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Geotechnical Investigation Report:

Lunar Exploration Ground Sites (LEGS) Communication Facility

Matjiesfontein, South Africa

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1. Introduction

PeraGage South Africa (Pty) Ltd has been appointed by the South African National Space Agency (SANS) to undertake geotechnical investigations for the proposed Lunar Exploration Ground Site (LEGS) Communication Facility in Matjiesfontein, South Africa. The geotechnical investigation is a specialist study required to inform the engineering design team of the ground conditions on site to assist with the detailed design phase of the project.

This report presents the results of the geotechnical investigation at the LEGS Communication Facility project site. The report is prepared in accordance with the requirements of the relevant Codes of Practice as noted below.

1.1 Terms of Reference

The scope of works was included in PeraGage's quotation referenced *Quote #23123G*, prepared in response to SANS's Request for Quotation (RFQ) referenced *SO/677/04/2023* dated 17th April 2023.

The report sets out the methodology, findings and recommendations for geotechnical and foundation works for the proposed development. The report is prepared in accordance with the requirements of the relevant Codes of Practice as noted below.

1.2 Objectives and Methodology

The investigation is aimed at assessing and classifying the ground conditions, specifically the founding conditions, and identifying any geotechnical constraints that may limit the development or result in increased risk or costs.

The objectives of the investigation were to:

- I. Analyse the geotechnical conditions prevalent on the site;
- II. Assess the founding conditions for the infrastructure and provide recommendations for foundation design
- III. Assess the excavation conditions for earthworks;
- IV. Expose and assess subgrade conditions along the site access road and internal roads and pavement works;
- V. Recover representative soil samples for laboratory testing;
- VI. Determine the in-situ soil consistencies through DCP testing and visual assessment;
- VII. Assess the groundwater conditions and the need for subsoil drainage;
- VIII. Assess the soil/rock parameters for foundation design, slope stability and retaining structure design; and
- IX. Comment on the geotechnical constraints that would result in increased risk or costs for foundation and pavement layerworks and to enable economic design and construction of the proposed development.

The following methodology was assumed to realise the aims of this study:



- I. A general site walk-over by a PeraGage Geotechnical Engineer and Engineering Geologist along with a review of available geological and geotechnical records;
- II. Geotechnical site investigations including the mechanical excavation and profiling of thirty (30 No.) test pits and undertaking DCP tests; and
- III. Laboratory testing of soils to establish geotechnical properties of the soils and to classify the materials in accordance with the COTO materials classification system.

1.3 Proposed Development

The proposed development of the LEGS Communication Facility in the Matjiesfontein area will comprise of:

- Operations building
- Power room building
- Approximately three (3 No.) telecommunications dishes of various sizes ranging between 10 m and 34 m in diameter
- Solar PV facility/s
- Associated infrastructure such as roads and pavement, underground and overhead transmission and communication lines and water infrastructure

The proposed communication facility layout is presented in Figure 1-1.

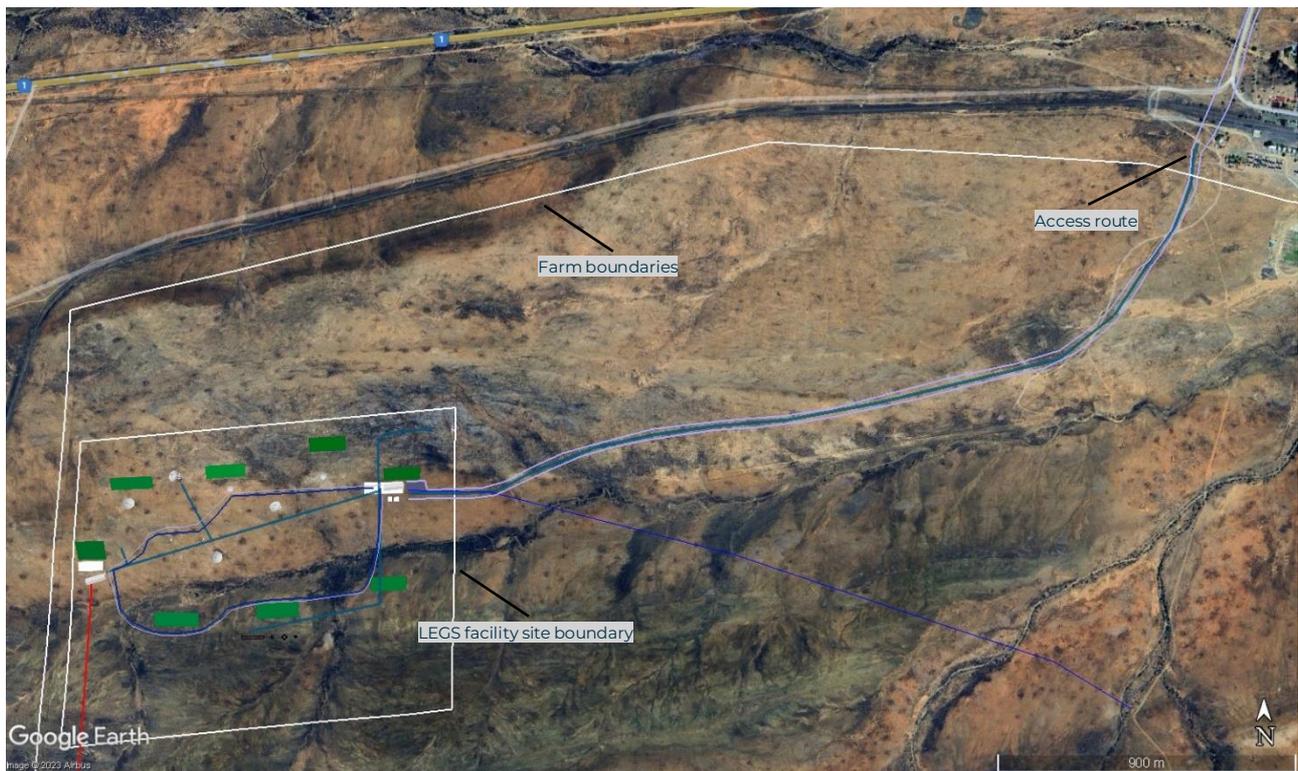


Figure 1-1 Proposed development

1.4 Classification into Geotechnical Category (SANS10160-5)

The major proportion of the development is considered to classify as Geotechnical category 2 in terms of SANS 10160-5:2009 (*Basis of structural design and actions for building and industrial structures - Part 5: Basis of geotechnical design and actions*). The works comprise of conventional structures and foundations, with no exceptional risks or loading conditions or difficult ground conditions and for which design methods are well-established. The large communication antennae are considered to classify as Geotechnical category 3, for which the nature of the ground or design complexity requires specialist geotechnical input.

1.5 Scope and Limitations of Assessment

The nature of geotechnical engineering is such that variations in what is reported here may occur elsewhere over the site. Our opinions can only be based on what was visible from the limited number of data points at the time the investigation was conducted.

This report has been prepared for the exclusive use of the client, with specific application to the proposed project.

1.6 Codes of Practice

The services performed PeraGage (Pty) Ltd are conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession practicing under similar conditions in the locality of the project.

The investigation was carried out per standard practice codes and guidelines including:

- I. South African Institute of Civil Engineering (SAICE) Geotechnical Division (2010) *Code of Practice for Site Investigations*;
- II. Inspecting the test pits and recording the soil profiles using the standard procedures as recommended in the AEG/SAICE/SAIEG (2002) *Guidelines for Soil and Rock Logging in South Africa*;
- III. South African National Standard (2010) SANS 10160 Part 5 Basis of geotechnical design and actions;
- IV. South African National Standards (2011) SANS 10400-H: National Building Regulations – Foundations;
- V. South African National Standards (2011) SANS 10400-P: National Building Regulations – Drainage; and
- VI. South African National Standards (1990) SANS 1200 D: Earthworks

1.7 Information Sources

The following principal sources were consulted and/or made available:

- I. 1:250 000 scale Geological Map 3320 Ladysmith published in 1990;
- II. Google Earth satellite imagery (current and historical); and
- III. Various literature relating to the site geology and soils.



2. Site Characterisation

2.1 Site Location and Description

The project site is situated near Matjiesfontein, which is roughly 237 km north-east of Cape Town's city centre. The LEGS communication facility is to be constructed on an approximately 200 hectare site area.

The location of the site relative to Matjiesfontein is illustrated in Figure 2-1.



Figure 2-1 Locality plan of the LEGS communication facility

2.2 Topography, Drainage, Existing Infrastructure and Site History

The topography of Matjiesfontein and its surrounding areas is characterised by a mix of open plains, gentle slopes, and rocky outcrops. The undulating, semi-arid plains of the area are characterised by expanses of flat terrain with sparse vegetation and occasional dry riverbeds known as "dorps" between steeper hills.

The Witteberg Mountain Range lies directly south of the project site.

There are several distinct natural drainage features on site, with rills, gullies and occasional dongas sporadically located, all leading towards a generally dry riverbed which runs in a west-to-east direction through the middle of the project site. These are typical surface erosion features caused by sudden heavy rains which are associated with the climate of the Karoo region.

In general, the topography in the northern section slopes gently towards the south while the topography to the south of the riverbed slopes to the north. Rocky outcrops occur over the north-eastern portion of the site and the topography is steep and undulating locally in this area.

The only noteworthy nearby infrastructure is the railway line, which is approximately 250 m from the north-east portion of the site boundary.

2.3 Climate

Matjiesfontein is situated in the drier regions of the Western Cape province, and experiences a semi-arid climate with hot summers and cool winters. Summers months (December to February) are hot and dry, with average daytime temperatures ranging from 30 to 35 degrees Celsius. Winter months (June to August) are mild and cool, with daytime temperatures ranging from 15 to 20 degrees Celsius. Frost is rare but can occur during cold spells.

Rainfall in Matjiesfontein is relatively low throughout the year. The town receives an average of about 200 to 250 mm of rainfall annually, with the majority of precipitation occurring during the winter months.

Climate determines the mode of weathering as well as the rate of weathering, with the effect of climate on the weathering process (i.e., soil formation) determined by the climatic N-value defined by Weinert (1964).

The climatic N-value has been determined to be approximately 9.0 in the Matjiesfontein area. This implies an arid climate with a slight deficit of water. Soil profiles are likely to be thinly developed, and the dominant mode of weathering being mechanical disintegration.

2.4 Geology and Engineering Geology

Matjiesfontein is located within the Karoo Basin, a geological region that spans across various parts of South Africa and is known for its rich sedimentary rock formations. According to the 1:250 000 geological map of Ladysmith (Sheet 3320), the site is underlain by rock units of the Dwyka Formation (designated C-Pd) and Prince Albert Formation (designated Pp) of the Eccca Group, comprising predominantly of tillite, diamictite and subsidiary shales, as well as occasional dark-grey shales with reddish-brown weathering siltstone. The site lies near the northern edge of the Cape Fold Belt and has been subjected to folding and is characterised by east-west trending folds with cleavage planes occurring where buckling of the rock has been accompanied by fracturing.

The bedrock within the site was variably overlain by hillwash (sediments transported largely by sheet flow) and alluvium within the valley. The site location is illustrated on an extract of the 1:250 000 geological sheet 3320 Ladysmith in Figure 2-2.





Figure 2-2 Extract from the 1:250 000 scale Geological Map 3320 Ladysmith

2.5 Seismicity

Seismically active areas in South Africa are divided into two groups in SABS 10160 “Basis of structural design and actions for buildings and industrial structures — part 4: seismic actions and general requirements for building”, namely those where seismic activity is due to natural seismic events (Zone 1 areas), and those where it is predominantly due to mining activity (Zone 2 areas). As indicated in Figure 2-3, which is extracted from SANS 10160, the site falls on the boundary of Zone 1 of the seismically active south-western part of the Western Cape Province. In absence of a detailed Probabilistic Seismic Hazard Assessment (PSHA) study, provision should be made for seismic loading in the design of the foundations as per a site within Zone 1.

According to the Seismic Hazard Map of South Africa contained in SANS 10160 the peak ground acceleration (g) with a 10% probability of being exceeded in a 50-year period in the Matjiesfontein area is in the order of 0.1 g, which would be considered a moderate hazard. The ground type is Type 1 which is characterised by shallow rock and other rock like geological formations, including at most 5 m of weaker material at the surface.

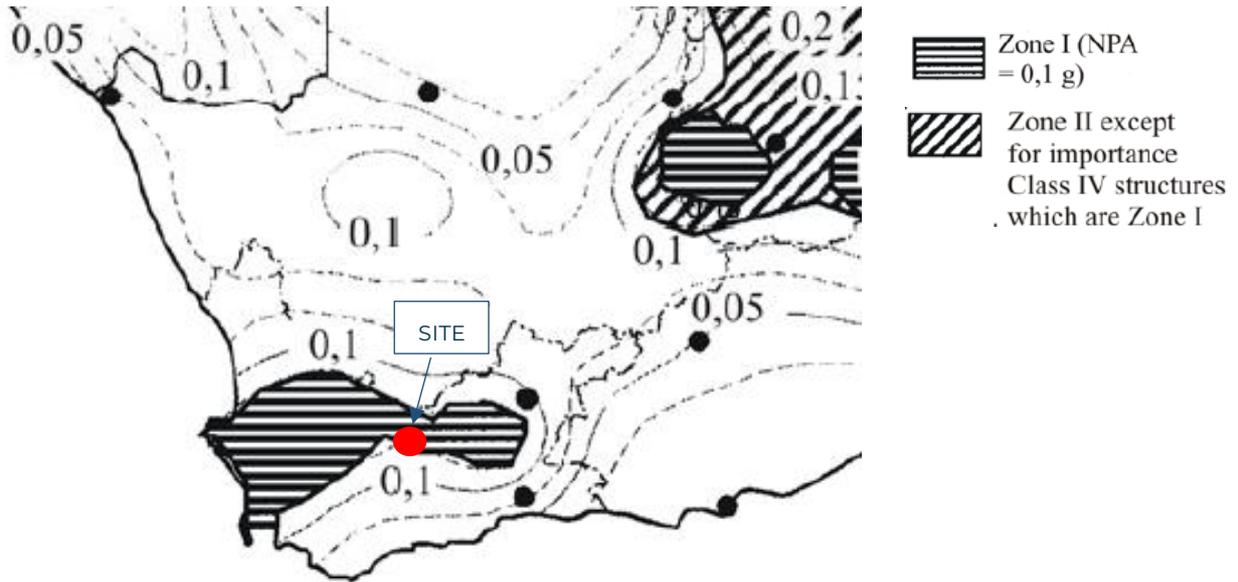


Figure 2-3 Extract from SANS 10160, Seismic Hazard Map of South Africa

3. Investigation Methodology

3.1 Overview

The field investigations were undertaken by a PeraGage Geotechnical Engineer from the 7th to the 9th of June, 2023 and involved the following activities:

- General site walk-over
- Excavation of Test Pits
 - Mechanical excavation of thirty (30 No.) test pits designated SMTP01 to SMTP30a
 - Excavated using a CASE 570T Tractor-Loader-Backhoe (TLB)
 - Excavated to depths of between 0.20 m to 2.00 m below existing ground level
 - Materials were photographed, sampled and profiled according to the relevant profiling standards and guidelines (AEG/SAICE/SAEIG, 2002) by a Geotechnical Engineer
 - Excavations were loosely backfilled on completion
- Dynamic Cone Penetrometer (DCP) Tests
 - DCP tests undertaken from surface adjacent to the test pits using a 1 m length probe
 - Data recorded as mm of penetration per 5 blows

The test pit profiling parameters are attached in Appendix A. The test pit logs are included as Appendix B. Test pit photographs are provided in Appendix C. The DCP test results are included in Appendix E.

The locations of the test pits along the proposed access road (i.e., SMTP01 to SMTP07) are illustrated in Figure 3-1.

The remaining test pits (i.e., SMTP08 to SMTP30a) are illustrated in Figure 3-2, and the specific locations according to the preliminary development plan are as follows:

- SMTP08 – water storage and sewage infrastructure;
- SMTP09 – parking area;
- SMTP10 and SMTP11 – main building;
- SMTP12 – signal processing operations;
- SMTP13, SMTP14 and SMTP15 – 18 m to 24 m diameter satellite;
- SMTP16, SMTP17 and SMTP18 – 10 m diameter satellite;
- SMTP19, SMTP20, SMTP21 and SMTP22 – 34 m diameter satellite;
- SMTP23 and SMTP24 – power infrastructure;
- SMTP25 and SMTP26 – power generation building; and
- SMTP27, SMTP28, SMTP29 and SMTP30a – along road within LEGS communication facility.



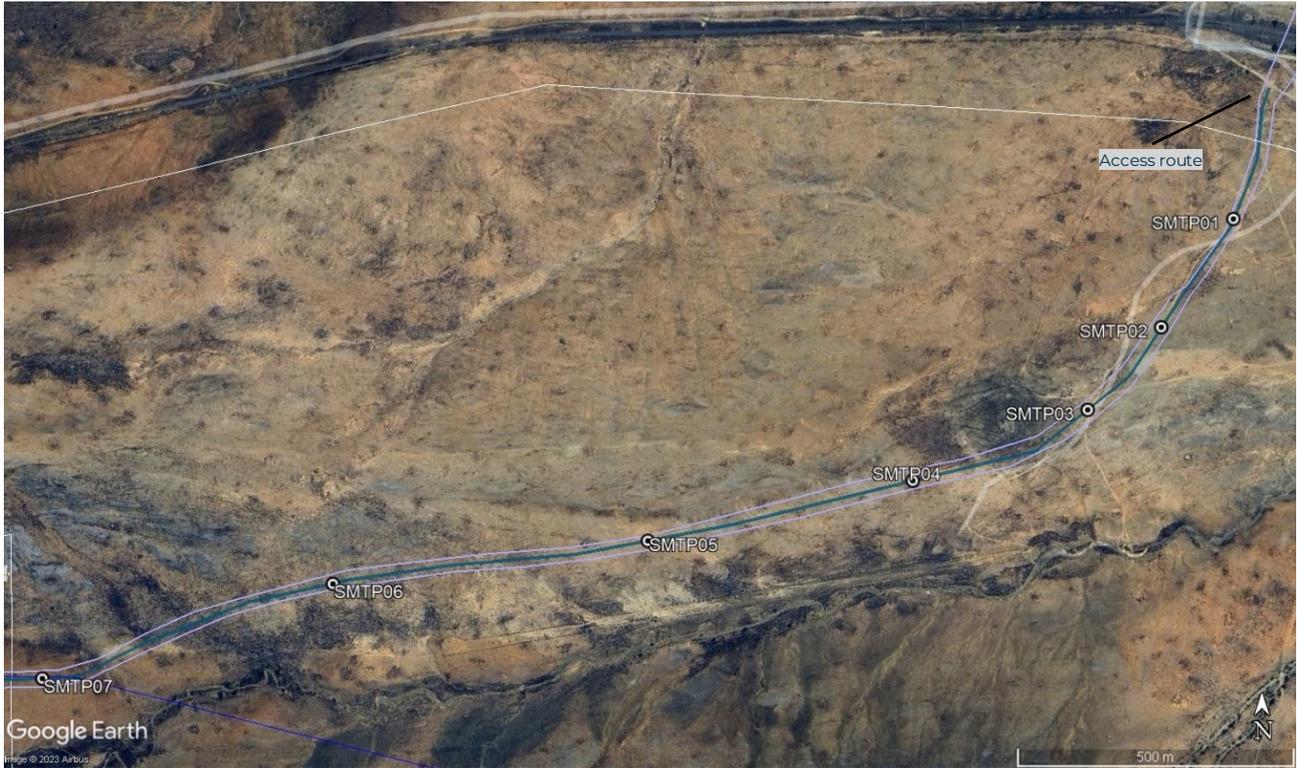


Figure 3-1 Location of test pits along the proposed access road (SMTP01 to SMTP07)



Figure 3-2 Location of test pits within the LEGS communication facility area (SMTP08 to SMTP30a)

3.2 Soil Profiles

A summary of the soil profiles observed in the test pits are summarised below. The logging parameters and descriptive terms used for the soils and rock are provided in Appendix A. The test pit logs provided in Appendix B should be consulted for more-detailed descriptions.

Transported hillwash **topsoil** was observed in twenty-six (26 No.) test pits from surface to between 0.08 m and 0.30 m below ground level (BGL), with an average thickness of 0.22 m. The topsoil was typically described as *moist, brown to reddish brown, intact to matrix supported, silty, fine to medium grained sand, with sub-angular to sub-rounded, tillite fine to medium and occasional coarse gravel, and fine plant roots*. The consistency of the soil horizon was predominately “loose”, and occasionally “medium dense”. No excavatability issues were experienced.

The topsoil layer was occasionally logged as a predominately sandy material, with slightly less gravel. The description was typically *moist, brown to orange brown, intact, gravelly, silty, fine to medium grained sand, with fine plant roots*. The consistency remained “loose” and no excavation issues were experienced.

Three (3 No.) test pits were situated near the relatively dry river bed running through the length of the site, namely SMTP27, SMTP29 and SMTP30a. Due to the close proximity to the river, thicker hillwash and alluvium deposits were observed. These soil horizons are summarised below.

Beneath the topsoil, an alluvium deposited **Sand and Gravel** horizon was observed from between 0.15 m and 1.90 m BGL. The description was typically *slightly moist, light brown to orange brown, intact to matrix supported, slightly silty, fine to medium grained sand, with sub-angular to sub-rounded, fine to medium gravel of mixed origin*. The consistency generally increased with depth, ranging from “loose” to “medium dense”. No excavatability issues were experienced.

A distinct pebble marker layer of alluvium transported **Gravel** was encountered in SMTP27, SMTP29 and SMTP30a from between 0.75 m and 1.90 m BGL, with an average thickness of 0.40 m. The pebble marker layer was generally described as *slightly moist to dry, grey, stained orange brown, clast supported, sub-angular to angular, elongated, medium to coarse gravel and occasional cobbles of mixed origin, with slightly silty sand*. The consistency ranged from “medium dense” to “dense”. Excavation rates slowed in this horizon, but did not incur refusal.

Generally, a thin soil profile was anticipated prior to executing the fieldwork, which proved to be correct. Across the majority of the site shallow bedrock was encountered beneath the topsoil horizon, with the degree of weathering differing slightly.

Completely weathered, **very soft rock, Tillite** was observed in two test pits (2 No.), namely SMTP06 and SMTP24, between 0.20 m and 0.80 m BGL. The in-situ material was logged as *reddish brown, stained orange brown, completely weathered, fine grained, weakly laminated, highly jointed, very soft rock, Tillite*. The joints were noted as wide and were stained and filled with the above-described hillwash transported gravelly sand. The very soft rock, tillite was excavated as fine to coarse gravel. No excavatability issues were experienced.

The hillwash transported topsoil predominately transitioned to highly weathered, **soft rock, Tillite**. The soft rock, tillite was observed in twelve (12 No.) test pits between 0.15 m and 0.80 m BGL, with an average thickness of 0.23 m. The rock layer was logged as *brown olive grey to grey, speckled white, stained reddish brown and orange brown, highly weathered, fine grained, massive to weakly laminated, very highly jointed,*



soft rock, Tillite. The joints were noted as very wide to wide, and were stained and filled with gravelly sand. The soft rock, tillite was generally excavated as fine to coarse gravel. No excavability issues were encountered.

The TLB approached and encountered refusal in twenty-nine (29 No.) test pits in a moderately weathered, **medium hard rock, Tillite**. This rock layer was observed between 0.08 m and 2.00 m BGL, with an average thickness of 0.32 m. The rock layer was logged as *grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, highly jointed, medium hard rock, Tillite*. The joints were generally noted as wide to narrow, and were stained and filled with minor gravelly sand. The medium hard rock, tillite was typically excavated as cobble to boulder sized fragments. The narrow joints, particle size and rock hardness lead to hard excavation conditions and as a result the rippability of the TLB in this material became challenging.

