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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.

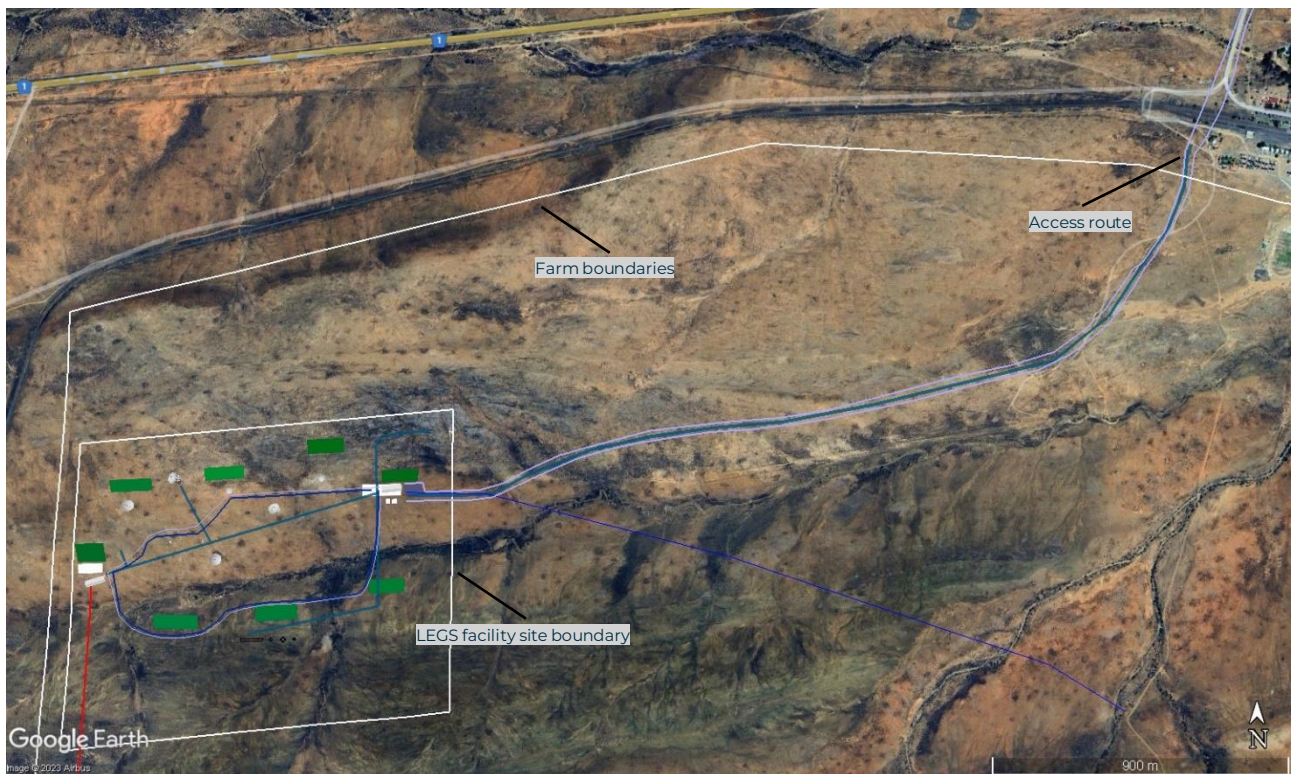


Figure 1-1 Proposed development

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 Ecca 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.

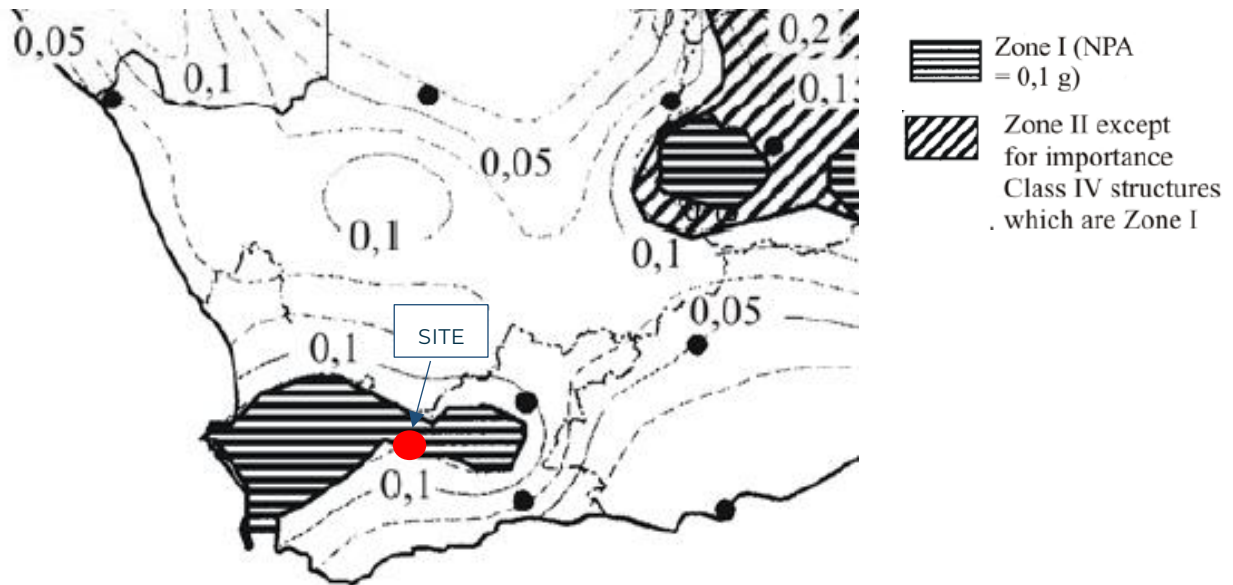


Figure 2-3 Extract from SANS 10160, Seismic Hazard Map of South Africa

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.

