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PRELIMINARY GEOTECHNICAL INVESTIGATION
for

PROPOSED CSP - NEW SITE 5

Client: Emvelo Eco Projects

Date: August 2015

Job No: 15107/3

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1 INTRODUCTION

1.1 Preamble

On 17th April 2015, a proposal, referenced *Z:\Projects 2015\Emvelo\Karoshhoek, Upington\Combined Sites 1.4, 3, 4 and 5\Reports\Site 5\Final Report.wpd* was submitted to Mr Pancho Ndebele of Emvelo Eco Projects for phase,1 preliminary geotechnical investigation for the proposed CSP power block and solar field on New Site 5 as part of the Karoshhoek Solar farm Project in Upington.

1.2 Database

Prior to the investigation a detailed scope of work, produced by the clients professional team, reference Ilanga CSP 1-100MW Concentrated Solar Power Plant was issued to Geopractica. In addition the following drawings were also issued:

An untitled A0 Drawing indicating all the corner coordinates of the site.

1.3 Objectives

The objectives of the investigation were to complete a geotechnical survey of the site that would:-

- 1.3.1 identify the general soil and rock profile, below the site to depths between 3.5m and 15m using a combination of TLB. test holes and rotary core boreholes.
- 1.3.2 determine the general engineering parameters of the near surface soils.
- 1.3.3 create a general soil and rock facet map of the site.
- 1.3.4 discuss general foundation recommendations for the structures.
- 1.3.5 visually assess the suitability of the near surface soils for use in earthworks and road pavement layers.
- 1.3.6 comment on any geotechnical problems that may impact upon the construction.

2 FACTUAL REPORT

2.1 Programme of Work

2.1.1 *Literary Review*

Prior to the commencement of any field work, a literary review was conducted on the data obtained from previous investigations by both Geopractica, and other consultants. The 1:250,000 Geological Series 2820 Upington was consulted for the regional geology of the general area.

2.1.2 *Field Work*

2.1.2.1 Trial Hole Excavation

Between the 4th and 17th August 2015, seventy test holes were excavated across the site, to refusal or maximum reach of a CAT 428F TLB and a Volvo BL61B TLB. necessary and subsequently

loosely backfilled.

The positions of the trial holes were selected by Geopractica in consultation with the client.

The test holes were located in the field using a hand held GPS, and each hole was profiled in detail by a Geopractica engineering geologist according to the "Guidelines for soil and rock logging in South Africa, 2nd Impression 2002", sampled as necessary and subsequently loosely backfilled.

The location of the trial holes can be seen on the site plan attached as Appendix 1, while their profiles appear as Appendix 3 of this report.

2.1.2.2 Rotary Core Drilling

Between the 31st July 2015 and 27th August 2015, six rotary core boreholes were drilled across the New Site 5 to a depth of 15m or more at least 6m of competent medium hard rock.

The core boxes were transported to Johannesburg where they were logged in detail by a Geopractica engineering geologist according to the "Guidelines for soil and rock logging in South Africa, 2nd Impression 2002". The boreholes were individually photographed and sampled as necessary.

The locations of the boreholes are shown on the site plan, attached as Appendix 1, while the detailed borehole logs are attached as Appendix 4.

2.1.3 Office and Laboratory Work

From the soil samples recovered during the field work the following were selected for testing:-

Foundation Indicator Tests	33
CBR Tests	7
Soil pH and Conductivity	15
UCS tests	8

The individual test results are attached as appendix 5.

The report was finally prepared using the data obtained from all the sources mentioned above.

2.2 Site Description

The investigation area is located some 35km south east of Upington and roughly 25km south of the Orange River. The site is a "green fields" area, approximately 490 Ha in extent.

The topography is relatively flat and undulates gently from 908m to 890m above mean sea level. In general the site slopes gently down towards the north and north west at a gradient of approximately 0.7%. Two, seasonal drainage channels which “rise” from within the central portion of the site, drain the area towards the north and west, and these in turn contribute to the gentle undulating nature of the site.

The site, which is covered by short veld grass, small shrubs and occasional small trees, is currently being used as grazing for livestock which has resulted in the erection of a number of small fences which crisscross the site. A number of animal burrows were also seen across the investigation area.

Access to the site is via a gravel road, approximately 21km that turns off the N10 and sand tracks which follow fire-breaks or fence cut-lines between the farms.

Reference should be made to the panoramic views of the sites contained in the Photograph albums which are attached as appendix 6.

2.3 Site Geology

From the available literature as well as the observations during the site investigation, it is evident that the area is overlain by the Quaternary age aeolian sands of the Gordonia formation of the Kalahari group.

The calcretes of the Mokalanen Formation are widely developed and have formed in the overlying aeolian deposits. In places the calcrete also develops in the residual granites.

These hardpan calcareous materials are intern underlain by Swartz Porphyroblastic Biotite Gneiss / Granite.

The Weinert – N value for the Upington is 35.2 and thus the residual soils are expected to be thin and gravelly with mechanical disintegration being the predominant mode of weathering with an insignificant development of secondary minerals.

The geology of the area is illustrated in the extract of the 1:250 000 scale, geological map 2820 Upington attached as Appendix 2 of this report.

2.4 Hydrology

The average annual rainfall in this area is between 120mm and 180mm, most of which occurs in heavy isolated falls between January and May.

No ground water was intercepted in any of the trial holes.

Due to the generally permeable nature of the near surface soils, it is anticipated that water will infiltrate relatively rapidly into these material and upon saturation, stormwater runoff in the form of sheet wash will occur towards the north west, particularly after periods of heavy or prolonged rainfall.

The surface runoff will, eventually be collected in the two dendritic drainage

channels which occur with the northern and western portion of the site, and will drain the stormwater away in these respective directions, towards the Orange River, located some 25km to the north of the site.

2.5 Observations

Table 1 gives the depths at which practical refusal of the TLB was achieved, and the material present at refusal depth.

Table 1: Refusal Depths of TLB		
Test Hole No	Refusal Depth (m)	Materials present at refusal depth
A 26	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
A 27	0.90	Very dense to soft rock, gravelly sand: Residual Granite/Gneiss
A 28	0.55	Very dense, well cemented and calcretised silty sand: Pedogenic
A 29	0.57	Very dense, well cemented and calcretised silty sand: Pedogenic
A 30	0.70	Very dense, well cemented and calcretised silty sand: Pedogenic
A 31	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
A 32	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
B 26	0.80	Dense, well cemented and calcretised silty sand: Pedogenic
B 27	0.80	Very dense, well cemented and calcretised silty sand: Pedogenic
B 28	0.30	Very dense, well cemented and calcretised silty sand: Pedogenic
B 29	1.65	Very dense, well cemented and calcretised silty sand: Pedogenic
B 30	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
B 31	0.70	Very dense, well cemented and calcretised silty sand: Pedogenic
B 32	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
C 26	0.35	Very dense, well cemented and calcretised silty sand: Pedogenic
C 27	0.55	Very dense, well cemented and calcretised silty sand: Pedogenic
C 28	0.30	Very dense, well cemented and calcretised silty sand: Pedogenic
C 29	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
C 30	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
C 31	0.90	Very dense, relict jointed gravelly silty sand: Residual Granite
C 32	0.70	Dense, calcretised silty sand: Pedogenic
D 26	0.80	Very dense, well cemented and calcretised silty sand: Pedogenic
D 27	0.40	Dense, calcretised silty sand: Pedogenic
D 28	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
D 29	0.35	Very dense, well cemented and calcretised silty sand: Pedogenic
D 30	0.90	Very dense, well cemented and calcretised silty sand: Pedogenic

Table 1: Refusal Depths of TLB		
D 31	0.70	Very dense, well cemented and calcretised silty sand: Pedogenic
D 32	1.00	Very dense, well cemented and calcretised silty sand: Pedogenic
E 26	0.70	Very dense, gravelly sand: Residual Granite/Gneiss
E 27	0.80	Very dense, gravelly sand: Residual Granite/Gneiss
E 28	1.00	Very dense, gravelly sand: Residual Granite/Gneiss
E 29	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
E 30	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
E 31	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
E 32	0.80	Very dense, well cemented and calcretised silty sand: Pedogenic
F 26	0.80	Very dense, gravelly sand: Residual Granite/Gneiss
F 27	0.80	Very dense, well cemented and calcretised silty sand: Pedogenic
F 28	1.70	Very dense, gravelly sand: Residual Granite/Gneiss
F 29	1.00	Very dense, well cemented and calcretised silty sand: Pedogenic
F 30	1.45	Very dense, well cemented and slightly calcretised silty sand: Pedogenic
F 31	0.80	Very dense, gravelly sand: Residual Granite/Gneiss
F 32	0.80	Very dense, gravelly sand: Residual Granite/Gneiss
G 26	0.85	Very dense, well cemented and calcretised silty sand: Pedogenic
G 27	0.50	Soft rock: Granite/Gneiss
G 28	0.30	Very dense, well cemented and calcretised silty sand: Pedogenic
G 29	0.35	Very dense, well cemented and calcretised silty sand: Pedogenic
G 30	0.30	Hard rock: Granite/Gneiss
G 31	1.20	Very dense, well cemented and calcretised silty sand: Pedogenic
G 32	0.40	Very dense, well cemented and calcretised silty sand: Pedogenic
H 26	0.40	Very dense, well cemented and calcretised silty sand: Pedogenic
H 27	1.00	Very dense, well cemented and calcretised silty sand: Pedogenic
H 28	0.80	Very dense, well cemented and calcretised silty sand: Pedogenic
H 29	0.40	Very dense, well cemented and calcretised silty sand: Pedogenic
H 30	0.50	Hard rock: Granite/Gneiss
H 31	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
H 32	0.55	Very dense, well cemented and calcretised silty sand: Pedogenic
I 26	0.40	Very dense, well cemented and calcretised silty sand: Pedogenic
I 27	0.35	Very dense, well cemented and calcretised silty sand: Pedogenic
I 28	0.30	Hard rock: Granite/Gneiss

Table 1: Refusal Depths of TLB		
I 29	0.40	Very dense, well cemented and calcretised silty sand: Pedogenic
I 30	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
I 31	0.40	Very dense, well cemented and calcretised silty sand: Pedogenic
I 32	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
K 26	0.80	Very dense, well cemented and calcretised silty sand: Pedogenic
K 27	0.90	Very dense, well cemented and calcretised silty sand: Pedogenic
K 28	1.00	Very dense to soft rock, gravelly sand: Residual Granite/Gneiss
K 29	0.50	Very dense to soft rock, gravelly sand: Residual Granite/Gneiss
K 30	0.60	Very dense, well cemented and calcretised silty sand: Pedogenic
K 31	0.50	Very dense, well cemented and calcretised silty sand: Pedogenic
K 32	0.55	Very dense, well cemented and calcretised silty sand: Pedogenic

While the nature of the soils encountered in the trial holes is relatively uniform in terms of the type of material, there is a reasonable degree of variation in the thicknesses of the various horizons. Table 2 gives the maximum, minimum and average depths to the top of the major horizons and their thicknesses.

Table 2 : Soil Horizons From Test Pit Data						
Material Type	Depth to top of horizon (m)			Thickness (m)		
	Min	Max	Avg	Min	Max	Avg
Aeolian Sand	0.00	0.00	0.00	0.10	1.60	0.37
Colluvium	0.00	0.20	0.02	0.10	0.40	0.22
Pedogenic (Calcrete)	0.00	1.60	0.29	0.05	>0.90	>0.37
Residual Granite Gneiss	0.20	1.40	0.52	0.10	>0.60	>0.36

Table 3 below, gives the depth to the top of each major horizon intercepted in the rotary bore holes.

Table 3 : Depth to top of major horizons in boreholes 1 - 6				
BH No	Depth to top of horizon (m)			
	Aeolian sand	Pedogenic (Calcrete)	Medium hard to hard rock Gneiss	Hard rock Granite/Gneiss
B 28	-	0.00	3.00	7.00
B 31	0.00	0.80	1.50	3.50
E 26	0.00	-	-	0.50
F 28	0.00	1.40	3.00	-
F 31	0.00	0.80	1.50	-

Table 3 : Depth to top of major horizons in boreholes 1 - 6				
BH No	Depth to top of horizon (m)			
	Aeolian sand	Pedogenic (Calcrete)	Medium hard to hard rock Gneiss	Hard rock Granite/Gneiss
I 29	-	-	-	0.00

2.6 Laboratory Test Results

All laboratory testing and field data results are attached as Appendix 4 to this report.

For more accurate determination and classification purposes, particle size distribution and Atterberg Limits tests were carried out on representative samples of the various soil horizons present below the site. The results are summarised in Table 4 below:-

Table 4: Summary of Foundation Indicators							
TP No.	Depth (m)	Material	PI	PI (ws)	GM	MC (%)	Activity
A 27	0.7 - 0.90	Gravelly sand: Residual granite gneiss.	np	np	2.05	5.81	Neg
A 28	0.0 - 0.50	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	1.32	1.89	Neg
A 29	0.0 - 0.57	Gravelly silty sand: Pedogenic/Colluvium.	np	np	1.51	2.04	Neg
A 30	0.2 - 0.70	Well cemented silty sand: Pedogenic.	np	np	1.98	3.42	Neg
A 31	0.0 - 0.20	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	0.93	1.71	Neg
A 32	0.5 - 0.60	Well cemented silty sand: Pedogenic.	np	np	1.4	1.49	Neg
B 26	0.0 - 0.80	Well cemented silty sand: Pedogenic.	np	np	1.8	2.62	Neg
B 28	0.1 - 0.30	Well cemented silty sand: Pedogenic.	np	np	0.91	2.24	Neg
B 29	0.8 - 1.00	Fine sand: Aeolian sand.	np	np	0.83	1.88	Neg
B 30	0.0 - 0.60	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	0.96	0.92	Neg
B 31	0.3 - 0.70	Well cemented silty sand: Pedogenic.	np	np	1.13	1.88	Neg
B 32	0.0 - 0.50	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	1.67	1.84	Neg
C 26	0.0 - 0.35	Gravelly silty sand: Pedogenic/Colluvium.	np	np	2.55	1.72	Neg
C 29	0.2 - 0.60	Well cemented silty sand: Pedogenic.	np	np	1.56	2.43	Neg
C 30	0.0 - 0.40	Gravelly silty sand: Pedogenic/Colluvium	np	np	2.05	1.77	Neg
C 32	0.0 - 0.70	Gravelly silty sand: Residual granite/Colluvium	np	np	1.76	2.03	Neg
D 27	0.1 - 0.40	Well cemented silty sand: Pedogenic	np	np	1.98	1.2	Neg
D 29	0.1 - 0.35	Well cemented silty sand: Pedogenic.	np	np	2.38	1.62	Neg

TP No.	Depth (m)	Material	PI	PI (ws)	GM	MC (%)	Activity
D 30	0.1 - 0.40	Fine sand : Aeolian sand.	np	np	0.98	2.23	Neg
D 31	0.0 - 0.20	Fine sand : Aeolian sand.	np	np	1.65	1.18	Neg
D 32	0.0 - 0.40	Fine sand : Aeolian sand.	np	np	1.13	1.76	Neg
E 26	0.2 - 0.70	Gravelly sand: Residual granite gneiss.	np	np	1.49	2.27	Neg
E 27	0.0 - 0.80	Gravelly sand: Residual Granite/Colluvium.	np	np	1.9	1.26	Neg
E 28	0.6 - 1.00	Gravelly sand: Residual granite gneiss.	np	np	1.96	0.71	Neg
E 29	0.2 - 0.50	Well cemented silty sand: Pedogenic.	np	np	1.38	2.27	Neg
E 31	0.0 - 0.50	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	1.7	3.44	Neg
E 32	0.0 - 0.80	Gravelly silty sand: Pedogenic/Colluvium.	np	np	1.77	1.66	Neg
F 26	0.4 - 0.80	Gravelly sand: Residual Granite/Aeolian sand.	np	np	2.28	1.72	Neg
F 28	0.5 - 1.70	Gravelly sand: Residual Granite/Pedogenic.	np	np	2.02	1.26	Neg
F 29	0.0 - 0.80	Fine sand : Aeolian sand.	np	np	2.07	1.39	Neg
F 30	0.0 - 1.40	Fine sand : Aeolian sand.	np	np	1.79	126	Neg
F 31	0.0 - 0.80	Gravelly sand: Residual granite gneiss/Aeolian sand.	np	np	1.91	2.61	Neg
F 32	0.6 - 0.80	Gravelly sand: Residual granite gneiss.	np	np	2.3	2.24	Neg
G 27	0.3 - 0.50	Soft rock: Granite gneiss.	np	np	1.73	1.18	Neg
G 29	0.0 - 0.30	Well cemented silty sand: Pedogenic.	np	np	1.03	2.31	Neg
G 30	0.0 - 0.30	Gravelly silty sand: Granite/Aeolian sand.	np	np	1.59	1.66	Neg
G 32	0.0 - 0.40	Well cemented silty sand: Pedogenic.	np	np	1.31	1.94	Neg
H 26	0.0 - 0.40	Well cemented silty sand: Pedogenic.	np	np	2.06	1.77	Neg
H 28	0.0 - 0.80	Well cemented silty sand: Pedogenic.	np	np	1.08	1.35	Neg
H 29	0.0 - 0.40	Well cemented silty sand: Pedogenic.	np	np	0.97	1.96	Neg
H 30	0.0 - 0.50	Gravelly sand: Granite/Pedogenic.	np	np	1.66	2.87	Neg
H 31	0.0 - 0.50	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	1.63	1.81	Neg
H 32	0.2 - 0.50	Gravelly silty sand: Pedogenic/Colluvium.	np	np	2.03	1.53	Neg
K 26	0.2 - 0.80	Well cemented silty sand: Pedogenic.	np	np	1.04	1.63	Neg
K 27	0.0 - 0.30	Fine sand: Aeolian sand.	np	np	1.19	1.5	Neg
K 29	0.0 - 0.30	Gravelly silty sand: Colluvium.	np	np	1.26	2.11	Neg
K 30	0.0 - 0.60	Gravelly silty sand: Pedogenic/Aeolian sand.	np	np	0.97	0.91	Neg
K 31	0.0 - 0.50	Gravelly silty sand: Pedogenic/Colluvium.	np	np	1.55	3.05	Neg
K 32	0.0 - 0.55	Gravelly silty sand: Pedogenic/Colluvium.	np	np	2.05	1.4	Neg

Note: np non plastic
Neg Negligible

To determine the suitability of any excavated soils for use as a general fill or selected layers in earthworks, a number of CBR tests were carried out on bulk samples collected during the field work. These results are presented in Table 5 below :-

Table 5: Summary of CBR test results									
TP No.	Depth (m)	Material	PI (%)	GM	CBR Value @ % Mod AASHTO				TRH 14 Class
					90%	93%	95%	100%	
B 30	0.0 - 0.60	Pedogenic/Aeolian sand.	np	0.96	12	18	25	53	G7
D 27	0.1 - 0.40	Pedogenic.	np	1.98	43	67	90	186	G4
E 27	0.0 - 0.80	Residual Granite/Colluvium.	np	1.90	51	80	108	227	G4
E 28	0.6 - 1.00	Residual granite gneiss.	np	1.96	39	60	81	166	G4
E 32	0.0 - 0.80	Pedogenic/Colluvium.	np	1.77	27	42	58	124	G4
F 28	0.5 - 1.70	Residual Granite/Pedogenic.	np	2.02	26	41	56	121	G4
K 30	0.0 - 0.60	Pedogenic/Aeolian sand.	np	0.97	12	18	24	51	G7

Table 6 below summarises the PH and Conductivity test results:-

Table 6: Soil pH and Conductivity						
TP No.	Depth (m)	Material	pH	Degree of acidity	Resistivity (Ohm/cm)	Degree of Corrosivity
A 27	0.0 - 0.90	Residual granite gneiss.	7.39	Slightly alkaline	4878	Corrosive
A 30	0.2 - 0.70	Pedogenic.	8.08	Moderately alkaline	5025	Mildly corrosive
B 30	0.0 - 0.60	Pedogenic/Aeolian sand.	7.61	Moderately alkaline	5435	Mildly corrosive
C 30	0.0 - 0.40	Pedogenic/Colluvium.	7.06	Slightly alkaline	5155	Mildly corrosive
C 32	0.0 - 0.70	Residual Granite/Colluvium.	7.59	Moderately alkaline	3731	Very corrosive
D 27	0.1 - 0.40	Pedogenic.	7.54	Moderately alkaline	5025	Mildly corrosive
E 27	0.0 - 0.80	Residual Granite/Colluvium.	7.77	Moderately alkaline	5000	Mildly corrosive
E 28	0.6 - 1.00	Residual granite gneiss.	8.32	Moderately alkaline	5263	Mildly corrosive
E 32	0.0 - 0.80	Pedogenic/Colluvium.	7.68	Moderately alkaline	5025	Mildly corrosive
F 28	0.5 - 1.70	Residual Granite/Pedogenic.	8.09	Moderately alkaline	4695	Corrosive
H 28	0.0 - 0.80	Pedogenic.	7.63	Moderately alkaline	5102	Mildly corrosive

Table 6: Soil pH and Conductivity						
TP No.	Depth (m)	Material	pH	Degree of acidity	Resistivity (Ohm/cm)	Degree of Corrosivity
H 31	0.0 - 0.60	Pedogenic/Aeolian sand.	7.65	Moderately alkaline	5747	Mildly corrosive
H 32	0.2 - 0.50	Pedogenic/Colluvium.	7.81	Moderately alkaline	3906	Very corrosive
K 30	0.0 - 0.60	Pedogenic/Aeolian sand.	7.46	Moderately alkaline	5128	Mildly corrosive
K 31	0.0 - 0.50	Pedogenic/Colluvium	7.56	Moderately alkaline	4049	Corrosive

Table 7 below is a summary of all the UCS tests conducted, most of these results are still outstanding and will be issued with the final report:-

Table 7: Summary of UCS tests.					
BH No.	Depth (m)	Material	Density (g/cm ³)	Failure Load (kN)	UCS Strength (MPa)
B 28	5.64 - 5.80	Medium hard rock: Granite gneiss	Results outstanding		
B 28	8.9 - 9.00	Hard rock Granite gneiss			
B 31	6.60 - 6.71	Hard rock Granite gneiss			
E 26	3.65 - 3.80	Very soft rock: Granite gneiss	2.35	5.2	2.4
E 26	9.20 - 9.35	Hard rock Granite gneiss	2.65	85.9	40.2
F 28	10.6 - 10.7	Medium hard rock: Granite gneiss	Results outstanding		
F 31	6.10 - 6.29	Medium hard rock: Granite gneiss			
I 29	3.6 - 3.80	Hard rock Granite gneiss			

3 INTERPRETIVE REPORT

3.1 Discussion of Results

A general assessment of the various soil horizons encountered in the 70 TLB dug test holes excavated across the site suggests the following:-

3.1.1 Aeolian Sand

The aeolian sand horizon was encountered in the vast majority of the trial pits from surface to typical depths of between 0.10 - 1.60m (average of 0.37m). Due to the presence of undulating hardpan calcrete and calcrete boulders within the profile, the thickness of the aeolian sands was found to be variable within the individual trial pits.

A “contour” drawing indicating the thickness of Aeolian Sand across the site has been prepared and appears in appendix 1.

The material has been described as a dry, red brown, slightly open textured, silty sand with a general consistency of loose. Aeolian sand of the Kalahari Group are known to have a collapsible grain structure. Some of the soils were described as having a weakly developed voided structure, although this was not observed in all trial pits. An open-voided soil structure is characteristic of collapsible soils.

Laboratory tests conducted on these soils, suggest that the material to be non plastic and were reasonably fine to coarse in texture, with a grading modulus of between 0.9 and 2.0.

CBR test was undertaken on this material mixed with the underlying pedogenic soils, suggest the material will classify as G7 quality material in terms of the TRH 14 classification system and thus is suitable as general backfill

Chemical analysis of this material mixed with the underlying pedogenic soils suggest a moderately alkaline pH.

The material is generally likely to be mildly corrosive towards buried concrete structures and services.

Given its poor consistency and possible large collapse potential, this material should not be considered as a founding medium for any of the proposed structures.

Visually the insitu aeolian sand is highly permeable, and is considered "free draining".

3.1.2 *Colluvium*

The transported gravelly soils, encountered in the majority of the test pits, were interpreted as being of colluvial origin. This horizon was encountered either from surface or directly below the Aeolian sand. It has been describe as a dry reddish brown, generally loose, open texture, silty sand matrix containing angular gravels and cobbles.

The horizon was relatively thin and variable, with its thickness ranging from 0.10m to 0.40m (average thickness 0.22m).

CBR and indicator tests undertaken on this material mixed with the underlying pedogenic and residual soils, suggest the material to be non plastic and will classify as G4 quality material in terms of the TRH 14 classification system.

Chemical analysis of this material mixed with the underlying pedogenic and residual soils suggest it to be generally slightly alkaline to moderately alkaline pH.

The material may be generally very corrosive to mildly corrosive towards buried concrete structures and services.

It is our opinion that due its limited thickness, sporadic occurrence and poor consistency, this material should not be considered as a founding medium for any of the proposed structures.

3.1.3 *Pedogenic Calcrete*

The pedogenic calcrete was intercepted immediately below the Aeolian sand or Colluvium and has been described as a dry, off white, dense to very dense, intact, partially cemented to well cemented, calcretised gravelly silty sand.

This horizon was intercepted on average at 0.2m below current ground level and was on average 0.37m thick, however information from the boreholes suggest an average thickness of 1.5m.

A number of indicators and CBR tests were conducted on this material mixed with the overlaying transported and underlying residual soils and the results indicate that it is non plastic and classifies as G4 to G7 quality material in terms of the THR14 classification system and is thus suitable as both general terrace backfill and road pavement layers up to Base (G4 material only).

Soil pH and conductivity tests suggest that this material is moderately alkaline and will generally be mildly aggressive towards buried concrete structures and services.

From field observations and borehole profiles this pedogenic horizon would offer an allowable bearing capacities of 200kPa, however the upper contact is irregular and uneven and rapid variations in depth below ground level may occur (0 to 5m).

As a pedogenic horizon, the thickness and consistency may also vary however this horizon is usually underlain by dense residual gravels or bedrock. The depth of foundations placed on the pedogenic horizon may therefore also vary from place to place and the integrity of the hardpan will need to be proven in every foundation.

3.1.4 *Residual Granite Gneiss*

The residual granite soil results from the insitu weathering of the granite gneiss bedrock and has been described as a dry, off white mottled greyish black/pink, very dense, relic structured, slightly cemented, gravelly silty sand.

This horizon was encountered at depths ranging from 0.20m to 1.40m (average depth of 0.52m) below current ground level with an average thickness of 0.36m.

Laboratory tests show the horizon is non plastic and classifies as G4 quality material in terms of the THR14 classification system.

Soil pH and conductivity tests suggest that this material is slightly alkaline to moderately alkaline and will generally be aggressive to mildly aggressive

towards buried concrete structures and services.

It is our opinion that this horizon represents a viable founding horizon for structures requiring a bearing capacity of less than 250KPa.

3.1.5 *Granite Gneiss Bedrock*

The bedrock encountered on New Site 5 was typically described as an off white, banded or blotched greenish grey, medium coarse to coarse grained. The rock showed varying degrees of weathering ranging from highly weathered to slightly weathered and was typically soft rock becoming medium hard rock to hard rock with depth.

It is our opinion that this horizon represents a viable founding horizon for structures and has been allocated an allowable bearing capacity of 350KPa, when encountered as a soft rock.

3.2 Preliminary Design Parameters

Design parameters for the major soil horizons are given in Table 8:-

Table 8 : Design Parameters		
Material Type	Allowable Bearing Capacity (kPa)	TRH 14 Classification
Aeolian sand	n/a	G7
Pedogenic Calcrete	200	G4
Residual Granite	250	G5
Soft Rock Granite	350	n/d
Medium Hard Rock Granite	650	n/d

Note:- n/d not determined
 n/a not applicable

3.3 Preliminary Design Solutions

3.3.1 *Lightly to medium loaded structures < 200kPa*

Structures requiring a bearing capacity of less than 200kPa can be founded conventionally using strip footing or pad footings at depths of between 0.5m and 1.0m below current ground level on the very dense pedogenic horizon.

3.3.2 *Heavily loaded structures < 500kPa*

Structures requiring a bearing capacity of less than 500kPa can be founded conventionally using strip footing or pad footings at depth of between 1.5m and 3m below current ground level on the medium hard rock granite.

3.3.3 Terracing

The classification of the near surface soils are in the order of G4 to G7.

It is our opinion that should terracing be required a minimum quality G7 material be considered for the backfilling.

Table 9 below suggests minimum material qualities for various road pavement layers.

Table 9 : Pavement Material Classes	
Pavement Layer	TRH 14 Material Class (natural gravels)
Base	G1, G2, G3, G4
Subbase	G5, G6
Selected Layers	G6, G7
Subgrade	G8, G9, G10

From experience it is suggested that a cohesive binder be investigated for incorporation into the terrace backfill material. Typically backfill materials encountered in the area are totally non cohesive and will be problematic when used in large fills. Typically their water demand will be significant, and climatic conditions will dry them out swiftly resulting in “dusty” platforms which will require constant maintenance after construction.

3.4 Construction Problems

- 3.4.1 Due to the arid nature of the area, dust control will be necessary during any earthworks operations.
- 3.4.2 Excavations for deep foundations and/or underground service trenches will probably require the use of large pneumatic equipment and/or blasting.
- 3.4.3 It is our opinion that the site construction and earthworks will consume a vast quantity of water and thus a detailed hydrological investigation should be undertaken across the general area to source viable (and sustainable) ground water aquifers. Alternative, water will need to be pumped from the Orange River located north of the M10.

3.5 Additional Investigations

It is recommended that a detailed geotechnical investigation be undertaken within the area of the power block as numerous heavily loaded, settlement sensitive structures will be constructed within this area.

Whilst the spacing of the geotechnical data points in this preliminary investigation is approximately 265m, the ground conditions are considered relatively uniform and thus it is our opinion that additional limited geotechnical investigations are required within the solar farm area, to accurately delineate those areas were deeply

weathered very soft rock to soft rock granitoid material has been located. It is however recommended that these detailed investigations only be considered once the final layout of the Solar Farm and Power Block have been decided.

It is however recommended that alternative foundation solutions be investigated for the mirror structures. It is our opinion that shallow, conventional, concrete strip footings and or column bases are both impractical and time consuming. In addition, conventional post driving solutions are also considered impractical.

4 CONSTRUCTION MONITORING

4.1 Excavation Inspection

It is recommended that all excavations be regularly inspected by a competent person in order to ensure side wall stability.

4.2 Control Testing

Regular checks should be made on both the quality and compaction of the material used in the road pavement layers to ensure design requirements are met.

REFERENCES

1. Jennings JE et al . "Revised Guide to Soil profiling for Civil Engineering Purposes in Southern Africa" - Civil Engineer in South Africa , January 1973
2. Van der Merwe DH . "The prediction of heave from the Plasticity Index and percentage clay fraction of soils" - Civil Engineer in South Africa Vol 6, 1964
3. TRH 14, "Guidelines for Road Construction Materials" - NITRR, 1985
4. "Guidelines for Soil and Rock Logging in South Africa" - S.A.I.E.G
5. Jennings, J and Knight, K. (1975). A guide to construction on or with materials exhibiting additional settlement due to "collapse" of grain structure. Proceedings of the Sixth Regional Conference on Soil Mechanics and Foundation Engineering. Durban
6. Probabilistic Peak Ground Acceleration and Spectral Seismic Hazard Map for South Africa Report number : 2003 - 0053. Kijko. A., Graham. G., Bejaichund. M., Roblin. D. L. and Brandt. M. B. C. 2004.

APPENDIX 1

SITE PLAN AND SOIL CONTOUR DRAWING



Geopractica

SITE LOCALITY PLAN

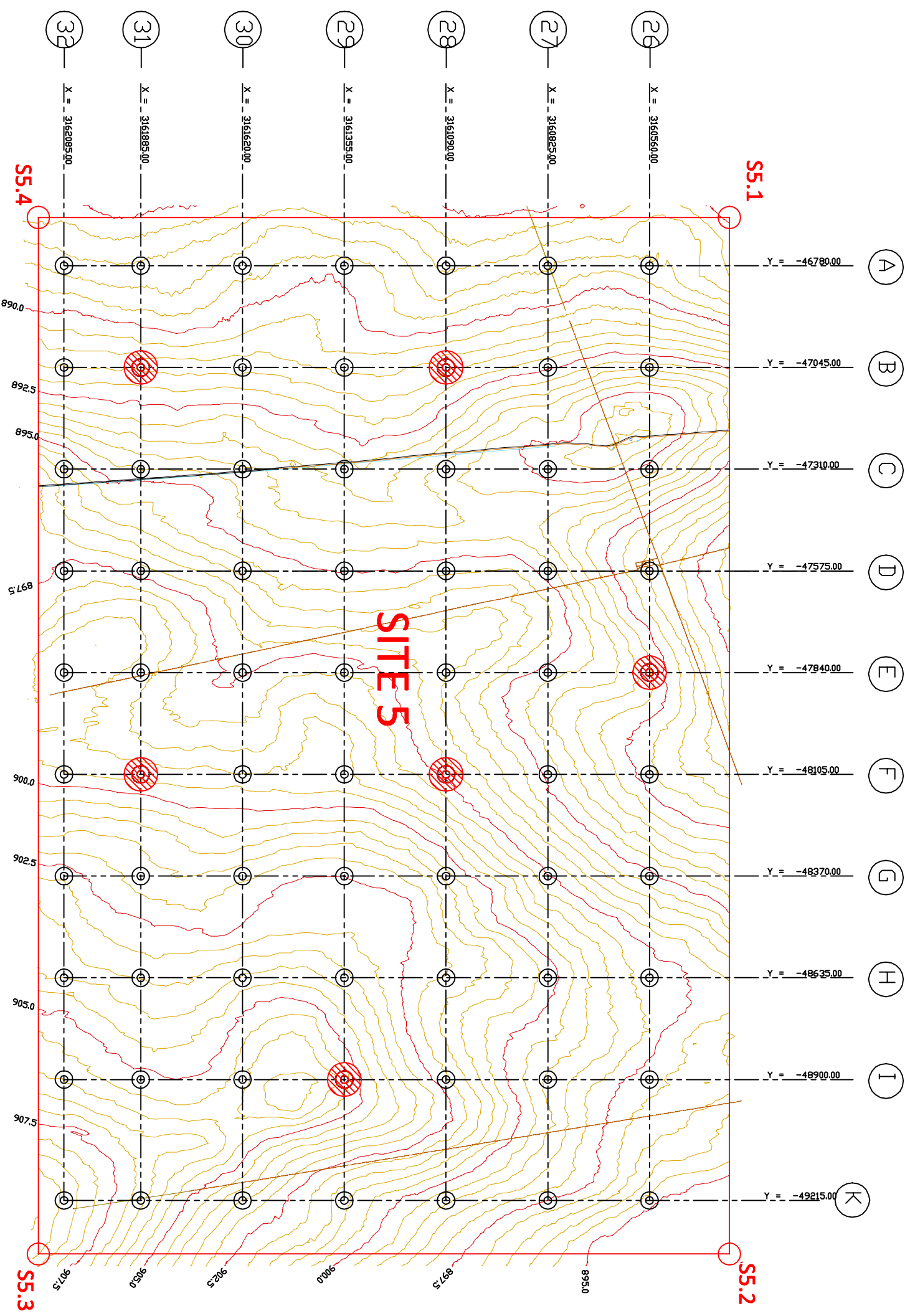
EMVELO

Karoshhoek – Site 5

DATE : August 2015

Job No: 15107/3

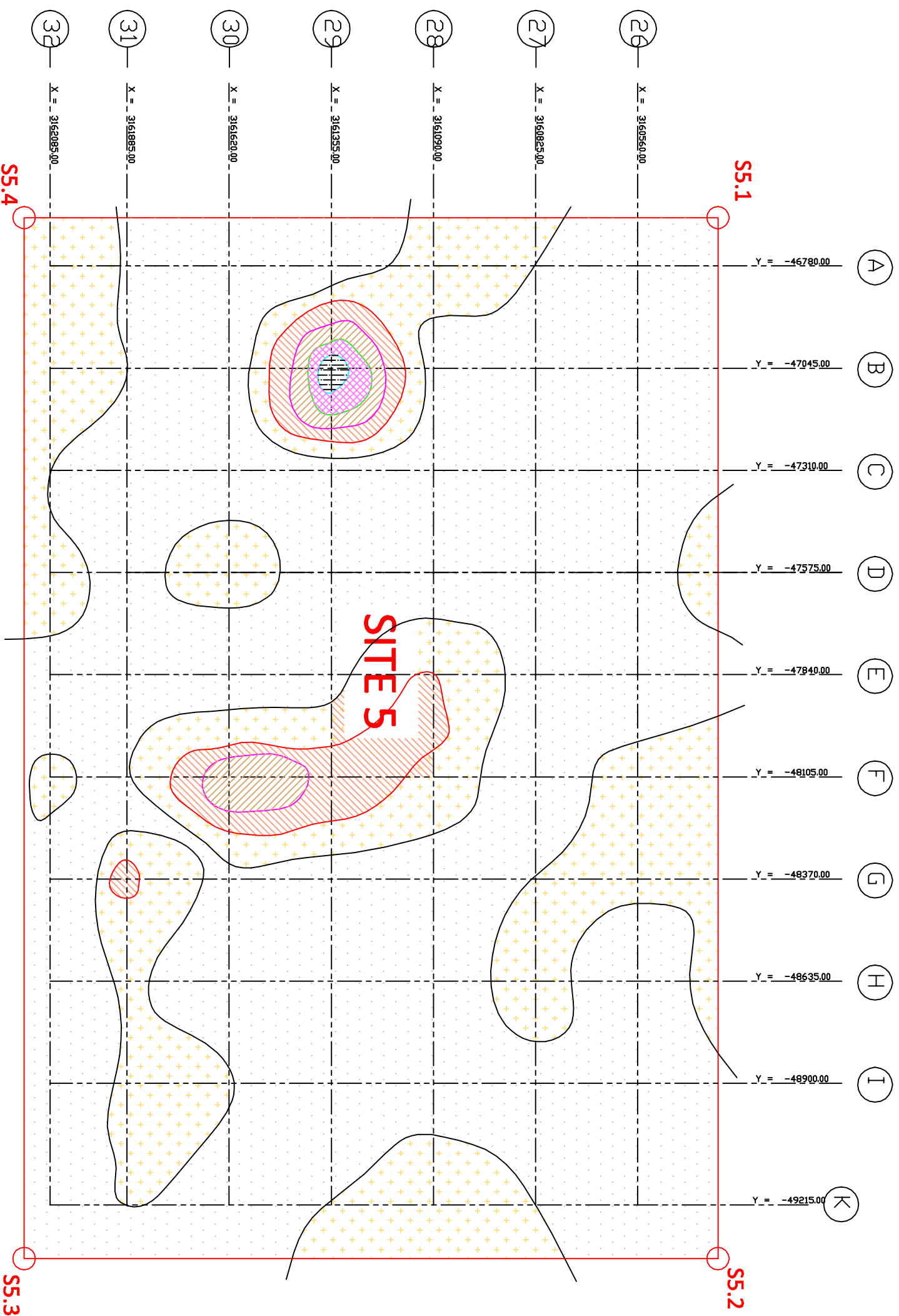
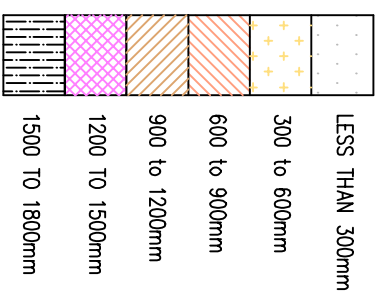
Figure : 1



LEGEND	
	TLB dug Test Holes
	Rotary Core Borehole
	Fence
	Track
	Track

REV	A	Aug 15	ISSUED WITH REPORT
CONSULTING GEOTECHNICAL ENGINEERS ENVIRONMENTAL SCIENTISTS			
EMVELO ECOPROJECTS KAROSHOK SOLAR PROJECT PRELIMINARY GEOTECHNICAL INVESTIGATION FOR NEW SITE 5			
SCALE	DRAWN	CHECKED	DATE
do not	SR	CD	Aug 15
	DRAWING NO.	FILE NO.	REV
	15107-103	15107-103	A

ESTIMATED SOIL THICKNESSES



TRIAL HOLE & BOREHOLE DATA

Ref	Y	X	Soil Thickness
A 26	46780	3160560	0.10
A 27	46780	3160825	0.30
A 28	46780	3161090	0.50
A 29	46780	3161355	0.10
A 30	46780	3161620	0.00
A 31	46780	3161885	0.25
A 32	46780	3162085	0.50
B 26	47045	3160560	0.00
B 27	47045	3160825	0.20
B 28	47045	3161090	0.10
B 29	47045	3161355	1.60
B 30	47045	3161620	0.20
B 31	47045	3161885	0.30
B 32	47045	3162085	0.40
C 26	47310	3160560	0.10
C 27	47310	3160825	0.20
C 28	47310	3161090	0.00
C 29	47310	3161355	0.20
C 30	47310	3161620	0.20
C 31	47310	3161885	0.15
C 32	47310	3162085	0.30
D 26	47575	3160560	0.20
D 27	47575	3160825	0.10
D 28	47575	3161090	0.00
D 29	47575	3161355	0.10
D 30	47575	3161620	0.40
D 31	47575	3161885	0.20
D 32	47575	3162085	0.40
E 26	47840	3160560	0.20
E 27	47840	3160825	0.20
E 28	47840	3161090	0.60
E 29	47840	3161355	0.20
E 30	47840	3161620	0.10
E 31	47840	3161885	0.20
E 32	47840	3162085	0.20
F 26	48105	3160560	0.55
F 27	48105	3160825	0.00
F 28	48105	3161090	0.50
F 29	48105	3161355	0.80
F 30	48105	3161620	1.40
F 31	48105	3161885	0.30
F 32	48105	3162085	0.40
G 26	48370	3160560	0.50
G 27	48370	3160825	0.30
G 28	48370	3161090	0.20
G 29	48370	3161355	0.00
G 30	48370	3161620	0.25
G 31	48370	3161885	0.60
G 32	48370	3162085	0.00
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H 27	48635	3160825	0.50
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H 30	48635	3161620	0.00
H 31	48635	3161885	0.35
H 32	48635	3162085	0.20
I 26	48900	3160560	0.00
I 27	48900	3160825	0.10
I 28	48900	3161090	0.20
I 29	48900	3161355	0.20
I 30	48900	3161620	0.30
I 31	48900	3161885	0.35
I 32	48900	3162085	0.15
K 26	49215	3160560	0.20
K 27	49215	3160825	0.30
K 28	49215	3161090	0.40
K 29	49215	3161355	0.30
K 30	49215	3161620	0.20
K 31	49215	3161885	0.30
K 32	49215	3162085	0.15

ISSUED WITH REPORT



CONSULTING GEOTECHNICAL ENGINEERS
ENVIRONMENTAL SCIENTISTS

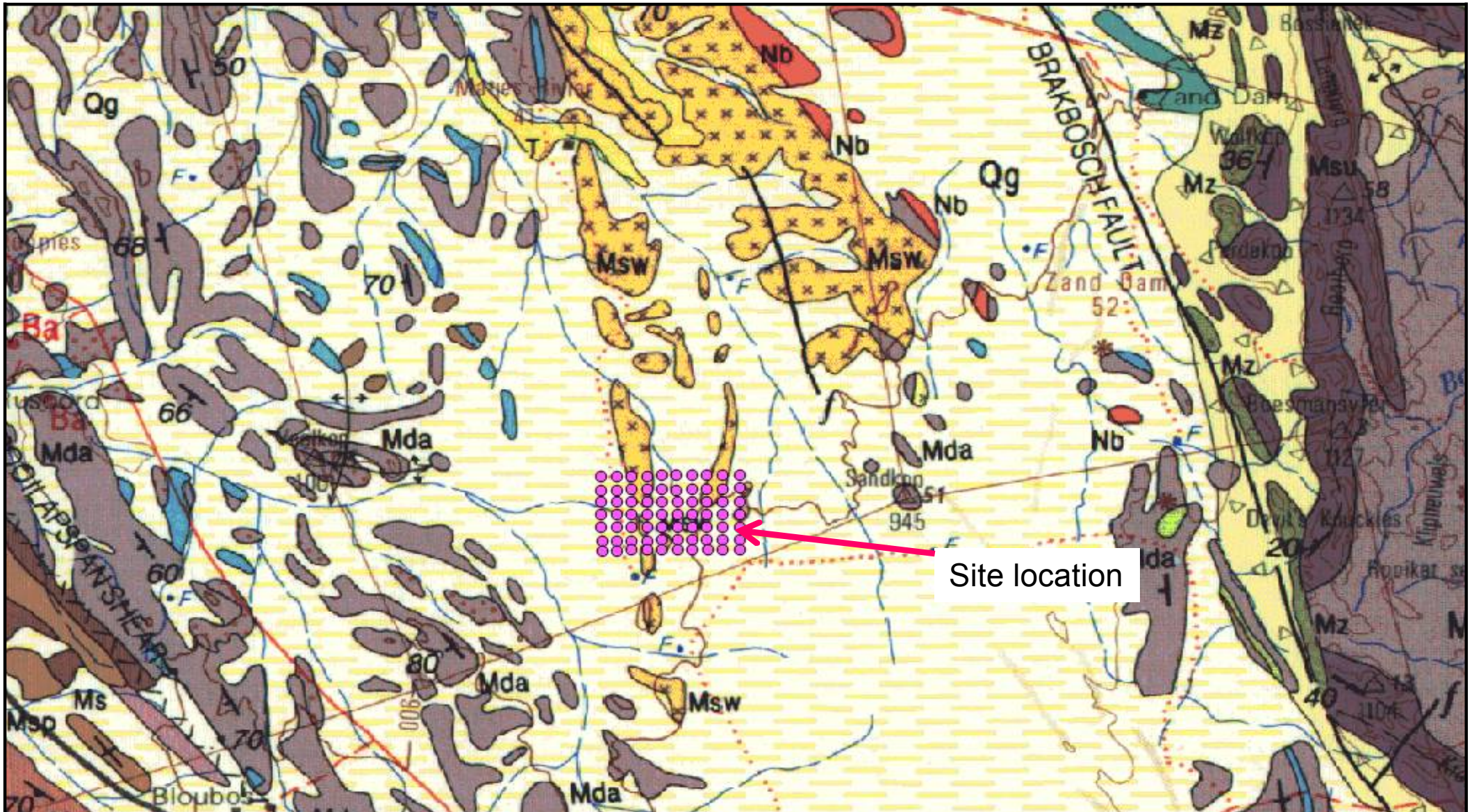
EMVELO ECOPROJECTS
KAROSHOK SOLAR PROJECT

PRELIMINARY GEOTECHNICAL INVESTIGATION
ESTIMATED SOIL THICKNESSES FOR NEW SITE 5

SCALE	DRAWN	CHECKED	DATE
do not	SR	CD	Aug 15
	DRAWING NO.	FILE NO.	REV
	15107-203	15107-203	A

APPENDIX 2

REGIONAL GEOLOGY



Geopractica

REGIONAL GEOLOGY PLAN

EMVELO

Karoshoeck – Site 5

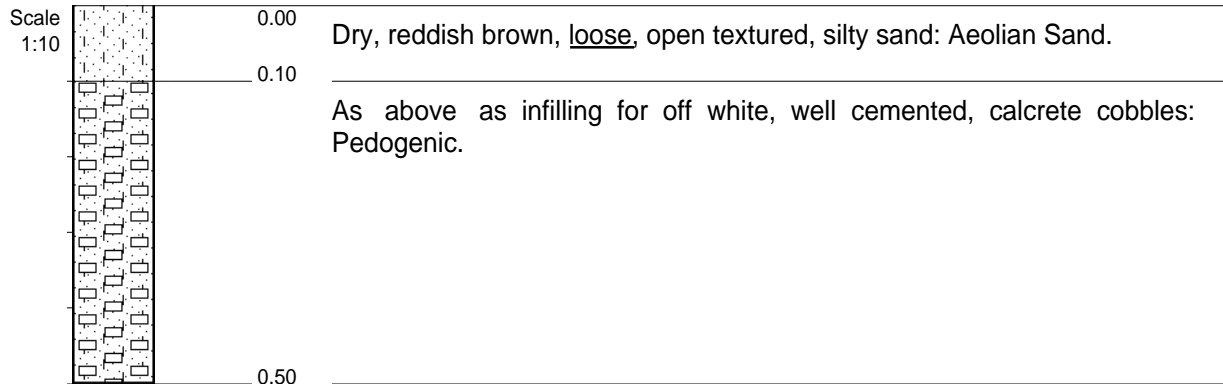
DATE : August 2015

Job No: 15107/3

Figure : 2

APPENDIX 3

TEST PIT PROFILES


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed

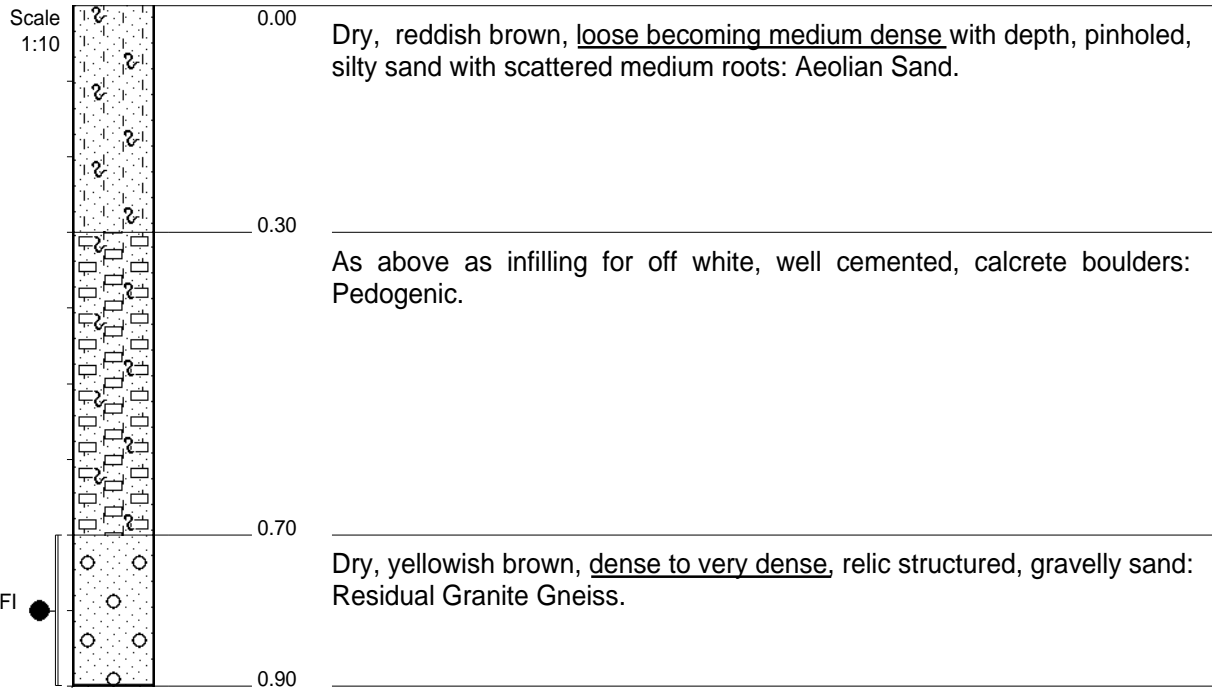
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION : Vertical
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPA26

