mm | | 100 |
| 4.75 mm | 100 | 100 |
| 2.00 mm | 99 | 98 |
| 0.425 mm | 75 | 75 |
| 0.075 mm | 29 | 45 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 22 | 36 |
| 0.027 mm | 20 | 33 |
| 0.013 mm | 17 | 30 |
| 0.005 mm | 15 | 27 |
| 0.002 mm | 8 | 26 |
| % Clay (<0.002 mm) | 8 | 26 |
| % Silt (<0.075, >0.002 mm) | 21 | 19 |
| % Sand (<4.75, >0.075 mm) | 71 | 55 |
| % Gravel (> 4.75 mm) | 0 | 0 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | | 21 |
| Plasticity Index (-0.425) | 1 | 6 |
| Linear Shrinkage (%) | 0.0 | 2.0 |
| PI of whole sample | 1 | 5 |
| Grading Modulus | 0.97 | 0.82 |
| TRB Classification | A-2-4 (0) | A-4 (2) |
| Unified Classification | SM | SC-SM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

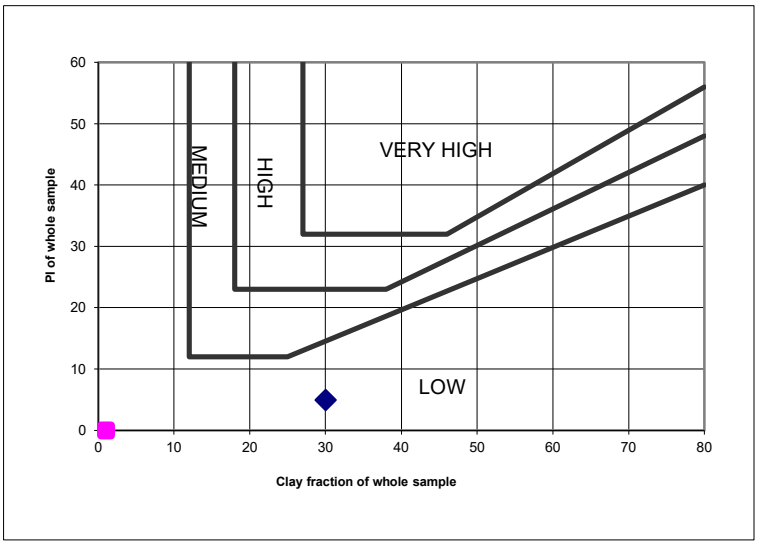
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

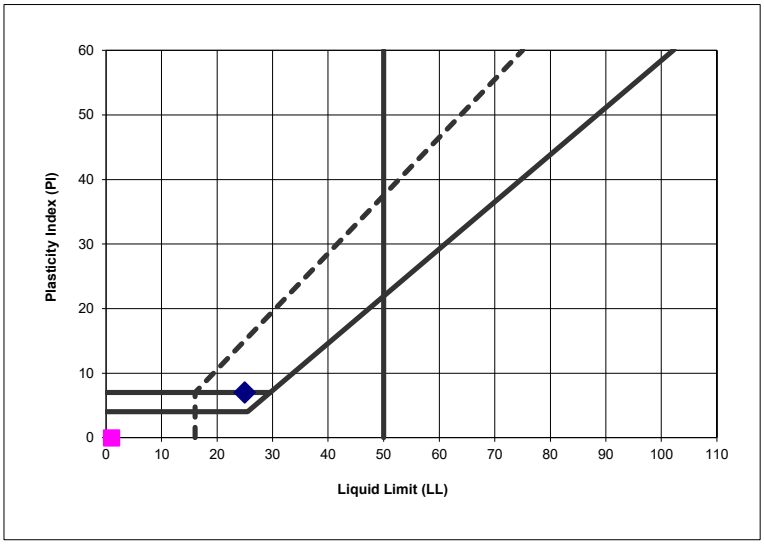
Project: Omitiomire | Sampling Date: 23-Jun-23

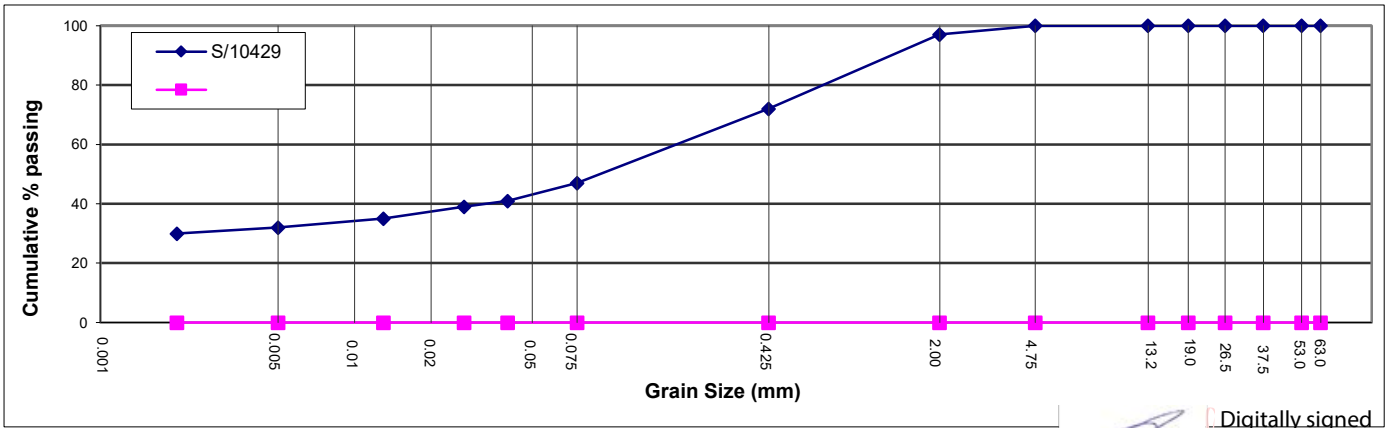
| Sample No. | S/10429 | |
|---|---|---|
| Report No. | SG23/1617 | |
| Depth (mm) | 1000-1700 | |
| Position | Plant-TP32 | |
| Material description | Clayey sand | |
| Moisture (%) | | |
| SG | 2.538 | |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | |
| 13.2 mm | 100 | |
| 4.75 mm | 100 | |
| 2.00 mm | 97 | |
| 0.425 mm | 72 | |
| 0.075 mm | 47 | |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 41 | |
| 0.027 mm | 39 | |
| 0.013 mm | 35 | |
| 0.005 mm | 32 | |
| 0.002 mm | 30 | |
| % Clay (<0.002 mm) | 30 | |
| % Silt (<0.075, >0.002 mm) | 17 | |
| % Sand (<4.75, >0.075 mm) | 53 | |
| % Gravel (> 4.75 mm) | 0 | |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 25 | |
| Plasticity Index (-0.425) | 7 | |
| Linear Shrinkage (%) | 2.5 | |
| PI of whole sample | 5 | |
| Grading Modulus | 0.84 | |
| TRB Classification | A-4 (3) | |
| Unified Classification | SC | |

### Potential Expansiveness




### Plasticity Chart






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# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** New Road **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1618 **Page no :** 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10432** | **S/10437** | **S/10443** | **S/10450** | **S/10452** | **S/10454** |
| | Chainage | | | | | | |
| | Position (from LHS) | RD-TP02 | RD-TP04 | RD-TP12 | RD-TP08 | RD-TP02 | RD-TP14 |
| | Depth sampled (mm) | 1200-2800 | 600-2900 | 1100-4300 | 1000-3200 | 3900-4300 | 1400-2600 |
| | Sample description | Brown to greyish brown, silty clayey sand with minor cobbles to boulders, coarse alluvium | Reddish brown, clayey silty coarse sand with traces of gravel, fine alluvium | Reddish brown slightly stained brown, clayey silty gravelly sand with minor fine gravel, fine alluvium | White to yellowish brown, silty gravelly sand, calcified alluvium | Completely weathered, white streaked black and gold, very soft rock, biotite gneiss | Completely weathered, dark grey streaked white stained orange, very soft rock, ferruginised biotite gneiss |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | Scalping | Scalping |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | 89 | | | | 100 | |
| | 53,0 mm | 89 | | | | 85 | 100 |
| | 37,5 mm | 86 | | | | 81 | 91 |
| | 26,5 mm | 82 | | | | 73 | 86 |
| | 19,0 mm | 79 | | | 100 | 72 | 81 |
| | 13,2 mm | 79 | | | 98 | 71 | 75 |
| | 4,75 mm | 73 | 100 | 100 | 92 | 69 | 61 |
| | 2,00 mm | 58 | 99 | 97 | 88 | 62 | 52 |
| | 0,425 mm | 21 | 84 | 77 | 71 | 26 | 40 |
| | 0,075 mm | 13 | 34 | 30 | 46 | 16 | 25 |
| | Grading Modulus (GM) | 2.08 | 0.83 | 0.96 | 0.95 | 1.96 | 1.83 |
| Atterberg Limits | Liquid Limit (LL) | 28 | | | 48 | 29 | 34 |
| | Plasticity Index (PI) | 11 | 1 | 1 | 20 | 7 | 9 |
| | Linear Shrinkage (LS) | 3.5 | | | 7.5 | 2.5 | 3.5 |
| Mod AASHTO & CBR values | CBR @ 100 % | | 118 | 60 | 5 | 29 | 23 |
| | CBR @ 98 % | | 81 | 46 | 5 | 20 | 20 |
| | CBR @ 95 % | | 46 | 30 | 4 | 11 | 17 |
| | CBR @ 93 % | | 32 | 23 | 4 | 8 | 15 |
| | CBR @ 90 % | | 18 | 16 | 3 | 5 | 12 |
| | Swell @ 100 % | | 0.1 | -0.1 | 0.0 | 0.0 | 0.0 |
| | Mod AASHTO (kg/m$^3$) | | 2041 | 2119 | 1640 | 1940 | 2016 |
| | O.M.C. (%) | | 8.1 | 7.4 | 20.0 | 9.2 | 12.9 |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

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# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** New Road **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1618 **Page no :** 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10455** | | | | | |
| | Chainage | | | | | | |
| | Position (from LHS) | RD-TP13 | | | | | |
| | Depth sampled (mm) | 2600-4000 | | | | | |
| | Sample description | Yellowish brown with scattered red, white and black mottles, clayey gravelly silty fine sand with minor gravels, slightly | | | | | |
| | Method of Preparation used | Scalping | | | | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | | | |
| | 53,0 mm | | | | | | |
| | 37,5 mm | | | | | | |
| | 26,5 mm | | | | | | |
| | 19,0 mm | 100 | | | | | |
| | 13,2 mm | 99 | | | | | |
| | 4,75 mm | 95 | | | | | |
| | 2,00 mm | 90 | | | | | |
| | 0,425 mm | 77 | | | | | |
| | 0,075 mm | 38 | | | | | |
| | Grading Modulus (GM) | 0.95 | | | | | |
| Atterberg Limits | Liquid Limit (LL) | 27 | | | | | |
| | Plasticity Index (PI) | 9 | | | | | |
| | Linear Shrinkage (LS) | 4.5 | | | | | |
| Mod AASHTO & CBR values | CBR @ 100 % | | | | | | |
| | CBR @ 98 % | | | | | | |
| | CBR @ 95 % | | | | | | |
| | CBR @ 93 % | | | | | | |
| | CBR @ 90 % | | | | | | |
| | Swell @ 100 % | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

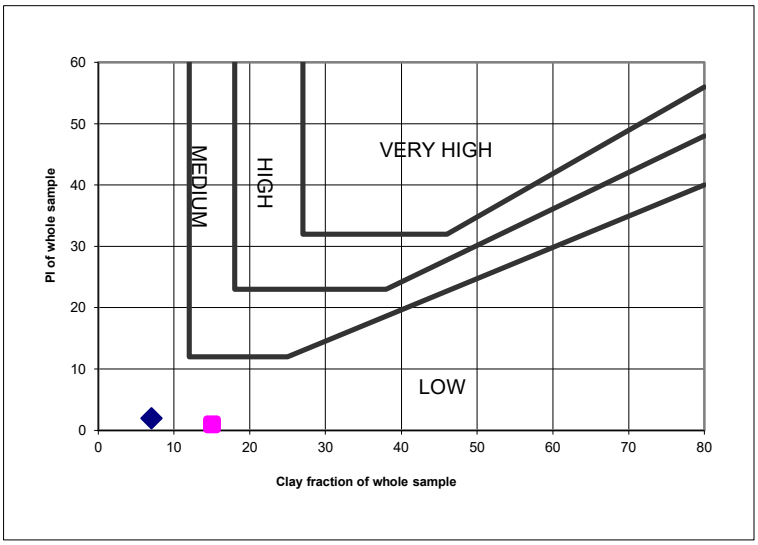
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

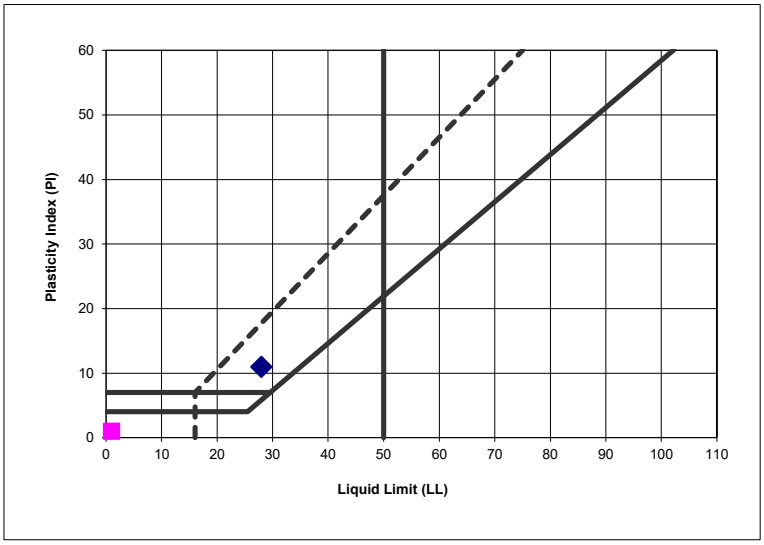
Project: Omitiomire | Sampling Date: 23-Jun-23

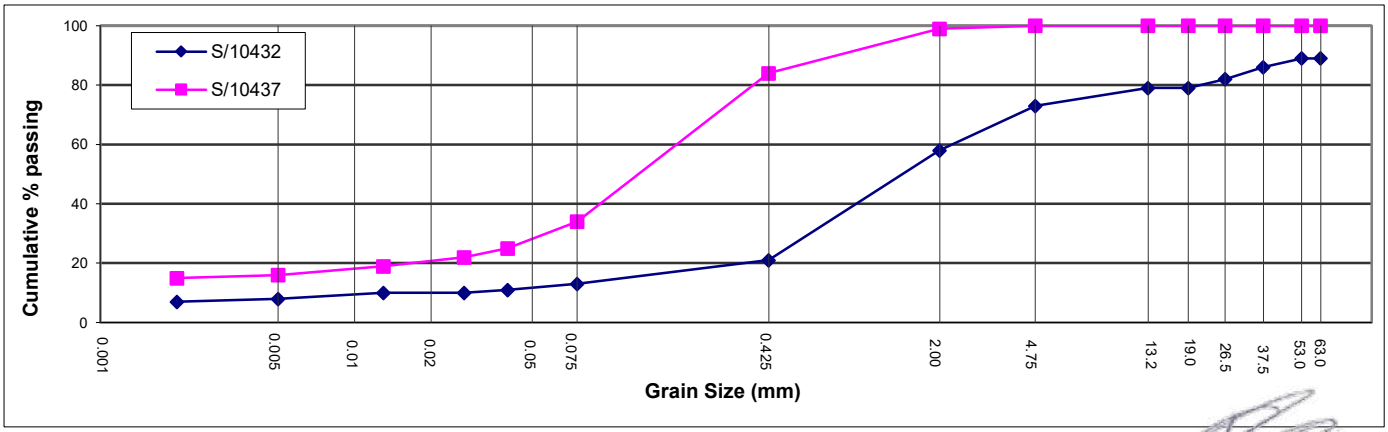
| Sample No. | S/10432 | S/10437 |
|---|---|---|
| Report No. | SG23/1618 | |
| Depth (mm) | 1200-2800 | 600-2900 |
| Position | RD-TP02 | RD-TP04 |
| Material description | Clayey sand with gravel | Silty sand |
| Moisture (%) | | |
| SG | 2.609 | 2.637 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 89 | |
| 53.0 mm | 89 | |
| 37.5 mm | 86 | |
| 26.5 mm | 82 | |
| 19.0 mm | 79 | |
| 13.2 mm | 79 | |
| 4.75 mm | 73 | 100 |
| 2.00 mm | 58 | 99 |
| 0.425 mm | 21 | 84 |
| 0.075 mm | 13 | 34 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 11 | 25 |
| 0.027 mm | 10 | 22 |
| 0.013 mm | 10 | 19 |
| 0.005 mm | 8 | 16 |
| 0.002 mm | 7 | 15 |
| % Clay (<0.002 mm) | 7 | 15 |
| % Silt (<0.075, >0.002 mm) | 6 | 19 |
| % Sand (<4.75, >0.075 mm) | 60 | 66 |
| % Gravel (> 4.75 mm) | 27 | 0 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 28 | |
| Plasticity Index (-0.425) | 11 | 1 |
| Linear Shrinkage (%) | 3.5 | 0.0 |
| PI of whole sample | 2 | 1 |
| Grading Modulus | 2.08 | 0.83 |
| TRB Classification | A-2-6 (0) | A-2-4 (0) |
| Unified Classification | SC | SM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

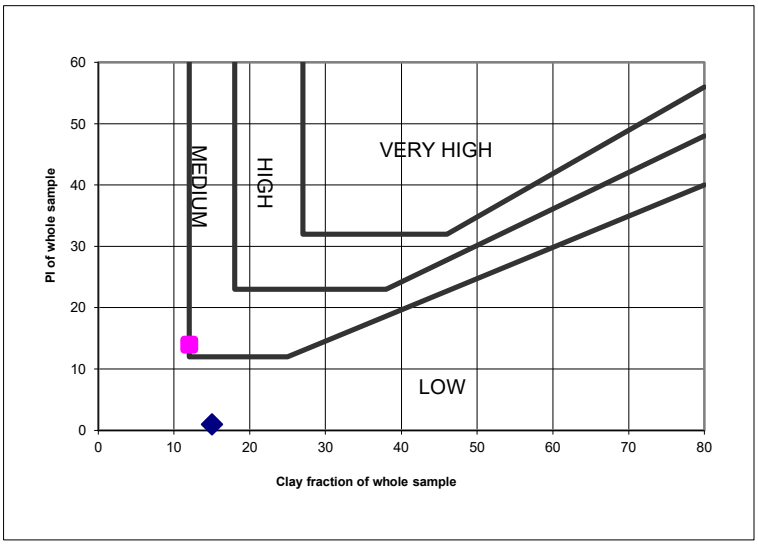
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

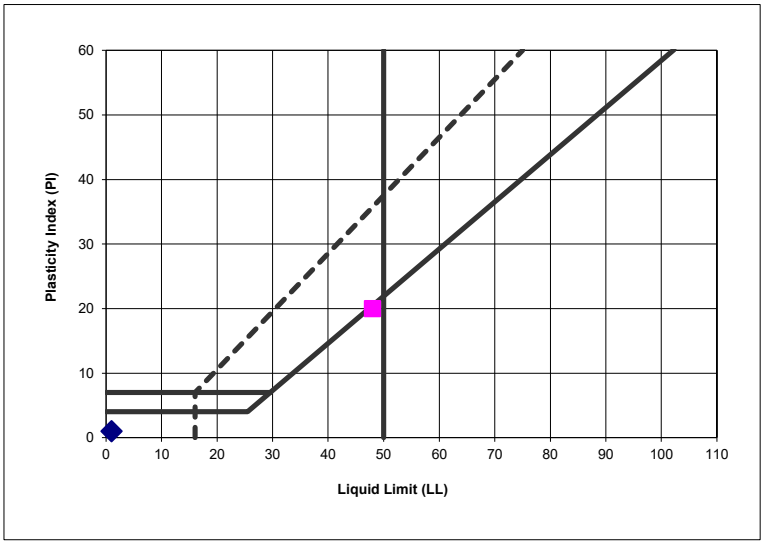
Project: Omitiomire | Sampling Date: 23-Jun-23

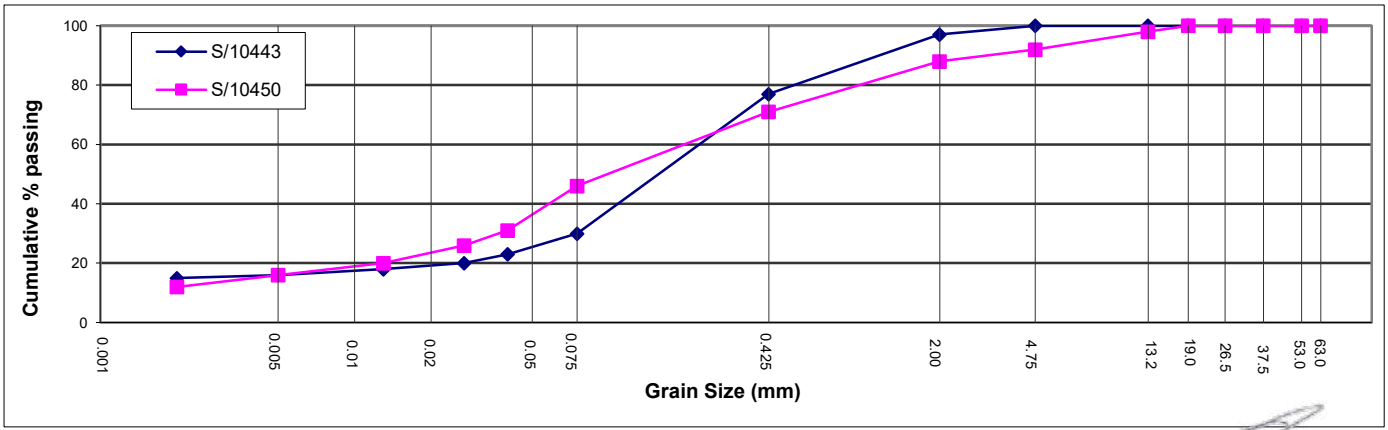
| Sample No. | S/10443 | S/10450 |
|---|---|---|
| Report No. | SG23/1618 | |
| Depth (mm) | 1100-4300 | 1000-3200 |
| Position | RD-TP12 | RD-TP08 |
| Material description | Silty sand | Silty sand |
| Moisture (%) | | |
| SG | 2.648 | 2.411 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | 100 |
| 13.2 mm | | 98 |
| 4.75 mm | 100 | 92 |
| 2.00 mm | 97 | 88 |
| 0.425 mm | 77 | 71 |
| 0.075 mm | 30 | 46 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 23 | 31 |
| 0.027 mm | 20 | 26 |
| 0.013 mm | 18 | 20 |
| 0.005 mm | 16 | 16 |
| 0.002 mm | 15 | 12 |
| % Clay (<0.002 mm) | 15 | 12 |
| % Silt (<0.075, >0.002 mm) | 15 | 34 |
| % Sand (<4.75, >0.075 mm) | 70 | 46 |
| % Gravel (> 4.75 mm) | 0 | 8 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | | 48 |
| Plasticity Index (-0.425) | 1 | 20 |
| Linear Shrinkage (%) | 0.0 | 7.5 |
| PI of whole sample | 1 | 14 |
| Grading Modulus | 0.96 | 0.95 |
| TRB Classification | A-2-4 (0) | A-7-5 (5) |
| Unified Classification | SM | SM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

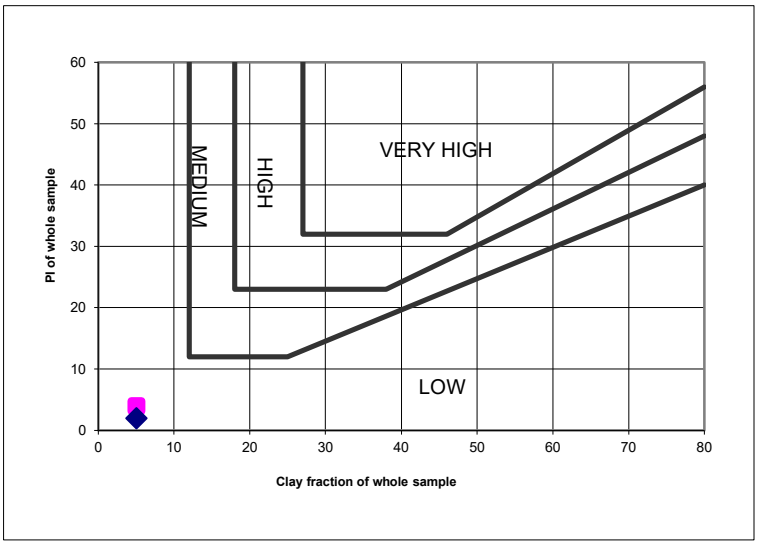
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

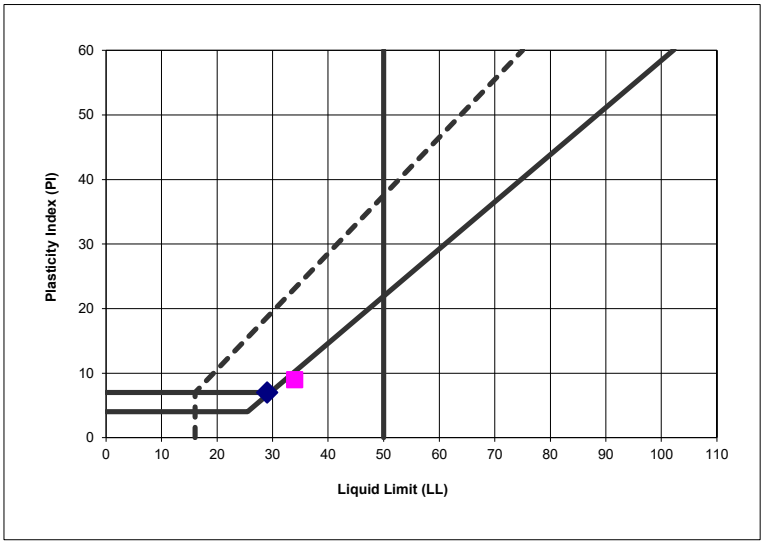
Project: Omitiomire | Sampling Date: 23-Jun-23

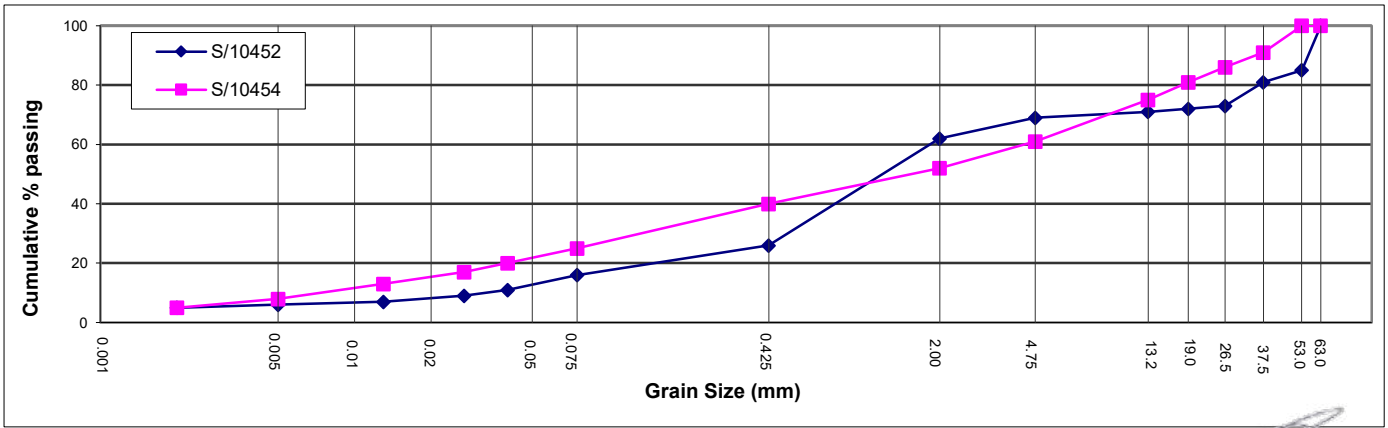
| Sample No. | S/10452 | S/10454 |
|---|---|---|
| Report No. | SG23/1618 | |
| Depth (mm) | 3900-4300 | 1400-2600 |
| Position | RD-TP02 | RD-TP14 |
| Material description | Clayey sand with gravel | Silty gravel with sand |
| Moisture (%) | | |
| SG | 2.673 | 2.604 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 100 | |
| 53.0 mm | 85 | 100 |
| 37.5 mm | 81 | 91 |
| 26.5 mm | 73 | 86 |
| 19.0 mm | 72 | 81 |
| 13.2 mm | 71 | 75 |
| 4.75 mm | 69 | 61 |
| 2.00 mm | 62 | 52 |
| 0.425 mm | 26 | 40 |
| 0.075 mm | 16 | 25 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 11 | 20 |
| 0.027 mm | 9 | 17 |
| 0.013 mm | 7 | 13 |
| 0.005 mm | 6 | 8 |
| 0.002 mm | 5 | 5 |
| % Clay (<0.002 mm) | 5 | 5 |
| % Silt (<0.075, >0.002 mm) | 11 | 20 |
| % Sand (<4.75, >0.075 mm) | 53 | 36 |
| % Gravel (> 4.75 mm) | 31 | 39 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 29 | 34 |
| Plasticity Index (-0.425) | 7 | 9 |
| Linear Shrinkage (%) | 2.5 | 3.5 |
| PI of whole sample | 2 | 4 |
| Grading Modulus | 1.96 | 1.83 |
| TRB Classification | A-2-4 (0) | A-2-4 (0) |
| Unified Classification | SC | GM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