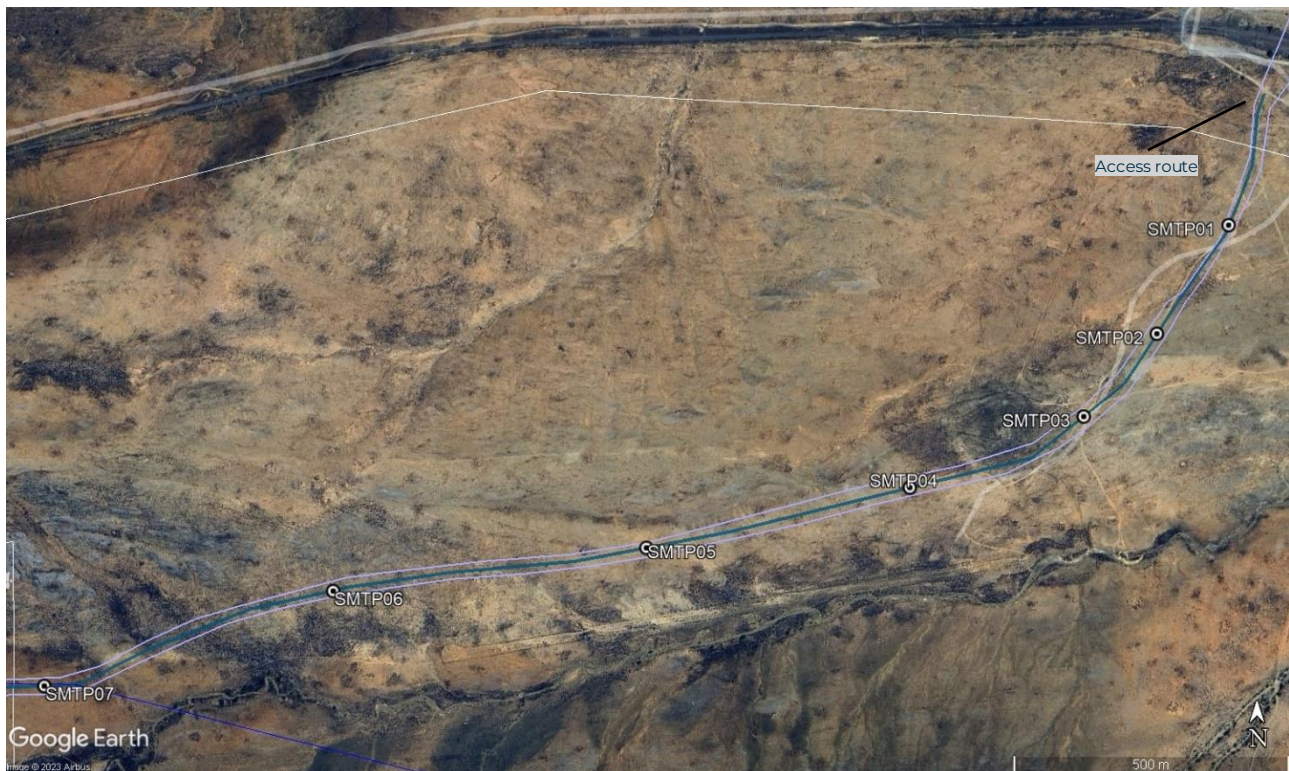


Figure 3-1 Location of test pits along the proposed access road (SMTP01 to SMTP07)



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.

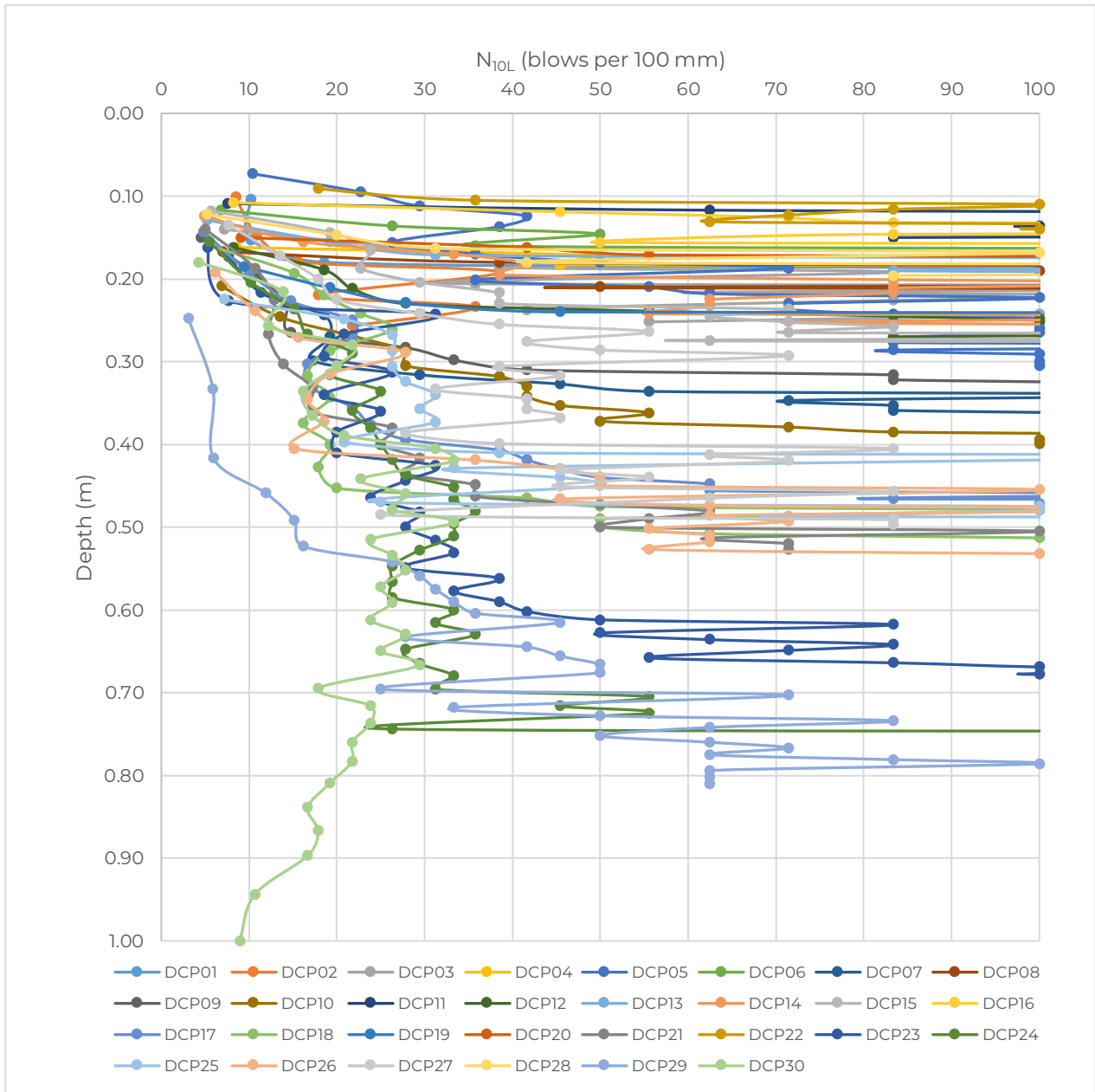


Figure 3-3 Scatter plot of N_{10L} versus depth for entire LEGS communication facility

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.