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.9m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.7--0.9m

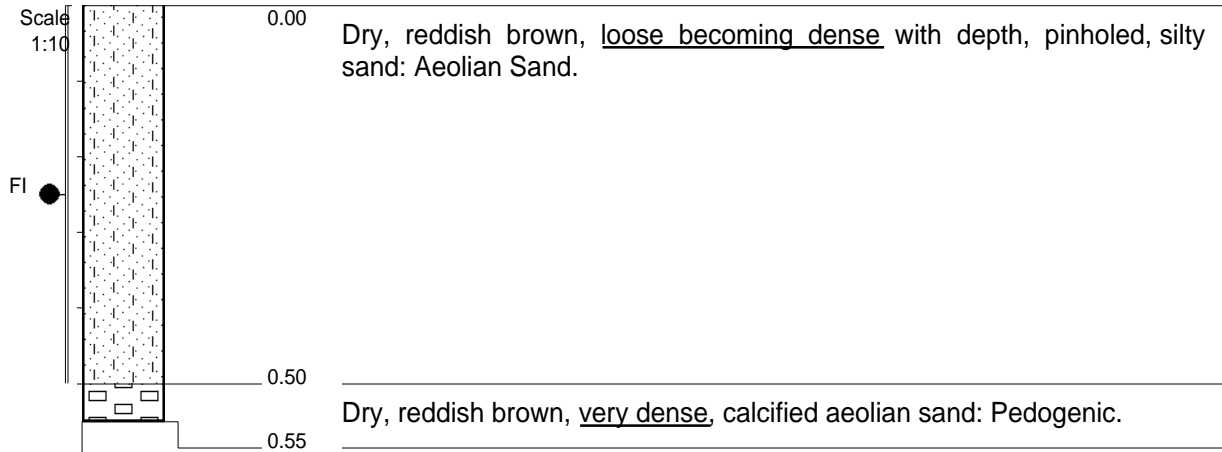
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
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 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPA27

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



NOTES

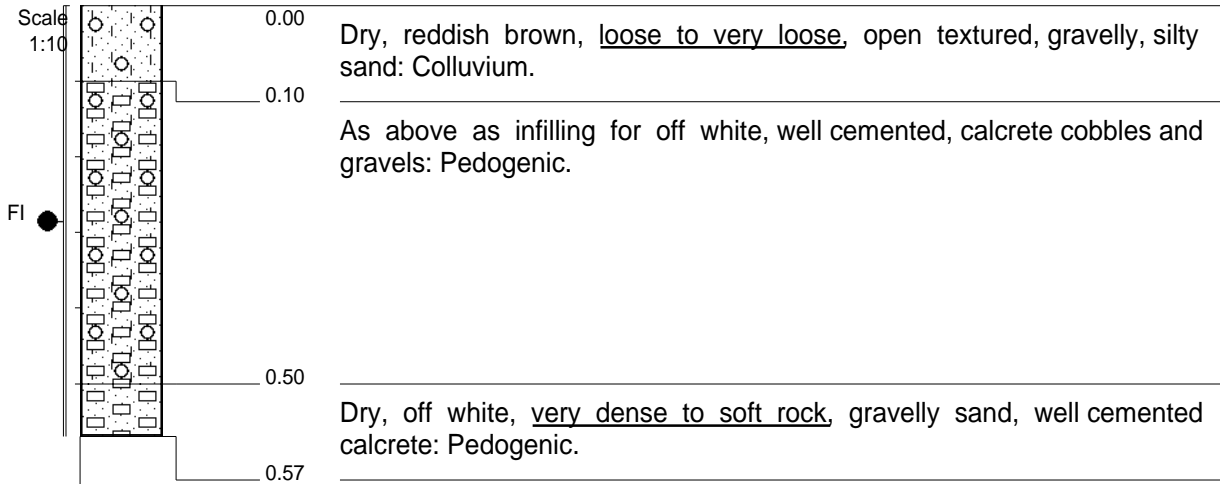
- 1) EOH @ 0.55m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.5m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
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 DATE : 31/08/15 20:58
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HOLE No: TPA28



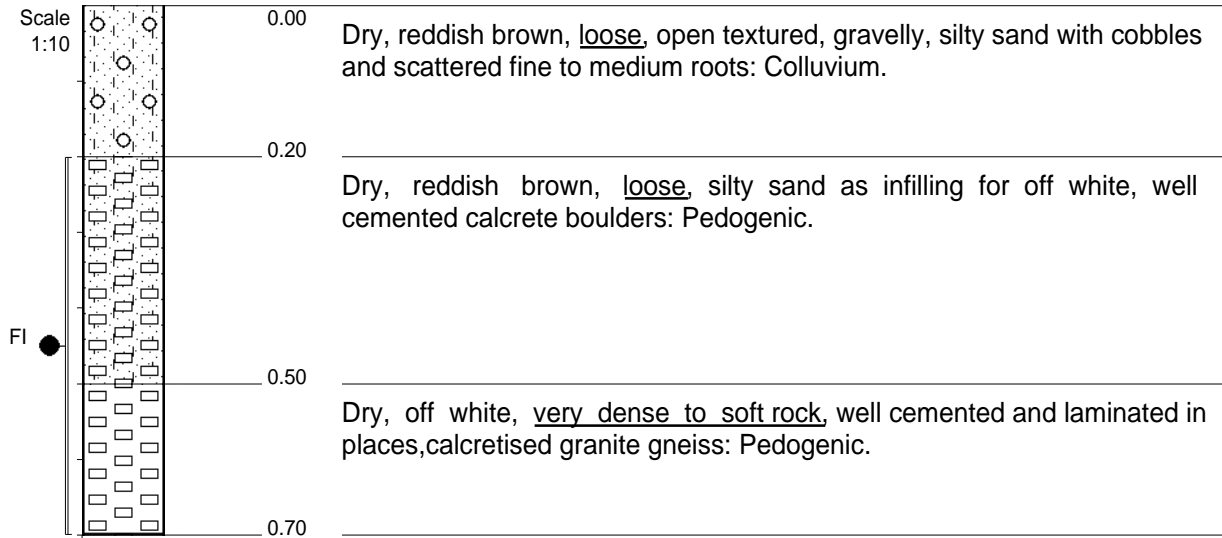
NOTES

- 1) EOH @ 0.57m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.57m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.7m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.2--0.7m

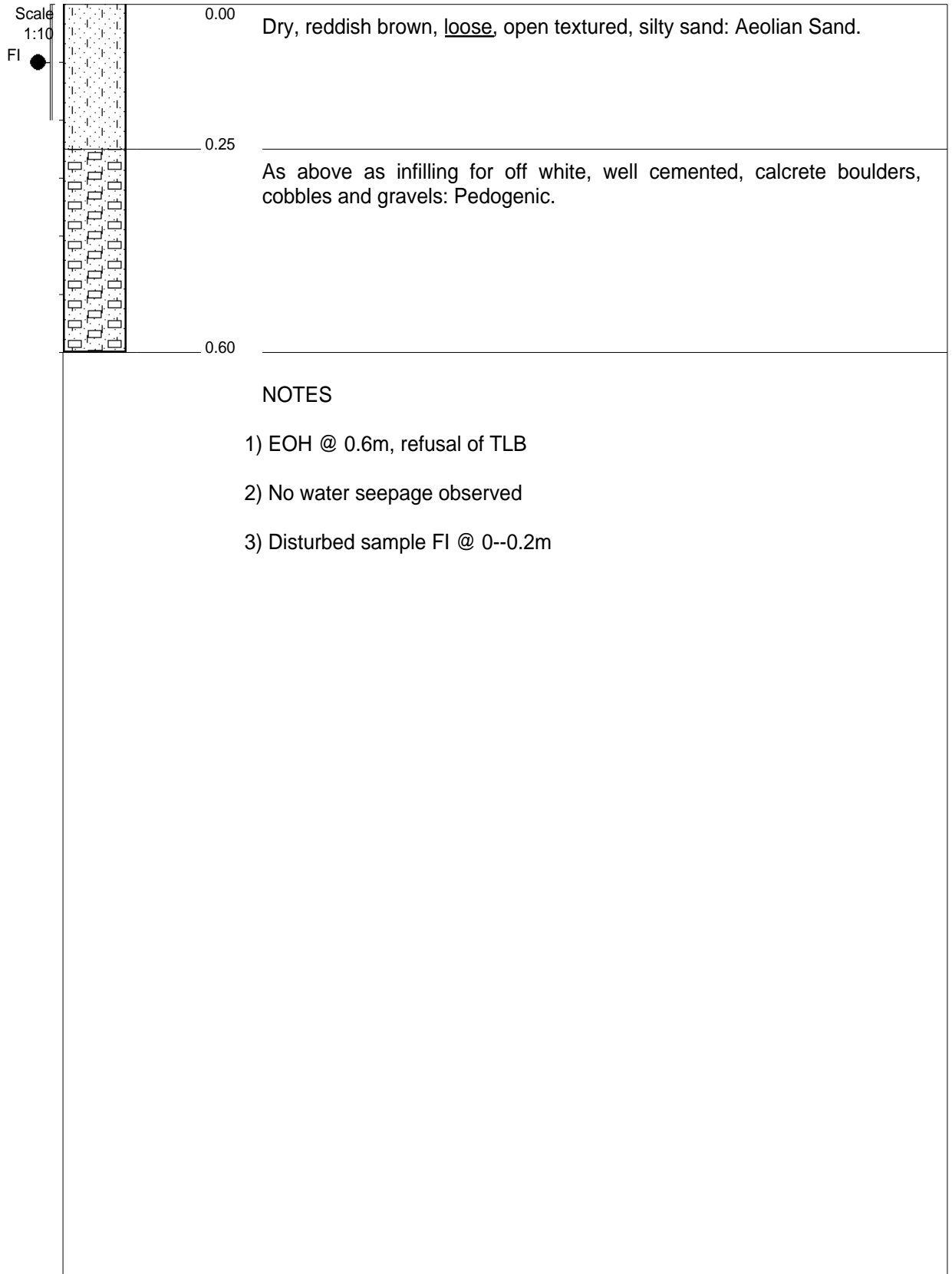
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 MACHINE : Volvo BL61B
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 PROFILED BY : MM

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 Y-COORD :

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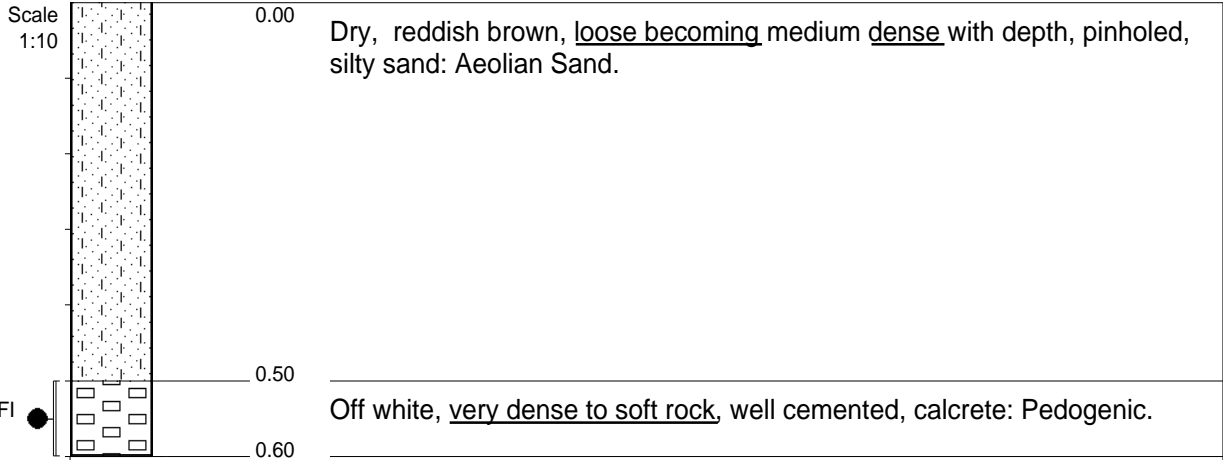

 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
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 DATE : 31/08/15 20:58
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 ELEVATION :
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HOLE No: TPA31

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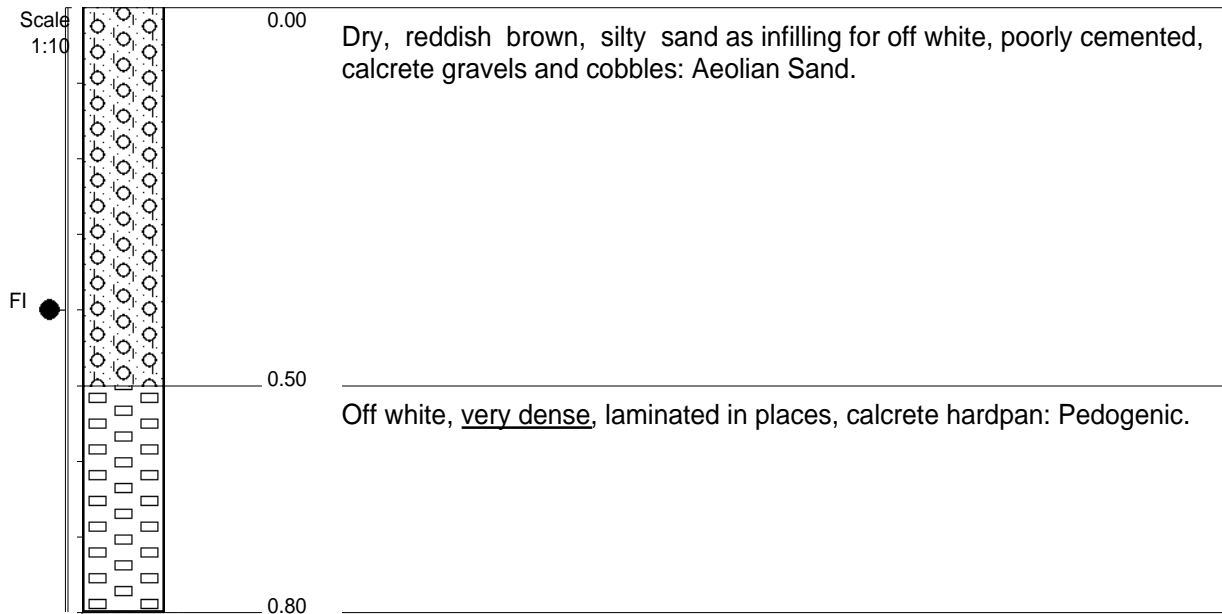
NOTES

- 1) EOH @ 0.6m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.5--0.6m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
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ELEVATION :
 X-COORD :
 Y-COORD :



NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.8m

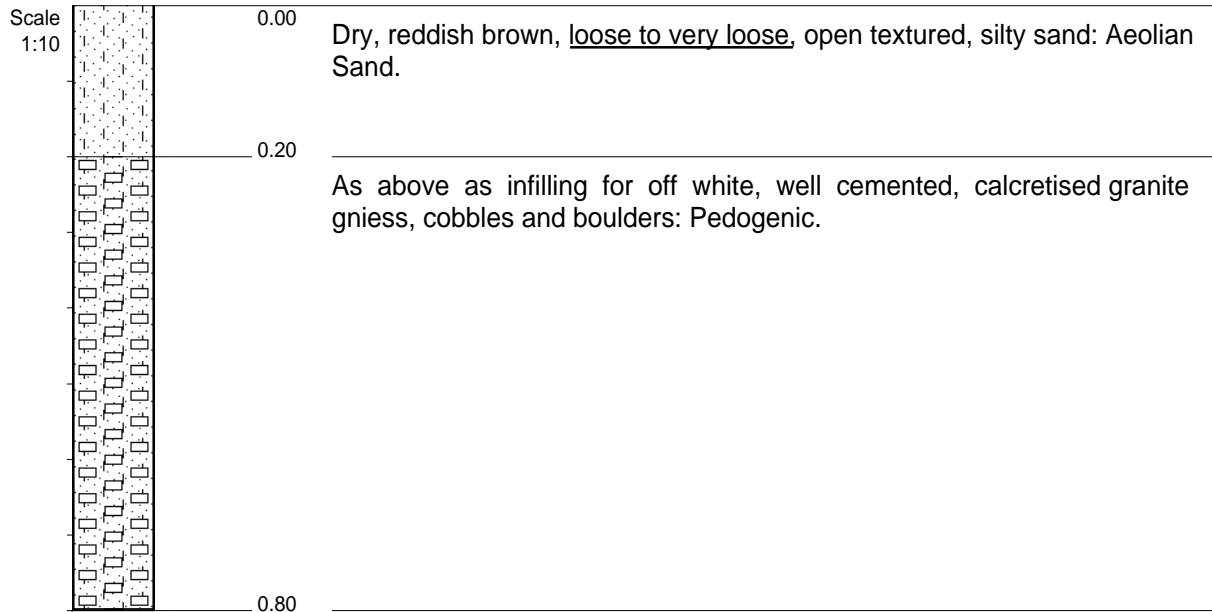
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ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPB26

TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed

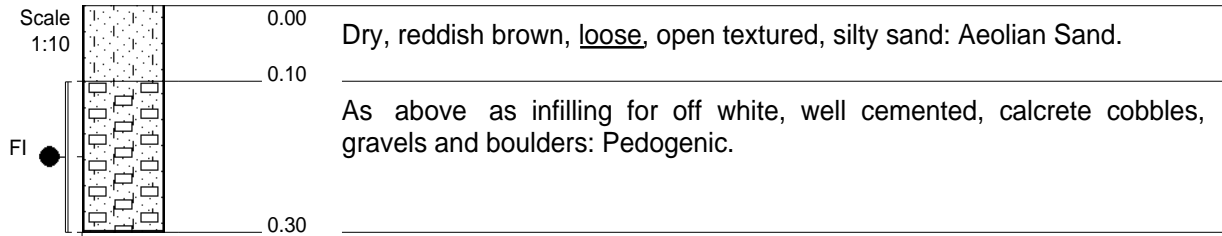
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 PROFILED BY : MM

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 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPB27

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.3m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.1--0.3m

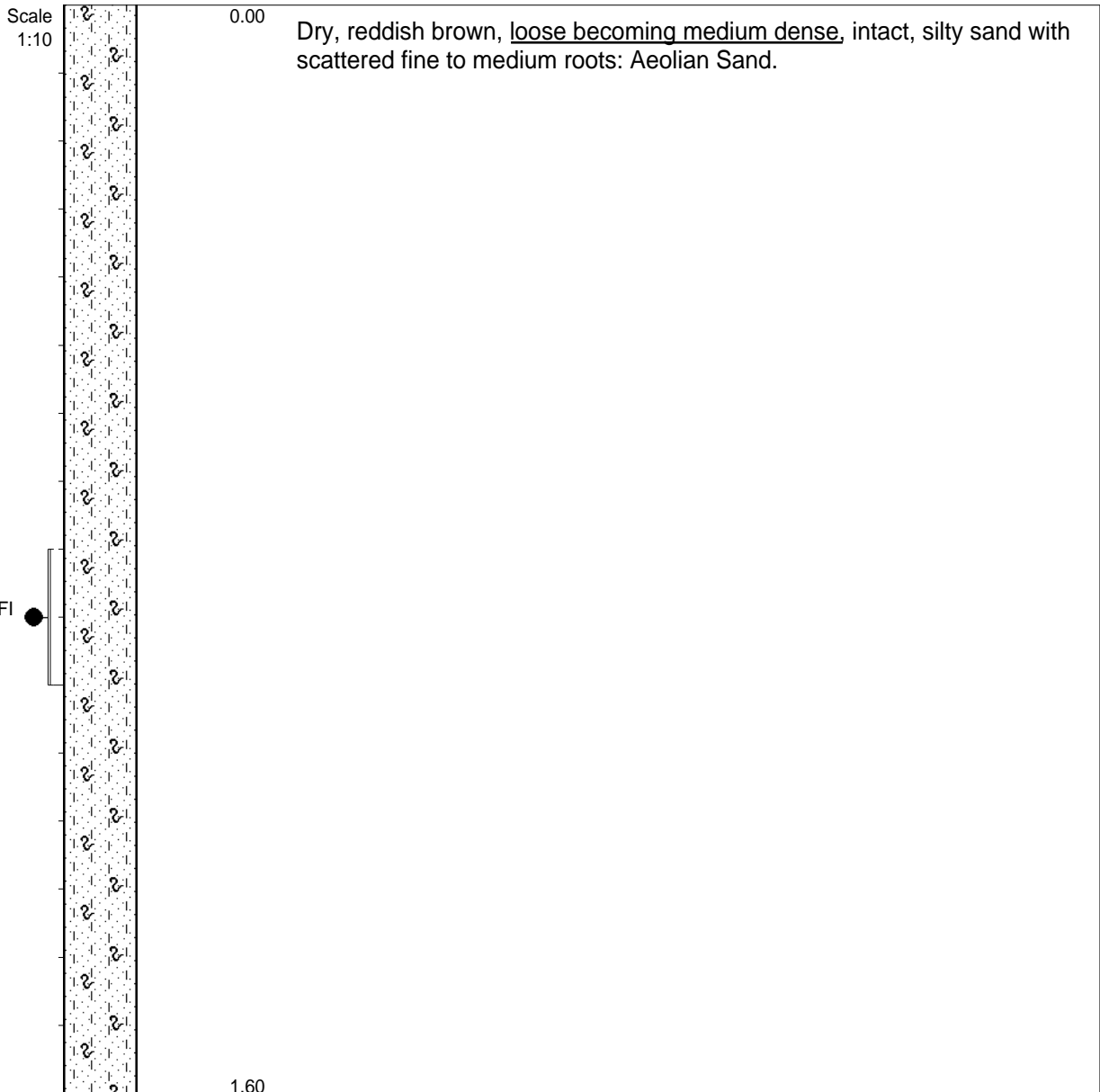
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 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
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 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPB28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



Off white, very dense to soft rock, calcrete hardpan: Pedogenic.

1.65

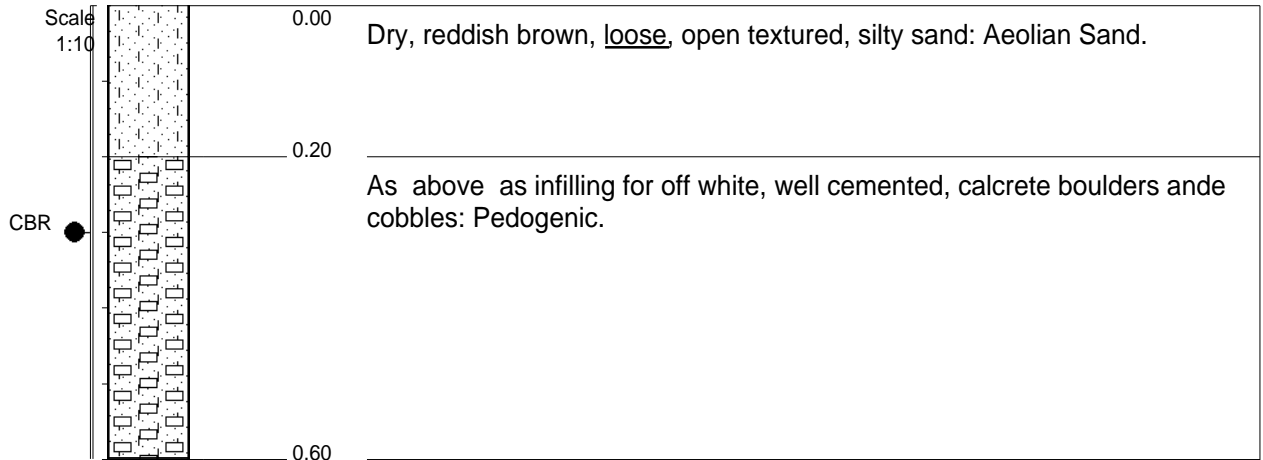
NOTES

- 1) EOH @ 1.65m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.8--1.0m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM
 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.6m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample CBR @ 0--0.6m

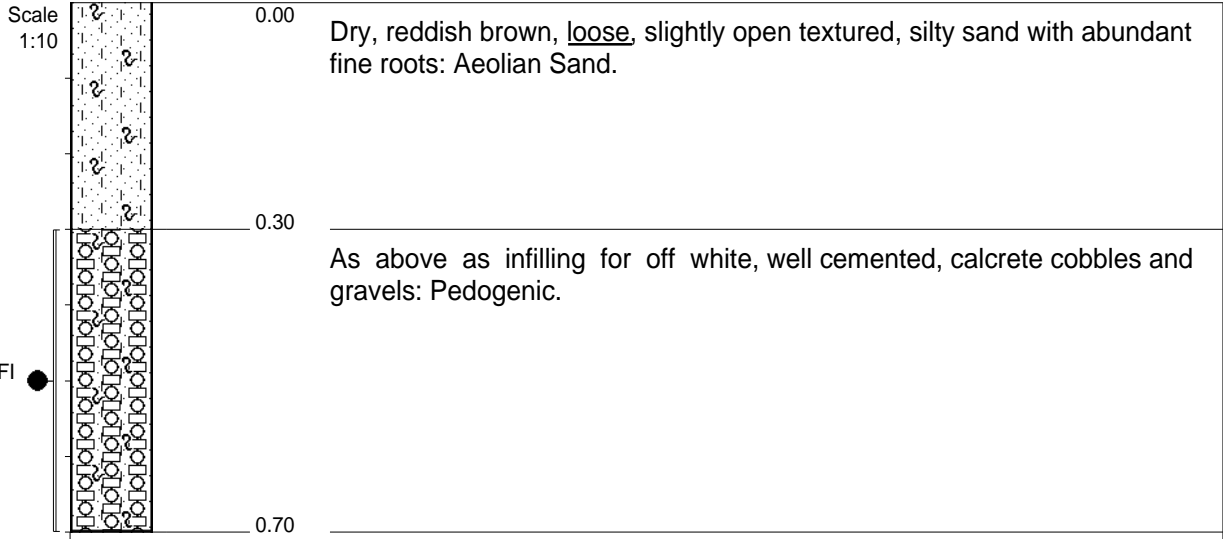
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
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 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPB30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



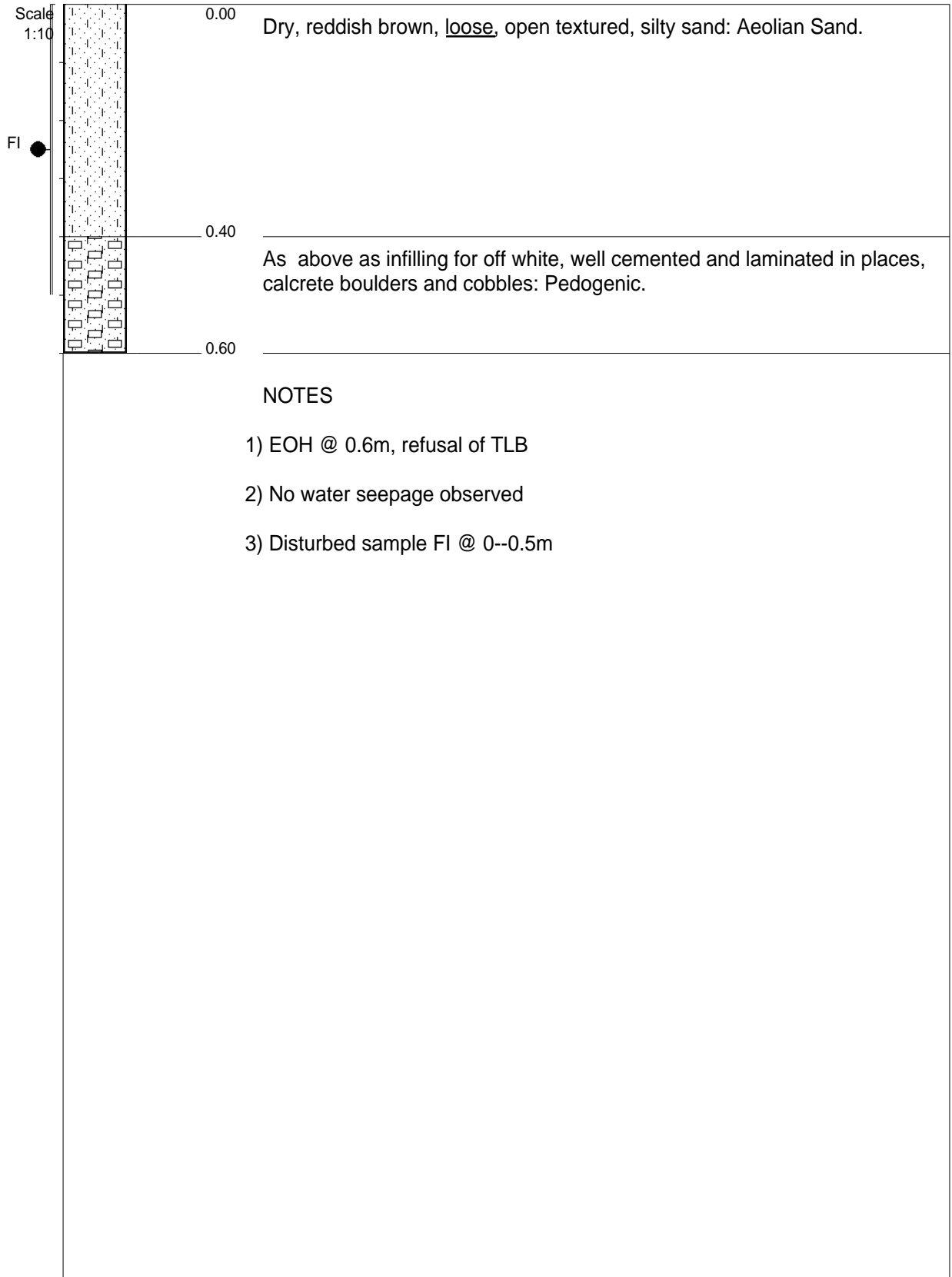
NOTES

- 1) EOH @ 0.7m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.3--0.7m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

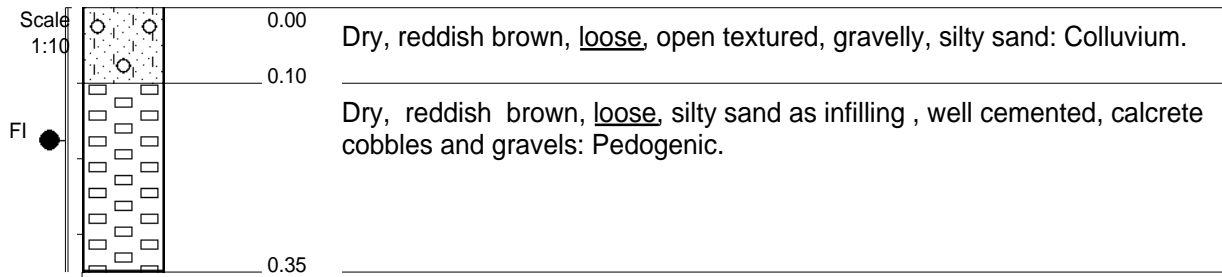
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 DATE : 06/08/2015
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 DATE : 31/08/15 20:58
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ELEVATION :
 X-COORD :
 Y-COORD :


 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.35m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.35m

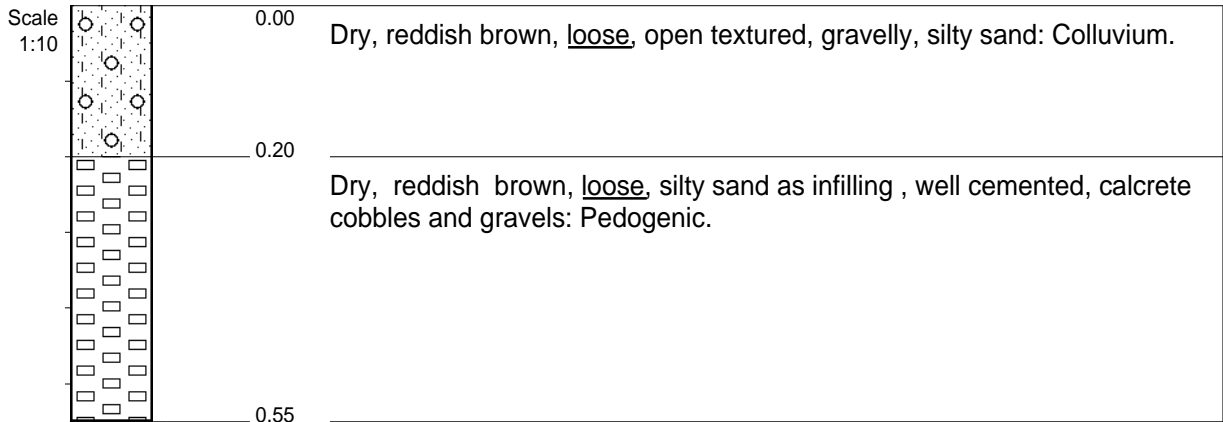
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 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
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 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPC26

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



NOTES

- 1) EOH @ 0.55m, refusal of TLB
- 2) No water seepage observed

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :

Scale
 1:10


0.00

 Dry, reddish brown, loose, silty sand as infilling , well cemented, calcrete
 cobbles and gravels: Pedogenic.

0.30

NOTES

- 1) EOH @ 0.30m, refusal of TLB
- 2) No water seepage observed

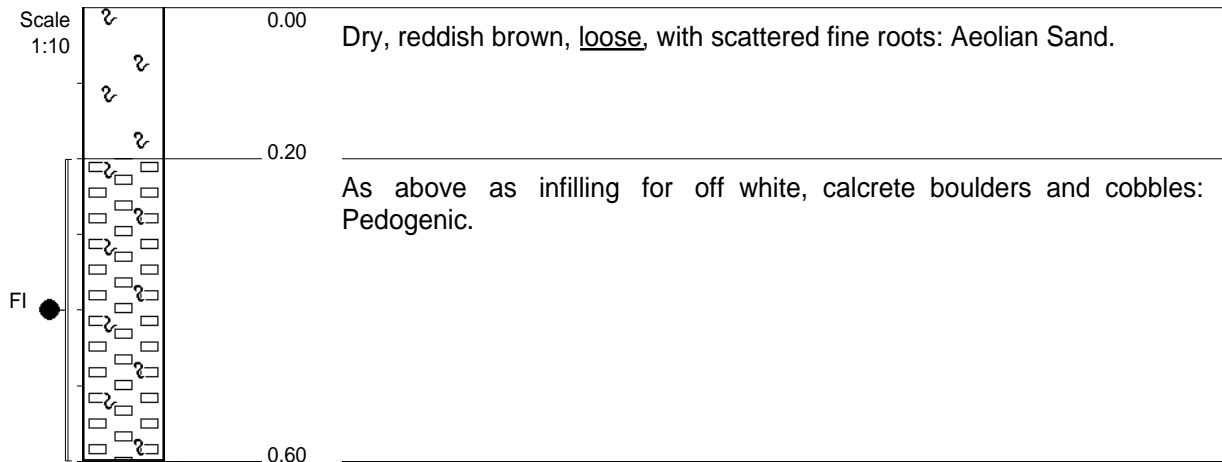
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPC28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.60m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.2--0.6m

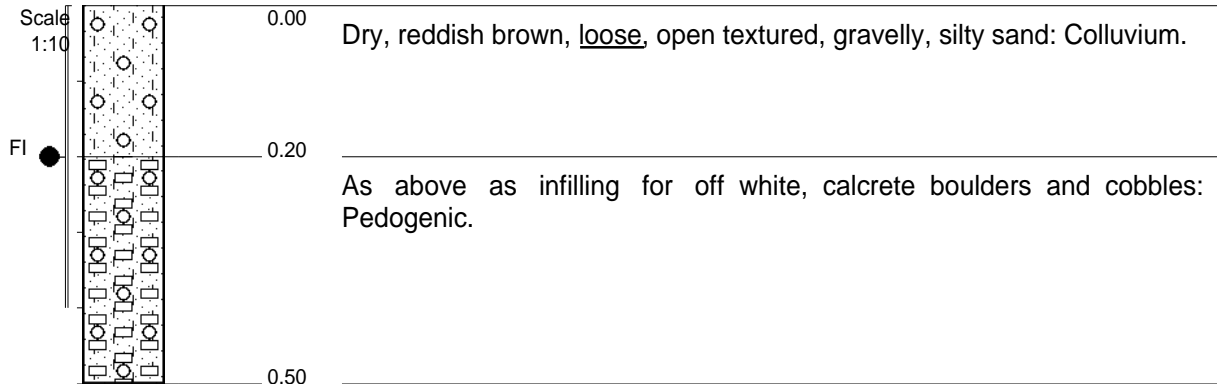
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPC29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.50m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.4m

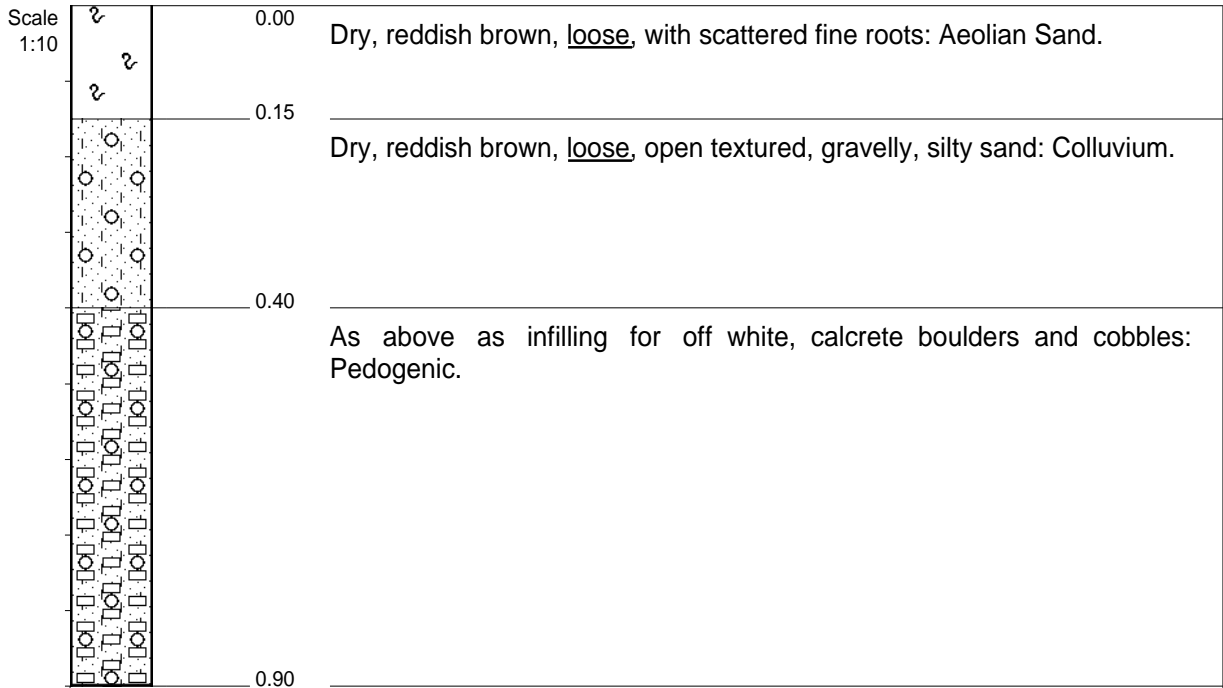
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPC30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



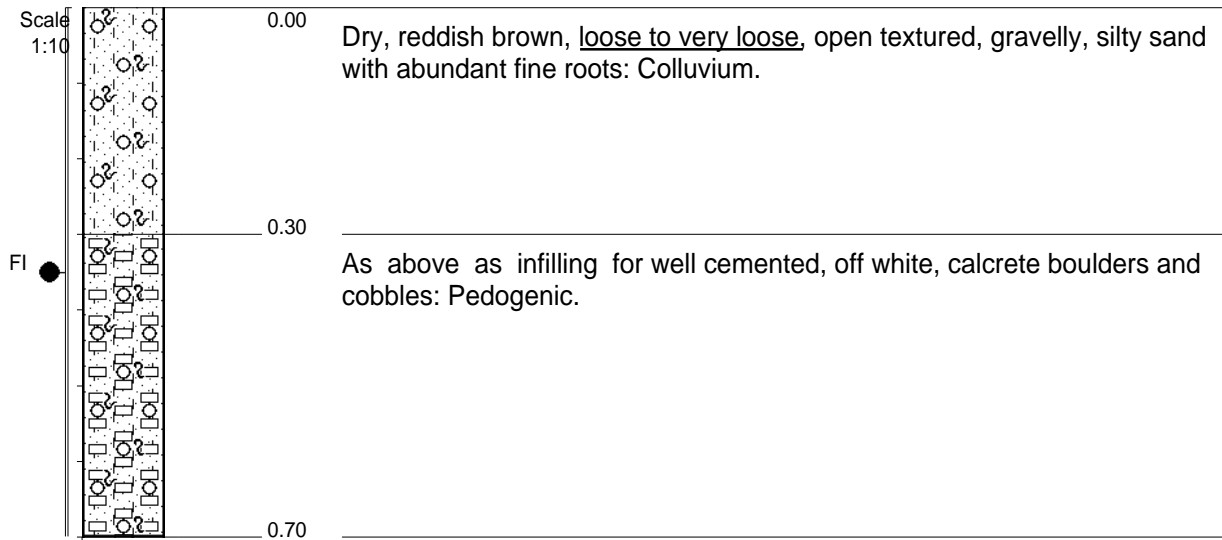
NOTES

- 1) EOH @ 0.90m, refusal of TLB
- 2) No water seepage observed

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.7m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample @ FI 0--0.7m

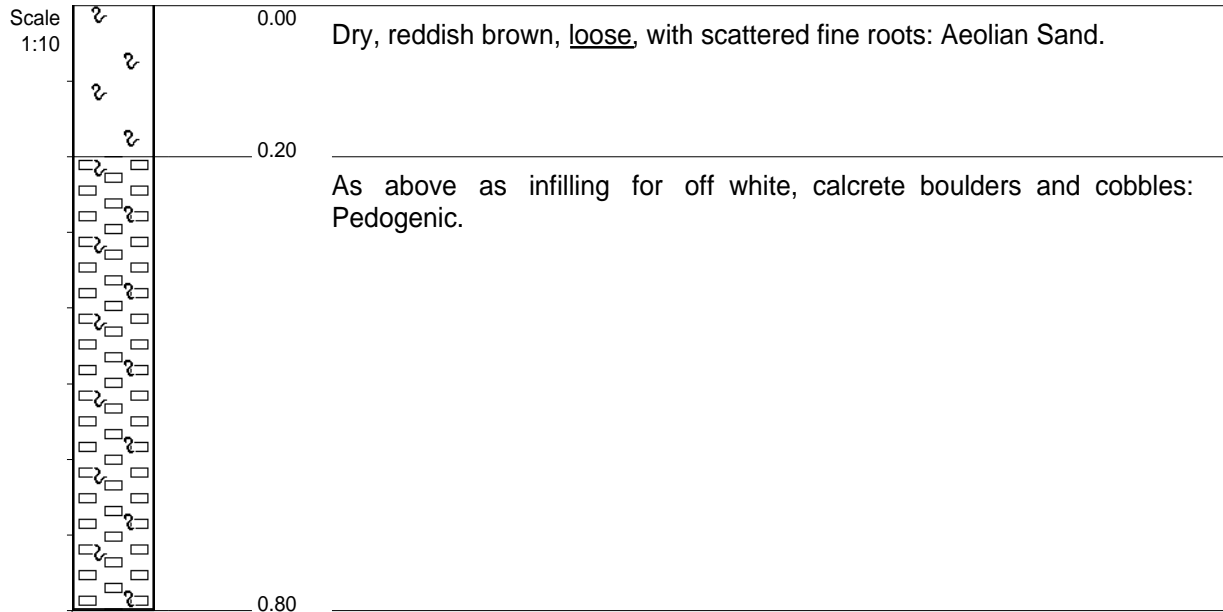
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPC32

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed

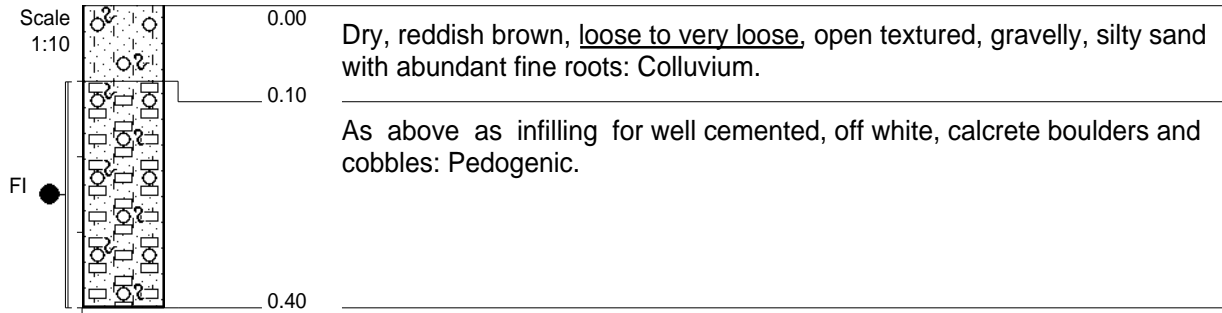
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD26

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.4m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample @ FI 0.1--0.4m

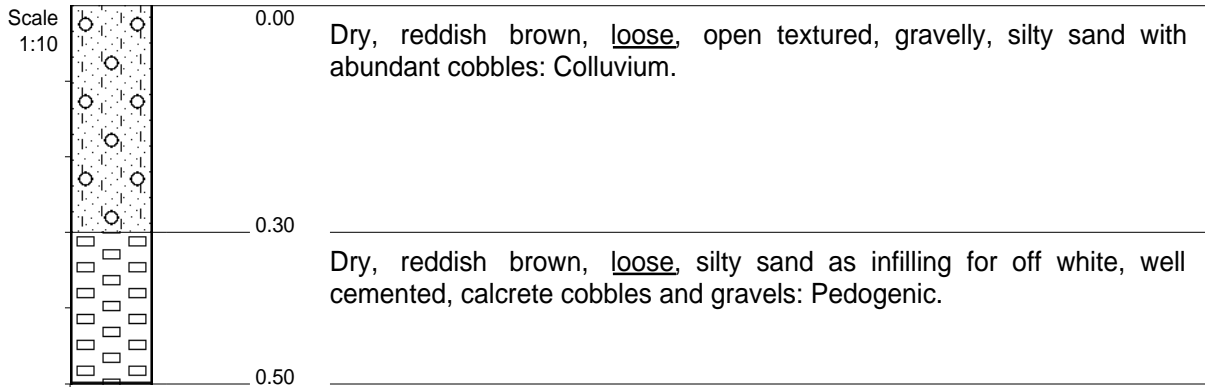
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD27

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed

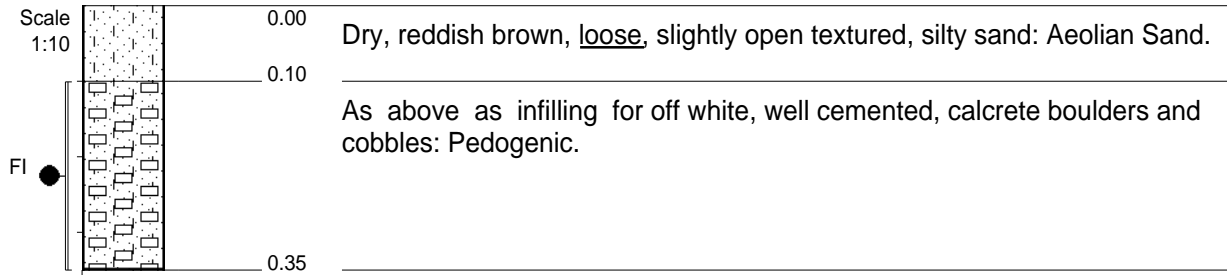
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.35m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample @ FI 0.1--0.35m

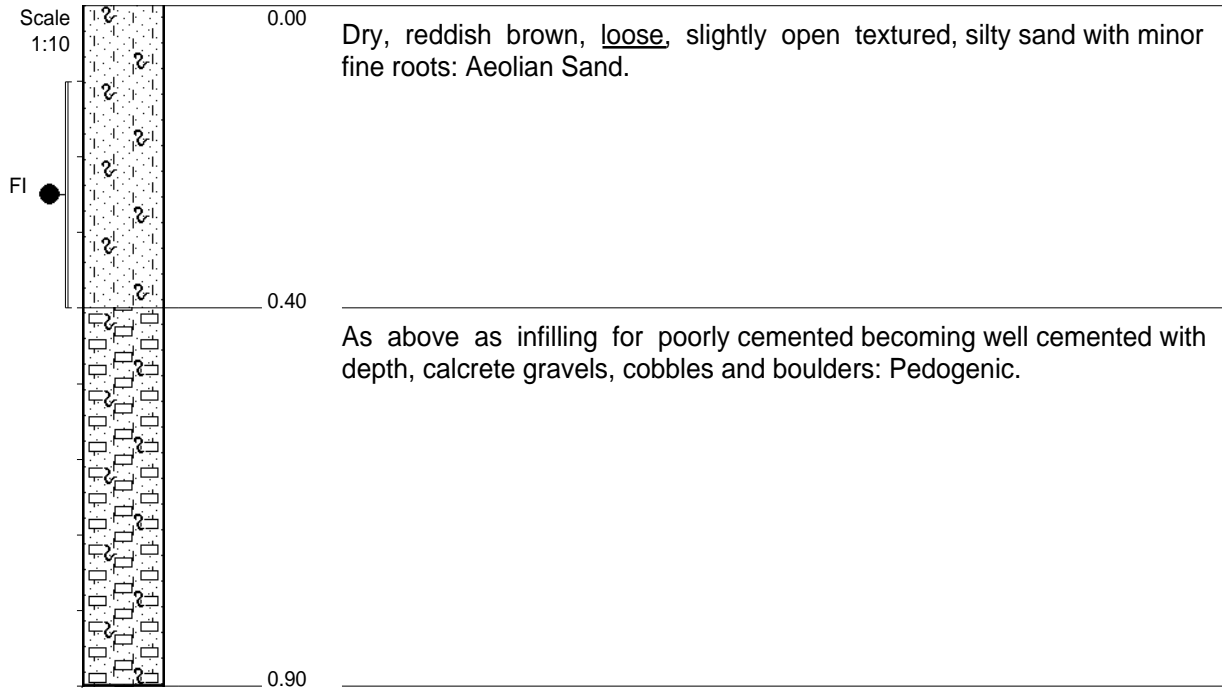
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.9m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample @ FI 0.1--0.4m