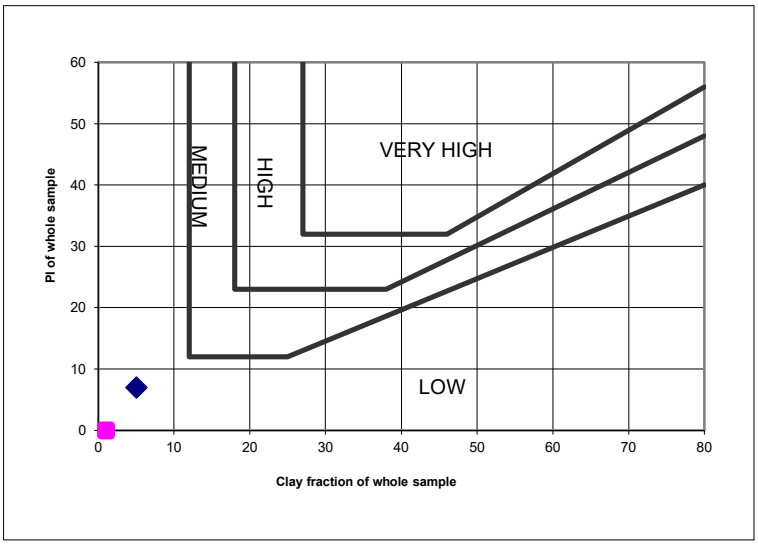
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

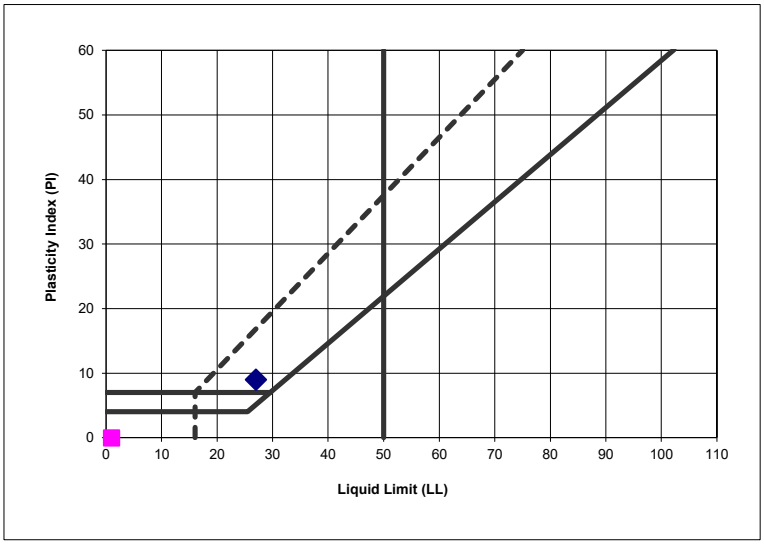
Project: Omitiomire | Sampling Date: 23-Jun-23

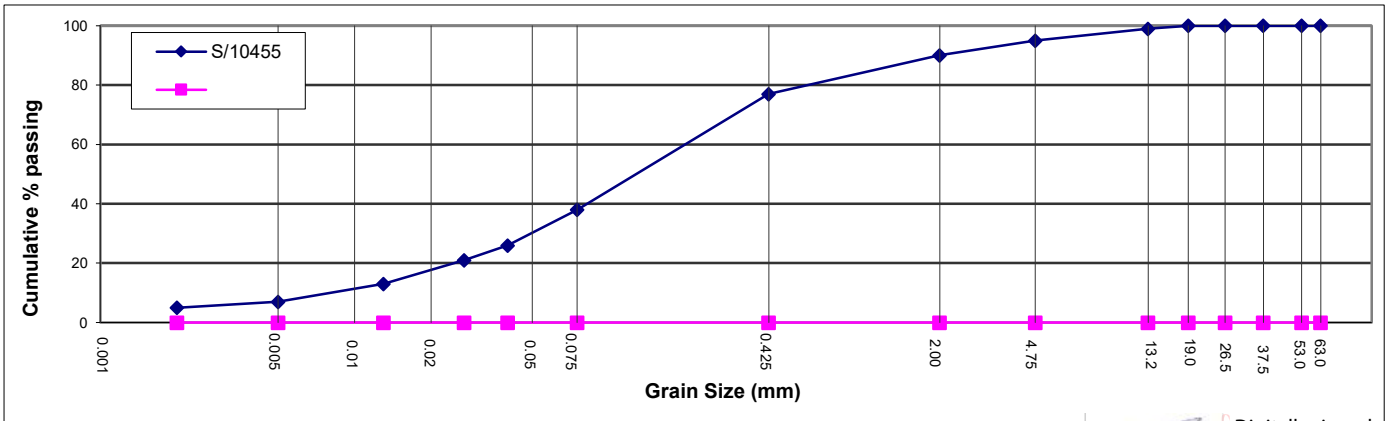
| Sample No. | S/10455 | |
|---|---|---|
| Report No. | SG23/1618 | |
| Depth (mm) | 2600-4000 | |
| Position | RD-TP13 | |
| Material description | Clayey sand | |
| Moisture (%) | | |
| SG | 2.669 | |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | 100 | |
| 13.2 mm | 99 | |
| 4.75 mm | 95 | |
| 2.00 mm | 90 | |
| 0.425 mm | 77 | |
| 0.075 mm | 38 | |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 26 | |
| 0.027 mm | 21 | |
| 0.013 mm | 13 | |
| 0.005 mm | 7 | |
| 0.002 mm | 5 | |
| % Clay (<0.002 mm) | 5 | |
| % Silt (<0.075, >0.002 mm) | 33 | |
| % Sand (<4.75, >0.075 mm) | 57 | |
| % Gravel (> 4.75 mm) | 5 | |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 27 | |
| Plasticity Index (-0.425) | 9 | |
| Linear Shrinkage (%) | 4.5 | |
| PI of whole sample | 7 | |
| Grading Modulus | 0.95 | |
| TRB Classification | A-4 (1) | |
| Unified Classification | SC | |

**Potential Expansiveness**




**Plasticity Chart**






Digitally signed by Jaco Strydom
Date: 2023.08.24 15:57:14 +02'00'

# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Stormwater Diversion Channel (SWD) **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1619 **Page no :** 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10456** | **S/10459** | **S/10463** | **S/10465** | **S/10466** | **S/10468** |
| | Chainage | | | | | | |
| | Position (from LHS) | SWD-TP02 | SWD-TP15 | SWD-TP23 | SWD-TP17 | SWD-TP08 | SWD-TP19 |
| | Depth sampled (mm) | 0-700 | 500-2500 | 1200-2500 | 1300-2200 | 1000-1400 | 1400-2400 |
| | Sample description | Brown mottled black , gravelly silty sand, fine alluvium | Orange brown stained red, clayey silty fine gravelly sand, fine alluvium | Dark reddish brown, sandy silty clay. Fine Alluvium | Olive brown mottled white stained orange, gravelly silty fine sand. Calcified Alluvium. | Dark reddish brown speckled white, silty sandy gravel. Ferruginized Alluvium. | Yellowish brown mottled black stained red, clayey silty gravelly sand with trace gravels, ferruginised alluvium |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | Scalping | Scalping |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | | | |
| | 53,0 mm | | | | | | |
| | 37,5 mm | | | | 100 | | |
| | 26,5 mm | | | | 95 | 100 | |
| | 19,0 mm | | | | 92 | 95 | |
| | 13,2 mm | | | 100 | 92 | 94 | 100 |
| | 4,75 mm | 100 | 100 | 99 | 81 | 84 | 99 |
| | 2,00 mm | 99 | 98 | 98 | 71 | 67 | 97 |
| | 0,425 mm | 74 | 74 | 86 | 45 | 42 | 85 |
| | 0,075 mm | 32 | 40 | 53 | 23 | 19 | 46 |
| | Grading Modulus (GM) | 0.95 | 0.88 | 0.63 | 1.61 | 1.72 | 0.72 |
| Atterberg Limits | Liquid Limit (LL) | | 20 | 23 | 38 | 31 | 25 |
| | Plasticity Index (PI) | 3 | 8 | 8 | 16 | 15 | 8 |
| | Linear Shrinkage (LS) | 1.0 | 4.0 | 2.5 | 5.5 | 5.0 | 2.0 |
| Mod AASHTO & CBR values | CBR @ 100 % | | 12 | | | 6 | |
| | CBR @ 98 % | | 12 | | | 4 | |
| | CBR @ 95 % | | 11 | | | <3 | |
| | CBR @ 93 % | | 11 | | | <3 | |
| | CBR @ 90 % | | 10 | | | <3 | |
| | Swell @ 100 % | | 0.0 | | | 0.3 | |
| | Mod AASHTO (kg/m$^3$) | | 2055 | | | 2053 | |
| | O.M.C. (%) | | 9.7 | | | 7.3 | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | 90.0% Mod AASHTO @ OMC | | | 90.0% Mod AASHTO @ OMC | |
| | Permeabilty cm/s | | 3.57 E-05 | | | 4.59 E-05 | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Note 1: In the case of G6 and G7 material with a large coarse fraction, Maximum Pi = 3GM+10

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# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

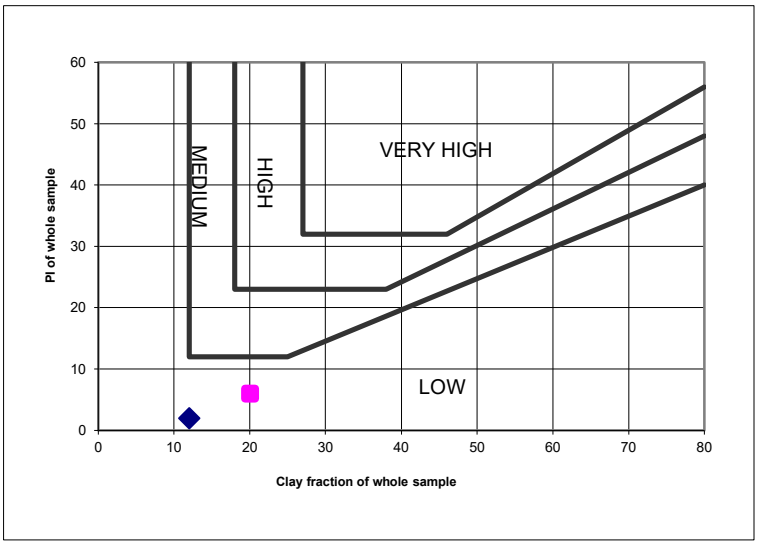
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

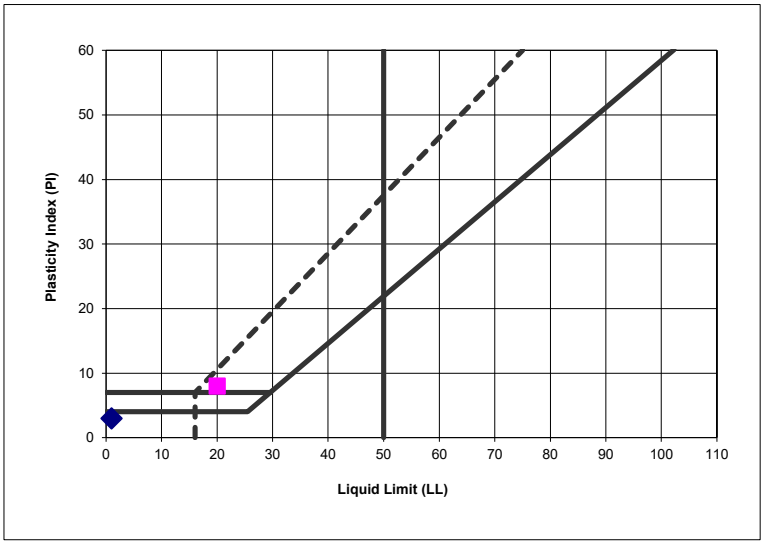
Project: Omitiomire | Sampling Date: 23-Jun-23

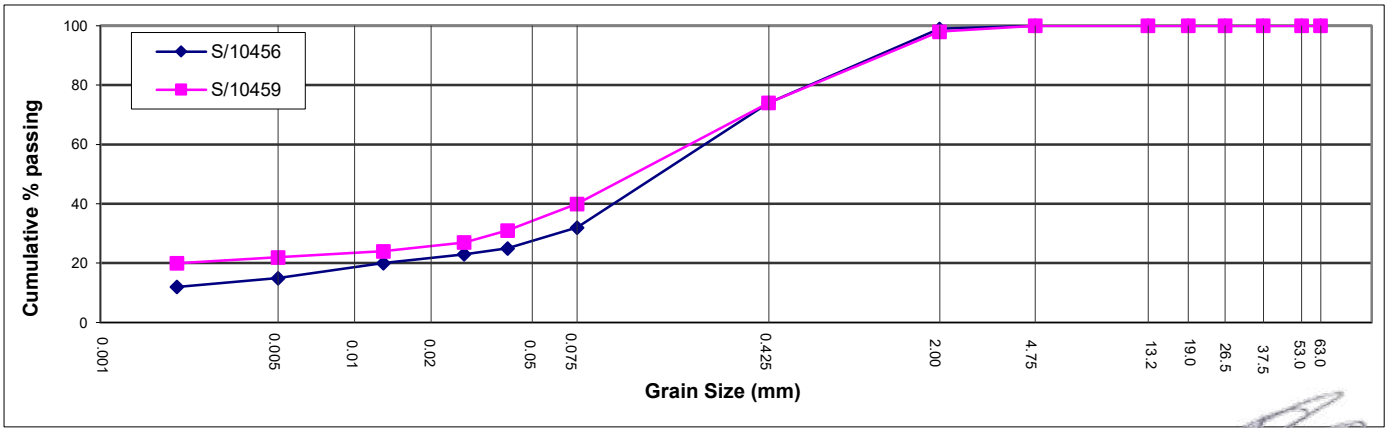
| Sample No. | S/10456 | S/10459 |
|---|---|---|
| Report No. | SG23/1619 | |
| Depth (mm) | 0-700 | 500-2500 |
| Position | SWD-TP02 | SWD-TP15 |
| Material description | Silty sand | Clayey sand |
| Moisture (%) | | |
| SG | 2.586 | 2.628 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | |
| 13.2 mm | | |
| 4.75 mm | 100 | 100 |
| 2.00 mm | 99 | 98 |
| 0.425 mm | 74 | 74 |
| 0.075 mm | 32 | 40 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 25 | 31 |
| 0.027 mm | 23 | 27 |
| 0.013 mm | 20 | 24 |
| 0.005 mm | 15 | 22 |
| 0.002 mm | 12 | 20 |
| % Clay (<0.002 mm) | 12 | 20 |
| % Silt (<0.075, >0.002 mm) | 20 | 20 |
| % Sand (<4.75, >0.075 mm) | 68 | 60 |
| % Gravel (> 4.75 mm) | 0 | 0 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | | 20 |
| Plasticity Index (-0.425) | 3 | 8 |
| Linear Shrinkage (%) | 1.0 | 4.0 |
| PI of whole sample | 2 | 6 |
| Grading Modulus | 0.95 | 0.88 |
| TRB Classification | A-2-4 (0) | A-4 (0) |
| Unified Classification | SM | SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

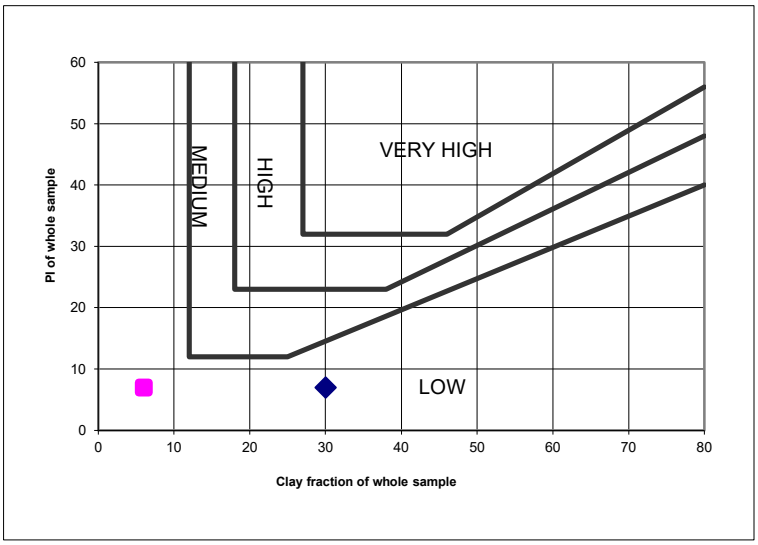
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

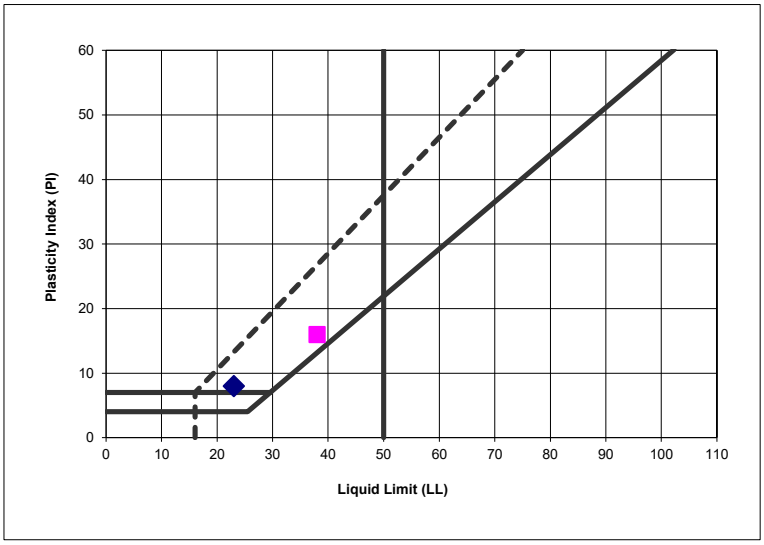
Project: Omitiomire | Sampling Date: 23-Jun-23

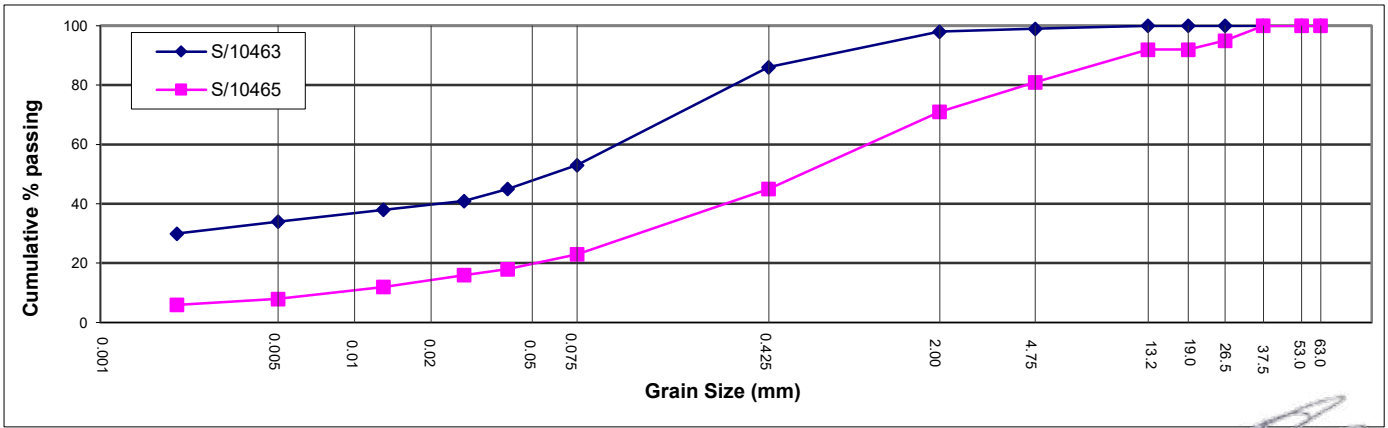
| Sample No. | S/10463 | S/10465 |
|---|---|---|
| Report No. | SG23/1619 | |
| Depth (mm) | 1200-2500 | 1300-2200 |
| Position | SWD-TP23 | SWD-TP17 |
| Material description | Clayey sand | Clayey sand with gravel |
| Moisture (%) | | |
| SG | 2.654 | 2.615 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | 100 |
| 26.5 mm | | 95 |
| 19.0 mm | | 92 |
| 13.2 mm | 100 | 92 |
| 4.75 mm | 99 | 81 |
| 2.00 mm | 98 | 71 |
| 0.425 mm | 86 | 45 |
| 0.075 mm | 53 | 23 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 45 | 18 |
| 0.027 mm | 41 | 16 |
| 0.013 mm | 38 | 12 |
| 0.005 mm | 34 | 8 |
| 0.002 mm | 30 | 6 |
| % Clay (<0.002 mm) | 30 | 6 |
| % Silt (<0.075, >0.002 mm) | 23 | 17 |
| % Sand (<4.75, >0.075 mm) | 46 | 58 |
| % Gravel (> 4.75 mm) | 1 | 19 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 23 | 38 |
| Plasticity Index (-0.425) | 8 | 16 |
| Linear Shrinkage (%) | 2.5 | 5.5 |
| PI of whole sample | 7 | 7 |
| Grading Modulus | 0.63 | 1.61 |
| TRB Classification | A-4 (4) | A-2-6 (1) |
| Unified Classification | SC | SC |

### Potential Expansiveness




### Plasticity Chart



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

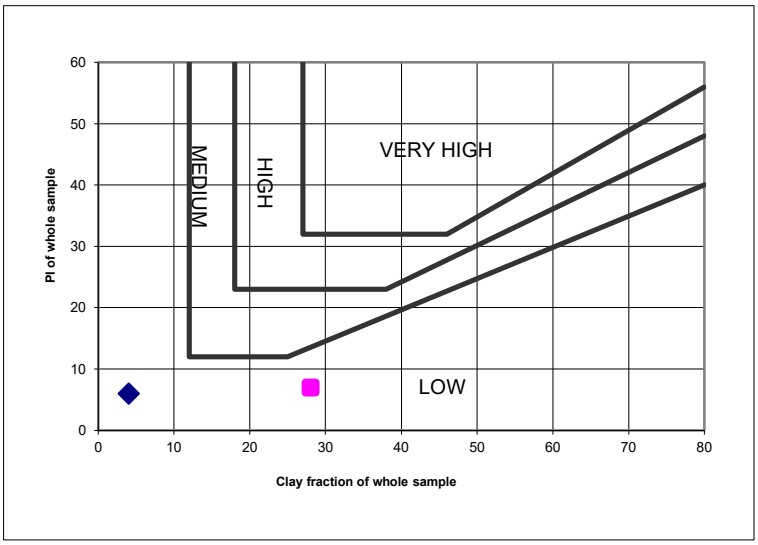
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

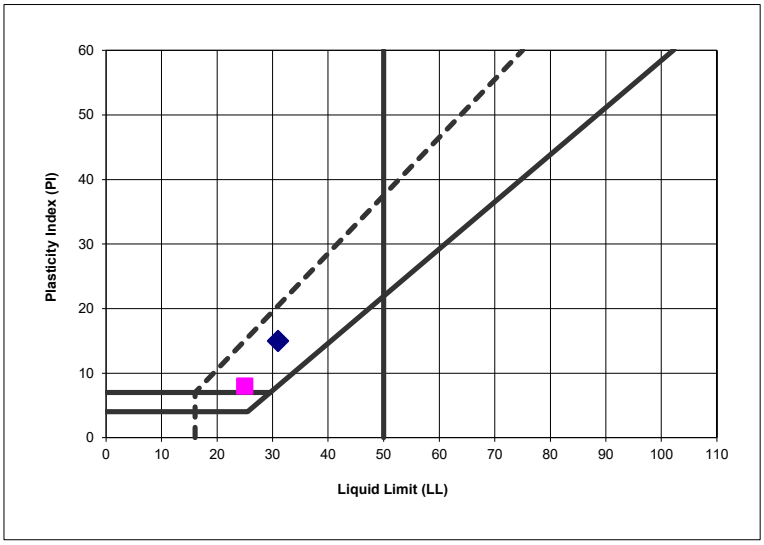
Project: Omitiomire | Sampling Date: 23-Jun-23

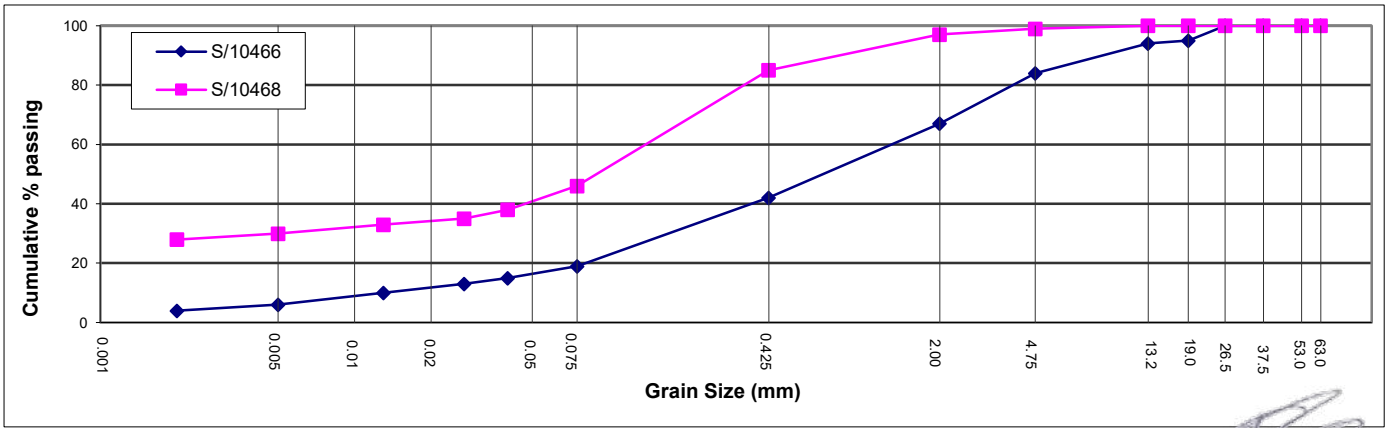
| Sample No. | S/10466 | S/10468 |
|---|---|---|
| Report No. | SG23/1619 | |
| Depth (mm) | 1000-1400 | 1400-2400 |
| Position | SWD-TP08 | SWD-TP19 |
| Material description | Clayey sand with gravel | Clayey sand |
| Moisture (%) | | |
| SG | 2.557 | 2.645 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | 100 | |
| 19.0 mm | 95 | |
| 13.2 mm | 94 | 100 |
| 4.75 mm | 84 | 99 |
| 2.00 mm | 67 | 97 |
| 0.425 mm | 42 | 85 |
| 0.075 mm | 19 | 46 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 15 | 38 |
| 0.027 mm | 13 | 35 |
| 0.013 mm | 10 | 33 |
| 0.005 mm | 6 | 30 |
| 0.002 mm | 4 | 28 |
| % Clay (<0.002 mm) | 4 | 28 |
| % Silt (<0.075, >0.002 mm) | 15 | 18 |
| % Sand (<4.75, >0.075 mm) | 65 | 53 |
| % Gravel (> 4.75 mm) | 16 | 1 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 31 | 25 |
| Plasticity Index (-0.425) | 15 | 8 |
| Linear Shrinkage (%) | 5.0 | 2.0 |
| PI of whole sample | 6 | 7 |
| Grading Modulus | 1.72 | 0.72 |
| TRB Classification | A-2-6 (1) | A-4 (1) |
| Unified Classification | SC | SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Stormwater Diversion Channel (SWD) **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1619 **Page no :** 5