It must be noted that a change in geology was observed in SMTP28. The profile exhibited a upper hillwash transported clayey **Sand** layer with occasional angular, elongated, mudrock fine to coarse gravel, which had a “loose” to “medium dense” consistency. This was underlain by a **Gravel** layer described as *slightly moist, dark brown to grey, clast supported, angular to sub-angular, elongated, mudrock fine to coarse gravel, with clayey sand as above*. The consistency was described as “medium dense”. The TLB reached refusal in a layer of *grey, streaked white, stained red and brown, moderately weathered, very fine grained, laminated, highly jointed, medium hard rock, Mudrock*. The joints were noted as narrow, and were stained and filled with clayey sand. The cobble to boulder sized excavations slowed the TLB progress and eventually incurred refusal.

No groundwater seepage was observed in any of the test pits on site.

No major sidewall collapse occurred in any of the test pits during excavations.

3.3 Dynamic Cone Penetrometer (DCP) Test Results

In-situ Dynamic Cone Penetrometer (DCP) tests were conducted from surface level adjacent to the test pits to assess the consistency of the soils and to provide data for estimation of the in-situ CBR values for pavement design. The tests were undertaken using a DCP apparatus with an 8 kg hammer falling from a height of fall of 575 mm onto a 20 mm diameter cone.

The results were recorded as millimetres of penetration per 5 blows. The results were converted to equivalent N_{10L} values (number of blows per 100 mm) for assessment of soil consistency and converted to “DN” values (mm/blow) for calculation of in-situ CBR values.

The N_{10L} values are plotted against depth of penetration in Figure 3-3 to Figure 3-4. The consistency of sands and gravels may be estimated using the correlation provided in Table 15-4 of the City of Cape Town Standards and Guidelines for Roads and Stormwater as calculated from Annex G in EN1997-2 (provided in Table 3-1).



Table 3-1 DCP N_{10L} consistency correlations for sands and gravels

Consistency	N_{10L}
Very Loose (Above groundwater)	<1
Loose (Above groundwater)	1-6
Medium Dense (Above groundwater)	>6
Dense (Above groundwater)	>50
Very loose (Below Groundwater)	<1
Loose (Below Groundwater)	1-4
Medium Dense (Below groundwater)	>4
Dense (Below groundwater)	>50

It must be noted that the soil strength is influenced by the in-situ moisture content. The soils below the topsoil were typically described as “slightly moist” and are anticipated to lose strength with increasing soil moisture content. The soil consistency and in-situ CBR values must therefore be interpreted conservatively.



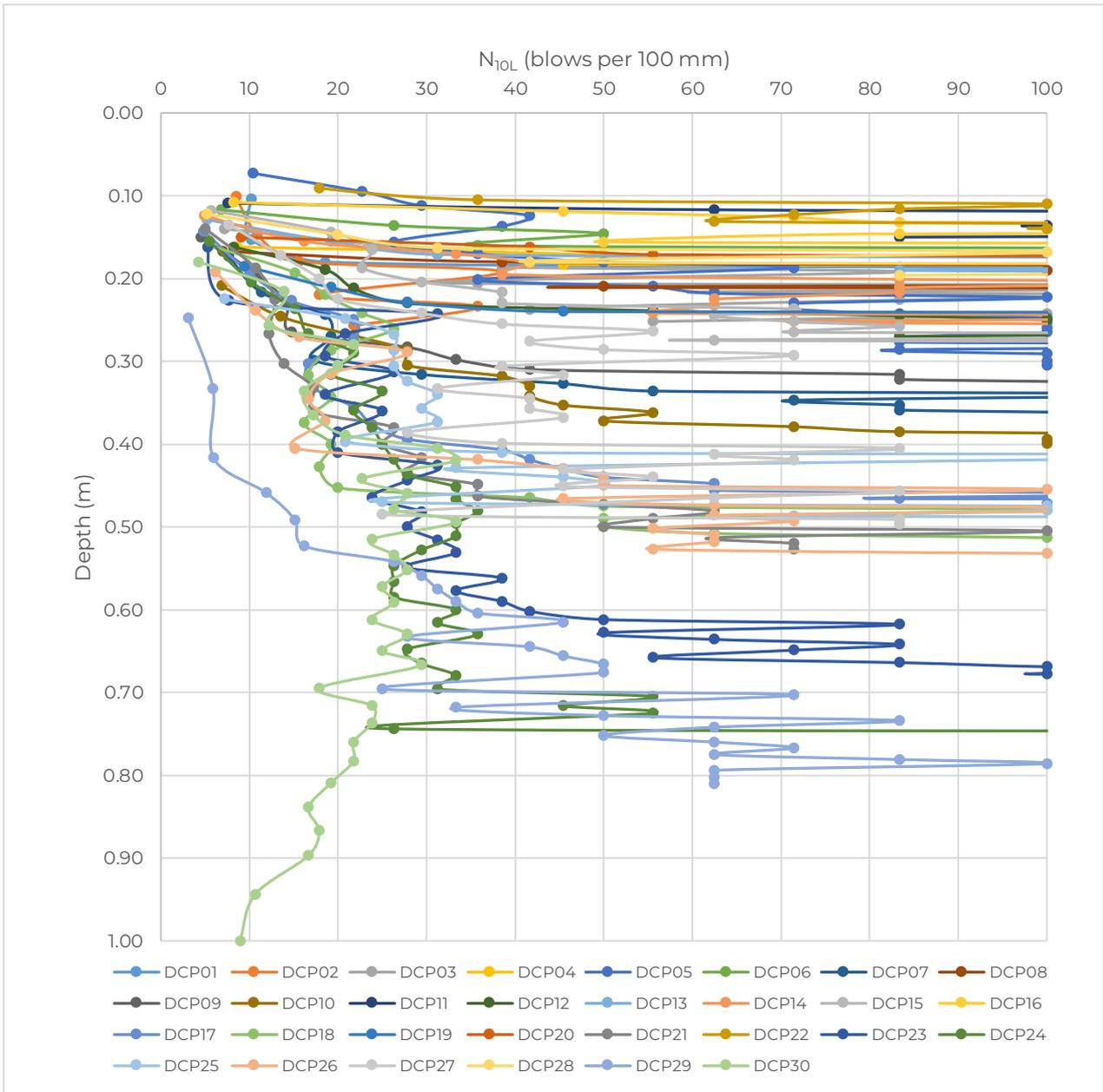


Figure 3-3 Scatter plot of N_{10L} versus depth for entire LEGS communication facility

The DCP profiles corresponds with the initial assumption made prior to executing the fieldwork that a thin soil profile was anticipated. For the majority of the DCP probes, the soil consistency was “loose” near surface, becoming “medium dense”. This rapidly increased to a “dense” consistency at bedrock level at depths between 0.10 m and 0.75 m below ground level. Shallow bedrock was encountered beneath the topsoil, which lead to the termination of twenty-nine (29 No.) DCP tests without managing to probe to 1.00 m below the surface.

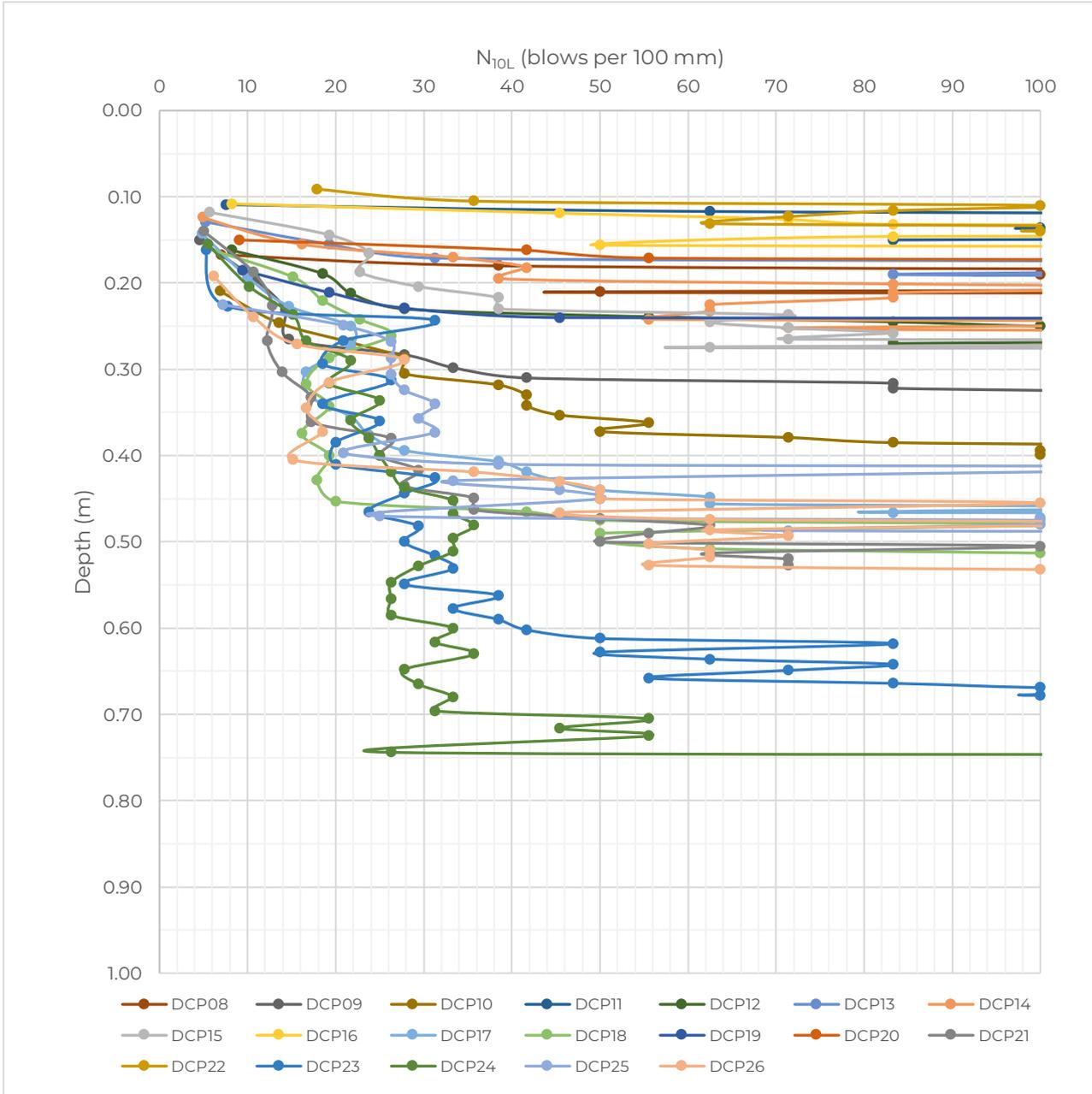


Figure 3-4 Scatter plot of N_{10L} versus depth for DCPs executed for proposed structures

The upper sand and gravel, hillwash transported, topsoil layer has a consistency ranging from “loose” to “medium dense”. The scatter plot follows a general trend exhibiting a steep increase in consistency from the topsoil to the shallow bedrock. DCP24 (executed adjacent to SMTP24) probed to a depth of 0.75 m before reaching refusal. This coincided with the soil layers observed during the excavations of SMTP24, where bands of completely weathered, very soft rock- and highly weathered, soft rock, tillite were first noted before moderately weathered, medium hard rock, tillite was observed from 0.80 m below ground level.

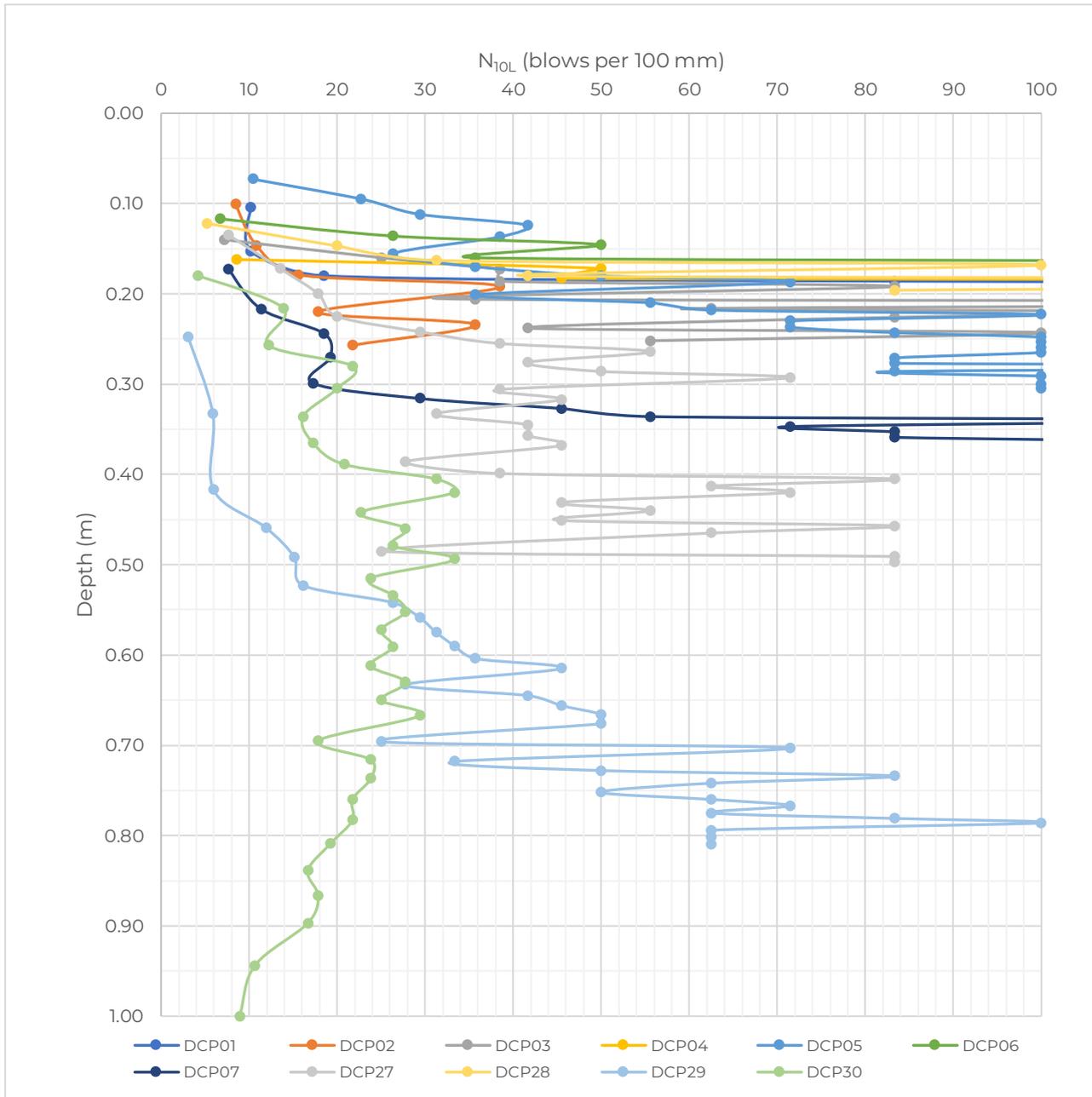


Figure 3-5 Scatter plot of N_{10L} versus depth for DCPs executed along the roads

For the majority of the DCP probes executed along the roads, a similar profile was observed as the DCPs for the proposed structures. However, at DCP27, DCP29 and DCP30 (the probes executed nearest to the relatively dry river bed running through the length of the site, where thicker hillwash and alluvium deposits were observed) the sand and gravel soils classified as “loose” to “medium dense” and “dense” with depth.

A number of methods to correlate DCP penetration values and in-situ CBR have been derived by various authors. Paige-Green (2009), suggests that the following can be used to estimate the CBR of in-situ materials from the DCP:

if $DN > 2$ mm/blow:
 $CBR = 410 \times DN^{-1.27}$

if $DN \leq 2$ mm/blow:
 $CBR = (66.66 \times DN^2) - (330 \times DN) + 563.33$

The above method has been used to calculate the in-situ CBR values plotted in Figure 3-6 and Figure 3-7.



It must be noted that the results of DCP testing are influenced by the soil moisture content as well as the presence of gravel, cobbles and boulders within the soil profile. The DCP test results may also be influenced by shaft friction, particularly with depth. Based on these factors, the soaked CBR values obtained from the laboratory testing are considered to provide more reliable CBR values for the soils than the DCP test results.

The DCP raw data is included as Appendix E in this report.

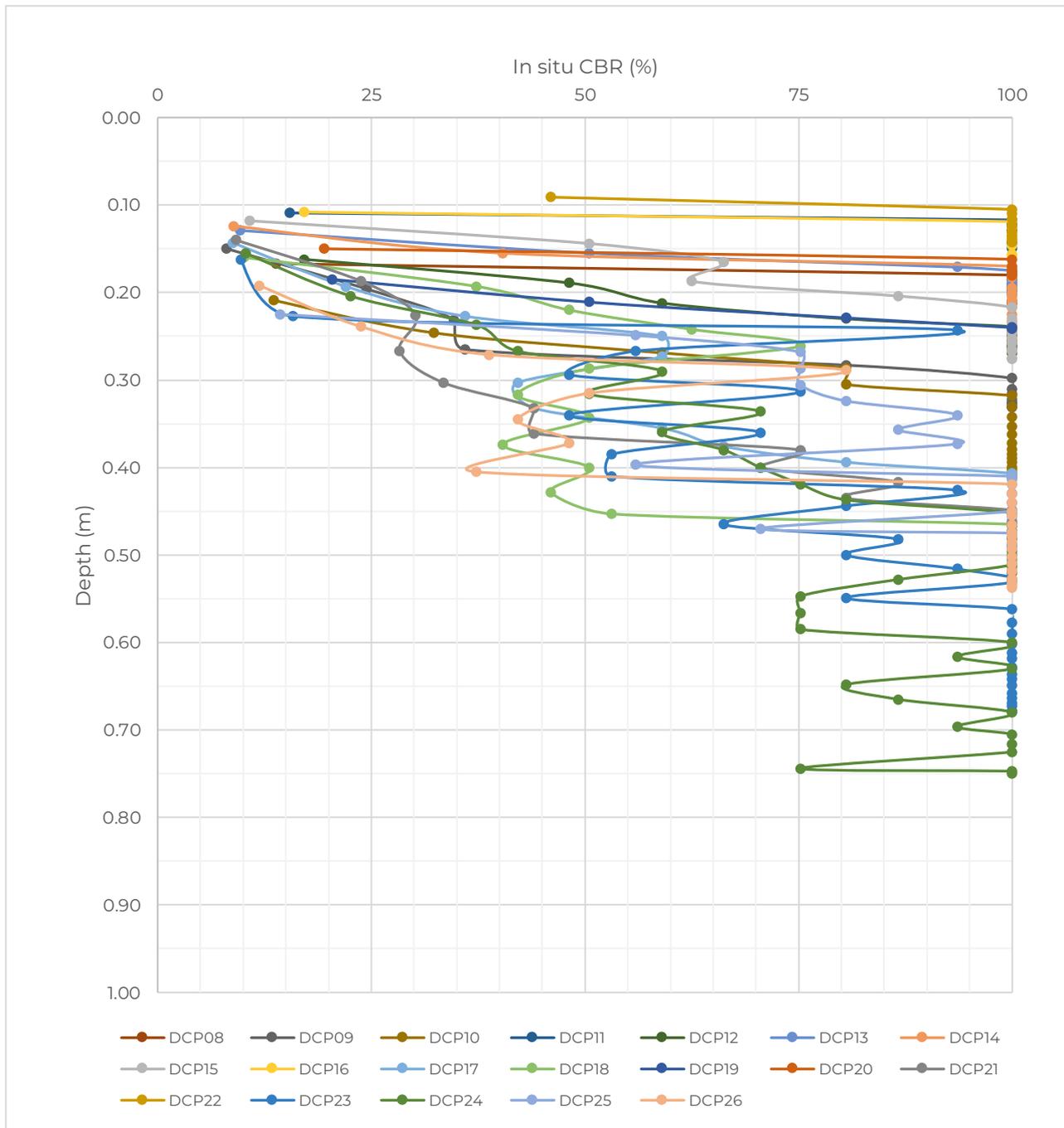


Figure 3-6 In-situ CBR versus depth for DCPs executed for proposed structures



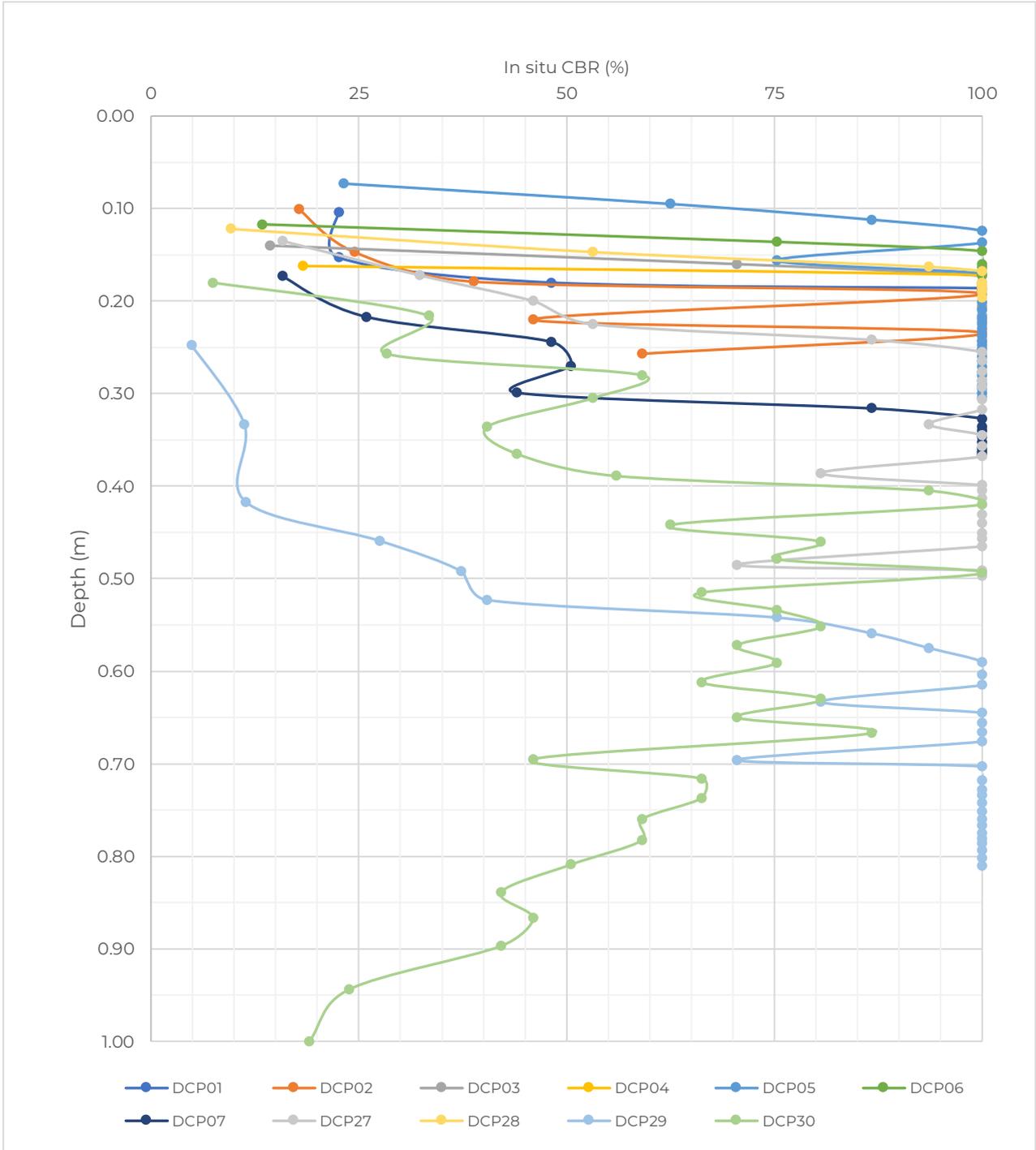


Figure 3-7 In-situ CBR versus depth for DCPs executed along the roads



3.4 Laboratory Testing

The representative soil samples were tested by Steyn-Wilson Laboratories, with the tests undertaken summarised in Table 3-2.