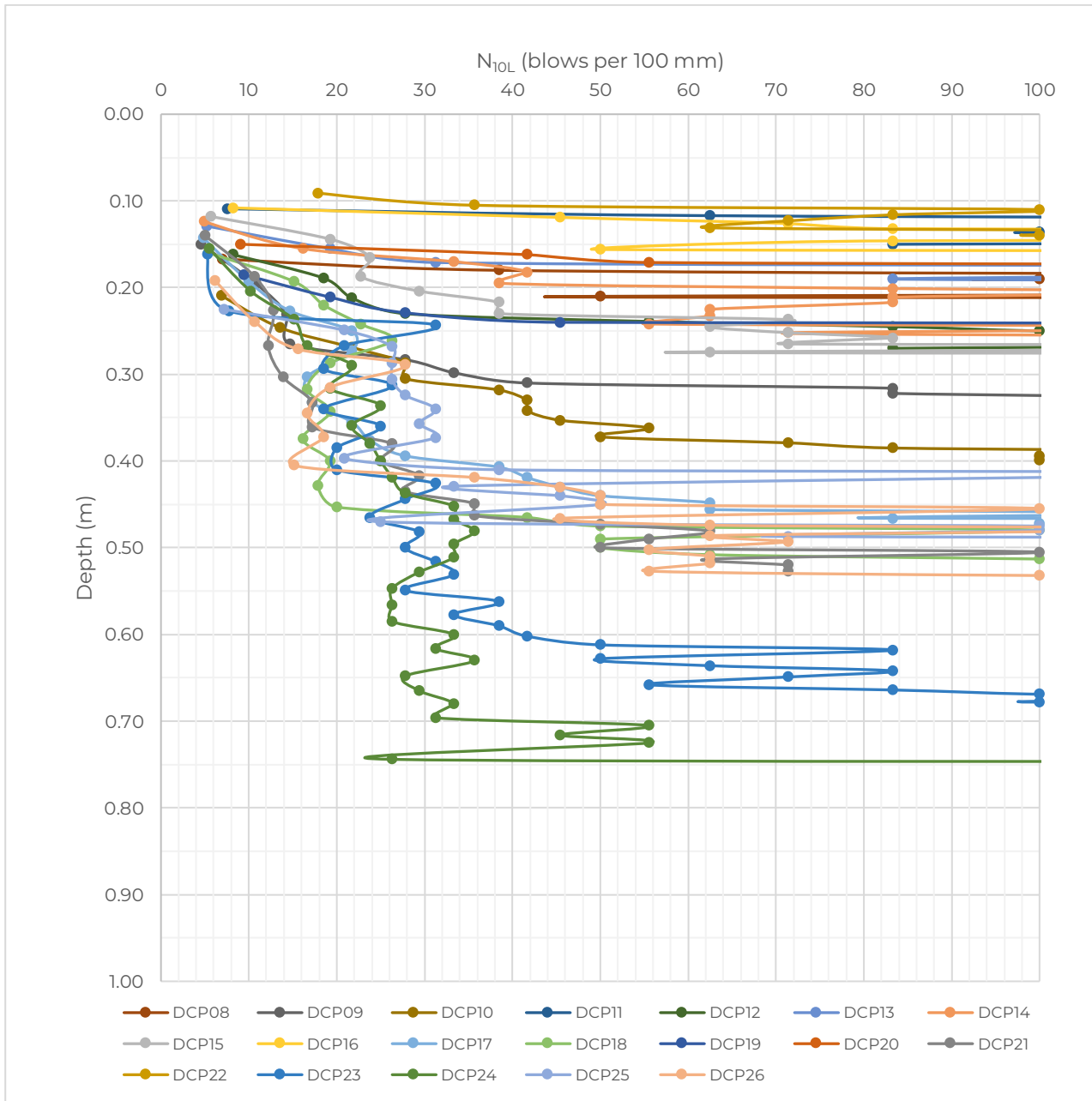


Figure 3-4 Scatter plot of N_{10L} versus depth for DCPs executed for proposed structures

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.

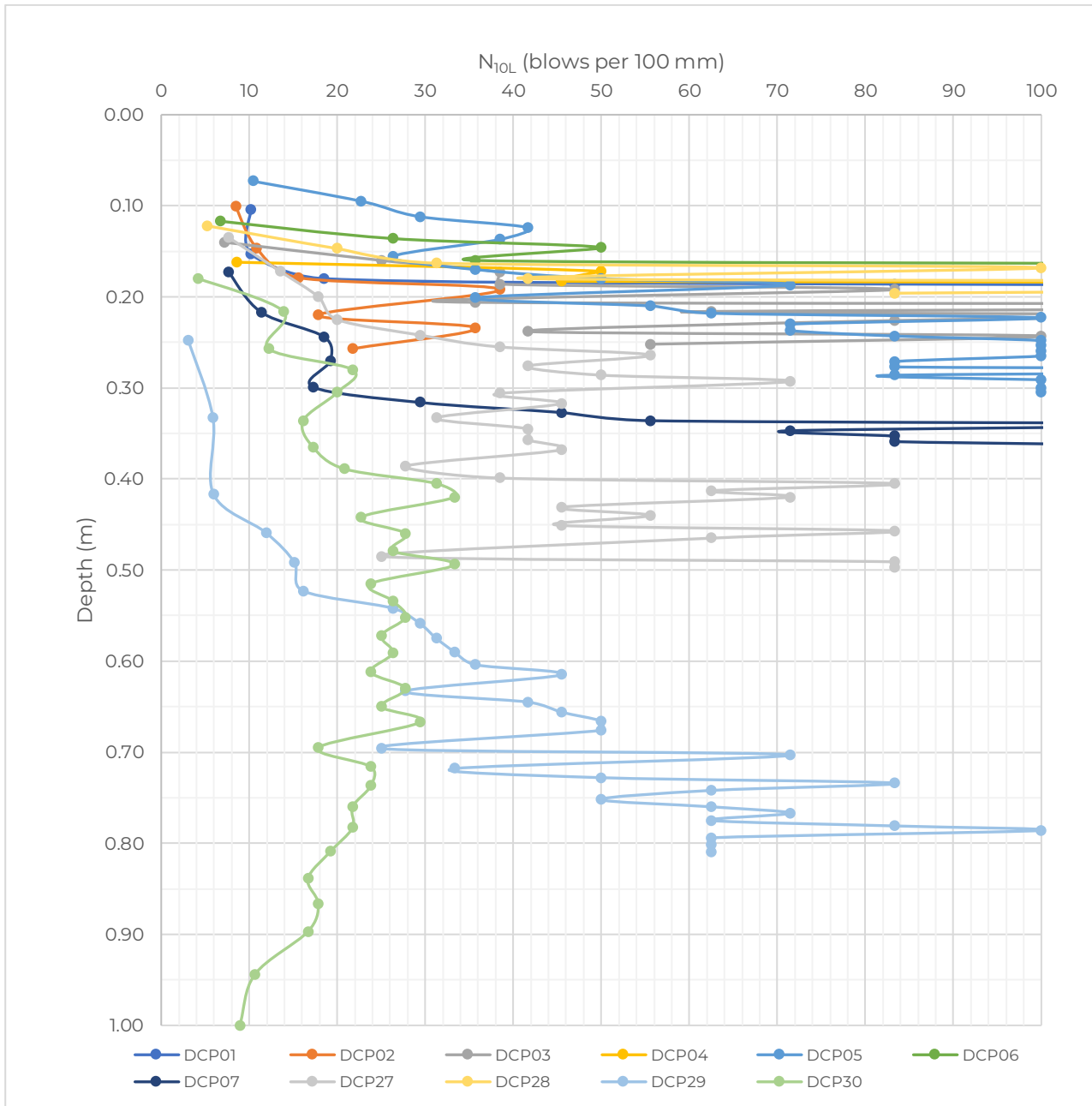


Figure 3-5 Scatter plot of N_{10L} versus depth for DCPs executed along the roads

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 $DN > 2 \text{ mm/blow}$:

$$CBR = 410 \times DN^{-1.27}$$

if $DN \leq 2 \text{ mm/blow}$:

$$CBR = (66.66 \times DN^2) - (330 \times DN) + 563.33$$

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.