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10470** | **S/10471** | | | | |
| | Chainage | | | | | | |
| | Position (from LHS) | SWD-TP07 | SWD-TP10 | | | | |
| | Depth sampled (mm) | 1400-1900 | 1200-2100 | | | | |
| | Sample description | Completely weathered, green speckled to streaked black, white and gold, very soft rock, biotite gneiss | Reddish brown mottled white, silty sandy gravel. Nodular Ferricrete. | | | | |
| | Method of Preparation used | Scalping | Scalping | | | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | 100 | | | | |
| | 53,0 mm | | 86 | | | | |
| | 37,5 mm | 100 | 80 | | | | |
| | 26,5 mm | 95 | 74 | | | | |
| | 19,0 mm | 92 | 66 | | | | |
| | 13,2 mm | 91 | 61 | | | | |
| | 4,75 mm | 75 | 59 | | | | |
| | 2,00 mm | 63 | 57 | | | | |
| | 0,425 mm | 40 | 49 | | | | |
| | 0,075 mm | 20 | 32 | | | | |
| | Grading Modulus (GM) | 1.77 | 1.62 | | | | |
| Atterberg Limits | Liquid Limit (LL) | 32 | 29 | | | | |
| | Plasticity Index (PI) | 12 | 12 | | | | |
| | Linear Shrinkage (LS) | 3.5 | 6.0 | | | | |
| Mod AASHTO & CBR values | CBR @ 100 % | 65 | 8 | | | | |
| | CBR @ 98 % | 40 | 6 | | | | |
| | CBR @ 95 % | 19 | 4 | | | | |
| | CBR @ 93 % | 12 | 3 | | | | |
| | CBR @ 90 % | 6 | <3 | | | | |
| | Swell @ 100 % | 0.0 | 0.0 | | | | |
| | Mod AASHTO (kg/m$^3$) | 2174 | 1875 | | | | |
| | O.M.C. (%) | 7.2 | 14.9 | | | | |
| Permeability ISO/TS 17892-11:2004(IE) | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

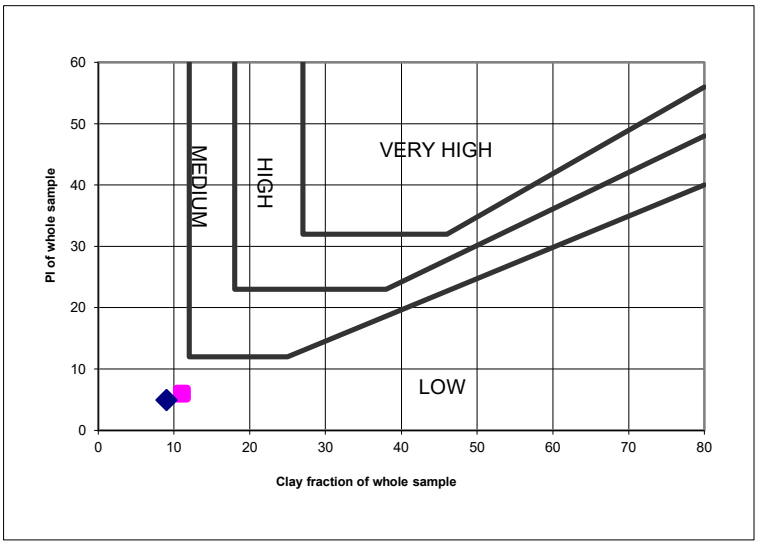
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

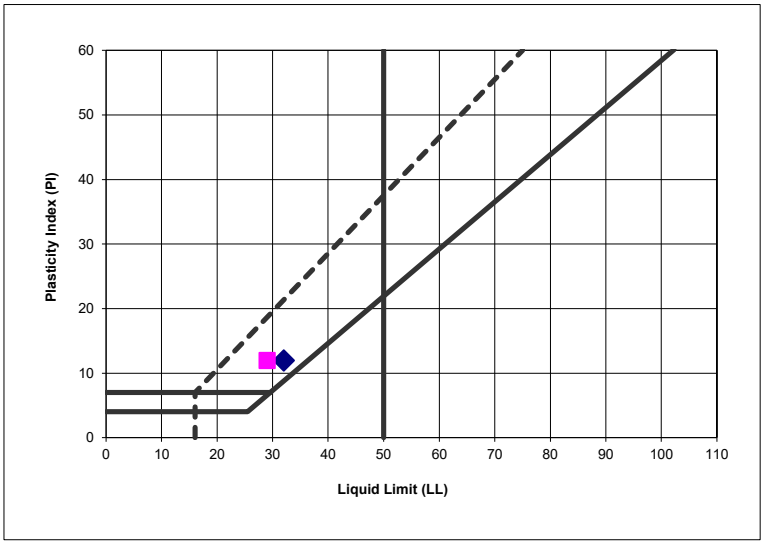
Project: Omitiomire | Sampling Date: 23-Jun-23

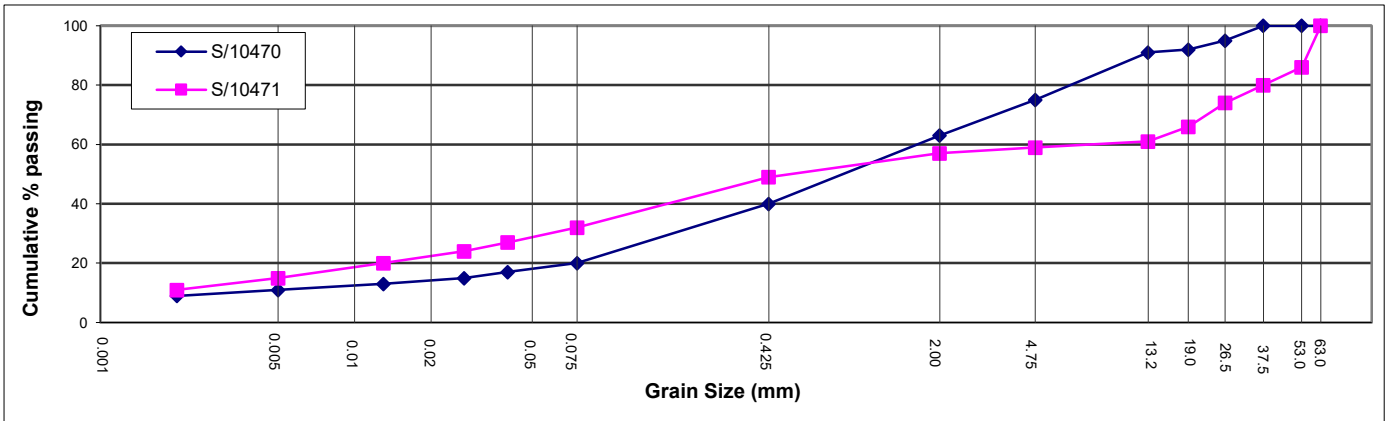
| Sample No. | S/10470 | S/10471 |
|---|---|---|
| Report No. | SG23/1619 | |
| Depth (mm) | 1400-1900 | 1200-2100 |
| Position | SWD-TP07 | SWD-TP10 |
| Material description | Clayey sand with gravel | Clayey gravel with sand |
| Moisture (%) | | |
| SG | 2.736 | 2.629 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | 100 |
| 53.0 mm | | 86 |
| 37.5 mm | 100 | 80 |
| 26.5 mm | 95 | 74 |
| 19.0 mm | 92 | 66 |
| 13.2 mm | 91 | 61 |
| 4.75 mm | 75 | 59 |
| 2.00 mm | 63 | 57 |
| 0.425 mm | 40 | 49 |
| 0.075 mm | 20 | 32 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 17 | 27 |
| 0.027 mm | 15 | 24 |
| 0.013 mm | 13 | 20 |
| 0.005 mm | 11 | 15 |
| 0.002 mm | 9 | 11 |
| % Clay (<0.002 mm) | 9 | 11 |
| % Silt (<0.075, >0.002 mm) | 11 | 21 |
| % Sand (<4.75, >0.075 mm) | 55 | 27 |
| % Gravel (> 4.75 mm) | 25 | 41 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 32 | 29 |
| Plasticity Index (-0.425) | 12 | 12 |
| Linear Shrinkage (%) | 3.5 | 6.0 |
| PI of whole sample | 5 | 6 |
| Grading Modulus | 1.77 | 1.62 |
| TRB Classification | A-2-6 (1) | A-2-6 (1) |
| Unified Classification | SC | GC |

**Potential Expansiveness**




**Plasticity Chart**






Digitally signed by Jaco Strydom
Date: 2023.08.24 16:27:34 +02'00'

# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Waste Rock Dump **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1620 **Page no :** 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | S/10472 | S/10474 | S/10478 | S/10479 | S/10488 | S/10494 |
| | Chainage | | | | | | |
| | Position (from LHS) | WRD-TP01 | WRD-TP04 | WRD-TP14 | WRD-TP15 | WRD-TP04 | WRD-TP26 |
| | Depth sampled (mm) | 1400-3500 | 1500-2400 | 2800-4900 | 0-700 | 400-1500 | 1200-2600 |
| | Sample description | Dark reddish brown, silty sandy clay. Fine Alluvium. | Orange brown, gravelly silty sand. Alluvium. | Pale yellow brown, silty sandy gravel and cobbles. Coarse Alluvium. | Brown, sandy clayey silt. Fine Alluvium. | Pale brown mottled white, gravelly sandy silt. Calcified Alluvium. | White speckled to mottled black and brown, silty sandy gravel, hardpan calcrete |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | Scalping | Scalping |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | | | 82 |
| | 53,0 mm | | | 100 | | | 76 |
| | 37,5 mm | | 100 | 85 | | | 71 |
| | 26,5 mm | | 98 | 75 | | | 63 |
| | 19,0 mm | | 98 | 71 | | | 60 |
| | 13,2 mm | 100 | 97 | 68 | 100 | 100 | 53 |
| | 4,75 mm | 100 | 96 | 63 | 97 | 98 | 42 |
| | 2,00 mm | 98 | 94 | 52 | 95 | 92 | 34 |
| | 0,425 mm | 81 | 79 | 32 | 86 | 76 | 22 |
| | 0,075 mm | 40 | 43 | 18 | 62 | 28 | 20 |
| | Grading Modulus (GM) | 0.81 | 0.84 | 1.98 | 0.57 | 1.04 | 2.24 |
| Atterberg Limits | Liquid Limit (LL) | 23 | 29 | 29 | 33 | 25 | 31 |
| | Plasticity Index (PI) | 9 | 12 | 11 | 16 | 6 | 9 |
| | Linear Shrinkage (LS) | 2.5 | 2.5 | 4.0 | 7.0 | 2.5 | 3.0 |
| Mod AASHTO & CBR values | CBR @ 100 % | 9 | 8 | 9 | | 8 | |
| | CBR @ 98 % | 5 | 7 | 8 | | 6 | |
| | CBR @ 95 % | <3 | 5 | 8 | | 3 | |
| | CBR @ 93 % | <3 | 5 | 7 | | <3 | |
| | CBR @ 90 % | <3 | 4 | 7 | | <3 | |
| | Swell @ 100 % | 0.0 | 0.1 | 0.0 | | 0.1 | |
| | Mod AASHTO (kg/m$^3$) | 2035 | 1963 | 2071 | | 1975 | |
| | O.M.C. (%) | 9.3 | 12.0 | 9.5 | | 11.0 | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | | 90.0% Mod AASHTO @ OMC | | 90.0% Mod AASHTO @ OMC | |
| | Permeabilty cm/s | | | 7.44 E-05 | | 1.19 E-05 | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Note 1: In the case of G6 and G7 material with a large coarse fraction, Maximum Pi = 3GM+10

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

## Namibia Technical Services cc

### SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Waste Rock Dump **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1620 **Page no :** 2

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10479** | | | | | |
| | Chainage | | | | | | |
| | Position (from LHS) | WRD-TP15 | | | | | |
| | Depth sampled (mm) | 0-700 | | | | | |
| | Sample description | Brown, sandy clayey silt. Fine Alluvium. | | | | | |
| | Method of Preparation used | | | | | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | | | |
| | 53,0 mm | | | | | | |
| | 37,5 mm | | | | | | |
| | 26,5 mm | | | | | | |
| | 19,0 mm | | | | | | |
| | 13,2 mm | 100 | | | | | |
| | 4,75 mm | 97 | | | | | |
| | 2,00 mm | 95 | | | | | |
| | 0,425 mm | 86 | | | | | |
| | 0,075 mm | 62 | | | | | |
| | Grading Modulus (GM) | 0.57 | | | | | |
| Atterberg Limits | Liquid Limit (LL) | 33 | | | | | |
| | Plasticity Index (PI) | 16 | | | | | |
| | Linear Shrinkage (LS) | 7.0 | | | | | |
| Mod AASHTO & CBR values | CBR @ 100 % | | | | | | |
| | CBR @ 98 % | | | | | | |
| | CBR @ 95 % | | | | | | |
| | CBR @ 93 % | | | | | | |
| | CBR @ 90 % | | | | | | |
| | Swell @ 100 % | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| Proctor | Proctor MDD (kg/m³) | 1628 | | | | | |
| | O.M.C. (%) | 14.0 | | | | | |
| Chem. | pH | | | | | | |
| | Conductivity (Sm$^{-1}$) | | | | | | |

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

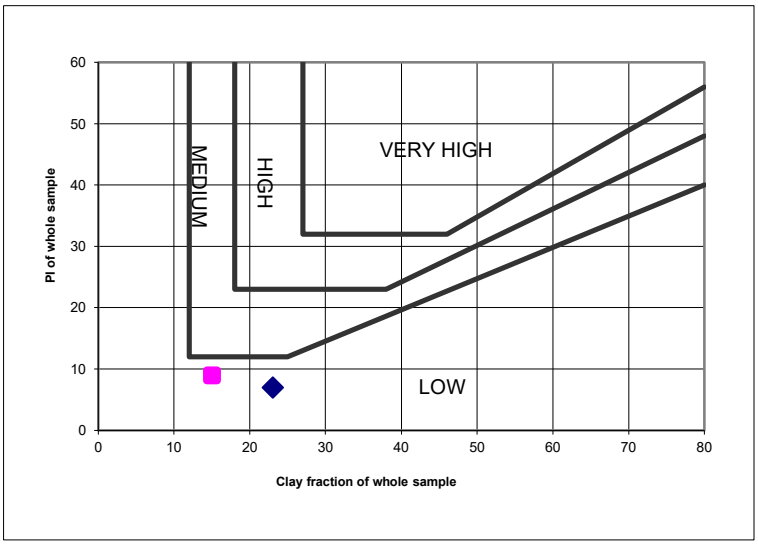
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

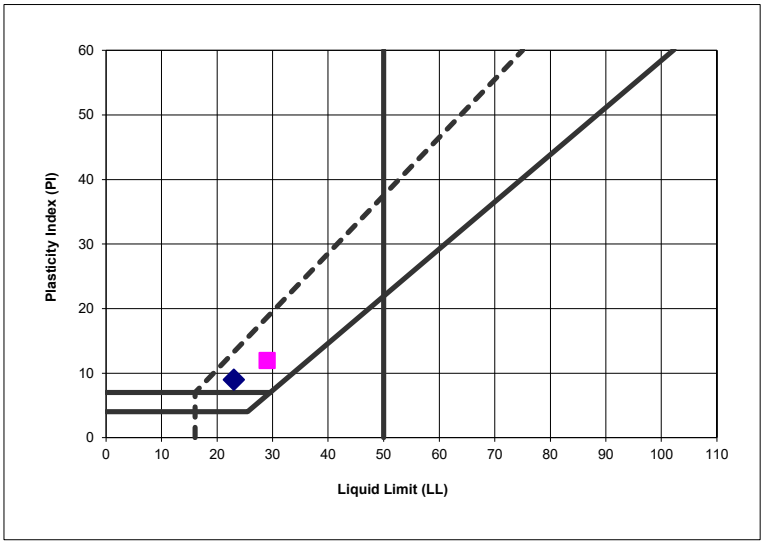
Project: Omitiomire | Sampling Date: 23-Jun-23

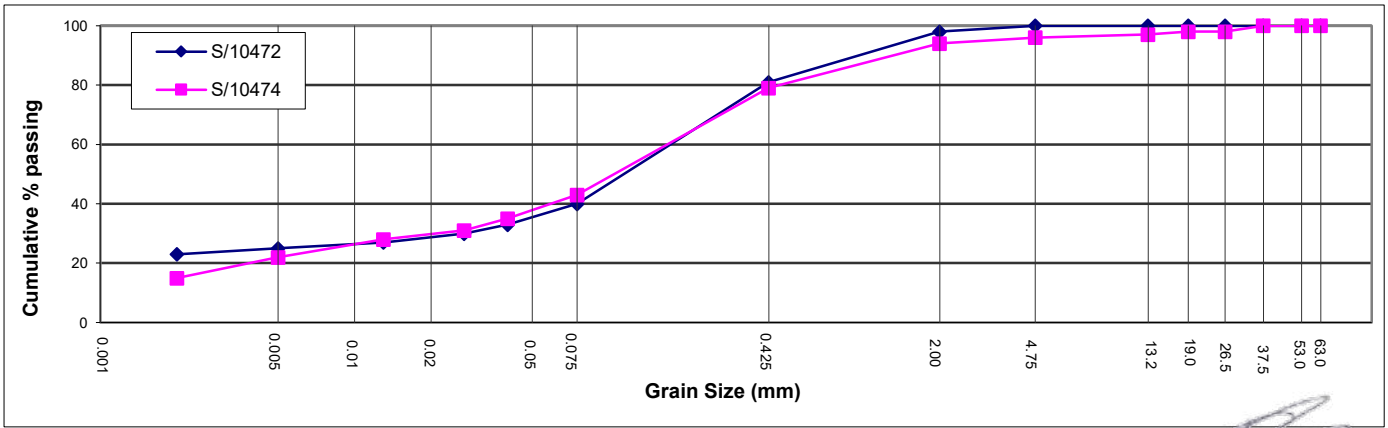
| Sample No. | S/10472 | S/10474 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 1400-3500 | 1500-2400 |
| Position | WRD-TP01 | WRD-TP04 |
| Material description | Clayey sand | Clayey sand |
| Moisture (%) | | |
| SG | 2.624 | 2.641 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | 100 |
| 26.5 mm | | 98 |
| 19.0 mm | | 98 |
| 13.2 mm | 100 | 97 |
| 4.75 mm | 100 | 96 |
| 2.00 mm | 98 | 94 |
| 0.425 mm | 81 | 79 |
| 0.075 mm | 40 | 43 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 33 | 35 |
| 0.027 mm | 30 | 31 |
| 0.013 mm | 27 | 28 |
| 0.005 mm | 25 | 22 |
| 0.002 mm | 23 | 15 |
| % Clay (<0.002 mm) | 23 | 15 |
| % Silt (<0.075, >0.002 mm) | 17 | 28 |
| % Sand (<4.75, >0.075 mm) | 60 | 53 |
| % Gravel (> 4.75 mm) | 0 | 4 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 23 | 29 |
| Plasticity Index (-0.425) | 9 | 12 |
| Linear Shrinkage (%) | 2.5 | 2.5 |
| PI of whole sample | 7 | 9 |
| Grading Modulus | 0.81 | 0.84 |
| TRB Classification | A-4 (1) | A-6 (3) |
| Unified Classification | SC | SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

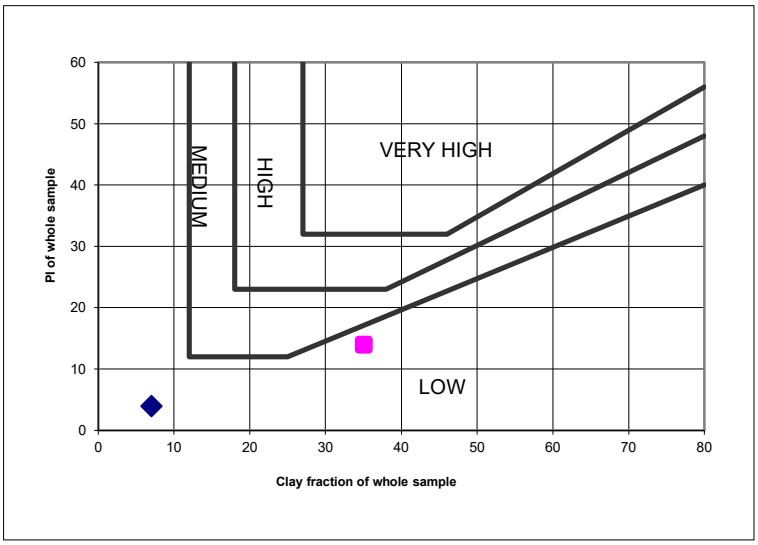
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

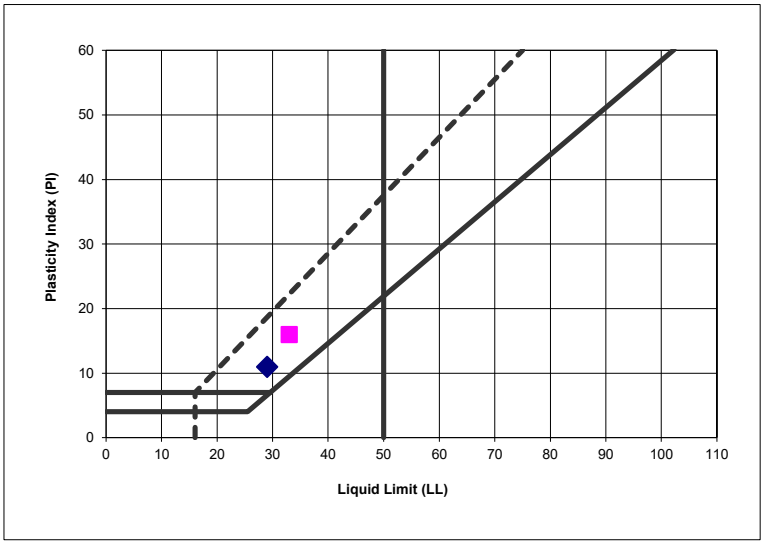
Project: Omitiomire | Sampling Date: 23-Jun-23

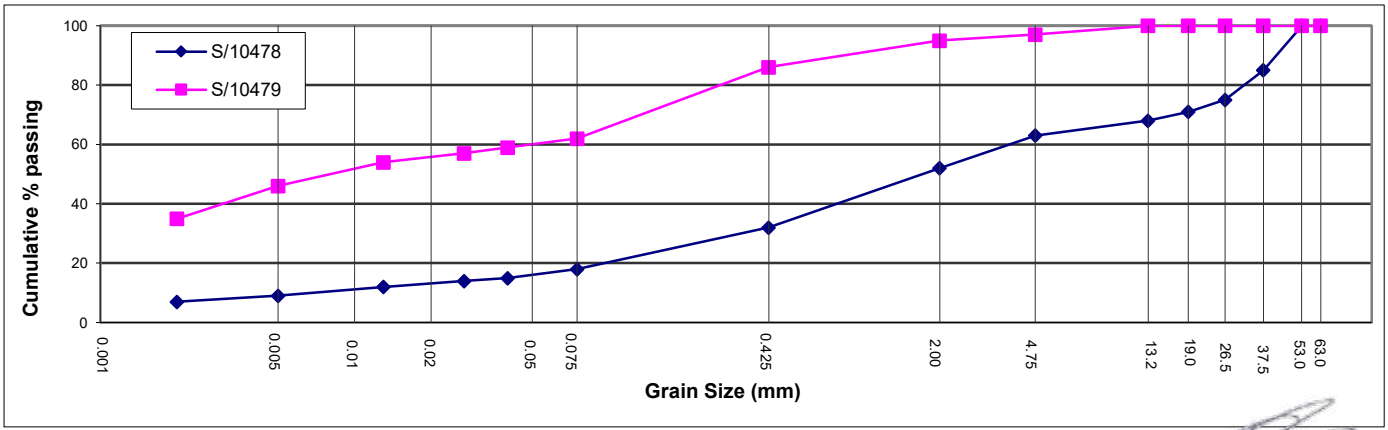
| Sample No. | S/10478 | S/10479 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 2800-4900 | 0-700 |
| Position | WRD-TP14 | WRD-TP15 |
| Material description | Clayey sand with gravel | Sandy lean clay |
| Moisture (%) | | |
| SG | 2.616 | 2.619 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | 100 | |
| 37.5 mm | 85 | |
| 26.5 mm | 75 | |
| 19.0 mm | 71 | |
| 13.2 mm | 68 | 100 |
| 4.75 mm | 63 | 97 |
| 2.00 mm | 52 | 95 |
| 0.425 mm | 32 | 86 |
| 0.075 mm | 18 | 62 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 15 | 59 |
| 0.027 mm | 14 | 57 |
| 0.013 mm | 12 | 54 |
| 0.005 mm | 9 | 46 |
| 0.002 mm | 7 | 35 |
| % Clay (<0.002 mm) | 7 | 35 |
| % Silt (<0.075, >0.002 mm) | 11 | 27 |
| % Sand (<4.75, >0.075 mm) | 45 | 35 |
| % Gravel (> 4.75 mm) | 37 | 3 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 29 | 33 |
| Plasticity Index (-0.425) | 11 | 16 |
| Linear Shrinkage (%) | 4.0 | 7.0 |
| PI of whole sample | 4 | 14 |
| Grading Modulus | 1.98 | 0.57 |
| TRB Classification | A-2-6 (0) | A-6 (7) |
| Unified Classification | SC | CL |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

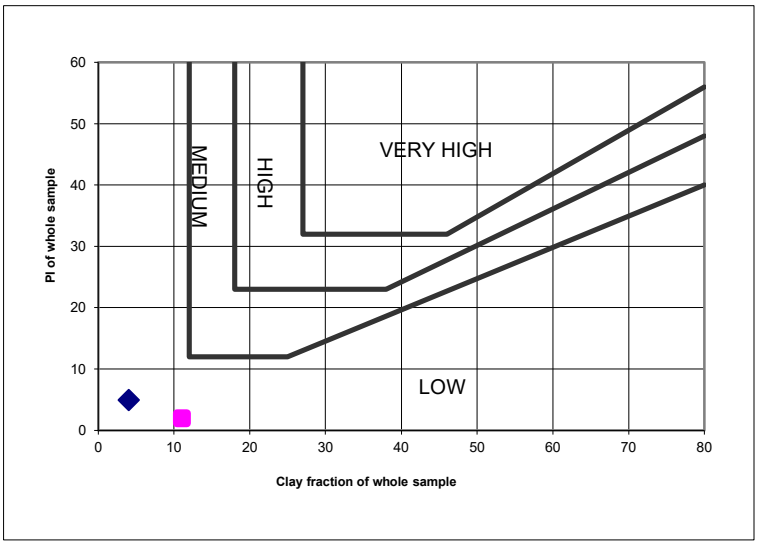
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

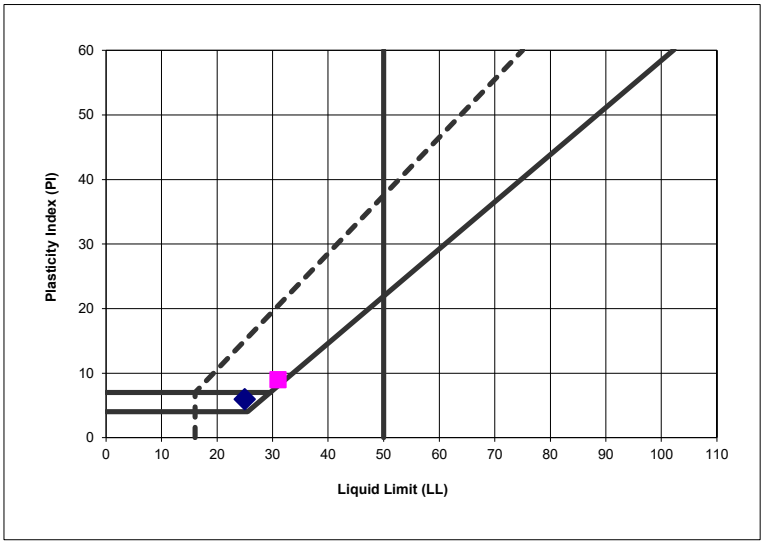
Project: Omitiomire | Sampling Date: 23-Jun-23