Table 3-2 Sample list

Laboratory Test	Number
Foundation Indicator (gradings, inc. hydrometer, Atterberg Limits)	10
Road Indicator, Moisture Density Relationship and CBR	4

The test results are summarised in Table 3-3 and Table 3-4. The detailed test results received from Steyn-Wilson Laboratories are included as Appendix D.

Table 3-3 Summary of Road- and Foundation Indicator test results

ID	Depth (m BGL)	Particle Size (%)				MC (%)	Atterberg Limits			PE
		Clay	Silt	Sand	Gravel		LL (%)	PI	LS (%)	
SMTP03*	0.20 – 0.40	15		25	60	N/A	22.00	6.90	3.70	Low
SMTP06*	0.20 – 0.55	10		21	69	N/A	24.00	6.60	3.30	Low
SMTP09*	0.00 – 0.40	19		38	43	N/A	28.10	11.40	6.50	Low
SMTP10	0.00 – 0.25	14	17	64	5	9.60	19.40	5.00	2.50	Low
SMTP12	0.00 – 0.80	6	7	52	35	4.70	21.60	8.30	4.20	Low
SMTP15	0.00 – 0.15	30	10	40	20	8.50	23.60	7.90	3.60	Low
SMTP16	0.00 – 0.70	24	9	44	23	6.90	24.30	7.60	4.00	Low
SMTP17	0.00 – 1.10	19	16	52	13	5.10	23.20	9.70	4.40	Low
SMTP20	0.00 – 0.65	22	10	41	27	6.30	21.10	8.70	4.30	Low
SMTP21	0.00 – 1.10	19	12	54	15	6.30	29.70	15.40	7.30	Low
SMTP23	0.00 – 1.15	13	12	59	17	6.40	24.50	8.20	4.30	Low
SMTP25	0.00 – 0.45	19	14	55	12	8.20	22.20	7.90	3.80	Low
SMTP26	0.00 – 0.75	15	12	50	23	6.70	24.80	9.40	5.30	Low
SMTP27*	0.00 – 1.60	29		36	35	N/A	26.50	13.40	7.10	Low

Notes: * – Road Indicator; MC – Moisture Content; LL – Liquid Limit; PI – Plasticity Index; LS – Linear Shrinkage; PE – Potential Expansiveness

The results from the samples recovered for laboratory testing indicate that the soils on site are primarily comprised of sand and gravels. However, a moderate distribution of silt and clay sized particles were found in certain samples, which exceeded the amount of fines described in the test pit logs. This resulted in



reasonable liquid limits and plasticity indices. Linear shrinkage values of >8 are considered problematic for heave and shrinkage related movements. Most samples did not obtain values of concern, however the samples retrieved at SMTP21 and SMTP27 had linear shrinkage values of 7.30 and 7.10, respectively. According to the Van der Merwe (1964) chart, the samples classified as “low” for potential expansiveness. Based on the test results, the soils are not expected to be expansive, however a conservative approach should be considered for foundation design purposes.

Table 3-4 Summary of moisture/density relationship and California Bearing Ratio (CBR) results

ID	Depth (m BGL)	GM	SANS GR40		CBR				COTO Classification
			OMC (%)	MDD (kg/m ³)	93%	95%	98%	Swell %	
SMTP03	0.20 – 0.40	2.10	7.5	2000	6	8	10	0.00	<G9
SMTP06	0.20 – 0.55	2.35	8.5	2111	10	14	22	0.00	G8
SMTP09	0.00 – 0.40	1.80	6.4	2165	2	3	3	1.99	<G9
SMTP27	0.00 – 1.60	1.56	9.4	2041	2	2	3	1.21	<G9

Notes: GM – Grading Modulus; OMC – Optimum Moisture Content; MDD – Maximum Dry Density

The CBR test results indicate that the materials at subgrade levels along the roads will predominately classify as poorer than G9 quality in terms of the COTO classification system.



4. Geotechnical Interpretation

4.1 Overview

The evaluation of the ground conditions is based on the site walk-over, profiles observed in the excavated test pits, DCP results and laboratory tests from the representative samples that were retrieved.

The Lunar Exploration Ground Sites (LEGS) Communication Facility will be developed on a site area of approximately 200 ha, with an access road of 2.5 km in length. The development will comprise of an operations building, power room building, telecommunication dishes of varying sizes, solar photovoltaic (PV) systems, internal roads and parking areas, underground and overhead transmission and communication lines and water infrastructure. Crane pads and laydown areas will also be required.

The founding materials will range from surface:

- Thin layer of hillwash transported, gravelly sand topsoil
- Completely weathered, very soft rock, tillite to moderately weathered, medium hard rock, tillite from depths of 0.25 m to 1.10 m below ground level (BGL)

The investigation indicates that the site conditions are suitable for the proposed development. Reasonable bearing capacities are expected on the tillite rock which will act as suitable founding medium for the proposed infrastructure.

The following geotechnical constraints were identified during the investigation:

- i. Thin layers of clayey surficial soils (potentially expansive and poor quality subgrade materials);
- ii. Thicker horizons of loose, compressible sandy soils near the river bed;
- iii. Intermediate to hard excavation conditions at relatively shallow depths; and
- iv. Poor ground permeability for on-site effluent disposal.

More detailed assessment of the founding conditions and foundation recommendations for the components of the development are provided in Sections 4.2 to 4.7.

4.2 Founding Conditions – Building and Ancillary Structures

The investigations indicate that moderately weathered, highly fractured, “medium hard rock” (estimated intact rock strength of 10 to 25 MPa), tillite occurs beneath all building and ancillary structures. The depth to bedrock and recommended founding levels are summarised in Table 4-1.

Table 4-1 Bedrock depths and recommended founding levels for buildings and ancillary structures

Structure	Test Pit	Depth of Bedrock	Refusal depth of TLB	Recommended founding level
Water storage and sewage	SMTPO8	0.40 m	0.75 m	0.50 m
Main building	SMTPI0	0.50 m	0.90 m	0.50 m
	SMTPI1	0.40 m	0.85 m	
Signal processing operations	SMTPI2	0.35 m	0.80 m	0.40 m
Power infrastructure	SMTPI23	0.70 m	1.15 m	0.60 m
	SMTPI24	0.80 m	1.00 m	



Structure	Test Pit	Depth of Bedrock	Refusal depth of TLB	Recommended founding level
Power generation building	SMTP25	0.25 m	0.45 m	0.40 m
	SMTP26	0.30 m	0.75 m	

The upper weathered tillite rock is expected to provide an acceptable founding medium for the buildings and ancillary structures, as the rock will have a suitable bearing capacity for the expected imposed loads of each specific structure. As such, the recommended founding levels have been provided to ensure that the structures are founded at a suitable depth, where minimal settlements are anticipated.

4.3 Founding Conditions – Antennae Structures

The investigations indicate that moderately weathered, highly fractured, “medium hard rock” (estimated intact rock strength of 10 to 25 MPa), tillite occurs beneath all major antennae. The intact rock strengths are anticipated to increase with depth to within the range of “hard rock” (estimated intact rock strength of 25 to 70 MPa).

It is understood that the antennae structures will be founded on large reinforced concrete bases or reinforced concrete structures below ground level. The foundation loads and further information on the founding requirements were not available at the time this report was produced.

The depth to bedrock, refusal depth of the TLB and the minimum recommended founding depths are listed in Table 4-2.

Table 4-2 Bedrock depths for all major antennae

Structure	Test Pit	Depth of Bedrock ¹	Refusal depth of TLB	Recommended minimum founding depth ²
18 m to 24 m diameter antennae	SMTP13	0.30 m	0.75	0.30 m
	SMTP14	0.15 m	0.25	
	SMTP15	0.15 m	0.55	
10 m diameter antennae	SMTP16	0.70 m	0.90	0.70 m
	SMTP17	0.80 m	1.10	
	SMTP18	0.30 m	0.80	
34 m diameter antennae	SMTP19	0.18 m	0.55	0.60 m
	SMTP20	0.30 m	0.65	
	SMTP21	0.55 m	1.10	
	SMTP22	0.25 m	0.50	

¹ - medium hard rock
² – below ground level at test position



The tillite rock is anticipated to provide an adequate founding medium for the antennae structure foundations. Given the sensitive nature of the antennae and the loads that will be imposed (wind and dynamic loads) is recommended that detailed analysis of the behaviour of the rock mass beneath the foundations is undertaken during the foundation design process. The interpretation of the rock mass properties is therefore provided below.

The method proposed by Hoek and Brown (1980) has been utilised to determine the rock mass parameters for the moderately weathered, highly fractured, medium hard rock, tillite described in the test pit logs. Three rock mass “properties” need to be estimated as inputs into the Hoek-Brown criterion for determining the strength and deformability of jointed rock masses, namely:

- Uniaxial Compressive Strength (UCS) of the intact rock pieces
- Value of the Hoek-Brown constant m_i for these intact rock pieces
- Value of the Geological Strength Index (GSI) for the rock mass

UCS values were assumed for the intact rock strength based on the rock hardness descriptions stated in the test pit logs.

The Hoek-Brown Rock Mass constant m_i of 15 was estimated for the moderately weathered, medium hard rock, tillite.

The GSI was determined by estimating the Rock Mass Rating (RMR) with the following relationship:

$$\text{GSI} = \text{RMR} - 5$$

The rock mass ratings and subsequent GSI is presented in Table 4-3.

Table 4-3 Estimated founding bedrock parameters

Rock Characteristic	Unit / description	Score
Uniaxial Compressive Strength (UCS)	25 MPa	4
Rock Quality Designation (RQD)	<25%	3
Joint spacing	Close (0.06-0.20 m)	8
Joint conditions	Slightly rough and moderately to highly weathered, wall rock separation <1mm	20
Groundwater condition	Damp	15
Joint orientation	Very favourable	0
Rock Mass Rating (RMR)		40
Geological Strength Index (GSI)		40

The method of Hoek and Diederichs (2005) was used to estimate the rock mass deformation modulus E_{rm} . For the moderately weathered, medium hard rock, tillite the rock mass deformation modulus E_{rm} was determined as 483 MPa.

The findings presented above show that the bedrock should provide a suitable founding medium for the proposed antennae bases, provided that these are founded at adequate depths and sized for the founding conditions.



4.4 Founding Conditions – Solar PV Facilities

While the location of the proposed solar PV facility had not been determined at the time of investigation, the ground conditions across the site were found to be broadly similar and the following generalised recommendation can therefore be provided.

The shallow depth to bedrock rules out the use of driven piles for founding the solar PV support structures.

The recommended foundation solutions for the solar PV facilities are as follows:

- Pre-drill holes to required depths, install posts into concreted holes.
- Reinforced concrete spread footing foundations with the supporting pole welded to a base plate anchored on a concrete pier.
- Pre-drill holes to required depths, backfill with spoil or imported soil and, subsequently, drive posts into hole.

It is expected that installing posts into concreted pre-drilled holes will be the most economical foundation solution when compared to the options provided above. The pre-drilled holes can be drilled using conventional rotary percussion drill rigs. Only manual labour is required to cast the piles into concrete filled holes.

Reinforced concrete spread footing foundations are considered to be technically feasible. However, these structures will need to be founded below the clayey surficial soils. Difficult excavations conditions are anticipated should the footings be founded below approximately 0.50 m.

Posts may be driven into the pre-drilled holes which would be backfilled with a combination of spoil material and/or imported soil prior to driving in the posts. This method requires the establishment of additional plant to ram the piles into the backfilled holes, which would increase costs.

A hybrid solution consisting of driven posts placed with a concrete collar may also be considered.

4.5 Subgrade Conditions

Materials of variable quality were encountered during the investigation.

The moisture/density relationship and California Bearing Ratio (CBR) results provided in Section 3.4 showed that the samples retrieved from SMTP09 and SMTP27 had CBRs of ≥ 3 . These results suggests that box cutting of the poor-quality clayey soils to the depth of bedrock or a maximum of 300 mm below roadbed level is required, and needs to be replaced with imported fill material.

The upper gravelly sands were found to generally classify as poorer than G9 quality in terms of the COTO materials classification system and are considered suitable for general fill only.

The sample retrieved from SMTP06 for laboratory testing was predominately completely to highly weathered, soft rock tillite which was found to classify as G8 quality. Weathered tillite rock recovered from cuttings and other excavations is considered suitable for use as fill material for the box cut solution proposed above. However, obtaining this material during construction will require careful selective excavation and separate stockpiling to prevent contamination with the clayey surficial soils.

4.6 Excavatability

In Table 4-4 the Classes of Excavation according to SANS 1200D are presented.



Table 4-4 SANS 1200D Classes of Excavation

Excavation Class	Description (for restricted excavation methods)
Soft Excavation	Excavation in material that can be efficiently removed by a back-acting excavator of flywheel power approximately 0.10 kW per millimetre of tined-bucket width, without the use of pneumatic tools such as paving breakers
Intermediate Excavation	Excavation in material that requires a back-acting excavator of flywheel power exceeding 0.10 kW per millimetre of tined-bucket width or the use of pneumatic tools before removal by equipment equivalent to that specified for soft excavation.
Hard Excavation	Hard rock excavation shall be excavation in material (excluding boulder excavation) that cannot be efficiently removed without blasting or wedging and splitting.

Excavations within the upper soil profile will classify as “Soft excavation” according to the SANS 1200 D Classes of Excavation. Excavations within the bedrock will grade rapidly from “Intermediate excavation” to “Hard rock excavation” according to SANS 1200 D Earthwork Classification.

4.7 On-site Effluent Disposal

The suitability for on-site effluent disposal via a septic tank and soak-away system is dependent on the permeability of the soils and environmental factors (chiefly the distance to drainage lines and water sources). Soak-aways do not function adequately if the soil permeability is low. While percolation testing was not undertaken as part of this investigation to assess the ground permeability, the shallow to bedrock and the clayey overlying soils will have low permeabilities. The permeability of the soils will likely result in the percolation rate, as defined in SANS 10400-P: National Building Regulations – Drainage, exceeding the 30-minute limit. Construction of soak-aways is not permitted in these conditions.

It is recommended that a conservancy system is implemented on this site. Alternatively, an on-site treatment system (package plant) may be considered.

Should the above options prove unfeasible, it is recommended that further intrusive investigations are undertaken in an attempt to find more suitable ground conditions. Effluent could then be piped to a soak away constructed in this area. Ground improvement in the form of ripping and /or placement of fill may be required to create suitable conditions for a soak away to function correctly.

4.8 Further Works, Construction Quality Assurance and Validation

The nature of geotechnical engineering is that variations in what is reported here may become evident during construction, once the site is opened up. It is thus imperative that a Competent Person inspect the ground conditions during construction, once the founding and subgrade materials have been exposed to ensure that conditions at variance with those predicted do not occur, and to undertake an interpretation of the facts applied in this report so as to validate the recommendations made. These requirements are also mandated under the SAICE Code of Practice.



While deep investigations (such as rotary core drilling) were not undertaken during this investigation, the ground conditions at depth may be estimated with a high degree of certainty based on the information obtained from the test pits. We submit that further investigations to assess the founding conditions beneath structures are not required (provided that the locations remain as investigated).



References

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Hoek, E. and Brown, E.T. (1980) Empirical strength criterion for rock masses. J. Geotech. Engng Div., ASCE 106(GT9), 12013-1035.

Hoek, E. and Diederichs, M. (2006) Empirical estimates of rock mass modulus. Int. J Rock Mech. Min. Sci., 43, 203-215.

Van der Merwe, D.M. (1964) The prediction of heave from the plasticity index and percentage clay fraction of soils. The Civil Engineer in South Africa, 6(6): 103-107.

Weinert, H.H. (1964) Basic igneous rocks in road construction. CSIR Research Report No. 218 (Natn. Inst. Res. Bull. No. 5), Pretoria, CSIR, 47 p.



Appendix A.

Test pit logging parameters



SOIL DESCRIPTIVE TERMS

Reference: Brink, ABA and Bruin, RMH (2002) Guidelines for Soil and Rock Logging in South Africa, AEG/SAICE/SAIEG

DESCRIPTIVE ORDER: 1. Consistency; 2. Soil type; 3. Moisture condition; 4. Colour; 5. Soil structure; and 6. Origin

1a Consistency: Granular Soils			
*SPT "N"	GRAVELS & SANDS Generally free draining soils		Dry density (kg/m ³)
< 4	VERY LOOSE	Crumbles very easily when scraped with geological pick	< 1450
4-10	LOOSE	Small resistance to penetration by sharp pick point	1450-1600
10-30	MEDIUM DENSE	Considerable resistance to penetration by sharp pick point	1600-1750
30-50	DENSE	Very high resistance to penetration by sharp pick point. Requires many blows of pick for excavation	1750-1925
> 50	VERY DENSE	High resistance to repeated blows of geological pick. Requires power tools for excavation	> 1925

*Saturated SPT

1b Consistency: Cohesive Soils			
*SPT "N"	Insensitive SILTS & CLAYS and combination with SANDS Generally slow draining soils.		UCS (kPa)
< 5	VERY SOFT	Pick point easily pushed in 100mm. Easily moulded by fingers	< 50
5-10	SOFT	Pick point easily pushed in 30-40mm. Moulded by fingers with some pressure. Easily penetrated by thumb.	50-125
11-25	FIRM	Pick point penetrates up to 10mm. Very difficult to mould with fingers. Indented by thumb with effort. Spade just penetrates.	125-500
26-50	STIFF	Slight indentation by pushing in pick point. Cannot be moulded by fingers. Penetrated by thumbnail. Pick necessary to excavate.	250-500
51-80	VERY STIFF	Slight indentation by blow of pick point. Requires power tools for excavation.	500-1000

*Saturated SPT

2 Soil Type	
SOIL TYPE"	PARTICLE SIZE (mm)
CLAY	< 0,002
SILT	0,002 – 0,06
SAND	0,06 – 2
GRAVEL	2 – 60*
COBBLES	60 – 200*

* Specify average and maximum sizes, hardness, shape as well as proportion

3 Moisture Condition	
DRY	No water detectable
SLIGHTLY MOIST	Water just discernable
MOIST	Water easily discernable
VERY MOIST	Water can be squeezed out
WET	Generally below the water table

4 Colour	
Described at natural moisture content, as seen in profile (unless otherwise specified) and using bedding thickness criteria. (e.g. thickly banded, thinly streaked, etc.)	
SPECKLED	Very small patches of colour < 2 mm
MOTTLED	Irregular patches of colour 2 – 6 mm
BLOTCHED	Large irregular patches 6 – 20 mm
BANDED	Approximately parallel bands of varying colour
STREAKED	Randomly orientated streaks of colour
STAINED	Local colour variations: associated with discontinuity surfaces

5 Soil Structure	
INTACT	No structure present
FISSURED	Presence of discontinuities, possibly cemented
SLICKENSIDED	Very smooth, glossy, often striated discontinuity planes
SHATTERED	Presence of open fissures. Soil breaks into gravel size blocks
MICRO-SHATTERED	Small scale shattering, very closely spaced open fissures. Soil breaks into sand size crumbs
RESIDUAL STRUCTURES	Relict bedding, lamination, foliation, etc.

5 Origin	
TRANSPORTED	Alluvium, hillwash, talus, etc.
RESIDUAL	Weathered from parent rock e.g. residual granite
PEDOCRETES	Ferricrete, laterite, silcrete, calcrete, etc.

Pedocretes		
DEGREE OF CEMENTATION		UCS (MPa)
VERY WEAKLY CEMENTED	Some material can be crumbled between finger and thumb. Disintegrates under knife blade to a friable state.	0,1 – 0,5
WEAKLY CEMENTED	Cannot be crumbled between strong fingers. Some material can be crumbled by strong pressure between thumb and hard surface. Under light hammer blows disintegrates to friable state.	0,5 – 2
CEMENTED	Material crumbles under firm blows of sharp pick point. Grains can be dislodged with some difficulty by a knife blade.	2 – 5
STRONGLY CEMENTED	Firm blows of sharp pick point on hand-held specimen show 1-3mm indentations. Grains cannot be dislodged by knife blade.	5 – 10
VERY STRONGLY CEMENTED	Hand-held specimen can be broken by single firm blow of hammerhead. Similar appearance to concrete.	10 - 25

Appendix B.