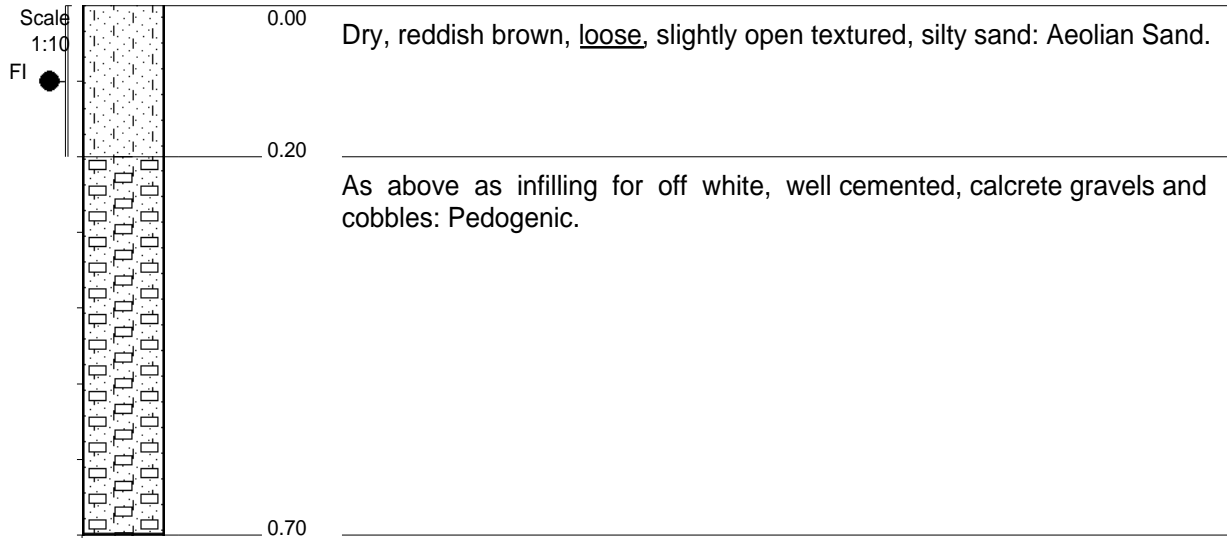
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.7m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample @ FI 0--0.2m

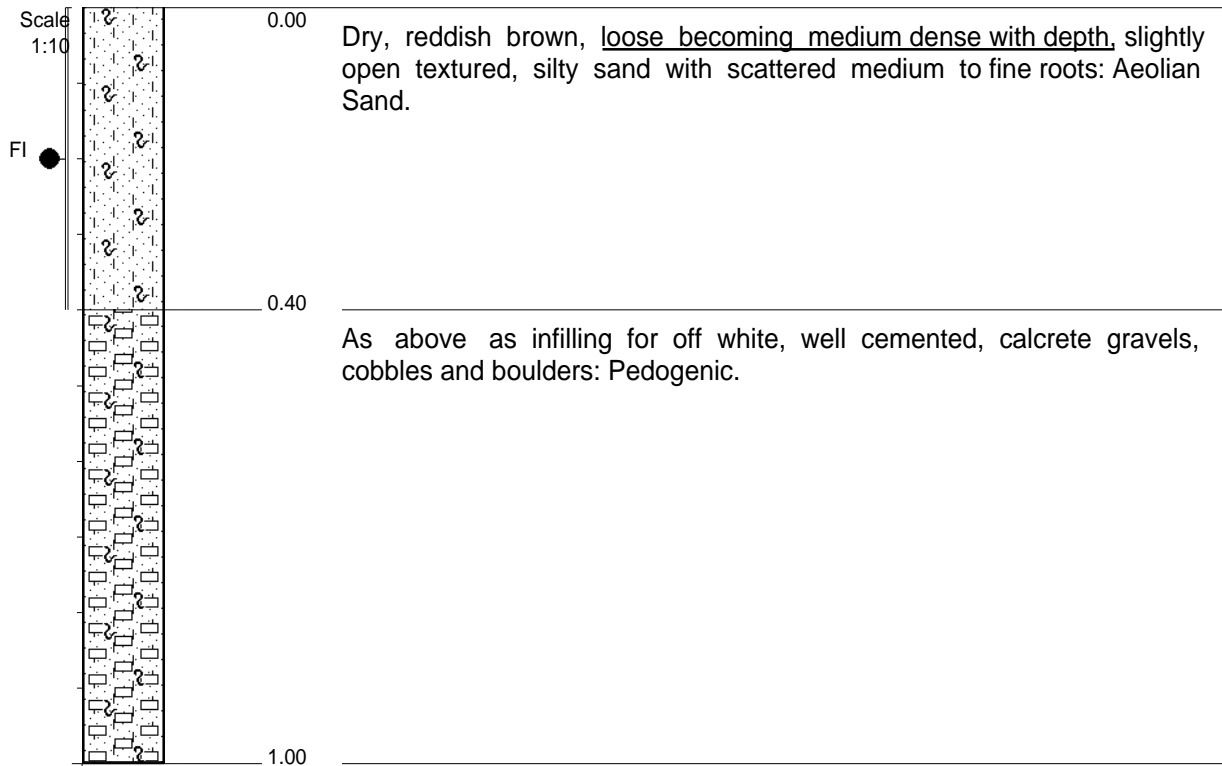
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD31

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 1.0m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample @ FI 0--0.4m

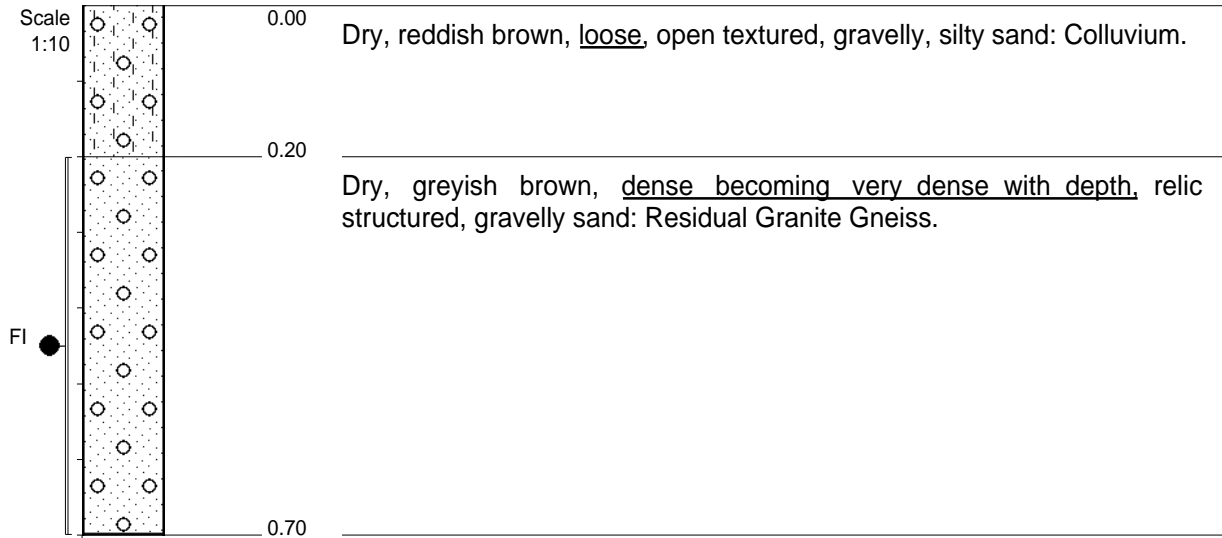
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPD32

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.7m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.2--0.7m

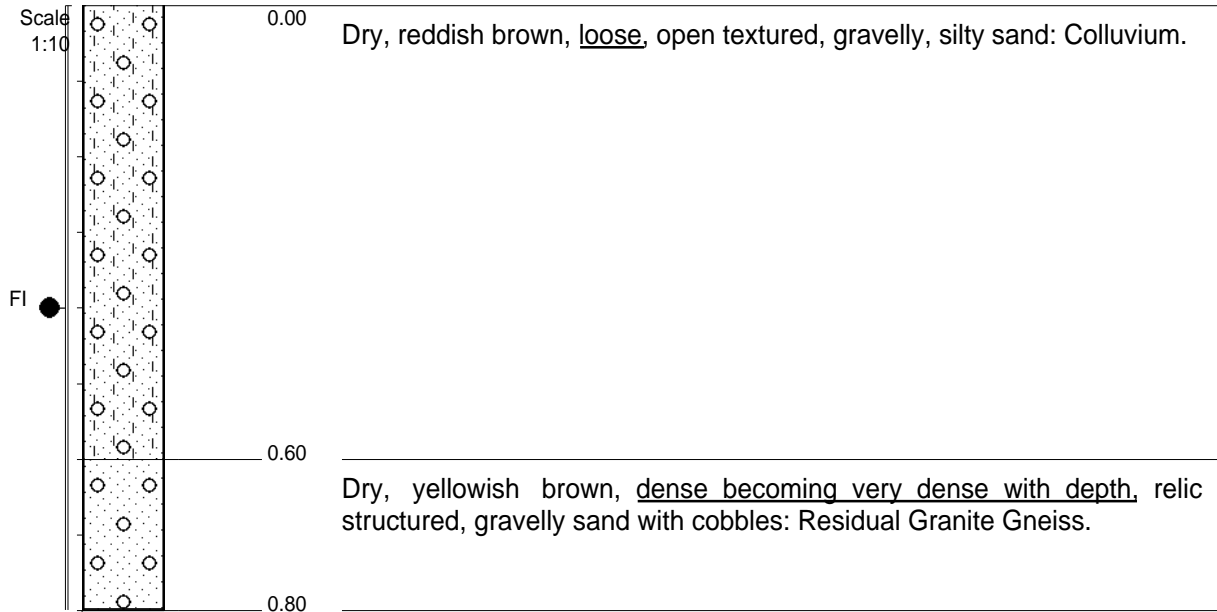
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE26

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.8m

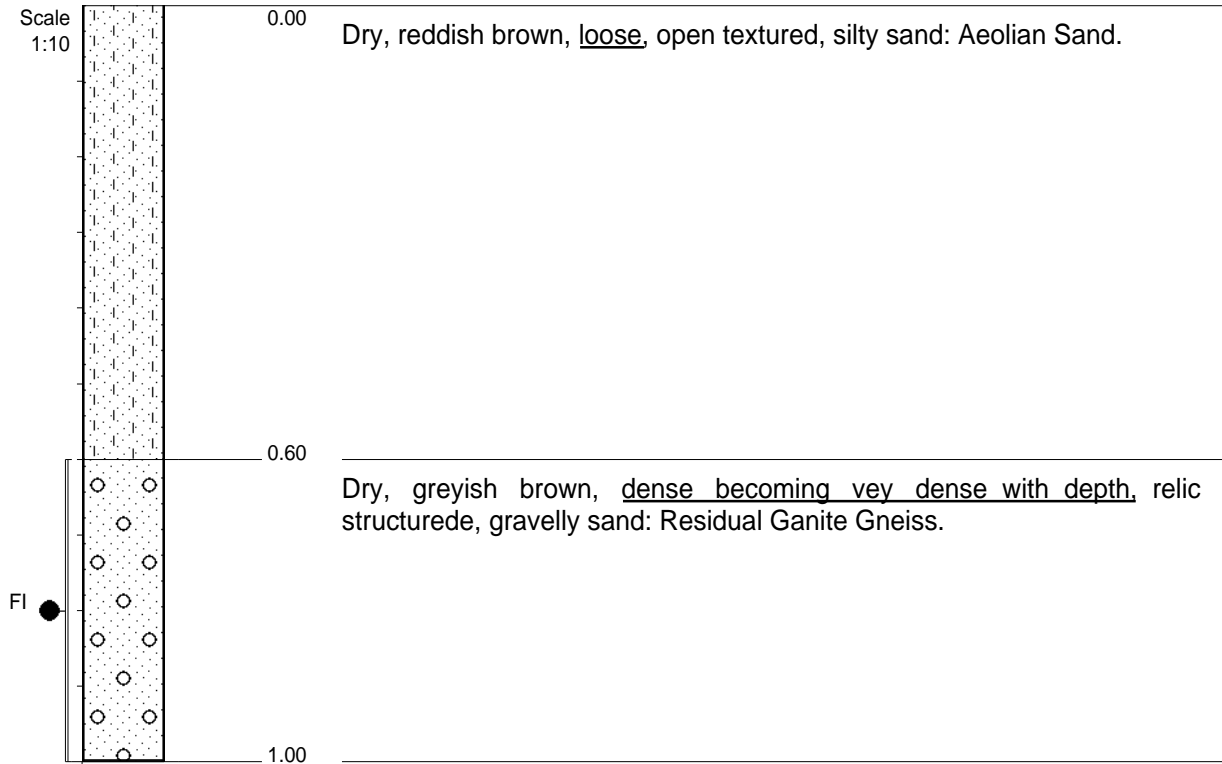
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE27

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 1.0m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.6--1.0m

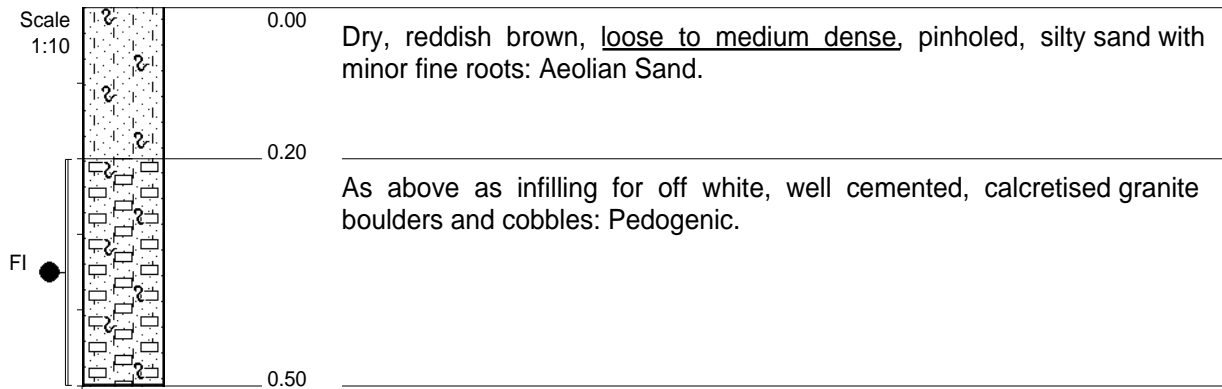
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.2--0.5m

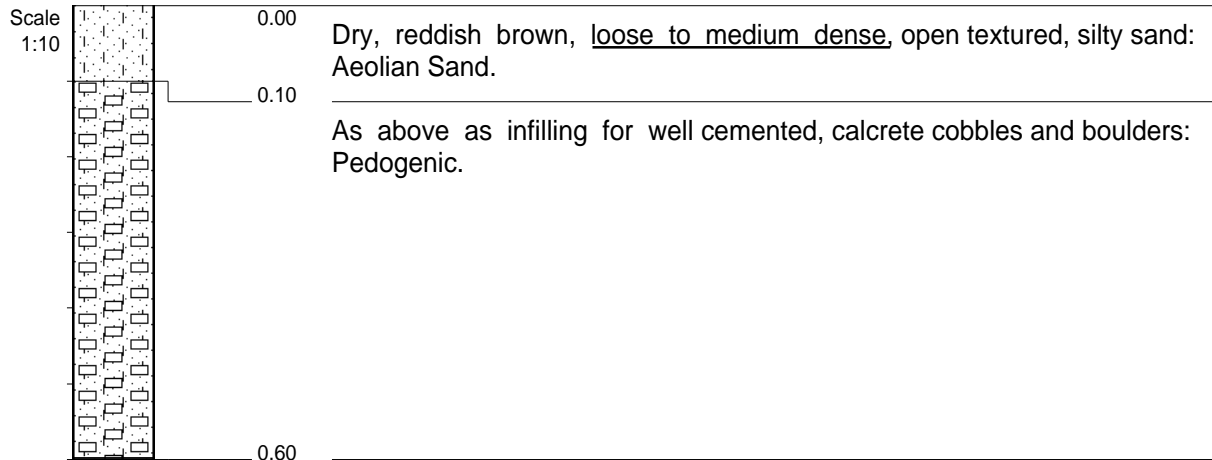
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.6m, refusal of TLB
- 2) No water seepage observed

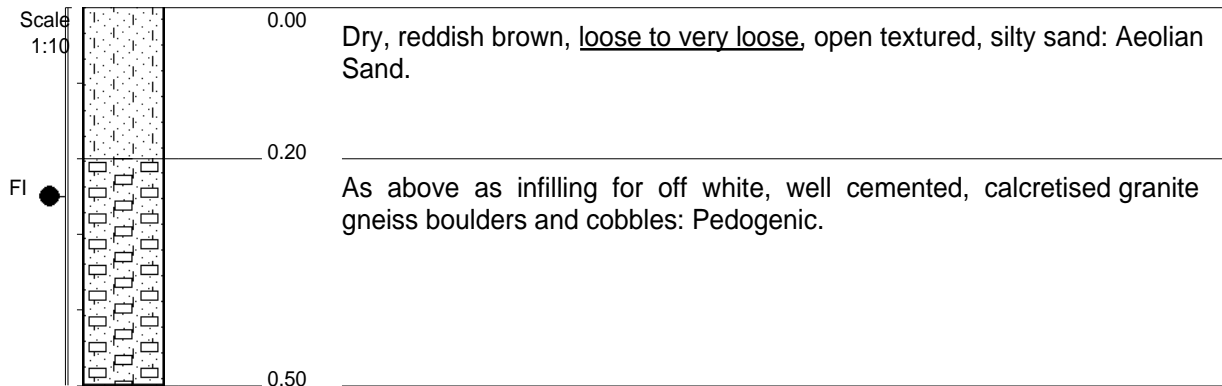
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.5m

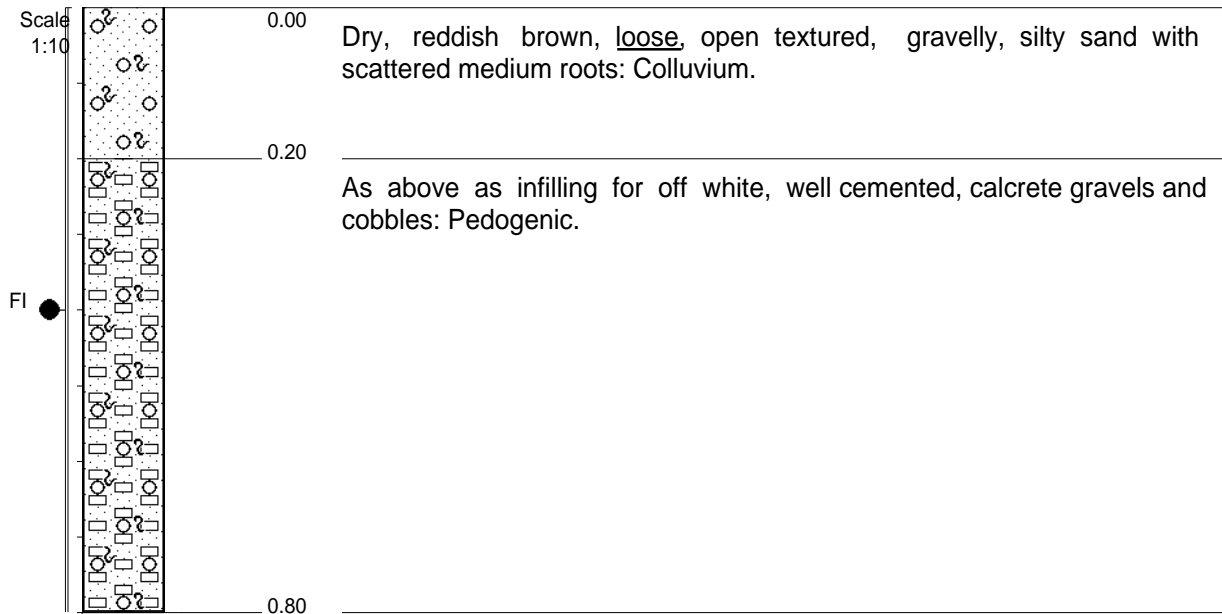
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE31

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.8m

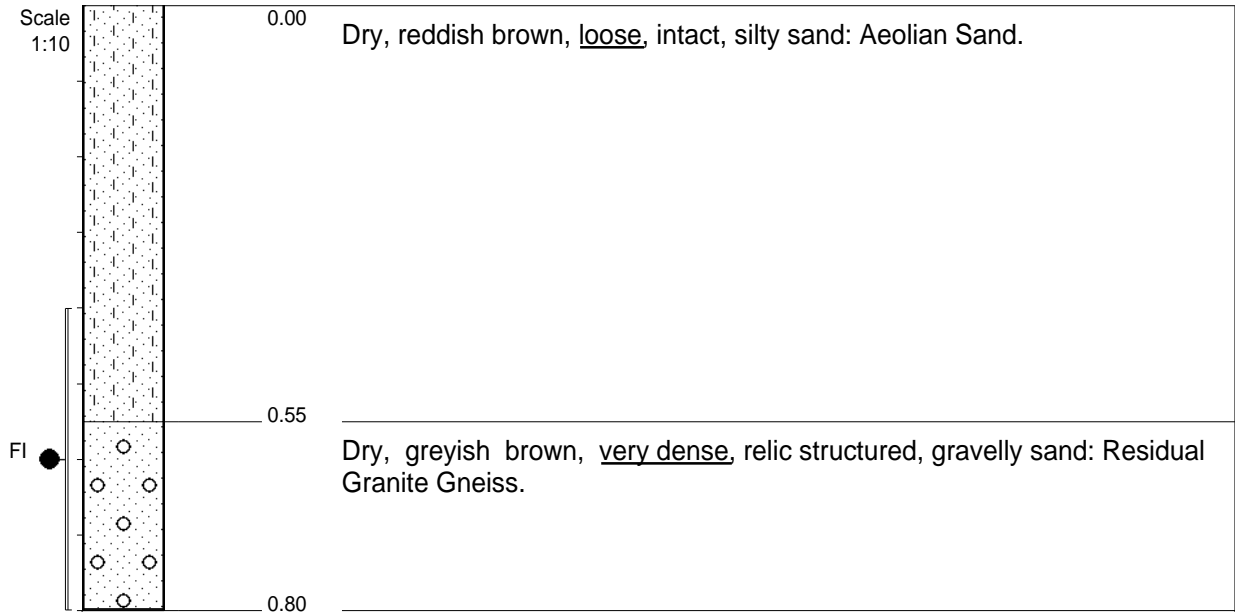
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPE32

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.4--0.8m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :

Scale
1:10

0.00

Dry, reddish brown, loose, silty sand as infilling for off white, well cemented, calcrete gravel and cobbles: Pedogenic.

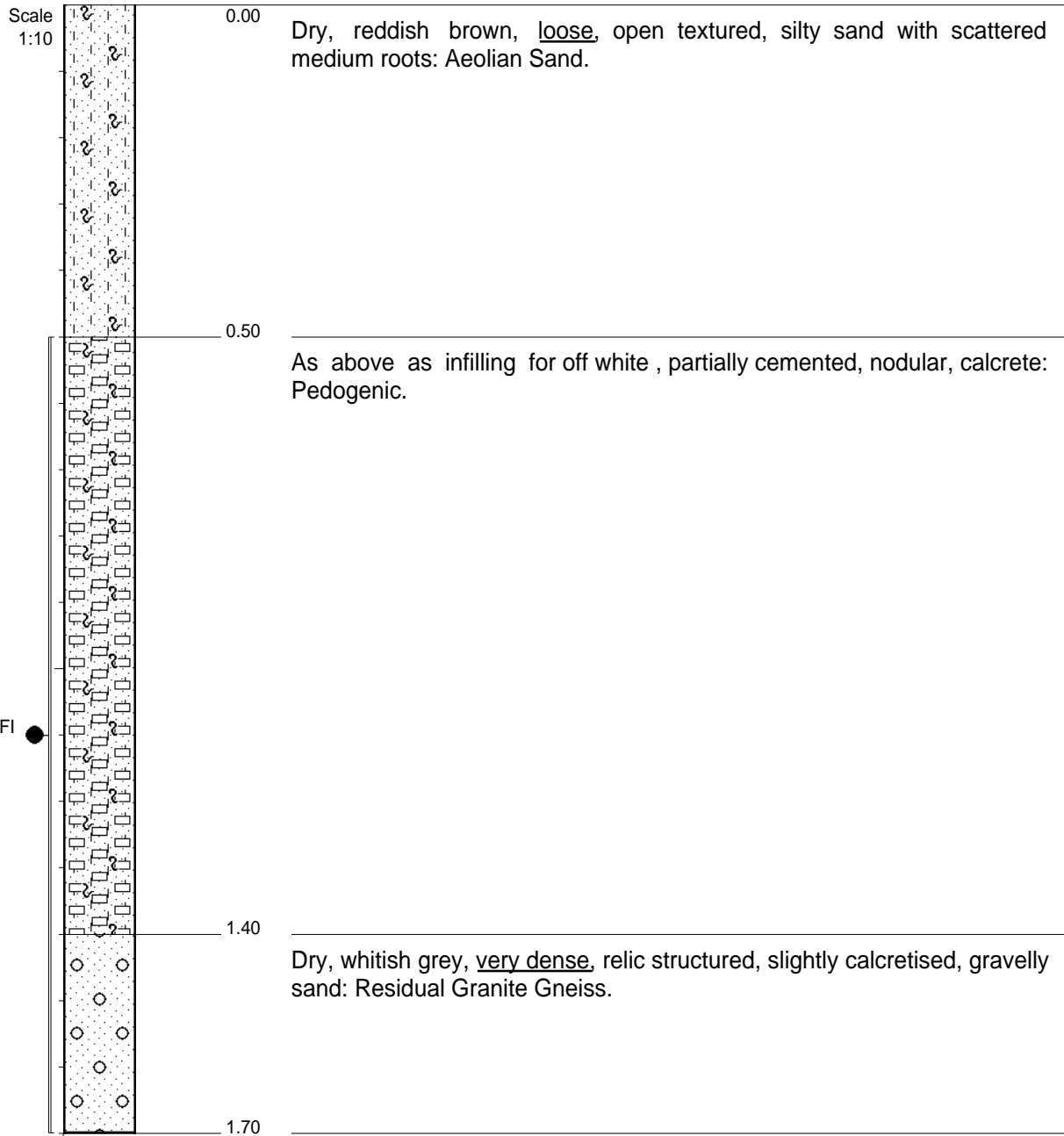
0.50

NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed

CONTRACTOR : Mass Hire
MACHINE : Volvo BL61B
DRILLED BY : Riaan
PROFILED BY : MMTYPE SET BY : Rev 1
SETUP FILE : STANDARD.SETINCLINATION :
DIAM :
DATE : 06/08/2015
DATE :
DATE : 31/08/15 20:58
TEXT : ..\2015\15126F~1.TXTELEVATION :
X-COORD :
Y-COORD :

HOLE No: TPF27


NOTES

- 1) EOH @ 1.7m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.5--1.7m

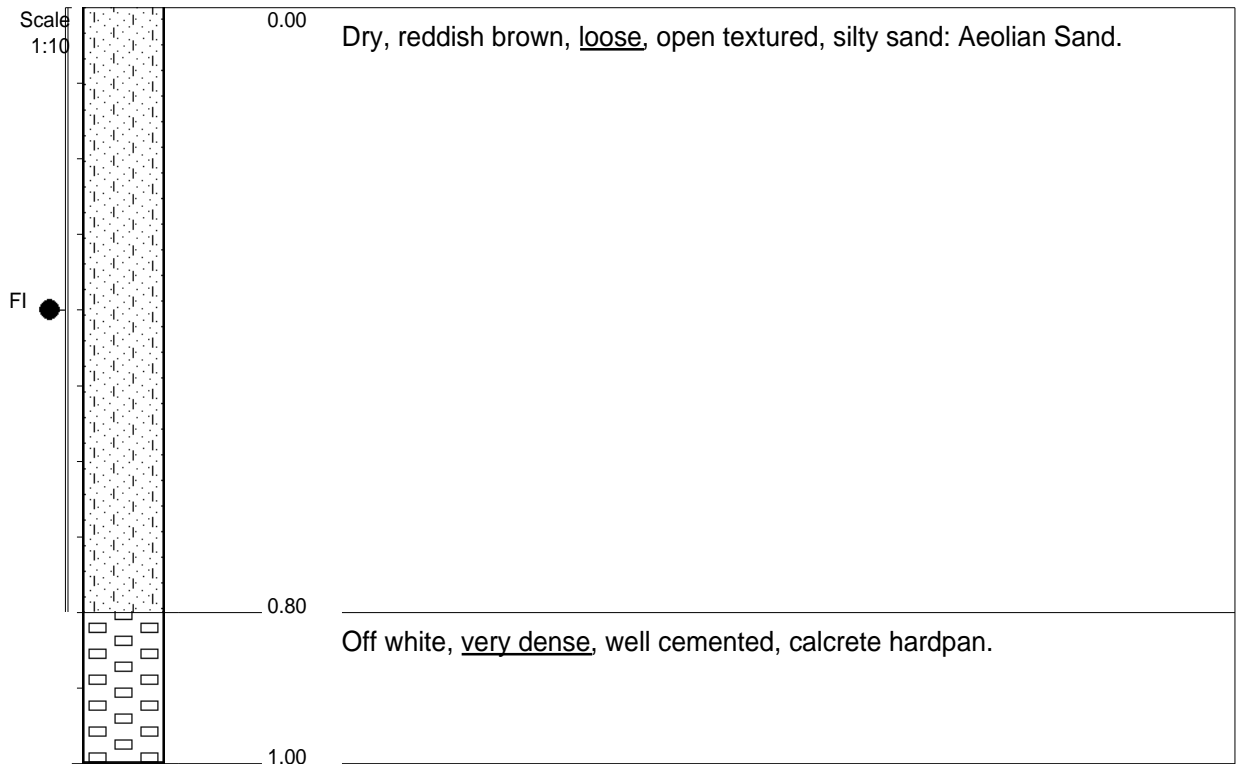
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPF28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 1.0m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.8m

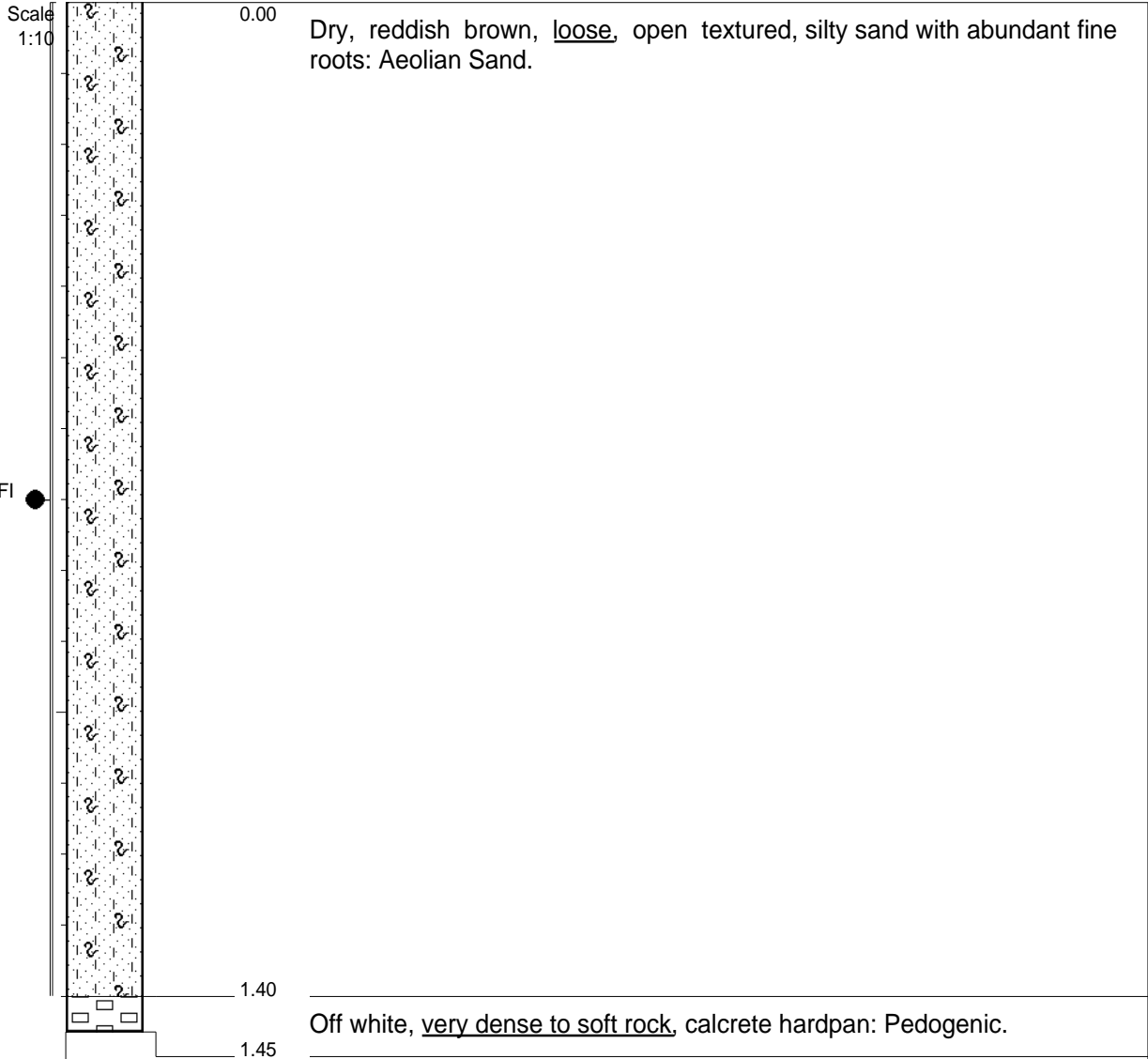
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPF29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



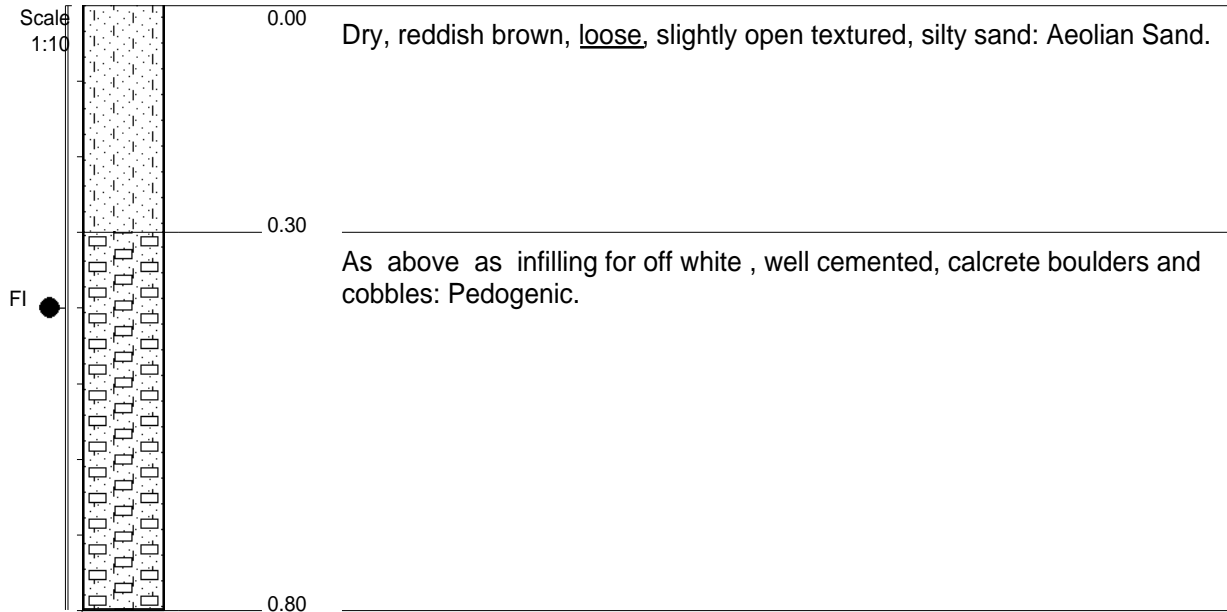
NOTES

- 1) EOH @ 1.45m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--1.4m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.8m

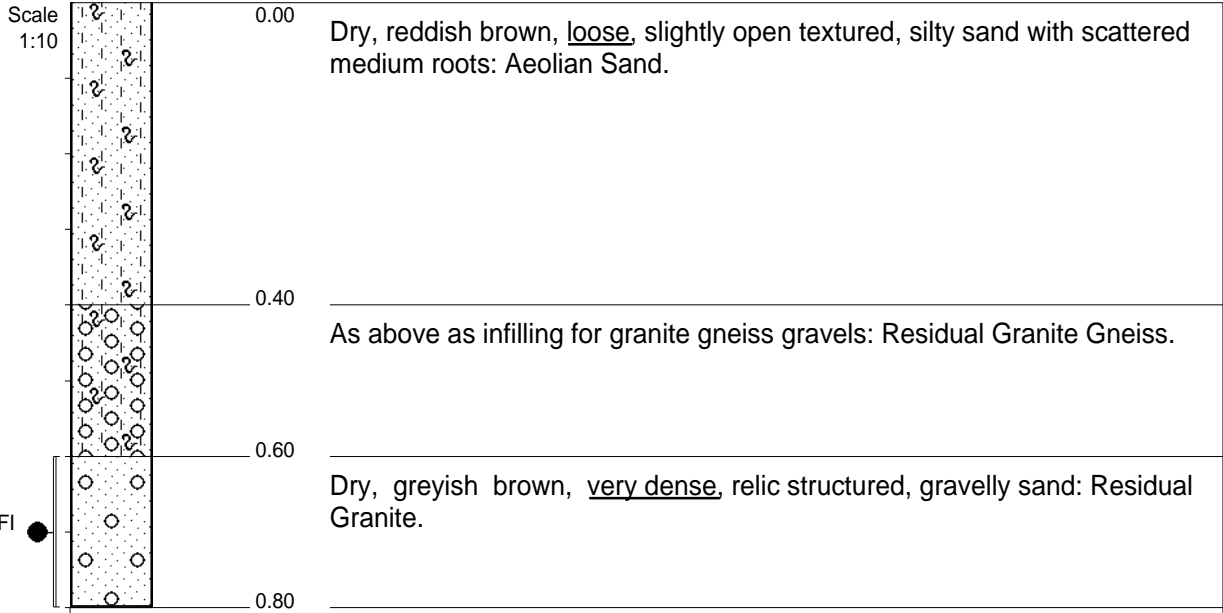
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPF31

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET

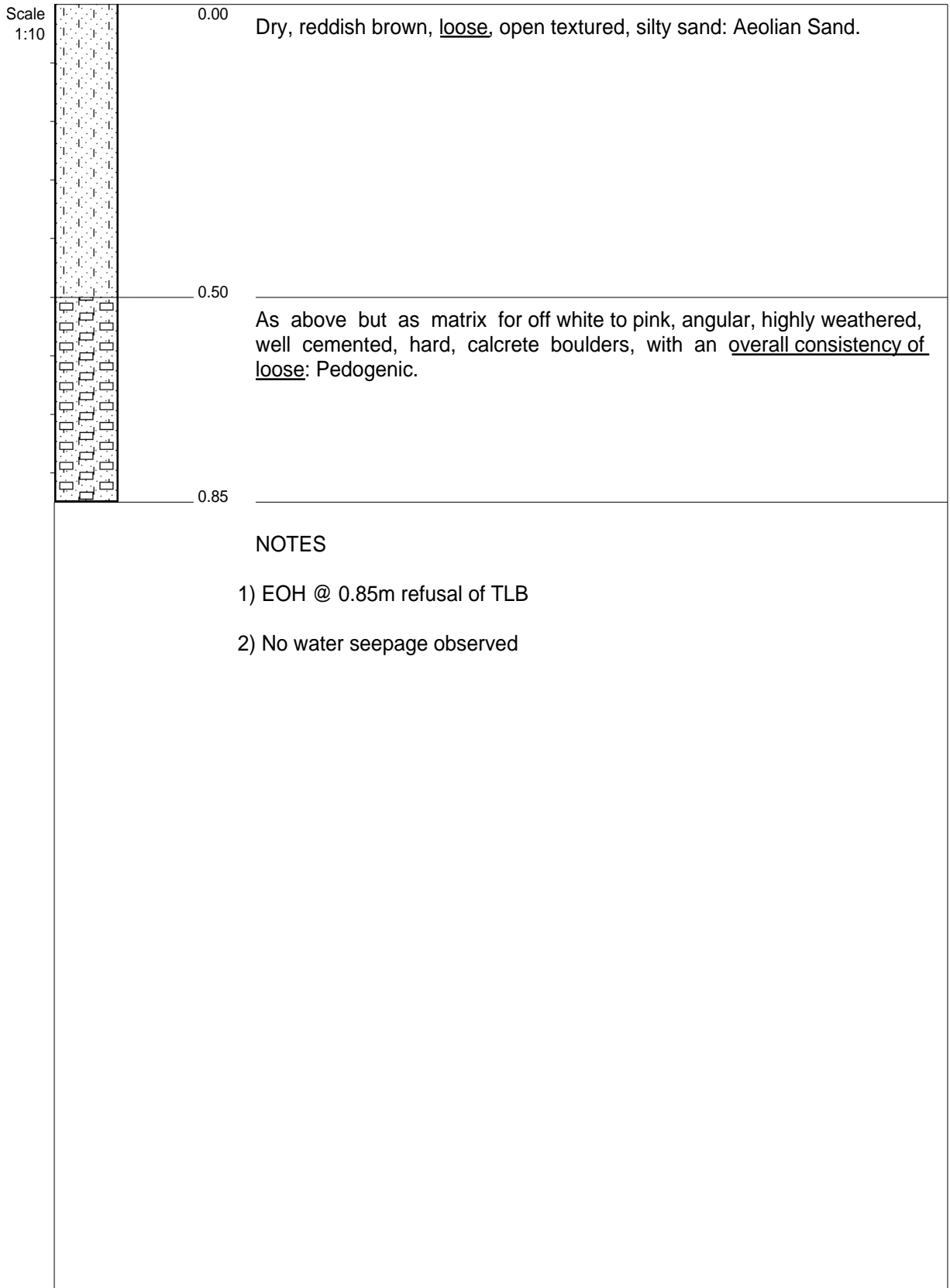

NOTES

- 1) EOH @ m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.6--0.8m

 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

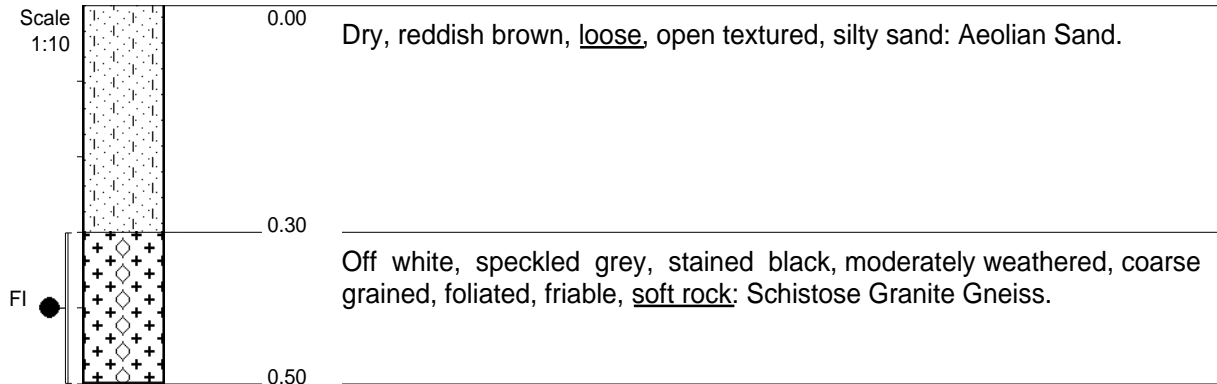
 INCLINATION :
 DIAM :
 DATE : 06/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :


 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.5m refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.3--0.5m

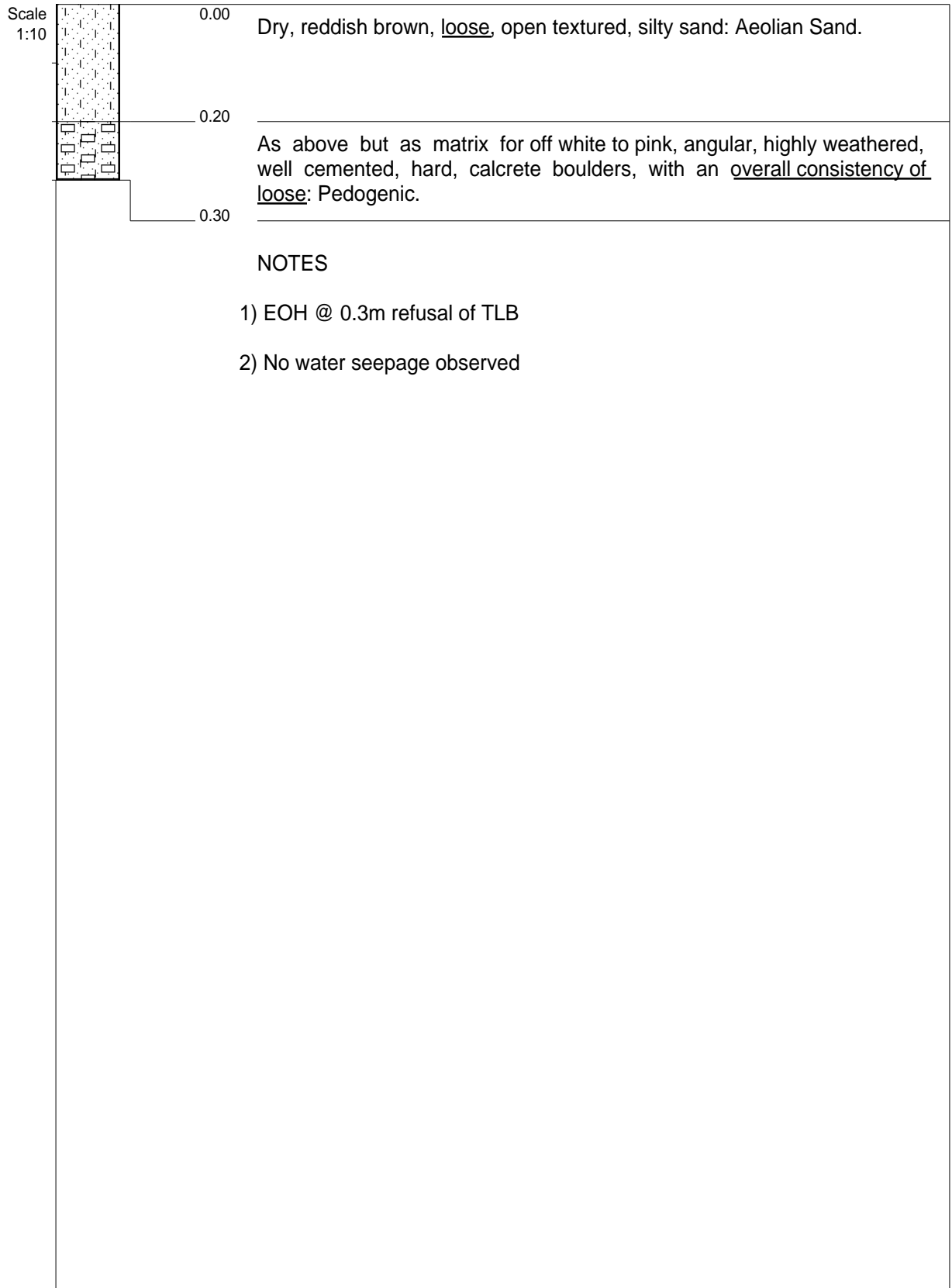
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

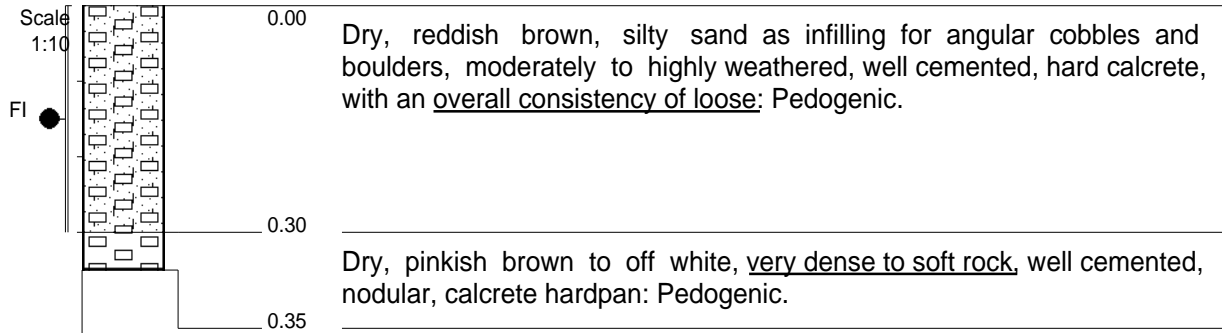
HOLE No: TPG27

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.35 refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.3m

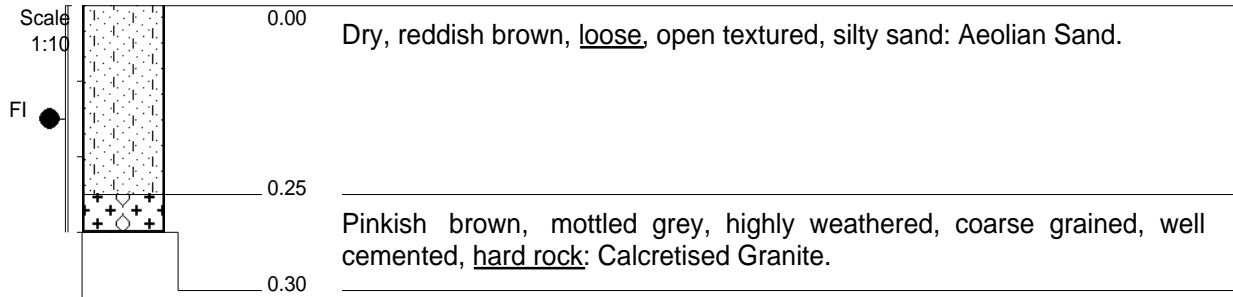
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPG29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.3m refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.3m