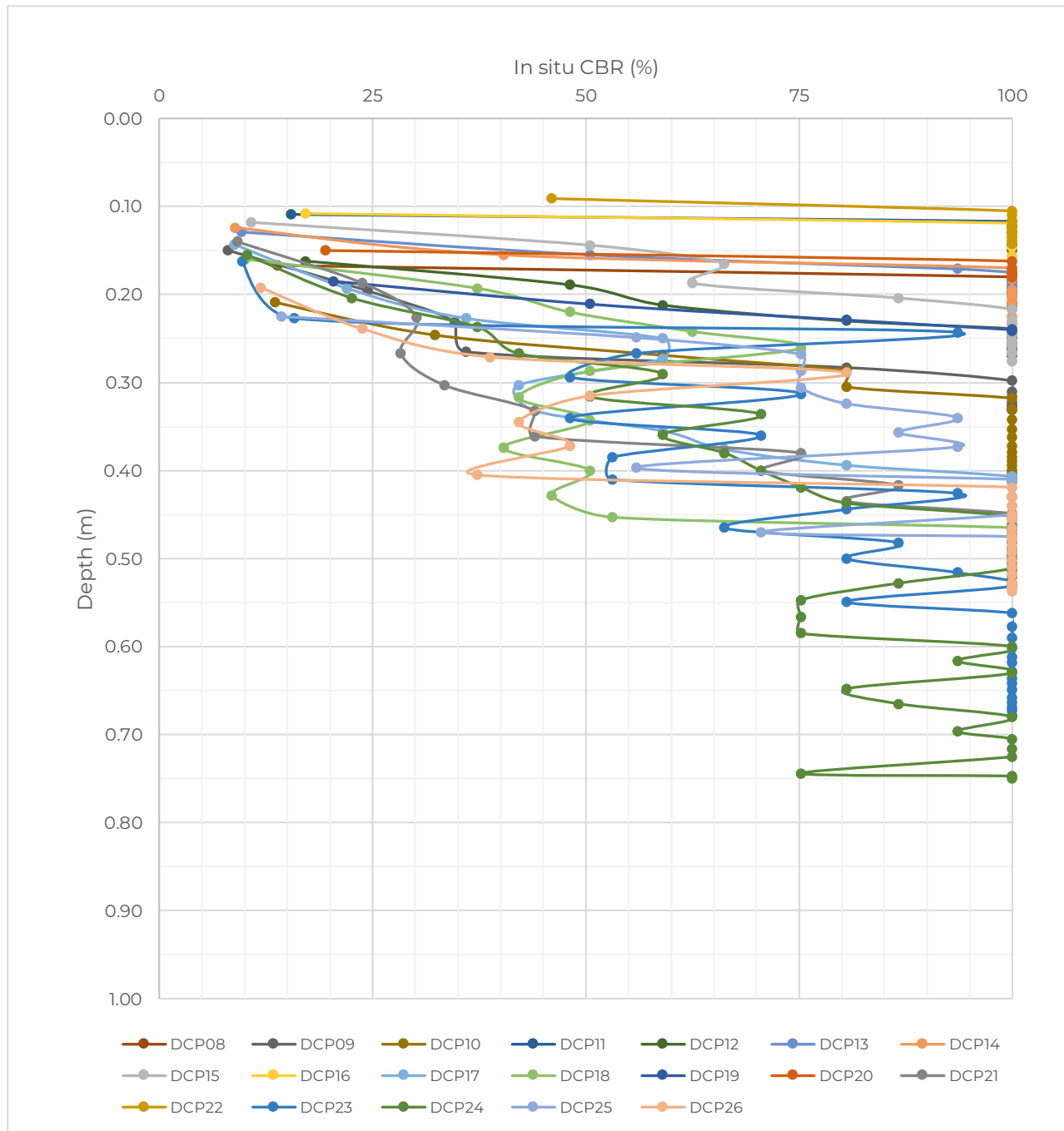


Figure 3-6 In-situ CBR versus depth for DCPs executed for proposed structures

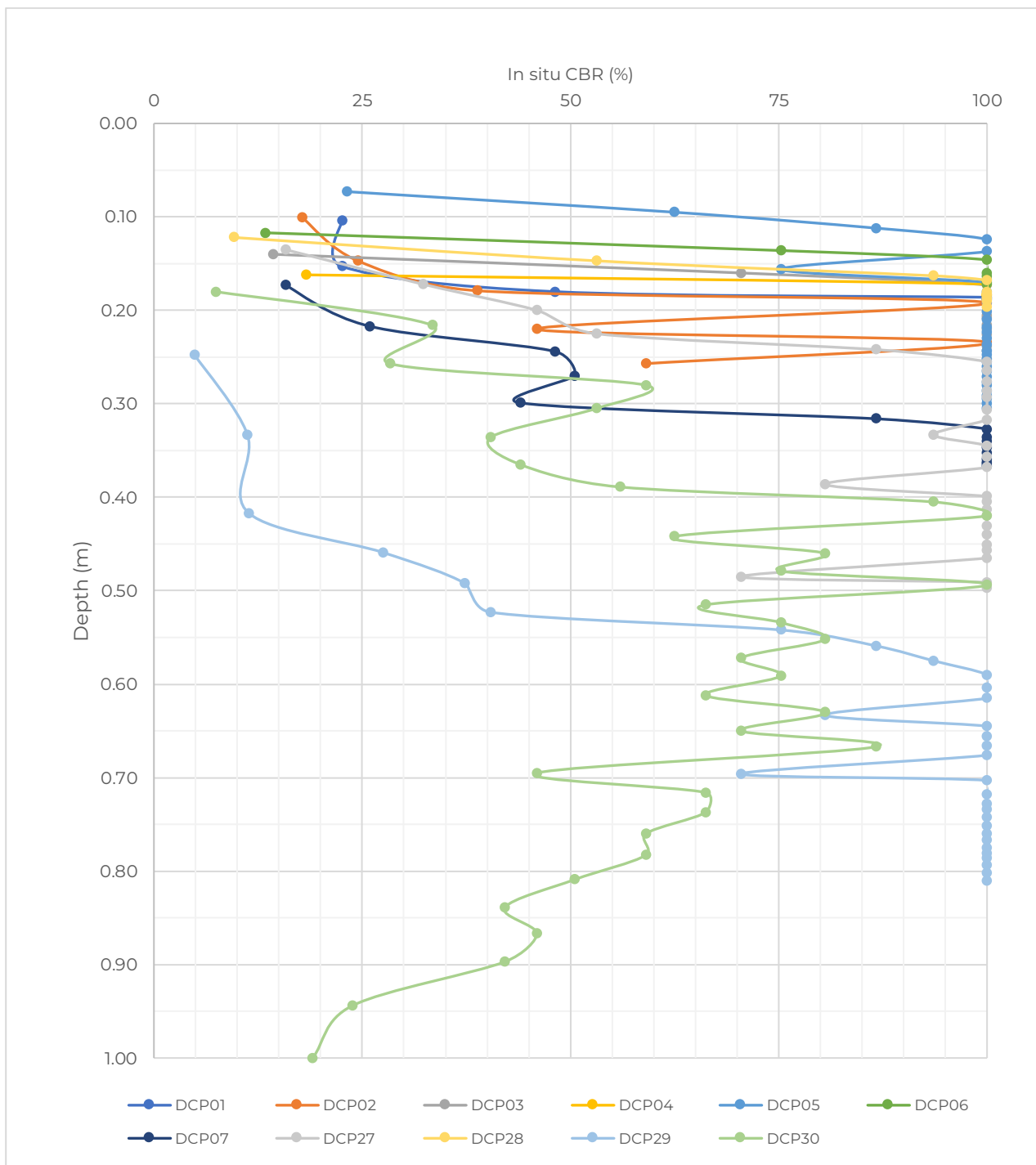


Figure 3-7 In-situ CBR versus depth for DCPs executed along the roads

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 | SMTP08 | 0.40 m | 0.75 m | 0.50 m |
| Main building | SMTP10 | 0.50 m | 0.90 m | 0.50 m |
| | SMTP11 | 0.40 m | 0.85 m | |
| Signal processing operations | SMTP12 | 0.35 m | 0.80 m | 0.40 m |
| Power infrastructure | SMTP23 | 0.70 m | 1.15 m | 0.60 m |
| | SMTP24 | 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