Test pit logs



TRIAL PIT LOG

HOLE NO. : SMTP01

X COORD: 20°34'37.43"E

Y COORD: 33°14'2.56"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.20		<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, slightly clayey, silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, fine to medium gravel and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.45		<p>Moderately weathered medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, mottled cream, stained orange brown and reddish brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.40 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 09/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG:

TRIAL PIT LOG

HOLE NO. : SMTP03

X COORD: 20°34'27.17"E

Y COORD: 33°14'13.74"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.20 0.40 1 2 3 4 5		<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, slightly clayey, silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, fine to medium gravel and fine to coarse plant roots, Topsoil/Hillwash.</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, mottled cream, stained orange brown and reddish brown, moderately weathered, fine grained, massive, medium hard rock, Tillite Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.30 m: Joints very wide and filled with sand as above. 2) Excavated as cobble to boulder sized fragments. 3) Band of highly weathered, weakly laminated, very highly jointed, Tillite at 0.20 - 0.35 m. 4) Joints at base of test pit: Highly jointed, narrow, stained.</p>	

NOTES:

1. Sample taken: 0.20 – 0.40 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 09/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP04

X COORD: 20°34'15.00"E

Y COORD: 33°14'17.86"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.15		<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, slightly clayey, silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, fine to medium gravel and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.65		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, mottled cream, stained orange brown and reddish brown, moderately weathered, fine grained, massive, medium hard rock, Tillite Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.40 m: Joints very wide to wide with depth and filled with sand as above. 2) Excavated as cobble to boulder sized fragments with minor sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 09/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP06

X COORD: 20°33'35.10"E

Y COORD: 33°14'23.78"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			● 5 10 15 20 25 30 35 40 45 50 55 ●
0.20		<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, slightly clayey, silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, fine to medium gravel and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.45	█		
0.55	█		
1		<p>Highly to completely weathered, very soft rock, TILLITE</p> <p>Light brown grey to olive grey, speckled grey, stained red and orange brown, highly to completely weathered, fine grained, weakly laminated, very soft rock, Tillite Dwyka Formation.</p> <p>Note: 1) Excavated as a fine to coarse gravel. 2) Very highly jointed, wide, stained and filled with gravelly sand.</p>	
2		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, mottled cream, stained orange brown and reddish brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Excavated as medium to coarse gravel to cobble to boulder sized fragments with depth. 2) Highly jointed, wide to narrow, stained and filled with minor sand.</p>	
3			
4			
5			

NOTES:

1. Sample taken: 0.20 – 0.55 m	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 09/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP07

X COORD: 20°33'15.29"E

Y COORD: 33°14'29.21"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.30	█	<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, slightly clayey, silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, fine to medium gravel and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.65	█	<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, mottled cream, stained orange brown and reddish brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.40 m: Joints wide and filled with gravelly sand as above 2) Excavated as cobble to boulder sized fragments with minor sand. 3) Joints at base of test pit: Highly jointed, narrow to very narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 09/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP08

X COORD: 20°33'6.12"E

Y COORD: 33°14'30.04"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.25		<p>Loose, GRAVEL and SAND</p> <p>Slightly moist to moist, brown, blotched light brown and reddish brown, loose, intact to matrix supported, slightly clayey, silty, fine to medium grained sand, with sub-angular to angular, tillite fine to medium gravel and cobble sized fragments, and fine plant roots, Topsoil/Hillwash.</p>	
0.40		<p>Highly to moderately weathered, soft rock, TILLITE</p> <p>Grey brown to grey, speckled black, stained red and orange brown, highly to moderately weathered, fine grained, massive, soft rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Very highly jointed, wide, stained and filled with gravelly sand. 2) Excavated as gravel to cobble to boulder sized fragments.</p>	
0.75		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey brown to grey, speckled black and orange brown, stained red and orange, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, wide to narrow, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP09

X COORD: 20°33'9.57"E

Y COORD: 33°14'28.67"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.25		<p>Loose, SAND</p> <p>Slightly moist to moist, brown to light brown, loose, intact, gravelly, silty, fine to medium grained sand, with fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.40			
0.80	██████	<p>Highly weathered, very soft rock, TILLITE</p> <p>Dark grey, speckled orange brown, stained red, highly weathered, fine grained, massive to weakly laminated, very soft rock, Tillite Dwyka Formation.</p> <p>Note: 1) Very highly jointed, wide, stained and filled with gravelly sand. 2) Excavated as a fine to coarse gravel.</p>	
1		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, moderately weathered, fine grained, massive, medium hard rock, Tillite Dwyka Formation.</p> <p>Note: 1) Highly jointed, wide to narrow with depth, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments.</p>	
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.40 m	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP10

X COORD: 20°33'6.98"E

Y COORD: 33°14'28.56"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.25		<p>Loose, SAND</p> <p>Slightly moist to moist, brown to light brown, loose, intact, gravelly, silty, fine to medium grained sand, with fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.40			
0.80	██████	<p>Highly weathered, very soft rock, TILLITE</p> <p>Dark grey, speckled orange brown, stained red, highly weathered, fine grained, massive to weakly laminated, very soft rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Very highly jointed, wide, stained and filled with gravelly sand. 2) Excavated as a fine to coarse gravel.</p>	
1		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, wide to narrow with depth, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments.</p>	
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.25 m	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Triple width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP11

X COORD: 20°33'6.98"E

Y COORD: 33°14'28.56"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.20		<p>Loose, SAND and GRAVEL</p> <p>Slightly moist to moist, brown, blotched light brown and reddish brown, loose, intact to matrix supported, slightly clayey, silty, fine to medium grained sand, with sub-angular to angular, tillite fine to medium gravel and cobble sized fragments, and fine plant roots, Topsoil/Hillwash.</p>	
0.40		<p>Highly to moderately weathered, soft rock, TILLITE</p> <p>Grey brown to grey, speckled black, stained red and orange brown, highly to moderately weathered, fine grained, massive, soft rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Very highly jointed, wide to narrow, stained and filled with gravelly sand. 2) Excavated as gravel to cobble to boulder sized fragments.</p>	
0.85		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey brown to grey, speckled black and orange brown, stained red and orange, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.25 m	5. Test pit terminated due to TLB approaching refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Triple width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP12

X COORD: 20°33'2.90"E

Y COORD: 33°14'28.31"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			● 5 10 15 20 25 30 35 40 45 50 55 ●
0.20		Loose, SAND and GRAVEL	
0.35		Moist, brown to reddish brown, loose, intact to matrix supported, silty, fine to medium grained sand, with sub-angular to sub-rounded, tillite fine to medium and occasional coarse gravel, and fine plant roots, Topsoil/Hillwash.	
0.80	██████████	Highly weathered, very soft rock, TILLITE	
1		Dark grey, blotched red, stained reddish brown, highly weathered, fine grained, massive to weakly laminated, very soft rock, Tillite. Dwyka Formation. Note: 1) Very highly jointed, wide, stained and filled with gravelly sand. 2) Excavated as fine to coarse gravel.	
2		Moderately weathered, medium hard rock, TILLITE	
3		Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. Note: 1) Highly jointed, narrow, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments.	
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.80 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP13

X COORD: 20°32'58.17"E

Y COORD: 33°14'27.48"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.15		Loose, SAND and GRAVEL	
0.30		Slightly moist to moist, brown, blotched light brown and reddish brown, loose, intact to matrix supported, slightly clayey, silty, fine to medium grained sand, with sub-angular to angular, tillite fine to medium gravel and cobble sized fragments, and fine plant roots, Topsoil/Hillwash.	
0.75		Highly weathered, very soft rock, TILLITE	
1		Dark grey, speckled orange brown, stained red, highly weathered, fine grained, massive to weakly laminated, very soft rock, Tillite. Dwyka Formation. Note: 1) Very highly jointed, wide, stained and filled with gravelly sand. 2) Excavated as fine to coarse gravel.	
2		Moderately weathered, medium hard rock, TILLITE	
3		Olive grey to grey, speckled white, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. Note: 1) Highly jointed, narrow, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments.	
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP14

X COORD: 20°32'57.60"E

Y COORD: 33°14'27.36"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.15 0.25		<p>Loose, gravelly SAND</p> <p>Slightly moist, brown to light brown, loose, intact, slightly silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, tillite fine to coarse gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, blotched cream, stained orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.15 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor gravelly sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7. Slow progress/excavation rate by TLB on tillite
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP15

X COORD: 20°32'57.94"E

Y COORD: 33°14'27.96"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.15		<p>Loose, gravelly SAND</p> <p>Slightly moist, brown to light brown, loose, intact, slightly silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, tillite fine to coarse gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.55		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, blotched cream, stained orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.40 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.15 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7. Slow progress/excavation rate by TLB on tillite
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP16

X COORD: 20°32'44.46"E

Y COORD: 33°14'33.60"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.30		<p>Loose, SAND</p> <p>Slightly moist to moist, brown to light brown, loose, intact, silty, fine to medium grained sand, with abundant fine plant roots, Topsoil/Hillwash.</p>	
0.70		<p>Highly weathered, soft rock, TILLITE</p> <p>Dark grey to grey, speckled white, stained reddish brown and orange brown, highly weathered, fine grained, massive to weakly laminated, soft rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Very highly jointed, very wide to wide, stained and filled with sand. 2) Excavated as fine to coarse gravel.</p>	
0.90		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled cream, blotched white, stained red, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with minor sand. 2) Excavated as cobble to boulder sized fragments.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.70 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP17

X COORD: 20°32'44.14"E

Y COORD: 33°14'34.06"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.40	[Symbol]	<p>Loose, SAND</p> <p>Slightly moist to moist, brown to light brown, loose, intact, silty, fine to medium grained sand, with abundant fine plant roots, Topsoil/Hillwash.</p>	
0.80	[Symbol]	<p>Highly weathered, soft rock, TILLITE</p> <p>Dark grey to grey, speckled white, stained reddish brown and orange brown, highly weathered, fine grained, massive to weakly laminated, soft rock, Tillite. Dwyka Formation.</p>	
1.10	[Symbol]	<p>Note: 1) Very highly jointed, very wide to wide, stained and filled with sand.</p> <p>2) Excavated as fine to coarse gravel.</p>	
2		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled cream, blotched white, stained red, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with minor sand.</p> <p>2) Excavated as cobble to boulder sized fragments.</p>	
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 1.10 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP18

X COORD: 20°32'44.09"E

Y COORD: 33°14'33.18"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.30		<p>Loose, gravelly SAND</p> <p>Slightly moist, orange brown, loose, intact, silty, fine to medium grained sand, with occasional sub-angular to sub-rounded, tillite fine gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.80		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, blotched cream, stained orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.50 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor gravelly sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 07/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP19

X COORD: 20°32'35.91"E

Y COORD: 33°14'30.12"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.18		<p>Loose, SAND and GRAVEL</p> <p>Moist, brown to reddish brown, loose, intact to matrix supported, silty, fine to medium grained sand, with sub-angular to sub-rounded, tillite fine to medium and occasional coarse gravel, and fine plant roots, Topsoil/Hillwash.</p>	
0.55		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.30 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor gravelly sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP20

X COORD: 20°32'36.23"E

Y COORD: 33°14'29.62"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.30		<p>Loose, SAND and GRAVEL</p> <p>Moist, brown to reddish brown, loose, intact to matrix supported, silty, fine to medium grained sand, with sub-angular to sub-rounded, tillite fine to medium and occasional coarse gravel, and fine plant roots, Topsoil/Hillwash.</p>	
0.65		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.40 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor gravelly sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.65 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP21

X COORD: 20°32'36.37"E

Y COORD: 33°14'30.54"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.25	█	<p>Loose, SAND and GRAVEL</p> <p>Moist, brown to reddish brown, loose, intact to matrix supported, silty, fine to medium grained sand, with sub-angular to sub-rounded, tillite fine to medium and occasional coarse gravel, and fine plant roots, Topsoil/Hillwash.</p>	
0.55	█	<p>Highly weathered, soft rock, TILLITE</p> <p>Dark grey to grey, speckled white, stained reddish brown and orange brown, highly weathered, fine grained, massive to weakly laminated, soft rock, Tillite. Dwyka Formation.</p>	
1.10	█	<p>Note: 1) Very highly jointed, very wide to wide, stained and filled with gravelly sand.</p> <p>2) Excavated as fine to coarse gravel.</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, wide to narrow with depth, stained and filled with minor gravelly sand.</p> <p>2) Excavated as cobble to boulder sized fragments.</p>	
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 1.10 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. Confined space for the TLB
3. No major sidewall collapse	7. DCP undertaken at ground level
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP22

X COORD: 20°32'35.30"E

Y COORD: 33°14'30.08"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.25		<p>Loose, SAND and GRAVEL</p> <p>Moist, brown to reddish brown, loose, intact to matrix supported, silty, fine to medium grained sand, with sub-angular to sub-rounded, tillite fine to medium and occasional coarse gravel, and fine plant roots, Topsoil/Hillwash.</p>	
0.50		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.35 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor gravelly sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP23

X COORD: 20°32'30.45"E

Y COORD: 33°14'36.32"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			<div style="display: flex; justify-content: space-between; border-top: 1px solid black; border-bottom: 1px solid black;"> 5 10 15 20 25 30 35 40 45 50 55 </div>
0.30	█	<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, silty, fine to medium grained sand, with occasional sub-angular, tillite fine to coarse gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.70	█	<p>Highly weathered, soft rock, TILLITE</p> <p>Brown to olive grey, speckled white, stained red, highly weathered, fine grained, massive to weakly laminated, soft rock, Tillite. Dwyka Formation.</p>	
1.15	█	<p>Note: 1) Very highly to highly jointed, wide to narrow with depth, stained and filled with gravelly sand.</p> <p>2) Excavated as gravel to cobble to boulder sized fragments.</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with sand.</p> <p>2) Excavated as cobble to boulder sized fragments.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 1.15 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. Confined space for the TLB
3. No major sidewall collapse	7. DCP undertaken at ground level
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP24

X COORD: 20°32'32.49"E

Y COORD: 33°14'36.24"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.30	█	<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, silty, fine to medium grained sand, with occasional sub-angular, tillite fine to coarse gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.70	█	<p>Completely weathered, very soft rock, TILLITE</p> <p>Reddish brown, stained orange brown, completely weathered, fine grained, weakly laminated, very soft rock, Tillite. Dwyka Formation</p> <p>Note: 1) Very highly jointed, wide, stained and filled with sand. 2) Excavated as fine to coarse gravel.</p>	
0.80	█		
1.00	█	<p>Highly weathered, soft rock, TILLITE</p> <p>Brown to olive grey, speckled white, stained red, highly weathered, fine grained, massive to weakly laminated, soft rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Very highly to highly jointed, wide to narrow with depth, stained and filled with sand. 2) Excavated as gravel to cobble to boulder sized fragments.</p>	
2		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite, with sand as above. Overall consistency dense to very dense with depth.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with sand. 2) Excavated as cobble to boulder sized fragments.</p>	
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. Confined space for the TLB
3. No major sidewall collapse	7. DCP undertaken at ground level
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP25

X COORD: 20°32'31.13"E

Y COORD: 33°14'37.78"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			5 10 15 20 25 30 35 40 45 50 55
0.25		<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, silty, fine to medium grained sand, with occasional sub-angular, tillite fine to coarse gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.45		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.35 m: Joints very wide and filled with gravelly sand as above. 2) Excavated as cobble to boulder sized fragments with minor gravelly sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.45 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP27

X COORD: 20°32'34.31"E

Y COORD: 33°14'39.74"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			• 5 10 15 20 25 30 35 40 45 50 55 •
0.15		<p>Loose, SAND</p> <p>Moist, brown to orange brown, loose, intact, gravelly, silty, fine to medium grained sand, with fine plant roots, Topsoil/Hillwash.</p>	
0.75		<p>Medium dense, SAND</p> <p>Slightly moist, light orange brown, predominately medium dense, intact, slightly silty, fine to medium grained sand, Alluvium</p>	
1.10		<p>Medium dense, SAND and GRAVEL</p> <p>As above, interlayered with mudrock coarse gravel to cobble sized fragments, Pebble marker.</p>	
1.60		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Grey, speckled white, stained orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with sand. 2) Excavated as cobble sized fragments.</p>	
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 1.60 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP26

X COORD: 20°32'32.95"E

Y COORD: 33°14'37.36"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA

PROJECT: SANSA Matjiesfontein

PROJECT NO.: 23123G

SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.30		<p>Loose, gravelly SAND</p> <p>Moist, brown to orange brown, loose, intact, silty, fine to medium grained sand, with occasional sub-angular, tillite fine to coarse gravel, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
0.75		<p>Moderately weathered, medium hard rock, TILLITE</p> <p>Olive grey to grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Upper 0.00 - 0.50 m: Joints very wide and filled with sand as above. 2) Excavated as cobble to boulder sized fragments with minor sand. 3) Joints at base of test pit: Highly jointed, narrow, stained.</p>	
1			
2			
3			
4			
5			

NOTES:

1. Sample taken: 0.00 – 0.75 m	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP28

X COORD: 20°32'43.29"E

Y COORD: 33°14'42.84"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			● 5 10 15 20 25 30 35 40 45 50 55 ●
0.30	0.45	<p>Loose to medium dense, gravelly SAND</p> <p>Moist, dark brown, mottled grey, loose to medium dense, intact, clayey, fine to medium grained sand, with occasional angular, elongated, mudrock fine to coarse gravel, Topsoil/Hillwash.</p>	
		<p>Medium dense, GRAVEL</p> <p>Slightly moist, dark brow to grey, medium dense, clast supported, angular to sub-angular, elongated, mudrock fine to coarse gravel, with clayey sand as above, Hillwash.</p>	
1.00		<p>Moderately weathered, medium hard rock, MUDROCK</p> <p>Grey, streaked white, stained red and brown, moderately weathered, very fine grained, laminated, medium hard rock, seemingly Mudrock. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with clayey sand. 2) Excavated as cobble to boulder sized fragments.</p>	
2			
3			
4			
5			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. DCP undertaken at ground level
3. No major sidewall collapse	7.
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

TRIAL PIT LOG

HOLE NO. : SMTP29

X COORD: 20°32'58.09"E

Y COORD: 33°14'39.44"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA

PROJECT: SANSA Matjiesfontein

PROJECT NO.: 23123G

SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10
			● 5 10 15 20 25 30 35 40 45 50 55 ●
0.25	0.60	<p>Loose, SAND and GRAVEL</p> <p>Slightly moist to moist, brown, loose, intact to matrix supported, slightly silty, fine to medium grained sand, with sub-angular, elongated, fine to medium gravel of mixed origin, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
1	1.50	<p>Loose to medium dense, SAND and GRAVEL</p> <p>Slightly moist, light brown to orange brown, loose to medium dense, matrix supported, sub-angular, elongated, fine to medium gravel of mixed origin, with slightly silty, fine to medium grained sand, Hillwash.</p> <p>Medium dense, SAND and GRAVEL</p> <p>Dry, light brown to orange brown, medium dense, intact to matrix supported, slightly silty, fine to medium grained sand, with sub-angular to sub-rounded, fine to medium gravel of mixed origin, Alluvium</p>	
2	1.75	<p>Medium dense to dense, GRAVEL</p> <p>Dry, grey, stained orange brown, medium dense to dense, clast supported, sub-angular to angular elongated, tillite medium to coarse gravel, with slightly silty, sand as above, Alluvium</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Dark grey, speckled white, stained dark red and light orange brown, moderately weathered, fine grained, predominately massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with silty sand. 2) Excavated as cobble sized fragments.</p>	
3	1.80		
4			
5			

<p>NOTES:</p> <ol style="list-style-type: none"> 1. No sample taken 2. No groundwater seepage 3. No major sidewall collapse 4. Double width test pit 	<ol style="list-style-type: none"> 5. Test pit terminated due to TLB refusal 6. Confined space for the TLB 7. DCP undertaken at ground level 8.
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<p>MACHINE:</p> <p>DIAM:</p> <p>FILE REF:</p>	<p>DATE PROFILED: 08/06/2023</p> <p>PROFILED BY: TJS</p> <p>CHECKED BY: SB</p>	<p>PROF REG.:</p> <p>PROF. REG: 4002279/07</p>
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TRIAL PIT LOG

HOLE NO. : SMTP30a

X COORD: 20°33'3.06"E

Y COORD: 33°14'36.09"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA
PROJECT: SANSA Matjiesfontein
PROJECT NO.: 23123G
SITE : Matjiesfontein

DEPTH (m)		DESCRIPTION	Dynamic Probe Light DCP N10 5 10 15 20 25 30 35 40 45 50 55
0.20	0.35	<p>Loose, SAND and GRAVEL</p> <p>Slightly moist to moist, brown, loose, intact to matrix supported, slightly silty, fine to medium grained sand, with sub-angular, elongated, fine to medium gravel of mixed origin, and fine to coarse plant roots, Topsoil/Hillwash.</p>	
1	1.30	<p>Loose to medium dense, SAND and GRAVEL</p> <p>Slightly moist, light brown to orange brown, loose to medium dense, matrix supported, sub-angular, elongated, fine to medium gravel of mixed origin, with slightly silty, fine to medium grained sand, Hillwash.</p>	
1.90	2.00	<p>Medium dense, SAND and GRAVEL</p> <p>Dry, light brown to orange brown, medium dense, intact to matrix supported, slightly silty, fine to medium grained sand, with sub-angular to sub-rounded, fine to medium gravel of mixed origin, Alluvium</p>	
2	3	<p>Medium dense to dense, GRAVEL</p> <p>Dry, grey, stained orange brown, medium dense to dense, clast supported, sub-angular to angular, elongated, tillite medium to coarse gravel, with slightly silty, sand as above, Alluvium.</p> <p>Moderately weathered, medium hard rock, TILLITE</p> <p>Dark grey, speckled white, stained dark red and light orange brown, moderately weathered, fine grained, predominately massive, medium hard rock, Tillite. Dwyka Formation.</p> <p>Note: 1) Highly jointed, narrow, stained and filled with silty, gravelly sand. 2) Excavated as cobble sized fragments.</p>	
4			

NOTES:

1. No sample taken	5. Test pit terminated due to TLB refusal
2. No groundwater seepage	6. Confined space for the TLB
3. No major sidewall collapse	7. DCP undertaken at ground level
4. Double width test pit	8.

MACHINE:	DATE PROFILED: 08/06/2023	
DIAM:	PROFILED BY: TJS	PROF REG.:
FILE REF:	CHECKED BY: SB	PROF. REG: 4002279/07

Appendix C.

Test pit photographs





Figure 1 SMTP01 test pit excavations



Figure 2 SMTP01 test pit profile



Figure 3 SMTP02 test pit excavations



Figure 4 SMTP02 closeup of moderately weathered, medium hard rock, tillite



Figure 5 SMTP03 test pit excavations



Figure 6 SMTP03 closeup of moderately weathered, medium hard rock, tillite



Figure 7 SMTPO4 test pit profile



Figure 8 SMTPO4 test pit excavations



Figure 9 SMTP05 test pit profile



Figure 10 SMTP05 spoil



Figure 11 SMTP06 test pit profile



Figure 12 SMTP06 test pit excavations



Figure 13 SMTP07 test pit profile



Figure 14 SMTP07 test pit excavations and spoil



Figure 15 SMTP08 test pit profile



Figure 16 SMTP08 test pit excavations



Figure 17 SMTP09 test pit profile



tillite

Figure 18 SMTP09 moderately weathered,



Figure 19 SMTP10 test pit profile



Figure 20 SMTP10 spoil



Figure 21 SMTPI1 test pit profile



Figure 22 SMTPI1 test pit excavations



Figure 23 SMTP12 test pit profile



Figure 24 SMTP12 test pit excavations



Figure 25 SMTP13 test pit profile



Figure 26 SMTP13 spoil



Figure 27 SMTPI4 test pit excavations



Figure 28 SMTPI4 moderately weathered, medium hard rock, tillite



Figure 29 SMTP15 test pit profile



Figure 30 SMTP15 test pit excavations



Figure 31 SMTP16 test pit profile



Figure 32 SMTP16 test pit excavations



Figure 33 SMTP17 test pit profile



Figure 34 SMTP17 spoil



Figure 35 SMTPI8 test pit profile



Figure 36 SMTPI8 closeup of moderately weathered, medium hard rock, tillite



Figure 37 SMTP19 test pit profile



Figure 38 SMTP19 test pit excavations



Figure 39 SMTP20 test pit profile



Figure 40 SMTP20 test pit excavations



Figure 41 SMTP21 test pit profile



Figure 42 SMTP21 test pit excavations



Figure 43 SMTP22 test pit excavations



Figure 44 SMTP22 spoil



Figure 45 SMTP23 test pit profile



Figure 46 SMTP23 spoil



Figure 47 SMTP24 test pit profile



Figure 48 SMTP24 test pit excavations



Figure 49 SMTP25 test pit profile



tillite

Figure 50 SMTP25 moderately weathered,



Figure 51 SMTP26 test pit profile



Figure 52 SMTP26 test pit excavations



Figure 53 SMTP27 test pit profile



marker

Figure 54 SMTP27 closeup of pebble



Figure 55 SMTP28 test pit profile



Figure 56 SMTP28 closeup of moderately weathered, medium hard rock, mudrock



Figure 57 SMTP29 test pit profile



Figure 58 SMTP29 spoil



Figure 59 SMTP30a test pit profile



Figure 60 SMTP30a spoil

Appendix D.

Laboratory test results



Client: **PeraGage**
Project: 23123G SANSA Matjiesfontien
Attention: Steven Bok
Your Ref. No: -
Date Reported 20/06/23

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWL28376

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

4 x FOUNDATION INDICATOR

Site Sampling and Materials Information

Sampling Method Specimens delivered to Steyn Wilson Laboratory.

Environmental Condition Rainy

Deviation from the prescribed test method No deviation from standard test method.

Responsibility of information disclaimer The sample information was received from the customer. Results apply to the sample as received from the Customer.

 **FINAL REPORT**

We would like to take this opportunity to thank you for your valued support.
Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

STEYN-WILSON LABORATORIES (PTY) LTD

Remarks:

- Information contained herein is confidential to STEYN-WILSON PTY LTD and the addressee
- Opinions & Interpretations are not included in our schedule of Accreditation.
- The samples were subjected and analysed according to ASTM.
- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.
- This document is the correct record of all measurements made, and may not be reproduced other than with full written approval from a director of STEYN-WILSON LABORATORIES (PTY) LTD.
- Measuring equipment is traceable to national standards (Where applicable).
- Should there be any deviation from the prescribed test method comments will be made thereof, pertaining to the test on the relevant materials report.
- Uncertainty of measurement is calculated and corresponds to a coverage probability of approximately 95%. Available on request.
- The decision rule states that the measurement of uncertainty can be applied by the customer to the test results, on request. It is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.