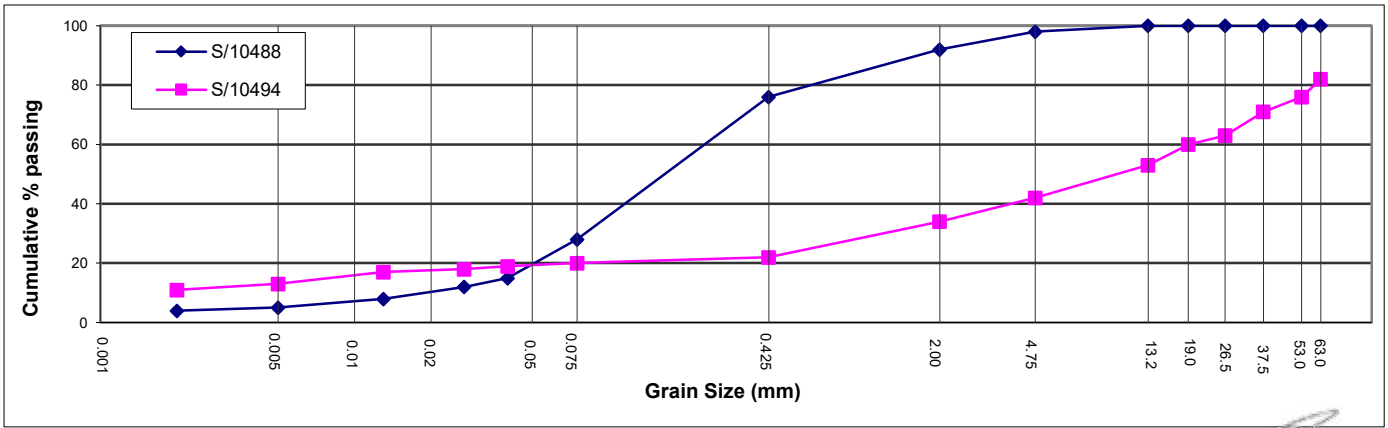
| Sample No. | S/10488 | S/10494 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 400-1500 | 1200-2600 |
| Position | WRD-TP04 | WRD-TP26 |
| Material description | Silty, clayey sand | Clayey gravel with sand |
| Moisture (%) | | |
| SG | 2.502 | 2.588 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | 82 |
| 53.0 mm | | 76 |
| 37.5 mm | | 71 |
| 26.5 mm | | 63 |
| 19.0 mm | | 60 |
| 13.2 mm | 100 | 53 |
| 4.75 mm | 98 | 42 |
| 2.00 mm | 92 | 34 |
| 0.425 mm | 76 | 22 |
| 0.075 mm | 28 | 20 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 15 | 19 |
| 0.027 mm | 12 | 18 |
| 0.013 mm | 8 | 17 |
| 0.005 mm | 5 | 13 |
| 0.002 mm | 4 | 11 |
| % Clay (<0.002 mm) | 4 | 11 |
| % Silt (<0.075, >0.002 mm) | 24 | 9 |
| % Sand (<4.75, >0.075 mm) | 70 | 22 |
| % Gravel (> 4.75 mm) | 2 | 58 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 25 | 31 |
| Plasticity Index (-0.425) | 6 | 9 |
| Linear Shrinkage (%) | 2.5 | 3.0 |
| PI of whole sample | 5 | 2 |
| Grading Modulus | 1.04 | 2.24 |
| TRB Classification | A-2-4 (0) | A-2-4 (0) |
| Unified Classification | SC-SM | GC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Waste Rock Dump **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1620 **Page no :** 6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10496** | **S/10498** | **S/10500** | **S/10502** | **S/10504** | **S/10507** |
| | Chainage | | | | | | |
| | Position (from LHS) | WRD-TP35 | WRD-TP39 | WRD-TP37 | WRD-TP32 | WRD-TP16 | WRD-TP37 |
| | Depth sampled (mm) | 2500-4100 | 1400-1500 | 2400-2700 | 1150-1450 | 500-1800 | 900-1100 |
| | Sample description | Yellow brown, sandy silt. Ferruginous Alluvium. | Khaki stained brown to black, silty gravelly sand to silty sandy gravel, ferruginised alluvium | Completely to highly weathered, white speckled black stained orange, gneiss | Pale brown blotched white, sandy silt with abundant calcrete nodules and cobbles. Honeycomb Calcrete. | Pale brown speckled white, sandly silty gravel. Nodular Calcrete. | Yellowish brown mottled white and black, silty sandy gravel, calcified pebble marker |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | Scalping | Scalping |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | 88 | 88 | |
| | 53,0 mm | | | 100 | 83 | 73 | |
| | 37,5 mm | | | 84 | 76 | 64 | |
| | 26,5 mm | | | 79 | 62 | 47 | 100 |
| | 19,0 mm | | 100 | 76 | 56 | 36 | 99 |
| | 13,2 mm | 100 | 99 | 71 | 51 | 33 | 98 |
| | 4,75 mm | 97 | 78 | 61 | 44 | 26 | 90 |
| | 2,00 mm | 92 | 65 | 52 | 39 | 23 | 81 |
| | 0,425 mm | 75 | 39 | 31 | 29 | 20 | 63 |
| | 0,075 mm | 41 | 17 | 12 | 17 | 10 | 42 |
| | Grading Modulus (GM) | 0.92 | 1.79 | 2.05 | 2.15 | 2.47 | 1.14 |
| Atterberg Limits | Liquid Limit (LL) | 32 | 36 | 23 | 24 | 30 | 37 |
| | Plasticity Index (PI) | 13 | 10 | 8 | 8 | 11 | 13 |
| | Linear Shrinkage (LS) | 6.0 | 3.5 | 4.0 | 3.0 | 4.0 | 6.5 |
| Mod AASHTO & CBR values | CBR @ 100 % | 4 | | 27 | | 27 | |
| | CBR @ 98 % | 3 | | 21 | | 24 | |
| | CBR @ 95 % | <3 | | 14 | | 19 | |
| | CBR @ 93 % | <3 | | 11 | | 17 | |
| | CBR @ 90 % | <3 | | 7 | | 14 | |
| | Swell @ 100 % | 0.1 | | 0.1 | | 0.2 | |
| | Mod AASHTO (kg/m$^3$) | 1946 | Insufficient | 2010 | | 1869 | |
| | O.M.C. (%) | 11.2 | material | 10.8 | | 14.5 | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | Insufficient material | | | | |
| | Permeabilty cm/s | | | | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

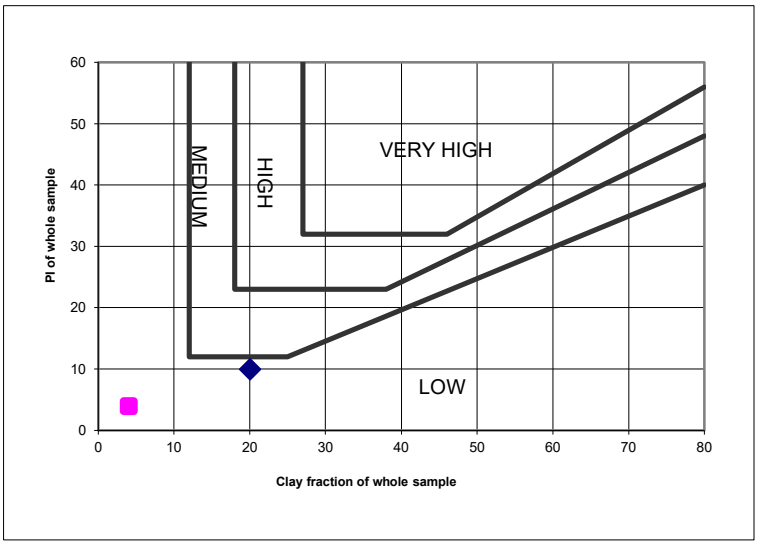
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

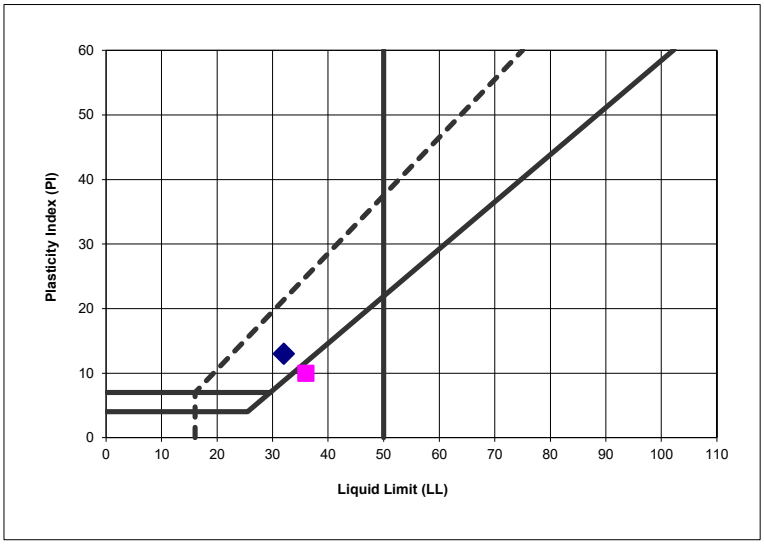
Project: Omitiomire | Sampling Date: 23-Jun-23

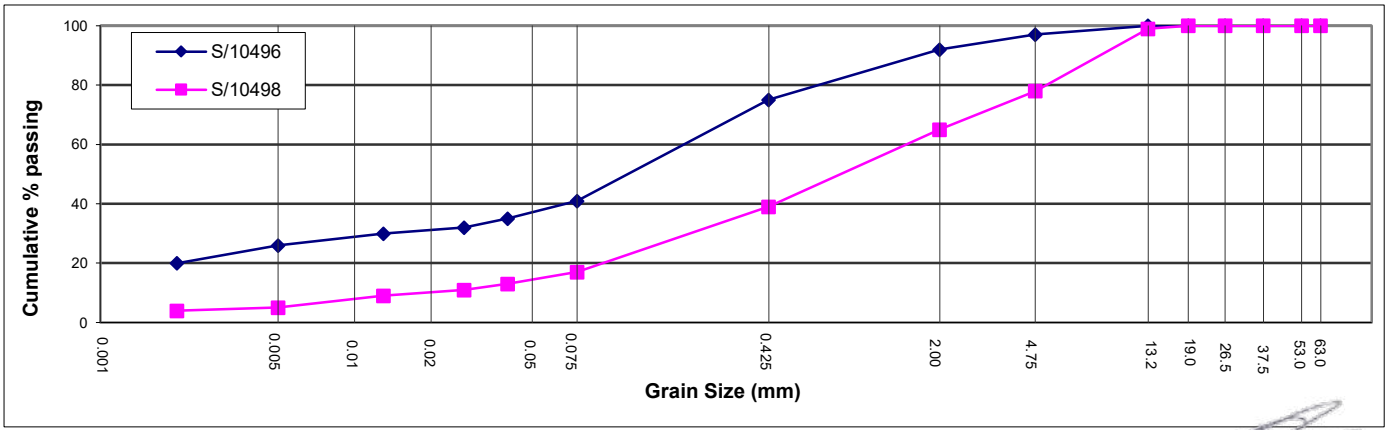
| Sample No. | S/10496 | S/10498 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 2500-4100 | 1400-1500 |
| Position | WRD-TP35 | WRD-TP39 |
| Material description | Clayey sand | Silty sand with gravel |
| Moisture (%) | | |
| SG | 2.647 | 2.596 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | | |
| 37.5 mm | | |
| 26.5 mm | | |
| 19.0 mm | | 100 |
| 13.2 mm | 100 | 99 |
| 4.75 mm | 97 | 78 |
| 2.00 mm | 92 | 65 |
| 0.425 mm | 75 | 39 |
| 0.075 mm | 41 | 17 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 35 | 13 |
| 0.027 mm | 32 | 11 |
| 0.013 mm | 30 | 9 |
| 0.005 mm | 26 | 5 |
| 0.002 mm | 20 | 4 |
| % Clay (<0.002 mm) | 20 | 4 |
| % Silt (<0.075, >0.002 mm) | 21 | 13 |
| % Sand (<4.75, >0.075 mm) | 56 | 61 |
| % Gravel (> 4.75 mm) | 3 | 22 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 32 | 36 |
| Plasticity Index (-0.425) | 13 | 10 |
| Linear Shrinkage (%) | 6.0 | 3.5 |
| PI of whole sample | 10 | 4 |
| Grading Modulus | 0.92 | 1.79 |
| TRB Classification | A-6 (2) | A-2-4 (0) |
| Unified Classification | SC | SM |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

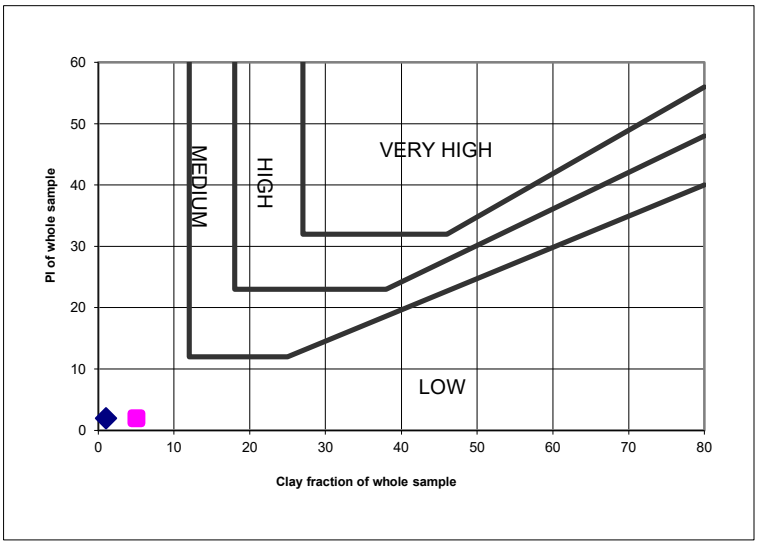
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

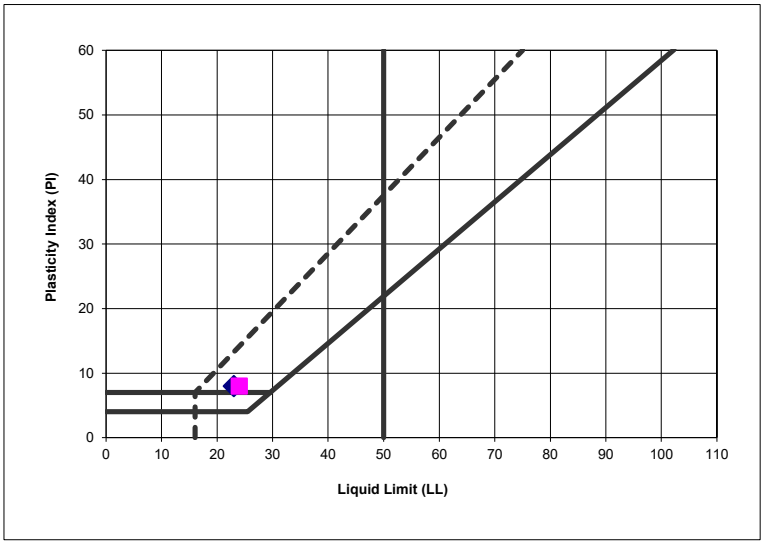
Project: Omitiomire | Sampling Date: 23-Jun-23

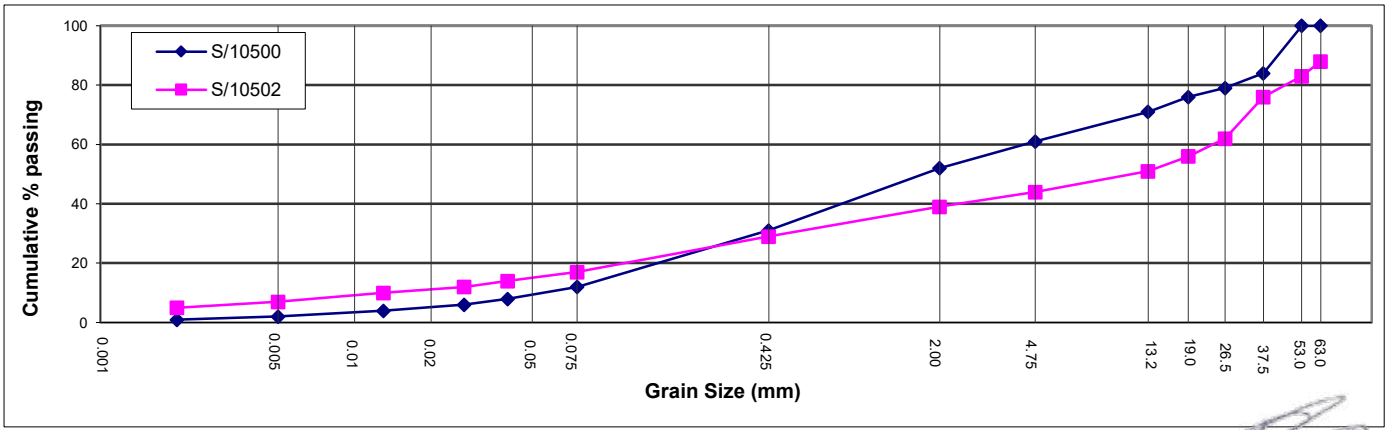
| Sample No. | S/10500 | S/10502 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 2400-2700 | 1150-1450 |
| Position | WRD-TP37 | WRD-TP32 |
| Material description | Clayey sand with gravel | Clayey gravel with sand |
| Moisture (%) | | |
| SG | 2.655 | 2.602 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | 88 |
| 53.0 mm | 100 | 83 |
| 37.5 mm | 84 | 76 |
| 26.5 mm | 79 | 62 |
| 19.0 mm | 76 | 56 |
| 13.2 mm | 71 | 51 |
| 4.75 mm | 61 | 44 |
| 2.00 mm | 52 | 39 |
| 0.425 mm | 31 | 29 |
| 0.075 mm | 12 | 17 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 8 | 14 |
| 0.027 mm | 6 | 12 |
| 0.013 mm | 4 | 10 |
| 0.005 mm | 2 | 7 |
| 0.002 mm | 1 | 5 |
| % Clay (<0.002 mm) | 1 | 5 |
| % Silt (<0.075, >0.002 mm) | 11 | 12 |
| % Sand (<4.75, >0.075 mm) | 49 | 27 |
| % Gravel (> 4.75 mm) | 39 | 56 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 23 | 24 |
| Plasticity Index (-0.425) | 8 | 8 |
| Linear Shrinkage (%) | 4.0 | 3.0 |
| PI of whole sample | 2 | 2 |
| Grading Modulus | 2.05 | 2.15 |
| TRB Classification | A-2-4 (0) | A-2-4 (0) |
| Unified Classification | SC | GC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

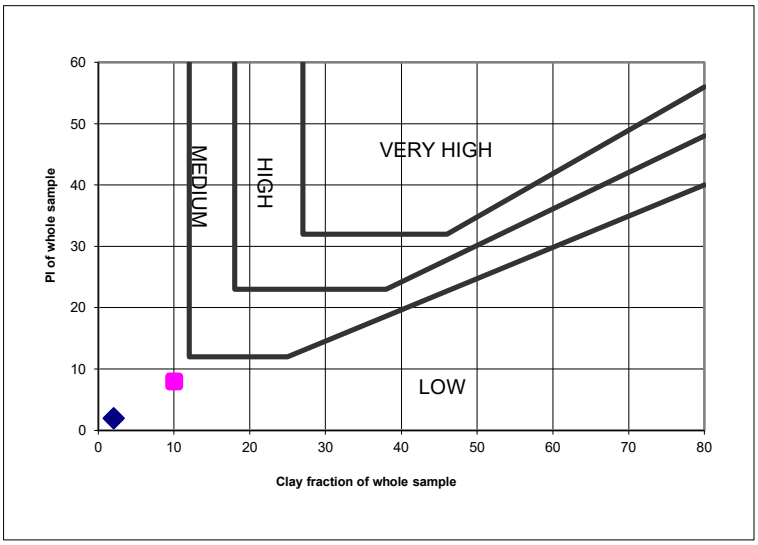
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

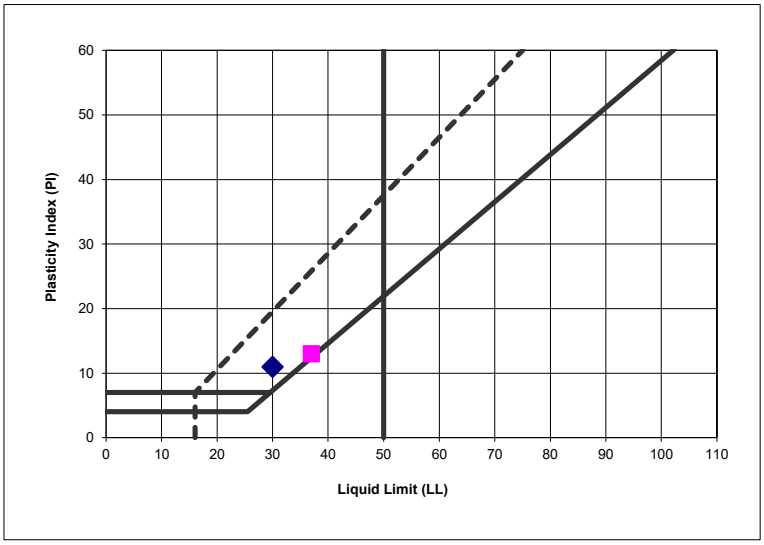
Project: Omitiomire | Sampling Date: 23-Jun-23

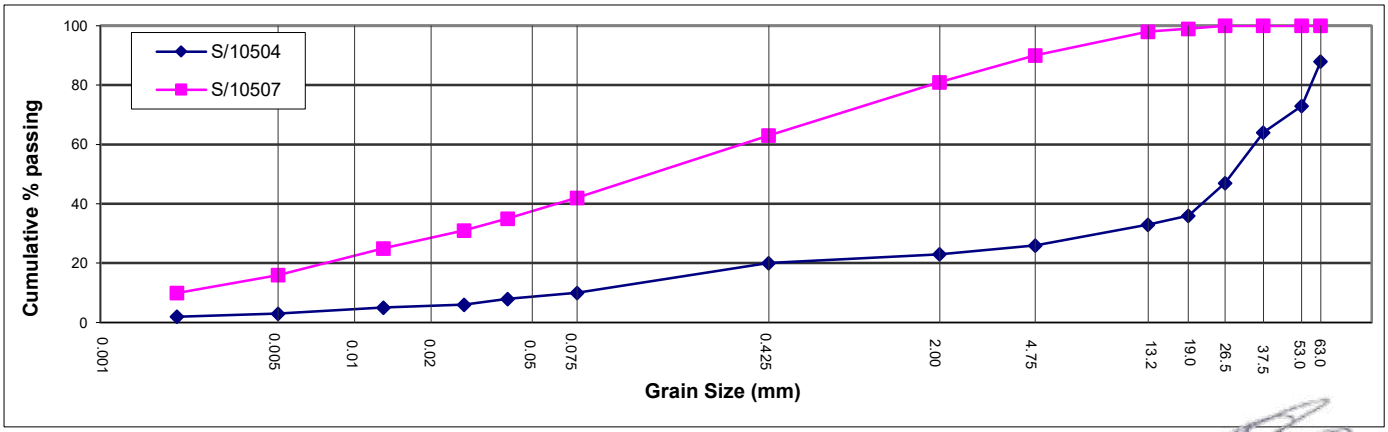
| Sample No. | S/10504 | S/10507 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 500-1800 | 900-1100 |
| Position | WRD-TP16 | WRD-TP37 |
| Material description | Poorly graded gravel with clay and sand | Clayey sand |
| Moisture (%) | | |
| SG | 2.614 | 2.518 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | 88 | |
| 53.0 mm | 73 | |
| 37.5 mm | 64 | |
| 26.5 mm | 47 | 100 |
| 19.0 mm | 36 | 99 |
| 13.2 mm | 33 | 98 |
| 4.75 mm | 26 | 90 |
| 2.00 mm | 23 | 81 |
| 0.425 mm | 20 | 63 |
| 0.075 mm | 10 | 42 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 8 | 35 |
| 0.027 mm | 6 | 31 |
| 0.013 mm | 5 | 25 |
| 0.005 mm | 3 | 16 |
| 0.002 mm | 2 | 10 |
| % Clay (<0.002 mm) | 2 | 10 |
| % Silt (<0.075, >0.002 mm) | 8 | 32 |
| % Sand (<4.75, >0.075 mm) | 16 | 48 |
| % Gravel (> 4.75 mm) | 74 | 10 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 30 | 37 |
| Plasticity Index (-0.425) | 11 | 13 |
| Linear Shrinkage (%) | 4.0 | 6.5 |
| PI of whole sample | 2 | 8 |
| Grading Modulus | 2.47 | 1.14 |
| TRB Classification | A-2-6 (0) | A-4 (2) |
| Unified Classification | GP-GC | SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF TEST RESULTS - EARTHWORKS

Testing performed in accordance with the applicable methods under SANS 3001

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Project no :** 10795.0
**Project :** Omitiomire **Sampling date :** 23-Jun-23
**Section :** Waste Rock Dump **Stabilizing agent :**
**Layer :** **From chainage :** **To chainage :**
**Report no :** SG23/1620 **Page no :** 10

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| sample detail | Sample no. | **S/10509** | **S/10510** | **S/10511** | **S/10512** | | |
| | Chainage | | | | | | |
| | Position (from LHS) | WRD-TP02 | WRD-TP33 | WRD-TP37 | WRD-TP23 | | |
| | Depth sampled (mm) | 1400-1600 | 1200-1300 | 1100-2400 | 850-1500 | | |
| | Sample description | White to grey mottled black stained orange, silty gravelly sand, calcified reworked residual gneiss | Dark brown mottled orange and black, clayey silty coarse sand, slightly ferruginised reworked residual biotite gneiss | Yellowish brown mottled black and white, gravelly silty sand, reworked residual gneiss | Pale brown blotched white, hardpan calcrete. | | |
| | Method of Preparation used | Scalping | Scalping | Scalping | Scalping | | |
| field density | Testing depth (mm) | | | | | | |
| | Dry density (kg/m$^3$) | | | | | | |
| | Moisture (%) | | | | | | |
| | Mod AASHTO (kg/m$^3$) | | | | | | |
| | O.M.C. (%) | | | | | | |
| | Compaction (%) | | | | | | |
| sieve analysis (% passing) | 63,0 mm | | | | 75 | | |
| | 53,0 mm | 100 | | | 62 | | |
| | 37,5 mm | 91 | | | 58 | | |
| | 26,5 mm | 80 | | | 58 | | |
| | 19,0 mm | 71 | | 100 | 58 | | |
| | 13,2 mm | 66 | 100 | 100 | 51 | | |
| | 4,75 mm | 42 | 100 | 92 | 37 | | |
| | 2,00 mm | 28 | 96 | 86 | 31 | | |
| | 0,425 mm | 18 | 70 | 59 | 20 | | |
| | 0,075 mm | 5 | 34 | 24 | 8 | | |
| | Grading Modulus (GM) | 2.49 | 1.00 | 1.31 | 2.41 | | |
| Atterberg Limits | Liquid Limit (LL) | | 22 | 24 | 35 | | |
| | Plasticity Index (PI) | 1 | 8 | 6 | 9 | | |
| | Linear Shrinkage (LS) | | 3.0 | 3.0 | 4.0 | | |
| Mod AASHTO & CBR values | CBR @ 100 % | | | | 64 | | |
| | CBR @ 98 % | | | | 54 | | |
| | CBR @ 95 % | | | | 42 | | |
| | CBR @ 93 % | | | | 36 | | |
| | CBR @ 90 % | | | | 28 | | |
| | Swell @ 100 % | | | | 0.0 | | |
| | Mod AASHTO (kg/m$^3$) | | | | 1651 | | |
| | O.M.C. (%) | | | | 19.9 | | |
| Permeability ISO/TS 17892-11:2004(E) | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |
| | % Compaction @ Moisture | | | | | | |
| | Permeabilty cm/s | | | | | | |

Remarks:

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, or any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

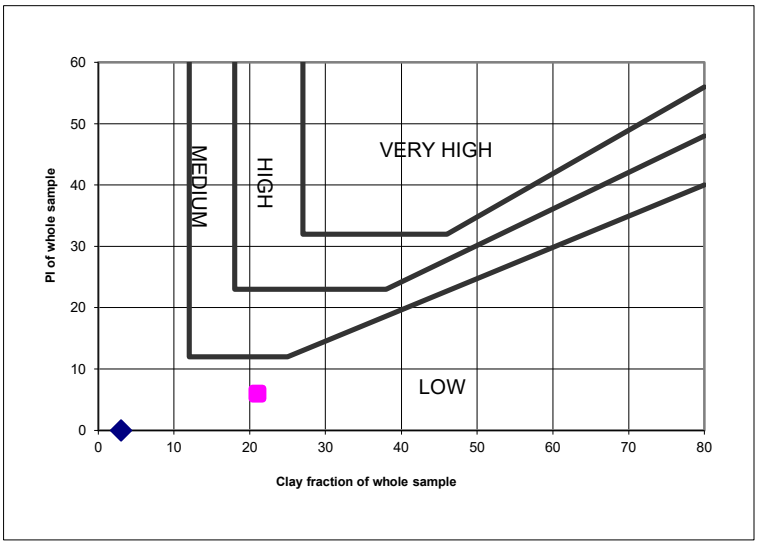
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