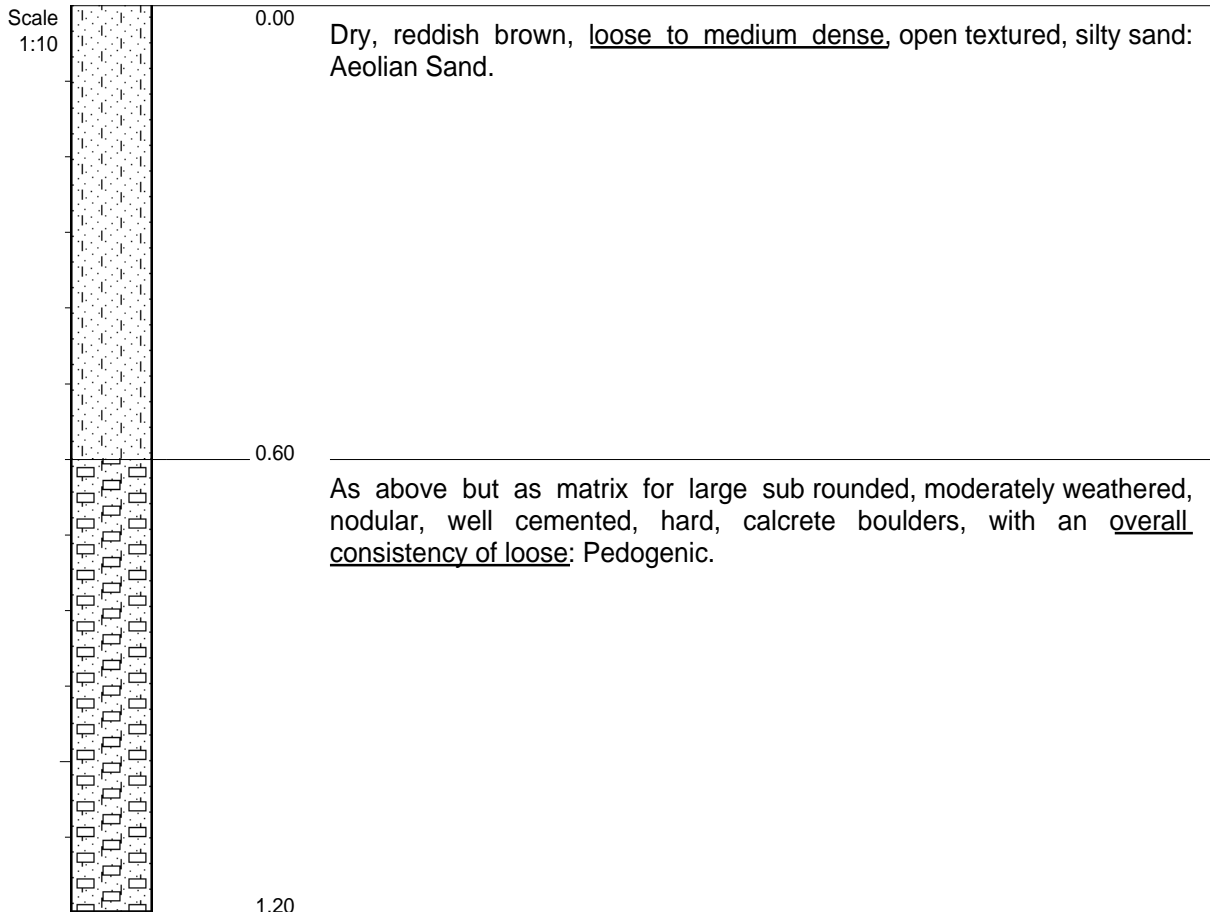
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPG30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 1.2m refusal of TLB
- 2) No water seepage observed

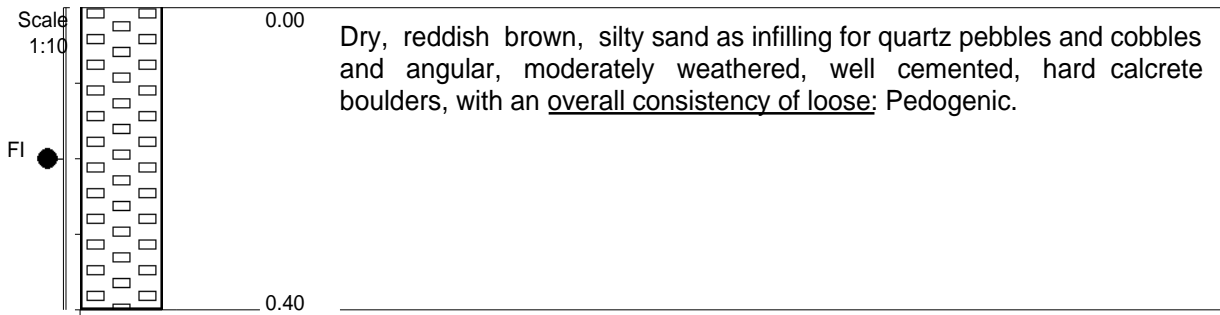
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPG31

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.4m refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.4m

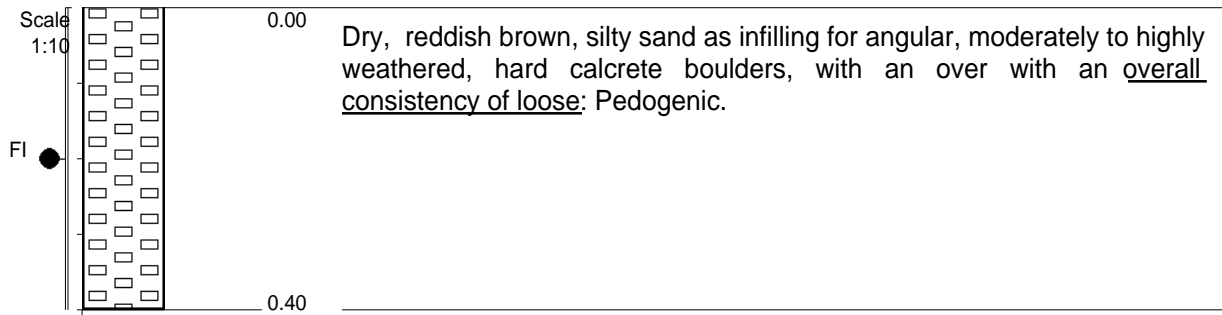
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPG32

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.4m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.4m

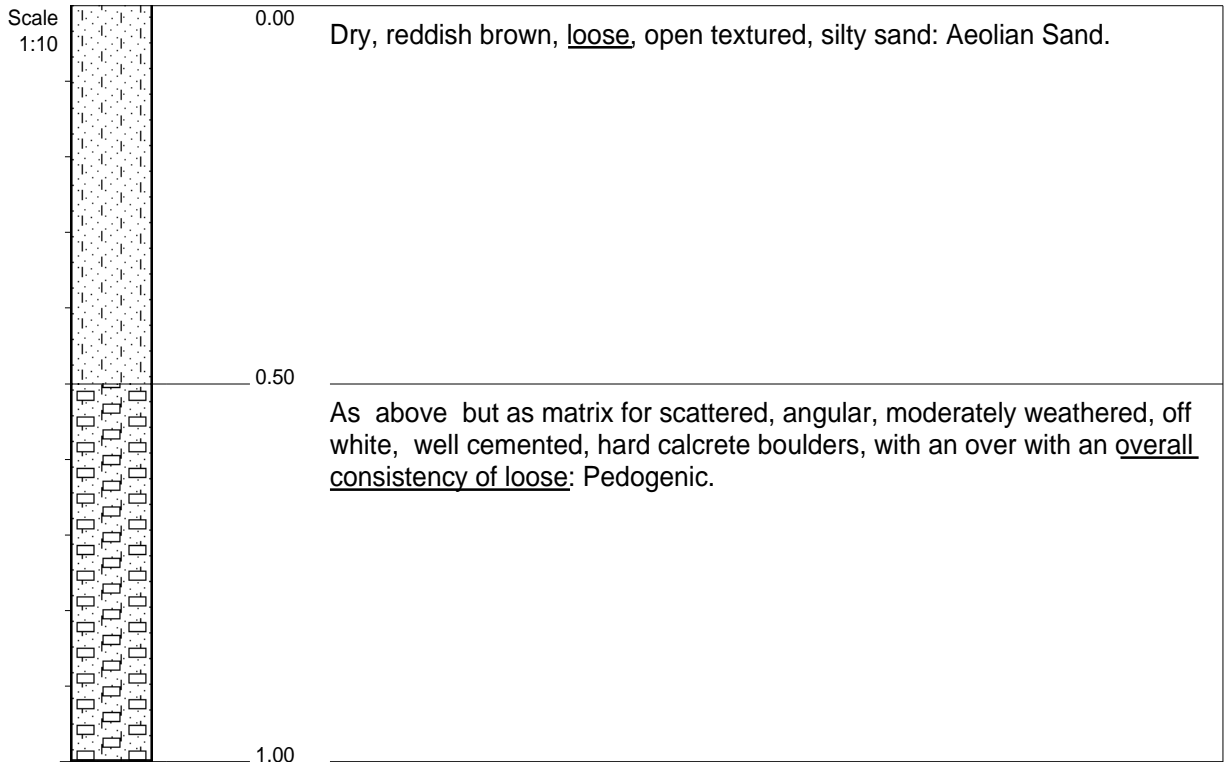
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPH26

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



NOTES

- 1) EOH @ 1.0m, refusal of TLB
- 2) No water seepage observed

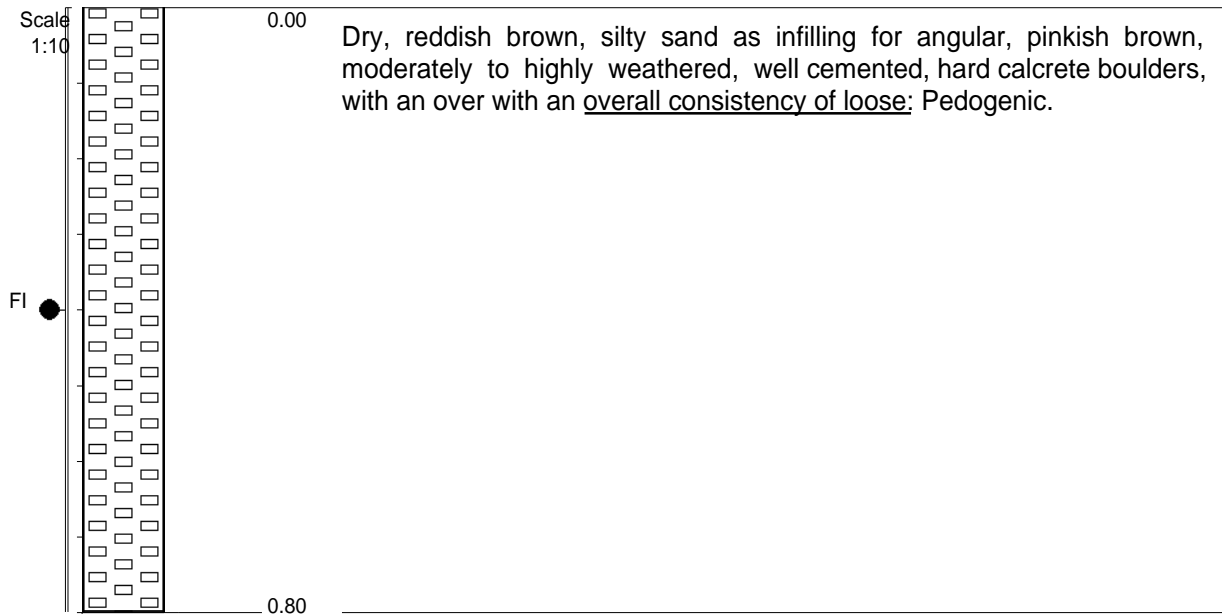
CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE : 12/08/2015
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPH27

TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.8m

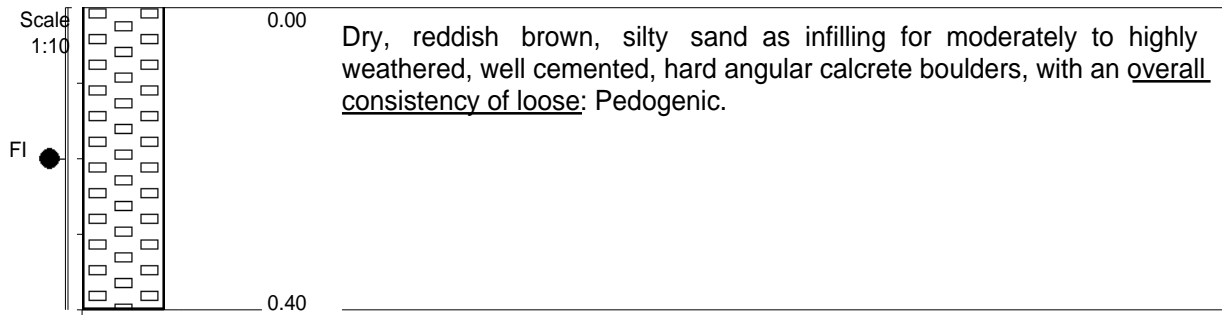
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPH28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.4m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.4m

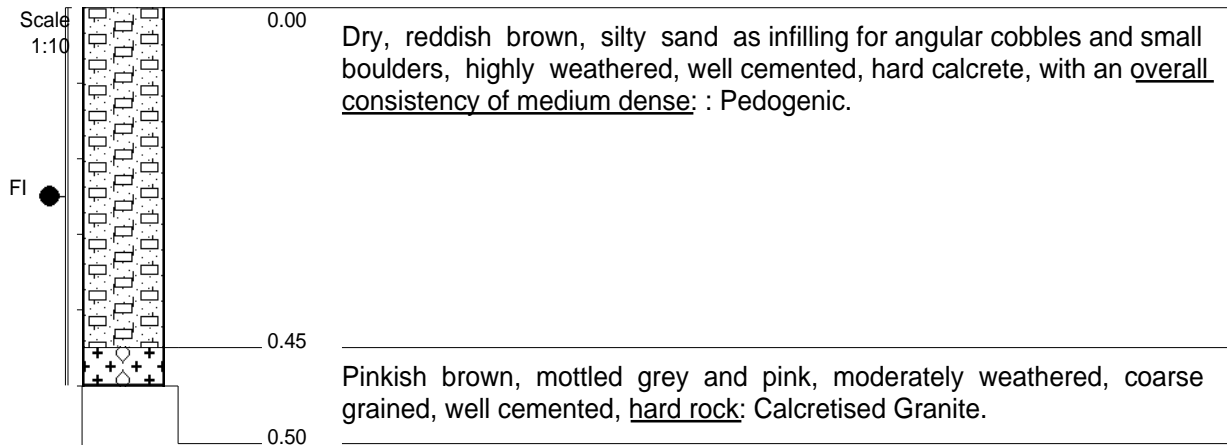
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:58
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPH29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.5m

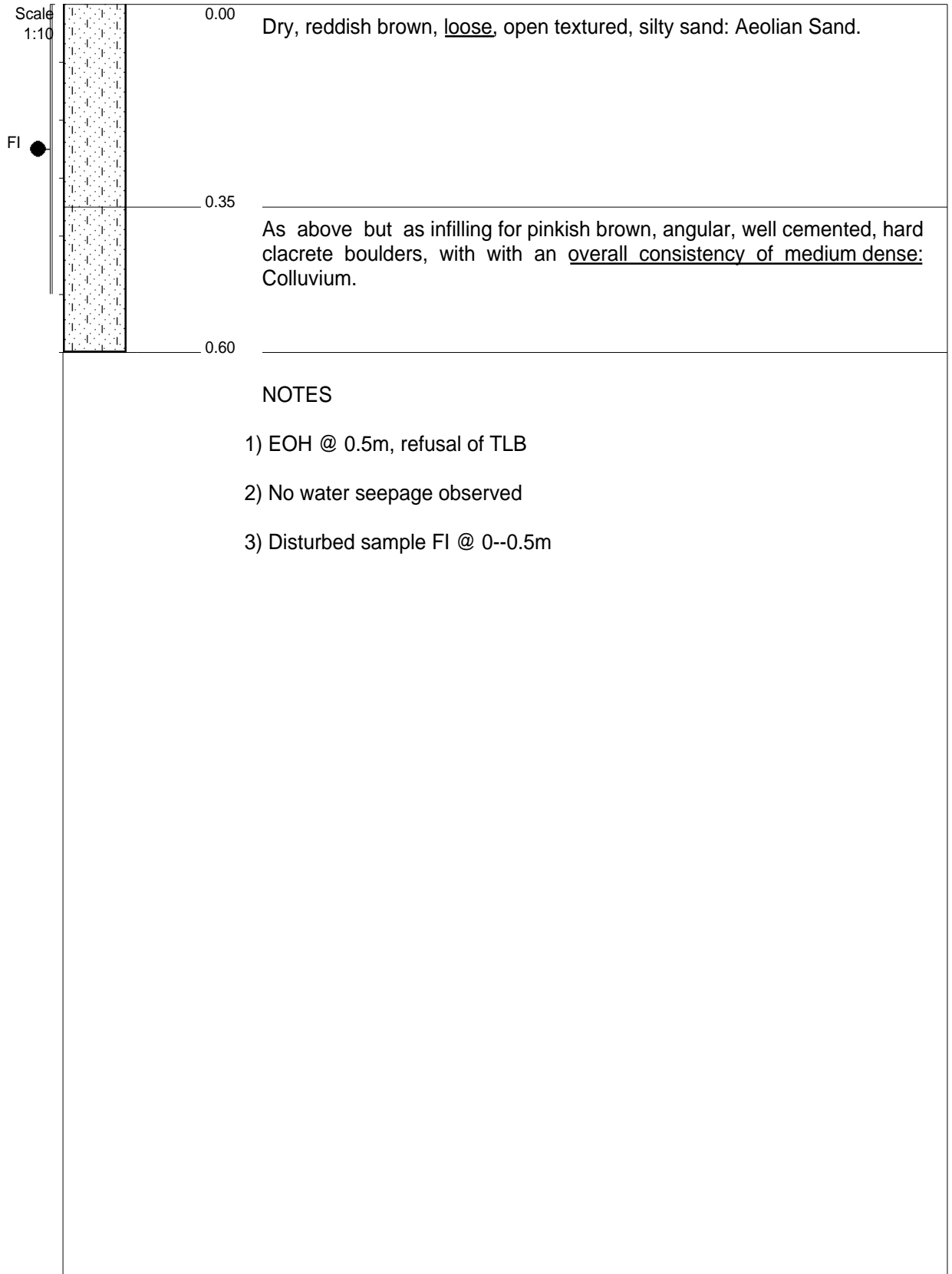
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

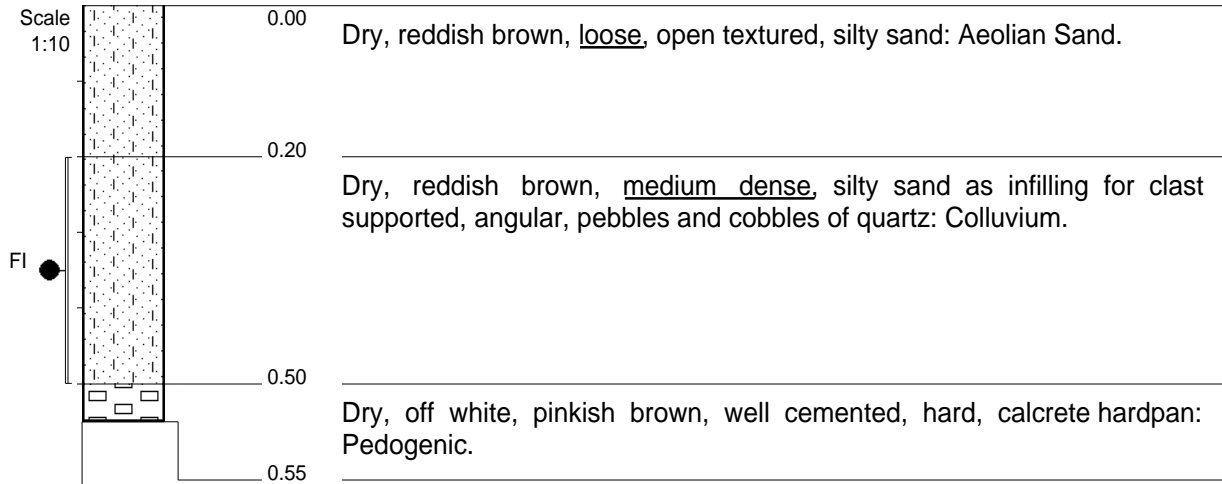
HOLE No: TPH30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.55m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.2--0.5m

 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPH32

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET

Scale
1:10

0.00

Dry, off white, very dense, nodular in places, hardpan, calcrete:
Pedogenic.

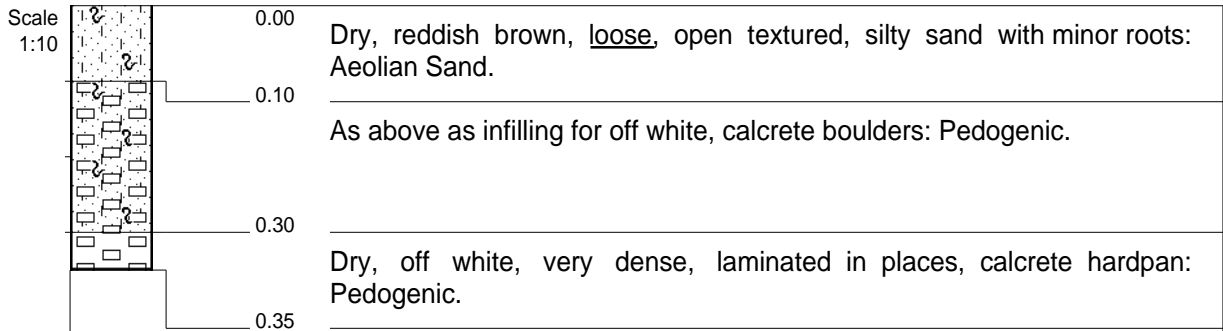
0.40

NOTES

- 1) EOH @ 0.4m, refusal of TLB
- 2) No water seepage observed

CONTRACTOR : Mass Hire
MACHINE : Volvo BL61B
DRILLED BY : Riaan
PROFILED BY : MMTYPE SET BY : Rev 1
SETUP FILE : STANDARD.SETINCLINATION :
DIAM :
DATE :
DATE :DATE : 31/08/15 20:59
TEXT : ..\2015\15126F~1.TXTELEVATION :
X-COORD :
Y-COORD :

HOLE No: TPI26



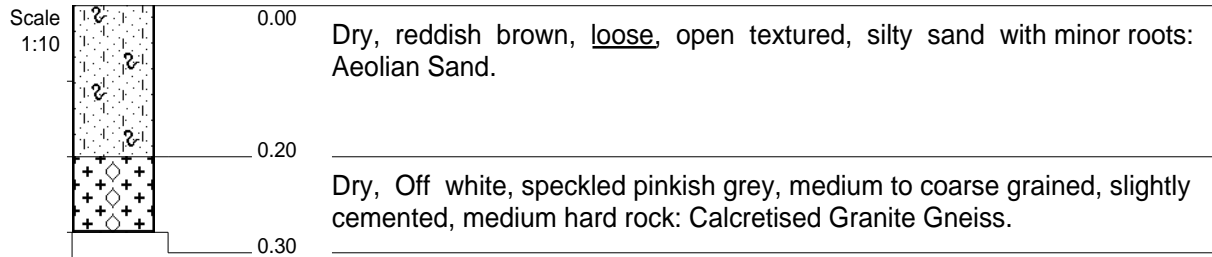
NOTES

- 1) EOH @ 0.35m, refusal of TLB
- 2) No water seepage observed

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.3m, refusal of TLB
- 2) No water seepage observed

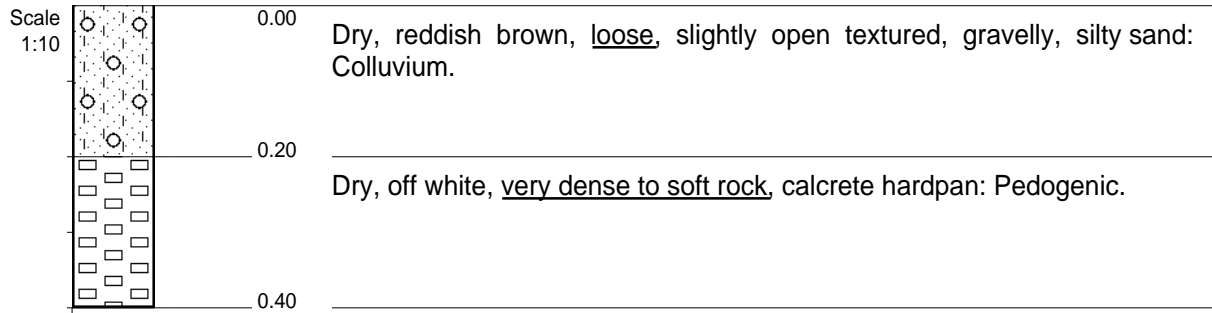
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

 HOLE No: **TPI28**

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.4m, refusal of TLB
- 2) No water seepage observed

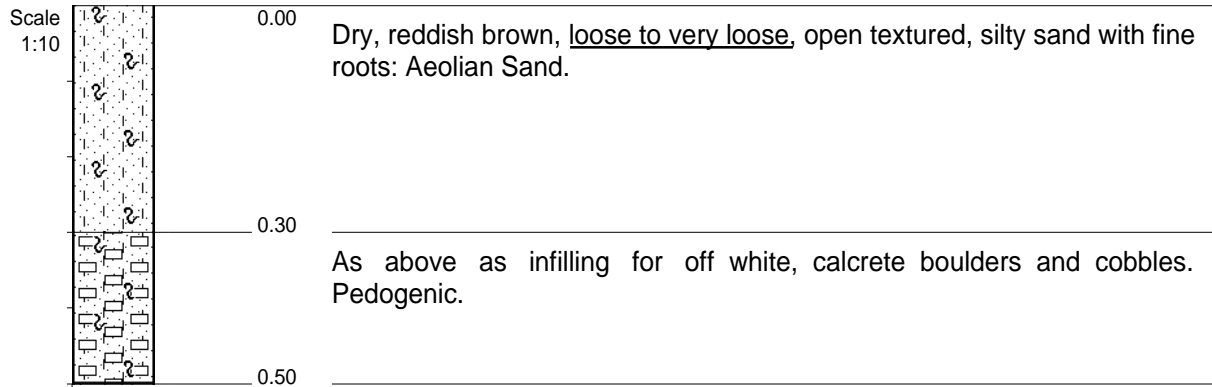
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

 HOLE No: **TPI29**

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET



NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed

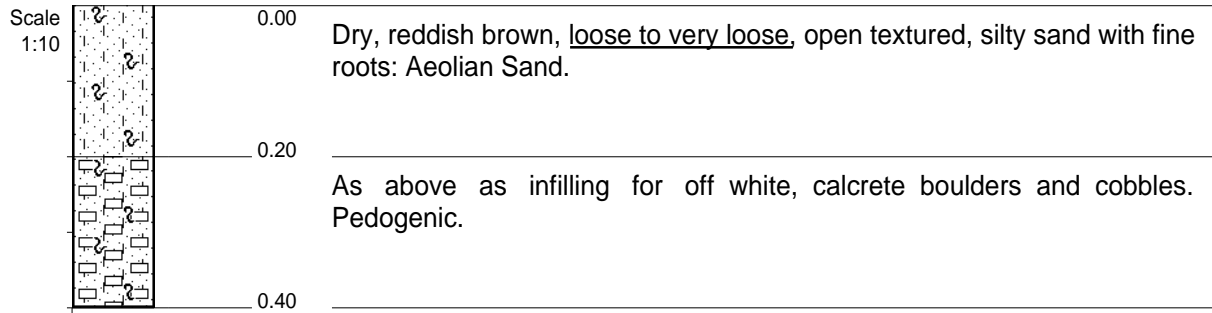
CONTRACTOR : **Mass Hire**
 MACHINE : **Volvo BL61B**
 DRILLED BY : **Riaan**
 PROFILED BY : **MM**

INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : **31/08/15 20:59**
 TEXT : **..\\2015\15126F~1.TXT**

ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPI30

TYPE SET BY : **Rev 1**
 SETUP FILE : **STANDARD.SET**


NOTES

- 1) EOH @ 0.4m, refusal of TLB
- 2) No water seepage observed

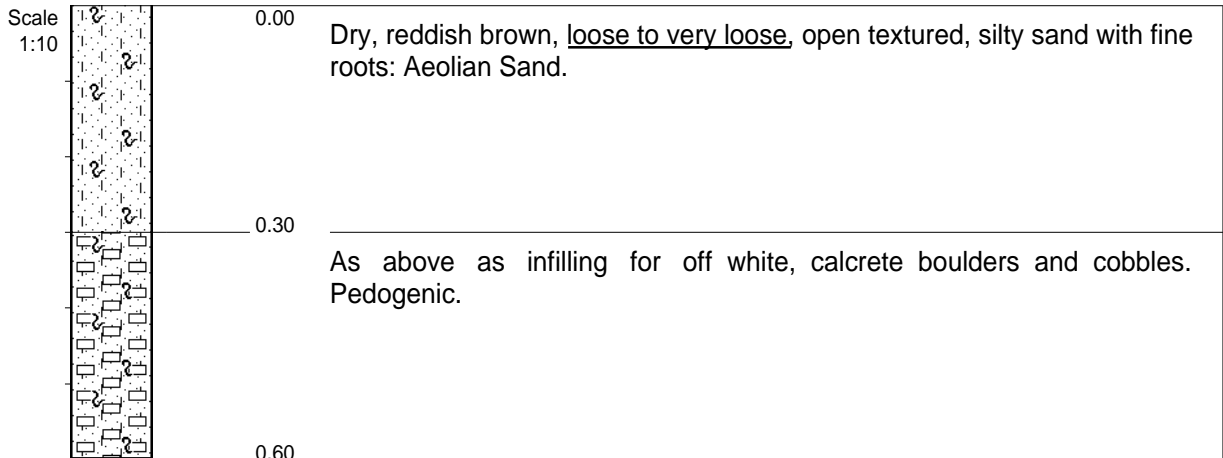
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPI31

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET

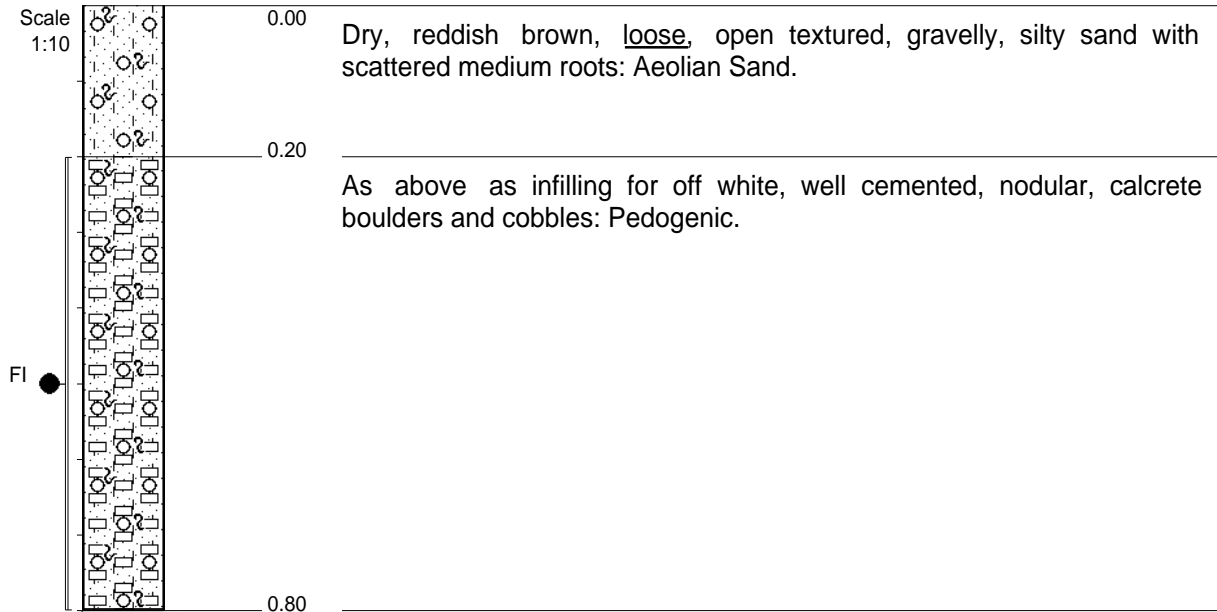

NOTES

- 1) EOH @ 0.6m, refusal of TLB
- 2) No water seepage observed

 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :


NOTES

- 1) EOH @ 0.8m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0.2--0.8m

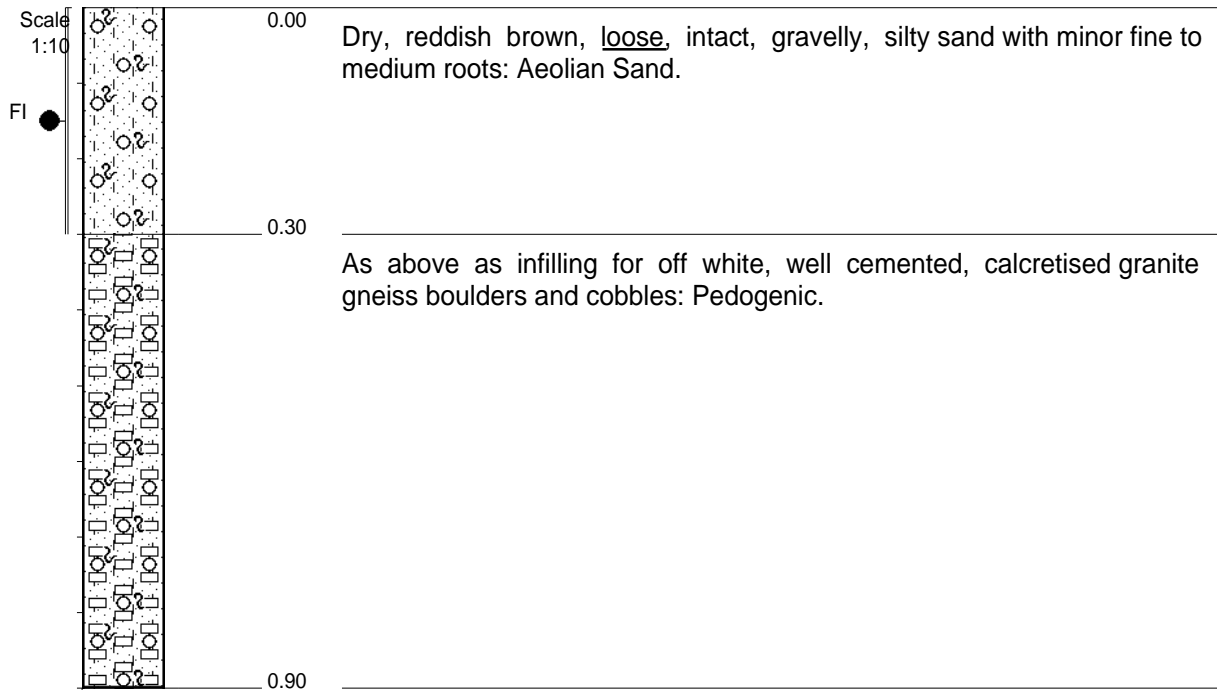
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPK26

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.9m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.3m

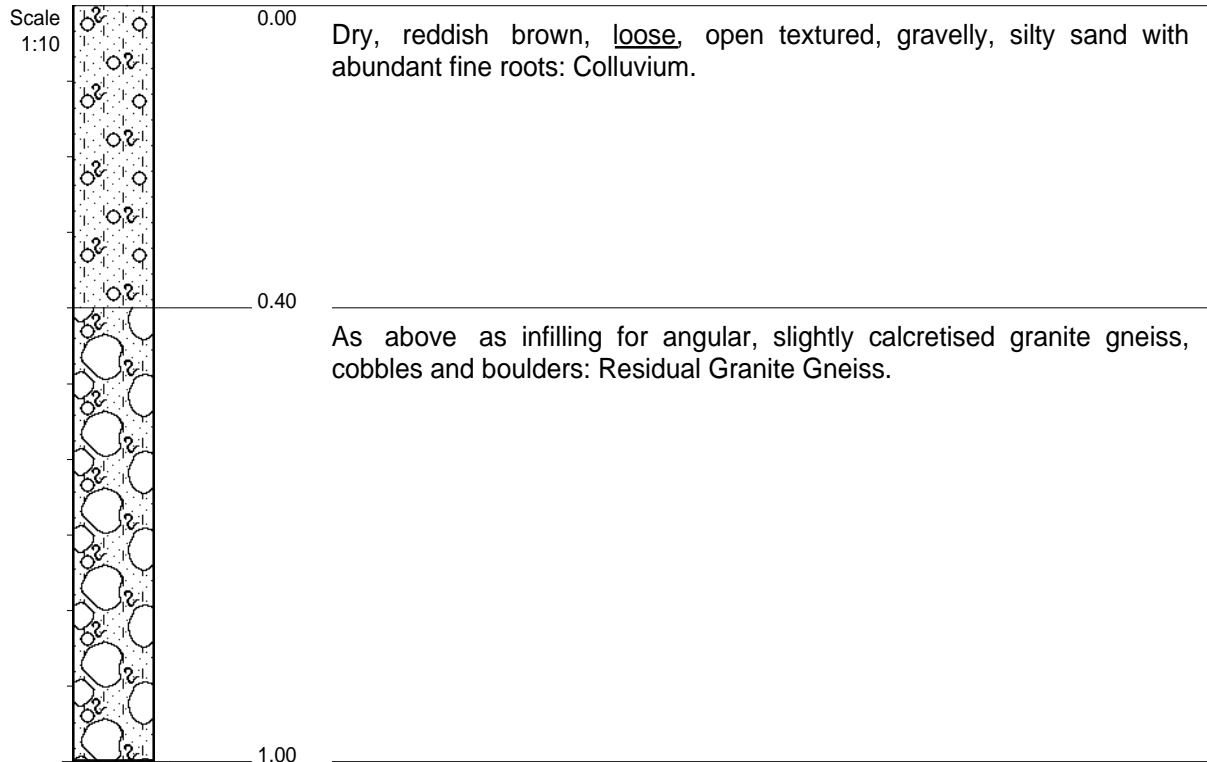
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPK27

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 1.0m, refusal of TLB
- 2) No water seepage observed

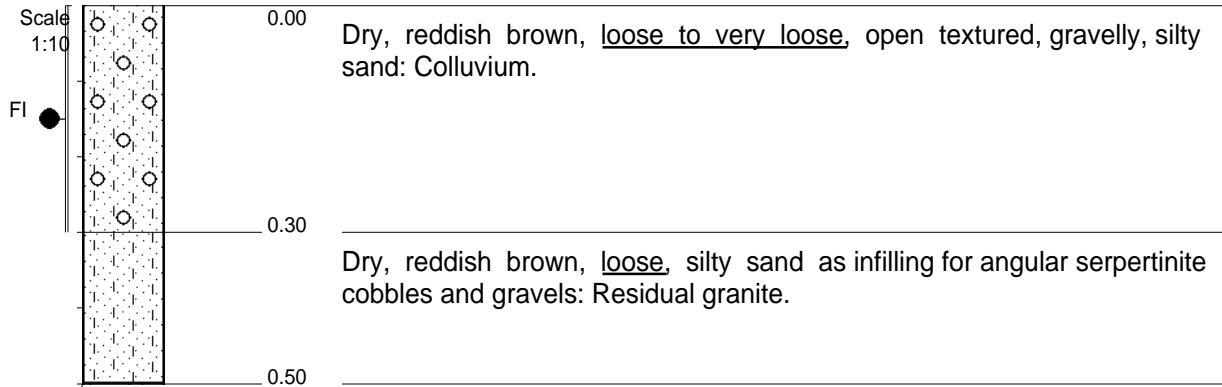
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPK28

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.3m

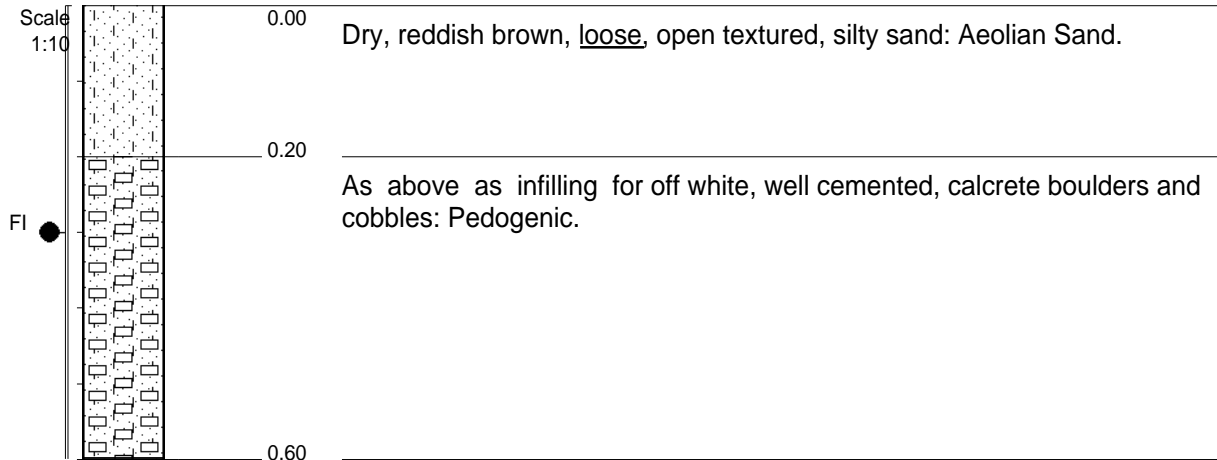
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPK29

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.6m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.6m

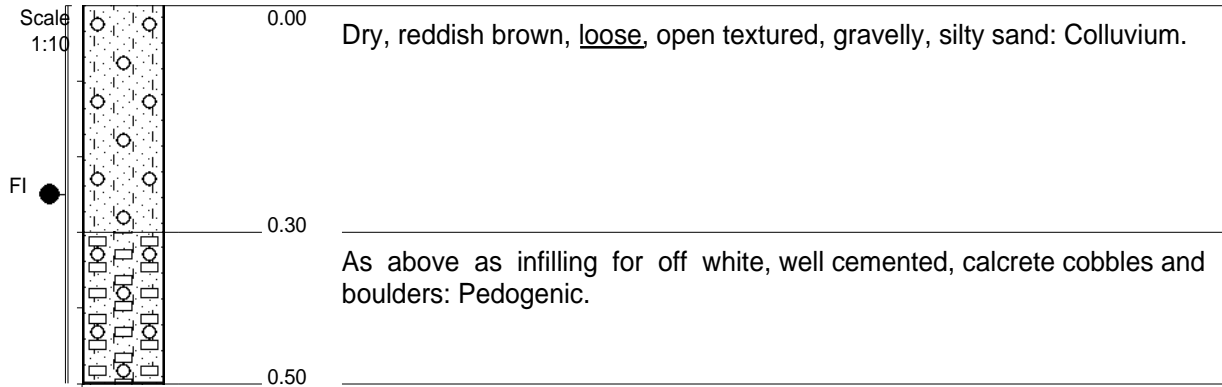
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPK30

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET


NOTES

- 1) EOH @ 0.5m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.5m

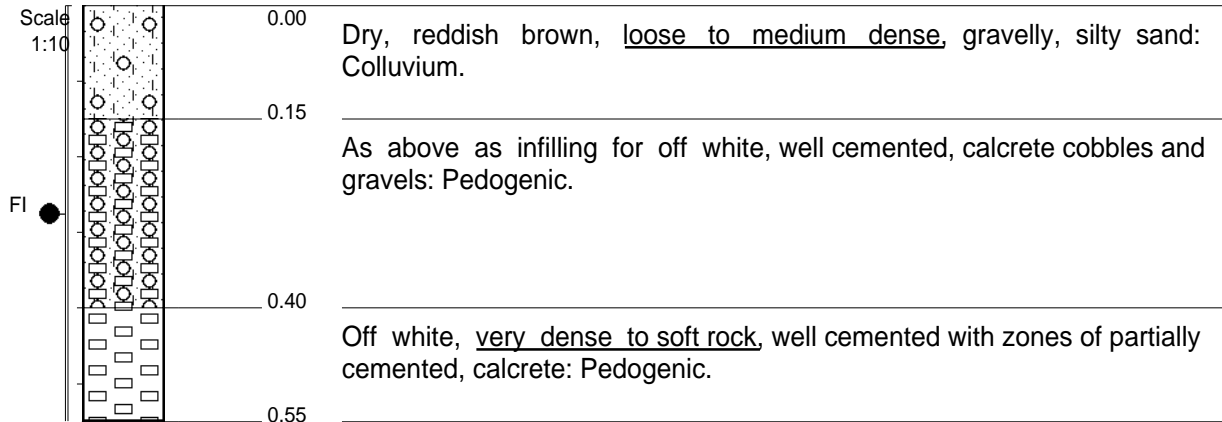
 CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

 INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

 ELEVATION :
 X-COORD :
 Y-COORD :

HOLE No: TPK31

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET













NOTES

- 1) EOH @ 0.55m, refusal of TLB
- 2) No water seepage observed
- 3) Disturbed sample FI @ 0--0.55m

CONTRACTOR : Mass Hire
 MACHINE : Volvo BL61B
 DRILLED BY : Riaan
 PROFILED BY : MM

INCLINATION :
 DIAM :
 DATE :
 DATE :
 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

ELEVATION :
 X-COORD :
 Y-COORD :

	BOULDERS	{SA01}
	GRAVELS	{SA02}
	GRAVELLY	{SA03}
	SAND	{SA04}
	SILTY	{SA07}
	PLUTONIC/norite/syenite	{SA17}
	FREE QUARTZ/visible quartz	{SA44}
	DENSE CALCRETE/hardpan calcrete	{SA26}
	DISTURBED SAMPLE	{SA38}
	ROOTS	{SA40}

Name ●

 CONTRACTOR :
 MACHINE :
 DRILLED BY :
 PROFILED BY :

 INCLINATION :
 DIAM :
 DATE :
 DATE :

 ELEVATION :
 X-COORD :
 Y-COORD :

 TYPE SET BY : Rev 1
 SETUP FILE : STANDARD.SET

 DATE : 31/08/15 20:59
 TEXT : ..\2015\15126F~1.TXT

APPENDIX 4

BOREHOLE LOGS and PHOTOGRAPHS

HOLE No: BHB28
Sheet 1 of 1

JOB NUMBER: 15107

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF schistose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grained
CG -coarse grained

JOINT SPACING
VCJ -very close spacing
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ -very wide spacing

JOINT S
CUR -cu
PLA -pl
UND -un
STE -st
IRR -ir

JOINT ROUGHNESS
SLJ -slickensided
SJ -smooth
RJ -rough

HAPE
rvilinear
anar
dulating
epped
regular

ROCK HARDNESS
EHR -extremely hard rock
VHR -very hard rock
HR -hard rock
MHR -medium hard rock
SR -soft rock
ery soft rock



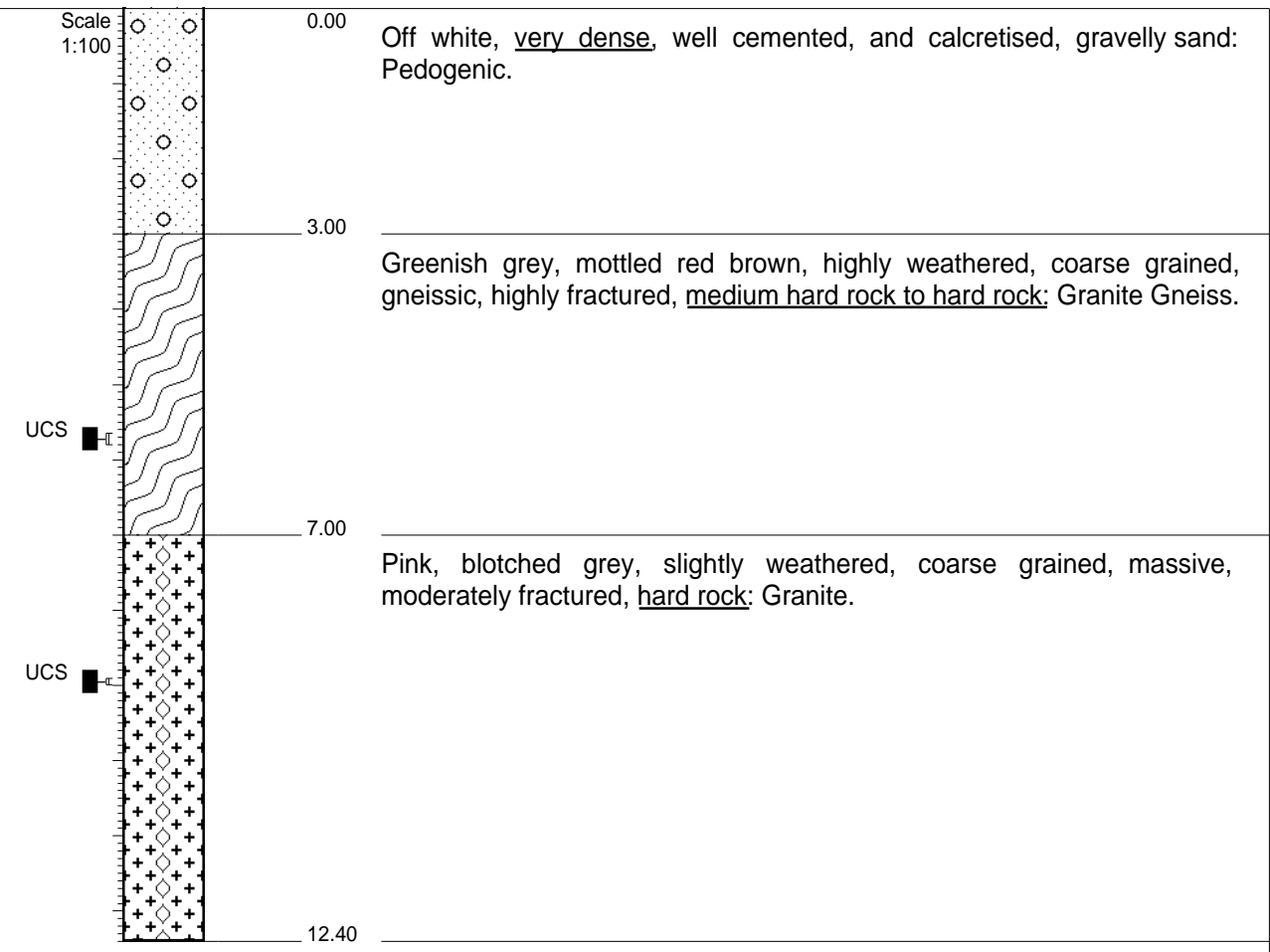
Emvelo
Karshoek
Upington

HOLE No: BHB28
Sheet 1 of 1

JOB NUMBER: 15107

27	7		
17		>20	
27	0		
43	18		
19	0	6	
15	9	>10	
100	75	6	
	0	17	
	48	11	

CR	RQD	FF
----	-----	----



- NOTES
- 1) EOH @ 12.4m
 - 2) No water encountered
 - 3) Undisturbed sample UCS @ 5.64--5.8m
 - 4) Undisturbed sample UCS @ 8.9--9.0m