- AEG/SAICE/SAIEG Association of Engineering Geologists – South African Section, South African Institution of Civil Engineering - Geotechnical Division, and South African Institute for Engineering and Environmental Geologists (2002) Guidelines for Soil and Rock Logging in South Africa, 2nd Impression, Brink, A.B.A. and Bruin, R.M.H. (eds.), Proceedings of the Geoterminology Workshop, 1990.
- 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

| 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 | |

| 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 |

| 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

| 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 |

| 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.</p> <p>2) Excavated as cobble to boulder sized fragments with minor sand.</p> <p>3) Joints at base of test pit: Highly jointed, narrow, stained.</p> | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |

NOTES:

1. No sample taken

2. No groundwater seepage

3. No major sidewall collapse

4. Double width test pit

5. Test pit terminated due to TLB approaching refusal

6. DCP undertaken at ground level

7.

8.

MACHINE:

DIAM:

FILE REF:

DATE PROFILED: 09/06/2023

PROFILED BY: TJS

CHECKED BY: SB

PROF REG.:

PROF. REG:

TRIAL PIT LOG

HOLE NO. : SMTP02

X COORD: 20°34'32.35"E

Y COORD: 33°14'8.91"S

ELEVATION:

SHEET 1 of 1

CLIENT: SANSA

PROJECT: SANSA Matjiesfontein

PROJECT NO.: 23123G


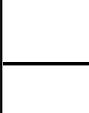
SITE : Matjiesfontein

[illegible]


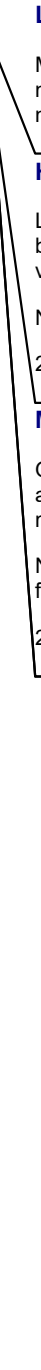
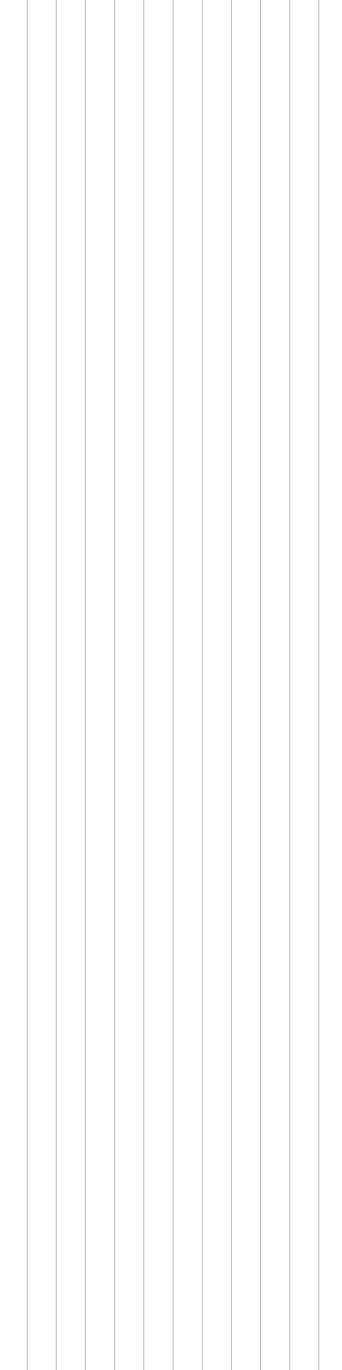
| | | |
|--------|-------------------------------|---|
| NOTES: | 1. No sample taken | 5. Test pit terminated due to TLB refusal |
| | 2. No groundwater seepage | 6. DCP undertaken at ground level |
| | 3. No major sidewall collapse | 7. |
| | 4. Triple width test pit | 8. |

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

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|------|--|---|--|--|--|--|--|--|--|--|--|--------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|
| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | | <div>HOLE NO. : SMTP03 X COORD: 20°34'27.17"E Y COORD: 33°14'13.74"S ELEVATION: SHEET 1 of 1</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DEPTH (m) | | | DESCRIPTION | | | | Dynamic Probe Light | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.20 | | <div>Loose, gravelly SAND 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.</div> <div>Moderately weathered, medium hard rock, TILLITE 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. 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.</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0.40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | |


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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP04 X COORD: 20°34'15.00"E Y COORD: 33°14'17.86"S ELEVATION: SHEET 1 of 1</div> | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | |
| 0.15 |  |  | <div>Loose, gravelly SAND 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.</div> | | | |
| | | | | | | |
| 0.65 | | | <div>Moderately weathered, medium hard rock, TILLITE 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. 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.</div> | | | |
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| 5 | | | | | | |
| <div>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.</div> | | | | | | |
| <div>MACHINE: DATE PROFILED: 09/06/2023 DIAM: PROFILED BY: TJS PROF REG.: FILE REF: CHECKED BY: SB PROF. REG: 4002279/07</div> | | | | | | |

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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP05 X COORD: 20°33'56.70"E Y COORD: 33°14'21.33"S ELEVATION: SHEET 1 of 1</div> | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | |
| | 0.10 | | Loose, gravelly SAND 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. | | | |
| | 0.40 | | Moderately weathered, medium hard rock, TILLITE 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. Note: 1) Upper 0.00 - 0.20 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. | | | |
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| | 5 | | | | | |
| <div>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. Triple width test pit 8.</div> | | | | | | |
| <div>MACHINE: DATE PROFILED: 09/06/2023 DIAM: PROFILED BY: TJS PROF REG.: FILE REF: CHECKED BY: SB PROF. REG: 4002279/07</div> | | | | | | |

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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | | <div>HOLE NO. : SMTP06 X COORD: 20°33'35.10"E Y COORD: 33°14'23.78"S ELEVATION: SHEET 1 of 1</div> | | | | | | | | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | | | | | | | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | | | | | | | | |
| 0.20 0.45 0.55 1 2 3 4 5 |  |  | Loose, gravelly SAND 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. |  | | | | | | | | | | | |
| | | | Highly to completely weathered, very soft rock, TILLITE 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. Note: 1) Excavated as a fine to coarse gravel. 2) Very highly jointed, wide, stained and filled with gravelly sand. | | | | | | | | | | | | |
| | | | Moderately weathered, medium hard rock, TILLITE 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. 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. | | | | | | | | | | | | |
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NOTES: 1. Sample taken: 0.20 – 0.55 m
2. No groundwater seepage
3. No major sidewall collapse
4. Double width test pit
5. Test pit terminated due to TLB approaching refusal
6. DCP undertaken at ground level
7.
8.