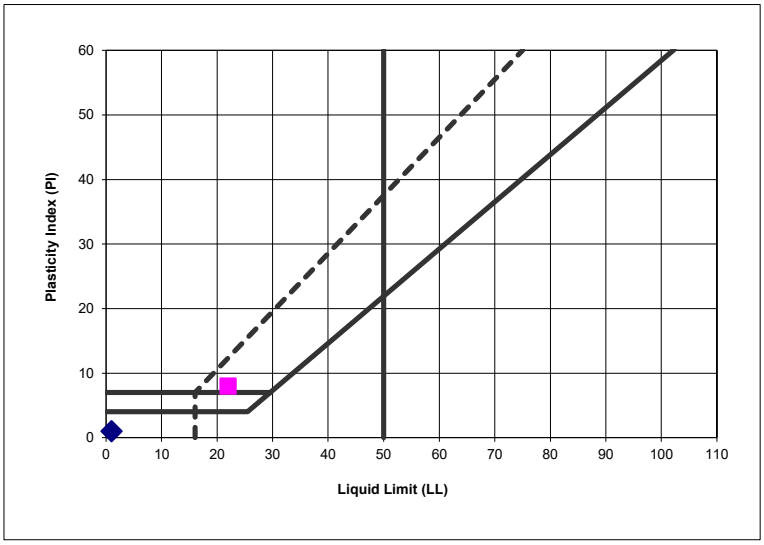
Project: Omitiomire | Sampling Date: 23-Jun-23

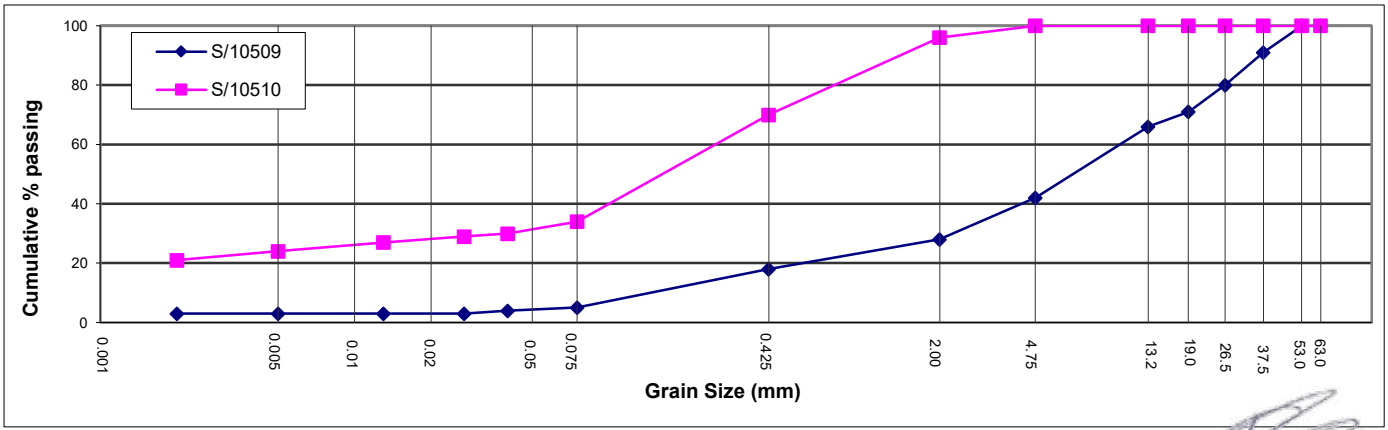
| Sample No. | S/10509 | S/10510 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 1400-1600 | 1200-1300 |
| Position | WRD-TP02 | WRD-TP33 |
| Material description | Poorly graded gravel with silt and sand | Clayey sand |
| Moisture (%) | | |
| SG | 2.635 | 2.634 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | |
| 53.0 mm | 100 | |
| 37.5 mm | 91 | |
| 26.5 mm | 80 | |
| 19.0 mm | 71 | |
| 13.2 mm | 66 | 100 |
| 4.75 mm | 42 | 100 |
| 2.00 mm | 28 | 96 |
| 0.425 mm | 18 | 70 |
| 0.075 mm | 5 | 34 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 4 | 30 |
| 0.027 mm | 3 | 29 |
| 0.013 mm | 3 | 27 |
| 0.005 mm | 3 | 24 |
| 0.002 mm | 3 | 21 |
| % Clay (<0.002 mm) | 3 | 21 |
| % Silt (<0.075, >0.002 mm) | 2 | 13 |
| % Sand (<4.75, >0.075 mm) | 37 | 66 |
| % Gravel (> 4.75 mm) | 58 | 0 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | | 22 |
| Plasticity Index (-0.425) | 1 | 8 |
| Linear Shrinkage (%) | 0.0 | 3.0 |
| PI of whole sample | 0 | 6 |
| Grading Modulus | 2.49 | 1 |
| TRB Classification | A-1-a (0) | A-2-4 (0) |
| Unified Classification | GP-GM | SC |

**Potential Expansiveness**




**Plasticity Chart**



# Namibia Technical Services cc

## SUMMARY OF INDICATOR / HYDROMETER TEST RESULTS

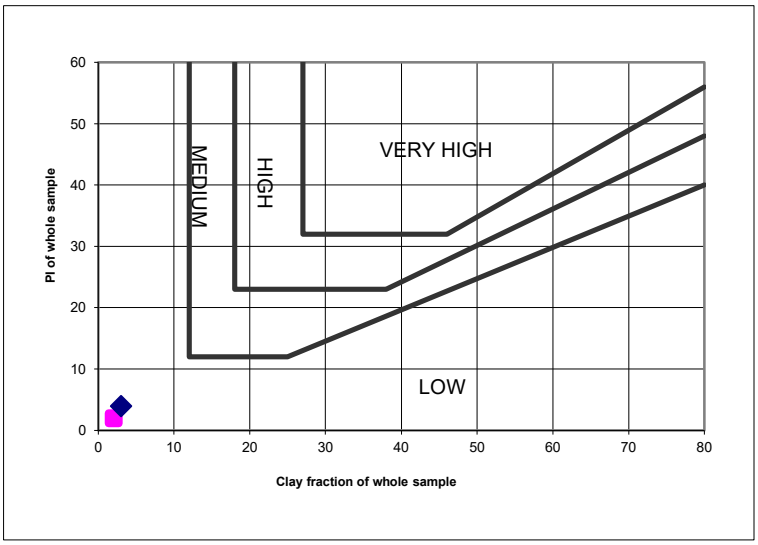
Tests done according to: TMH 1 Methods A1a + A1a + A2 + A3 + A5, ASTM D422 - 63 (2002), ASTM D2487 - 06

Client: Knight Piesold (Pty) Ltd (Namibia) | Project No.: 10795

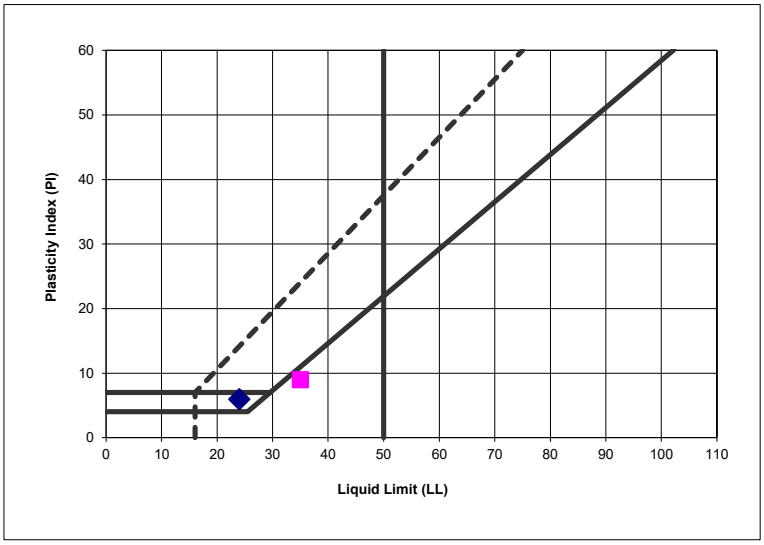
Project: Omitiomire | Sampling Date: 23-Jun-23

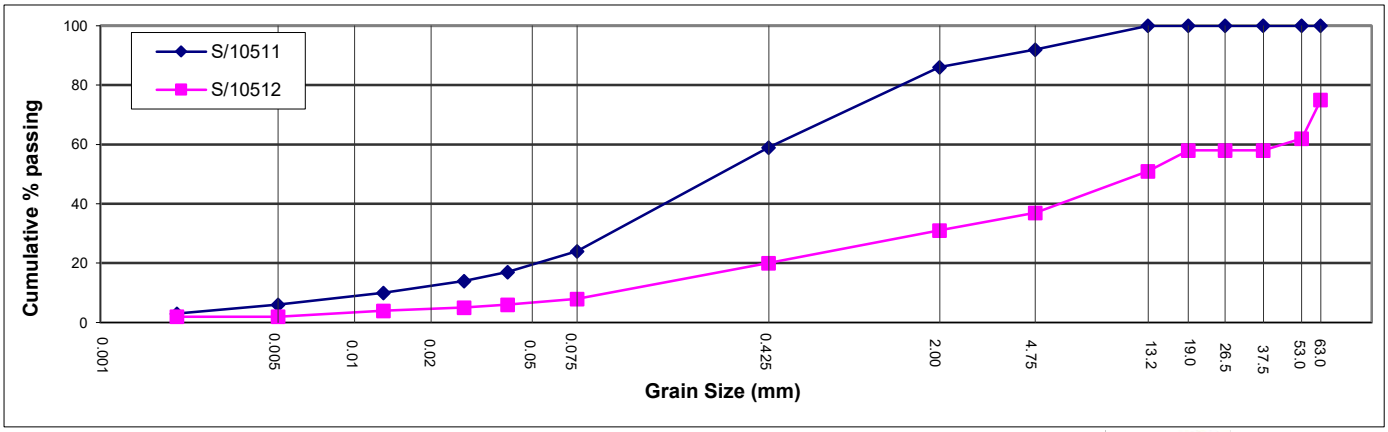
| Sample No. | S/10511 | S/10512 |
|---|---|---|
| Report No. | SG23/1620 | |
| Depth (mm) | 1100-2400 | 850-1500 |
| Position | WRD-TP37 | WRD-TP23 |
| Material description | Silty, clayey sand | Poorly graded gravel with silt and sand |
| Moisture (%) | | |
| SG | 2.648 | 2.543 |
| **Sieve Analysis ( % passing )** | | |
| 63.0 mm | | 75 |
| 53.0 mm | | 62 |
| 37.5 mm | | 58 |
| 26.5 mm | | 58 |
| 19.0 mm | 100 | 58 |
| 13.2 mm | 100 | 51 |
| 4.75 mm | 92 | 37 |
| 2.00 mm | 86 | 31 |
| 0.425 mm | 59 | 20 |
| 0.075 mm | 24 | 8 |
| **Hydrometer Analysis ( % passing )** | | |
| 0.040 mm | 17 | 6 |
| 0.027 mm | 14 | 5 |
| 0.013 mm | 10 | 4 |
| 0.005 mm | 6 | 2 |
| 0.002 mm | 3 | 2 |
| % Clay (<0.002 mm) | 3 | 2 |
| % Silt (<0.075, >0.002 mm) | 21 | 6 |
| % Sand (<4.75, >0.075 mm) | 68 | 29 |
| % Gravel (> 4.75 mm) | 8 | 63 |
| **Atterberg Limits** | | |
| Liquid Limit (-0.425) | 24 | 35 |
| Plasticity Index (-0.425) | 6 | 9 |
| Linear Shrinkage (%) | 3.0 | 4.0 |
| PI of whole sample | 4 | 2 |
| Grading Modulus | 1.31 | 2.41 |
| TRB Classification | A-2-4 (0) | A-2-4 (0) |
| Unified Classification | SC-SM | GP-GM |

**Potential Expansiveness**




**Plasticity Chart**






Digitally signed by Jaco Strydom
Date: 2023.08.24 16:22:45 +02'00'

# Namibia Technical Services cc

## SUMMARY OF AGGREGATE TEST RESULTS

Tests done according to SANS 3001

**Client:** Knight Piesold (Pty) Ltd (Namibia) **Project no:** 10795

**Project:** Omitiomire **Date:** 31-Aug-23

**Source:** PLT-BH01 : 2.80 - 9.00m **Report no:** AG23/336

**Order no:** **Page no:** 1

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Sample no. | | **S/10595** | | | | | |
| Description | | PLT-BH01 : 2.80 - 9.00m | | | | | |
| Sieve Analysis | 75.0 mm | | | | | | |
| | 63.0 mm | | | | | | |
| | 53.0 mm | | | | | | |
| | 37.5 mm | | | | | | |
| | 26.5 mm | | | | | | |
| | 19.0 mm | | | | | | |
| | 13.2 mm | | | | | | |
| | 9.5 mm | | | | | | |
| | 6.7 mm | | | | | | |
| | 4.75 mm | | | | | | |
| | 2.36 mm | | | | | | |
| | 1.18 mm | | | | | | |
| | 0.600 mm | | | | | | |
| | 0.425 mm | | | | | | |
| | 0.300 mm | | | | | | |
| | 0.150 mm | | | | | | |
| | 0.075 mm | | | | | | |
| | Fineness Modulus | | | | | | |
| Loose Bulk Density (kg/m$^3$) | | | | | | | |
| Consolidated Bulk Density (kg/m$^3$) | | | | | | | |
| Bulk Relative Density (kg/m$^3$) | | | | | | | |
| Apparent Relative Density (kg/m$^3$) | | | | | | | |
| Water absorption (%) | | | | | | | |
| Sand Equivalent | | | | | | | |
| Organic Impurities | | | | | | | |
| Aggregate Crushing Value (dry) | | 19.3 | | | | | |
| Aggregate Crushing Value (wet) | | 36.2 | | | | | |
| 10% FACT (dry) (kN) | | | | | | | |
| 10% FACT (wet) (kN) | | | | | | | |
| Flakiness Index | | | | | | | |
| Riedel & Weber | | | | | | | |
| Average Least Dimension | | | | | | | |
| Los Angeles Abrasion (LAA) | | | | | | | |
| PI on LAA fines | | | | | | | |
| Mill Abrasion (MA) | | | | | | | |
| Deleterious Clay Content (MBT) | | | | | | | |
| Presence of Sugar | | | | | | | |
| Water Soluble Sulphates (% m/m) | | | | | | | |
| Water Soluble Salts (% m/m) | | | | | | | |
| Chloride Content (% m/m Cl) | | | | | | | |

**Remarks:**

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, nor any erroneous statement or opinion. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

**Lab / NTS 21**

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Date: 2023.08.31 19:48:20 +02'00'

## Namibia Technical Services cc

### SUMMARY OF TEST RESULTS

### BASSON INDEX & BRE

**Client :** Knight Piesold (Pty) Ltd (Namibia)
PO Box 86062
Eros, Windhoek
Namibia
**Report no :** 23BI/09

**Project no :** 10795.0
**Report date :** 29-Aug-23
**ALS Reference :** I231538
**Sample ID :**
**Page no :** 1 of 2

| ANALYSIS | Unit | Sample Reference / description | | | |
|---|---|---|---|---|---|
| | | S/10410 | S/10418 | | |
| Sample position | | **HLP-TP05** | **HLP-TP13** | | |
| Depth from to (m) | | **0.0-1.1** | **0.3-2.25** | | |
| pH | 1 / log H | 6.9 | 6.6 | | |
| Temp at which above pH performed | °C | 25.1 | 24.6 | | |
| pH Value at 25 °C | 1 / log H | 6.90 | 6.60 | | |
| Calcium carbonate-saturated pH (Calc) at 20 °C | 1 / log H | 10.90 | 10.70 | | |
| Electrical Conductivity at 25 °C | mS/m | 1.6 | 2 | | |
| Total dissolved solids * (Calc) | mg/l | 11 | 13 | | |
| Total Alkalinity as $CaCO_4$ | mg/l | 5 | 5 | | |
| Total Hardness as $CaCO_3$ (Calc) | mg/l | 4 | 5 | | |
| Calcium Hardness as $CaCO_3$ (Calc) | mg/l | 2 | 3 | | |
| Calcium as Ca | mg/l | 1 | 1.1 | | |
| Magnesium Hardness CaCO3 (Calc) | mg/l | 2 | 2 | | |
| Magnesium ion (as Mg) | mg/l | 0.6 | 0.6 | | |
| Total ammonium ion (as $NH_4$) | mg/l | 0.03 | 0.11 | | |
| Total Sulphate ion (as $SO_4$) | mg/l | 6 | 49 | | |
| Chloride ion (as Cl) (see note 1 below) | mg/l | 5 | 5 | | |
| Total water soluble salts | mg/l | 140 | 290 | | |
| Langelier Index at 20 °C (Calc) | | -4.0 | -4.2 | | |
| Ryznar Index at 20 °C (Calc) | | 15.0 | 15.0 | | |
| Corrosivity Ratio (Calc) | | 2.7 | 11.7 | | |
| **Indices for standard local conditions (ie under conditions of laminar flow at 20°C)** | | | | | |
| Leaching corrosion sub-index | LSCI | 3201 | 3305 | | |
| Spalling corrosion sub-index | SCSI | 1 | 5 | | |
| Aggressiveness index | Nc | 3202 | 3310 | | |

* TDS Calculated EC x 6.7

2:1 Distilled Water : Soil Extract

**Important notes:**

1. The above aggressiveness index is only applicable for conditions of laminar flow at a mean annual temperature of 20 °C.
2. For stagnant / turbulent conditions the aggressiveness index must be corrected.
3. For wet / dry cycling conditions (for example tidal zones) the aggressiveness index must be corrected.
4. For mean annual temperatures lower / higher than 20 °C the aggressiveness index must be corrected.

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## Namibia Technical Services cc

### SUMMARY OF TEST RESULTS

### BASSON INDEX & BRE

**Client :** Knight Piesold (Pty) Ltd (Namibia)
PO Box 86062
Eros, Windhoek
Namibia
**Report no :** 23BI/09

**Project no :** 10799.0
**Report date :** 29-Aug-23
**ALS Reference :** I231538
**Sample ID :**
**Page no :** 2 of 2

| To correct for: | Multiply | By: (see Notes 2 to 5 below) |
|---|---|---|
| Turbulence | LSCI | 1.75 |
| Stagnance | LSCI | 0.5 |
| Temperature | LSCI,SCSI,N7 | (1+(0.05 x (T-20))) where T = mean annual temperature |
| Wet-dry cycles | SCSI | $0.23 \times 10^{-6} \times Cl^{-} \times DTF \times CPA$ where DTF = dry time fraction and CPA = wet-dry cycles per annum |

Note 1: Only if the concrete contains embedded steel

Note 2: To preserve the correct logical relationships when dealing with negative sub-indices (ie LSCI or SCSI having minus values) they should be multiplied by the reciprocal of the relevant factor indicated in this column.

Note 3: If more than one correction is required, multiply by the product of the individual correction factors

Note 4: Use subscript c to indicate that the index has been corrected, eg for turbulent conditions LSCIc = LSCI x 1.75

Note 5: Round off corrected indices to the nearest 100

**GUIDELINES FOR ASSESSING OVERALL AGGRESSIVENSS (Nc):**

| Nc | Aggressiveness |
|---|---|
| **Not greater than 300** | **None to mild** |
| **400 - 700** | **Mild to moderate** |
| **800 - 1000** | **High** |
| **= or > 1100** | **Very High** |

**Aggressiveness Towards Concrete and Fibre Cement Pipes**

| Index | Aggressive | Neutral | Non-Aggressive |
|---|---|---|---|
| **a) Stability pH (pHs)** | **> pH** | **= pH** | **< pH** |
| **b) Langelier Index** | **Neg. Value** | **Zero** | **Pos. Value** |
| **c) Ryznar Index** | **> 7.5** | **6 - 7** | **< 6** |

| Corrosiveness Towards Metals | |
|---|---|
| Corrosivity Ratio | > 0.2 |

| Sample Reference / description | Corrosivity Indices | Basson Index |
|---|---|---|
| S/10410 | Corrosive | Very High |
| S/10418 | Corrosive | Very High |
| | | |
| | | |

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## Namibia Technical Services cc

### SUMMARY OF TEST RESULTS

### BASSON INDEX & BRE

**Client :** Knight Piesold (Pty) Ltd (Namibia)
PO Box 86062
Eros, Windhoek
Namibia
**Report no :** 23BI/09

**Project no :** 10795.0
**Report date :** 29-Aug-23
**ALS Reference :** I231538
**Sample ID :**
**Page no :** 1 of 2

| ANALYSIS | Unit | Sample Reference / description | | | |
|---|---|---|---|---|---|
| | | S/10468 | S/10470 | | |
| Sample position | | SWD-TP19 | SWD-TP07 | | |
| Depth from to (m) | | 1.4-2.4 | 1.4-1.9 | | |
| pH | 1 / log H | 7.8 | 8.1 | | |
| Temp at which above pH performed | °C | 25.1 | 25.2 | | |
| pH Value at 25 °C | 1 / log H | 7.80 | 8.10 | | |
| Calcium carbonate-saturated pH (Calc) at 20 °C | 1 / log H | 8.70 | 9.00 | | |
| Electrical Conductivity at 25 °C | mS/m | 12.1 | 13 | | |
| Total dissolved solids * (Calc) | mg/l | 81 | 87 | | |
| Total Alkalinity as $CaCO_4$ | mg/l | 55 | 57.5 | | |
| Total Hardness as $CaCO_3$ (Calc) | mg/l | 63 | 29 | | |
| Calcium Hardness as $CaCO_3$ (Calc) | mg/l | 35 | 18 | | |
| Calcium as Ca | mg/l | 13.9 | 7.1 | | |
| Magnesium Hardness CaCO3 (Calc) | mg/l | 28 | 11 | | |
| Magnesium ion (as Mg) | mg/l | 6.9 | 2.7 | | |
| Total ammonium ion (as $NH_4$) | mg/l | 0.15 | 0.01 | | |
| Total Sulphate ion (as $SO_4$) | mg/l | 47 | 12 | | |
| Chloride ion (as Cl) (see note 1 below) | mg/l | 5 | 12 | | |
| Total water soluble salts | mg/l | 240 | 170 | | |
| Langelier Index at 20 °C (Calc) | | -0.9 | -0.8 | | |
| Ryznar Index at 20 °C (Calc) | | 9.7 | 9.9 | | |
| Corrosivity Ratio (Calc) | | 1.0 | 0.5 | | |
| **Indices for standard local conditions (ie under conditions of laminar flow at 20°C)** | | | | | |
| Leaching corrosion sub-index | LSCI | 1040 | 1068 | | |
| Spalling corrosion sub-index | SCSI | 6 | 3 | | |
| Aggressiveness index | Nc | 1046 | 1071 | | |

* TDS Calculated EC x 6.7

2:1 Distilled Water : Soil Extract

**Important notes:**

1. The above aggressiveness index is only applicable for conditions of laminar flow at a mean annual temperature of 20 °C.
2. For stagnant / turbulent conditions the aggressiveness index must be corrected.
3. For wet / dry cycling conditions (for example tidal zones) the aggressiveness index must be corrected.
4. For mean annual temperatures lower / higher than 20 °C the aggressiveness index must be corrected.

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## Namibia Technical Services cc

### SUMMARY OF TEST RESULTS

### BASSON INDEX & BRE

**Client :** Knight Piesold (Pty) Ltd (Namibia)
PO Box 86062
Eros, Windhoek
Namibia
**Report no :** 23BI/09

**Project no :** 10799.0
**Report date :** 29-Aug-23
**ALS Reference :** I231538
**Sample ID :**
**Page no :** 2 of 2

| To correct for: | Multiply | By: (see Notes 2 to 5 below) |
|---|---|---|
| Turbulence | LSCI | 1.75 |
| Stagnance | LSCI | 0.5 |
| Temperature | LSCI,SCSI,N7 | (1+(0.05 x (T-20))) where T = mean annual temperature |
| Wet-dry cycles | SCSI | $0.23 \times 10^{-6} \times Cl^{-} \times DTF \times CPA$ where DTF = dry time fraction and CPA = wet-dry cycles per annum |

Note 1: Only if the concrete contains embedded steel

Note 2: To preserve the correct logical relationships when dealing with negative sub-indices (ie LSCI or SCSI having minus values) they should be multiplied by the reciprocal of the relevant factor indicated in this column.