Mr. R. Wilson
Technical Signatory

DIRECTORS: Mr. J. Steyn ND-Civil (Managing) | Mr. R. Wilson B-Tech Civil (Operations)



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CIVIL ENGINEERING TESTING LABORATORIES

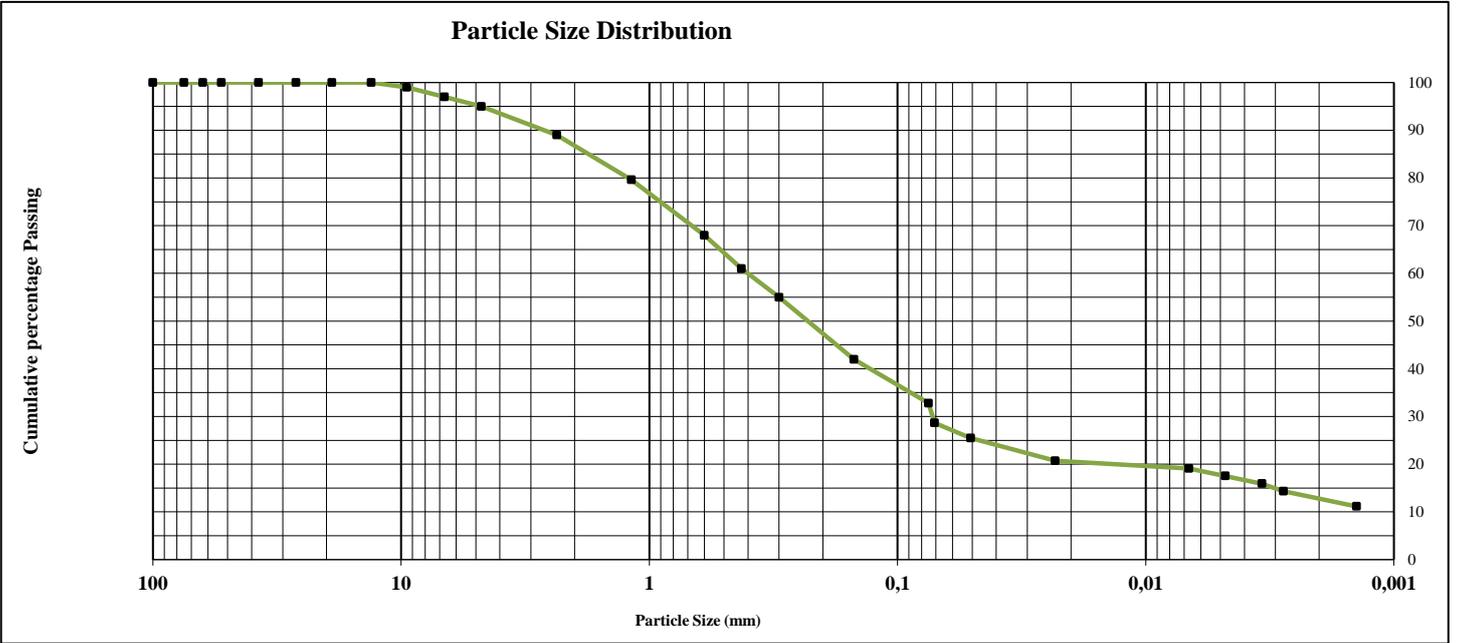
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	Date Sampled: 09/06/23

FOUNDATION INDICATOR ASTM D422

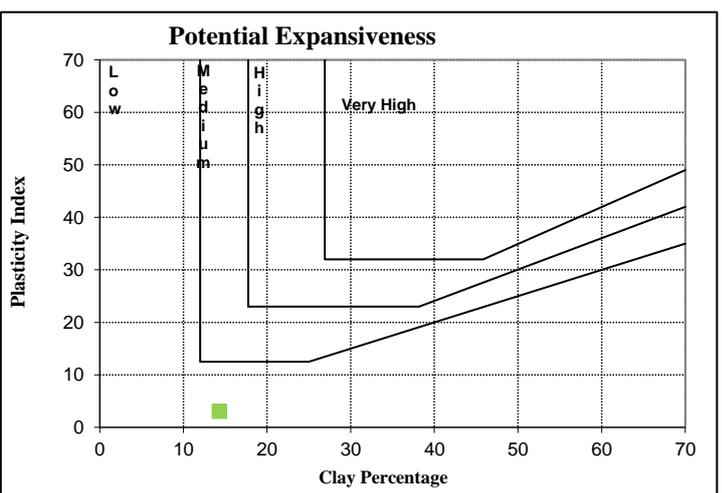
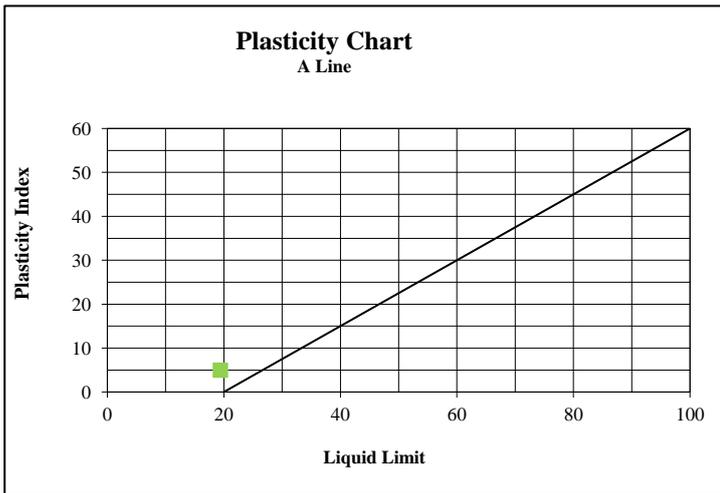
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 4
Position: TP10	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 19,4 Linear Shrinkage: 2,5
Depth: 0.00 - 0.25m	Plasticity Index: 5 Insitu M/C%: 9,6

PH (TMH1 A20)	(TMH1 A21T) Conductivity s.m ⁻¹	SG (TMH1 A12T)* 2,510
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,071	0,051	0,023	0,007	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	100	100	99	97	95	89	79,6	68	61	55	42	32,8	28,66	25,47	20,7	19,1	17,51	15,92	14,33	11,14		
% Passing																											



% Gravel	5	% Sand	64	% Silt	17	% Clay	14
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NOTE: All tests marked with (*) means that those test methods are not accredited.



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CIVIL ENGINEERING TESTING LABORATORIES

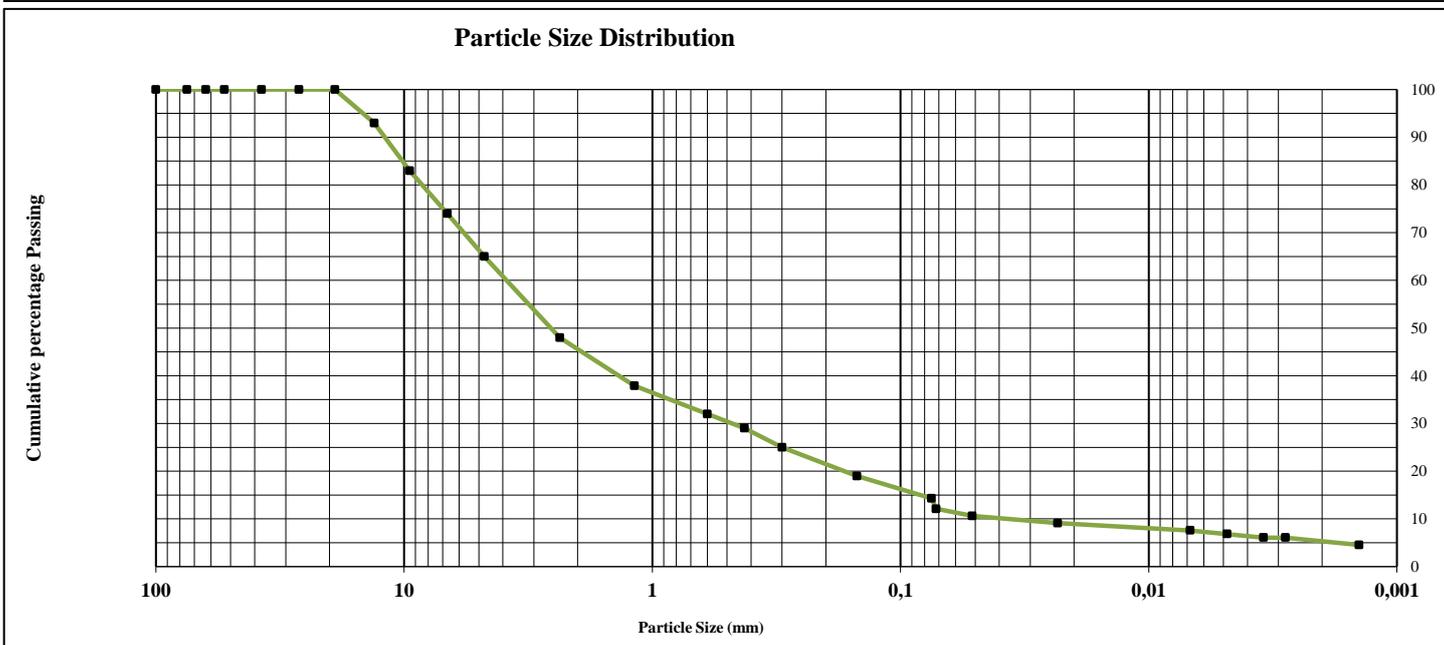
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

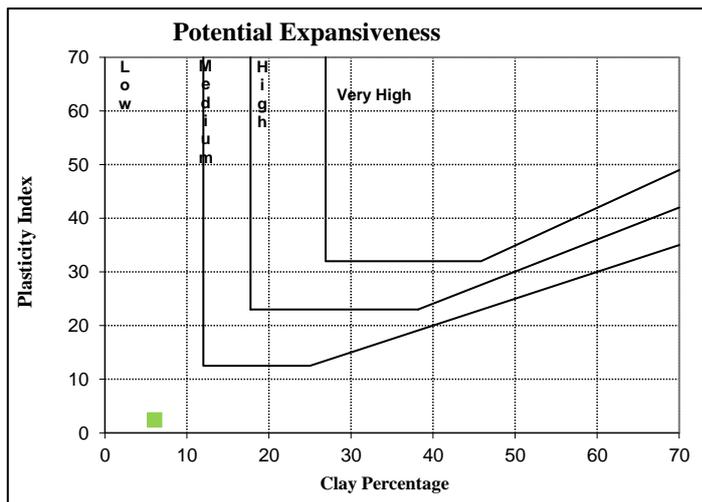
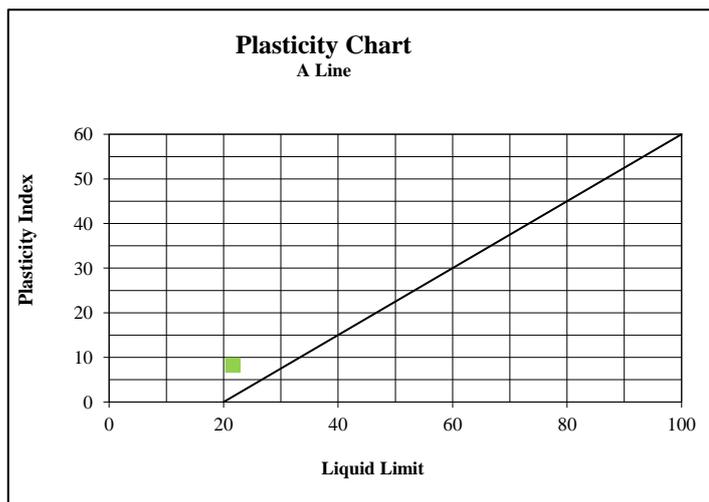
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 5
Position: TP12	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 21,6 Linear Shrinkage: 4,2
Depth: 0.00 - 0.80m	Plasticity Index: 8,3 Insitu M/C%: 4,7

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,515
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,072	0,051	0,023	0,007	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	100	93	83	74	65	48	37,9	32	29	25	19	14,3	12,13	10,61	9,096	7,58	6,822	6,064	6,064	4,548		
% Passing																											



% Gravel	35	% Sand	52	% Silt	7	% Clay	6
----------	----	--------	----	--------	---	--------	---



NOTE: All tests marked with (*) means that those test methods are not accredited.



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CIVIL ENGINEERING TESTING LABORATORIES

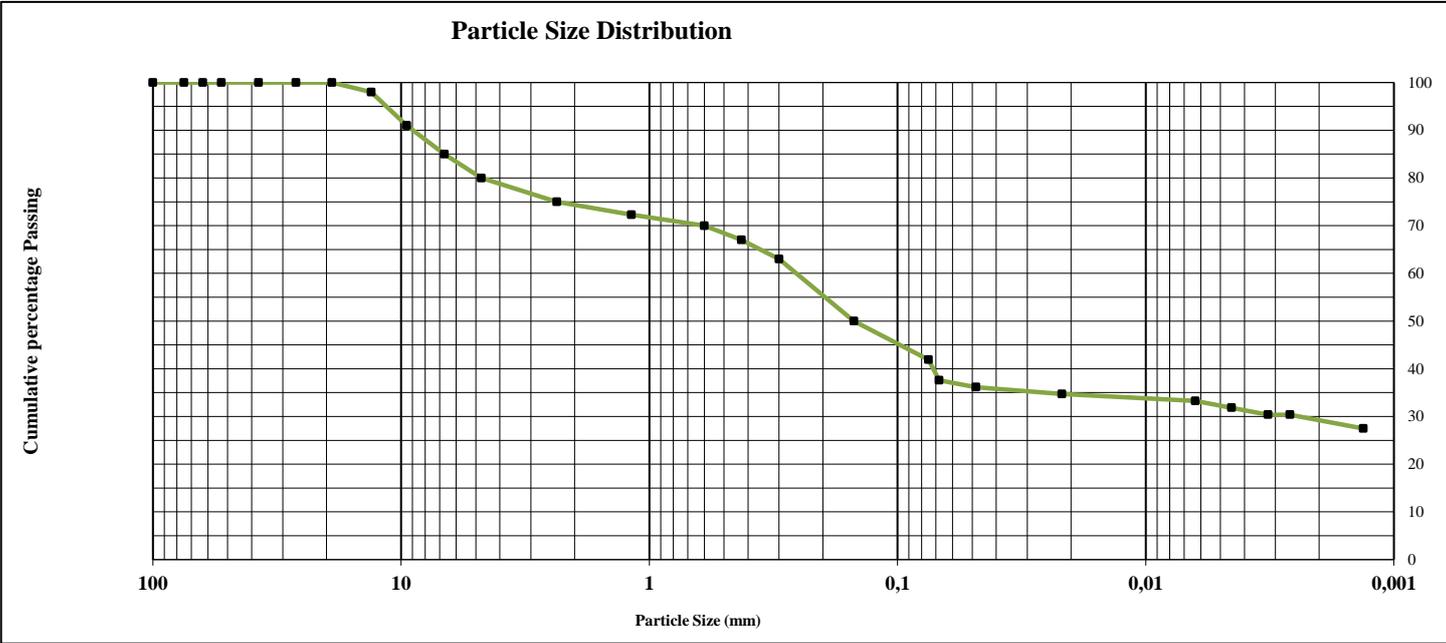
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

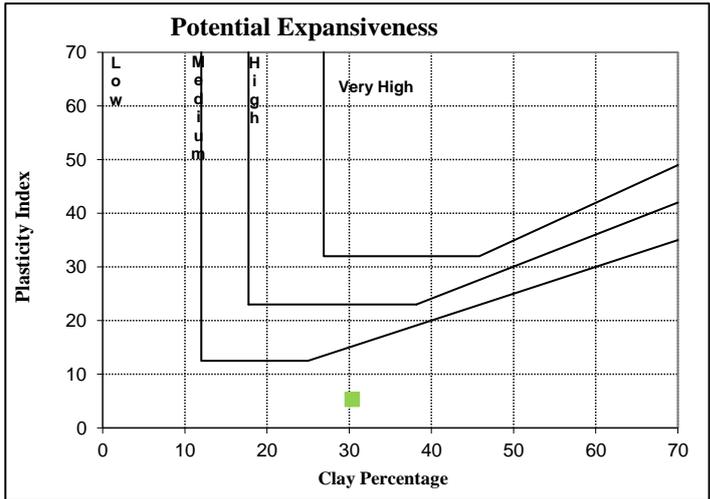
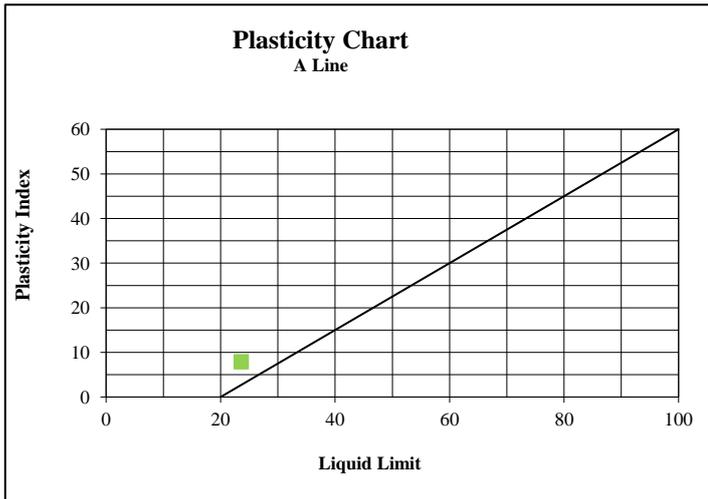
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 6
Position: TP15	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 23,6 Linear Shrinkage: 3,6
Depth: 0.00 - 0.15m	Plasticity Index: 7,9 Insitu M/C%: 8,5

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,478
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SIEVE ANALYSIS (TMH 1 A1a)*																HYDROMETER ASTM D422											
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,068	0,048	0,022	0,006	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	100	98	91	85	80	75	72,3	70	67	63	50	41,9	37,6	36,15	34,7	33,26	31,81	30,37	30,37	27,47		
% Passing																											



% Gravel	20	% Sand	40	% Silt	10	% Clay	30
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NOTE: All tests marked with (*) means that those test methods are not accredited.



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 Email: info@steynwilson.co.za
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CIVIL ENGINEERING TESTING LABORATORIES

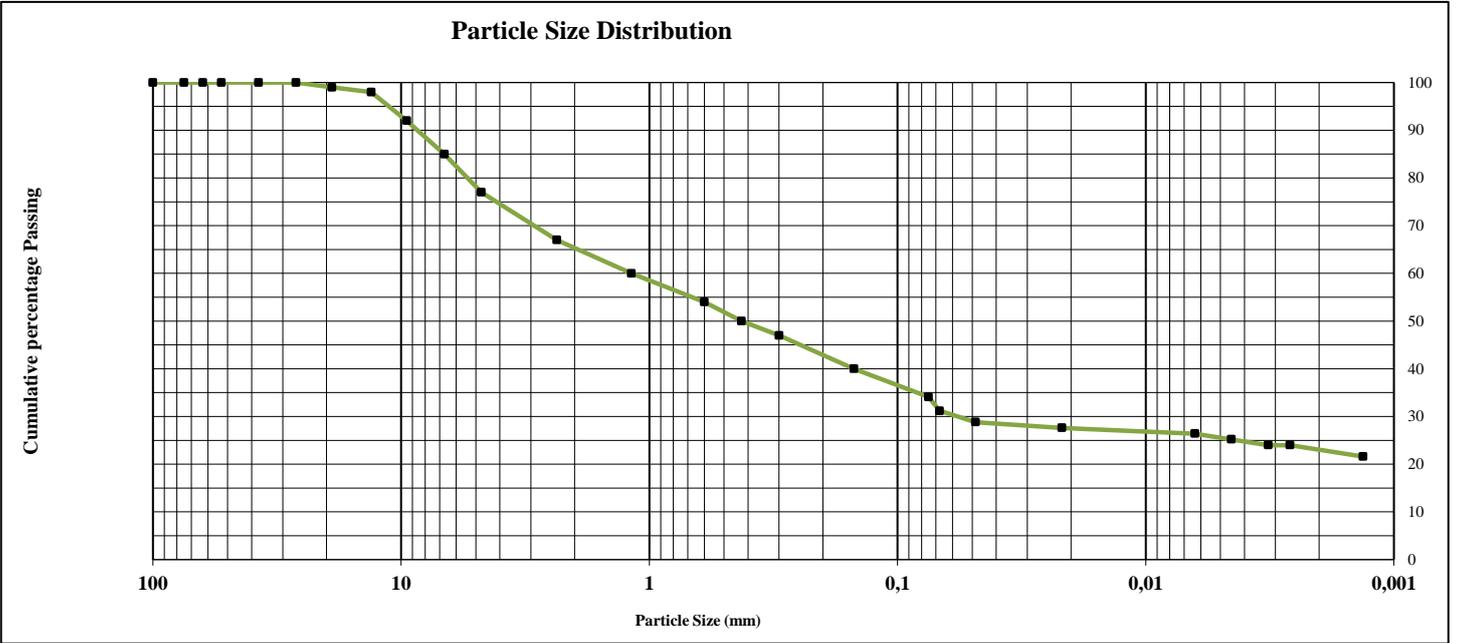
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

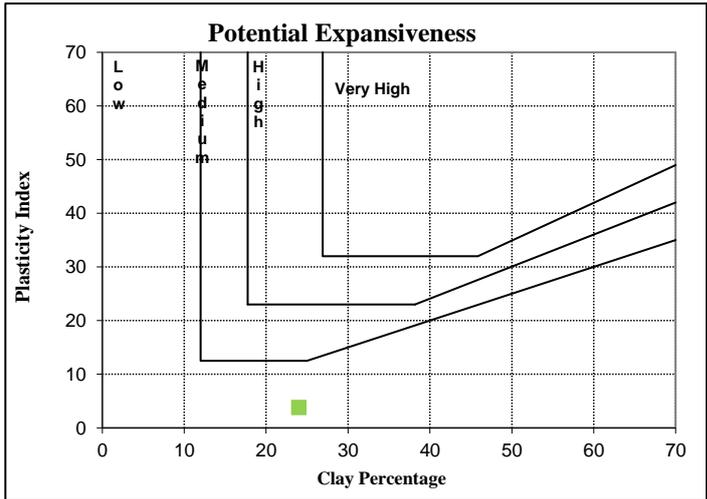
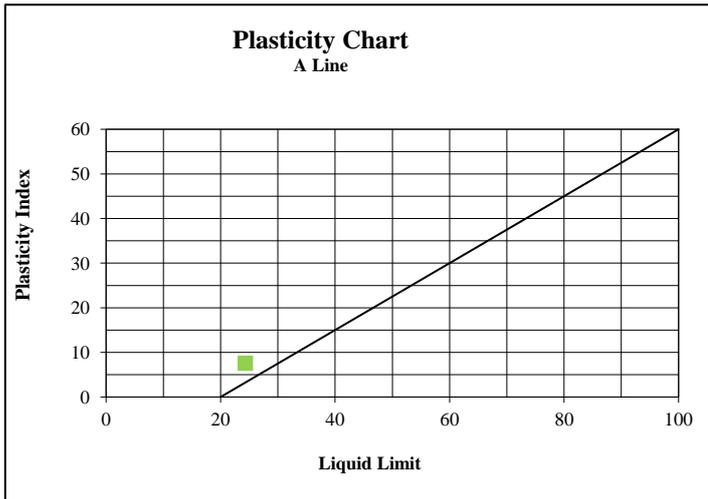
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 7
Position: TP16	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 24,3 Linear Shrinkage: 4
Depth: 0.00 - 0.70m	Plasticity Index: 7,6 Insitu M/C%: 6,9

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,493
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,068	0,048	0,022	0,006	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	99	98	92	85	77	67	60	54	50	47	40	34,1	31,2	28,8	27,6	26,4	25,2	24	24	21,6		
% Passing																											



% Gravel	23	% Sand	44	% Silt	9	% Clay	24
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Web: www.steynwilson.co.za

Client: **PeraGage**
 Project: 23123G SANSA Matjiesfontien
 Attention: Steven Bok
 Your Ref. No: -
 Date Reported 20/06/23

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWL28376

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

4 x FOUNDATION INDICATOR

Site Sampling and Materials Information

Sampling Method Specimens delivered to Steyn Wilson Laboratory.