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY : TS
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 17/08/2015
DATE :
DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: BHB28

HOLE No: BHB31
Sheet 1 of 1

JOB NUMBER: 15107

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF schistose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grained
CG -coarse grained

JOINT SPACING
VCJ -very close spacing
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ -very wide spacing

JOINT S
CUR -cu
PLA -pl
UND -un
STE -st
IRR -ir

JOINT ROUGHNESS
SLJ -slickensided
SJ -smooth
RJ -rough

HAPE
rvilinear
anar
dulating
epped
regular

SR -v

ROCK HARDNESS
EHR -extremely hard rock
VHR -very hard rock
HR -hard rock
MHR -medium hard rock
SR -soft rock
ery soft rock

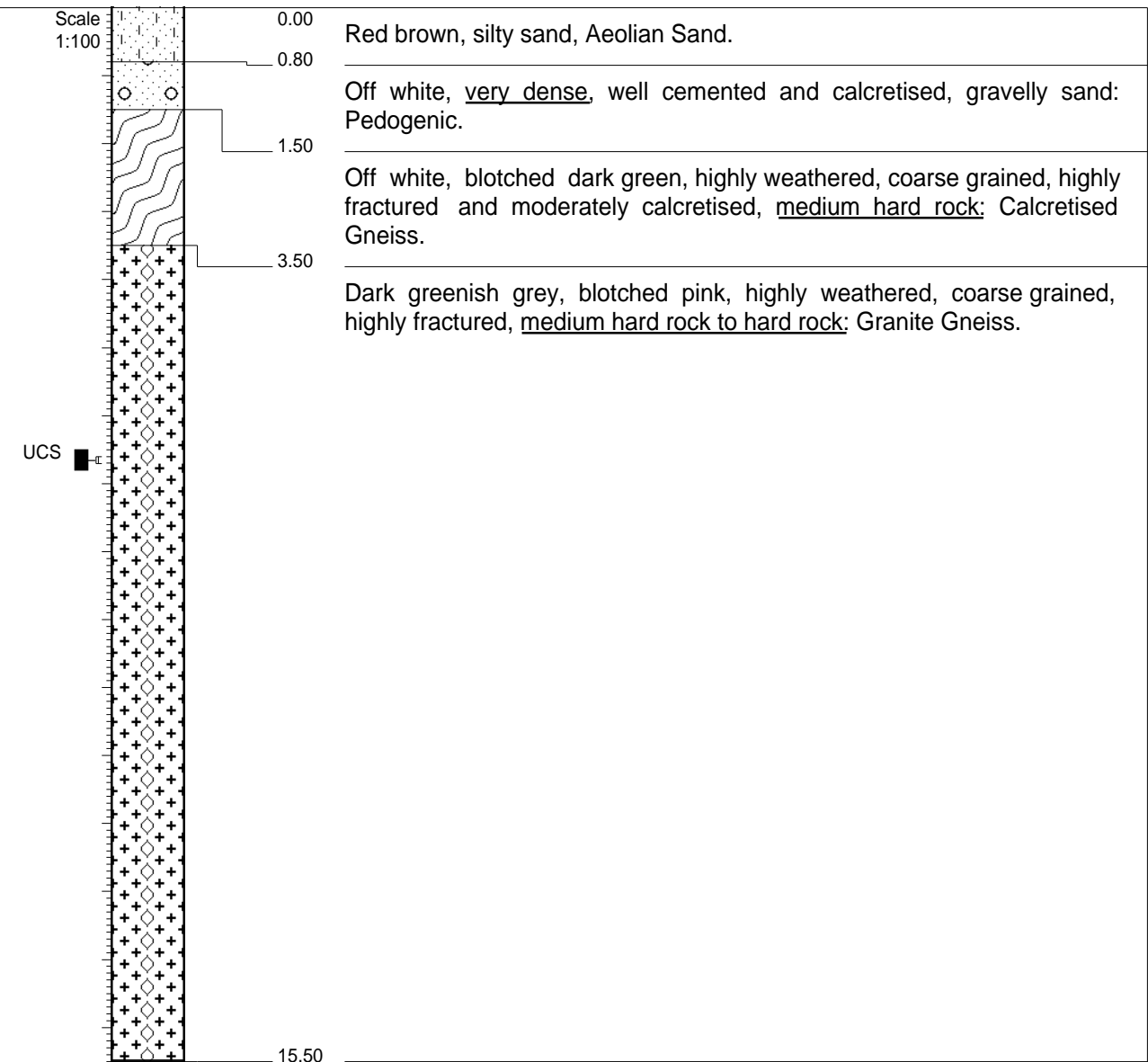


Emvelo
Karshoek
Upington

HOLE No: BHB31
Sheet 1 of 1

JOB NUMBER: 15107

CR	RQD	FF
	0	-
100	100	4
40	10	>20
50		6
10	0	
7		>20
63	21	
43	13	9
60	0	
36	7	
87	17	>20
83	26	
CR	RQD	FF



NOTES

- 1) EOH @ 15.5m
- 2) No water encountered
- 3) Undisturbed sample UCS @ 6.6--6.71m

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY : TS
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 17/08/2015
DATE :
DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: BHB31

HOLE No: BHE26

Sheet 1 of 1

JOB NUMBER: 15107

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF schistose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grained
CG -coarse grained

JOINT SPACING
VCJ -very close spacing
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ -very wide spacing

JOINT S
CUR -cu
PLA -pl
UND -un
STE -st
IRR -ir

JOINT ROUGHNESS
SLJ -slickensided
SJ -smooth
RJ -rough

HAPE
rvilinear
anar
dulating
epped
regular

SR -v

ROCK HARDNESS
EHR -extremely hard rock
VHR -very hard rock
HR -hard rock
MHR -medium hard rock
SR -soft rock
ery soft rock



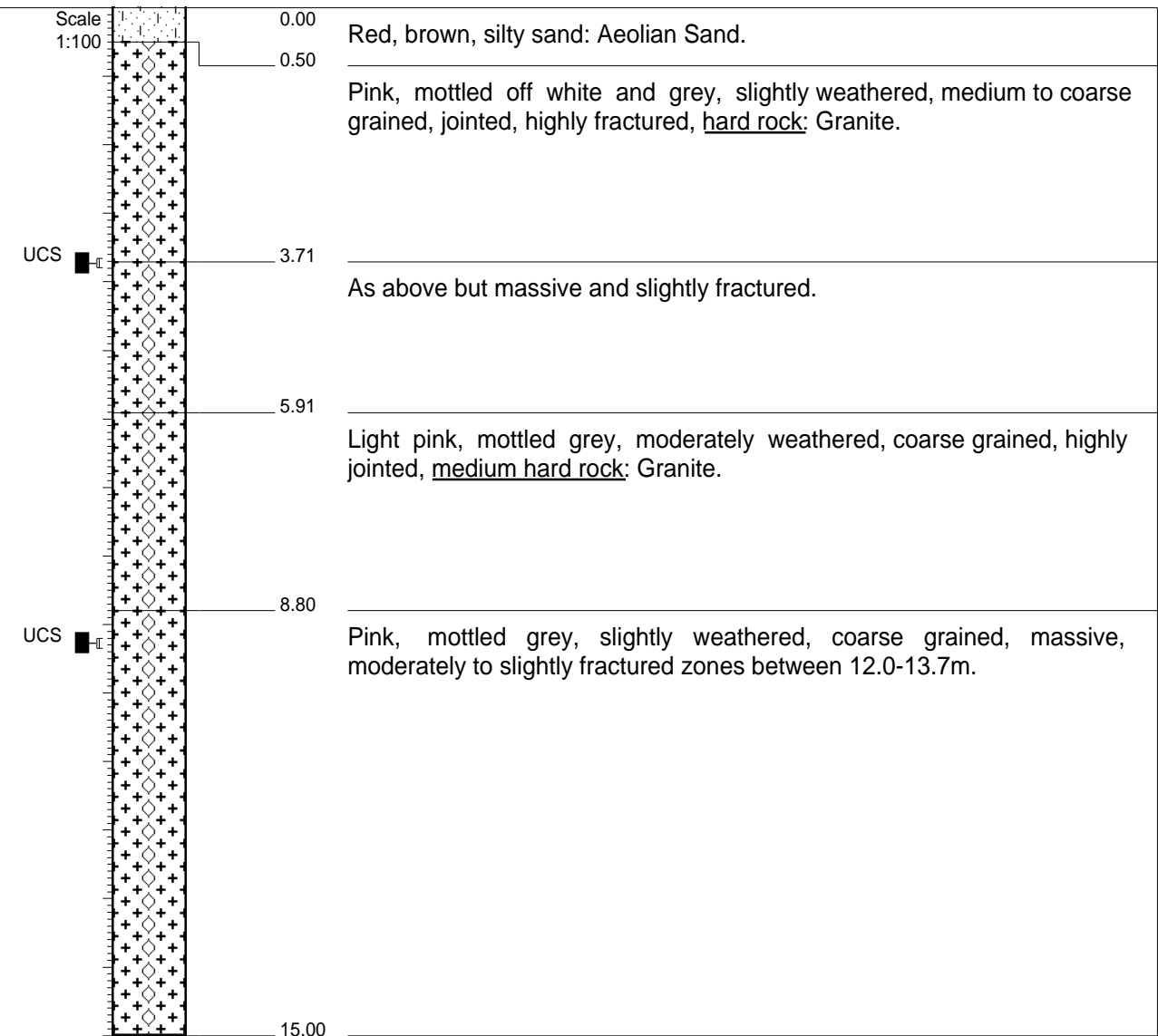
Emvelo
Karoshoek
Upington

HOLE No: BHE26

Sheet 1 of 1

JOB NUMBER: 15107

56	na	na
40	0	14
56	20	0
20	12	1
87	34	8
100	87	3
10	0	crumbled
61	17	8
59	26	5
70	31	6
7	0	3
100		>20
70	69	1
CR	RQD	FF



NOTES

- 1) EOH @ m
- 2) No water encountered
- 3) Undisturbed sample UCS @ 3.65--3.8m
- 4) Undisturbed sample UCS @ 9.2--9.35m

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY : TS
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION : Vertical
DIAM :
DATE : 17/08/2015
DATE :
DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: BHE26

HOLE No: BHF28
Sheet 1 of 1

JOB NUMBER: 15107

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF schistose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grained
CG -coarse grained

JOINT SPACING
VCJ -very close spacing
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ -very wide spacing

JOINT S
CUR -cu
PLA -pl
UND -un
STE -st
IRR úir

JOINT ROUGHNESS
SLJ -slickensided
SJ -smooth
RJ -rough

HAPE
rvilinear
anar
dulating
epped
regular

SR -v

ROCK HARDNESS
EHR -extremely hard rock
VHR -very hard rock
HR -hard rock
MHR -medium hard rock
SR -soft rock
ery soft rock

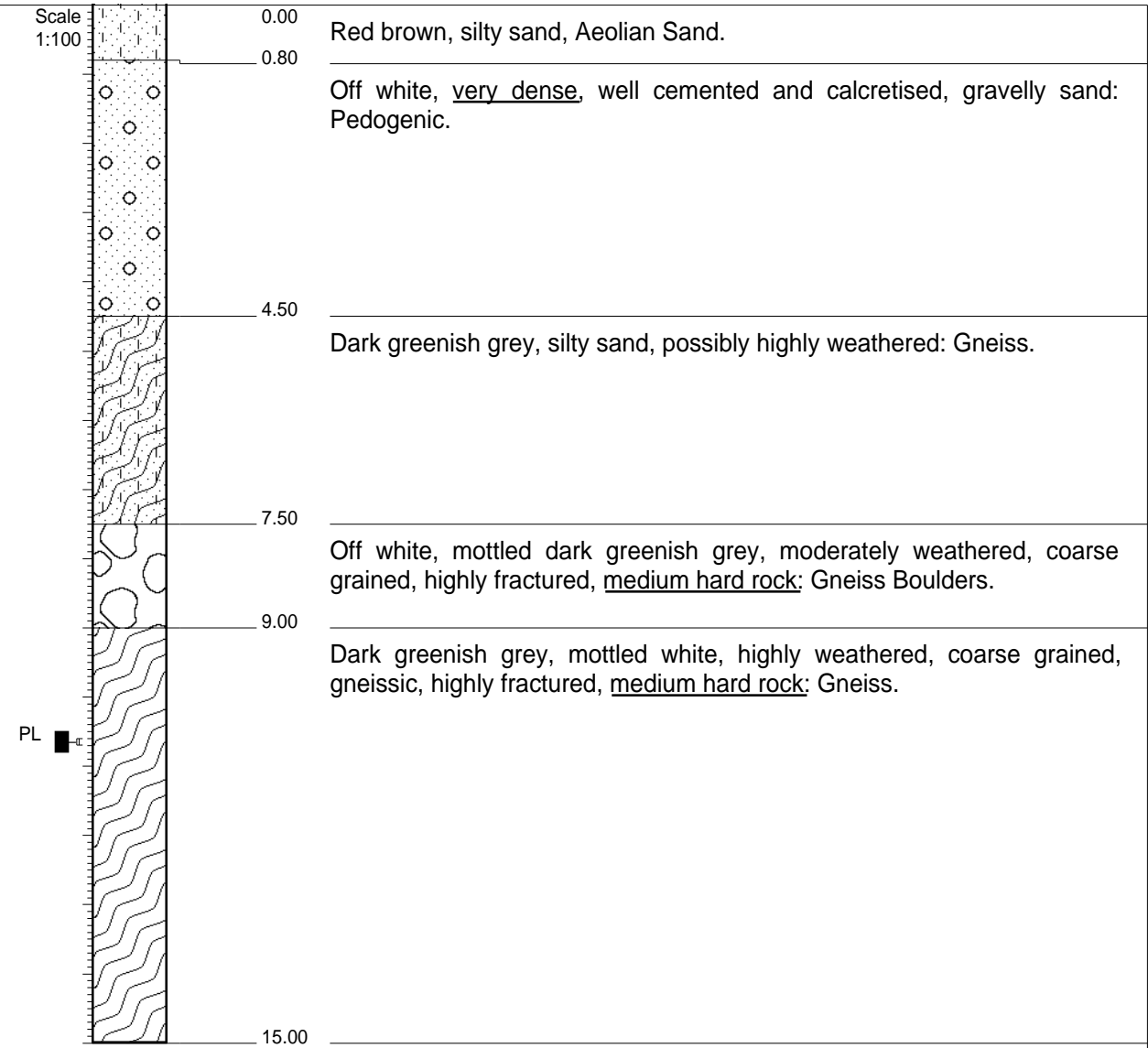


Emvelo
Karoshoek
Upington

HOLE No: BHF28
Sheet 1 of 1

JOB NUMBER: 15107

wash	na	na	
57	0	>20	
wash	-	-	
13	0	>20	
20	400		
87	33	7	
33	7		
17	0	>20	
CR	RQD	FF	



NOTES

- 1) EOH @ 15.0m
- 2) No water encountered
- 3) Undisturbed sample PL @ 10.6--10.7m

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY : TS
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 17/08/2015
DATE :
DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: BHF28

HOLE No: BHF31
Sheet 1 of 1

JOB NUMBER: 15107

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF schistose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grained
CG -coarse grained

JOINT SPACING
VCJ -very close spacing
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ -very wide spacing

JOINT S
CUR -cu
PLA -pl
UND -un
STE -st
IRR úir

JOINT ROUGHNESS
SLJ -slickensided
SJ -smooth
RJ -rough

HAPE
rvilinear
anar
dulating
epped
regular

SR -v

ROCK HARDNESS
EHR -extremely hard rock
VHR -very hard rock
HR -hard rock
MHR -medium hard rock
SR -soft rock
ery soft rock



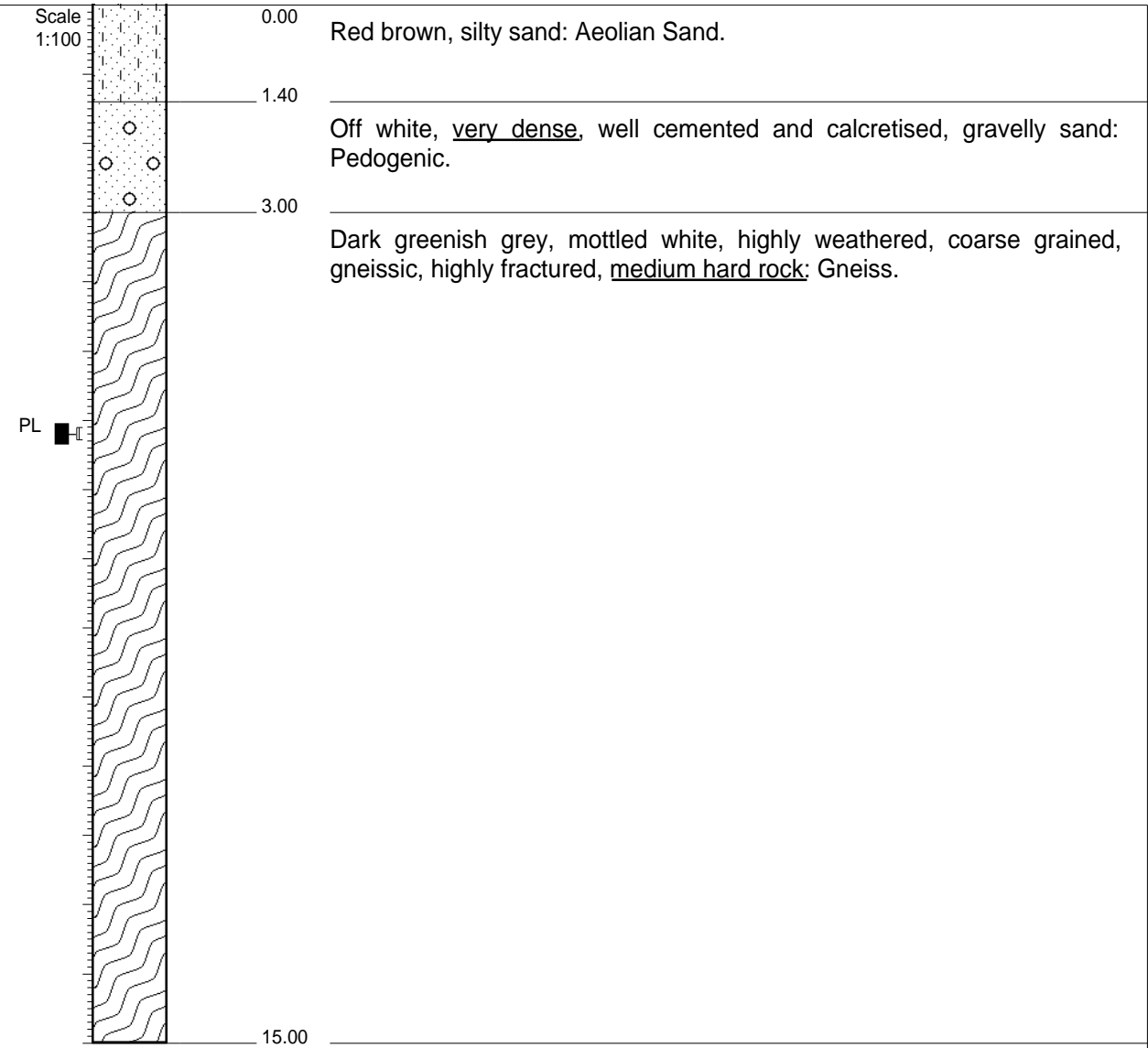
Emvelo
Karoshoek
Upington

HOLE No: BHF31
Sheet 1 of 1

JOB NUMBER: 15107

wash	na	na	
80			
13	0	>20	
wash	-	-	
100	49		
23	47	11	
30	0	3	
27	14	7	
30	21	3	
13	9	1	

CR	RQD	FF
----	-----	----



NOTES

- 1) EOH @ 15.0m
- 2) No water encountered
- 3) Undisturbed sample PL @ 6.1--6.29m

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY : TS

TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 17/08/2015
DATE :

DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: BHF31

HOLE No: BHI29
Sheet 1 of 1

JOB NUMBER: 15107

ROCK FABRIC
MF -massive
BF -bedded
FF -foliated
CF -cleaved
SF schistose
LF -laminated

GRAIN SIZE
FG -fine grained
MG -medium grained
CG -coarse grained

JOINT SPACING
VCJ -very close spacing
CJ -close spacing
MJ -medium spacing
WJ -wide spacing
VWJ -very wide spacing

JOINT S
CUR -cu
PLA -pl
UND -un
STE -st
IRR -ir

JOINT ROUGHNESS
SLJ -slickensided
SJ -smooth
RJ -rough

HAPE
rvilinear
anar
dulating
epped
regular

SR -v

ROCK HARDNESS
EHR -extremely hard rock
VHR -very hard rock
HR -hard rock
MHR -medium hard rock
SR -soft rock
ery soft rock

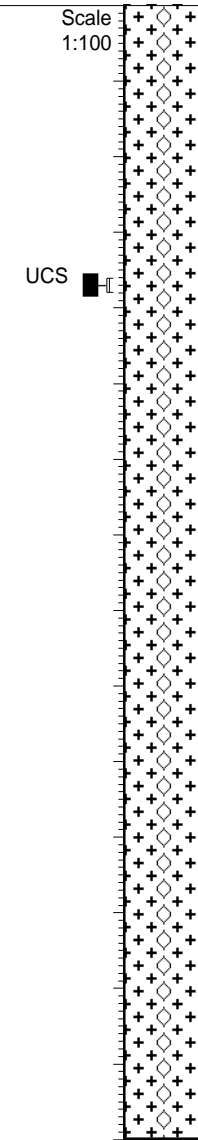


Emvelo
Karshoek
Upington

HOLE No: BHI29
Sheet 1 of 1

JOB NUMBER: 15107

33			
31	0	>10	
60	26		
70	0		
100	29		
30	0		
100	7		
60	33	>20	
87	31		
53	17		
27	0		
93	57	11	
CR	RQD	FF	



0.00
Dark green, blotched pink, moderately weathered, coarse grained, very slightly gneissic, highly fratured becoming slightly fractured below 3.5m, hard rock: Granite Gneiss.
15.00

NOTES











- 1) EOH @ 15.5m
- 2) No water encountered
- 3) Undisturbed sample UCS @ 3.6--3.8m

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY : TS
TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

INCLINATION :
DIAM :
DATE : 17/08/2015
DATE :
DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: BHI29

	BOULDERS	{SA01}
	GRAVELLY	{SA03}
	SAND	{SA04}
	SILTY	{SA07}
	PLUTONIC/norite/syenite	{SA17}
	PLUTONIC	{SA17}
	FREE QUARTZ/visible quartz	{SA44}
	FREE QUARTZ	{SA44}
	METAMORPHIC	{SA16}
	UNDISTURBED SAMPLE	{SA37}

Name

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY :

INCLINATION :
DIAM :
DATE :
DATE :

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : Rev 1
SETUP FILE : STANDARD.SET

DATE : 31/08/15 20:29
TEXT : ..\2015\15F91F-1.TXT



BH B28, From 0.0 – 10.92m



BH B28, From 10.92 – 12.14m



BH B31, From 0.0 – 11.25m



BH B31, From 11.25 – 15.50m

Geotechnical Investigation
Emvelo
Karoshhoek Site 5
15107/3



BH F28, From 0.0 – 12.20m



BH F28, From 12.20 – 15.00m



BH F31, From 0.0 – 12.30m



BH F31, From 12.30 – 15.00m



BH I29, From 0.0 – 13.50m



BH I29, From 13.50 – 15.00m

Geotechnical Investigation
Emvelo
Karoshoek Site 5
15107/3



BH E26, From 0.0 – 7.70m



BH E26, From 7.70 – 15.00m

APPENDIX 5

LABORATORY TEST RESULTS

FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP A27	@ 0,7 - 0,9m
Date	21 AUGUST 2015	Test No	1318
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	94.42
26.50	92.98
19.00	91.10
9.50	80.71
4.75	66.33
2.00	45.91
0.425	28.00

HYDROMETER ANALYSIS

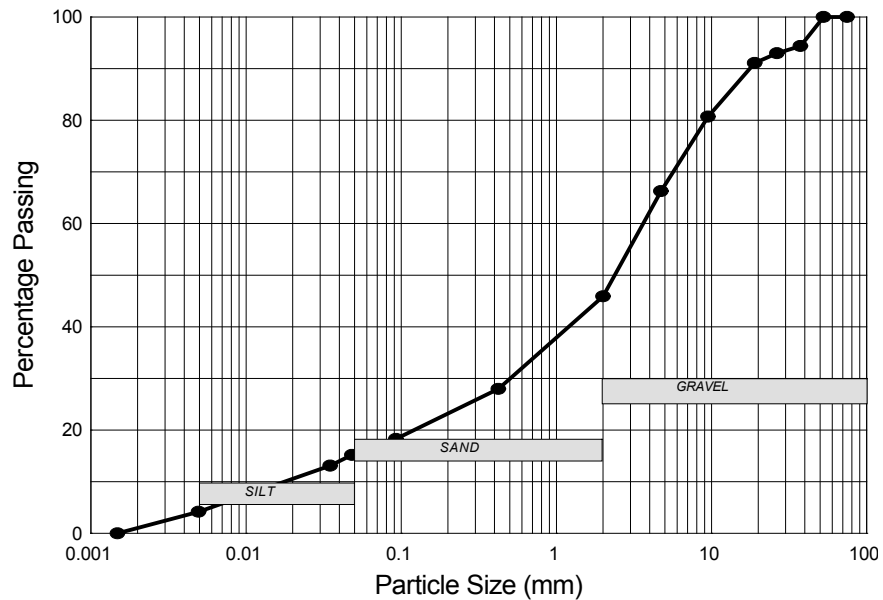
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	18.35
0.0669	16.78
0.0482	15.21
0.0350	13.11
0.0050	4.19
0.0015	0.00

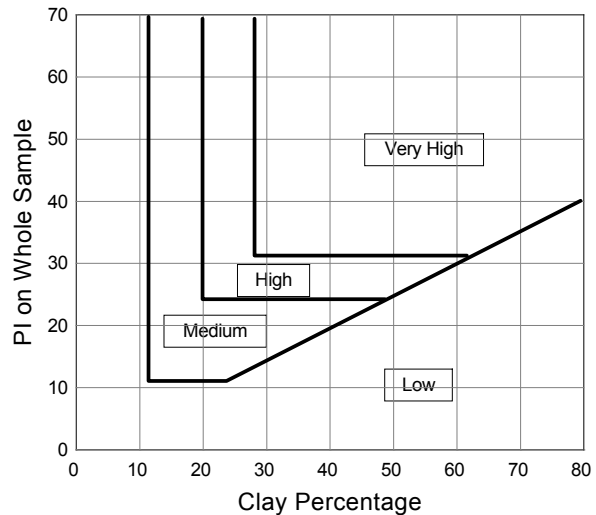
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.08
Moisture Content	5.81
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP A28	@ 0,0 - 0,5m
Date	21 AUGUST 2015	Test No	1335
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	97.34
26.50	93.05
19.00	85.70
9.50	79.82
4.75	76.39
2.00	74.10
0.425	56.79

HYDROMETER ANALYSIS

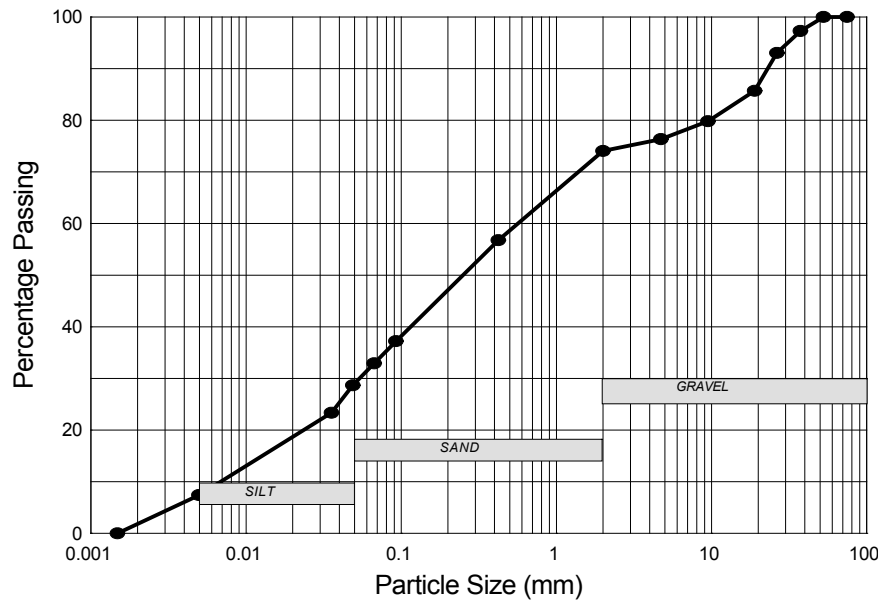
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	37.22
0.0674	32.97
0.0489	28.71
0.0356	23.40
0.0050	7.44
0.0015	0.00

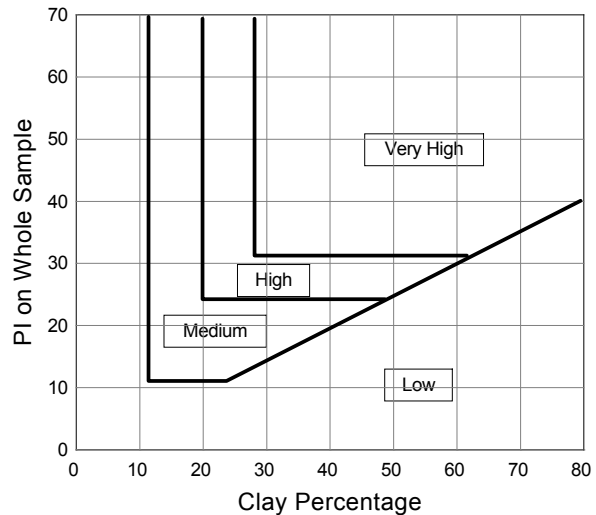
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.32
Moisture Content	1.89
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP A29	@ 0,0 - 0,57m
Date	21 AUGUST 2015	Test No	1281
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	94.63
26.50	92.35
19.00	78.84
9.50	74.19
4.75	72.33
2.00	67.33
0.425	50.75

HYDROMETER ANALYSIS

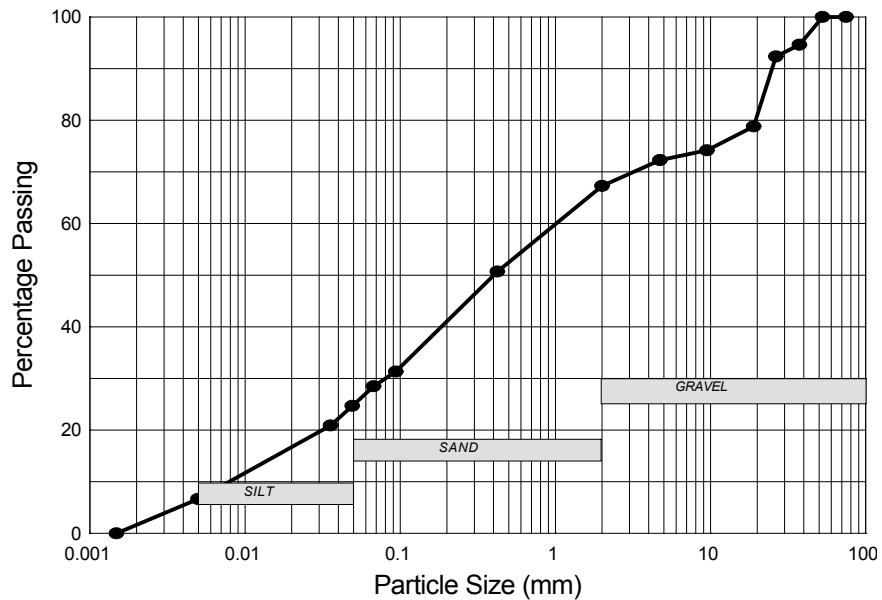
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	31.36
0.0678	28.51
0.0492	24.71
0.0356	20.91
0.0050	6.65
0.0015	0.00

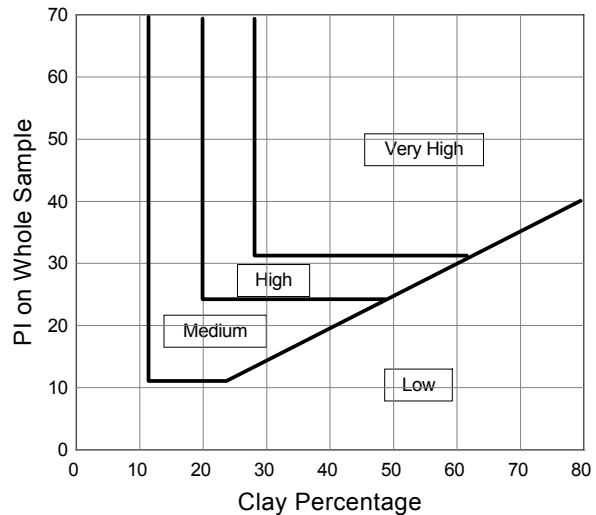
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.51
Moisture Content	2.04
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP A30 @ 0,2 - 0,7m	
Date	21 AUGUST 2015	Test No	1282
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	86.83
9.50	70.40
4.75	56.55
2.00	47.14
0.425	33.16

HYDROMETER ANALYSIS

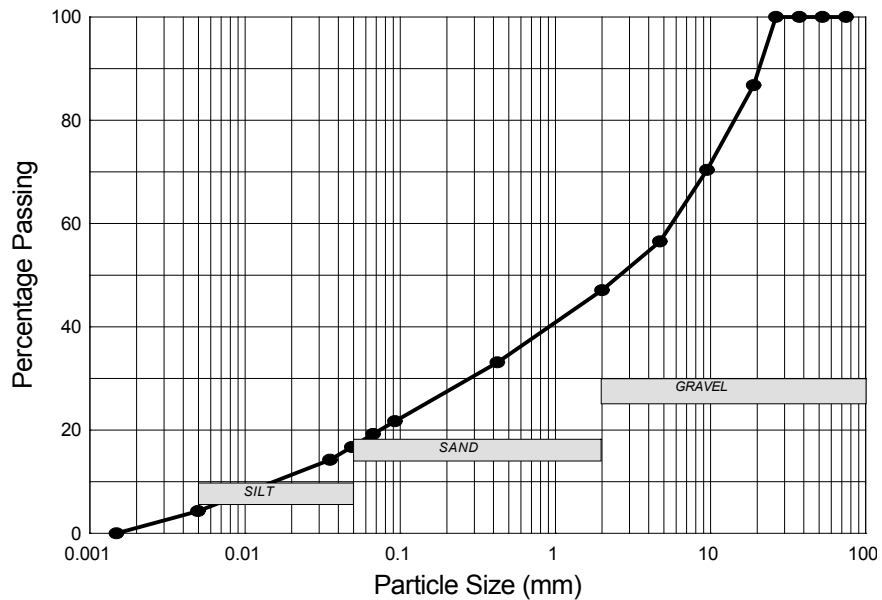
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	21.73
0.0674	19.25
0.0489	16.77
0.0354	14.28
0.0050	4.35
0.0015	0.00

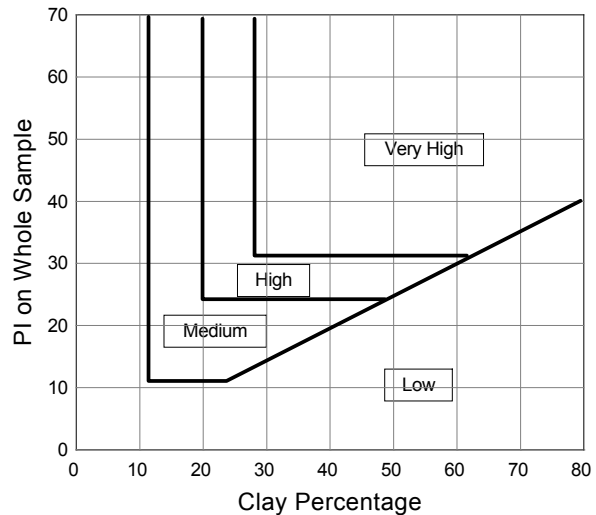
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.98
Moisture Content	3.42
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP A31	@ 0,0 - 0,2m
Date	21 AUGUST 2015	Test No	1283
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	98.89
4.75	97.89
2.00	95.46
0.425	69.24

HYDROMETER ANALYSIS

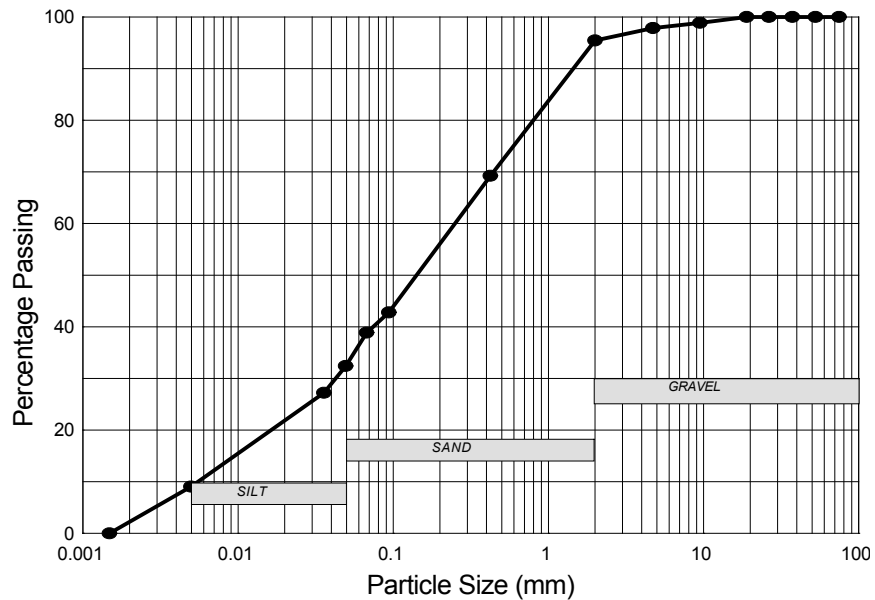
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	42.79
0.0678	38.90
0.0495	32.42
0.0358	27.23
0.0050	9.08
0.0015	0.00

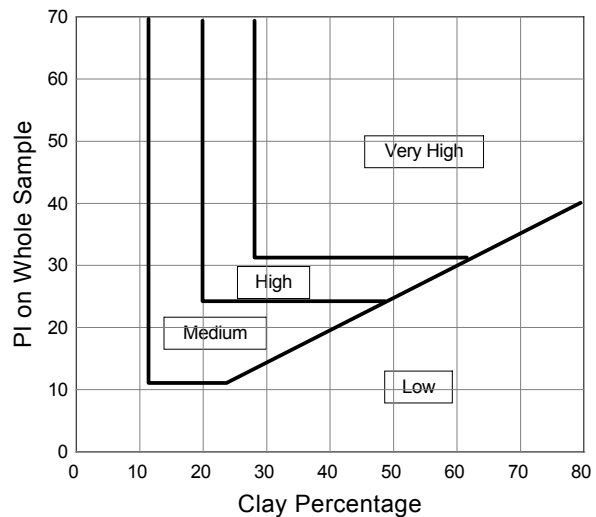
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.93
Moisture Content	1.71
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP A32 @ 0,5 - 0,6m	
Date	21 AUGUST 2015	Test No	1334
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	95.48
9.50	87.83
4.75	82.44
2.00	73.28
0.425	53.15

HYDROMETER ANALYSIS

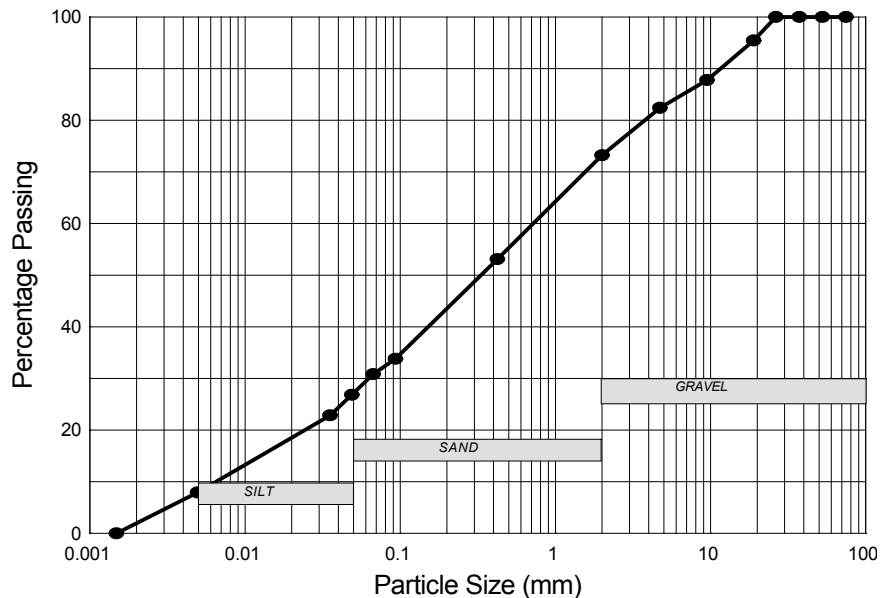
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	33.84
0.0674	30.86
0.0489	26.88
0.0354	22.89
0.0050	7.96
0.0015	0.00

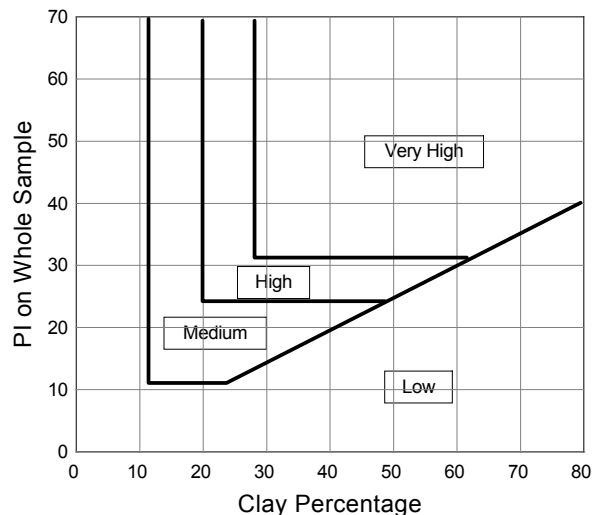
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.40
Moisture Content	1.49
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOK - SITE 5	TP B26	@ 0,0 - 0,8m
Date	21 AUGUST 2015	Test No	1310
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	83.25
26.50	78.34
19.00	69.64
9.50	62.26
4.75	60.05
2.00	55.51
0.425	40.78

HYDROMETER ANALYSIS

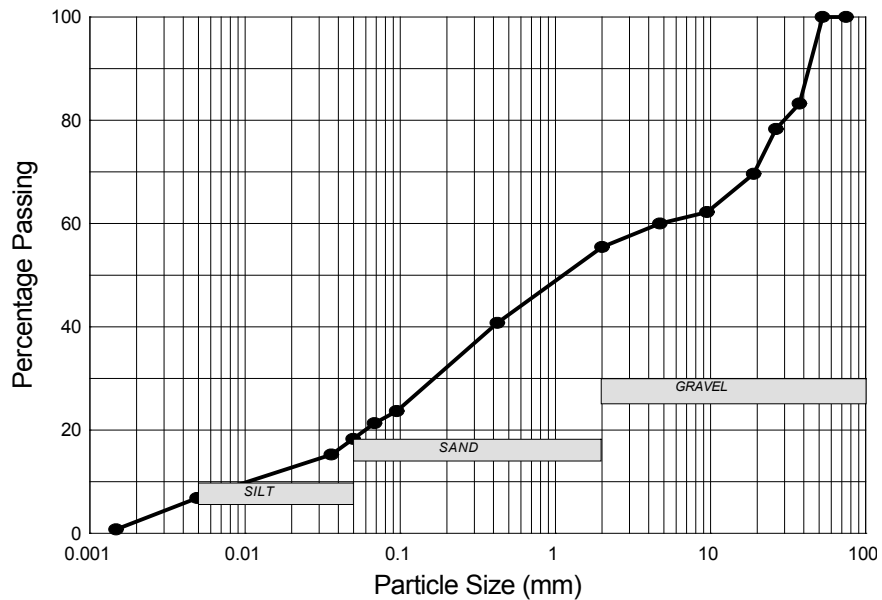
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0953	23.67
0.0687	21.38
0.0498	18.33
0.0360	15.27
0.0049	6.87
0.0015	0.76

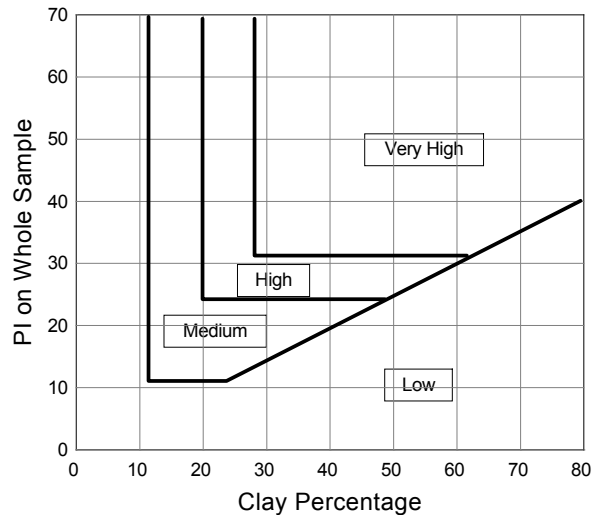
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.80
Moisture Content	2.62
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOK - SITE 5	TP B28 @ 0,1 - 0,3m	
Date	21 AUGUST 2015	Test No	1330
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	97.07
9.50	96.63
4.75	94.39
2.00	93.01
0.425	69.77

HYDROMETER ANALYSIS

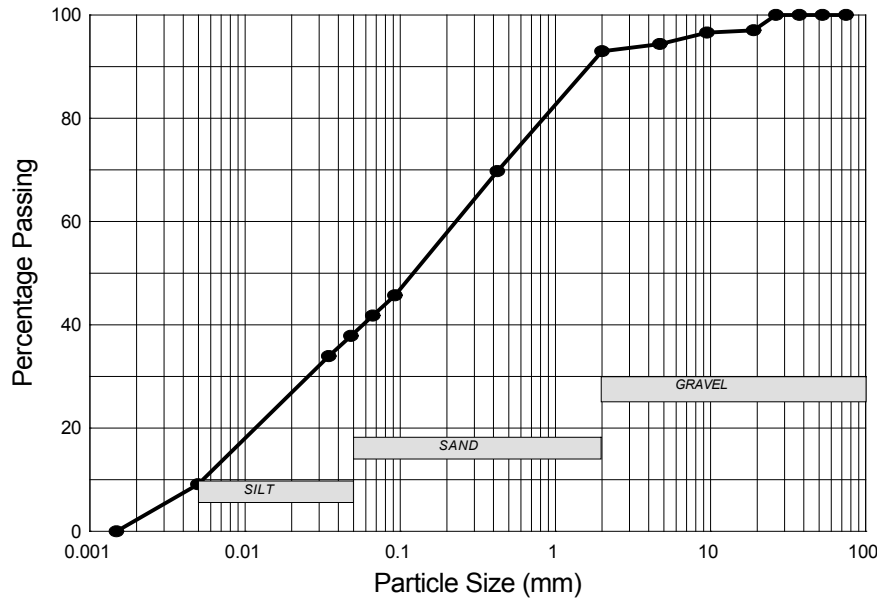
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	45.73
0.0669	41.81
0.0482	37.89
0.0348	33.97
0.0050	9.15
0.0015	0.00

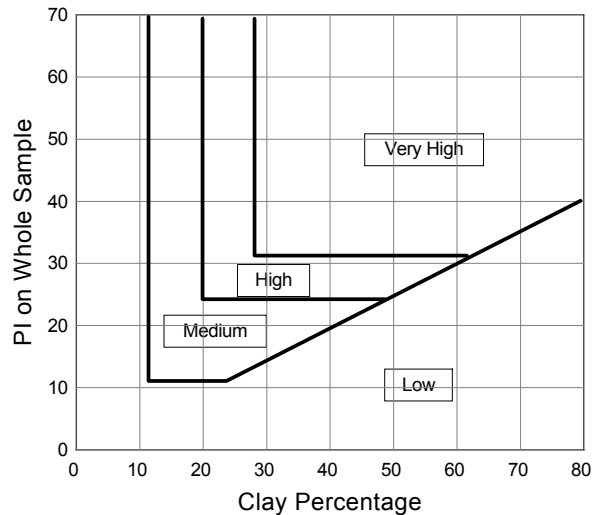
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.91
Moisture Content	2.24
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP B29 @ 0,8 - 1,0m	
Date	21 AUGUST 2015	Test No	1309
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	97.70
0.425	71.81

HYDROMETER ANALYSIS

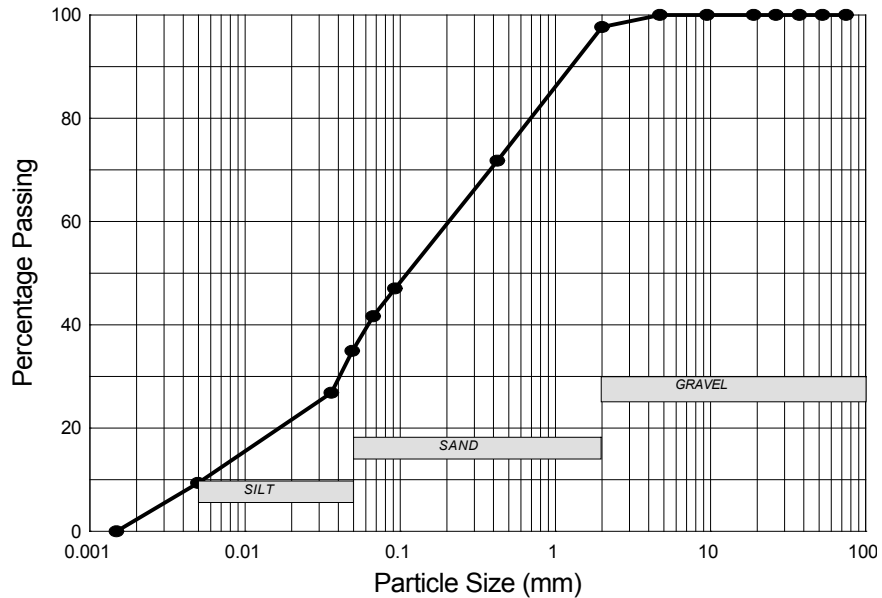
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	47.07
0.0674	41.69
0.0492	34.97
0.0360	26.90
0.0050	9.41
0.0015	0.00