Note 3: If more than one correction is required, multiply by the product of the individual correction factors

Note 4: Use subscript c to indicate that the index has been corrected, eg for turbulent conditions LSCIc = LSCI x 1.75

Note 5: Round off corrected indices to the nearest 100

**GUIDELINES FOR ASSESSING OVERALL AGGRESSIVENSS (Nc):**

| Nc | Aggressiveness |
|---|---|
| **Not greater than 300** | **None to mild** |
| **400 - 700** | **Mild to moderate** |
| **800 - 1000** | **High** |
| **= or > 1100** | **Very High** |

**Aggressiveness Towards Concrete and Fibre Cement Pipes**

| Index | Aggressive | Neutral | Non-Aggressive |
|---|---|---|---|
| **a) Stability pH (pHs)** | **> pH** | **= pH** | **< pH** |
| **b) Langelier Index** | **Neg. Value** | **Zero** | **Pos. Value** |
| **c) Ryznar Index** | **> 7.5** | **6 - 7** | **< 6** |

| Corrosiveness Towards Metals | |
|---|---|
| Corrosivity Ratio | > 0.2 |

| Sample Reference / description | Corrosivity Indices | Basson Index |
|---|---|---|
| S/10468 | Corrosive | High to Very High |
| S/10470 | Corrosive | High to Very High |
| | | |
| | | |

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**4P resistance (R)**

| | Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|---|
| 1 | Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| | N-S | 4.27 | 2.34 | 1.01 | 0.56 | 0.44 | 0.36 |
| | E-W | 4.30 | 2.29 | 1.02 | 0.58 | 0.44 | 0.37 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 80 | 88 | 76 | 84 | 100 | 122 |
| E-W | 81 | 86 | 77 | 87 | 100 | 126 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 80 | 88 | 76 | 84 | 100 | 122 |
| E-W | 81 | 88 | 76 | 83 | 100 | 126 |

2

**4P resistance (R)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| N-S | 4.13 | 1.76 | 0.83 | 0.61 | 0.43 | 0.31 |
| E-W | 4.21 | 1.89 | 0.90 | 0.62 | 0.40 | 0.29 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 78 | 66 | 63 | 92 | 97 | 105 |
| E-W | 79 | 71 | 68 | 93 | 90 | 98 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 78 | 66 | 62 | 92 | 98 | 107 |
| E-W | 77 | 71 | 68 | 92 | 90 | 98 |

3

**4P resistance (R)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| N-S | 1.71 | 1.09 | 0.75 | 0.37 | 0.45 | 0.71 |
| E-W | 1.72 | 1.10 | 0.75 | 0.38 | 0.46 | 0.56 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 32 | 41 | 57 | 56 | 102 | 241 |
| E-W | 32 | 41 | 57 | 57 | 104 | 190 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 32 | 41 | 56 | 56 | 101 | 241 |
| E-W | 33 | 43 | 56 | 56 | 101 | 190 |

**4P resistance (R)**

| 4 | Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|---|
| | Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| | N-S | 1.44 | 0.71 | 0.44 | 0.44 | 0.38 | 0.38 |
| | E-W | 1.32 | 0.72 | 0.53 | 0.33 | 0.36 | 0.33 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 27 | 27 | 33 | 66 | 86 | 129 |
| E-W | 25 | 27 | 40 | 50 | 81 | 112 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 27 | 27 | 33 | 65 | 84 | 129 |
| E-W | 25 | 27 | 39 | 50 | 79 | 112 |

5

**4P resistance (R)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| N-S | 1.30 | 0.75 | 0.47 | 0.33 | 0.32 | 0.44 |
| E-W | 1.26 | 0.73 | 0.44 | 0.26 | 0.28 | 0.36 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 25 | 28 | 35 | 50 | 72 | 149 |
| E-W | 24 | 28 | 33 | 39 | 63 | 122 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 24 | 28 | 35 | 49 | 70 | 149 |
| E-W | 24 | 28 | 33 | 39 | 63 | 122 |

6

**4P resistance (R)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| N-S | 1.56 | 1.06 | 0.69 | 0.56 | 0.62 | 0.52 |
| E-W | 1.45 | 1.01 | 0.66 | 0.50 | 0.56 | 0.47 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 29 | 40 | 52 | 84 | 140 | 176 |
| E-W | 27 | 38 | 50 | 75 | 127 | 159 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 29 | 40 | 52 | 84 | 140 | 176 |
| E-W | 27 | 38 | 50 | 74 | 126 | 159 |

7

**4P resistance (R)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| N-S | 1.45 | 1.02 | 0.63 | 0.45 | 0.54 | 0.47 |
| E-W | 1.45 | 1.01 | 0.65 | 0.47 | 0.50 | 0.45 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 27 | 38 | 48 | 68 | 122 | 159 |
| E-W | 27 | 38 | 49 | 71 | 113 | 153 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 27 | 38 | 47 | 69 | 119 | 159 |
| E-W | 27 | 38 | 48 | 71 | 113 | 153 |

8

**4P resistance (R)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω | Resistance Ω |
| N-S | 4.52 | 2.12 | 0.96 | 0.68 | 0.47 | 0.65 |
| E-W | 4.46 | 2.05 | 0.88 | 0.66 | 0.47 | 0.62 |

**Wenner Resistivity (*p* ) calculated from above resitance values**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 85 | 80 | 72 | 103 | 106 | 221 |
| E-W | 84 | 77 | 66 | 100 | 106 | 210 |

**Wenner Resistivity (*p* ) as tested with machine (Direct reading)**

| Electrode spacing (m) | 3 | 6 | 12 | 24 | 36 | 54 |
|---|---|---|---|---|---|---|
| Test Orientation | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m | Resistivity Ω.m |
| N-S | 85 | 80 | 72 | 103 | 106 | 221 |
| E-W | 84 | 77 | 66 | 99 | 103 | 210 |

## Namibia Technical Services cc

# Point Load Index Testing

### ASTM D5731

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** PL / 14 **Page no :** 1 **Testing date :** 28/Jul/23

*Sample Preparation* Specimens cut with Diamond Table saw from Rock Core Samples *Core Size* HQ 63

| Lab No | No. | Depth | Type | Orientation | W/L (mm) | D(mm) | P(kN) | $D_e^2$ ($mm^2$) | $D_e$ (mm) | $I_s$ (MPa) | F | $I_{s(50)}$ (MPa) | Estimated UCS Value (MPa) | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/10576 | SWD-BH01 | 2.39 - 2.51 | a | p | 28.7 | 60.8 | 1.10 | 2222.88 | 47.15 | 0.49 | 0.97 | 0.48 | 12.01 | 24.91 |
| S/10576 | SWD-BH01 | 2.39 - 2.51 | d | p | 27.9 | 60.8 | 1.70 | 3696.64 | 60.80 | 0.46 | 1.09 | 0.50 | 12.51 | 24.91 |
| | | | | | | | | | | | | | | |
| S/10577 | SWD-BH01 | 3.14 - 3.48 | a | p | 59.4 | 60.3 | 4.10 | 4562.83 | 67.55 | 0.90 | 1.14 | 1.03 | 25.53 | 24.82 |
| S/10577 | SWD-BH01 | 3.14 - 3.48 | d | p | 29.2 | 60.3 | 2.80 | 3636.09 | 60.30 | 0.77 | 1.09 | 0.84 | 20.79 | 24.82 |
| | | | | | | | | | | | | | | |
| S/10578 | SWD-BH01 | 3.36 - 3.95 | a | p | 59.3 | 60.1 | 6.25 | 4540.04 | 67.38 | 1.38 | 1.14 | 1.57 | 39.02 | 24.78 |
| S/10578 | SWD-BH01 | 3.36 - 3.95 | d | p | 30.7 | 60.1 | 3.60 | 3612.01 | 60.10 | 1.00 | 1.09 | 1.08 | 26.83 | 24.78 |
| | | | | | | | | | | | | | | |
| S/10579 | SWD-BH02 | 2.84 - 2.98 | a | p | 39.1 | 59.9 | 2.65 | 2983.55 | 54.62 | 0.89 | 1.04 | 0.92 | 22.87 | 24.74 |
| S/10579 | SWD-BH02 | 2.84 - 2.98 | d | p | 29.7 | 59.9 | 1.55 | 3588.01 | 59.90 | 0.43 | 1.08 | 0.47 | 11.59 | 24.74 |
| | | | | | | | | | | | | | | |
| S/10581 | SWD-BH02 | 8.16 - 8.35 | a | p | 40.1 | 60.6 | 3.40 | 3095.62 | 55.64 | 1.10 | 1.05 | 1.15 | 28.67 | 24.87 |
| S/10581 | SWD-BH02 | 8.16 - 8.35 | d | p | 28 | 60.6 | 3.40 | 3672.36 | 60.60 | 0.93 | 1.09 | 1.01 | 25.11 | 24.87 |
| | | | | | | | | | | | | | | |
| S/10582 | SWD-BH03 | 3.82 - 4.13 | a | p | 38.4 | 60.1 | 2.50 | 2939.92 | 54.22 | 0.85 | 1.04 | 0.88 | 21.86 | 24.78 |
| S/10582 | SWD-BH03 | 3.82 - 4.13 | d | p | 72.1 | 60.1 | 1.60 | 3612.01 | 60.10 | 0.44 | 1.09 | 0.48 | 11.92 | 24.78 |

d = diametrical; a = axial; b = block; i = irregular lump test; // = parrallel to planes of weekness; p = perpendicular

## Namibia Technical Services cc

# Point Load Index Testing

### ASTM D5731

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** PL / 14 **Page no :** 2 **Testing date :** 28/Jul/23

*Sample Preparation* Specimens cut with Diamond Table saw from Rock Core Samples *Core Size* HQ 63

| Lab No | No. | Depth | Type | Orientation | W/L (mm) | D(mm) | P(kN) | $D_e^2$ ($mm^2$) | $D_e$ (mm) | $I_s$ (MPa) | F | $I_{s(50)}$ (MPa) | Estimated UCS Value (MPa) | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/10583 | SWD-BH04 | 3.71 - 3.88 | a | p | 56.3 | 59.2 | 18.50 | 4245.81 | 65.16 | 4.36 | 1.13 | 4.91 | 120.83 | 24.62 |
| S/10583 | SWD-BH04 | 3.71 - 3.88 | d | p | 28.9 | 59.2 | 0.60 | 3504.64 | 59.20 | 0.17 | 1.08 | 0.18 | 4.55 | 24.62 |
| | | | | | | | | | | | | | | |
| S/10584 | SWD-BH04 | 8.23 - 8.39 | a | p | 42.2 | 60.1 | 12.40 | 3230.85 | 56.84 | 3.84 | 1.06 | 4.07 | 100.76 | 24.78 |
| S/10584 | SWD-BH04 | 8.23 - 8.39 | d | p | 22.6 | 60.1 | 5.45 | 3612.01 | 60.10 | 1.51 | 1.09 | 1.64 | 40.62 | 24.78 |
| | | | | | | | | | | | | | | |
| S/10585 | SWD-BH05 | 5.88 - 6.02 | a | p | 43.6 | 60.8 | 1.55 | 3376.92 | 58.11 | 0.46 | 1.07 | 0.49 | 12.23 | 24.91 |
| S/10585 | SWD-BH05 | 5.88 - 6.02 | d | p | 28.7 | 60.8 | 0.35 | 3696.64 | 60.80 | 0.09 | 1.09 | 0.10 | 2.58 | 24.91 |
| | | | | | | | | | | | | | | |
| S/10586 | SWD-BH05 | 9.69 - 9.93 | a | p | 27.6 | 60.6 | 3.85 | 2130.65 | 46.16 | 1.81 | 0.96 | 1.74 | 43.36 | 24.87 |
| S/10586 | SWD-BH05 | 9.69 - 9.93 | d | p | 23.1 | 60.6 | 2.05 | 3672.36 | 60.60 | 0.56 | 1.09 | 0.61 | 15.14 | 24.87 |
| | | | | | | | | | | | | | | |
| S/10587 | SWD-BH08 | 5.07 - 5.21 | a | p | 39.1 | 58.2 | 2.05 | 2898.88 | 53.84 | 0.71 | 1.03 | 0.73 | 17.86 | 24.43 |
| S/10587 | SWD-BH08 | 5.07 - 5.21 | d | p | 30.2 | 58.2 | 0.60 | 3387.24 | 58.20 | 0.18 | 1.07 | 0.19 | 4.63 | 24.43 |
| | | | | | | | | | | | | | | |
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d = diametrical; a = axial; b = block; i = irregular lump test; // = parrallel to planes of weekness; p = perpendicular

## Namibia Technical Services cc

# Point Load Index Testing

### ASTM D5731

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** PL / 14 **Page no :** 3 **Testing date :** 28/Jul/23

*Sample Preparation* Specimens cut with Diamond Table saw from Rock Core Samples *Core Size* HQ 63

| Lab No | No. | Depth | Type | Orientation | W/L (mm) | D(mm) | P(kN) | $D_e^2$ ($mm^2$) | $D_e$ (mm) | $I_s$ (MPa) | F | $I_{s(50)}$ (MPa) | Estimated UCS Value (MPa) | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/10588 | HLP-BH01 | 6.18 - 6.31 | a | p | 27.2 | 60.9 | 0.85 | 2110.17 | 45.94 | 0.40 | 0.96 | 0.39 | 9.67 | 24.93 |
| S/10588 | HLP-BH01 | 6.18 - 6.31 | d | p | 22.8 | 60.9 | 0.50 | 3708.81 | 60.90 | 0.13 | 1.09 | 0.15 | 3.67 | 24.93 |
| | | | | | | | | | | | | | | |
| S/10589 | HLP-BH01 | 8.35 - 8.60 | a | p | 38.3 | 60.3 | 1.75 | 2942.03 | 54.24 | 0.59 | 1.04 | 0.62 | 15.31 | 24.82 |
| S/10589 | HLP-BH01 | 8.35 - 8.60 | a | p | 46.5 | 60.3 | 1.60 | 3571.91 | 59.77 | 0.45 | 1.08 | 0.49 | 12.05 | 24.82 |
| | | | | | | | | | | | | | | |
| S/10590 | HLP-BH02 | 5.35 - 5.65 | a | p | 35.9 | 60.6 | 0.95 | 2771.39 | 52.64 | 0.34 | 1.02 | 0.35 | 8.73 | 24.87 |
| S/10590 | HLP-BH02 | 5.35 - 5.65 | d | p | 29.8 | 60.6 | 0.65 | 3672.36 | 60.60 | 0.18 | 1.09 | 0.19 | 4.80 | 24.87 |
| | | | | | | | | | | | | | | |
| S/10591 | HLP-BH03 | 2.27 - 2.41 | a | p | 26.1 | 60.1 | 0.40 | 1998.23 | 44.70 | 0.20 | 0.95 | 0.19 | 4.72 | 24.78 |
| S/10591 | HLP-BH03 | 2.27 - 2.41 | d | p | 22.1 | 60.1 | 0.35 | 3612.01 | 60.10 | 0.10 | 1.09 | 0.11 | 2.61 | 24.78 |
| | | | | | | | | | | | | | | |
| S/10592 | HLP-BH03 | 3.73 - 3.93 | a | p | 51.3 | 60.3 | 1.45 | 3940.62 | 62.77 | 0.37 | 1.11 | 0.41 | 10.12 | 24.82 |
| S/10592 | HLP-BH03 | 3.73 - 3.93 | d | p | 31.9 | 60.3 | 1.00 | 3636.09 | 60.30 | 0.28 | 1.09 | 0.30 | 7.43 | 24.82 |
| | | | | | | | | | | | | | | |
| S/10594 | HLP-BH04 | 5.19 - 5.35 | a | p | 38.5 | 60.6 | 1.95 | 2972.10 | 54.52 | 0.66 | 1.04 | 0.68 | 16.97 | 24.87 |
| S/10594 | HLP-BH04 | 5.19 - 5.35 | d | p | 30.1 | 60.6 | 1.05 | 3672.36 | 60.60 | 0.29 | 1.09 | 0.31 | 7.75 | 24.87 |

d = diametrical; a = axial; b = block; i = irregular lump test; // = parrallel to planes of weekness; p = perpendicular

## Namibia Technical Services cc

# Point Load Index Testing

### ASTM D5731

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** PL / 14 **Page no :** 4 **Testing date :** 28/Jul/23

*Sample Preparation* Specimens cut with Diamond Table saw from Rock Core Samples *Core Size* HQ 63

| Lab No | No. | Depth | Type | Orientation | W/L (mm) | D(mm) | P(kN) | $D_e^2$ ($mm^2$) | $D_e$ (mm) | $I_s$ (MPa) | F | $I_{s(50)}$ (MPa) | Estimated UCS Value (MPa) | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/10595 | PLT-BH01 | 2.80 - 9.00 | a | p | 58.6 | 60.1 | 6.55 | 4486.45 | 66.98 | 1.46 | 1.14 | 1.67 | 41.27 | 24.78 |
| S/10595 | PLT-BH01 | 2.80 - 9.00 | d | p | 30.1 | 60.1 | 5.25 | 3612.01 | 60.10 | 1.45 | 1.09 | 1.58 | 39.13 | 24.78 |
| | | | | | | | | | | | | | | |
| S/10596 | PLT-BH02 | 4.73 - 4.94 | a | p | 40.5 | 60.3 | 1.60 | 3111.02 | 55.78 | 0.51 | 1.05 | 0.54 | 13.41 | 24.82 |
| S/10596 | PLT-BH02 | 4.73 - 4.94 | a | p | 45.1 | 60.3 | 0.90 | 3464.37 | 58.86 | 0.26 | 1.08 | 0.28 | 6.94 | 24.82 |
| | | | | | | | | | | | | | | |
| S/10597 | PLT-BH02 | 8.09 - 8.37 | a | p | 58.5 | 60.8 | 16.00 | 4530.96 | 67.31 | 3.53 | 1.14 | 4.04 | 100.56 | 24.91 |
| | | | | | | | | | | | | | | |
| S/10598 | PLT-BH03 | 1.78 - 1.98 | a | p | 32.3 | 84.4 | 1.55 | 3472.76 | 58.93 | 0.45 | 1.08 | 0.48 | 14.06 | 29.26 |
| S/10598 | PLT-BH03 | 1.78 - 1.98 | d | p | 41.2 | 84.4 | 3.25 | 7123.36 | 84.40 | 0.46 | 1.27 | 0.58 | 16.89 | 29.26 |
| | | | | | | | | | | | | | | |
| S/10599 | PLT-BH03 | 6.33 - 6.55 | a | p | 30.4 | 60.2 | 3.90 | 2331.31 | 48.28 | 1.67 | 0.98 | 1.65 | 40.84 | 24.80 |
| S/10599 | PLT-BH03 | 6.33 - 6.55 | d | // | 28.1 | 60.2 | 2.70 | 3624.04 | 60.20 | 0.75 | 1.09 | 0.81 | 20.09 | 24.80 |
| | | | | | | | | | | | | | | |
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d = diametrical; a = axial; b = block; i = irregular lump test; // = parrallel to planes of weekness; p = perpendicular

## Namibia Technical Services cc

# Point Load Index Testing

### ASTM D5731

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** PL / 14 **Page no :** 5 **Testing date :** 28/Jul/23

*Sample Preparation* Specimens cut with Diamond Table saw from Rock Core Samples *Core Size* HQ 63

| Lab No | No. | Depth | Type | Orientation | W/L (mm) | D(mm) | P(kN) | $D_e^2$ ($mm^2$) | $D_e$ (mm) | $I_s$ (MPa) | F | $I_{s(50)}$ (MPa) | Estimated UCS Value (MPa) | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S/10601 | WRD-BH01 | 5.13 - 5.30 | a | p | 28.6 | 60.5 | 0.50 | 2204.20 | 46.95 | 0.23 | 0.97 | 0.22 | 5.48 | 24.86 |
| S/10601 | WRD-BH01 | 5.13 - 5.30 | d | p | 27.5 | 60.5 | 0.91 | 3660.25 | 60.50 | 0.25 | 1.09 | 0.27 | 6.73 | 24.86 |
| | | | | | | | | | | | | | | |
| S/10602 | WRD-BH01 | 7.75 - 7.88 | a | p | 42.3 | 60.4 | 0.40 | 3254.68 | 57.05 | 0.12 | 1.06 | 0.13 | 3.24 | 24.84 |
| | | | | | | | | | | | | | | |
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d = diametrical; a = axial; b = block; i = irregular lump test; // = parrallel to planes of weekness; p = perpendicular

Digitally signed by Jaco Strydom
Date: 2023.08.30 18:21:05 +02'00'

Dr Sabine Verryn

m: 083 548 0586
f: 086 565 7368
e: sabine.verryn@xrd.co.za

XRD Analytical and Consulting cc
75 Kafue Street, Lynnwood Glen,
0081, South Africa

**CLIENT:** STL

**DATE:** 28 August 2023

**SAMPLES:** 1 Sample (PO T 035)

**ANALYSIS:** Petrographic analysis & XRD

# REPORT ON OMITIOMIRE - NTS-05

1. **SERVICE REQUESTED**

   Petrographic description & XRD

2. **SAMPLE DESCRIPTION**

   Rock fragment

3. **TESTS CONDUCTED**

   1 x Thin Section, 1 x XRD

4. **DESCRIPTION& ANALYSIS**

   A thin section was prepared from a rock fragment set in epoxy and the remainder of the sample was split and milled for XRD analysis.

   NOTE:

   Quantities of minerals shown in the petrographic description are largely based on amounts calculated from XRD analysis as this reflects a more representative composition.

   In case the results do not correspond to the results of other analytical techniques, please let me know for further fine-tuning of XRD results.

**Limitation of Liability:** Although every effort is made to provide reliable and accurate results, by use of the results the client agrees that "XRD Analytical and Consulting cc" and/or its staff can only be held liable for the cost of the analysis.

XRD

The material was prepared for XRD analysis using a back-loading preparation method.
It was analysed with a PANalytical Aeris diffractometer with a PIXcel detector and fixed slits with Fe-filtered Co-Kα radiation. The phases were identified using X'PertHighscore plus software.

The relative phase amounts (weight %) were estimated using the Rietveld method. Mineral names may not reflect the actual compositions of minerals identified, but rather the mineral group. Due to crystallite size and preferred orientation effects, results may not be as accurate as shown. Mineral quantities observed in the overall sample in the thin section are in agreement with those calculated from XRD.

XRD Results:

| Project Name | Omitiomire |
|---|---|
| Project no | NTS-05 |

| Client No | Depth (m) | Our sample No | Test(s) |
|---|---|---|---|
| PLT-BH01/S/10595 | 2.80 - 9.0 | NTS-05-44 | Petrography and ASR comment |

| | Quartz | Microcline | Plagioclase | Biotite |
|---|---|---|---|---|
| **S/10595** | 36.0 | 28.8 | 33.5 | 1.7 |

**Limitation of Liability:** Although every effort is made to provide reliable and accurate results, by use of the results the client agrees that "XRD Analytical and Consulting cc" and/or its staff can only be held liable for the cost of the analysis.

## PETROGRAPHIC DESCRIPTIONS

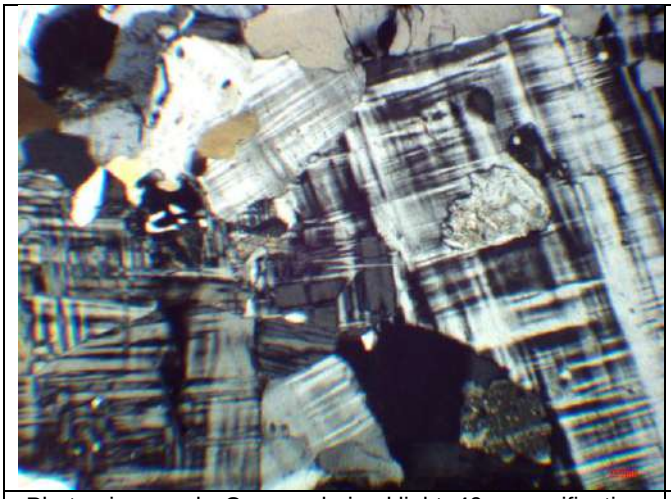
### PLT-BH01/S/10595

Sample type: Granite

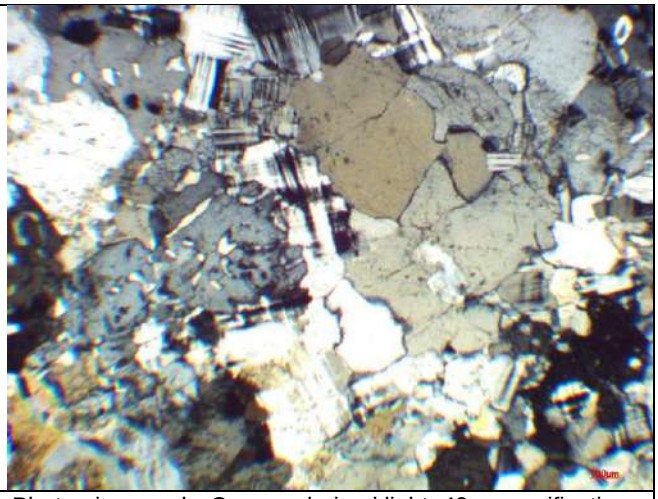
Macroscopic description: The sample is composed of a rock fragment of a light grey colour with a small to medium grain size.

Microscopic description: The sample investigated in the thin section overall comprises quartz crystals (30-40%), plagioclase (25-35%), microcline (25-35%), and biotite (~2%).
The rock may represent granite where the largest portion is composed of roughly subhedral plagioclase (albite) with faint albite twinning. Microcline appears as anhedral crystals with cross-hatch twinning. Quartz occurs as anhedral crystals with a high degree of undulatory extinction. Isolated biotite flakes occur on grain boundaries and as small clusters.

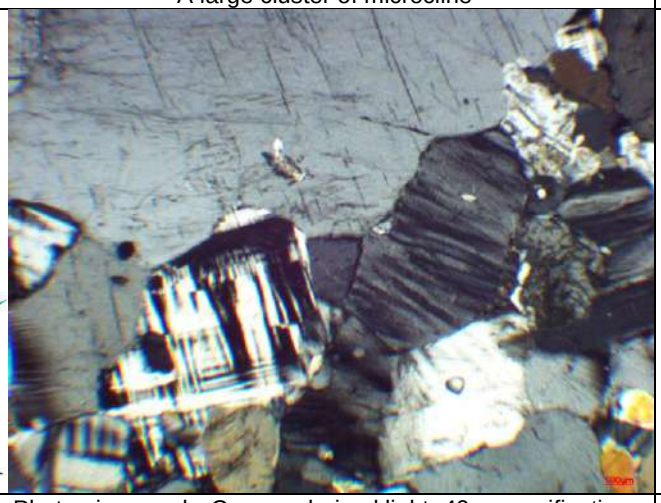
**Grain size data:** 100 – 1500 microns



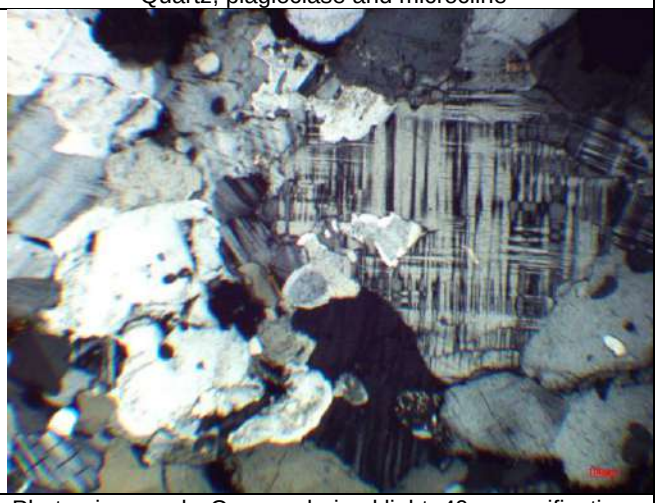
Photomicrograph**:** Cross-polarized light. 40x magnification
A large cluster of microcline



Photomicrograph**:** Cross-polarized light. 40x magnification.
Quartz, plagioclase and microcline



Photomicrograph**:** Cross-polarized light. 40x magnification.
Quartz, feldspar, and minor biotite



Photomicrograph**:** Cross-polarized light. 40x magnification.
Quartz, plagioclase and microcline

**Limitation of Liability:** Although every effort is made to provide reliable and accurate results, by use of the results the client agrees that "XRD Analytical and Consulting cc" and/or its staff can only be held liable for the cost of the analysis.

## 5. **COMMENTS**

Rock types are based on mineralogy and texture rather than stratigraphic position.

Depending on the intended use of the material the following comments can be made:

- Due to the presence of highly strained quartz and quartz with interlobate grain boundaries in the sample, a reaction with alkalis in cement can occur - unless otherwise shown by additional tests.
- The mica content consists of about 2% biotite.
- The sample may represent granite.
- It must be pointed out that the composition of rocks can vary over short distances in the field.

**Analyst:** Wiebke Grote



**Authorized:** Dr. Sabine Verryn (Pr.Sci.Nat)

**Limitation of Liability:** Although every effort is made to provide reliable and accurate results, by use of the results the client agrees that "XRD Analytical and Consulting cc" and/or its staff can only be held liable for the cost of the analysis.