Environmental Condition Rainy

Deviation from the prescribed test method No deviation from standard test method.

Responsibility of information disclaimer The sample information was received from the customer. Results apply to the sample as received from the Customer.

FINAL REPORT

We would like to take this opportunity to thank you for your valued support.
 Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

STEYN-WILSON LABORATORIES (PTY) LTD

Remarks:

- Information contained herein is confidential to STEYN-WILSON PTY LTD and the addressee
- Opinions & Interpretations are not included in our schedule of Accreditation.
- The samples were subjected and analysed according to ASTM.
- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.
- This document is the correct record of all measurements made, and may not be reproduced other than with full written approval from a director of STEYN-WILSON LABORATORIES (PTY) LTD.
- Measuring equipment is traceable to national standards (Where applicable).
- Should there be any deviation from the prescribed test method comments will be made thereof, pertaining to the test on the relevant materials report.
- Uncertainty of measurement is calculated and corresponds to a coverage probability of approximately 95%. Available on request.
- The decision rule states that the measurement of uncertainty can be applied by the customer to the test results, on request. It is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.

Mr. R. Wilson
Technical Signatory

DIRECTORS: Mr. J. Steyn ND-Civil (Managing) | Mr. R. Wilson B-Tech Civil (Operations)



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CIVIL ENGINEERING TESTING LABORATORIES

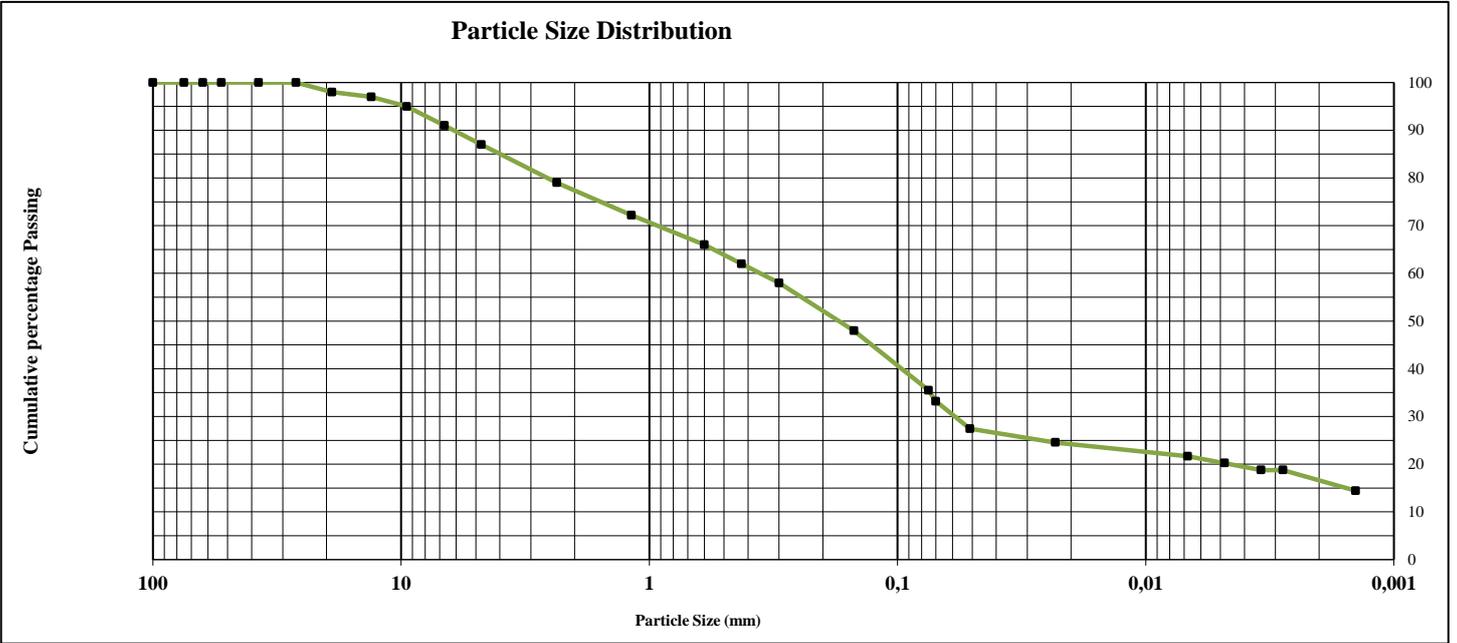
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	Date Sampled: 09/06/23

FOUNDATION INDICATOR ASTM D422

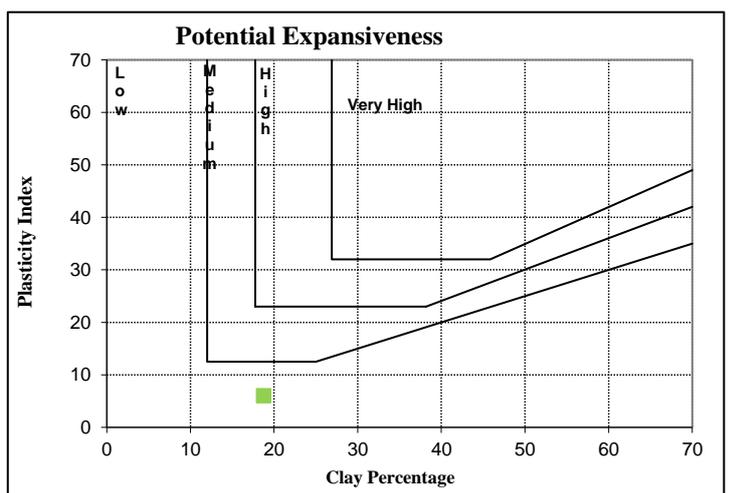
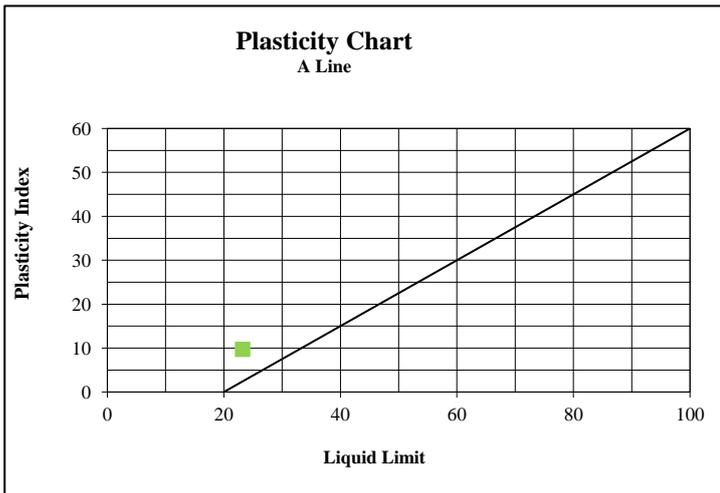
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 8
Position: TP17	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 23,2 Linear Shrinkage: 4,4
Depth: 0.00 - 1.10m	Plasticity Index: 9,7 Insitu M/C%: 5,1

PH (TMH1 A20)	(TMH1 A21T) Conductivity s.m ⁻¹	SG (TMH1 A12T)* 2,437
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,070	0,051	0,023	0,007	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	98	97	95	91	87	79	72,2	66	62	58	48	35,5	33,21	27,44	24,55	21,66	20,22	18,77	18,77	14,44		
% Passing																											



% Gravel	13	% Sand	52	% Silt	16	% Clay	19
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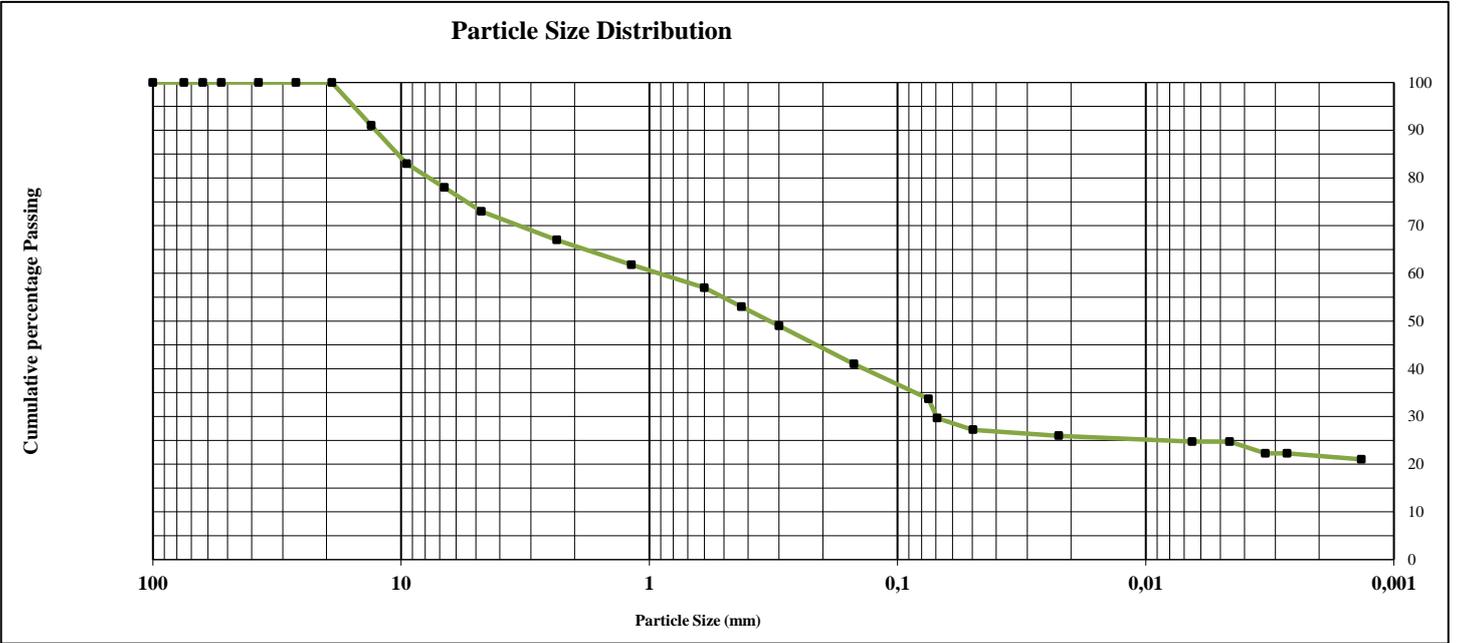
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

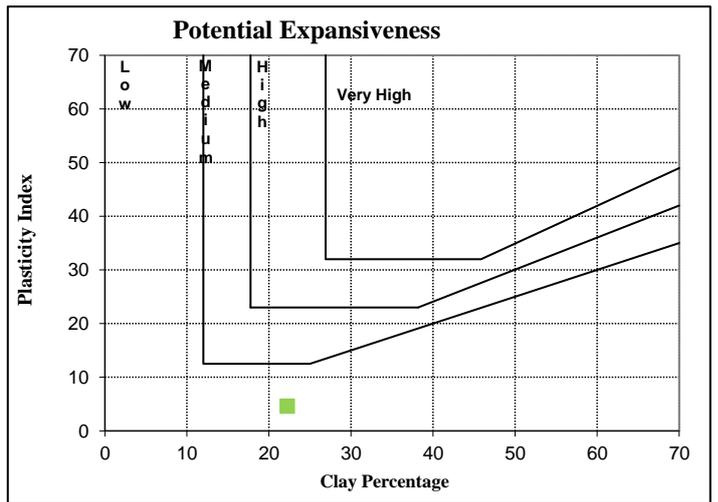
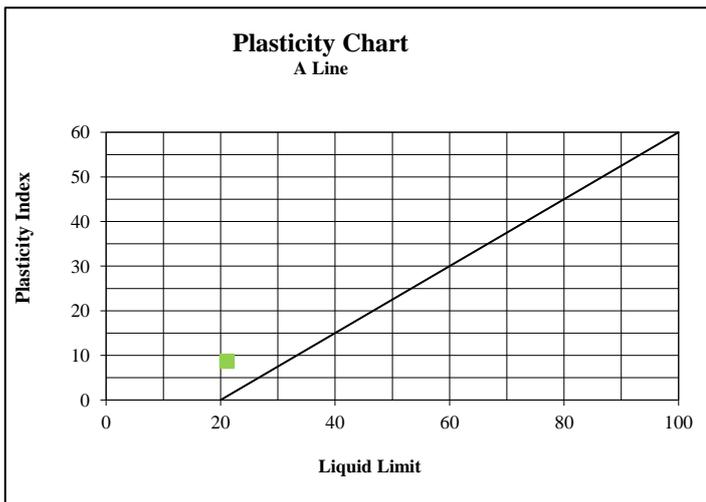
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 9
Position: TP20	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 21,1 Linear Shrinkage: 4,3
Depth: 0.00 - 0.65m	Plasticity Index: 8,7 Insitu M/C%: 6,3

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,461
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,069	0,050	0,022	0,006	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	100	91	83	78	73	67	61,8	57	53	49	41	33,7	29,66	27,19	25,96	24,72	24,72	22,25	22,25	21,01		
% Passing																											



% Gravel	27	% Sand	41	% Silt	10	% Clay	22
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CIVIL ENGINEERING TESTING LABORATORIES

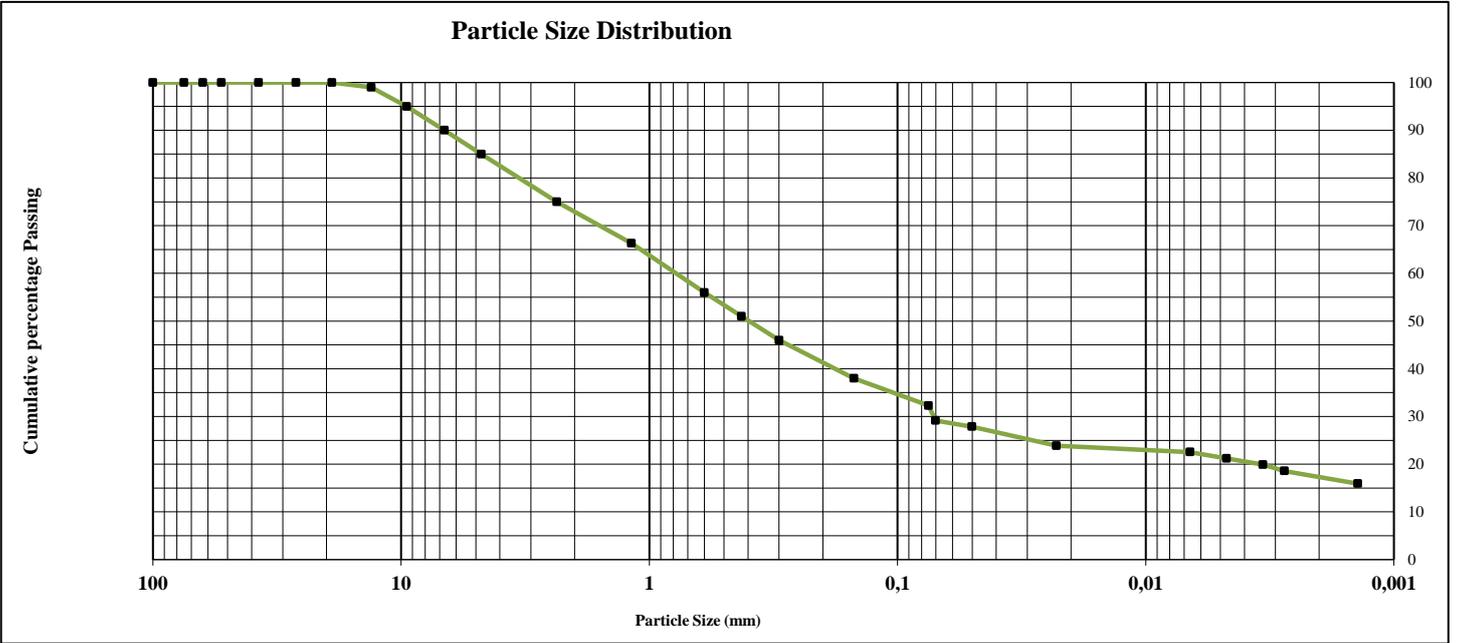
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

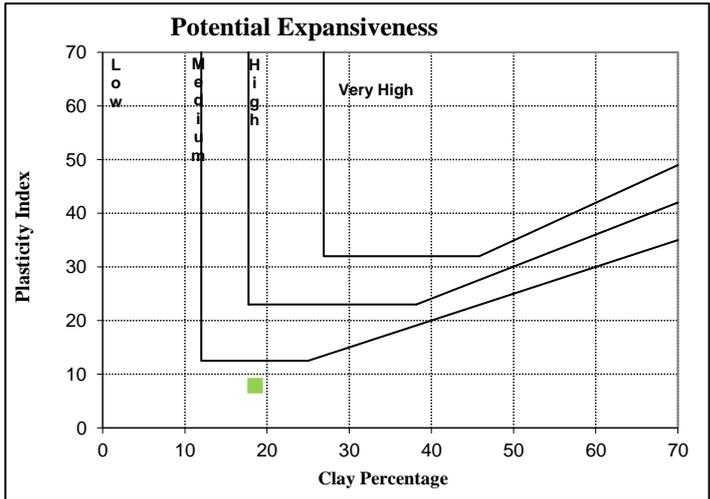
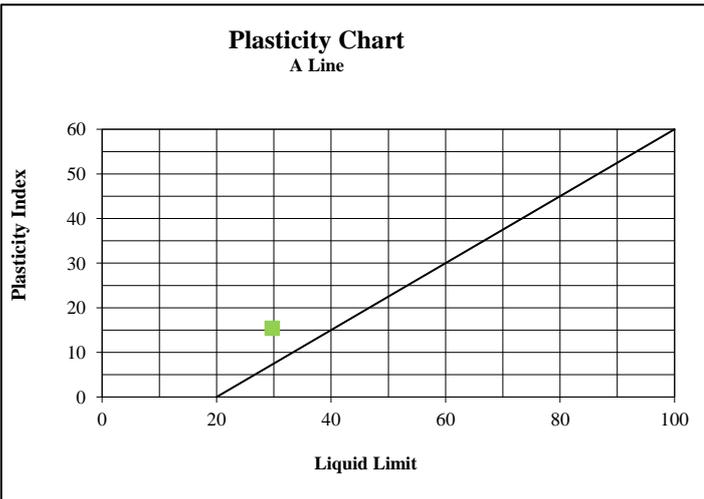
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 10
Position: TP21	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 29,7 Linear Shrinkage: 7,3
Depth: 0.00 - 1.10m	Plasticity Index: 15,4 Insitu M/C%: 6,3

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,456
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,070	0,050	0,023	0,007	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	100	99	95	90	85	75	66,3	56	51	46	38	32,3	29,17	27,85	23,87	22,54	21,22	19,89	18,56	15,91		
% Passing																											



% Gravel	15	% Sand	54	% Silt	12	% Clay	19
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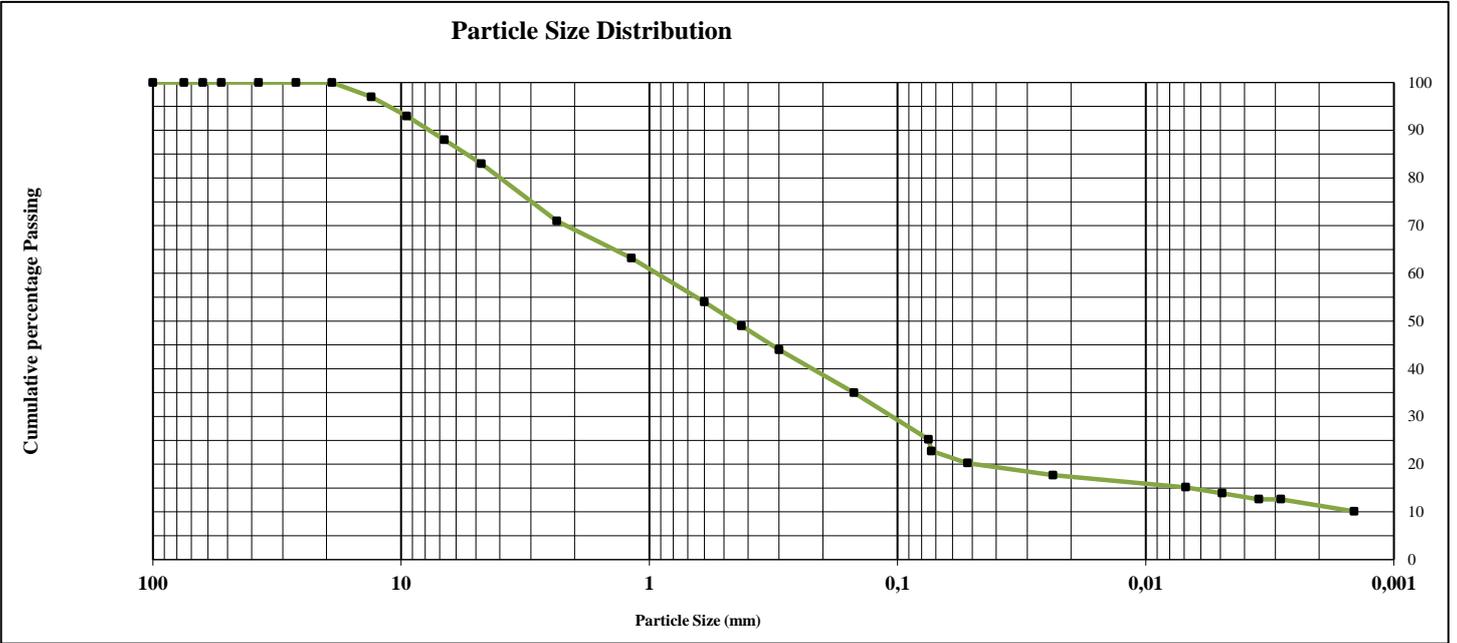
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

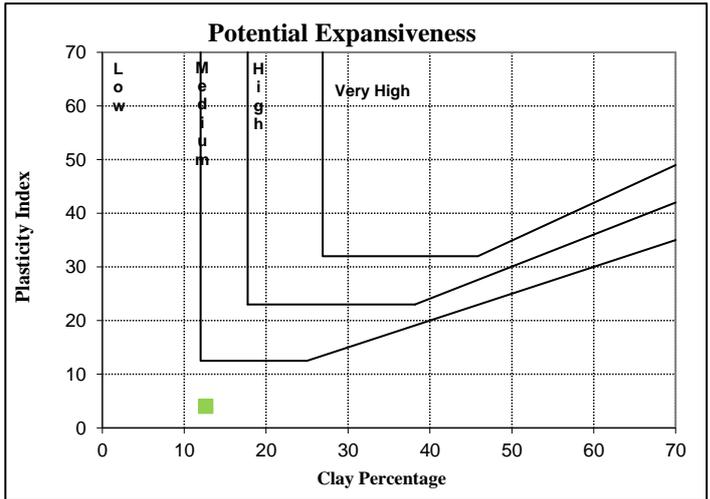
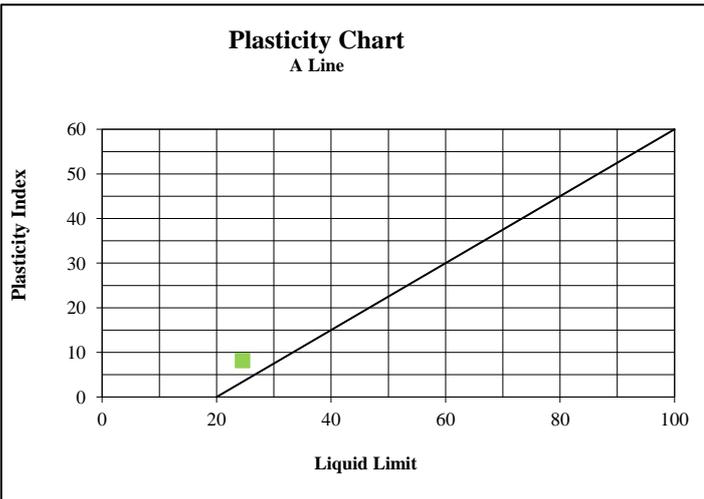
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 11
Position: TP23	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 24,5 Linear Shrinkage: 4,3
Depth: 0.00 - 1.15m	Plasticity Index: 8,2 Insitu M/C%: 6,4

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,432
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,073	0,052	0,024	0,007	0,005	0,004	0,003	0,001		
100	100	100	100	100	100	100	97	93	88	83	71	63,2	54	49	44	35	25,2	22,75	20,22	17,7	15,17	13,9	12,64	12,64	10,11		
% Passing																											



% Gravel	17	% Sand	59	% Silt	12	% Clay	13
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CIVIL ENGINEERING TESTING LABORATORIES



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Web: www.steynwilson.co.za

Client: **PeraGage**
 Project: 23123G SANSA Matjiesfontien
 Attention: Steven Bok
 Your Ref. No: -
 Date Reported 20/06/23

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWL28376

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

2 x FOUNDATION INDICATOR

Site Sampling and Materials Information

Sampling Method Specimens delivered to Steyn Wilson Laboratory.