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

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| <div>TRIAL PIT LOG</div> <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>HOLE NO. : SMTP07 X COORD: 20°33'15.29"E Y COORD: 33°14'29.21"S ELEVATION: SHEET 1 of 1</div> | | | | | | | | | | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | | | | | | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | | | | | | | |
| 0.30 |  | | Loose, gravelly SAND 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. | | | | | | | | | | | |
| | | 0.65 | Moderately weathered, medium hard rock, TILLITE 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. 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. | | | | | | | | | | | |
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| 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 | | Loose, GRAVEL and SAND | | | | | | | | | | | |
| 0.40 | | 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 to moderately weathered, soft rock, TILLITE | | | | | | | | | | | |
| 1 | | Grey brown to grey, speckled black, stained red and orange brown, highly to moderately weathered, fine grained, massive, soft rock, Tillite. Dwyka Formation. | | | | | | | | | | | |
| | | Note: 1) Very highly jointed, wide, stained and filled with gravelly sand. | | | | | | | | | | | |
| | | 2) Excavated as gravel to cobble to boulder sized fragments. | | | | | | | | | | | |
| | | Moderately weathered, medium hard rock, TILLITE | | | | | | | | | | | |
| 2 | | Grey brown to grey, speckled black and orange brown, stained red and orange, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. | | | | | | | | | | | |
| | | Note: 1) Highly jointed, wide to narrow, stained and filled with minor gravelly sand. | | | | | | | | | | | |
| | | 2) Excavated as cobble to boulder sized fragments. | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | |

- NOTES:
- No sample taken
 - No groundwater seepage
 - No major sidewall collapse
 - Double width test pit
 - Test pit terminated due to TLB approaching refusal
 - DCP undertaken at ground level
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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

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NOTES: 1. Sample taken: 0.00 – 0.40 m
2. No groundwater seepage
3. No major sidewall collapse
4. Double width test pit

5. Test pit terminated due to TLB approaching refusal
6. DCP undertaken at ground level
- 7.
- 8.

MACHINE:

DATE PROFILED: 07/06/2023

DIAM:

PROFILED BY: TJS

PROF REG.:

FILE REF:

CHECKED BY: SB

PROF. REG: 4002279/07

PROF. REG: 4002279/07

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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP10 X COORD: 20°33'6.98"E Y COORD: 33°14'28.56"S ELEVATION: SHEET 1 of 1</div> | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | |
| | 0.25 | | Loose, SAND 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. | | | |
| | 0.40 | | | | | |
| | 0.80 | | Highly weathered, very soft rock, TILLITE 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 a fine to coarse gravel. | | | |
| 1 | | | Moderately weathered, medium hard rock, TILLITE Olive grey to grey, speckled white, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. Note: 1) Highly jointed, wide to narrow with depth, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments. | | | |
| 2 | | | | | | |
| 3 | | | | | | |
| 4 | | | | | | |
| 5 | | | | | | |
| <div>NOTES: 1. Sample taken: 0.00 – 0.25 m 2. No groundwater seepage 3. No major sidewall collapse 4. Triple width test pit 5. Test pit terminated due to TLB approaching refusal 6. DCP undertaken at ground level 7. 8.</div> | | | | | | |
| MACHINE: DIAM: FILE REF: | | | DATE PROFILED: 07/06/2023 PROFILED BY: TJS CHECKED BY: SB PROF. REG.: PROF. REG: 4002279/07 | | | |

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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | | <div>HOLE NO. : SMTP11 X COORD: 20°33'6.98"E Y COORD: 33°14'28.56"S ELEVATION:</div> | | | <div>SHEET 1 of 1</div> | | | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | | | | | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | | | | | | |
| 0.20 | 0.40 | 0.85 | <div><div><div>Loose, SAND and GRAVEL</div><div>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.</div><div>Highly to moderately weathered, soft rock, TILLITE</div><div>Grey brown to grey, speckled black, stained red and orange brown, highly to moderately weathered, fine grained, massive, soft rock, Tillite. Dwyka Formation.</div><div>Note: 1) Very highly jointed, wide to narrow, stained and filled with gravelly sand.</div><div>2) Excavated as gravel to cobble to boulder sized fragments.</div><div>Moderately weathered, medium hard rock, TILLITE</div><div>Grey brown to grey, speckled black and orange brown, stained red and orange, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</div><div>Note: 1) Highly jointed, narrow, stained and filled with minor gravelly sand.</div><div>2) Excavated as cobble to boulder sized fragments.</div></div></div> | | | | | | | | | | |
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NOTES:

1. Sample taken: 0.00 – 0.25 m

2. No groundwater seepage

3. No major sidewall collapse

4. Triple width test pit

5. Test pit terminated due to TLB approaching refusal

6. DCP undertaken at ground level

7.

8.

| | | |
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| 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. | | | | | | | | | | | |
| | | Moderately weathered, medium hard rock, TILLITE | | | | | | | | | | | |
| 2 | | 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. | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
| 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

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NOTES:

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| 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. |

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

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|--|------|------|---|--|--|----|-------------------------|----|----|----|----|--|----|----|--|
| <div>CLIENT: SANSA</div> <div>PROJECT: SANSA Matjiesfontein</div> <div>PROJECT NO.: 23123G</div> <div>SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP14</div> <div>X COORD: 20°32'57.60"E</div> <div>Y COORD: 33°14'27.36"S</div> <div>ELEVATION:</div> | | <div>SHEET 1 of 1</div> | | | | | | | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | | | | | | | | |
| | | | | DCP N10 | | | | | | | | | | | |
| | | | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | |
| | 0.15 | 0.25 | <div><div>Loose, gravelly SAND</div><div>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.</div><div>Moderately weathered, medium hard rock, TILLITE</div><div>Moderately weathered, medium hard rock, TILLITE</div><div>Grey, speckled white, blotched cream, stained orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation.</div><div>Note: 1) Upper 0.00 - 0.15 m: Joints very wide and filled with gravelly sand as above.</div><div>2) Excavated as cobble to boulder sized fragments with minor gravelly sand.</div><div>3) Joints at base of test pit: Highly jointed, narrow, stained.</div></div> | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | |
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| 4 | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | |
| <div>NOTES: 1. No sample taken</div> <div>2. No groundwater seepage</div> <div>3. No major sidewall collapse</div> <div>4. Double width test pit</div> <div>5. Test pit terminated due to TLB refusal</div> <div>6. DCP undertaken at ground level</div> <div>7. Slow progress/excavation rate by TLB on tillite</div> <div>8.</div> | | | | | | | | | | | | | | | |
| <div>MACHINE:</div> <div>DIAM:</div> <div>FILE REF:</div> | | | | <div>DATE PROFILED: 07/06/2023</div> <div>PROFILED BY: TJS</div> <div>CHECKED BY: SB</div> | | | | | | | | <div>PROF REG.:</div> <div>PROF. REG: 4002279/07</div> | | | |

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

[illegible]

NOTES: 1. Sample taken: 0.00 – 0.70 m
2. No groundwater seepage
3. No major sidewall collapse
4. Double width test pit