# Namibia Technical Services cc

## UNCONFINED COMPRESSIVE STRENGTH OF ROCK CORES

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** RC / 14 **Page no :** 1 **Testing date :** 28/Jul/23

| Testing detail | | Core no. **C / 10575** | Core no. **C / 10577** | Core no. **C / 10580** | Core no. **C / 10582** | Core no. **C / 10586** |
|---|---|---|---|---|---|---|
| Rock type | | Highly to completely weathered, dark brown with red iron oxide staining, very soft rock, granitic gneiss | Moderately to slightly weathered, light brown speckled black and grey mottled white, medium hard rock, gneiss | Moderately weathered, grey to brown streaked yellow and white, soft rock, gneiss | Moderately weathered, grey speckled black and white, soft to medium hard rock, gneiss | Highly to moderately weathered, grey to brown speckled black streaked white, medium hard rock, gneiss |
| Core marking | | SWD-BH01 | SWD-BH01 | SWD-BH02 | SWD-BH03 | SWD-BH05 |
| Core depth | | 2.04 - 2.26 | 3.14 - 3.48 | 7.96 - 8.16 | 3.82 - 4.13 | 9.69 - 9.93 |
| Trimming method | | cutting table with diamond blade | cutting table with diamond blade | cutting table with diamond blade | cutting table with diamond blade | cutting table with diamond blade |
| Method of end preparation | | grinding | grinding | grinding | grinding | grinding |
| Core length trimmed | (mm) | 135 | 135 | 126 | 139 | 124 |
| Core length capped / ground | (mm) | 132 | 132 | 121 | 135 | 120 |
| Core diameter | (mm) | 59 | 60 | 61 | 60 | 60 |
| **Core length / diameter ratio** | (2.0) | 2.29 | 2.25 | 2.08 | 2.31 | 2.05 |
| Failing load | (kN) | 22 | 66 | 96 | 34 | 73 |
| **Unconfined Compressive Strength** | (MPa) | **8.0** | **23.5** | **33.5** | **12.0** | **25.5** |
| **Notes on failure** | | normal | normal | normal | normal | normal |

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, nor for any erroneous statement or opinion contained in a report based on such tests. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## UNCONFINED COMPRESSIVE STRENGTH OF ROCK CORES

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** RC / 14 **Page no :** 2 **Testing date :** 28/Jul/23

| Testing detail | | Core no. C / 10590 | Core no. C / 10593 | | | |
|---|---|---|---|---|---|---|
| Rock type | | Highly to completely weathered, brown to grey, banded white, very soft rock gneiss | Highly weathered, brown to grey speckled black streaked white, soft rock, gneiss | | | |
| Core marking | | HLP-BH02 | HLP-BH04 | | | |
| Core depth | | 5.35 - 5.65 | 2.66 - 2.86 | | | |
| Trimming method | | cutting table with diamond blade | cutting table with diamond blade | | | |
| Method of end preparation | | grinding | grinding | | | |
| Core length trimmed | (mm) | 128 | 132 | | | |
| Core length capped / ground | (mm) | 122 | 128 | | | |
| Core diameter | (mm) | 60 | 61 | | | |
| **Core length / diameter ratio** | (2.0) | 2.13 | 2.17 | | | |
| Failing load | (kN) | 22 | 21 | | | |
| **Unconfined Compressive Strength** | (MPa) | **8.0** | **7.0** | | | |
| **Notes on failure** | | normal | normal | | | |

Everything possible is being done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. NTS or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, nor for any erroneous statement or opinion contained in a report based on such tests. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

# Namibia Technical Services cc

## UNCONFINED COMPRESSIVE STRENGTH OF ROCK CORES

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** RC / 14 **Page no :** 3 **Testing date :** 28/Jul/23

| Testing detail | | Core no. **C / 10597** | Core no. **C / 10599** | | | |
|---|---|---|---|---|---|---|
| Rock type | | Moderately weathered, light brown to grey speckled black and streaked white, medium hard rock, granitic gneiss | Moderately weathered, dark grey to green speckled black streaked whit, medium hard rock, gneiss | | | |
| Core marking | | PLT-BH02 | PLT-BH03 | | | |
| Core depth | | 8.09 - 8.37 | 6.33 - 6.55 | | | |
| Trimming method | | cutting table with diamond blade | cutting table with diamond blade | | | |
| Method of end preparation | | grinding | grinding | | | |
| Core length trimmed | (mm) | 126 | 90 | | | |
| Core length capped / ground | (mm) | 120 | 84 | | | |
| Core diameter | (mm) | 60 | 61 | | | |
| **Core length / diameter ratio** | (2.0) | 2.10 | 1.48 | | | |
| Failing load | (kN) | 119 | 30 | | | |
| **Unconfined Compressive Strength** | (MPa) | **42.0** | **10.5** | | | |
| **Notes on failure** | | normal | normal | | | |

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# Namibia Technical Services cc

## UNCONFINED COMPRESSIVE STRENGTH OF ROCK CORES

**Client :** Knight Piesold (Pty) Ltd (Namibia) **Job No :** 10795

**Project :** WI301-00478/06 : OMITIOMIRE **Drilling/delivery date :** 28/Jun/23

**Report no :** RC / 14 **Page no :** 4 **Testing date :** 28/Jul/23

| **Testing detail** | | Core no. **C / 10600** | | | | |
|---|---|---|---|---|---|---|
| Rock type | | Pale brown blotched white, hardpan calcrete of soft rock strength | | | | |
| Core marking | | WRD-BH01 | | | | |
| Core depth | | 1.12 - 1.35 | | | | |
| Trimming method | | cutting table with diamond blade | | | | |
| Method of end preparation | | grinding | | | | |
| Core length trimmed | (mm) | 173 | | | | |
| Core length capped / ground | (mm) | 171 | | | | |
| Core diameter | (mm) | 85 | | | | |
| **Core length / diameter ratio** | (2.0) | 2.03 | | | | |
| Failing load | (kN) | 29 | | | | |
| **Unconfined Compressive Strength** | (MPa) | **5.0** | | | | |
| **Notes on failure** | | normal | | | | |

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Date: 2023.07.28 16:13:04 +02'00'

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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-37 |
| **Sample:** | HLP-TP26 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 0.0 - 1.1 | | |

# SHEARBOX TEST

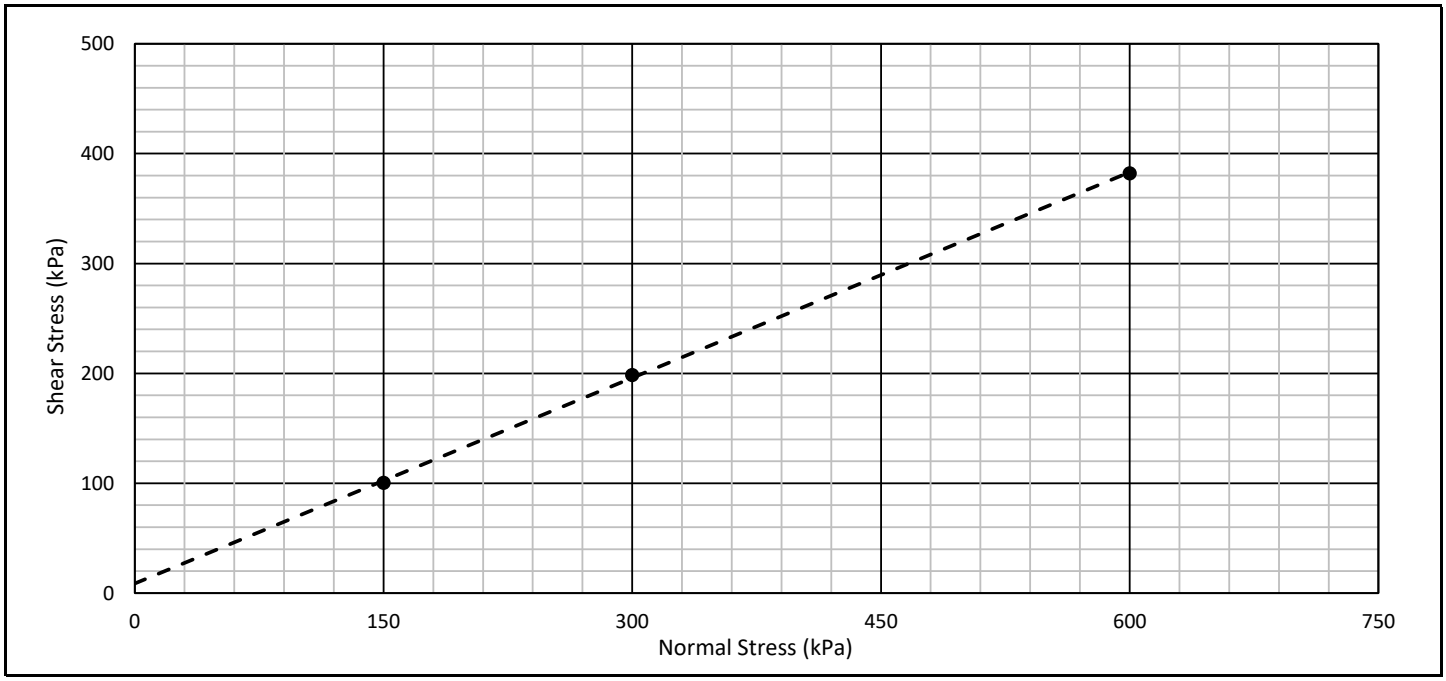
| General Test Data | |
|---|---|
| Type of Test: | Slow Drained, saturated |
| Type of Sample: | Remoulded to 90% of supplied MDD (MOD AASHTO) - 2030kg/m³ at 7.8% |
| Normal Stresses (kPa): | 150, 300, 600 |
| Rate of Shear (mm/min): | 0.011 |
| Comments: | - |

| Initial Specimen Details | | | | |
|---|---|---|---|---|
| | | **Specimen 1** | **Specimen 2** | **Specimen 3** |
| Moisture Content | % | 8.2 | 7.9 | 8.0 |
| Dry Density | g/cm³ | 1.818 | 1.822 | 1.821 |
| Void Ratio | - | 0.603 | 0.600 | 0.601 |
| Degree of Saturation | % | 39.5 | 38.6 | 38.9 |
| Particle Density (SG) | - | 2.915 - Determined | | |

| Final Specimen Details | | | | |
|---|---|---|---|---|
| Moisture Content | % | 14.2 | 16.6 | 15.2 |

| Shear Details | | | | |
|---|---|---|---|---|
| Maximum Shear Stress: | kPa | 100.6 | 198.6 | 382.2 |
| Strain at Maximum Shear Stress: | mm | 9.11 | 9.33 | 10.00 |

| Shear Results | | |
|---|---|---|
| ϕ' | Deg. | **32** |
| c' | kPa | **9** |



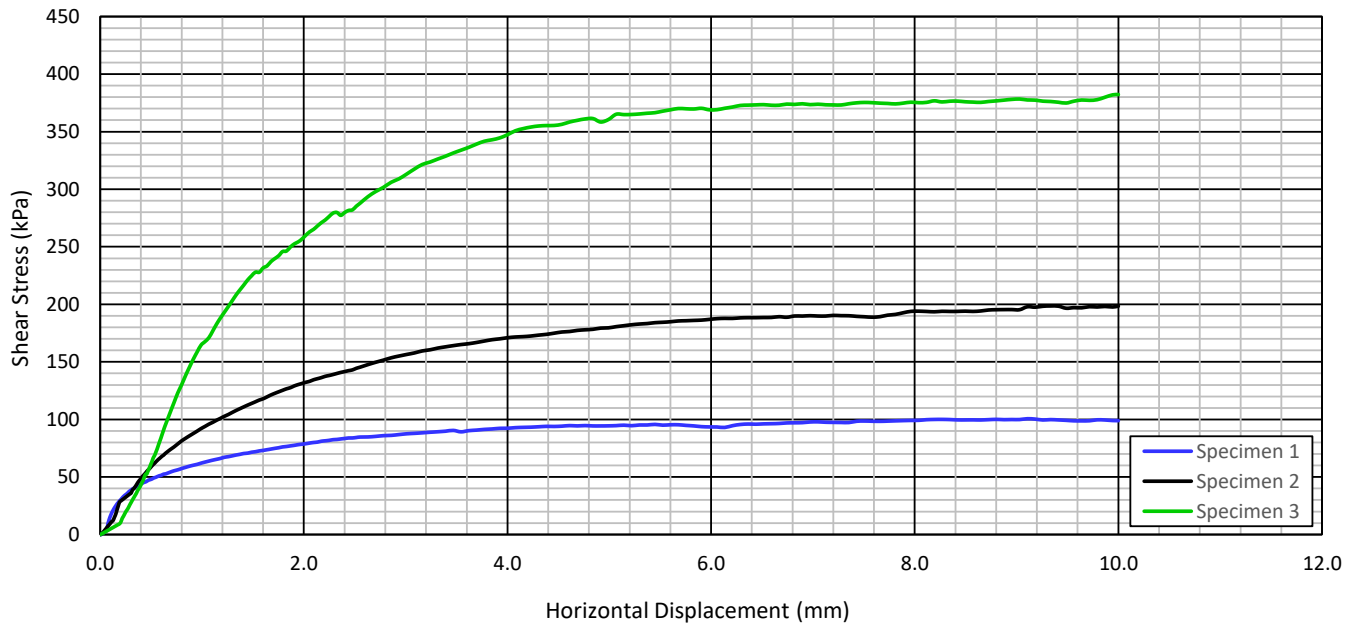

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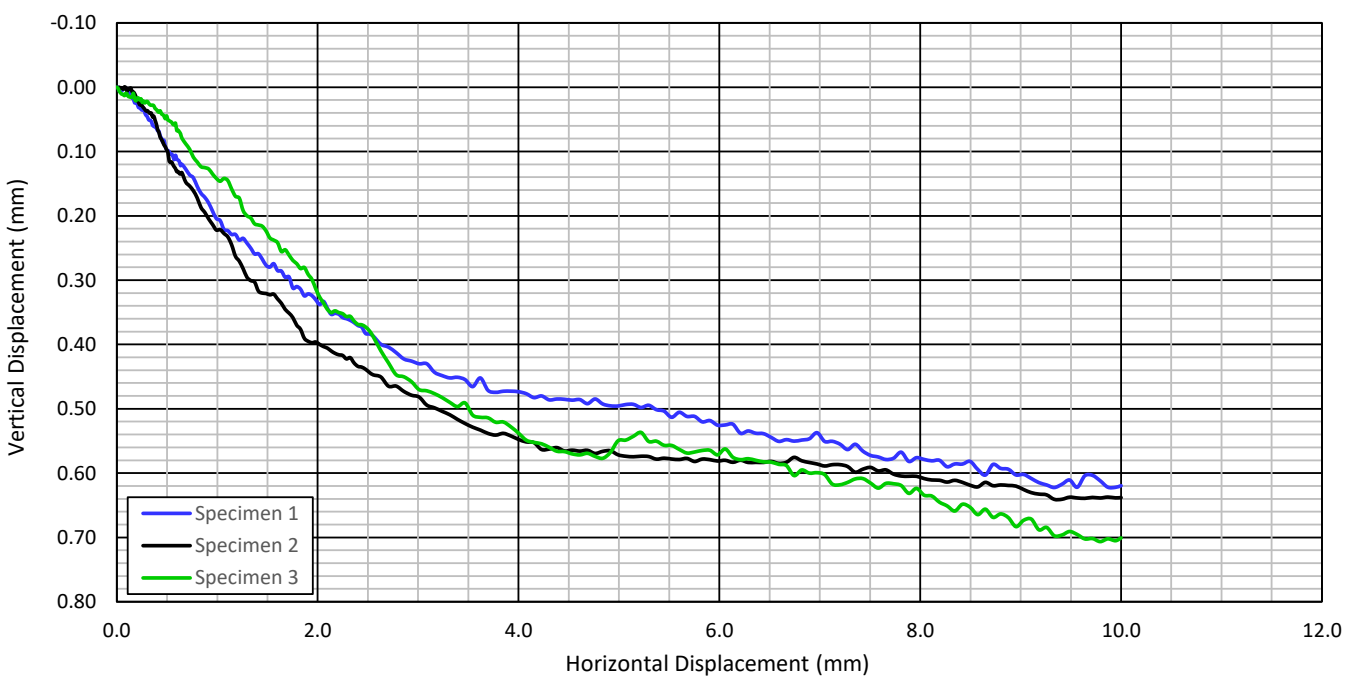
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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-37 |
| **Sample:** | HLP-TP26 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 0.0 - 1.1 | | |

# SHEARBOX TEST




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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-38 |
| **Sample:** | HLP-TP03 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 2.3 - 3.1 | | |

# SHEARBOX TEST

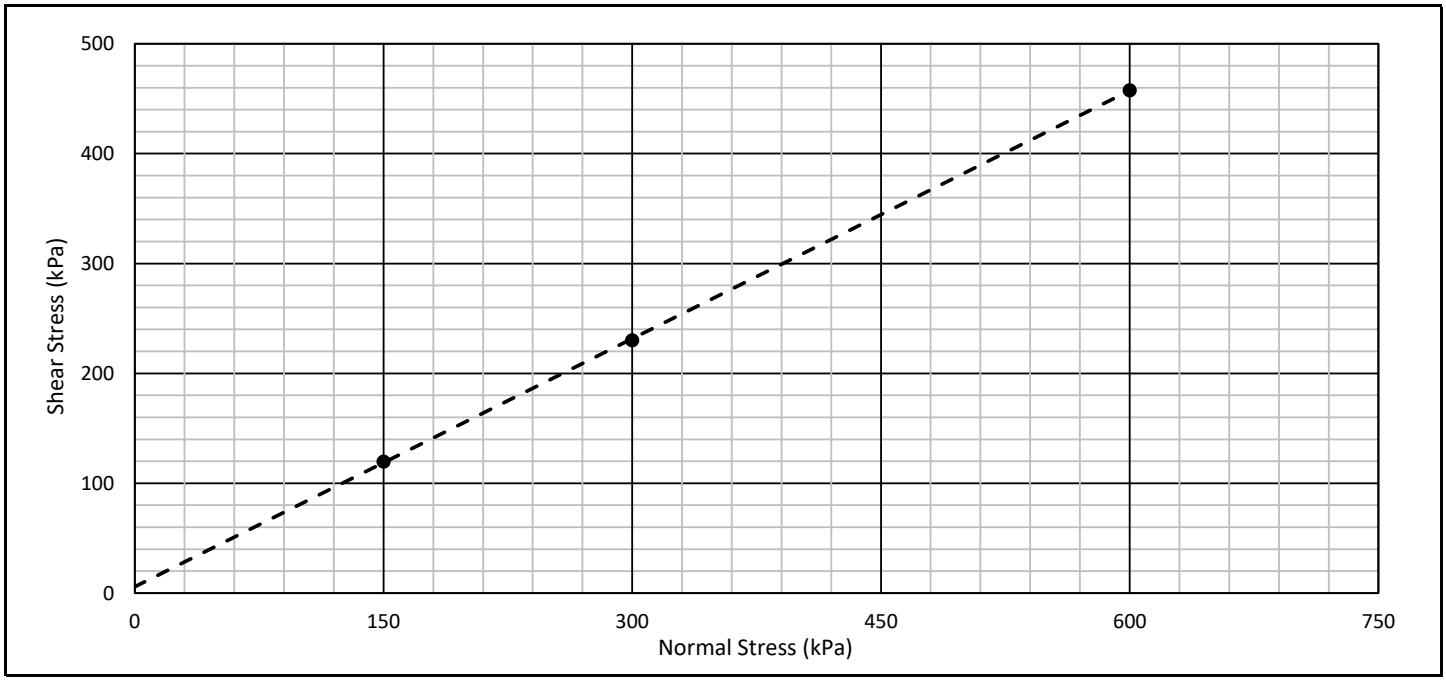
| General Test Data | |
|---|---|
| Type of Test: | Slow Drained, saturated |
| Type of Sample: | Remoulded to 90% of supplied MDD (MOD AASHTO) - 1974kg/m³ at 11.0% |
| Normal Stresses (kPa): | 150, 300, 600 |
| Rate of Shear (mm/min): | 0.025 |
| Comments: | - |

| Initial Specimen Details | | | | |
|---|---|---|---|---|
| | | **Specimen 1** | **Specimen 2** | **Specimen 3** |
| Moisture Content | % | 11.1 | 11.5 | 11.1 |
| Dry Density | g/cm³ | 1.779 | 1.771 | 1.777 |
| Void Ratio | - | 0.658 | 0.665 | 0.659 |
| Degree of Saturation | % | 49.5 | 51.1 | 49.9 |
| Particle Density (SG) | - | 2.949 - Determined | | |

| Final Specimen Details | | | | |
|---|---|---|---|---|
| Moisture Content | % | 22.2 | 20.5 | 20.1 |

| Shear Details | | | | |
|---|---|---|---|---|
| Maximum Shear Stress: | kPa | 119.7 | 230.2 | 457.8 |
| Strain at Maximum Shear Stress: | mm | 9.95 | 7.51 | 7.36 |

| Shear Results | | |
|---|---|---|
| $\phi'$ | Deg. | **37** |
| c' | kPa | **6** |



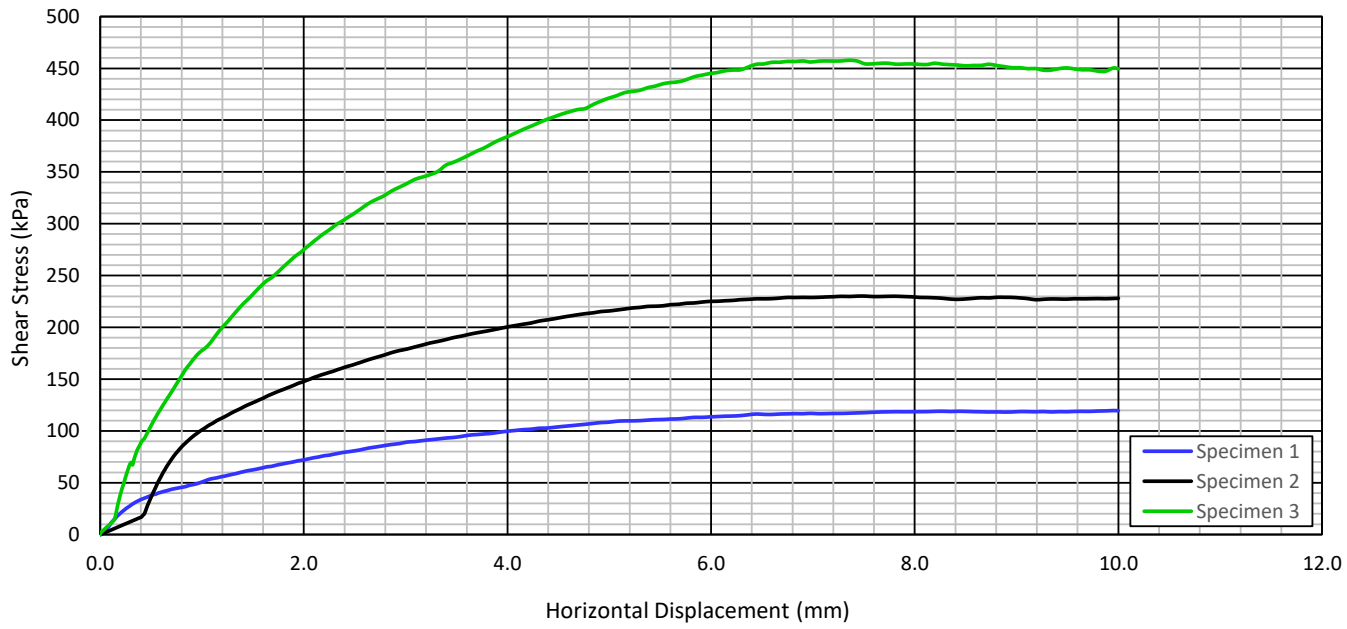

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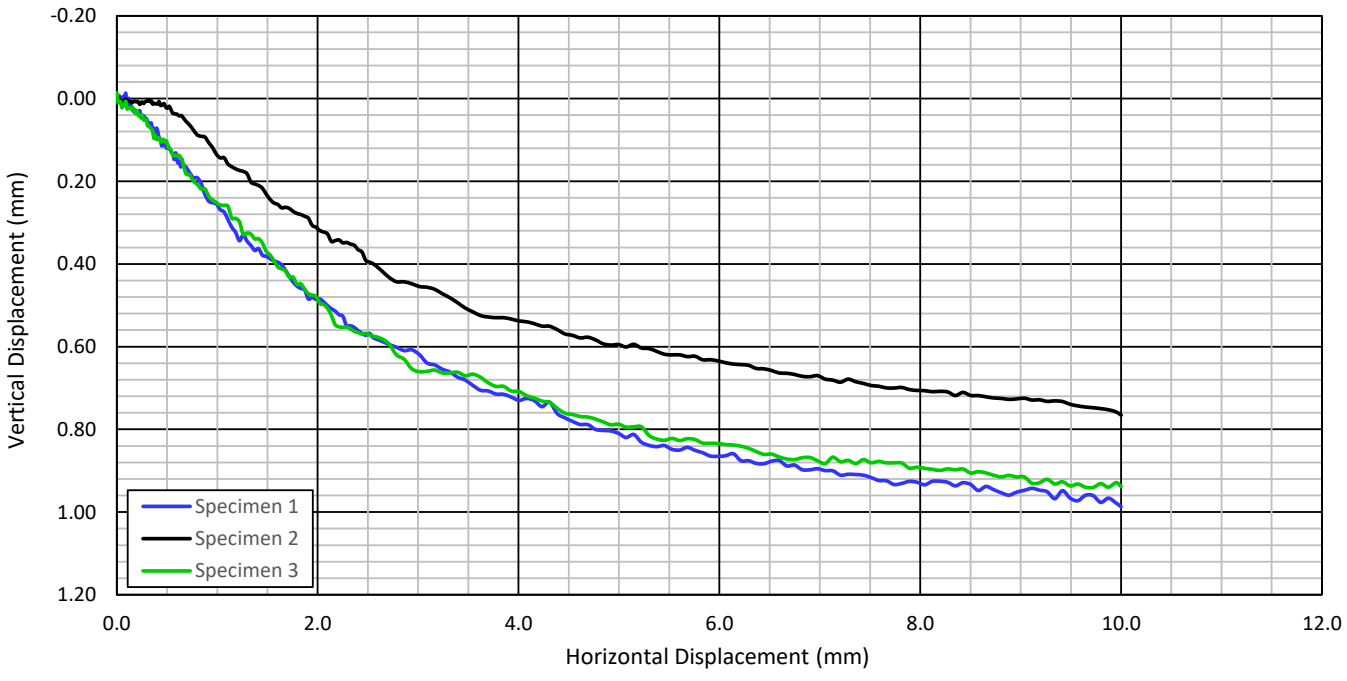
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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-38 |
| **Sample:** | HLP-TP03 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 2.3 - 3.1 | | |

# SHEARBOX TEST




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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-39 |
| **Sample:** | SWD-TP15 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 0.5 - 2.5 | | |

# SHEARBOX TEST

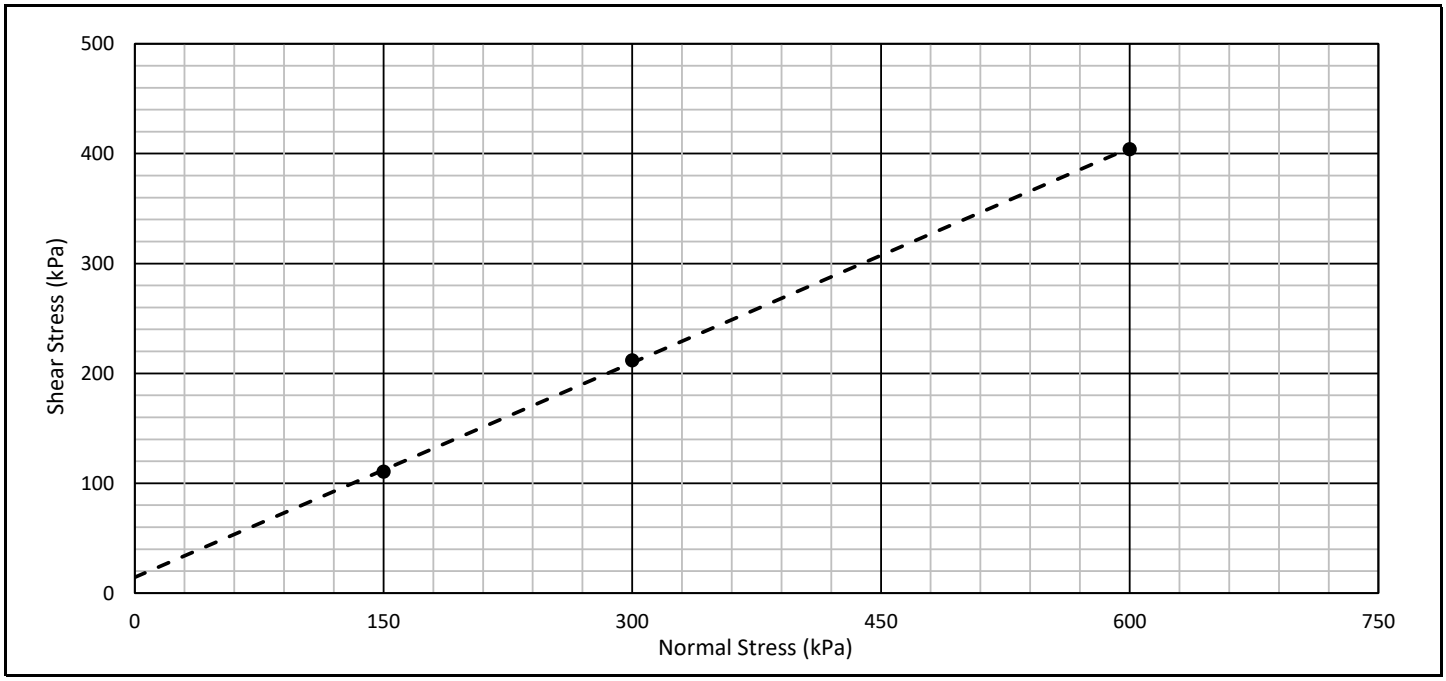
| General Test Data | |
|---|---|
| Type of Test: | Slow Drained, saturated |
| Type of Sample: | Remoulded to 90% of supplied MDD (MOD AASHTO) - 2055kg/m³ at 9.7% |
| Normal Stresses (kPa): | 150, 300, 600 |
| Rate of Shear (mm/min): | 0.011 |
| Comments: | - |

| Initial Specimen Details | | | | |
|---|---|---|---|---|
| | | **Specimen 1** | **Specimen 2** | **Specimen 3** |
| Moisture Content | % | 10.0 | 10.1 | 9.9 |
| Dry Density | g/cm³ | 1.847 | 1.845 | 1.848 |
| Void Ratio | - | 0.594 | 0.595 | 0.593 |
| Degree of Saturation | % | 49.5 | 49.8 | 49.2 |
| Particle Density (SG) | - | 2.944 - Determined | | |

| Final Specimen Details | | | | |
|---|---|---|---|---|
| Moisture Content | % | 18.5 | 17.0 | 17.4 |

| Shear Details | | | | |
|---|---|---|---|---|
| Maximum Shear Stress: | kPa | 110.6 | 212.0 | 404.3 |
| Strain at Maximum Shear Stress: | mm | 10.00 | 10.00 | 10.00 |