Environmental Condition Rainy

Deviation from the prescribed test method No deviation from standard test method.

Responsibility of information disclaimer The sample information was received from the customer. Results apply to the sample as received from the Customer.

FINAL REPORT

We would like to take this opportunity to thank you for your valued support. Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

STEYN-WILSON LABORATORIES (PTY) LTD

Remarks:

- Information contained herein is confidential to STEYN-WILSON PTY LTD and the addressee
- Opinions & Interpretations are not included in our schedule of Accreditation.
- The samples were subjected and analysed according to ASTM.
- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.
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- Measuring equipment is traceable to national standards (Where applicable).
- Should there be any deviation from the prescribed test method comments will be made thereof, pertaining to the test on the relevant materials report.
- Uncertainty of measurement is calculated and corresponds to a coverage probability of approximately 95%. Available on request.
- The decision rule states that the measurement of uncertainty can be applied by the customer to the test results, on request. It is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.

Mr. R. Wilson
Technical Signatory

DIRECTORS: Mr. J. Steyn ND-Civil (Managing) | Mr. R. Wilson B-Tech Civil (Operations)



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CIVIL ENGINEERING TESTING LABORATORIES

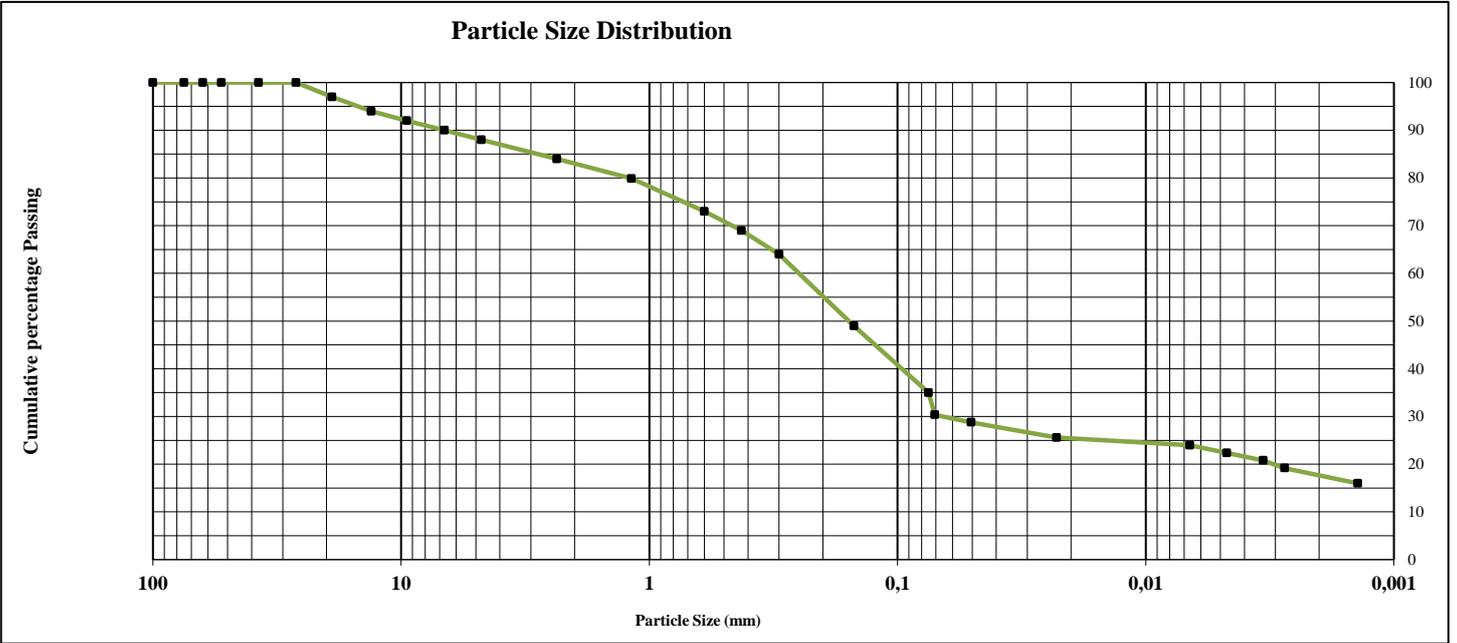
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	Date Sampled: 09/06/23

FOUNDATION INDICATOR ASTM D422

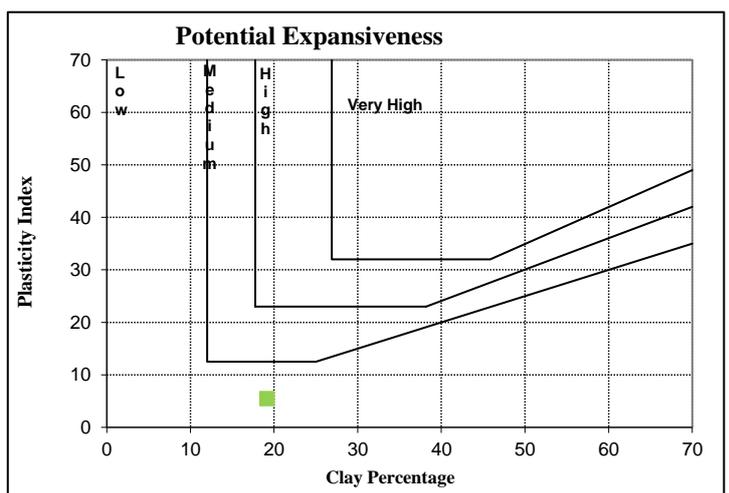
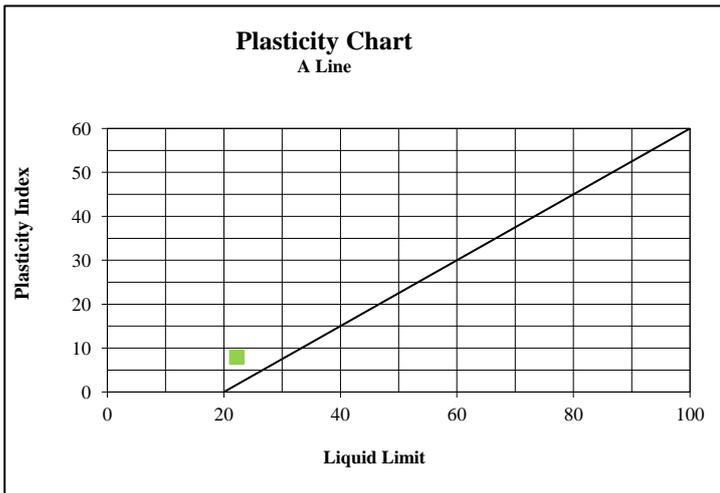
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 12
Position: TP25	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 22,2 Linear Shrinkage: 3,8
Depth: 0.00 - 0.45m	Plasticity Index: 7,9 Insitu M/C%: 8,2

PH (TMH1 A20)	(TMH1 A21T) Conductivity s.m ⁻¹	SG (TMH1 A12T)* 2,498
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,071	0,050	0,023	0,007	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	97	94	92	90	88	84	79,9	73	69	64	49	35	30,36	28,76	25,57	23,97	22,37	20,77	19,18	15,98		
% Passing																											



% Gravel	12	% Sand	55	% Silt	14	% Clay	19
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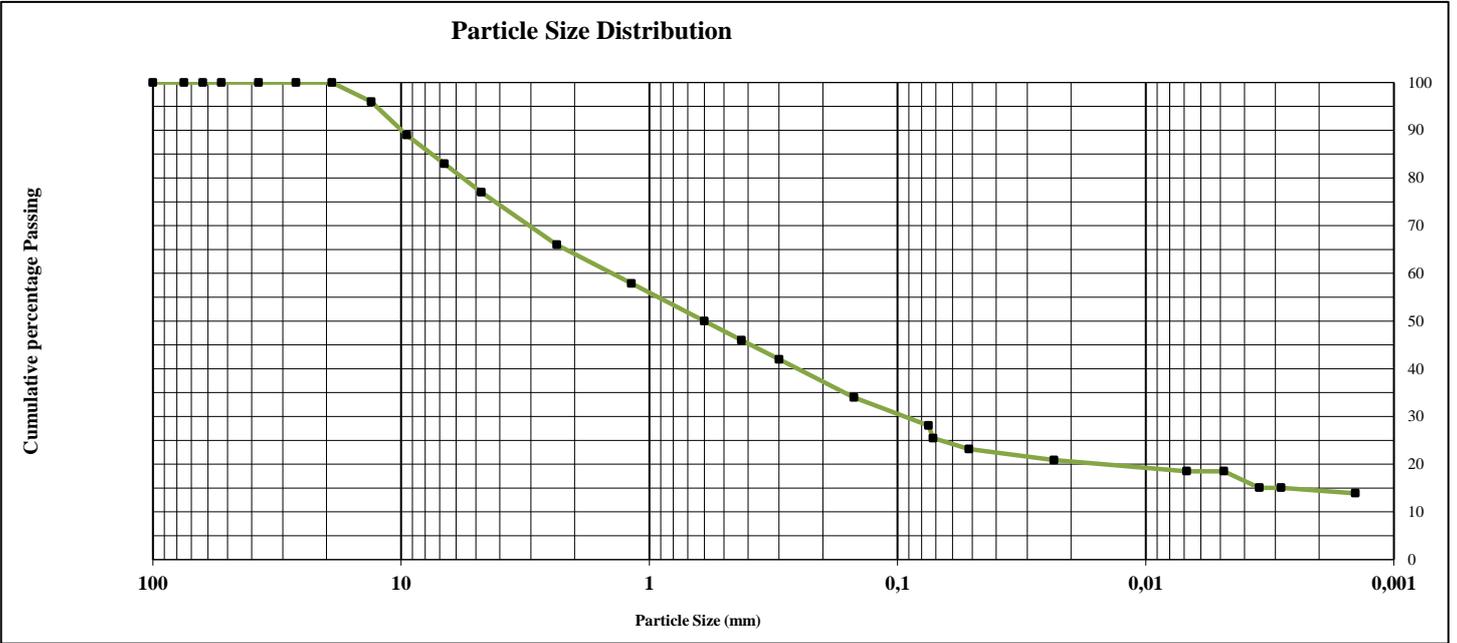
Customer : PeraGage	Project : 23123G SANSA Matjiesfontien
Private Bag X5	Date Received : 09/06/23
Century City	Date Reported : 20/06/23
7441	Req. Number : -
Attention : Steven Bok	

FOUNDATION INDICATOR ASTM D422

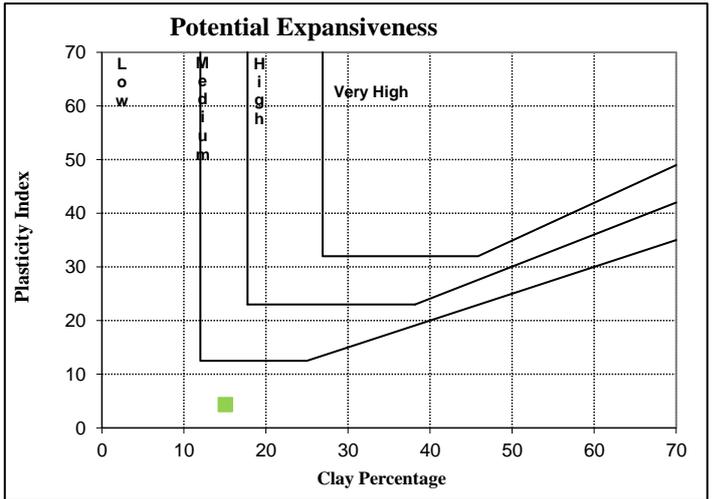
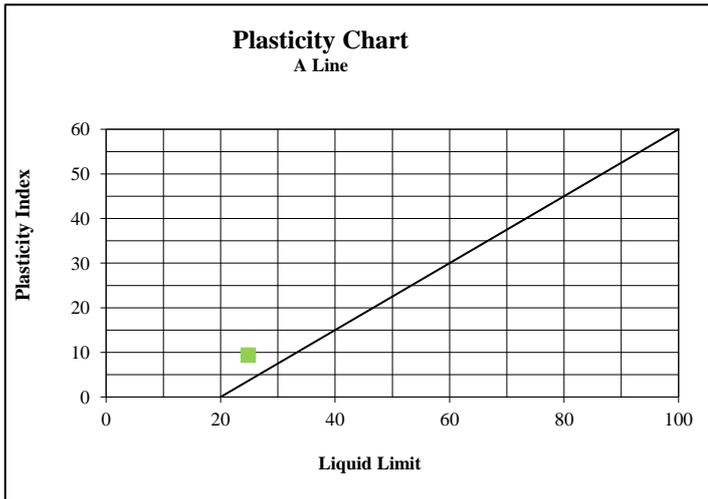
Material Description: Dark Reddish Brown Silty Soil	Sample Number: 28376 / 13
Position: TP26	Liquid Limit ^{Cassgranda} SANS 3001 GR12: 24,8 Linear Shrinkage: 5,3
Depth: 0.00 - 0.75m	Plasticity Index: 9,4 Insitu M/C%: 6,7

PH (TMH1 A20)*	(TMH1 A21T)* Conductivity s.m ⁻¹	SG (TMH1 A12T)*	2,388
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SIEVE ANALYSIS (TMH 1 A1a)*														HYDROMETER ASTM D422													
100	75	63	53	37,5	26,5	19,0	13,2	9,5	6,7	4,75	2,36	1,18	0,60	0,425	0,300	0,150	0,075	0,072	0,052	0,023	0,007	0,005	0,003	0,003	0,001		
100	100	100	100	100	100	100	96	89	83	77	66	57,9	50	46	42	34	28,1	25,48	23,16	20,84	18,53	18,53	15,05	15,05	13,9		
% Passing																											



% Gravel	23	% Sand	50	% Silt	12	% Clay	15
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Client: **PeraGage**
 Project: 23123G SANSA Matjiesfontein
 Attention: Steven Bok
 Your Ref. No: -
 Date Reported: 20/06/23

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWL28376

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

3 x MDD / CBR /IND

Site Sampling and Materials Information

Sampling Method *Sampled by CLIENT*

Enviromental Condition *Rainy*

Deviation from the prescribed test method *No deviation from standard test method.*

Responsibility of information disclaimer *The sample information was received from the customer. Results apply to the sample as received from the Customer.*

● FINAL REPORT

We would like to take this opportunity to thank you for your valued support. Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

STEYN-WILSON LABORATORIES (PTY) LTD

Remarks:

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- The samples where subjected and analysed according to SANS 3001.
- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.
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- Uncertainty of measurement is calculated and corresponds to a coverage probability of approximately 95%. Available on request.
- The decision rule states that the measurement of uncertainty can be applied by the customer to the test results, on request. It is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.

Mr. R. Wilson
Technical Signatory

DIRECTORS: Mr. J. Steyn ND-Civil (Managing) | Mr. R. Wilson B-Tech Civil (Operations)



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Web: www.steynwilson.co.za

JOB NO:	SWL28376		Your Ref	-	Date	20/06/23	
CLIENT:	PeraGage Private Bag X5 Century City 7441			PROJECT:	23123G SANSA Matjiesfontein		
ATTENTION:	Steven Bok			BALANCE:	AC1/0001		
				OVEN:	AB1/0001		
				AUTO COMPACTOR:	AD1/0002		
				CBR PRESS:	AA1/0001		
CBR REPORT - TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR20, GR30, GR40, AG10, AG4, AG14, TMH1 A20, TMH1 A21T, *COTO, SANS 3001 AG20/21							
The unambiguous description of the sample/s as received are as follows :							
SAMPLE No.		28376 / 1		SPEC	28376 / 2		SPEC
HOLE No. / SV. / CHAINAGE		TP3		COTO - G10	TP6		COTO - G8
ROAD No. OR NAME		-			-		
LAYER TESTED / SAMPLED FROM		0.20 - 0.40m			0.20 - 0.55m		
DATE RECEIVED		09/06/23			09/06/23		
CLIENTS MARKING		-			-		
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Light Brown Sandstone		Dark Brown Shale		Dark Yellowish Reddish Shale	
REDUCTION FACTOR / RF CHECK		0,0675			0,0424		0,0501
		0,04		< 1%	0,07		< 1%
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100	-	100	-	100	-
	75,0	95	-	100	-	100	-
	63,0	87	-	100	-	99	-
	53,0	81	-	100	-	98	-
	37,5	70	-	96	-	92	-
	28,0	60	-	88	-	83	-
	20,0	53	-	79	-	77	-
	14,0	50	-	70	-	74	-
	5,00	42	-	38	-	63	-
	2,00	40	-	31	-	57	-
	0,425	35	-	24	-	44	-
0,075	15	-	10	-	19	-	
ACV		%					
10 % FACT	SANS AG10	kN					
10 % FACT Wet / Dry ratio		%					
FLAKINESS INDEX	SANS AG4	%					
FRACTURED FACES	*COTO	%					
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL% - 0,425mm	22	-	24	-	28,1	-
	P.I. - 0,425mm	6,9	-	6,6	≤ (3xGM) + 10	11,4	-
	LS% - 0,425mm	3,7	-	3,3	-	6,5	-
	P.I. - 0,075mm						
	GM	2,10	-	2,35	0,75 ≥ GM ≤ 2,7	1,80	-
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand	12		21		23	
	Fine sand	51		46		44	
	Coarse fine sand	21		18		15	
	Medium fine sand	18		14		14	
	Fine fine sand	12		13		15	
	Silt and clay	37		33		33	
	Coarse sand ratio	0,1		0,2		0,2	
MOD AASHTO SANS 3001 GR30	OMC	%	7,5	8,5		6,4	
	MDD	(kg/m ³)	2000	2111		2165	
APPARENT & BULK DENSITY / WATER ABSORPTION SANS 3001 AG20/21	AD	(kg/m ³)					
	BD	(kg/m ³)					
	WA	%					
C.B.R. SANS 3001 GR40	COMP MC	%	7,4	8,4		6,3	
	SWELL	%	0,0	0,0	≤ 1,5	1,99	-
	100%		12	29	-	4	-
	98%		10	22	-	3	-
	97%		9	19	-	3	-
	95%		8	14	-	3	-
	93%		6	10	≥ 10	2	-
	90%		5	7	-	2	-
pH	TMH1 A20	%					
Conductivity	TMH1 A21T	(S/m)					
Water Soluble Sulfates	*SANS 5850-1	%					
Acid Soluble Sulfates	*SANS 5850-2	%					
Durability Mill Index (max)		-					
% passing 0,425mm sieve after Test	SANS AG16	%					

NOTE : All tests marked with (*) means that those test methods are not accredited.



CIVIL ENGINEERING TESTING LABORATORIES



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Client: **PeraGage**
 Project: 23123G SANSA Matjiesfontein
 Attention: Steven Bok
 Your Ref. No: -
 Date Reported: 20/06/23

TEST REPORT REFERENCE NUMBER / JOB NUMBER :

SWL28376

Dear Sir / Madam

Herewith please find the original reports pertaining to the above mentioned project.

Test Requested

1 x MDD / CBR /IND

Site Sampling and Materials Information

Sampling Method *Sampled by CLIENT*

Enviromental Condition *Rainy*

Deviation from the prescribed test method *No deviation from standard test method.*

Responsibility of information disclaimer *The sample information was received from the customer. Results apply to the sample as received from the Customer.*

● FINAL REPORT

We would like to take this opportunity to thank you for your valued support. Should you have any further enquiries please don't hesitate to contact me.

Yours Faithfully

STEYN-WILSON LABORATORIES (PTY) LTD

Remarks:

- Information contained herein is confidential to STEYN-WILSON PTY LTD and the addressee
- Opinions & Interpretations are not included in our schedule of Accreditation.
- The samples where subjected and analysed according to SANS 3001.
- The results reported relate only to the sample tested, Further use of the attached information is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.
- This document is the correct record of all measurements made, and may not be reproduced other than with full written approval from a director of STEYN-WILSON LABORATORIES (PTY) LTD.
- Measuring equipment is traceable to national standards (Where applicable).
- Should there be any deviation from the prescribed test method comments will be made thereof, pertaining to the test on the relevant materials report.
- Uncertainty of measurement is calculated and corresponds to a coverage probability of approximately 95%. Available on request.
- The decision rule states that the measurement of uncertainty can be applied by the customer to the test results, on request. It is not the responsibility or liability of STEYN-WILSON LABORATORIES (PTY) LTD.