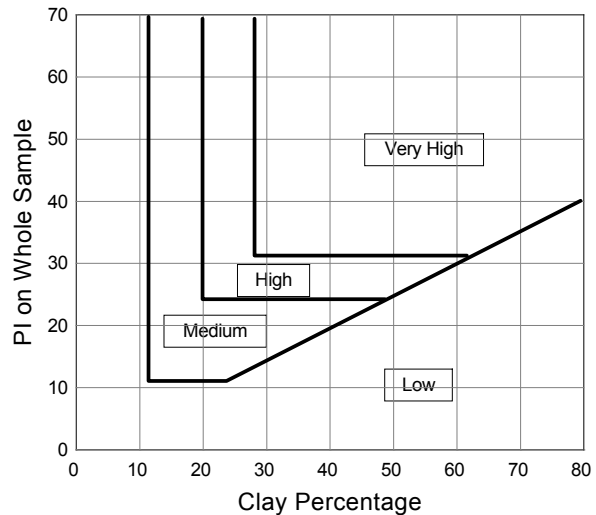
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.83
Moisture Content	1.88
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP B30	@ 0,0 - 0,6m
Date	21 AUGUST 2015	Test No	1307
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	98.36
9.50	98.20
4.75	97.79
2.00	95.45
0.425	67.61

HYDROMETER ANALYSIS

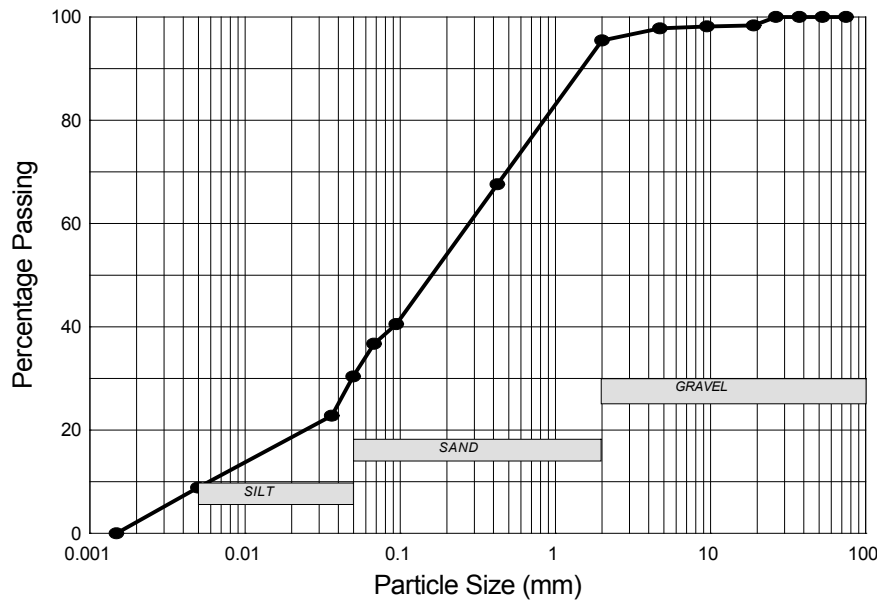
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	40.52
0.0682	36.72
0.0498	30.39
0.0364	22.79
0.0050	8.86
0.0015	0.00

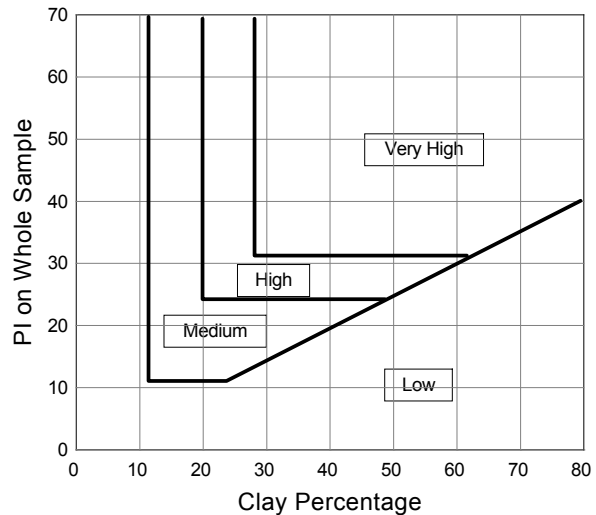
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.96
Moisture Content	0.92
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5 TP B30 @ 0,0 - 0,6m		
Date	22 AUGUST 2015	Test No	1308
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

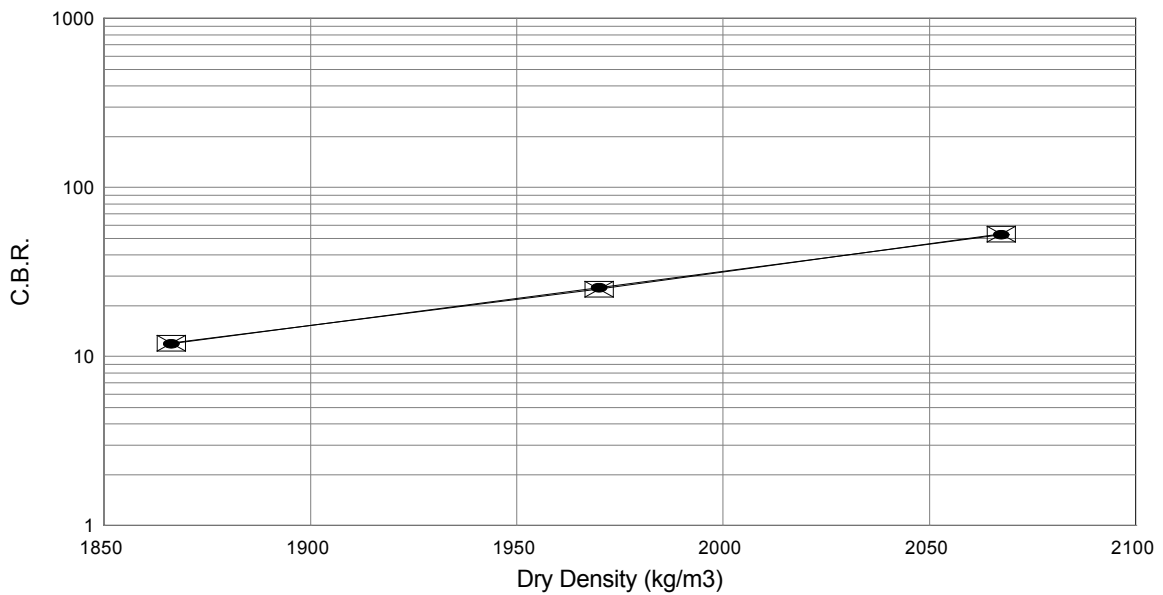
Maximum Dry Density (kg/m3)	2070
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Optimum Moisture Content (%)	7.2
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Percentage Mod AASHTO	99.9	95.2	90.2
CBR @ 2.54mm	53	25	12
CBR @ 5.08mm	56	27	12
CBR@ 7.62mm	58	28	13
Average Moisture Content (%)	7.0		
Percentage Swell	0.05	0.06	0.07

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	12	18	25	39	53



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP B31 @ 0,3 - 0,7m	
Date	21 AUGUST 2015	Test No	1329
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	97.50
4.75	92.01
2.00	80.93
0.425	64.77

HYDROMETER ANALYSIS

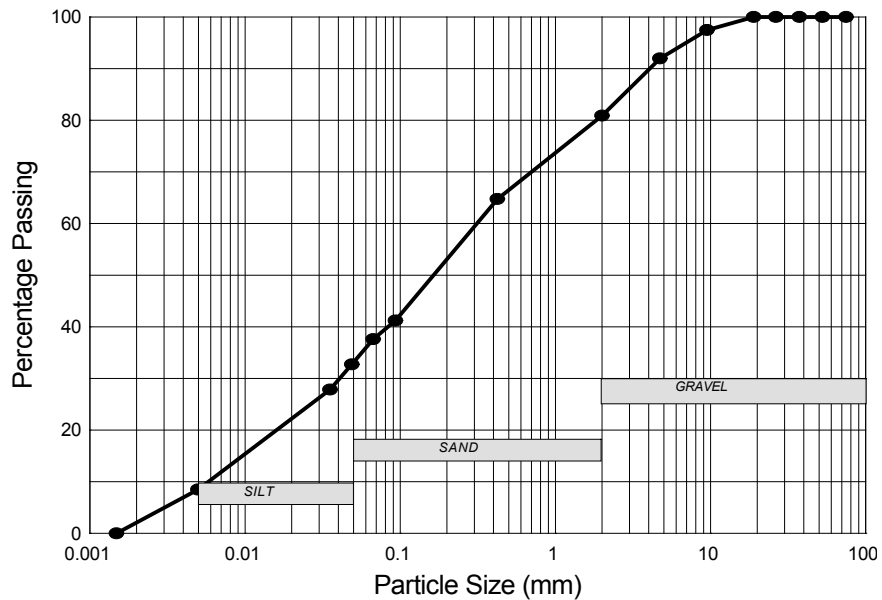
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	41.24
0.0674	37.60
0.0489	32.75
0.0354	27.90
0.0050	8.49
0.0015	0.00

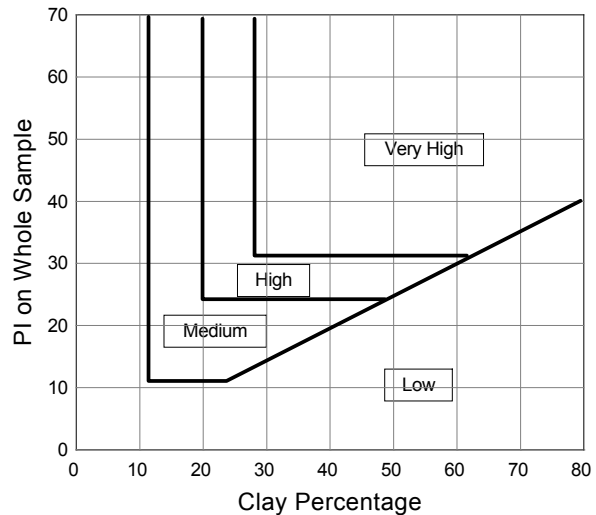
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.13
Moisture Content	1.88
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP B32	@ 0,0 - 0,5m
Date	21 AUGUST 2015	Test No	1306
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	96.98
26.50	91.96
19.00	80.48
9.50	72.09
4.75	66.93
2.00	62.32
0.425	43.38

HYDROMETER ANALYSIS

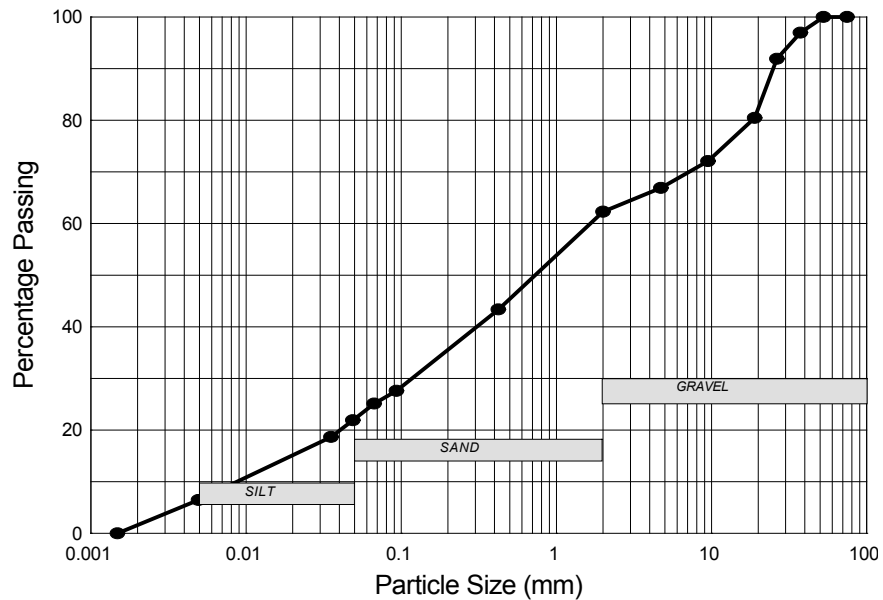
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	27.62
0.0674	25.19
0.0489	21.94
0.0354	18.69
0.0050	6.50
0.0015	0.00

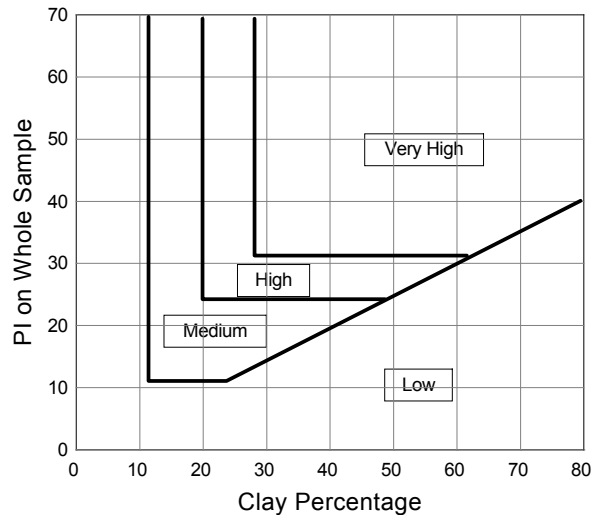
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.67
Moisture Content	1.84
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP C26 @ 0,0 - 0,35m	
Date	21 AUGUST 2015	Test No	1286
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	96.88
26.50	95.21
19.00	67.51
9.50	43.78
4.75	30.10
2.00	23.84
0.425	13.07

HYDROMETER ANALYSIS

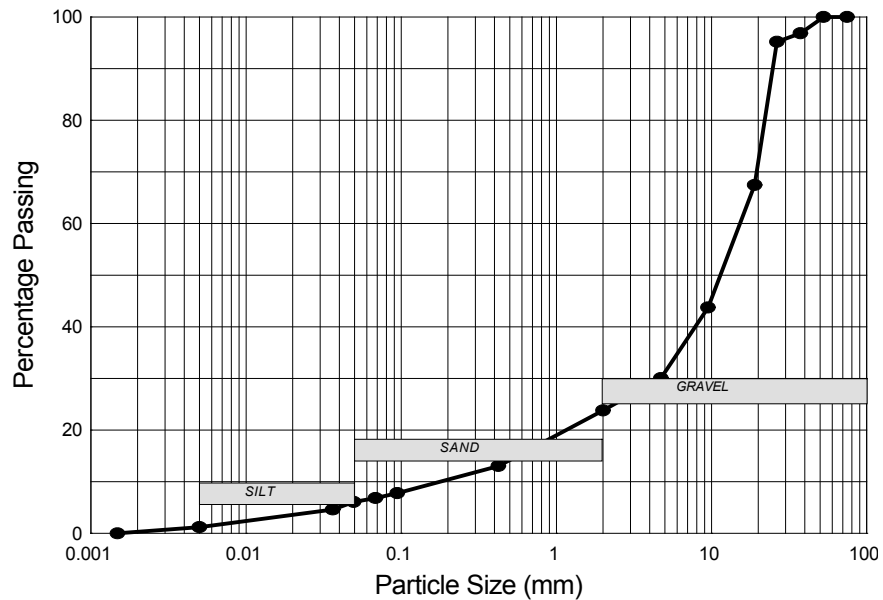
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	7.83
0.0687	6.85
0.0495	6.12
0.0362	4.65
0.0050	1.22
0.0015	0.00

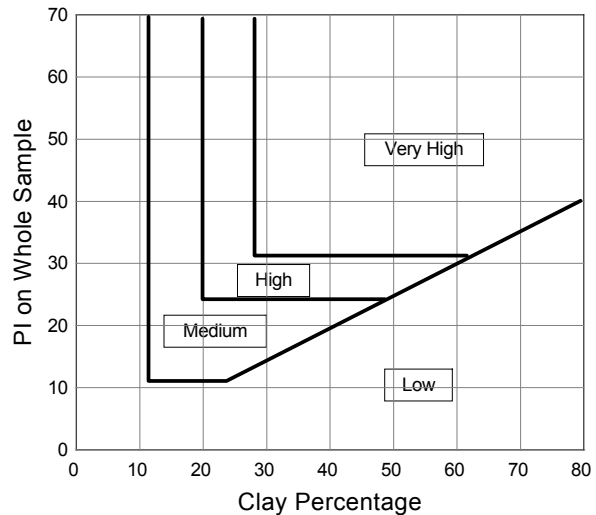
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.55
Moisture Content	1.72
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP C29	@ 0,2 - 0,6m
Date	21 AUGUST 2015	Test No	1332
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	98.71
26.50	95.74
19.00	86.75
9.50	71.23
4.75	66.65
2.00	63.27
0.425	48.93

HYDROMETER ANALYSIS

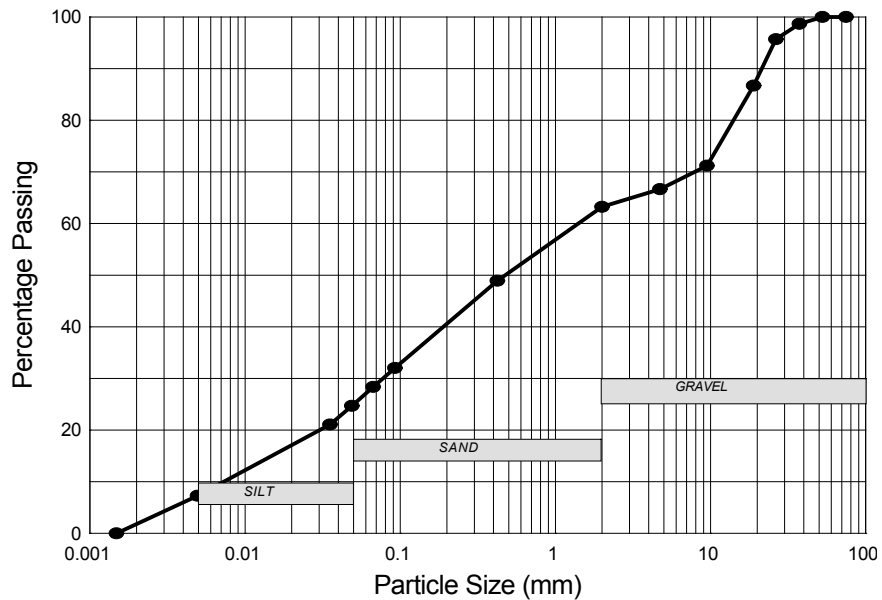
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	32.07
0.0674	28.41
0.0489	24.74
0.0354	21.08
0.0050	7.33
0.0015	0.00

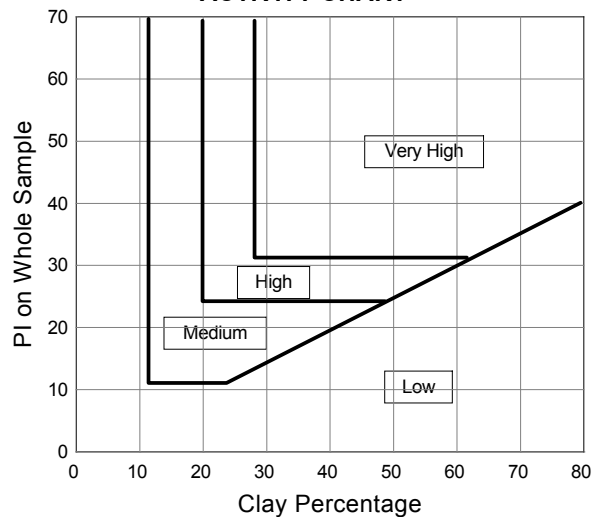
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.56
Moisture Content	2.43
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP C30 @ 0,0 - 0,4m	
Date	21 AUGUST 2015	Test No	1285
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	97.89
26.50	97.02
19.00	76.47
9.50	61.78
4.75	47.83
2.00	40.68
0.425	33.01

HYDROMETER ANALYSIS

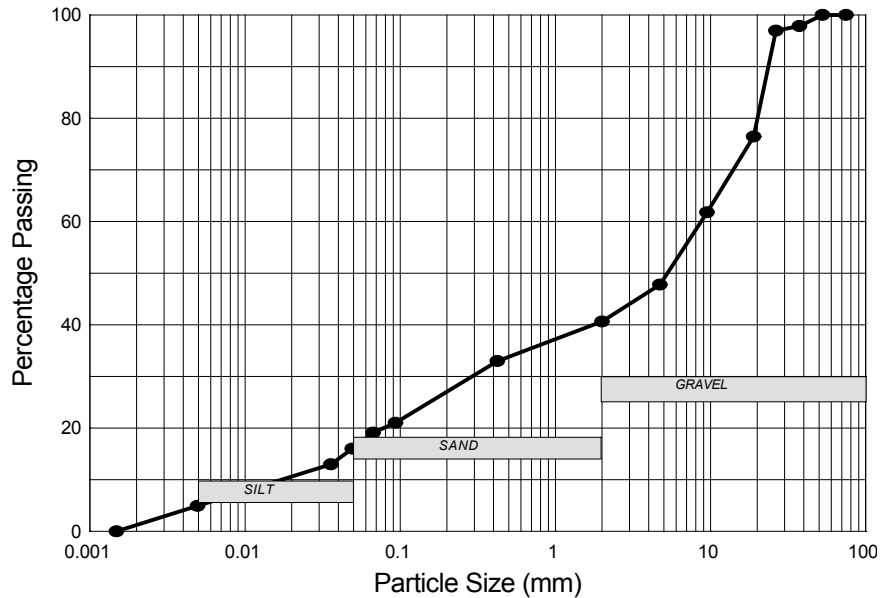
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	21.02
0.0674	19.16
0.0492	16.07
0.0358	12.98
0.0050	4.94
0.0015	0.00

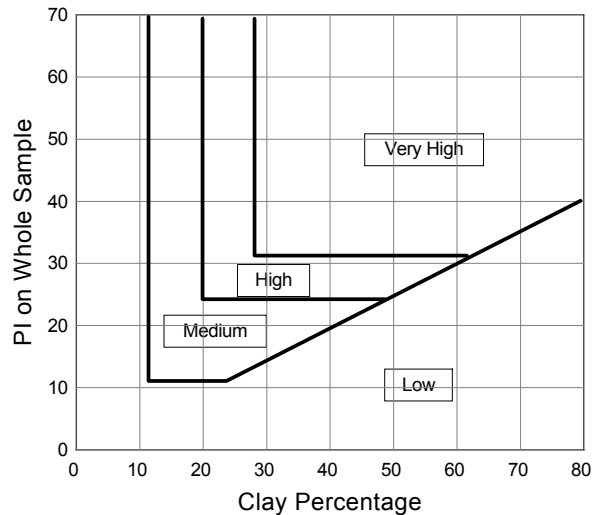
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.05
Moisture Content	1.77
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOK - SITE 5	TP C32	@ 0,0 - 0,7m
Date	21 AUGUST 2015	Test No	1284
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	87.20
26.50	79.74
19.00	67.15
9.50	61.50
4.75	59.86
2.00	55.82
0.425	42.47

HYDROMETER ANALYSIS

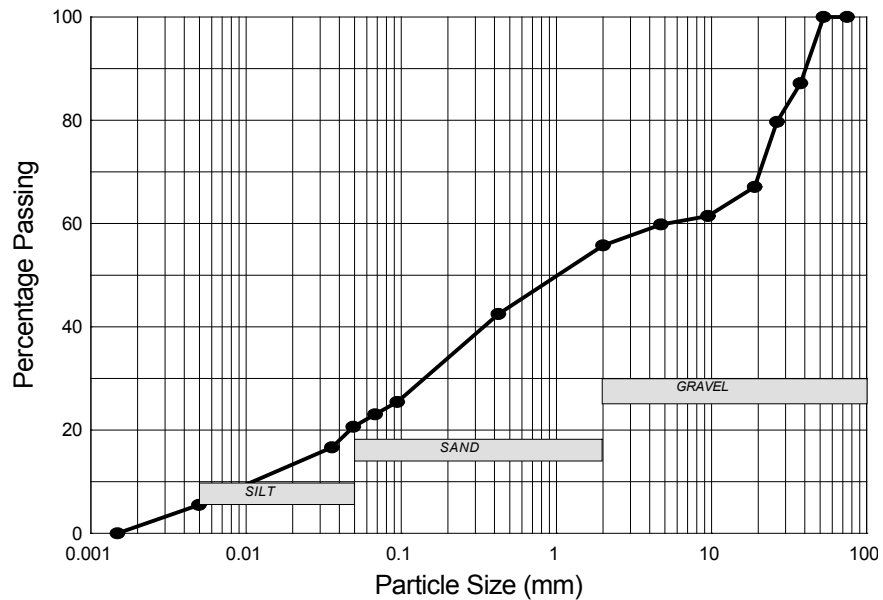
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	25.45
0.0682	23.07
0.0492	20.68
0.0358	16.70
0.0050	5.57
0.0015	0.00

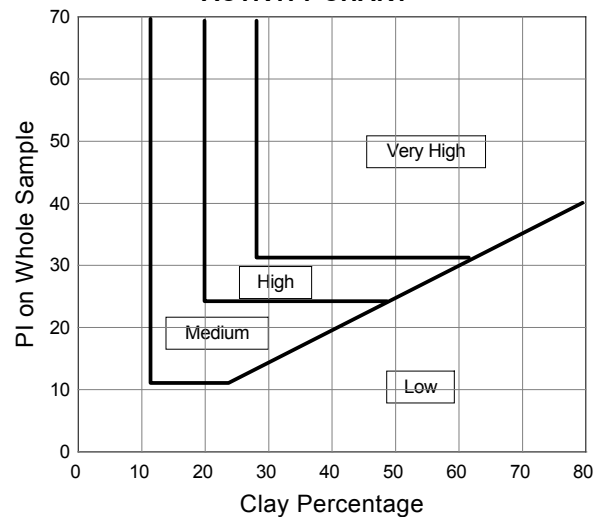
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.76
Moisture Content	2.03
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP D27 @ 0,1 - 0,4m	
Date	21 AUGUST 2015	Test No	1287
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	77.92
26.50	68.66
19.00	57.36
9.50	53.14
4.75	51.47
2.00	45.90
0.425	34.50

HYDROMETER ANALYSIS

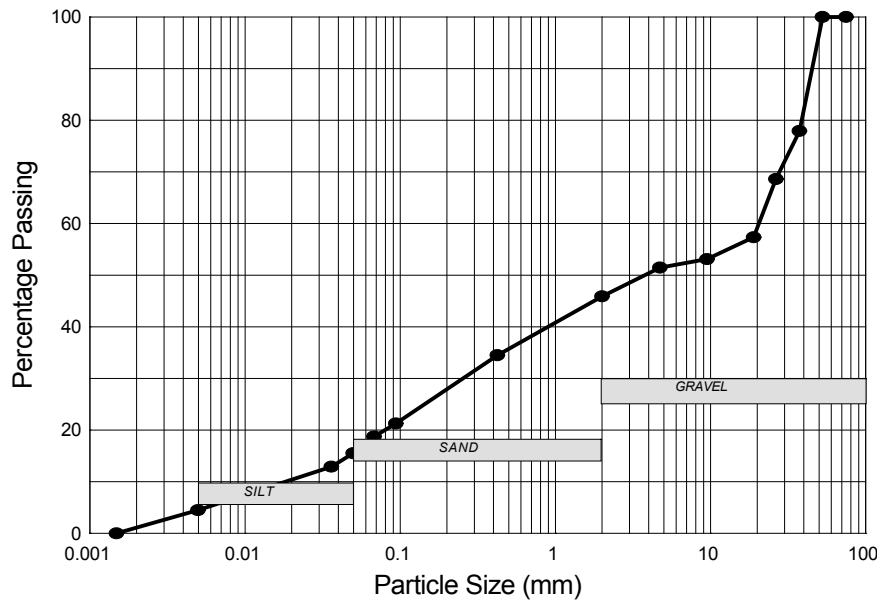
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	21.32
0.0682	18.74
0.0498	15.51
0.0360	12.92
0.0050	4.52
0.0015	0.00

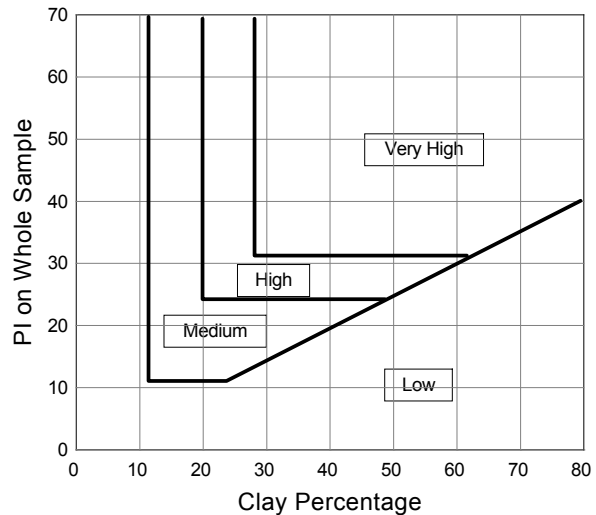
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.98
Moisture Content	1.20
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5 TP D27 @ 0,1 - 0,4m		
Date	22 AUGUST 2015	Test No	1288
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

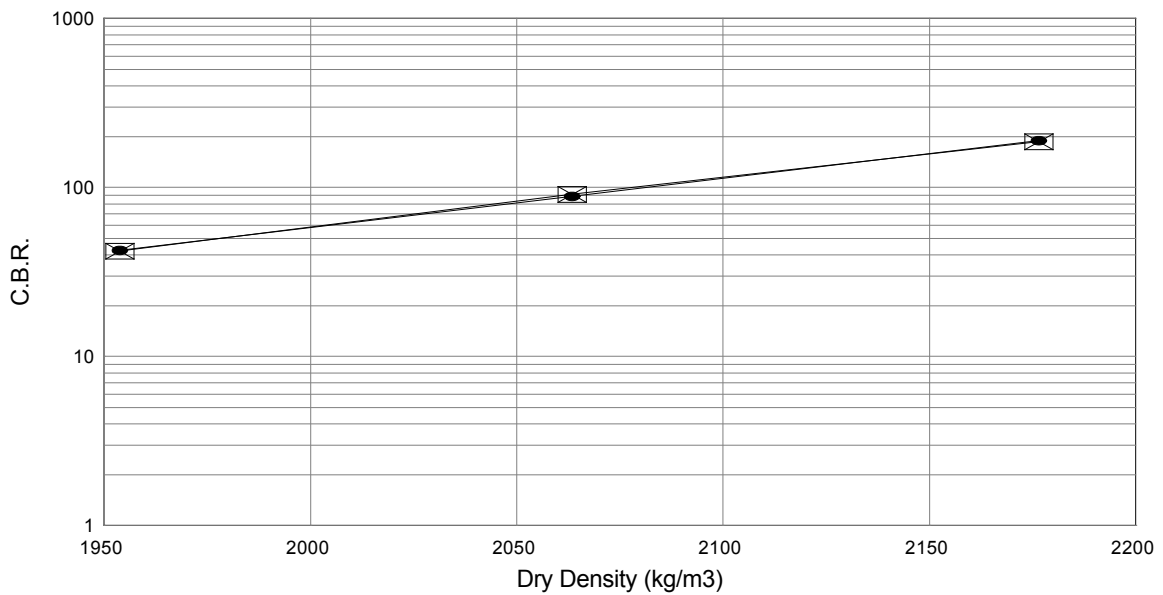
Maximum Dry Density (kg/m3)	2174
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Optimum Moisture Content (%)	5.3
------------------------------	-----

Percentage Mod AASHTO	100.1	94.9	89.9
CBR @ 2.54mm	187	91	42
CBR @ 5.08mm	189	92	44
CBR@ 7.62mm	190	94	46
Average Moisture Content (%)	5.0		
Percentage Swell	0.02	0.05	0.06

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	43	67	90	139	186



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP D29 @ 0,1 - 0,35m	
Date	21 AUGUST 2015	Test No	1320
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	97.05
26.50	92.50
19.00	70.28
9.50	53.90
4.75	36.98
2.00	31.49
0.425	18.65

HYDROMETER ANALYSIS

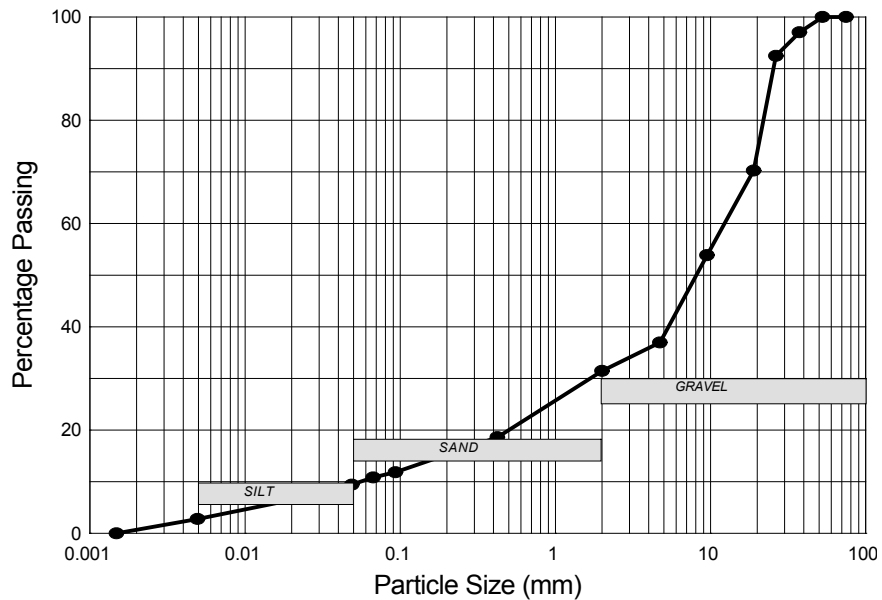
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	11.88
0.0674	10.83
0.0489	9.43
0.0354	8.03
0.0050	2.79
0.0015	0.00

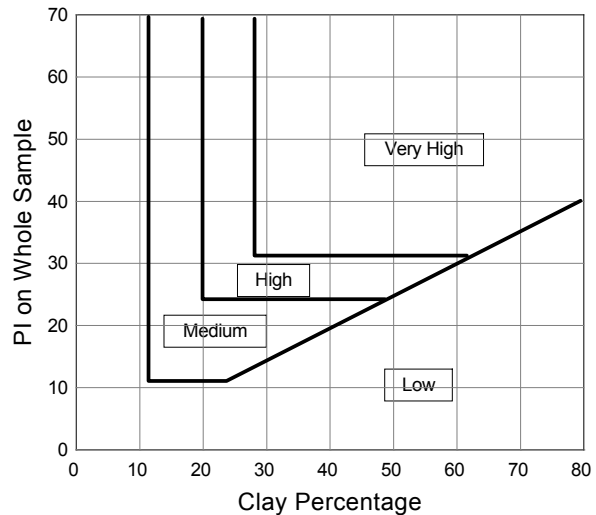
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.38
Moisture Content	1.62
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP D30 @ 0,1 - 0,4m	
Date	21 AUGUST 2015	Test No	1289
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	98.72
4.75	96.75
2.00	92.19
0.425	66.40

HYDROMETER ANALYSIS

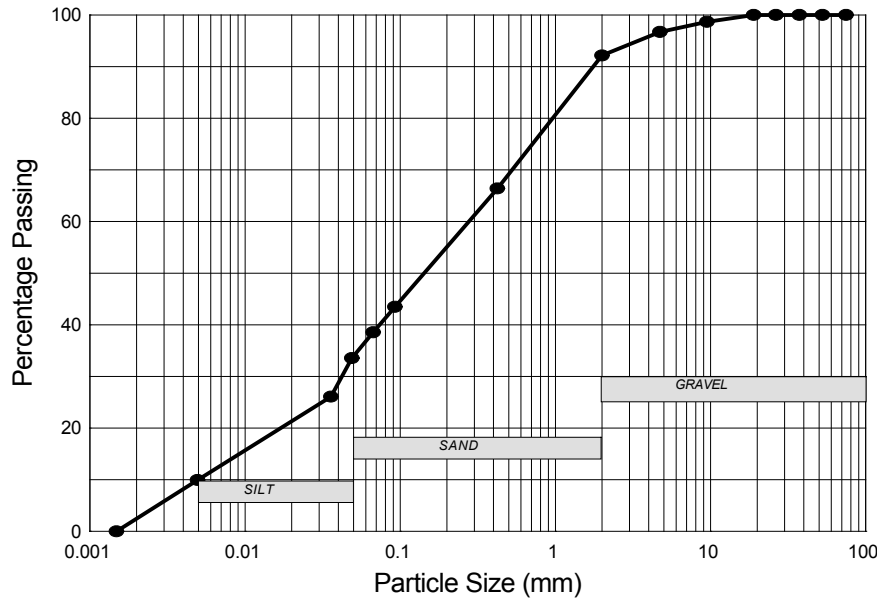
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	43.52
0.0674	38.55
0.0489	33.57
0.0358	26.11
0.0050	9.95
0.0015	0.00

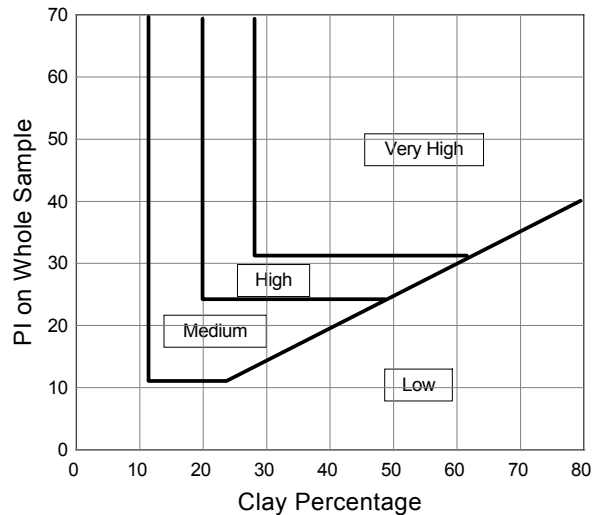
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.98
Moisture Content	2.23
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP D31	@ 0,0 - 0,2m
Date	21 AUGUST 2015	Test No	1321
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	85.10
26.50	78.65
19.00	69.78
9.50	64.58
4.75	62.15
2.00	55.99
0.425	48.30

HYDROMETER ANALYSIS

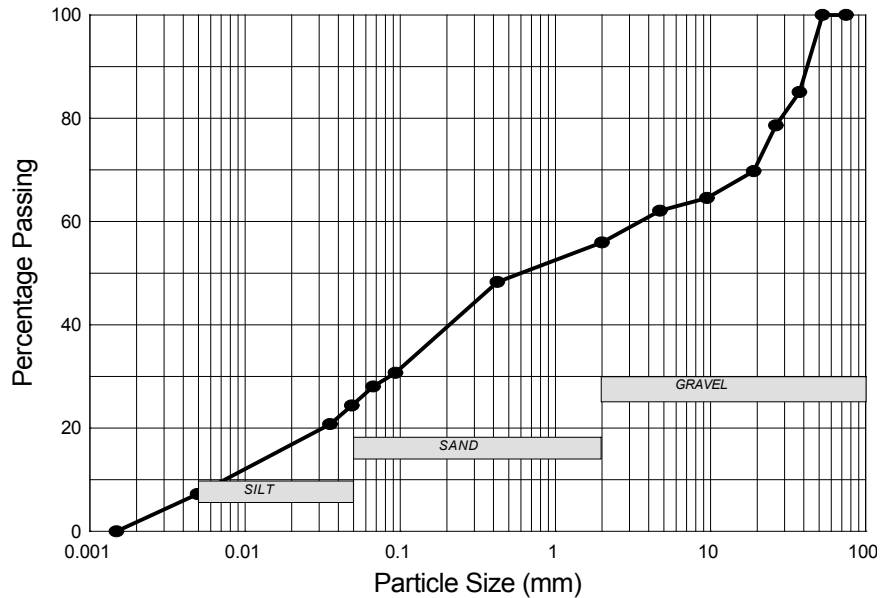
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	30.75
0.0674	28.04
0.0489	24.42
0.0354	20.80
0.0050	7.24
0.0015	0.00

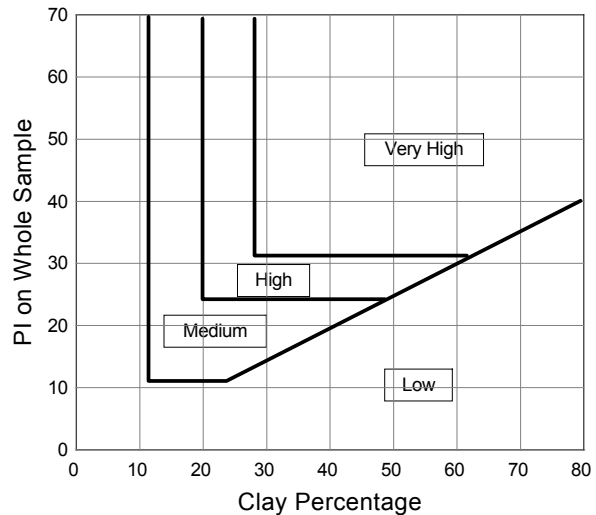
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.65
Moisture Content	1.18
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP D32 @ 0,0 - 0,4m	
Date	21 AUGUST 2015	Test No	1322
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	98.07
4.75	94.93
2.00	88.59
0.425	60.85

HYDROMETER ANALYSIS

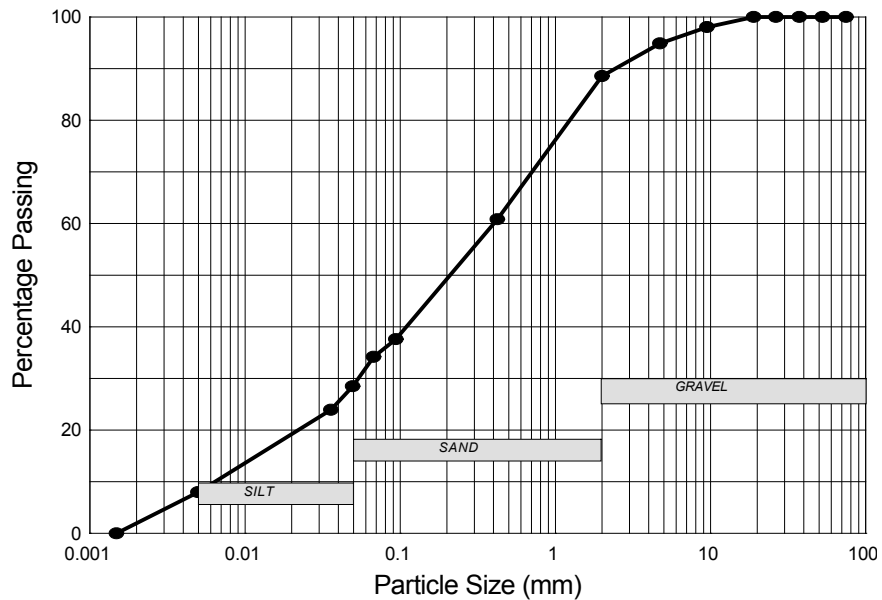
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	37.60
0.0678	34.19
0.0495	28.49
0.0358	23.93
0.0050	7.98
0.0015	0.00

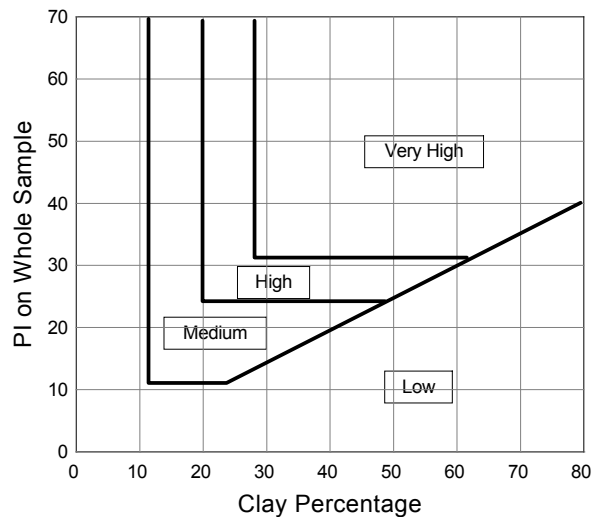
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.13
Moisture Content	1.76
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP E26 @ 0,2 - 0,7m	
Date	21 AUGUST 2015	Test No	1297
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	93.71
26.50	91.03
19.00	81.35
9.50	75.38
4.75	71.15
2.00	66.97
0.425	51.96

HYDROMETER ANALYSIS

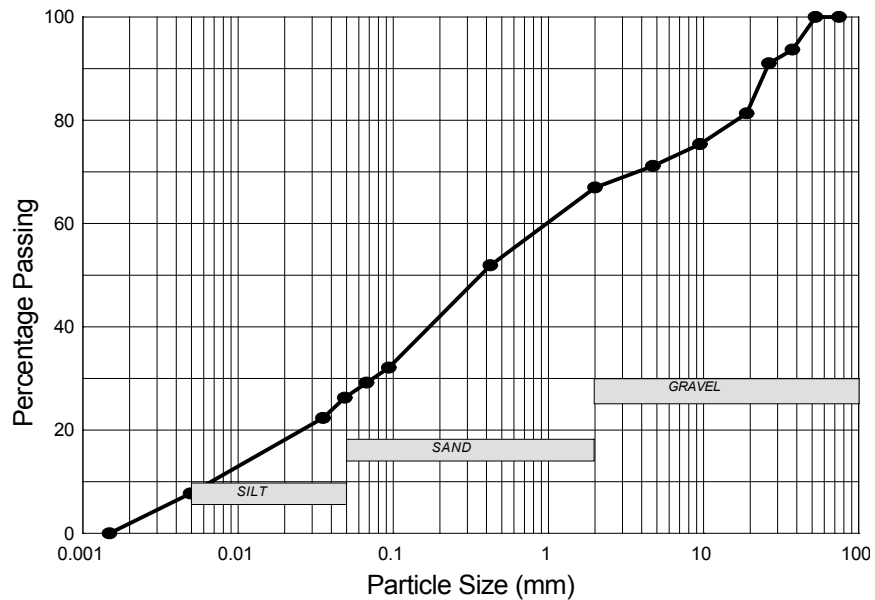
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	32.11
0.0678	29.19
0.0489	26.27
0.0354	22.38
0.0050	7.78
0.0015	0.00

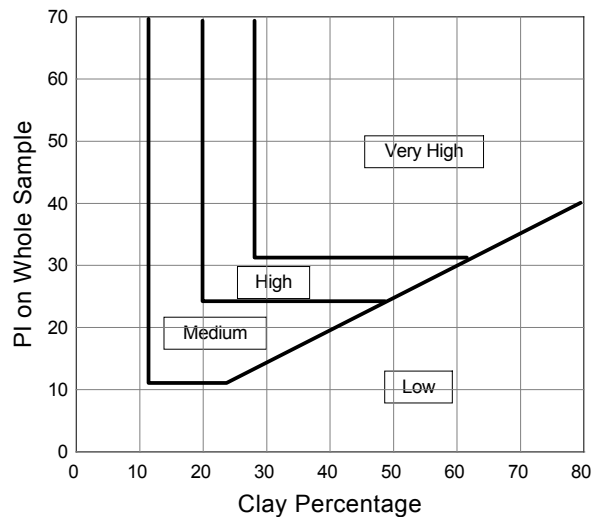
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.49
Moisture Content	2.27
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP E27	@ 0,0 - 0,8m
Date	21 AUGUST 2015	Test No	1295
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	85.90
9.50	78.85
4.75	65.86
2.00	51.86
0.425	36.24

HYDROMETER ANALYSIS

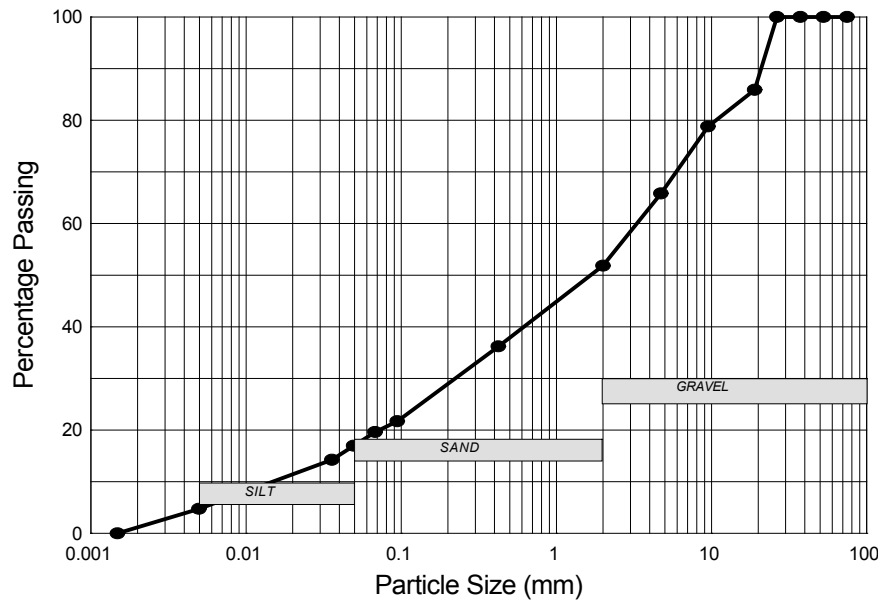
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	21.72
0.0682	19.68
0.0495	16.97
0.0358	14.25
0.0050	4.75
0.0015	0.00

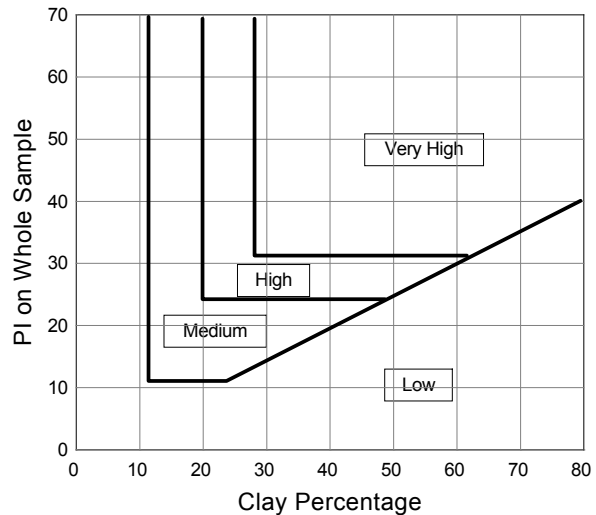
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.90
Moisture Content	1.26
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5 TP E27 @ 0,0 - 0,8m		
Date	22 AUGUST 2015	Test No	1296
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