5. Test pit terminated due to TLB refusal
6. DCP undertaken at ground level
- 7.
- 8.

MACHINE:

DATE PROFILED: 07/06/2023

DIAM:

PROFILED BY: TJS

PROF REG.:

FILE REF:

CHECKED BY: SB

PROF. REG: 4002279/07

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

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| | | |
|--------|--------------------------------|---|
| 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

| | | |
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| <div>CLIENT: SANSA</div> <div>PROJECT: SANSA Matjiesfontein</div> <div>PROJECT NO.: 23123G</div> <div>SITE : Matjiesfontein</div> | <div>HOLE NO. : SMTP18</div> <div>X COORD: 20°32'44.09"E</div> <div>Y COORD: 33°14'33.18"S</div> <div>ELEVATION:</div> | <div>SHEET 1 of 1</div> |
|---|--|-------------------------|

| DEPTH (m) | | DESCRIPTION | Dynamic Probe Light | | | | | | | | | | |
|-----------|--|---|---------------------|----|----|----|----|----|----|----|----|----|----|
| | | | DCP N10 | | | | | | | | | | |
| | | | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 |
| | | Loose, gravelly SAND | | | | | | | | | | | |
| 0.30 | | 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. | | | | | | | | | | | |
| | | Moderately weathered, medium hard rock, TILLITE | | | | | | | | | | | |
| 0.80 | | Olive grey to grey, speckled white, blotched cream, stained orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. | | | | | | | | | | | |
| 1 | | 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. | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | |
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| 4 | | | | | | | | | | | | | |
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| 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

CLIENT: SANSA

PROJECT: SANSA Matjiesfontein

PROJECT NO.: 23123G

SITE : Matjiesfontein

HOLE NO. : SMTP19

X COORD: 20°32'35.91"E

Y COORD: 33°14'30.12"S

ELEVATION:

SHEET 1 of 1

[illegible]

| | | |
|--------|-------------------------------|---|
| 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 | |

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|---|--|--|--|--|--|---|--|--|
| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | | <div>HOLE NO. : SMTP20 X COORD: 20°32'36.23"E Y COORD: 33°14'29.62"S ELEVATION:</div> | | |
| | | | | | | SHEET 1 of 1 | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | |
| 0.30 | | | Loose, SAND and GRAVEL 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. | | | | | |
| | | | | | | | | |
| 0.65 | | | Moderately weathered, medium hard rock, TILLITE Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. 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. | | | | | |
| 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 | | |

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|--|--|--|---|--|--|--|--|--|
| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | | <div>HOLE NO. : SMTP21 X COORD: 20°32'36.37"E Y COORD: 33°14'30.54"S ELEVATION: SHEET 1 of 1</div> | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | |
| 0.25 | | | Loose, SAND and GRAVEL | | | | | |
| | | | 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. | | | | | |
| 0.55 | | | Highly weathered, soft rock, TILLITE | | | | | |
| | | | 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. | | | | | |
| 1.10 | | | Note: 1) Very highly jointed, very wide to wide, stained and filled with gravelly sand. 2) Excavated as fine to coarse gravel. | | | | | |
| | | | Moderately weathered, medium hard rock, TILLITE | | | | | |
| | | | Grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. | | | | | |
| | | | Note: 1) Highly jointed, wide to narrow with depth, stained and filled with minor gravelly sand. 2) Excavated as cobble to boulder sized fragments. | | | | | |
| 2 | | | | | | | | |
| | | | | | | | | |
| 3 | | | | | | | | |
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| 4 | | | | | | | | |
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| 5 | | | | | | | | |
| | | | | | | | | |

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

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

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|---|------|--|--|--|--|--|
| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP22 X COORD: 20°32'35.30"E Y COORD: 33°14'30.08"S ELEVATION: SHEET 1 of 1</div> | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | |
| | 0.25 | | <div>Loose, SAND and GRAVEL</div> <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 | | <div>Moderately weathered, medium hard rock, TILLITE</div> <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.</p> <p>2) Excavated as cobble to boulder sized fragments with minor gravelly sand.</p> <p>3) Joints at base of test pit: Highly jointed, narrow, stained.</p> | | | |
| | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| | 4 | | | | | |
| | 5 | | | | | |
| <div>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.</div> | | | | | | |
| <div>MACHINE: DATE PROFILED: 08/06/2023 DIAM: PROFILED BY: TJS PROF REG.: FILE REF: CHECKED BY: SB PROF. REG: 4002279/07</div> | | | | | | |

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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP23 X COORD: 20°32'30.45"E Y COORD: 33°14'36.32"S ELEVATION: SHEET 1 of 1</div> | | | | | | | | | | |
| 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> | | | | | | | | | | | | | |
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| 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> <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> | | | | | | | | | | | | | |
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| 1.15 | | <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> | | | | | | | | | | | | | |
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| 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 | | | | | | | | | | | | | | | |

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| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | | <div>HOLE NO. : SMTP24 X COORD: 20°32'32.49"E Y COORD: 33°14'36.24"S ELEVATION: SHEET 1 of 1</div> | | | | | | | | | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | | | | | | | | | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | | | | | | | | | | |
| 0.30 0.70 0.80 1.00 1 2 3 4 5 | | | Loose, gravelly SAND 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. | | | | | | | | | | | | |
| | | | Completely weathered, very soft rock, TILLITE Reddish brown, stained orange brown, completely weathered, fine grained, weakly laminated, very soft rock, Tillite. Dwyka Formation Note: 1) Very highly jointed, wide, stained and filled with sand. 2) Excavated as fine to coarse gravel. | | | | | | | | | | | | |
| | | | Highly weathered, soft rock, TILLITE Brown to olive grey, speckled white, stained red, highly weathered, fine grained, massive to weakly laminated, soft rock, Tillite. Dwyka Formation. 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. | | | | | | | | | | | | |
| | | | Moderately weathered, medium hard rock, TILLITE 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. Note: 1) Highly jointed, narrow, stained and filled with sand. 2) Excavated as cobble to boulder sized fragments. | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

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

[illegible]

| | | |
|--------|--------------------------------|---|
| 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

| | | |
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| TRIAL PIT LOG CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein | | HOLE NO. : SMTP27 X COORD: 20°32'34.31"E Y COORD: 33°14'39.74"S ELEVATION: |
| | | SHEET 1 of 1 |

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

| | | |
|--|--|--|
| NOTES: 1. Sample taken: 0.00 – 1.60 m 2. No groundwater seepage 3. No major sidewall collapse 4. Double width test pit | | 5. Test pit terminated due to TLB refusal 6. DCP undertaken at ground level 7. 8. |
| MACHINE: DIAM: FILE REF: | DATE PROFILED: 08/06/2023 PROFILED BY: TJS CHECKED BY: SB | |
| | PROF REG.: PROF. REG: 4002279/07 | |