Mr. R. Wilson
Technical Signatory

DIRECTORS: Mr. J. Steyn ND-Civil (Managing) | Mr. R. Wilson B-Tech Civil (Operations)



CIVIL ENGINEERING TESTING LABORATORIES



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JOB NO:	SWL28376		Your Ref	-	Date	20/06/23	
CLIENT:	PeraGage Private Bag X5 Century City 7441			PROJECT:	23123G SANSA Matjiesfontein		
ATTENTION:	Steven Bok			BALANCE:	AC1/0003		
				OVEN:	AB1/0001		
				AUTO COMPACTOR:	AD1/0002		
				CBR PRESS:	AA1/0002		
CBR REPORT - TMH5 MD1, MD2 / SANS 3001 GR1, PR5, GR10, GR12, GR20, GR30, GR40, AG10, AG4, AG14, TMH1 A20, TMH1 A21T, *COTO, SANS 3001 AG20/21							
The unambiguous description of the sample/s as received are as follows :							
SAMPLE No.		28376 / 14		SPEC			
HOLE No. / SV. / CHAINAGE		TP27					
ROAD No. OR NAME		-					
LAYER TESTED / SAMPLED FROM		0.00 - 1.60m					
DATE RECEIVED		09/06/23		COTO - G10			
CLIENTS MARKING		-					
DESCRIPTION OF SAMPLE (COLOUR & TYPE)		Light Olive Shale					
REDUCTION FACTOR / RF CHECK		0,0489					
		0,07		< 1%			
SIEVE ANALYSIS (mm) SANS 3001 GR1	100,0	100		-			
	75,0	100		-			
	63,0	100		-			
	53,0	100		-			
	37,5	98		-			
	28,0	95		-			
	20,0	90		-			
	14,0	88		-			
	5,00	75		-			
	2,00	65		-			
	0,425	51		-			
0,075	29		-				
ACV		%					
10 % FACT	SANS AG10	kN					
10 % FACT Wet / Dry ratio		%					
FLAKINESS INDEX	SANS AG4	%					
FRACTURED FACES	*COTO	%					
ATTERBERG LIMITS SANS 3001 GR10, GR12	LL% - 0,425mm		26,5	-			
	P.I. - 0,425mm		13,4	-			
	LS% - 0,425mm		7,1	-			
	P.I. - 0,075mm						
	GM		1,56	-			
SOIL-MORTAR PERCENTAGES SANS 3001 PR5	Coarse sand		22				
	Fine sand		33				
	Coarse fine sand		14				
	Medium fine sand		9				
	Fine fine sand		11				
	Silt and clay		44				
	Coarse sand ratio		0,2				
MOD AASHTO SANS 3001 GR30	OMC	%	9,4				
	MDD	(kg/m ³)	2041				
APPARENT & BULK DENSITY / WATER ABSORPTION SANS 3001 AG20/21	AD	(kg/m ³)					
	BD	(kg/m ³)					
	WA	%					
C.B.R. SANS 3001 GR40	COMP MC	%	9,3				
	SWELL	%	1,21				
	100%		4	-			
	98%		3	-			
	97%		3	-			
	95%		2	-			
	93%		2	-			
	90%		1	-			
pH	TMH1 A20	%					
Conductivity	TMH1 A21T	(S/m)					
Water Soluble Sulfates	*SANS 5850-1	%					
Acid Soluble Sulfates	*SANS 5850-2	%					
Durability Mill Index (max)		-					
% passing 0,425mm sieve after Test	SANS AG16	%					

NOTE : All tests marked with (*) means that those test methods are not accredited.

Appendix E.

DCP raw data



Project: 23123G SANSA Matjiesfontein

DCP Raw Data

DCP01						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	55	-0.055	0	0	0	
5	104	-0.104	10	10	23	
10	153	-0.153	10	10	23	
15	180	-0.180	5	19	48	
20	186	-0.186	1	83	100	
25	188	-0.188	0	250	100	
30	189	-0.189	0	500	100	
35	REF					
40						
45						
50						

DCP02						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	42	-0.042	0	0	0	
5	101	-0.101	12	8	18	
10	147	-0.147	9	11	24	
15	179	-0.179	6	16	39	
20	192	-0.192	3	38	100	
25	220	-0.220	6	18	46	
30	234	-0.234	3	36	100	
35	257	-0.257	5	22	59	
40	DCP terminated-					
45	rod @ inclination					
50	seemingly due to rock interference					

DCP03						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	70	-0.070	0	0	0	
5	140	-0.140	14	7	14	
10	160	-0.160	4	25	70	
15	173	-0.173	3	38	100	
20	186	-0.186	3	38	100	
25	192	-0.192	1	83	100	
30	206	-0.206	3	36	100	
35	208	-0.208	0	250	100	
40	216	-0.216	2	63	100	
45	220	-0.220	1	125	100	
50	226	-0.226	1	83	100	
55	238	-0.238	2	42	100	
60	243	-0.243	1	100	100	
65	252	-0.252	2	56	100	
70	REF					

DCP04						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	104	-0.104	0	0	0	
5	162	-0.162	12	9	18	
10	172	-0.172	2	50	100	
15	183	-0.183	2	45	100	
20	184	-0.184	0	500	100	
25	185	-0.185	0	500	100	
30	REF					
35						
40						
45						
50						

DCP05

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	25	-0.025	0	0	0
5	73	-0.073	10	10	23
10	95	-0.095	4	23	62
15	112	-0.112	3	29	87
20	124	-0.124	2	42	100
25	137	-0.137	3	38	100
30	156	-0.156	4	26	75
35	170	-0.170	3	36	100
40	180	-0.180	2	50	100
45	187	-0.187	1	71	100
50	201	-0.201	3	36	100
55	210	-0.210	2	56	100
60	218	-0.218	2	63	100
65	223	-0.223	1	100	100
70	230	-0.230	1	71	100
75	237	-0.237	1	71	100
80	243	-0.243	1	83	100
85	248	-0.248	1	100	100
90	253	-0.253	1	100	100
95	255	-0.255	0	250	100
100	260	-0.260	1	100	100
105	265	-0.265	1	100	100
110	271	-0.271	1	83	100
115	277	-0.277	1	83	100
120	280	-0.280	1	167	100
125	286	-0.286	1	83	100
130	291	-0.291	1	100	100
135	295	-0.295	1	125	100
140	300	-0.300	1	100	100
145	305	-0.305	1	100	100
150	REF				

DCP06						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	43	-0.043	0	0	0	
5	117	-0.117	15	7	13	
10	136	-0.136	4	26	75	
15	146	-0.146	2	50	100	
20	160	-0.160	3	36	100	
25	164	-0.164	1	125	100	
30	168	-0.168	1	125	100	
35	170	-0.170	0	250	100	
40	172	-0.172	0	250	100	
45	REF					
50						

DCP07						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	108	-0.108	0	0	0	
5	173	-0.173	13	8	16	
10	217	-0.217	9	11	26	
15	244	-0.244	5	19	48	
20	270	-0.270	5	19	51	
25	299	-0.299	6	17	44	
30	316	-0.316	3	29	87	
35	327	-0.327	2	45	100	
40	336	-0.336	2	56	100	
45	340	-0.340	1	125	100	
50	347	-0.347	1	71	100	
55	353	-0.353	1	83	100	
60	359	-0.359	1	83	100	
65	363	-0.363	1	125	100	
70	364	-0.364	0	500	100	
75	367	-0.367	1	167	100	
80	REF					
85						

DCP08					
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	95	-0.095	0	0	0
5	167	-0.167	14	7	14
10	180	-0.180	3	38	100
15	184	-0.184	1	125	100
20	185	-0.185	0	500	100
25	190	-0.190	1	100	100
30	193	-0.193	1	167	100
35	195	-0.195	0	250	100
40	199	-0.199	1	125	100
45	200	-0.200	0	500	100
50	210	-0.210	2	50	100
55	212	-0.212	0	250	100
60	REF				

DCP09					
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	40	-0.040	0	0	0
5	150	-0.150	22	5	8
10	196	-0.196	9	11	24
15	231	-0.231	7	14	35
20	265	-0.265	7	15	36
25	283	-0.283	4	28	81
30	298	-0.298	3	33	100
35	310	-0.310	2	42	100
40	316	-0.316	1	83	100
45	322	-0.322	1	83	100
50	326	-0.326	1	125	100
55	327	-0.327	0	500	100
60	330	-0.330	1	167	100
65	331	-0.331	0	500	100
70	REF				
75					

DCPI0					
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	136	-0.136	0	0	0
5	209	-0.209	15	7	14
10	246	-0.246	7	14	32
15	269	-0.269	5	22	59
20	287	-0.287	4	28	81
25	305	-0.305	4	28	81
30	318	-0.318	3	38	100
35	330	-0.330	2	42	100
40	342	-0.342	2	42	100
45	353	-0.353	2	45	100
50	362	-0.362	2	56	100
55	372	-0.372	2	50	100
60	379	-0.379	1	71	100
65	385	-0.385	1	83	100
70	389	-0.389	1	125	100
75	394	-0.394	1	100	100
80	399	-0.399	1	100	100
85	402	-0.402	1	167	100
90	406	-0.406	1	125	100
95	409	-0.409	1	167	100
100	411	-0.411	0	250	100
105	REF				

DCPI1					
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	43	-0.043	0	0	0
5	109	-0.109	13	8	15
10	117	-0.117	2	63	100
15	120	-0.120	1	167	100
20	122	-0.122	0	250	100
25	125	-0.125	1	167	100
30	127	-0.127	0	250	100
35	130	-0.130	1	167	100
40	131	-0.131	0	500	100
45	136	-0.136	1	100	100
50	140	-0.140	1	125	100
55	142	-0.142	0	250	100
60	144	-0.144	0	250	100
65	150	-0.150	1	83	100
70	REF				

DCPI2						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	101	-0.101	0	0	0	
5	162	-0.162	12	8	17	
10	189	-0.189	5	19	48	
15	212	-0.212	5	22	59	
20	230	-0.230	4	28	81	
25	239	-0.239	2	56	100	
30	245	-0.245	1	83	100	
35	250	-0.250	1	100	100	
40	254	-0.254	1	125	100	
45	256	-0.256	0	250	100	
50	259	-0.259	1	167	100	
55	261	-0.261	0	250	100	
60	264	-0.264	1	167	100	
65	270	-0.270	1	83	100	
70	REF					

DCPI3						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	33	-0.033	0	0	0	
5	129	-0.129	19	5	10	
10	155	-0.155	5	19	51	
15	171	-0.171	3	31	94	
20	175	-0.175	1	125	100	
25	179	-0.179	1	125	100	
30	181	-0.181	0	250	100	
35	184	-0.184	1	167	100	
40	190	-0.190	1	83	100	
45	193	-0.193	1	167	100	
50	197	-0.197	1	125	100	
55	200	-0.200	1	167	100	
60	202	-0.202	0	250	100	
65	REF					

DCPI4						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	22	-0.022	0	0	0	
5	124	-0.124	20	5	9	
10	155	-0.155	6	16	40	
15	170	-0.170	3	33	100	
20	182	-0.182	2	42	100	
25	195	-0.195	3	38	100	
30	201	-0.201	1	83	100	
35	205	-0.205	1	125	100	
40	211	-0.211	1	83	100	
45	217	-0.217	1	83	100	
50	225	-0.225	2	63	100	
55	233	-0.233	2	63	100	
60	242	-0.242	2	56	100	
65	245	-0.245	1	167	100	
70	252	-0.252	1	71	100	
75	256	-0.256	1	125	100	
80	REF					

DCPI5						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	30	-0.030	0	0	0	
5	118	-0.118	18	6	11	
10	144	-0.144	5	19	51	
15	165	-0.165	4	24	66	
20	187	-0.187	4	23	62	
25	204	-0.204	3	29	87	
30	217	-0.217	3	38	100	
35	230	-0.230	3	38	100	
40	237	-0.237	1	71	100	
45	245	-0.245	2	63	100	
50	252	-0.252	1	71	100	
55	258	-0.258	1	83	100	
60	265	-0.265	1	71	100	
65	267	-0.267	0	250	100	
70	275	-0.275	2	63	100	
75	276	-0.276	0	500	100	
80	REF					

DCPI6						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	47	-0.047	0	0	0	
5	108	-0.108	12	8	17	
10	119	-0.119	2	45	100	
15	126	-0.126	1	71	100	
20	132	-0.132	1	83	100	
25	134	-0.134	0	250	100	
30	137	-0.137	1	167	100	
35	139	-0.139	0	250	100	
40	140	-0.140	0	500	100	
45	146	-0.146	1	83	100	
50	156	-0.156	2	50	100	
55	158	-0.158	0	250	100	
60	REF					

DCPI7						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	40	-0.040	0	0	0	
5	143	-0.143	21	5	9	
10	193	-0.193	10	10	22	
15	227	-0.227	7	15	36	
20	250	-0.250	5	22	59	
25	273	-0.273	5	22	59	
30	303	-0.303	6	17	42	
35	332	-0.332	6	17	44	
40	355	-0.355	5	22	59	
45	376	-0.376	4	24	66	
50	394	-0.394	4	28	81	
55	407	-0.407	3	38	100	
60	419	-0.419	2	42	100	
65	430	-0.430	2	45	100	
70	440	-0.440	2	50	100	
75	448	-0.448	2	63	100	
80	456	-0.456	2	63	100	
85	460	-0.460	1	125	100	
90	466	-0.466	1	83	100	
95	467	-0.467	0	500	100	
100	472	-0.472	1	100	100	
105	REF					

DCP18						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	68	-0.068	0	0	0	
5	160	-0.160	18	5	10	
10	193	-0.193	7	15	37	
15	220	-0.220	5	19	48	
20	242	-0.242	4	23	62	
25	261	-0.261	4	26	75	
30	287	-0.287	5	19	51	
35	317	-0.317	6	17	42	
40	343	-0.343	5	19	51	
45	374	-0.374	6	16	40	
50	400	-0.400	5	19	51	
55	428	-0.428	6	18	46	
60	453	-0.453	5	20	53	
65	465	-0.465	2	42	100	
70	475	-0.475	2	50	100	
75	480	-0.480	1	100	100	
80	490	-0.490	2	50	100	
85	500	-0.500	2	50	100	
90	508	-0.508	2	63	100	
95	513	-0.513	1	100	100	
100	517	-0.517	1	125	100	
105	521	-0.521	1	125	100	
110	REF					

DCP19						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	132	-0.132	0	0	0	
5	185	-0.185	11	9	20	
10	211	-0.211	5	19	51	
15	229	-0.229	4	28	81	
20	240	-0.240	2	45	100	
25	240	-0.240	0		0	
30	240	-0.240	0		0	
35	REF					
40						
45						
50						

DCP20						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	95	-0.095	0	0	0	
5	150	-0.150	11	9	20	
10	162	-0.162	2	42	100	
15	171	-0.171	2	56	100	
20	174	-0.174	1	167	100	
25	177	-0.177	1	167	100	
30	181	-0.181	1	125	100	
35	REF					
40						
45						
50						

DCP21						
Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)	
0	40	-0.040	0	0	0	
5	140	-0.140	20	5	9	
10	187	-0.187	9	11	24	
15	226	-0.226	8	13	30	
20	267	-0.267	8	12	28	
25	303	-0.303	7	14	33	
30	332	-0.332	6	17	44	
35	361	-0.361	6	17	44	
40	380	-0.380	4	26	75	
45	400	-0.400	4	25	70	
50	417	-0.417	3	29	87	
55	435	-0.435	4	28	81	
60	449	-0.449	3	36	100	
65	463	-0.463	3	36	100	
70	473	-0.473	2	50	100	
75	481	-0.481	2	63	100	
80	490	-0.490	2	56	100	
85	500	-0.500	2	50	100	
90	505	-0.505	1	100	100	
95	513	-0.513	2	63	100	
100	520	-0.520	1	71	100	
105	527	-0.527	1	71	100	
110	REF					

DCP22

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	63	-0.063	0	0	0
5	91	-0.091	6	18	46
10	105	-0.105	3	36	100
15	110	-0.110	1	100	100
20	116	-0.116	1	83	100
25	123	-0.123	1	71	100
30	131	-0.131	2	63	100
35	135	-0.135	1	125	100
40	140	-0.140	1	100	100
45	142	-0.142	0	250	100
50	REF				
55					

DCP23

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	67	-0.067	0	0	0
5	162	-0.162	19	5	10
10	227	-0.227	13	8	16
15	243	-0.243	3	31	94
20	267	-0.267	5	21	56
25	294	-0.294	5	19	48
30	313	-0.313	4	26	75
35	340	-0.340	5	19	48
40	360	-0.360	4	25	70
45	385	-0.385	5	20	53
50	410	-0.410	5	20	53
55	426	-0.426	3	31	94
60	444	-0.444	4	28	81
65	465	-0.465	4	24	66
70	482	-0.482	3	29	87
75	500	-0.500	4	28	81
80	516	-0.516	3	31	94
85	531	-0.531	3	33	100
90	549	-0.549	4	28	81
95	562	-0.562	3	38	100
100	577	-0.577	3	33	100
105	590	-0.590	3	38	100
110	602	-0.602	2	42	100
115	612	-0.612	2	50	100
120	618	-0.618	1	83	100
125	628	-0.628	2	50	100
130	636	-0.636	2	63	100
135	642	-0.642	1	83	100
140	649	-0.649	1	71	100
145	658	-0.658	2	56	100
150	664	-0.664	1	83	100
155	669	-0.669	1	100	100
160	673	-0.673	1	125	100
165	678	-0.678	1	100	100
170	679	-0.679	0	500	100
175	REF				

DCP24

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	64	-0.064	0	0	0
5	155	-0.155	18	5	10
10	204	-0.204	10	10	23
15	237	-0.237	7	15	37
20	267	-0.267	6	17	42
25	290	-0.290	5	22	59
30	316	-0.316	5	19	51
35	336	-0.336	4	25	70
40	359	-0.359	5	22	59
45	380	-0.380	4	24	66
50	400	-0.400	4	25	70
55	419	-0.419	4	26	75
60	437	-0.437	4	28	81
65	452	-0.452	3	33	100
70	467	-0.467	3	33	100
75	481	-0.481	3	36	100
80	496	-0.496	3	33	100
85	511	-0.511	3	33	100
90	528	-0.528	3	29	87
95	547	-0.547	4	26	75
100	566	-0.566	4	26	75
105	585	-0.585	4	26	75
110	600	-0.600	3	33	100
115	616	-0.616	3	31	94
120	630	-0.630	3	36	100
125	648	-0.648	4	28	81
130	665	-0.665	3	29	87
135	680	-0.680	3	33	100
140	696	-0.696	3	31	94
145	705	-0.705	2	56	100
150	716	-0.716	2	45	100
155	725	-0.725	2	56	100
160	744	-0.744	4	26	75
165	747	-0.747	1	167	100
170	750	-0.750	1	167	100
175	REF				

DCP25

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	155	-0.155	0	0	0
5	225	-0.225	14	7	14
10	249	-0.249	5	21	56
15	268	-0.268	4	26	75
20	287	-0.287	4	26	75
25	306	-0.306	4	26	75
30	324	-0.324	4	28	81
35	340	-0.340	3	31	94
40	357	-0.357	3	29	87
45	373	-0.373	3	31	94
50	397	-0.397	5	21	56
55	410	-0.410	3	38	100
60	414	-0.414	1	125	100
65	429	-0.429	3	33	100
70	440	-0.440	2	45	100
75	450	-0.450	2	50	100
80	470	-0.470	4	25	70
85	475	-0.475	1	100	100
90	480	-0.480	1	100	100
95	487	-0.487	1	71	100
100	489	-0.489	0	250	100
105	491	-0.491	0	250	100
110	REF				

DCP26

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	111	-0.111	0	0	0
5	192	-0.192	16	6	12
10	239	-0.239	9	11	24
15	271	-0.271	6	16	39
20	289	-0.289	4	28	81
25	315	-0.315	5	19	51
30	345	-0.345	6	17	42
35	372	-0.372	5	19	48
40	405	-0.405	7	15	37
45	419	-0.419	3	36	100
50	430	-0.430	2	45	100
55	440	-0.440	2	50	100
60	450	-0.450	2	50	100
65	455	-0.455	1	100	100
70	466	-0.466	2	45	100
75	474	-0.474	2	63	100
80	478	-0.478	1	125	100
85	486	-0.486	2	63	100
90	493	-0.493	1	71	100
95	502	-0.502	2	56	100
100	510	-0.510	2	63	100
105	518	-0.518	2	63	100
110	527	-0.527	2	56	100
115	532	-0.532	1	100	100
120	535	-0.535	1	167	100
125	537	-0.537	0	250	100
130	REF				

DCP27

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	70	-0.070	0	0	0
5	135	-0.135	13	8	16
10	172	-0.172	7	14	32
15	200	-0.200	6	18	46
20	225	-0.225	5	20	53
25	242	-0.242	3	29	87
30	255	-0.255	3	38	100
35	264	-0.264	2	56	100
40	276	-0.276	2	42	100
45	286	-0.286	2	50	100
50	293	-0.293	1	71	100
55	306	-0.306	3	38	100
60	317	-0.317	2	45	100
65	333	-0.333	3	31	94
70	345	-0.345	2	42	100
75	357	-0.357	2	42	100
80	368	-0.368	2	45	100
85	386	-0.386	4	28	81
90	399	-0.399	3	38	100
95	405	-0.405	1	83	100
100	413	-0.413	2	63	100
105	420	-0.420	1	71	100
110	431	-0.431	2	45	100
115	440	-0.440	2	56	100
120	451	-0.451	2	45	100
125	457	-0.457	1	83	100
130	465	-0.465	2	63	100
135	485	-0.485	4	25	70
140	491	-0.491	1	83	100
145	497	-0.497	1	83	100
150	REF				

DCP28

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	26	-0.026	0	0	0
5	122	-0.122	19	5	10
10	147	-0.147	5	20	53
15	163	-0.163	3	31	94
20	168	-0.168	1	100	100
25	180	-0.180	2	42	100
30	183	-0.183	1	167	100
35	187	-0.187	1	125	100
40	190	-0.190	1	167	100
45	196	-0.196	1	83	100
50	REF				
55					

DCP29

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	85	-0.085	0	0	0
5	248	-0.248	33	3	5
10	333	-0.333	17	6	11
15	417	-0.417	17	6	11
20	459	-0.459	8	12	27
25	492	-0.492	7	15	37
30	523	-0.523	6	16	40
35	542	-0.542	4	26	75
40	559	-0.559	3	29	87
45	575	-0.575	3	31	94
50	590	-0.590	3	33	100
55	604	-0.604	3	36	100
60	615	-0.615	2	45	100
65	633	-0.633	4	28	81
70	645	-0.645	2	42	100
75	656	-0.656	2	45	100
80	666	-0.666	2	50	100
85	676	-0.676	2	50	100
90	696	-0.696	4	25	70
95	703	-0.703	1	71	100
100	718	-0.718	3	33	100
105	728	-0.728	2	50	100
110	734	-0.734	1	83	100
115	742	-0.742	2	63	100
120	752	-0.752	2	50	100
125	760	-0.760	2	63	100
130	767	-0.767	1	71	100
135	775	-0.775	2	63	100
140	781	-0.781	1	83	100
145	786	-0.786	1	100	100
150	794	-0.794	2	63	100
155	802	-0.802	2	63	100
160	810	-0.810	2	63	100
165	REF				

DCP30

Blows	Depth (mm)	DCP Reading (m)	DPI (mm/blow)	N _{10L} (DCP Blows/100mm)	CBR (%)
0	62	-0.062	0	0	0
5	180	-0.180	24	4	7
10	216	-0.216	7	14	33
15	257	-0.257	8	12	28
20	280	-0.280	5	22	59
25	305	-0.305	5	20	53
30	336	-0.336	6	16	40
35	365	-0.365	6	17	44
40	389	-0.389	5	21	56
45	405	-0.405	3	31	94
50	420	-0.420	3	33	100
55	442	-0.442	4	23	62
60	460	-0.460	4	28	81
65	479	-0.479	4	26	75
70	494	-0.494	3	33	100
75	515	-0.515	4	24	66
80	534	-0.534	4	26	75
85	552	-0.552	4	28	81
90	572	-0.572	4	25	70
95	591	-0.591	4	26	75
100	612	-0.612	4	24	66
105	630	-0.630	4	28	81
110	650	-0.650	4	25	70
115	667	-0.667	3	29	87
120	695	-0.695	6	18	46
125	716	-0.716	4	24	66
130	737	-0.737	4	24	66
135	760	-0.760	5	22	59
140	783	-0.783	5	22	59
145	809	-0.809	5	19	51
150	839	-0.839	6	17	42
155	867	-0.867	6	18	46
160	897	-0.897	6	17	42
165	944	-0.944	9	11	24
170	1000	-1.000	11	9	19