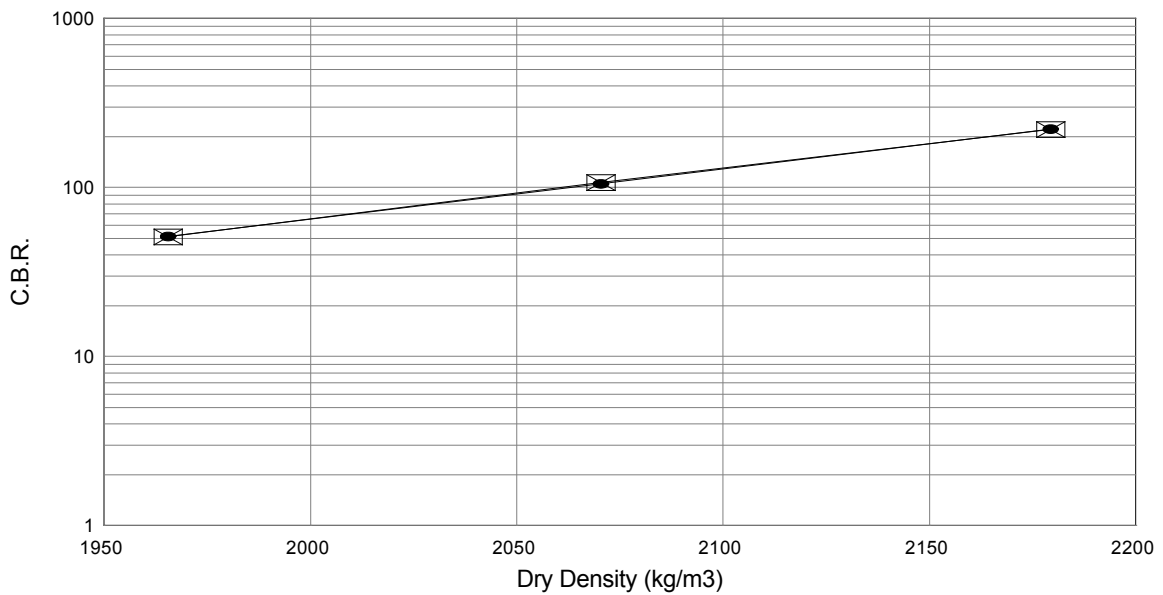
Maximum Dry Density (kg/m3)	2183
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Optimum Moisture Content (%)	5.4
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Percentage Mod AASHTO	99.9	94.9	90.1
CBR @ 2.54mm	220	107	51
CBR @ 5.08mm	240	110	53
CBR@ 7.62mm	266	121	56
Average Moisture Content (%)	5.1		
Percentage Swell	0.05	0.05	0.06

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	51	80	108	168	227



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOK - SITE 5	TP E28 @ 0,6 - 1,0m	
Date	21 AUGUST 2015	Test No	1293
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	95.50
26.50	94.26
19.00	89.13
9.50	82.53
4.75	70.39
2.00	55.55
0.425	29.35

HYDROMETER ANALYSIS

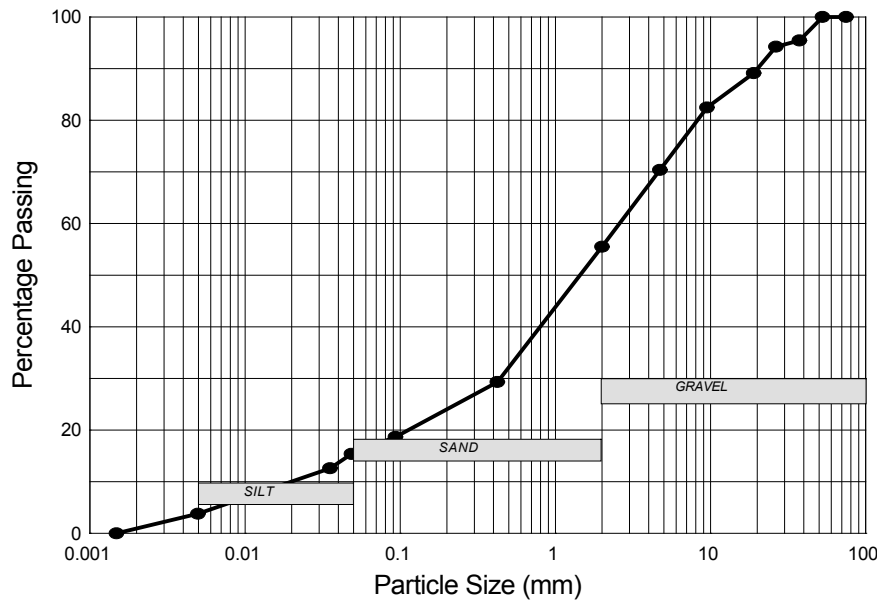
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	18.69
0.0674	17.04
0.0486	15.39
0.0354	12.64
0.0050	3.85
0.0015	0.00

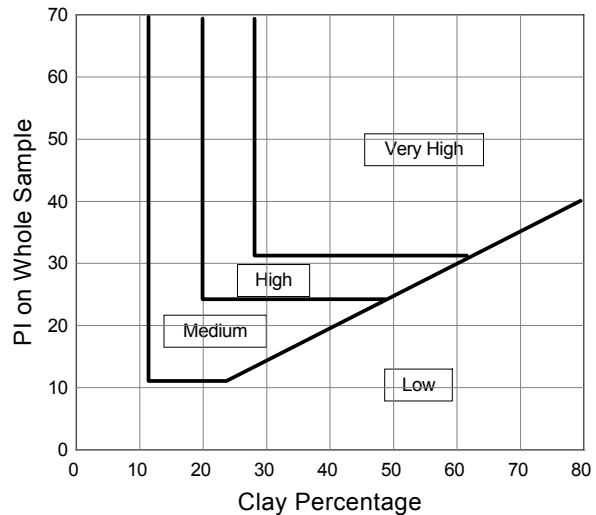
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.96
Moisture Content	0.71
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP E28 @ 0,6 - 1,0m	
Date	22 AUGUST 2015	Test No	1294
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

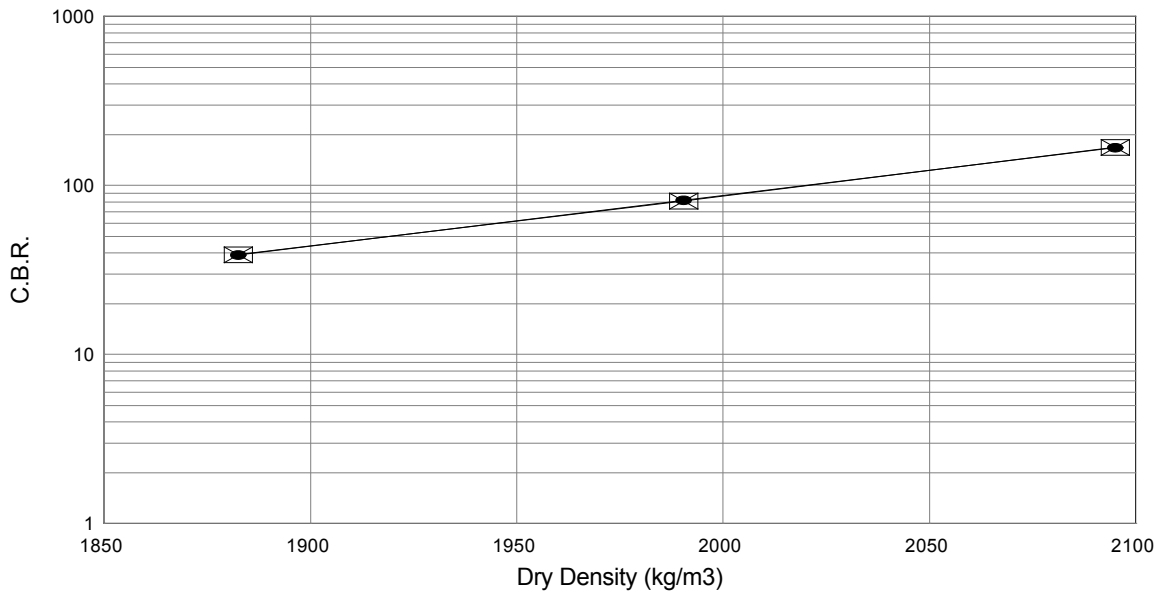
Maximum Dry Density (kg/m3)	2093
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Optimum Moisture Content (%)	7.3
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Percentage Mod AASHTO	100.1	95.1	89.9
CBR @ 2.54mm	168	81	39
CBR @ 5.08mm	173	83	41
CBR@ 7.62mm	176	86	43
Average Moisture Content (%)	7.3		
Percentage Swell	0.02	0.03	0.05

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	39	60	81	124	166



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP E29 @ 0,2 - 0,5m	
Date	21 AUGUST 2015	Test No	1323
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	95.86
26.50	94.82
19.00	87.18
9.50	79.97
4.75	76.98
2.00	71.58
0.425	56.13

HYDROMETER ANALYSIS

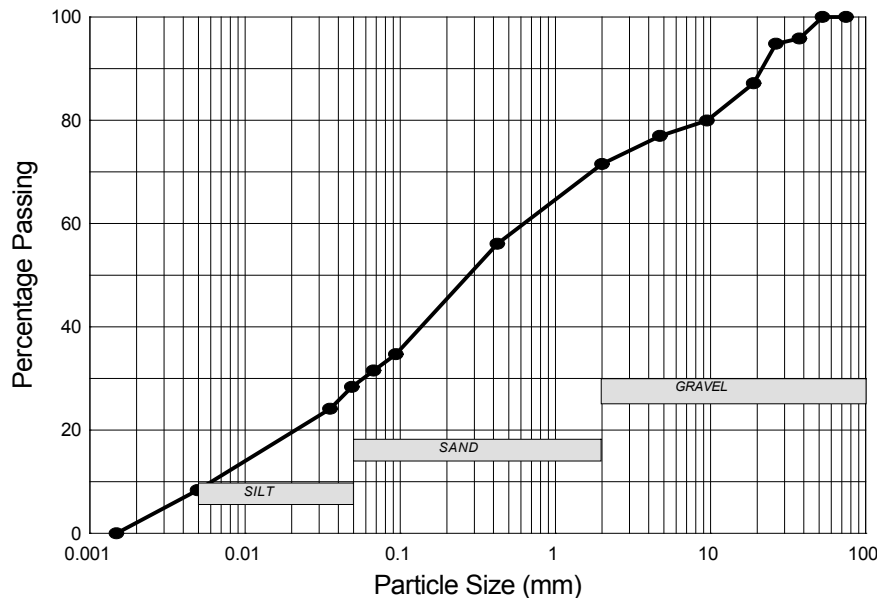
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	34.69
0.0678	31.53
0.0489	28.38
0.0354	24.18
0.0050	8.41
0.0015	0.00

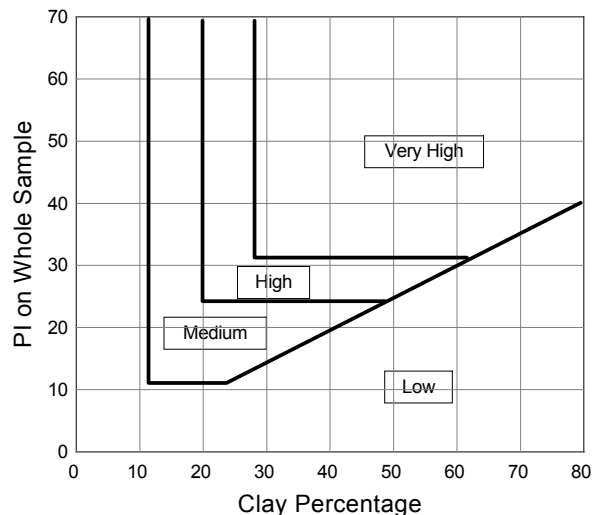
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.38
Moisture Content	2.27
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP E31	@ 0,0 - 0,5m
Date	21 AUGUST 2015	Test No	1292
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	75.73
9.50	66.46
4.75	61.67
2.00	58.37
0.425	43.54

HYDROMETER ANALYSIS

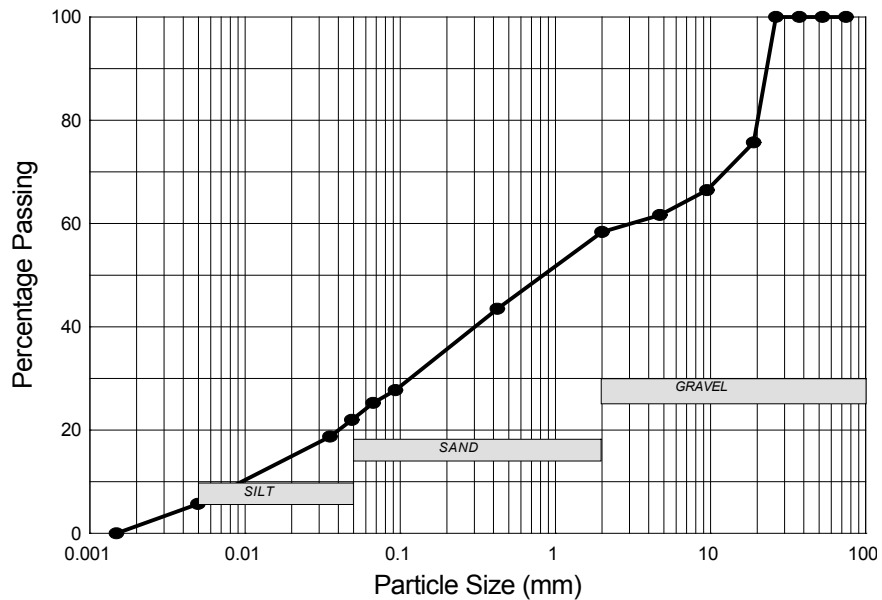
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	27.72
0.0674	25.28
0.0489	22.01
0.0354	18.75
0.0050	5.71
0.0015	0.00

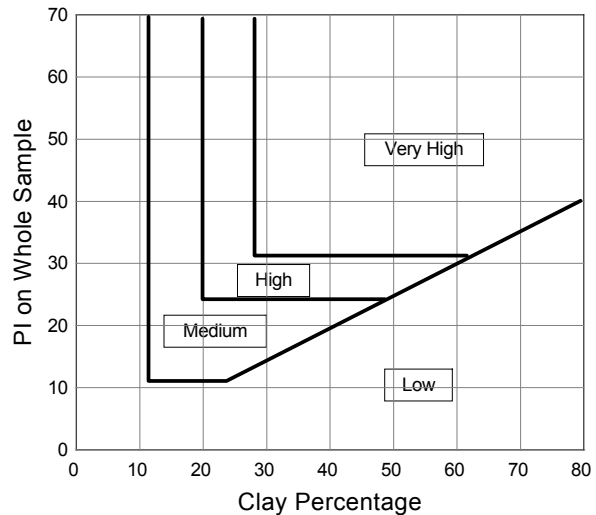
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.70
Moisture Content	3.44
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP E32 @ 0,0 - 0,8m	
Date	21 AUGUST 2015	Test No	1290
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	81.10
26.50	75.82
19.00	64.84
9.50	61.96
4.75	59.50
2.00	55.14
0.425	42.02

HYDROMETER ANALYSIS

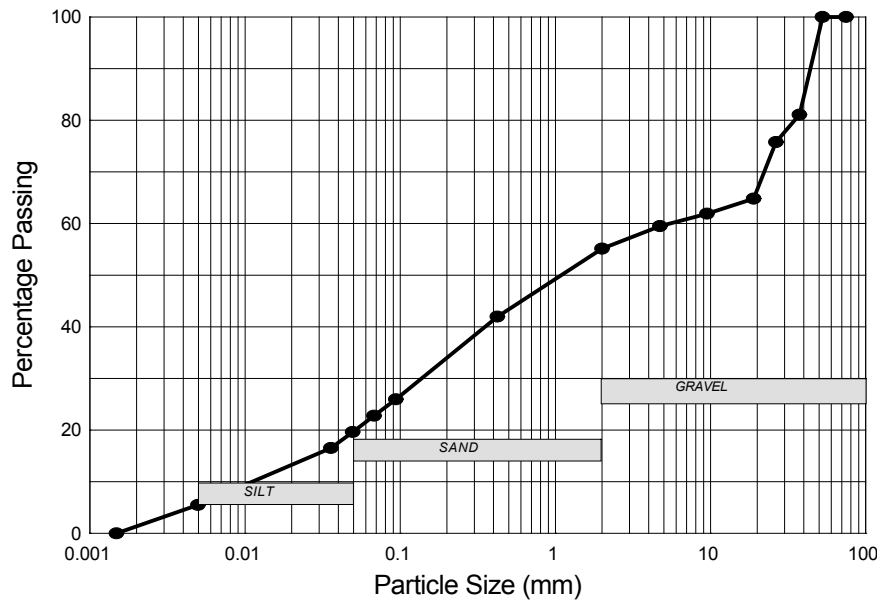
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	25.97
0.0682	22.82
0.0495	19.68
0.0358	16.53
0.0050	5.51
0.0015	0.00

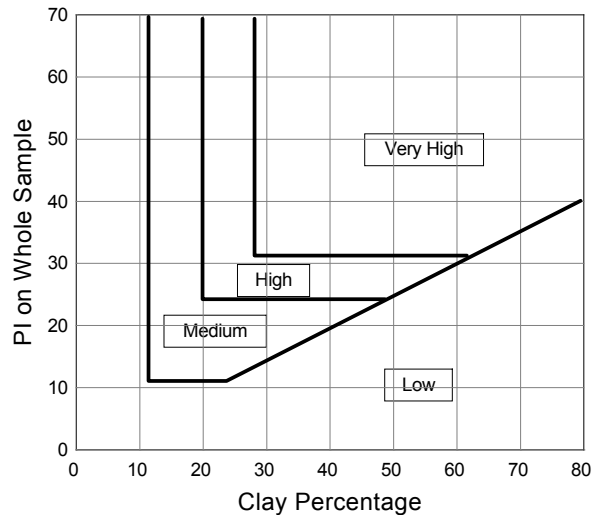
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.77
Moisture Content	1.66
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5 TP E32 @ 0,0 - 0,8m		
Date	22 AUGUST 2015	Test No	1291
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

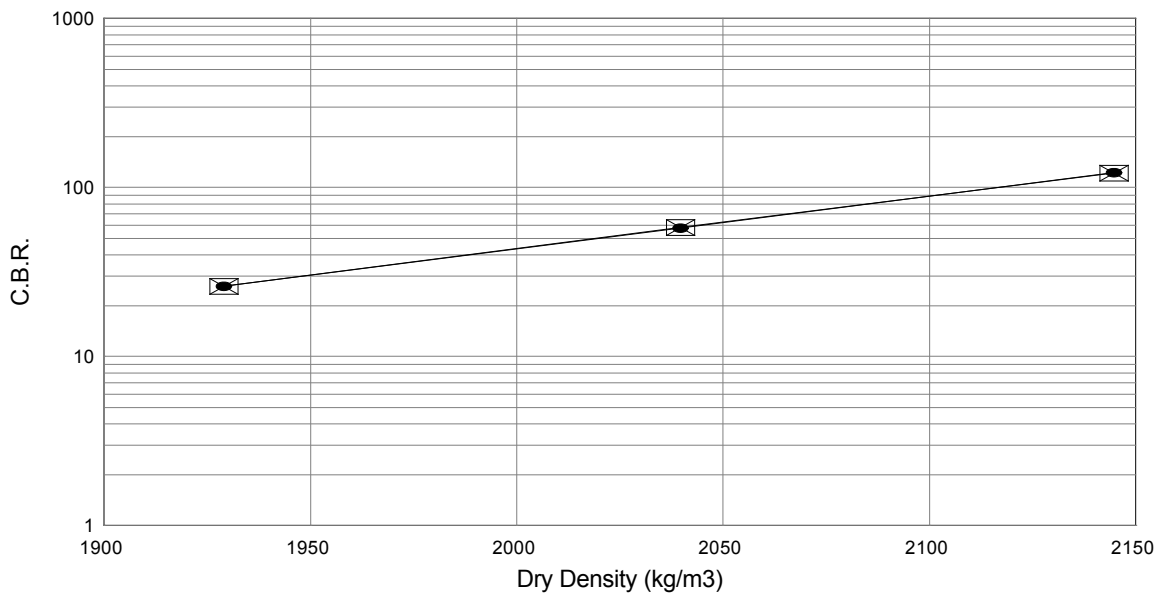
Maximum Dry Density (kg/m3)	2147
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Optimum Moisture Content (%)	7.8
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Percentage Mod AASHTO	99.9	95.0	89.9
CBR @ 2.54mm	122	58	26
CBR @ 5.08mm	124	60	28
CBR@ 7.62mm	127	62	30
Average Moisture Content (%)	7.8		
Percentage Swell	0.03	0.04	0.05

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	27	42	58	91	124



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP F26 @ 0,4 - 0,8m	
Date	21 AUGUST 2015	Test No	1298
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	82.21
9.50	65.71
4.75	51.64
2.00	38.61
0.425	20.86

HYDROMETER ANALYSIS

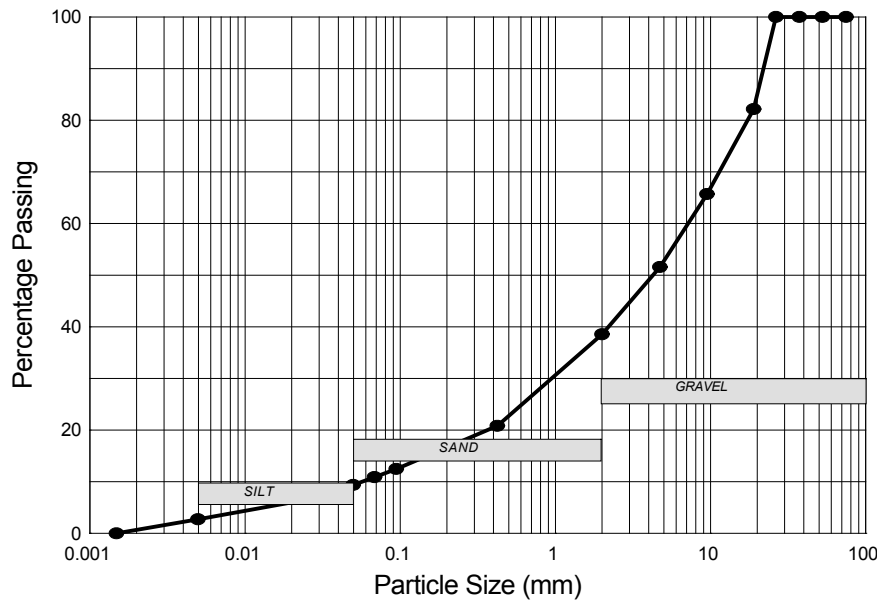
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	12.50
0.0687	10.94
0.0498	9.38
0.0362	7.42
0.0050	2.73
0.0015	0.00

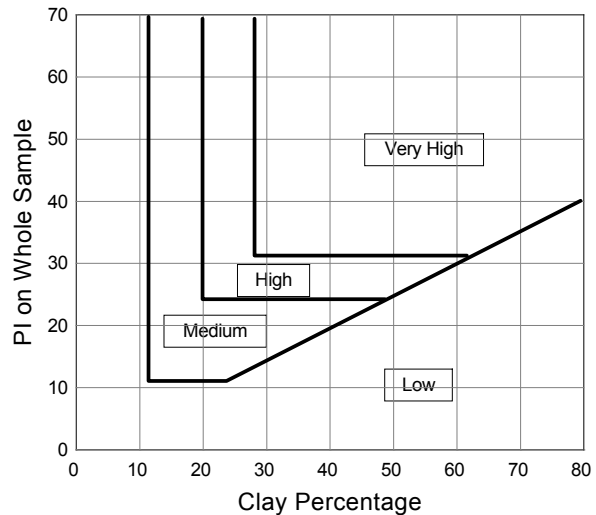
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.28
Moisture Content	1.72
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP F28 @	0,5 - 1,70m
Date	21 AUGUST 2015	Test No	1301
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	92.50
9.50	79.97
4.75	65.56
2.00	51.46
0.425	30.04

HYDROMETER ANALYSIS

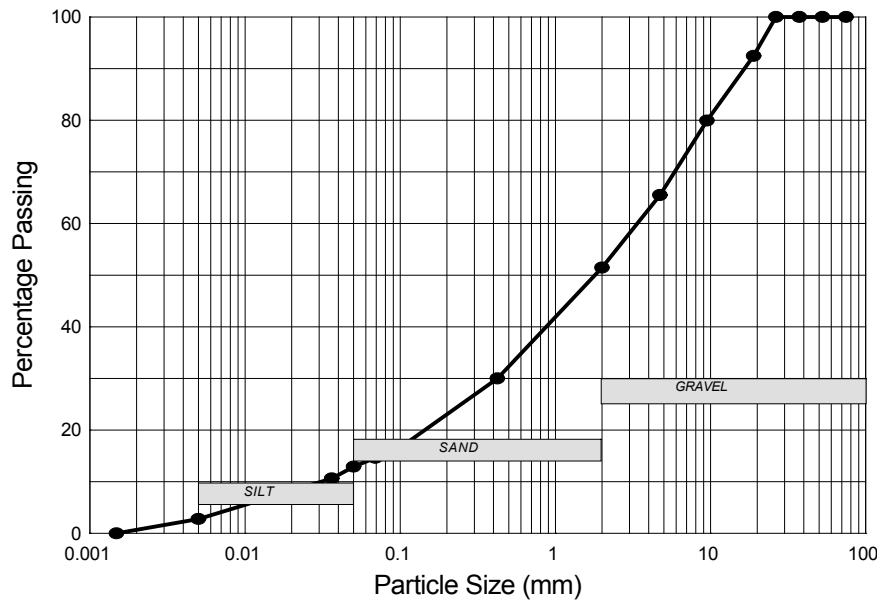
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0965	16.31
0.0695	14.62
0.0501	12.94
0.0362	10.69
0.0050	2.81
0.0015	0.00

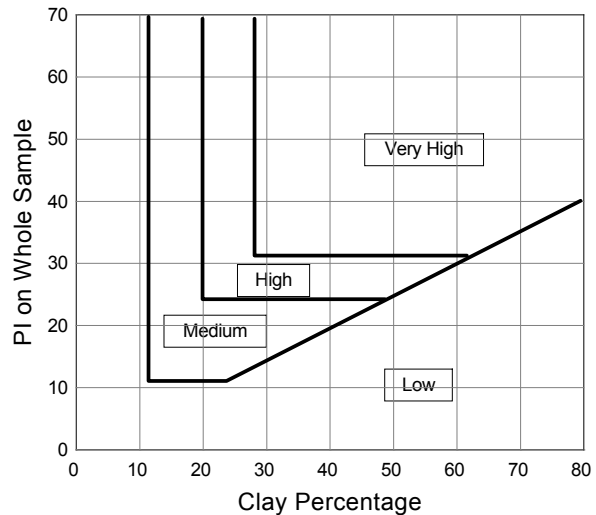
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.02
Moisture Content	1.26
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5 TP F28 @ 0,5 - 1,7m		
Date	22 AUGUST 2015	Test No	1302
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

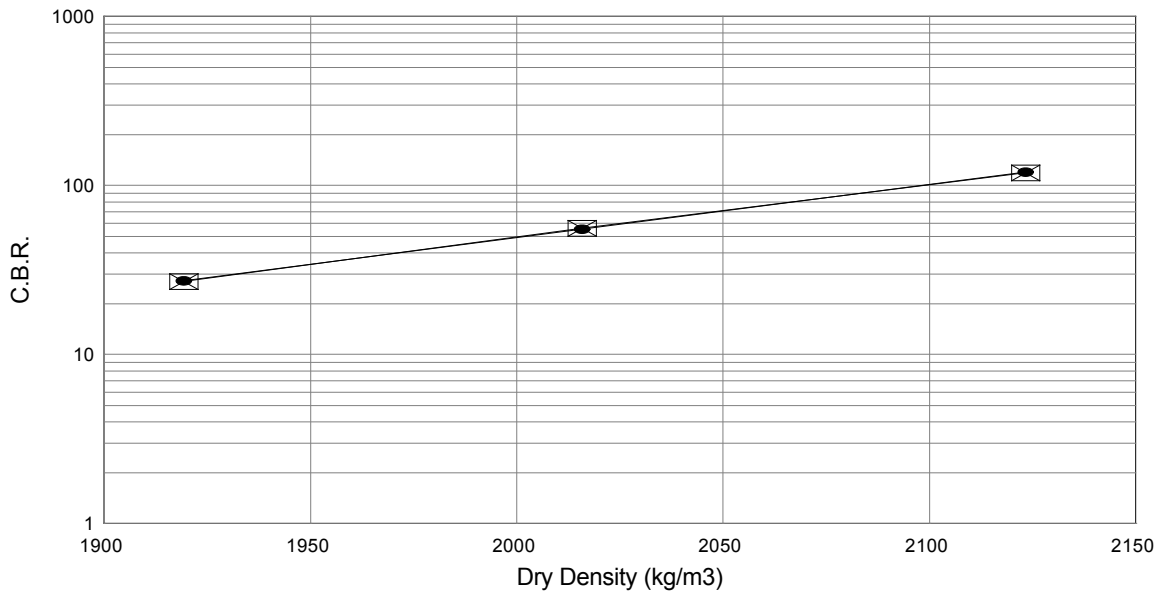
Maximum Dry Density (kg/m3)	2125
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Optimum Moisture Content (%)	7.8
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Percentage Mod AASHTO	99.9	94.9	90.3
CBR @ 2.54mm	119	56	27
CBR @ 5.08mm	125	58	27
CBR@ 7.62mm	127	60	29
Average Moisture Content (%)	7.8		
Percentage Swell	0.07	0.08	0.12

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	26	41	56	89	121



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP F29	@ 0,0 - 0,8m
Date	21 AUGUST 2015	Test No	1326
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	97.58
26.50	93.36
19.00	77.24
9.50	66.45
4.75	54.14
2.00	45.40
0.425	29.27

HYDROMETER ANALYSIS

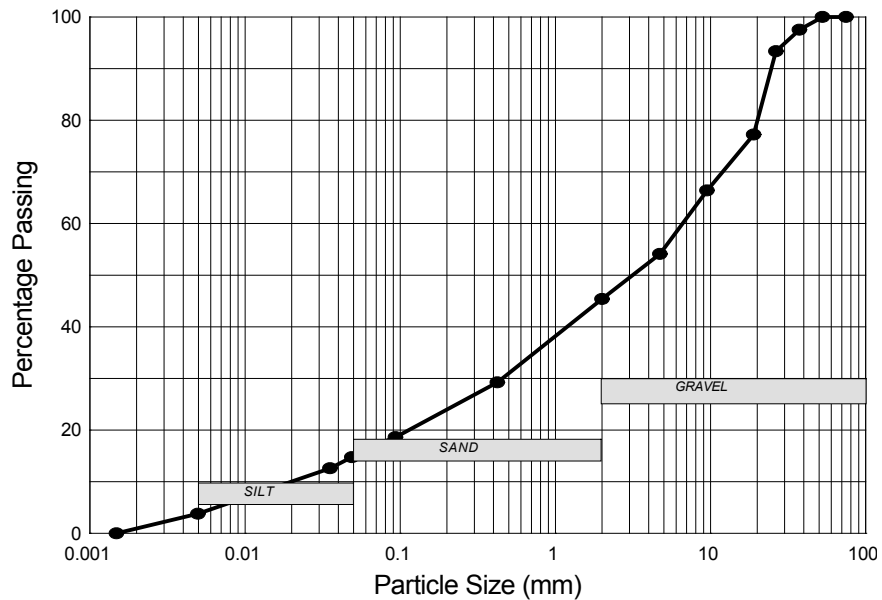
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	18.64
0.0674	16.99
0.0489	14.80
0.0354	12.61
0.0050	3.84
0.0015	0.00

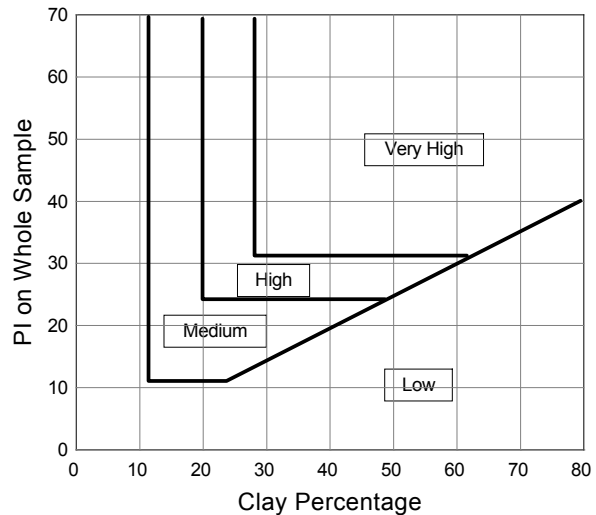
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.07
Moisture Content	1.39
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP F30	@ 0,0 - 1,4m
Date	21 AUGUST 2015	Test No	1325
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	94.46
9.50	84.80
4.75	72.90
2.00	60.21
0.425	37.61

HYDROMETER ANALYSIS

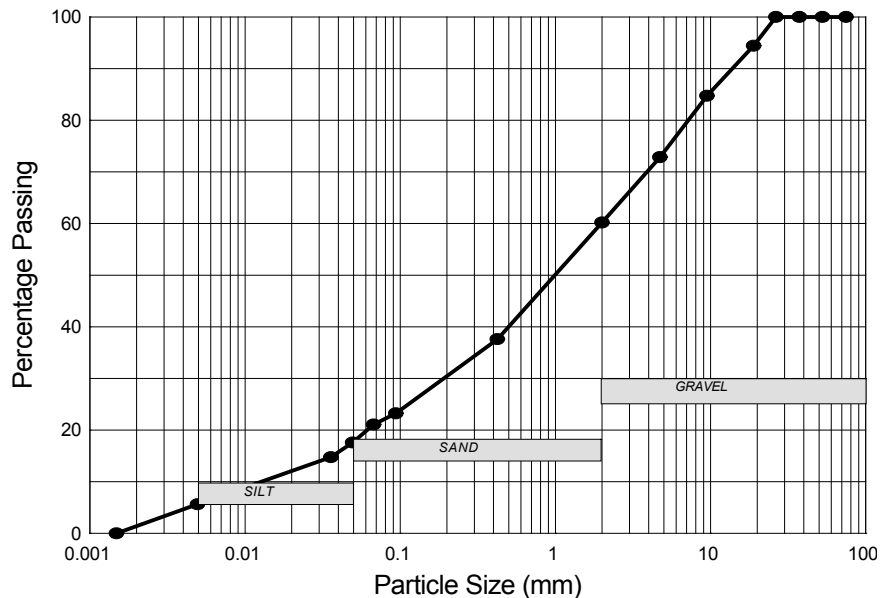
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	23.25
0.0678	21.13
0.0495	17.61
0.0358	14.79
0.0050	5.64
0.0015	0.00

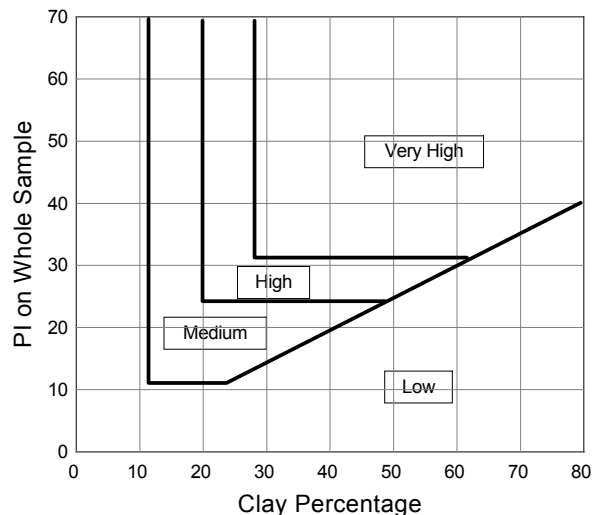
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.79
Moisture Content	1.26
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP F31	@ 0,0 - 0,8m
Date	21 AUGUST 2015	Test No	1319
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	95.64
26.50	90.05
19.00	64.91
9.50	56.51
4.75	53.65
2.00	49.44
0.425	36.56

HYDROMETER ANALYSIS

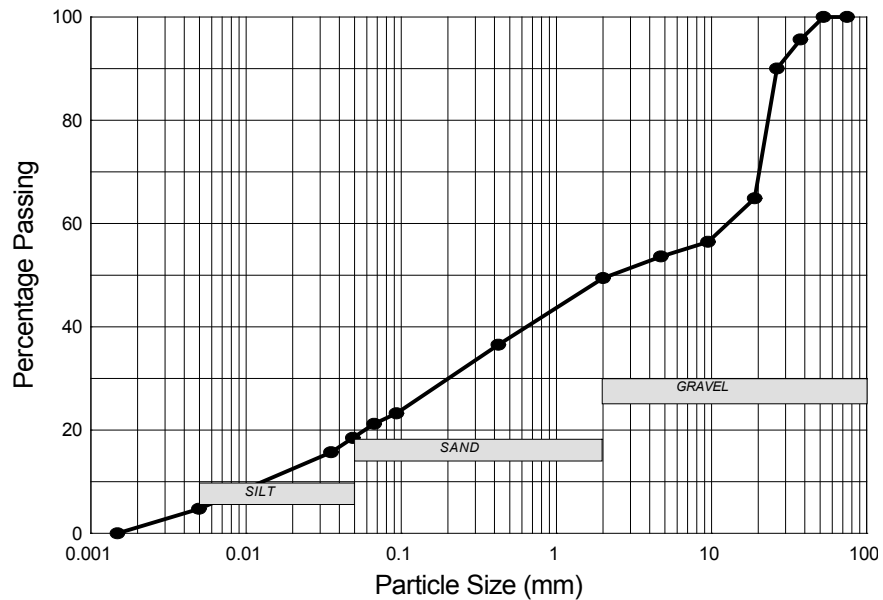
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	23.28
0.0674	21.22
0.0489	18.49
0.0354	15.75
0.0050	4.79
0.0015	0.00

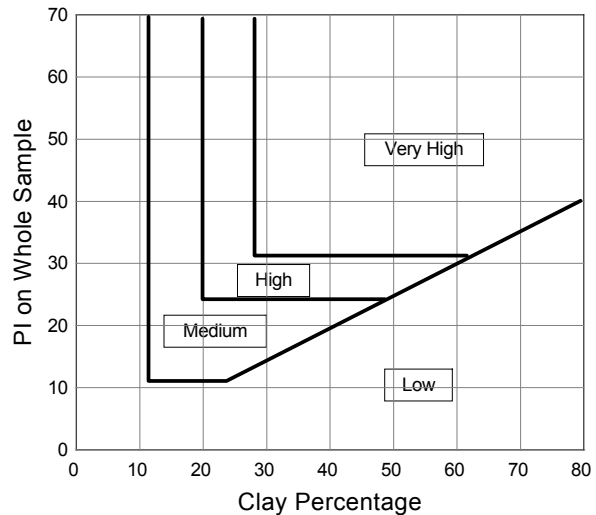
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.91
Moisture Content	2.61
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOK - SITE 5	TP F32	@ 0,6 - 0,8m
Date	21 AUGUST 2015	Test No	1300
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	95.37
26.50	89.86
19.00	72.71
9.50	60.68
4.75	46.55
2.00	34.92
0.425	21.33

HYDROMETER ANALYSIS

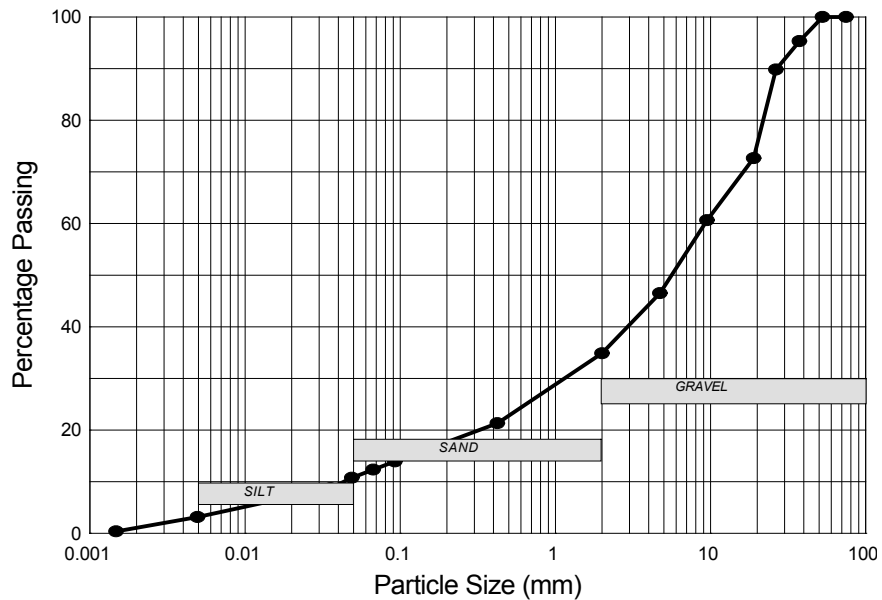
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	13.98
0.0674	12.38
0.0489	10.79
0.0356	8.79
0.0050	3.20
0.0015	0.40

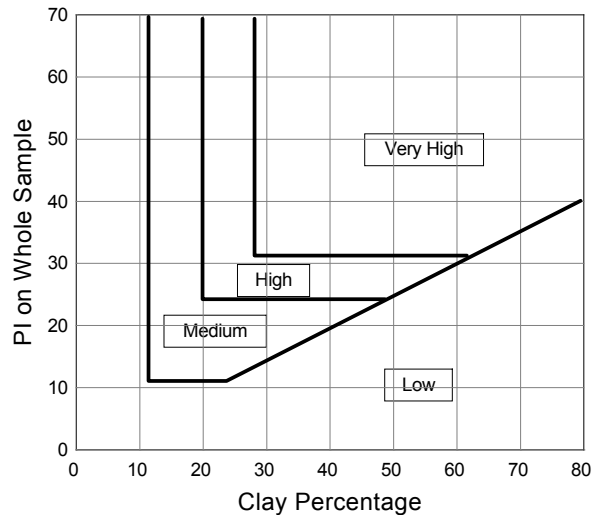
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.30
Moisture Content	2.24
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP G27 @ 0,3 - 0,5m	
Date	21 AUGUST 2015	Test No	1339
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	94.34
9.50	84.63
4.75	73.23
2.00	60.54
0.425	39.99

HYDROMETER ANALYSIS

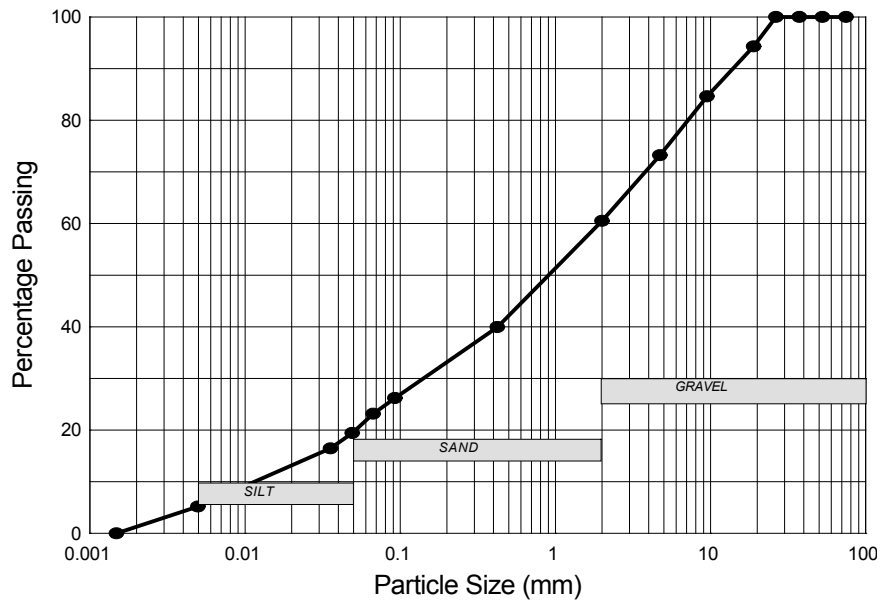
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	26.21
0.0674	23.21
0.0492	19.47
0.0356	16.47
0.0050	5.24
0.0015	0.00

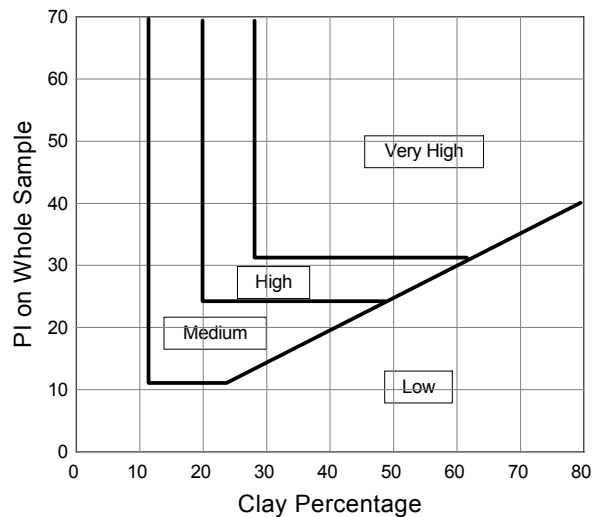
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.73
Moisture Content	1.18
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP G29 @ 0,0 - 0,3m	
Date	21 AUGUST 2015	Test No	1336
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	97.59
4.75	94.23
2.00	87.59
0.425	66.61

HYDROMETER ANALYSIS

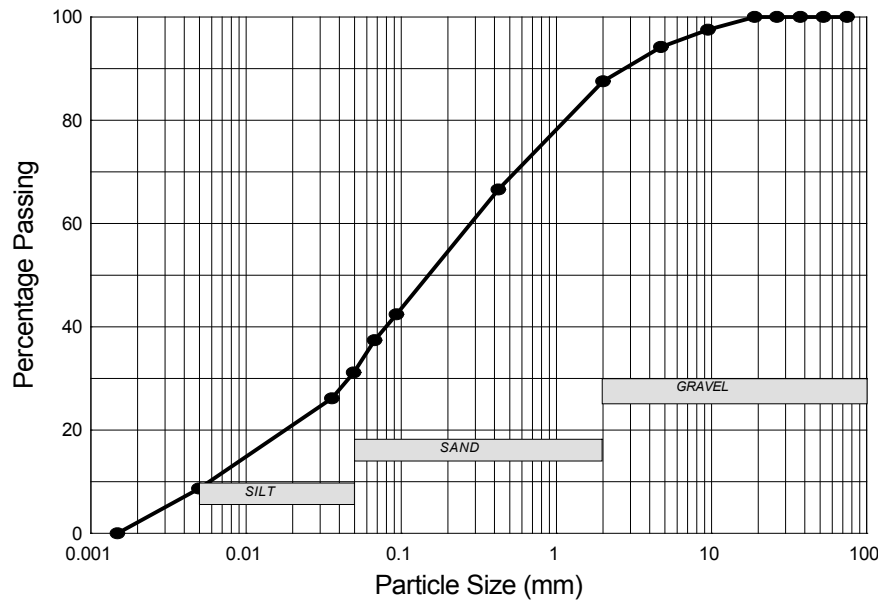
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	42.41
0.0678	37.42
0.0495	31.18
0.0358	26.19
0.0050	8.73
0.0015	0.00

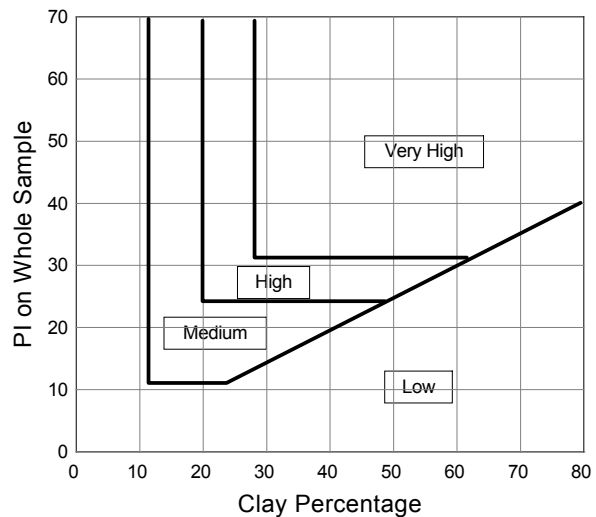
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.03
Moisture Content	2.31
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP G30	@ 0,0 - 0,3m
Date	21 AUGUST 2015	Test No	1337
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	83.63
9.50	74.60
4.75	68.76
2.00	60.71
0.425	48.32

HYDROMETER ANALYSIS

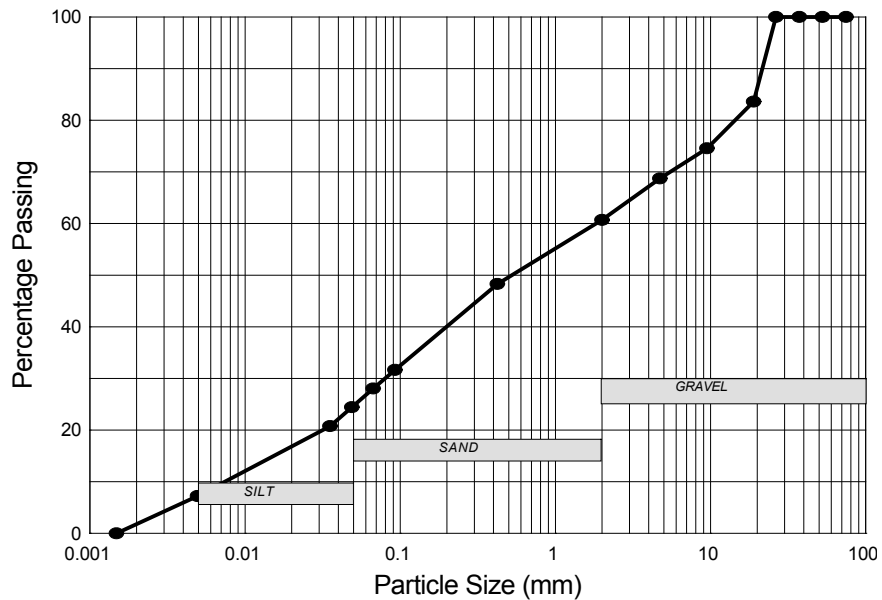
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	31.67
0.0674	28.05
0.0489	24.43
0.0354	20.81
0.0050	7.24
0.0015	0.00