| Shear Results | | |
|---|---|---|
| ϕ' | Deg. | **33** |
| c' | kPa | **14** |



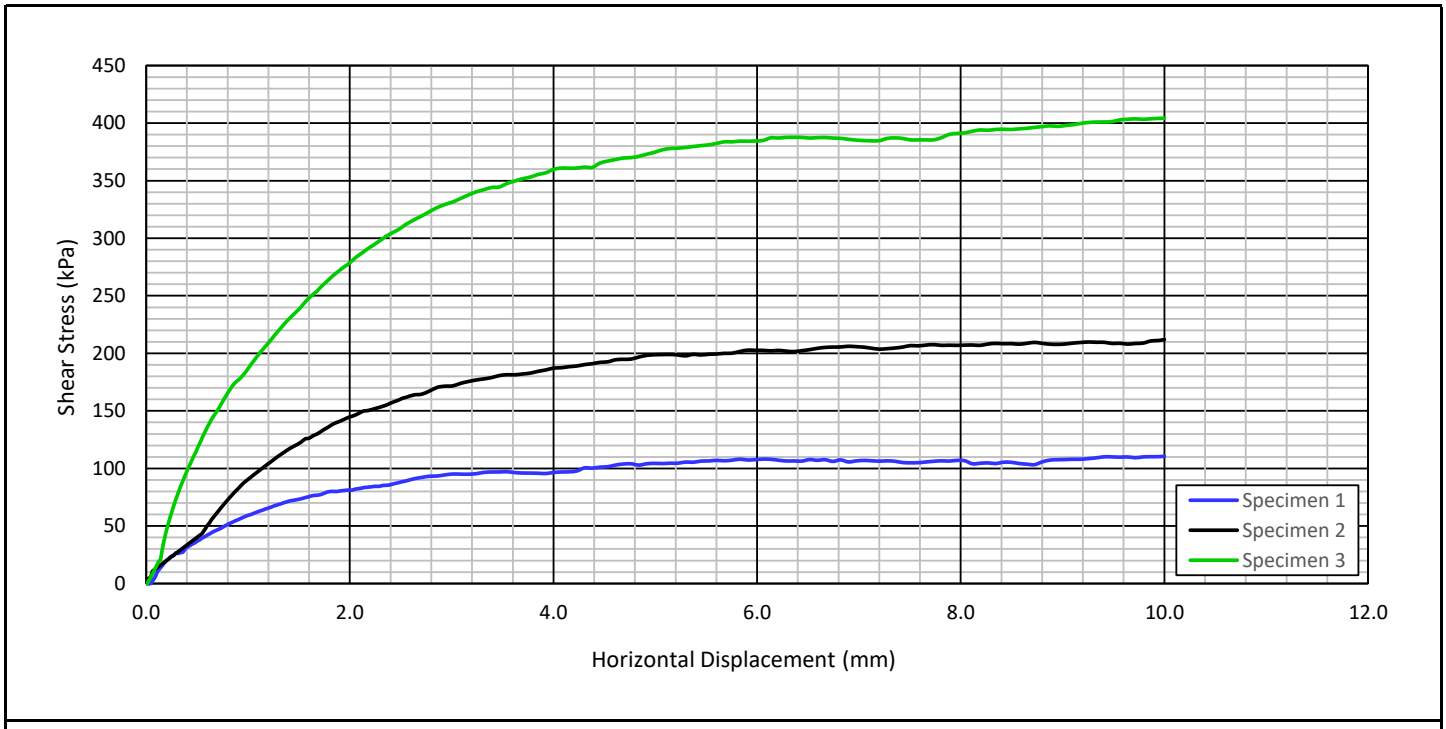

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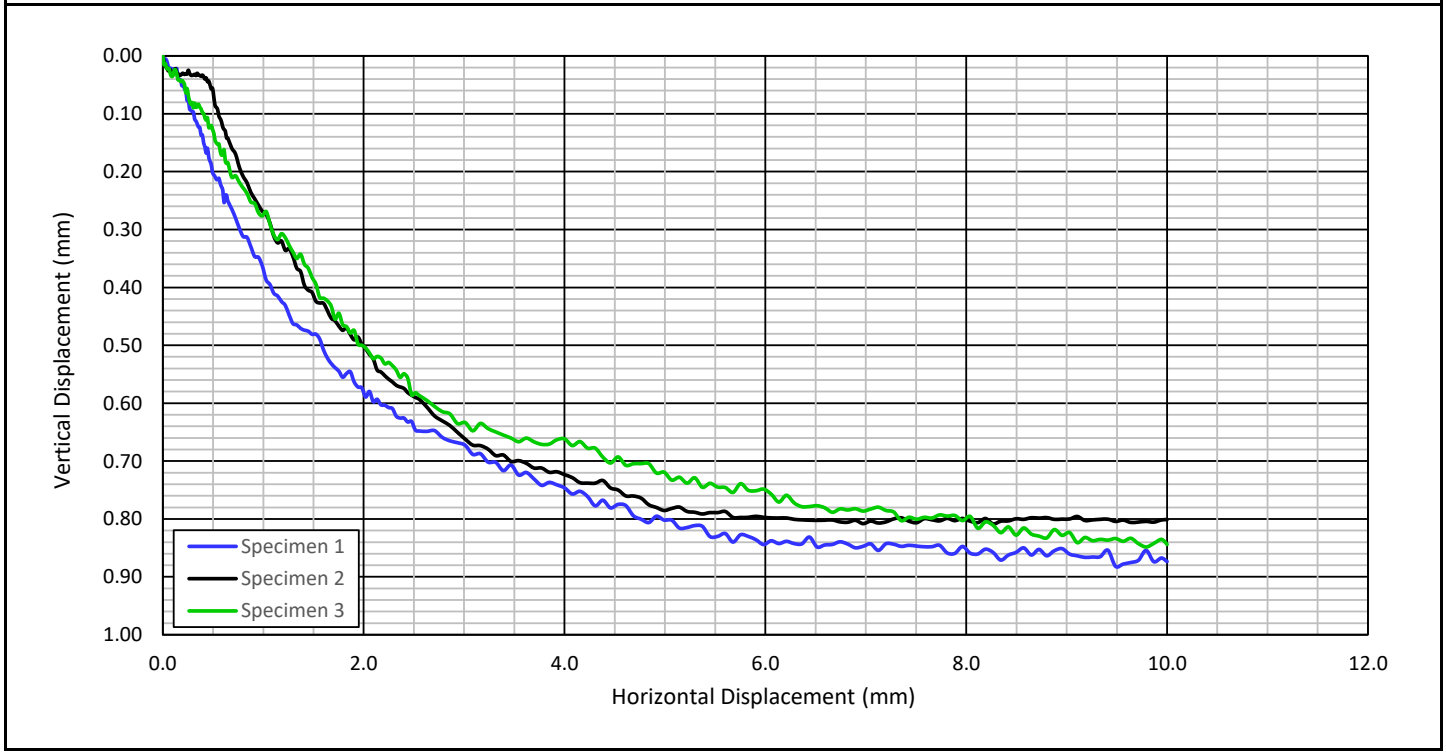
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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-39 |
| **Sample:** | SWD-TP15 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 0.5 - 2.5 | | |

# SHEARBOX TEST




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| | | | |
|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-42 |
| **Sample:** | WRD-TP04 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 0.4 - 1.5 | | |

# SHEARBOX TEST

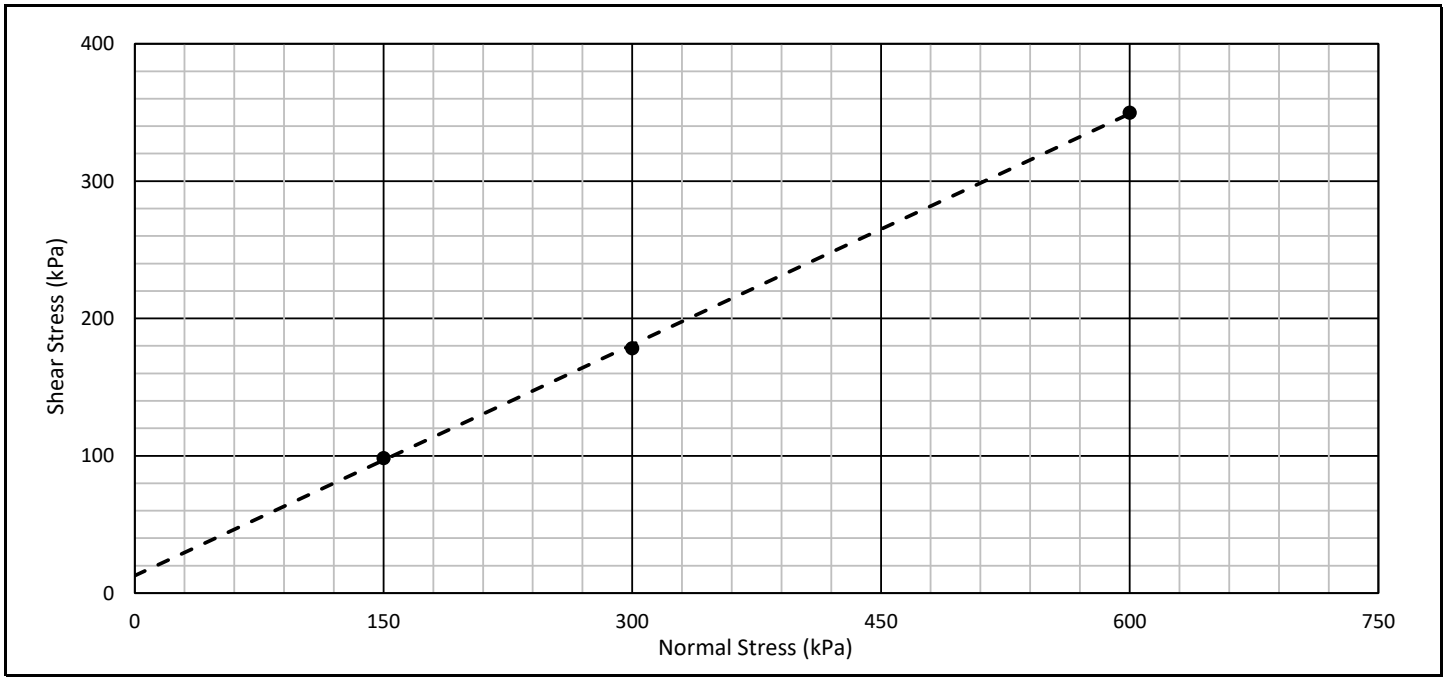
| General Test Data | |
|---|---|
| Type of Test: | Slow Drained, saturated |
| Type of Sample: | Remoulded to 90% of supplied MDD (MOD AASHTO) - 1975kg/m³ at 11.0% |
| Normal Stresses (kPa): | 150, 300, 600 |
| Rate of Shear (mm/min): | 0.025 |
| Comments: | - |

| Initial Specimen Details | | | | |
|---|---|---|---|---|
| | | **Specimen 1** | **Specimen 2** | **Specimen 3** |
| Moisture Content | % | 11.3 | 11.5 | 11.1 |
| Dry Density | g/cm³ | 1.810 | 1.805 | 1.812 |
| Void Ratio | - | 0.501 | 0.505 | 0.500 |
| Degree of Saturation | % | 61.0 | 62.1 | 60.6 |
| Particle Density (SG) | - | 2.718 - Determined | | |

| Final Specimen Details | | | | |
|---|---|---|---|---|
| Moisture Content | % | 22.2 | 20.7 | 26.1 |

| Shear Details | | | | |
|---|---|---|---|---|
| Maximum Shear Stress: | kPa | 98.5 | 178.4 | 349.9 |
| Strain at Maximum Shear Stress: | mm | 9.87 | 10.00 | 9.95 |

| Shear Results | | |
|---|---|---|
| ϕ' | Deg. | **29** |
| c' | kPa | **13** |



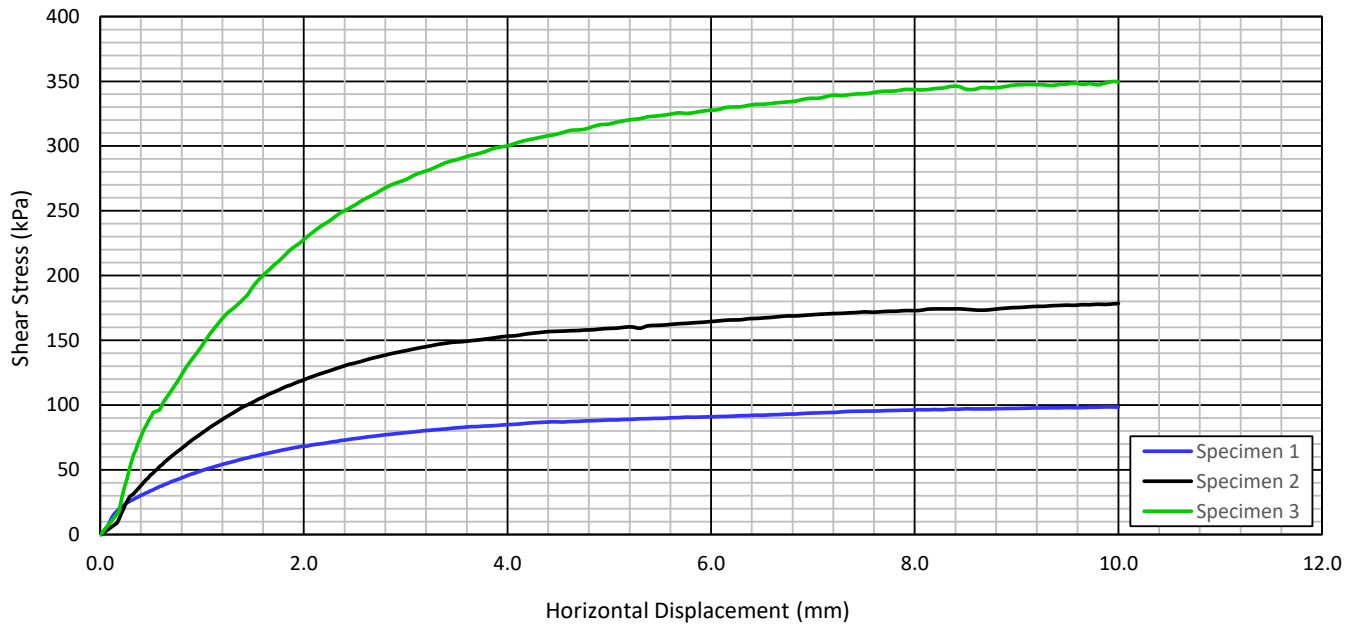

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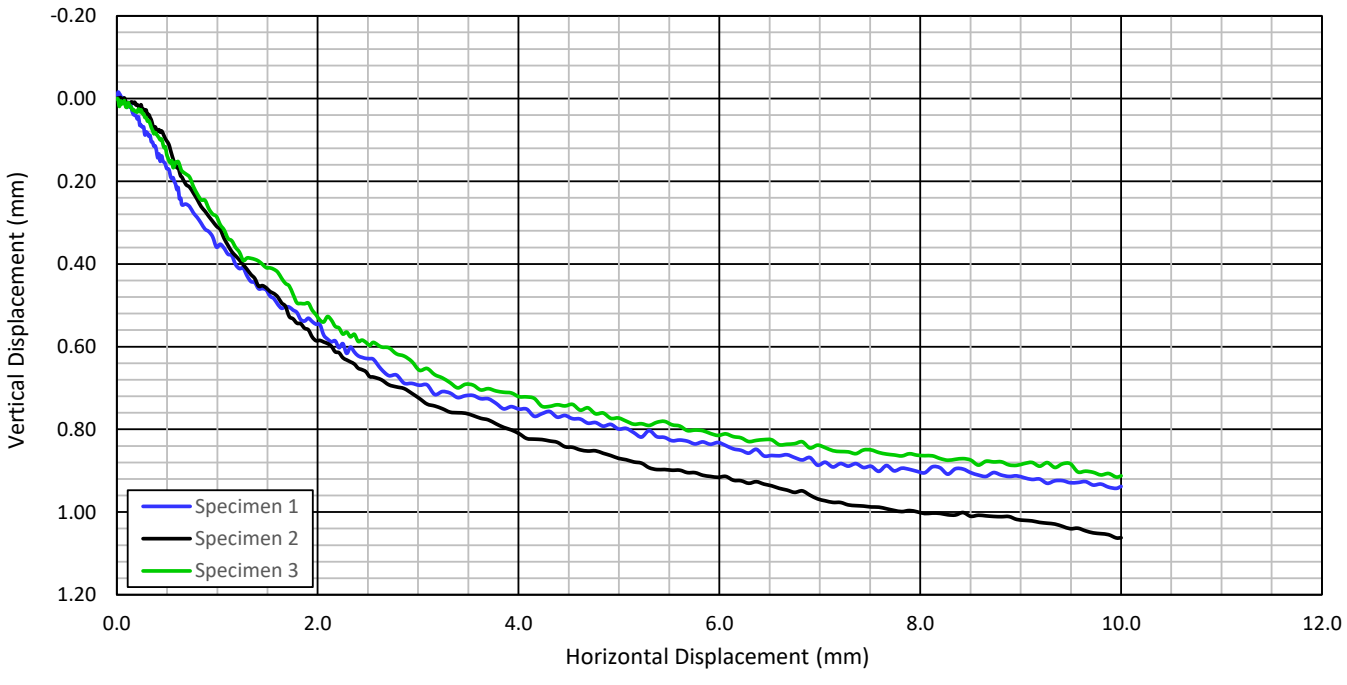
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|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-42 |
| **Sample:** | WRD-TP04 | **Date:** | 08/11/2023 |
| **Depth: (m)** | 0.4 - 1.5 | | |

# SHEARBOX TEST




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| | | | |
|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-43 |
| **Sample:** | WRD-TP35 | **Date:** | 10/11/2023 |
| **Depth: (m)** | 2.1 - 4.1 | | |

# SHEARBOX TEST

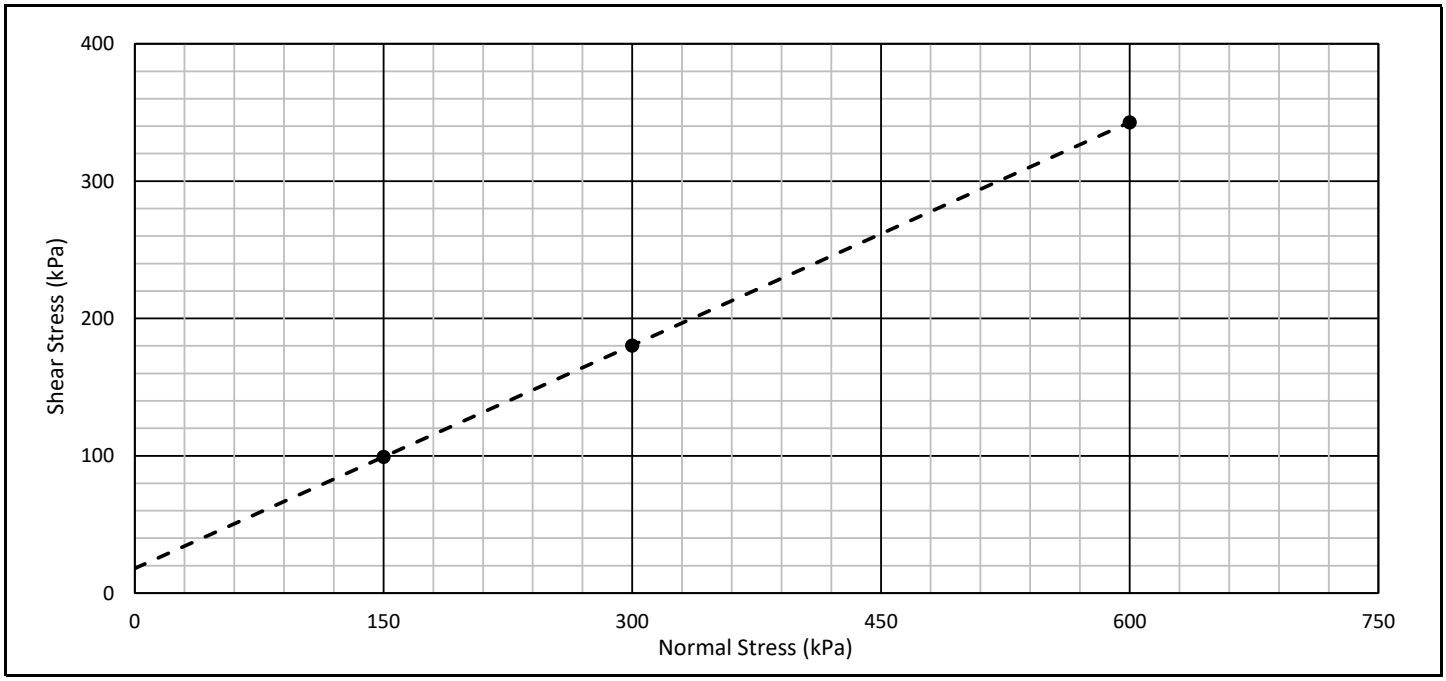
| General Test Data | |
|---|---|
| Type of Test: | Slow Drained, saturated |
| Type of Sample: | Remoulded to 90% of supplied MDD (MOD AASHTO) - 1946kg/m³ at 11.2% |
| Normal Stresses (kPa): | 150, 300, 600 |
| Rate of Shear (mm/min): | 0.011 |
| Comments: | - |

| Initial Specimen Details | | | | |
|---|---|---|---|---|
| | | **Specimen 1** | **Specimen 2** | **Specimen 3** |
| Moisture Content | % | 11.4 | 11.3 | 11.5 |
| Dry Density | g/cm³ | 1.751 | 1.753 | 1.749 |
| Void Ratio | - | 0.705 | 0.704 | 0.707 |
| Degree of Saturation | % | 48.1 | 47.8 | 48.5 |
| Particle Density (SG) | - | 2.987 - Determined | | |

| Final Specimen Details | | | | |
|---|---|---|---|---|
| Moisture Content | % | 23.2 | 20.4 | 20.4 |

| Shear Details | | | | |
|---|---|---|---|---|
| Maximum Shear Stress: | kPa | 99.3 | 180.2 | 342.9 |
| Strain at Maximum Shear Stress: | mm | 8.34 | 10.00 | 10.00 |

| Shear Results | | |
|---|---|---|
| ϕ' | Deg. | **28** |
| c' | kPa | **18** |



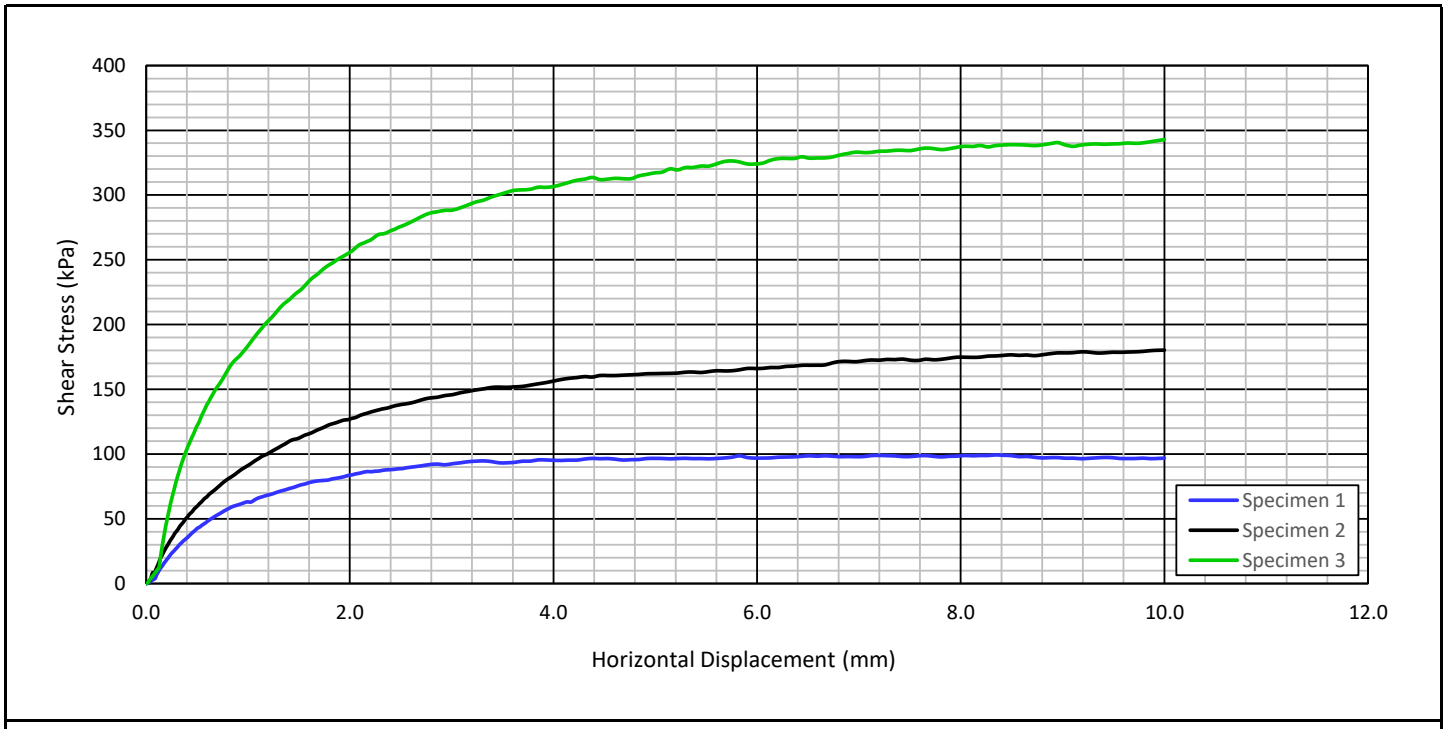

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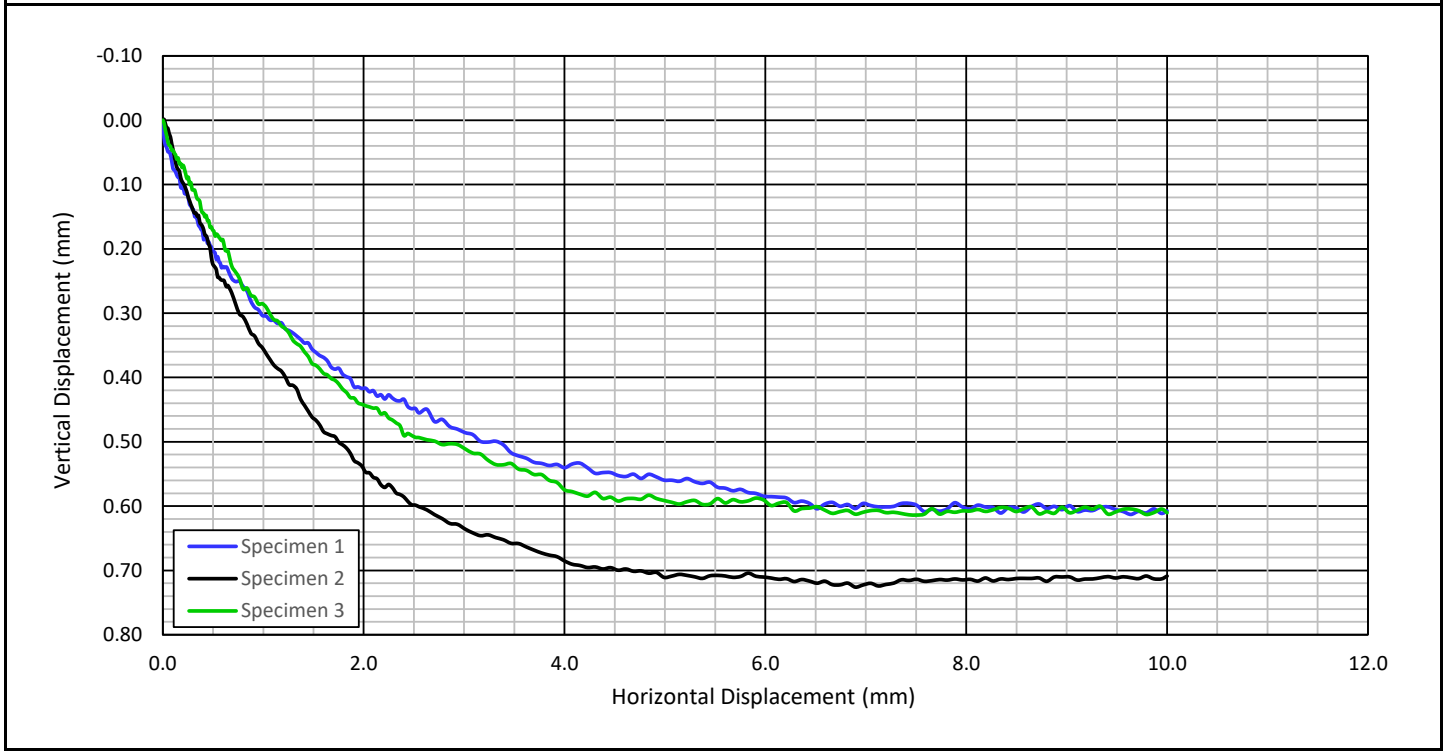
Specialised Testing Laboratory (Pty) Ltd
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Quality | Excellence | On Time

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| | | | |
|---|---|---|---|
| **Client Name:** | Namibia Technical Services | **Job Number:** | NTS-05 |
| **Project Name:** | Omitiomire | **Lab Number:** | NTS-05-43 |
| **Sample:** | WRD-TP35 | **Date:** | 10/11/2023 |
| **Depth: (m)** | 2.1 - 4.1 | | |

# SHEARBOX TEST




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