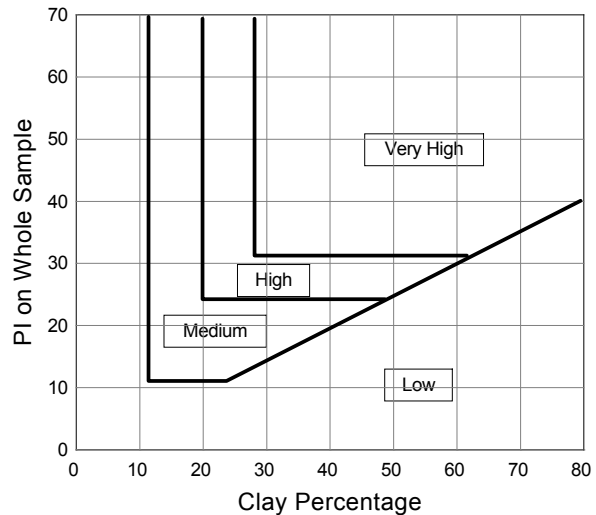
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.59
Moisture Content	1.66
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP G32	@ 0,0 - 0,4m
Date	21 AUGUST 2015	Test No	1316
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	94.76
26.50	93.10
19.00	87.74
9.50	82.78
4.75	77.51
2.00	75.03
0.425	57.56

HYDROMETER ANALYSIS

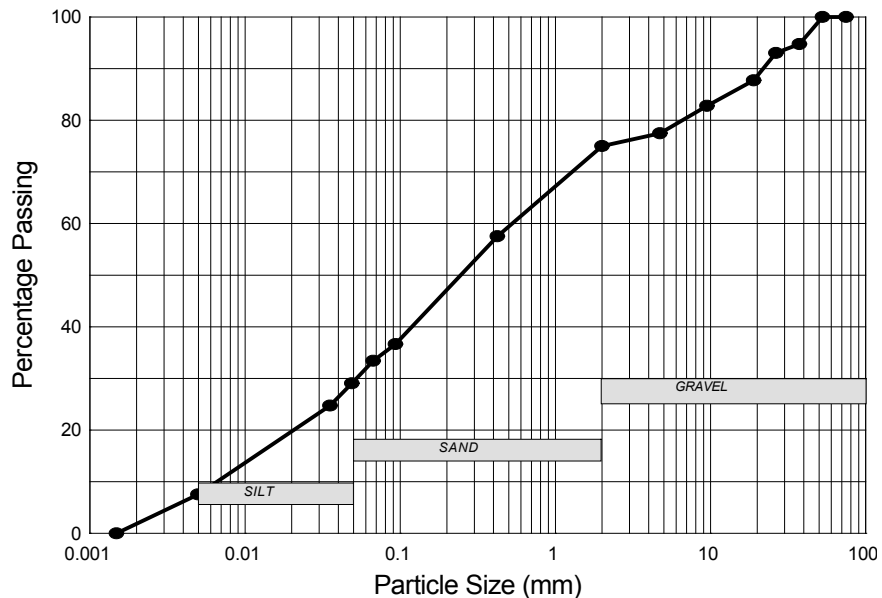
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	36.65
0.0674	33.42
0.0489	29.11
0.0354	24.79
0.0050	7.55
0.0015	0.00

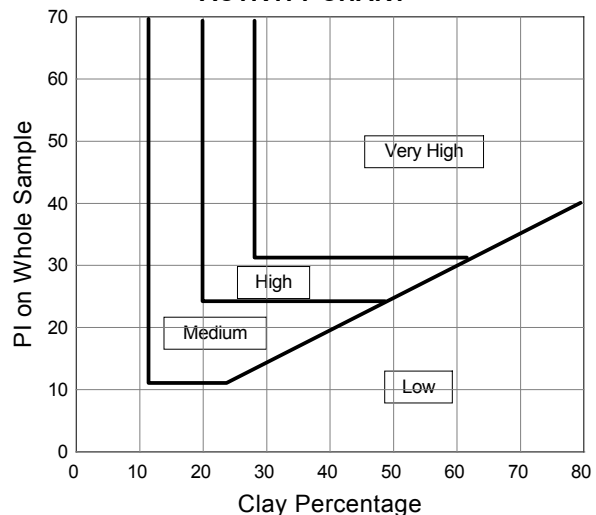
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.31
Moisture Content	1.94
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP H26 @ 0,0 - 0,4m	
Date	21 AUGUST 2015	Test No	1338
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	81.08
9.50	67.77
4.75	51.56
2.00	43.31
0.425	30.68

HYDROMETER ANALYSIS

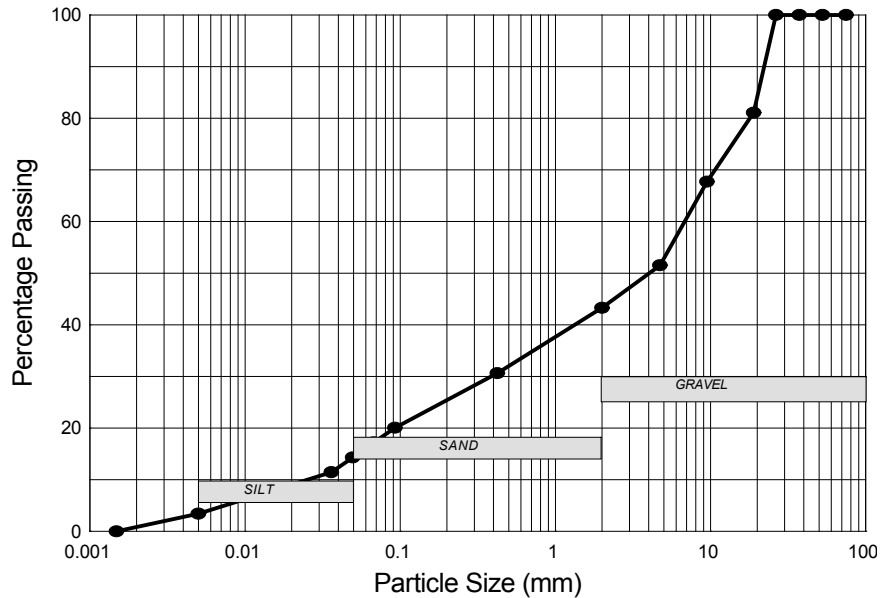
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	20.11
0.0678	17.24
0.0495	14.36
0.0360	11.49
0.0050	3.45
0.0015	0.00

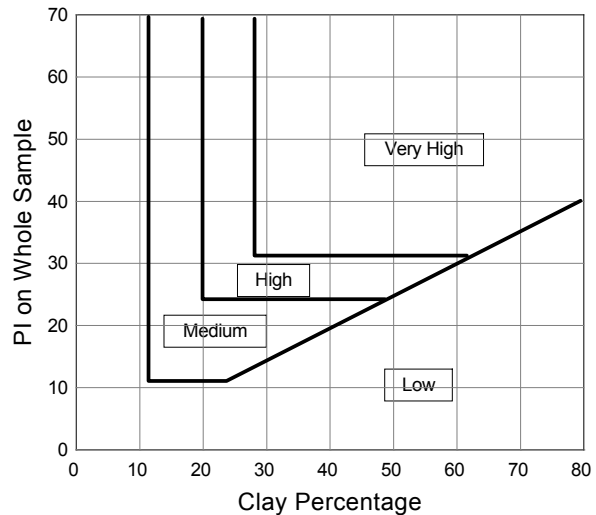
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.06
Moisture Content	1.77
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

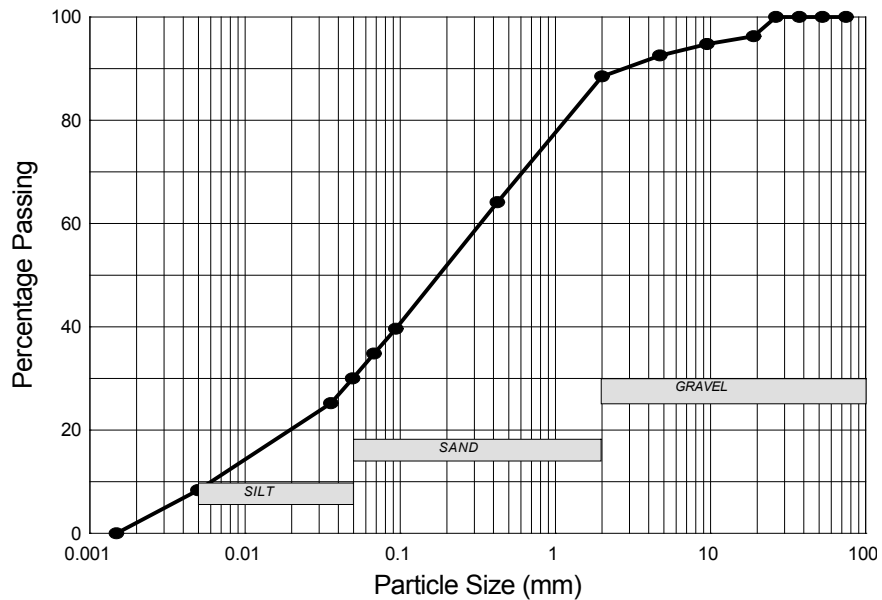
Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP H 28 @ 0,0 - 0,8m	
Date	21 AUGUST 2015	Test No	1311
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	96.28
9.50	94.80
4.75	92.57
2.00	88.48
0.425	64.15

GRADING ANALYSIS



HYDROMETER ANALYSIS

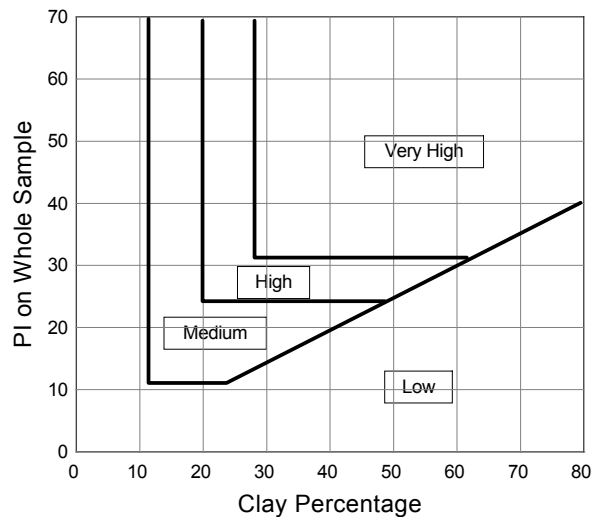
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0940	39.64
0.0682	34.84
0.0495	30.03
0.0358	25.23
0.0050	8.41
0.0015	0.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.08
Moisture Content	1.35
PI on Whole Sample	Non Plastic

ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOK - SITE 5	TP H 29 @ 0,0 - 0,4m	
Date	21 AUGUST 2015	Test No	1312
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	99.71
4.75	99.05
2.00	90.08
0.425	68.71

HYDROMETER ANALYSIS

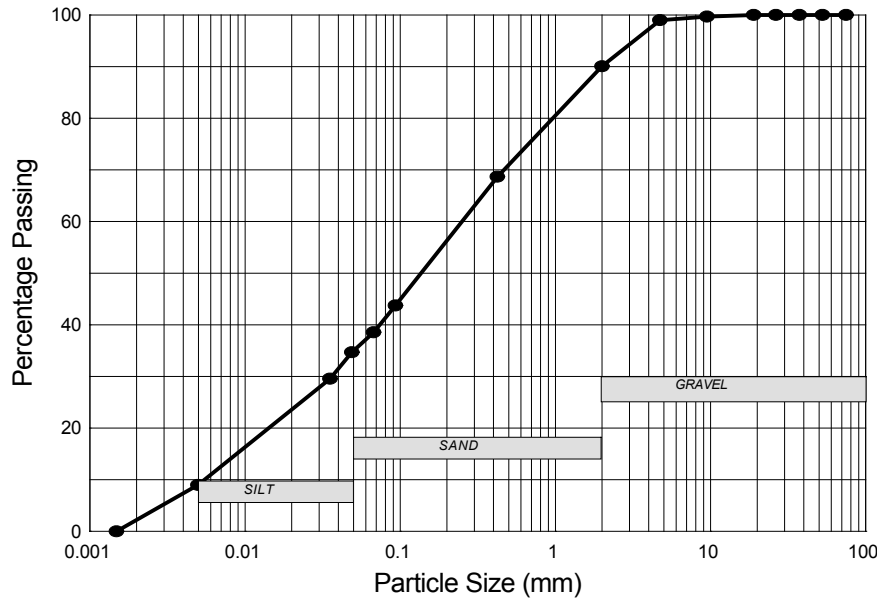
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	43.75
0.0678	38.61
0.0489	34.74
0.0354	29.60
0.0050	9.01
0.0015	0.00

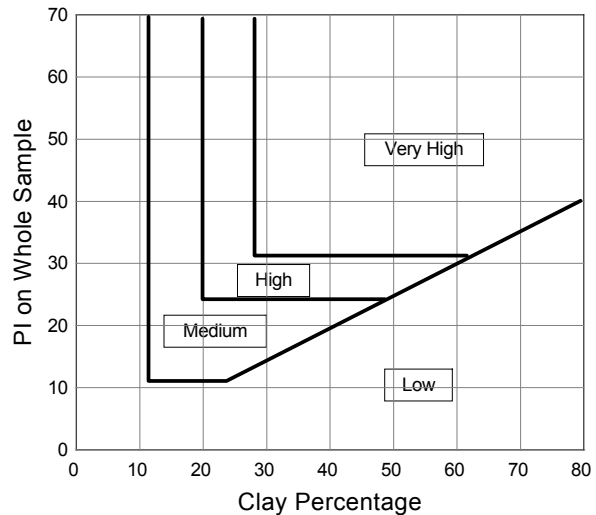
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.97
Moisture Content	1.96
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP H30 @ 0,0 - 0,5m	
Date	21 AUGUST 2015	Test No	1314
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	94.26
26.50	91.75
19.00	79.03
9.50	70.38
4.75	64.75
2.00	60.47
0.425	45.76

HYDROMETER ANALYSIS

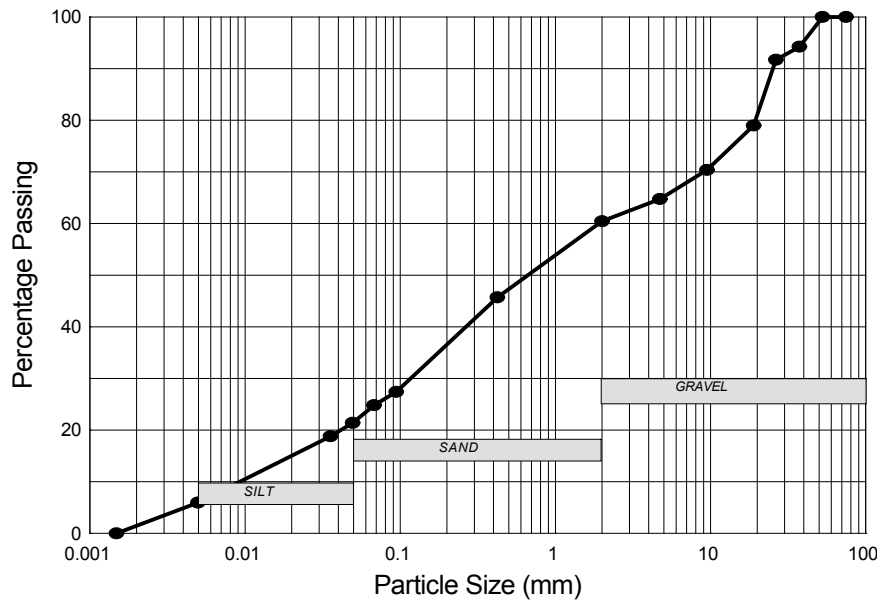
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	27.42
0.0682	24.85
0.0495	21.42
0.0356	18.85
0.0050	6.00
0.0015	0.00

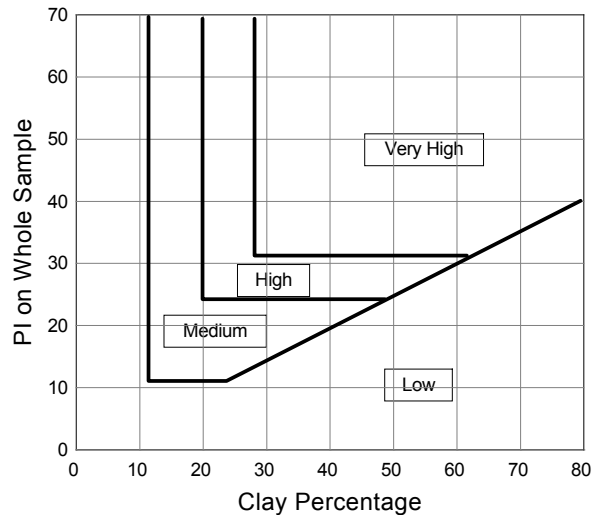
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.66
Moisture Content	2.87
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP H32	@ 0,2 - 0,5m
Date	21 AUGUST 2015	Test No	1317
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	95.74
26.50	94.71
19.00	91.75
9.50	78.25
4.75	55.36
2.00	44.17
0.425	32.06

HYDROMETER ANALYSIS

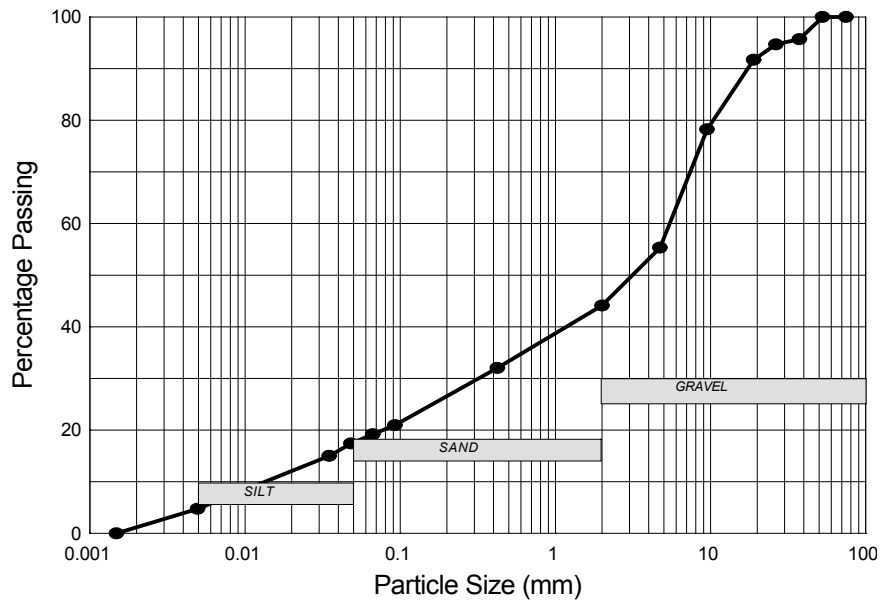
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	21.01
0.0669	19.21
0.0482	17.41
0.0350	15.01
0.0050	4.80
0.0015	0.00

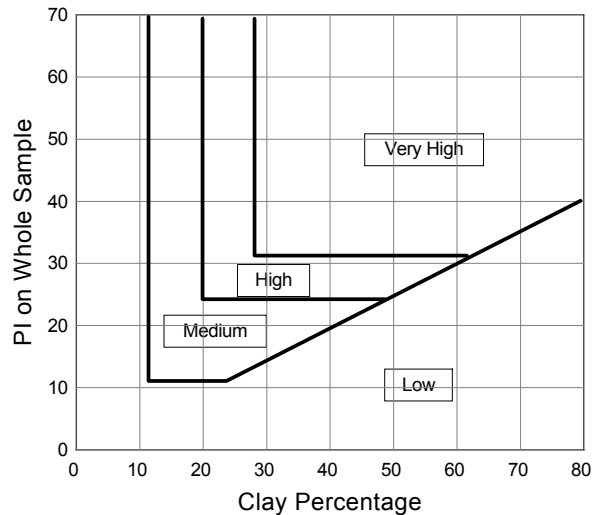
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.03
Moisture Content	1.53
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP K26 @ 0,2 - 0,8m	
Date	21 AUGUST 2015	Test No	1327
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	98.81
9.50	96.69
4.75	91.63
2.00	88.63
0.425	64.66

HYDROMETER ANALYSIS

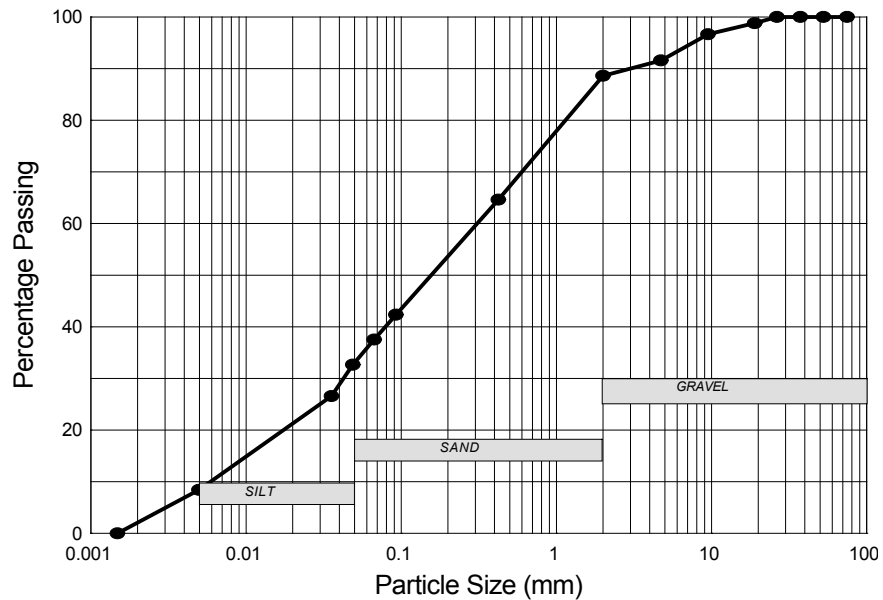
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	42.38
0.0674	37.54
0.0489	32.69
0.0356	26.64
0.0050	8.48
0.0015	0.00

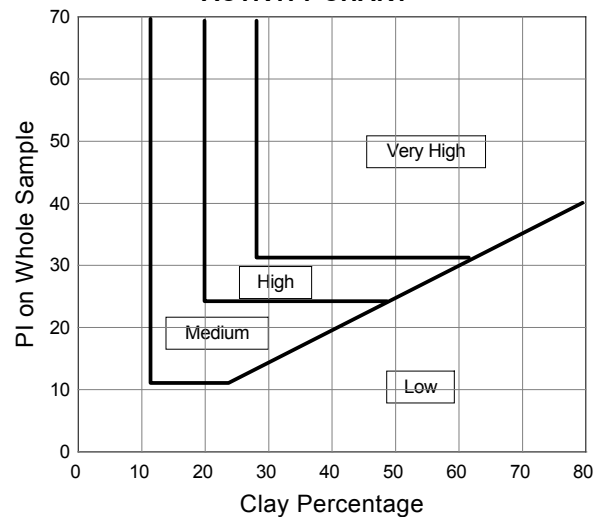
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.04
Moisture Content	1.63
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

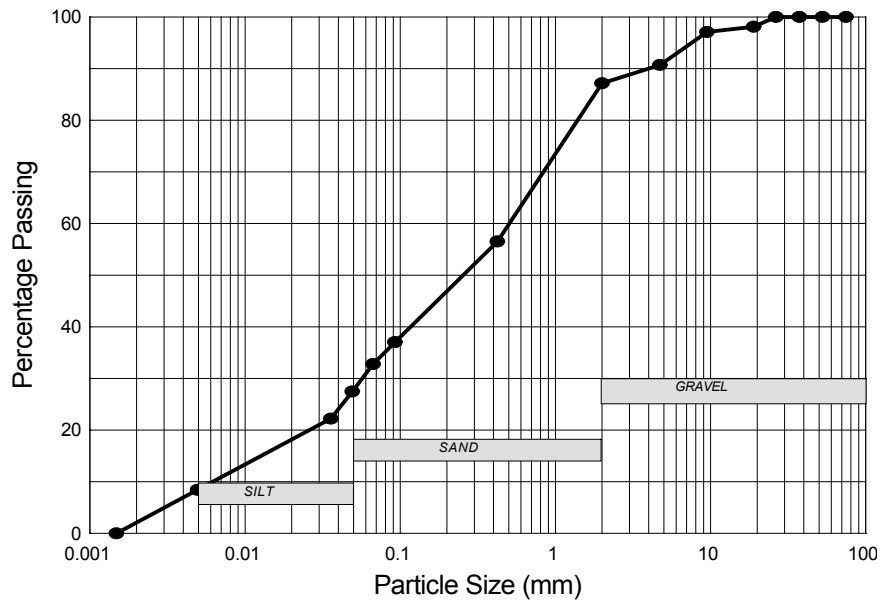
Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP K27 @ 0,0 - 0,3m	
Date	21 AUGUST 2015	Test No	1331
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	98.11
9.50	97.15
4.75	90.76
2.00	87.15
0.425	56.52

GRADING ANALYSIS



HYDROMETER ANALYSIS

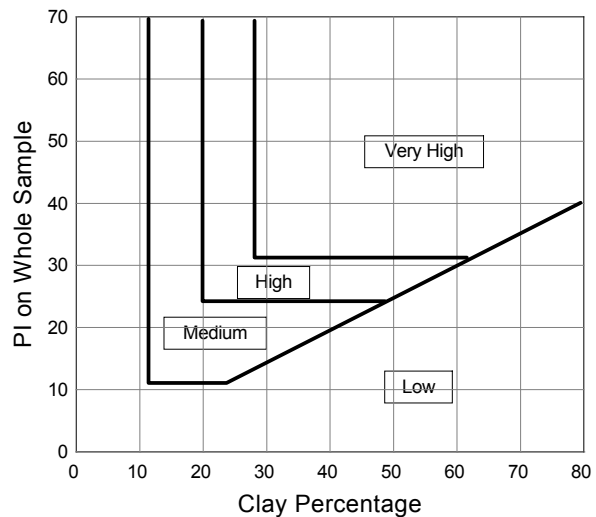
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	37.05
0.0674	32.81
0.0492	27.52
0.0358	22.23
0.0050	8.47
0.0015	0.00

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.19
Moisture Content	1.50
PI on Whole Sample	Non Plastic

ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP K29 @ 0,0 - 0,3m	
Date	21 AUGUST 2015	Test No	1328
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	93.07
26.50	90.53
19.00	82.72
9.50	79.15
4.75	75.82
2.00	73.07
0.425	63.04

HYDROMETER ANALYSIS

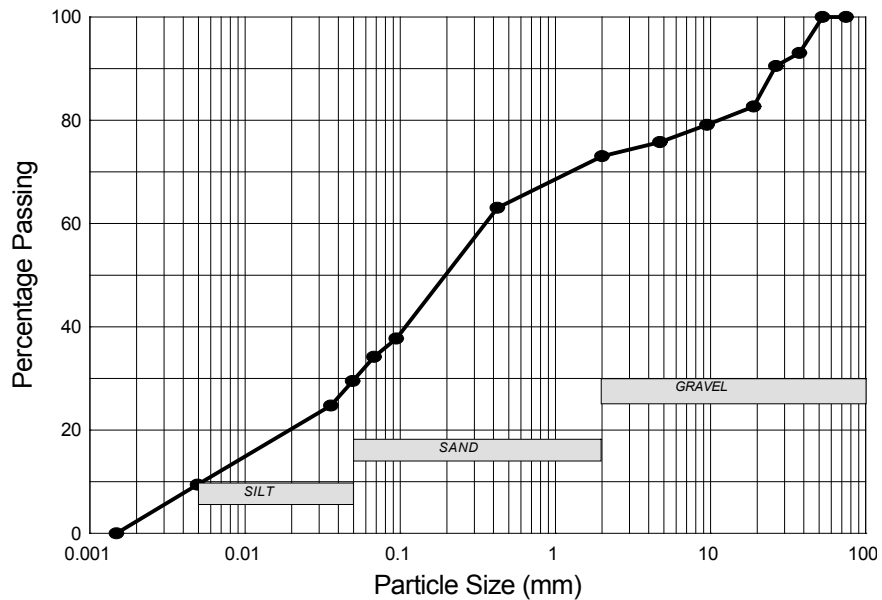
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0946	37.78
0.0682	34.24
0.0495	29.51
0.0358	24.79
0.0050	9.44
0.0015	0.00

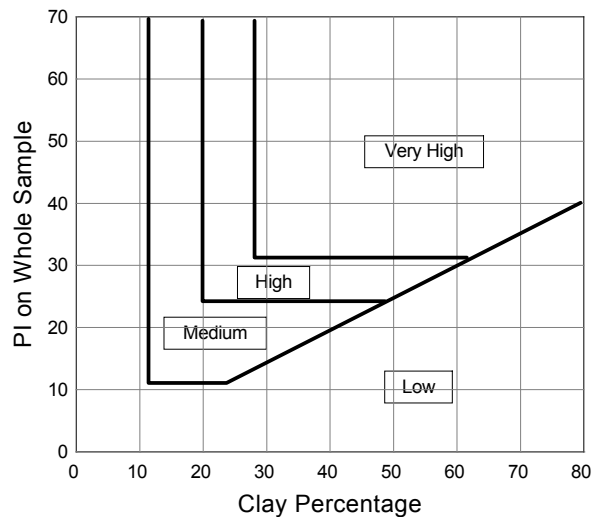
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.26
Moisture Content	2.11
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP K30 @ 0,0 - 0,6m	
Date	21 AUGUST 2015	Test No	1304
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	99.20
9.50	99.20
4.75	98.27
2.00	95.47
0.425	65.95

HYDROMETER ANALYSIS

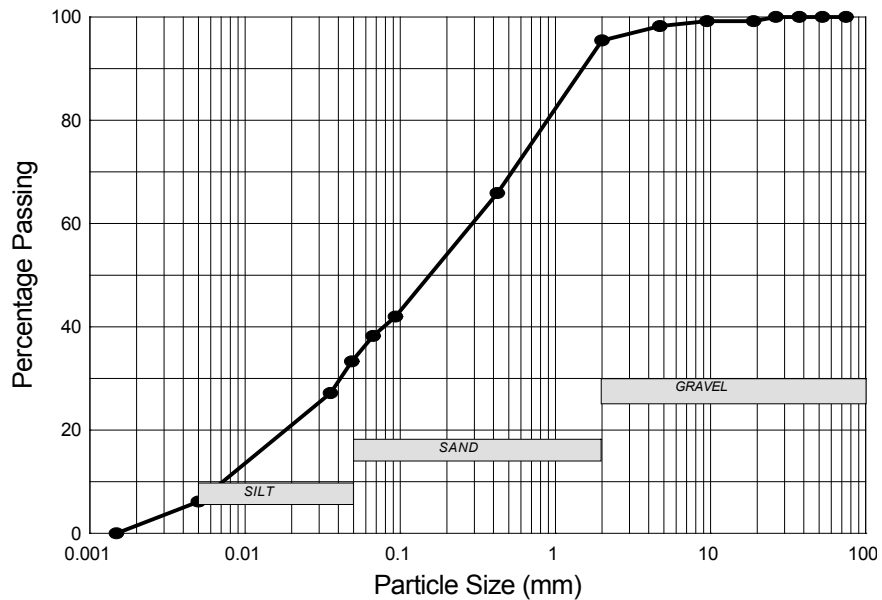
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	41.99
0.0674	38.29
0.0489	33.35
0.0356	27.17
0.0050	6.18
0.0015	0.00

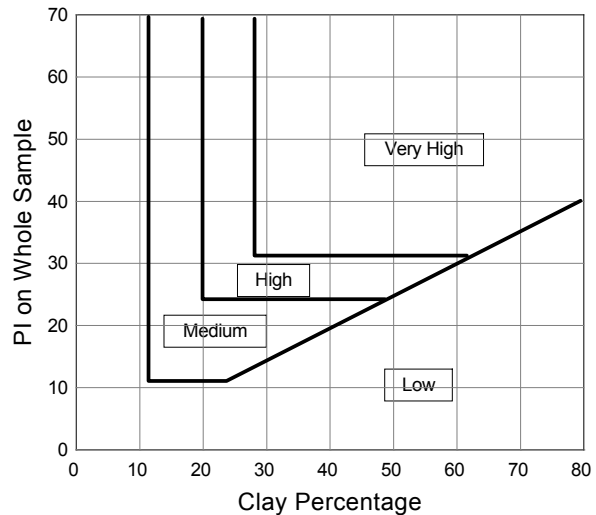
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	0.97
Moisture Content	0.91
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





C.B.R. DETERMINATION

Client	EMVELO		
Location	KAROSHOEK - SITE 5 TP K30 @ 0,0 - 0,6m		
Date	22 AUGUST 2015	Test No	1305
Job No	15107	Checked By	EB
Calibration Date	21 April 2010	Calibration Certificate	2077

Direct Results from Test Procedure

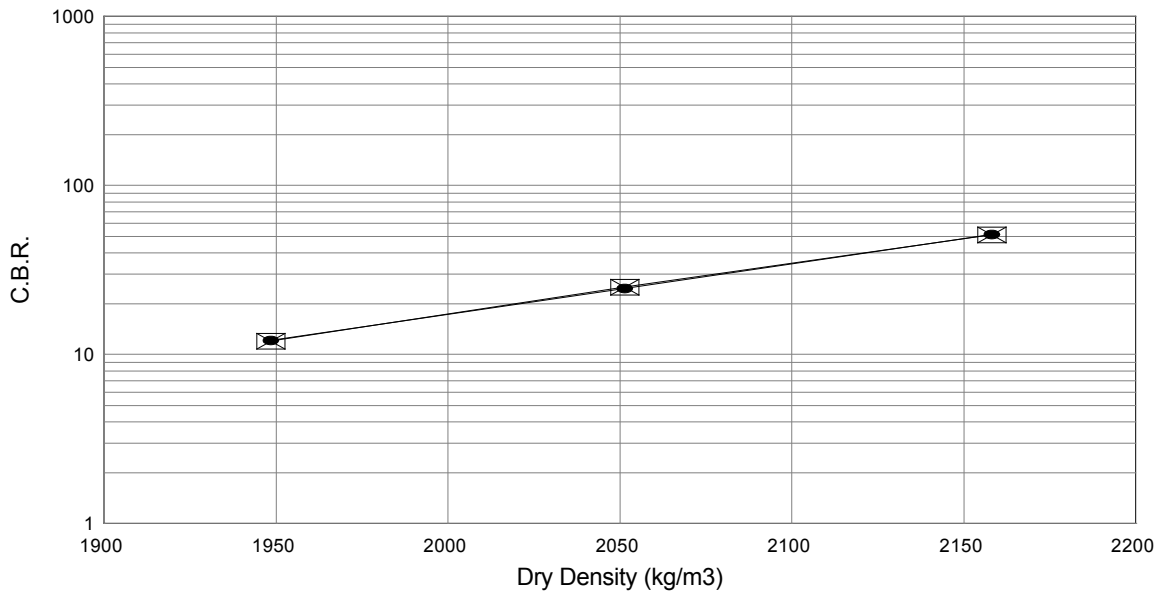
Maximum Dry Density (kg/m3)	2157
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Optimum Moisture Content (%)	6.9
------------------------------	-----

Percentage Mod AASHTO	100.0	95.1	90.3
CBR @ 2.54mm	51	25	12
CBR @ 5.08mm	54	25	13
CBR@ 7.62mm	57	27	13
Average Moisture Content (%)	6.8		
Percentage Swell	0.08	0.12	0.16

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	12	18	24	38	51



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP K31 @ 0,0 - 0,5m	
Date	21 AUGUST 2015	Test No	1299
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	89.07
26.50	85.26
19.00	74.24
9.50	68.90
4.75	66.80
2.00	64.83
0.425	48.72

HYDROMETER ANALYSIS

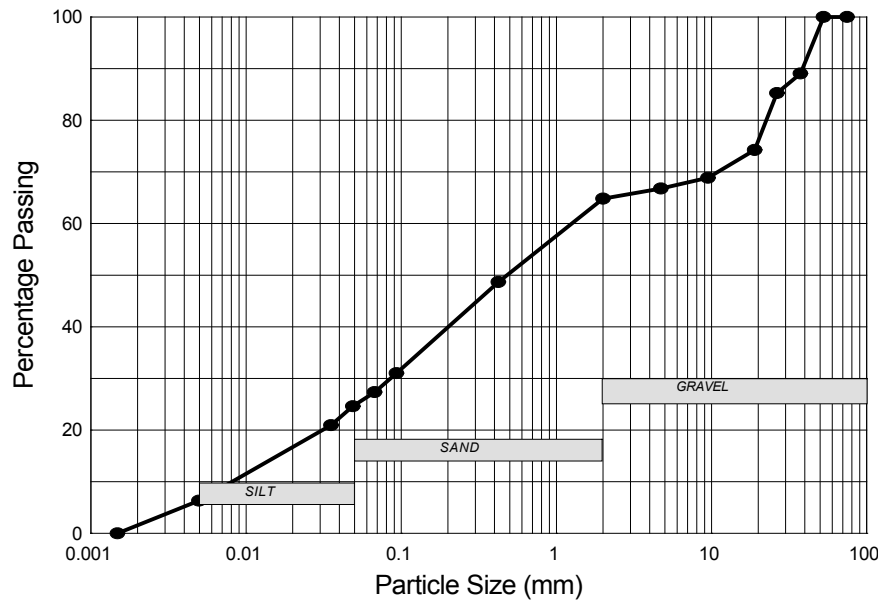
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	31.02
0.0678	27.37
0.0489	24.64
0.0354	20.99
0.0050	6.39
0.0015	0.00

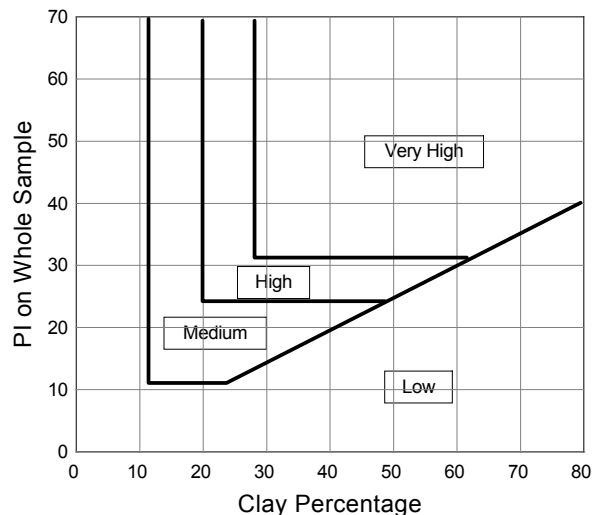
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.55
Moisture Content	3.05
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP K 32 @ 0,0 - 0,55m	
Date	21 AUGUST 2015	Test No	1324
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	84.53
9.50	73.00
4.75	60.93
2.00	46.36
0.425	29.64

HYDROMETER ANALYSIS

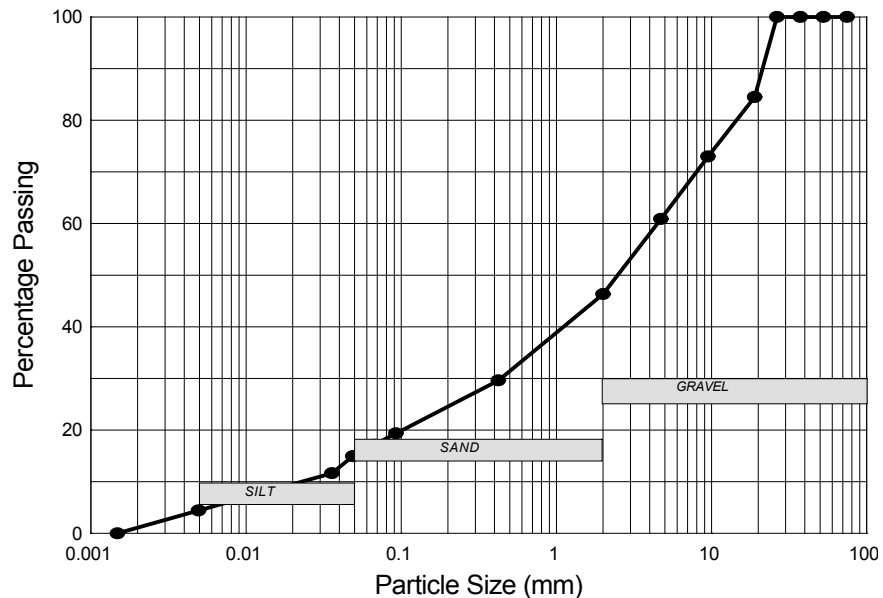
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	19.43
0.0674	17.21
0.0489	14.99
0.0358	11.66
0.0050	4.44
0.0015	0.00

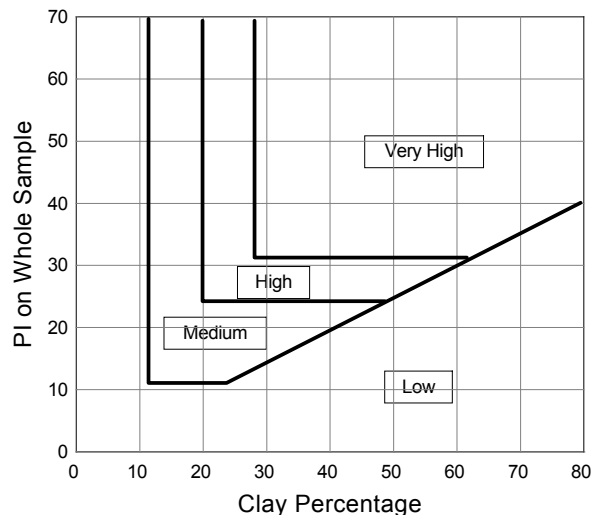
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2.05
Moisture Content	1.40
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART



FOUNDATION INDICATOR

Client	EMVELO		
Location	KAROSHOEK - SITE 5	TP H31 @ 0,0 - 0,5m	
Date	21 AUGUST 2015	Test No	1315
Job No	15107	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	93.96
26.50	88.82
19.00	75.34
9.50	69.97
4.75	66.95
2.00	59.85
0.425	47.22

HYDROMETER ANALYSIS

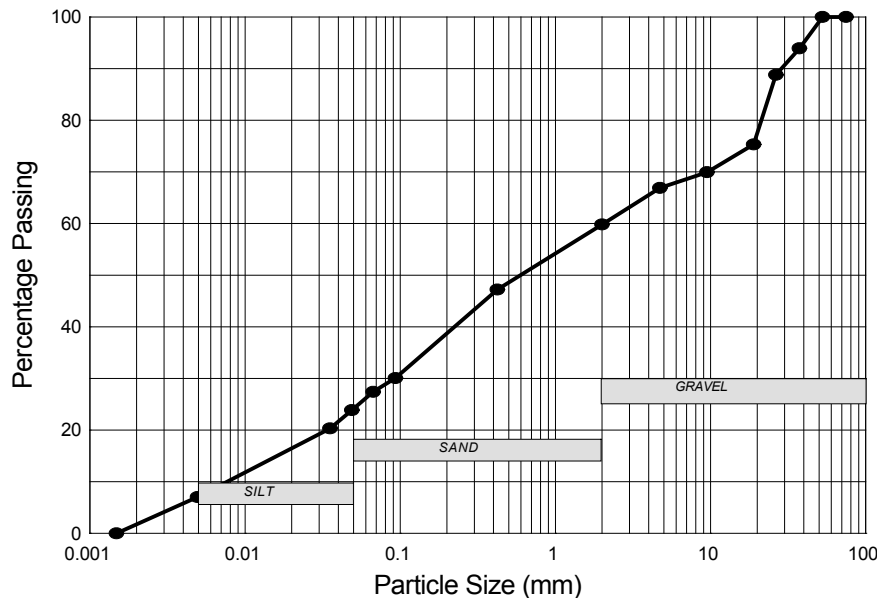
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	30.07
0.0674	27.41
0.0489	23.88
0.0354	20.34
0.0050	7.07
0.0015	0.00

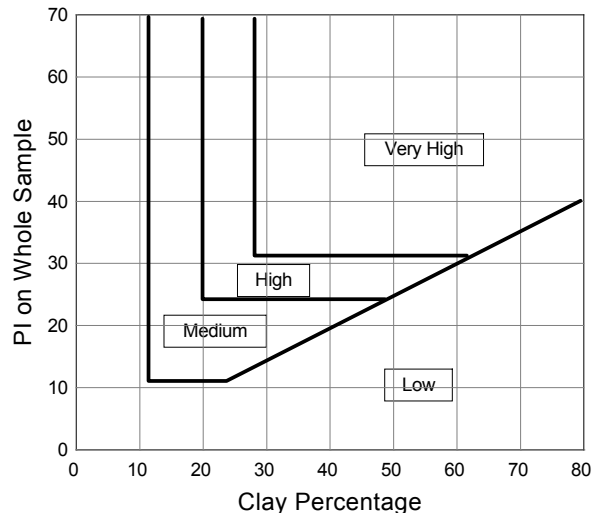
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1.63
Moisture Content	1.81
PI on Whole Sample	Non Plastic

GRADING ANALYSIS



ACTIVITY CHART





Geotechnical Engineers
 Geotechnical Drilling
 Engineering Surveying
 Soil, Concrete & Shotcrete Testing

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Client:	Emvelo
Project:	Karoshhoek
Location:	Uppington - site 5
Job no:	15107/3
Date:	28/08/2015

SAMPLE	PH	EC CONDUCTIVITY μS/cm	EC CONDUCTIVITY mS/cm	EC CONDUCTIVITY S	Total Dissolved Salts (TDS) ppm	R RESISTIVITY Ohm/cm
TP A27 @ 0.0 - 0.90	7.39	205	0.205	0.000205	103	4878
TP A30 @ 0.0 - 0.70	8.08	199	0.199	0.000199	92	5025
TP C32 @ 0.0 - 0.70	7.59	268	0.268	0.000268	134	3731
TP C30 @ 0.0 - 0.40	7.06	194	0.194	0.000194	97.1	5155
TP D27 @ 0.1 - 0.40	7.54	199	0.199	0.000199	100	5025
TP E32 @ 0.0 - 0.80	7.68	199	0.199	0.000199	87	5025
TP E28 @ 0.60 - 1.00	8.32	190	0.19	0.00019	96	5263
TP E27 @ 0.0 - 0.80	7.77	200	0.2	0.0002	100	5000
TP K31 @ 0.0 - 0.50	7.56	247	0.247	0.000247	124	4049
TP F28 @ 0.50 - 1.70	8.09	213	0.213	0.000213	107	4695
TP K30 @ 0.0 - 0.60	7.46	195	0.195	0.000195	100	5128
TP B30 @ 0.0 - 0.60	7.61	184	0.184	0.000184	92	5435
TP H28 @ 0.0 - 0.80	7.63	196	0.196	0.000196	98	5102
TP H31 @ 0.0 - 0.60	7.65	174	0.174	0.000174	100	5747
TP H32 @ 0.20 - 0.50	7.81	256	0.256	0.000256	128	3906

pH	DEGREE OF ACIDITY
<4	Extremely acidic
4 - 5.4	Strongly acidic
5.5 - 6.4	Moderately acidic
6.5 - 7.0	Slightly acidic
7.1 - 7.4	Slightly alkaline
7.5 - 8.4	Moderately alkaline
>8.4	Strongly alkaline

RESISTIVITY Ohm/cm	DEGREE OF CORROSIVITY
0 - 2 000	Extremely Corrosive
2 000 - 4 000	Very Corrosive
4 000 - 5 000	Corrosive
5 000 - 10 000	Mildly Corrosive
>10 000	Not Generally Corrosive

Issued by:

ROCKLAB

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RESULTS OF ROCK PROPERTIES TESTS

Sampling Site: Karoshoek

BY

DR J. F. CHEN

Submitted to:

GEOFACTICA (PTY) LTD.

1 September 2015

C O N T E N T S

TABLE 1 - RESULTS OF UNIAXIAL COMPRESSIVE STRENGTH TESTS

APPENDIX 1 FAILURE CODES OF MATERIAL COMPRESSION TESTS

TABLE 1 RESULTS OF UNIAXIAL COMPRESSIVE STRENGTH TESTS



Client: Geopractica

Sampling Site: Karoshoek, Upington

1-Sep-15

SPECIMEN PARTICULARS				SPECIMEN DIMENSIONS					SPECIMEN TEST RESULTS			
Rocklab Specimen No.	Borehole No	Sample Depth m	Rock Type	Diameter mm	Height mm	Ratio of Height to Diameter	Mass g	Density g/cm ³	Failure Load kN	Strength (UCS) MPa	Failure Code	Note
6316-UCS-04	E26	3.65 - 3.80		52.24	102.7	2.0	518.43	2.35	5.2	2.4	XA	
6316-UCS-05	E26	9.20 - 9.35		52.17	103.8	2.0	588.84	2.65	85.9	40.2	4B	

Note: All tests were conducted according to the ISRM's (International Society for Rock Mechanics) specification.

APPENDIX 1

CLASSIFICATION OF ROCK SPECIMEN FAILURE MODE INFLUENCED / NOT INFLUENCED BY DISCONTINUITIES DURING COMPRESSION TESTING

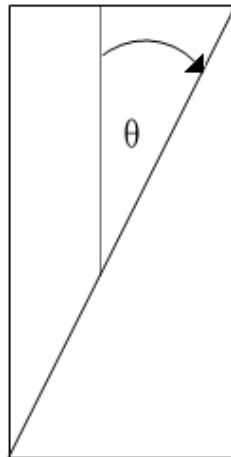
FAILURE NOT INFLUENCED BY DISCONTINUITIES (INTACT)

TYPE CODE	DESCRIPTION OF SUB CODES	
	A	B
X	SLIDING SHEAR FAILURE	COMPLETE CONE DEVELOPMENT
Y	SPLITTING	BREAKING INTO A LOT OF PIECES

FAILURE INFLUENCED BY DISCONTINUITIES

TYPE CODE	DESCRIPTION OF SUB CODES	
	A	B
	PARTIAL FAILURE ON DISCONTINUITY	FAILURE COMPLETELY ON DISCONTINUITY
1	AT 0-10° TO AXIS	AT 0-10° TO AXIS
2	AT 11-20° TO AXIS	AT 11-20° TO AXIS
3	AT 21-30° TO AXIS	AT 21-30° TO AXIS
4	AT 31-40° TO AXIS	AT 31-40° TO AXIS
5	AT 41-50° TO AXIS	AT 41-50° TO AXIS
6	AT 51-70° TO AXIS	AT 51-70° TO AXIS
7	AT 71-90° TO AXIS	AT 71-90° TO AXIS
0	Multiple Discontinuities	Multiple Discontinuities

Example: Failure Type3B: Failure completely on a discontinuity with an orientation of between 21° and 30° to the specimen axis.



APPENDIX 6

SITE PHOTOGRAPHS

Emvelo
Karoshoek
Upington – Site 5
15107



Typical soil calcrete cobbles and boulders as seen on site



Refusal of TLB on Hard pan calcrete

Emvelo
Karoshoek
Upington – Site 5
15107



Aeolian Sand from surface to 1.6m as seen in B29



Note Colluvium overlying the pedogenic