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|---|--|--|--|--|---|--|
| <div>CLIENT: SANSA PROJECT: SANSA Matjiesfontein PROJECT NO.: 23123G SITE : Matjiesfontein</div> | | | <div>TRIAL PIT LOG</div> | | <div>HOLE NO. : SMTP26 X COORD: 20°32'32.95"E Y COORD: 33°14'37.36"S ELEVATION:</div> | |
| | | | | | SHEET 1 of 1 | |
| DEPTH (m) | | | DESCRIPTION | Dynamic Probe Light | | |
| | | | | DCP N10 5 10 15 20 25 30 35 40 45 50 55 | | |
| 0.30 | | | Loose, gravelly SAND | | | |
| | | | 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. | | | |
| 0.75 | | | Moderately weathered, medium hard rock, TILLITE | | | |
| | | | Olive grey to grey, speckled white, stained red and orange brown, moderately weathered, fine grained, massive, medium hard rock, Tillite. Dwyka Formation. 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. | | | |
| 1 | | | | | | |
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| 3 | | | | | | |
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| 5 | | | | | | |
| | | | | | | |
| <div>NOTES: 1. Sample taken: 0.00 – 0.75 m 2. No groundwater seepage 3. No major sidewall collapse 4. Double width test pit 5. Test pit terminated due to TLB refusal 6. DCP undertaken at ground level 7. 8.</div> | | | | | | |
| <div>MACHINE: DATE PROFILED: 08/06/2023 DIAM: PROFILED BY: TJS PROF REG.: FILE REF: CHECKED BY: SB PROF. REG: 4002279/07</div> | | | | | | |

TRIAL PIT LOG

CLIENT: SANSA

PROJECT: SANSA Matjiesfontein

PROJECT NO.: 23123G

SITE : Matjiesfontein

HOLE NO. : SMTP28

X COORD: 20°32'43.29"E

Y COORD: 33°14'42.84"S

ELEVATION:

SHEET 1 of 1

[illegible]

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 | | | Loose, SAND and GRAVEL 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. | | | | | | | | | | | |
| 0.60 | | | Loose to medium dense, SAND and GRAVEL 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. | | | | | | | | | | | |
| 1.00 | | | Medium dense, SAND and GRAVEL 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 | | | | | | | | | | | |
| 1.50 | | | Medium dense to dense, GRAVEL 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 | | | | | | | | | | | |
| 1.75 | | | Moderately weathered, medium hard rock, TILLITE Dark grey, speckled white, stained dark red and light orange brown, moderately weathered, fine grained, predominately massive, medium hard rock, Tillite. Dwyka Formation. Note: 1) Highly jointed, narrow, stained and filled with silty sand. 2) Excavated as cobble sized fragments. | | | | | | | | | | | |
| 1.80 | | | | | | | | | | | | | | |
| 2.00 | | | | | | | | | | | | | | |
| 2.50 | | | | | | | | | | | | | | |
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| 4.00 | | | | | | | | | | | | | | |
| 4.50 | | | | | | | | | | | | | | |
| 5.00 | | | | | | | | | | | | | | |

- 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. : 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

[illegible]

| | | |
|--------|-------------------------------|---|
| 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 SMTP04 test pit profile



Figure 8 SMTP04 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 SMTP11 test pit profile



Figure 22 SMTP11 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 SMTP14 test pit excavations



Figure 28 SMTP14 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 SMTP18 test pit profile



Figure 36 SMTP18 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





11 Gooderson Road Blackheath

PO Box 58 Blackheath 7581

Tel: 021 905 0435

Fax: 086 499 9482

Email: info@steynwilson.co.zaWeb: 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)



CIVIL ENGINEERING TESTING LABORATORIES



11 Gooderson Road Blackheath
PO Box 58 Blackheath 7581
Tel: 021 905 0435
Fax: 086 499 9482
Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

Customer : **PeraGage**
Private Bag X5
Century City
7441
Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien
Date Received : 09/06/23
Date Reported : 20/06/23
Req. Number : -
Date Sampled: 09/06/23

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|-----------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 4 | | |
| Position: | TP10 | Liquid Limit | 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

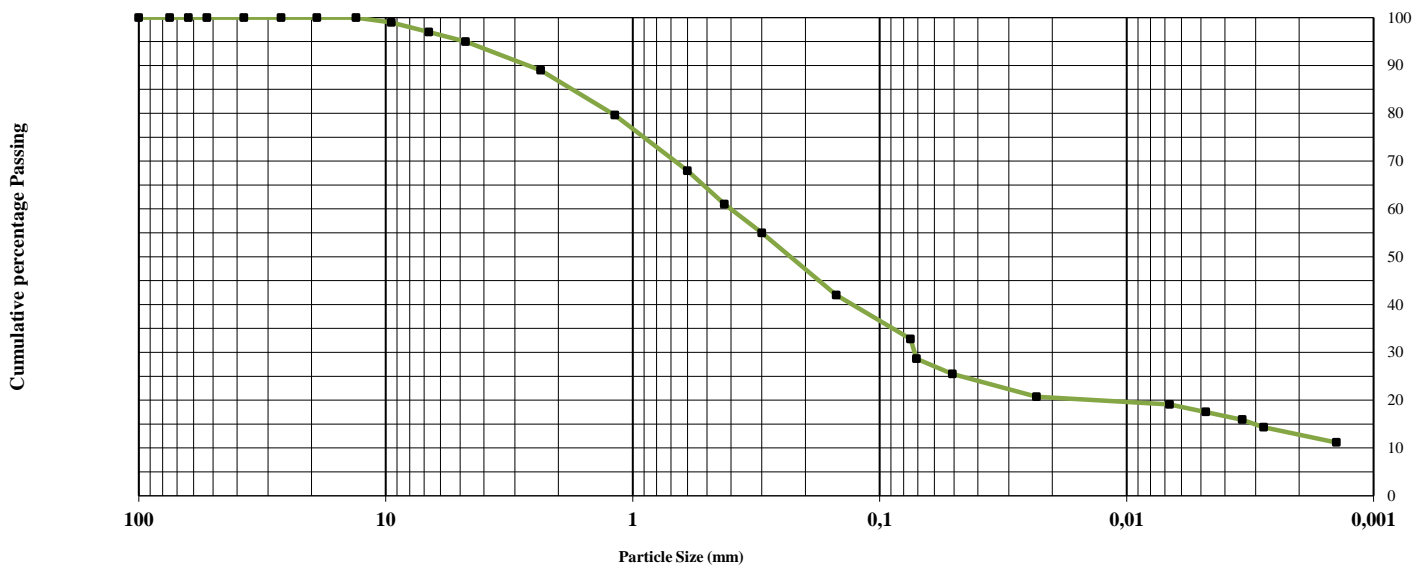
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

5

% Sand

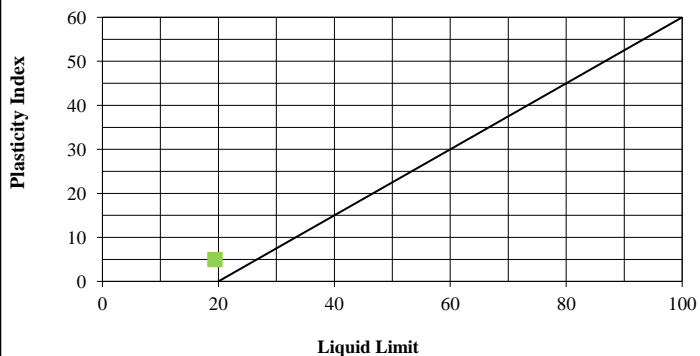
64

% Silt

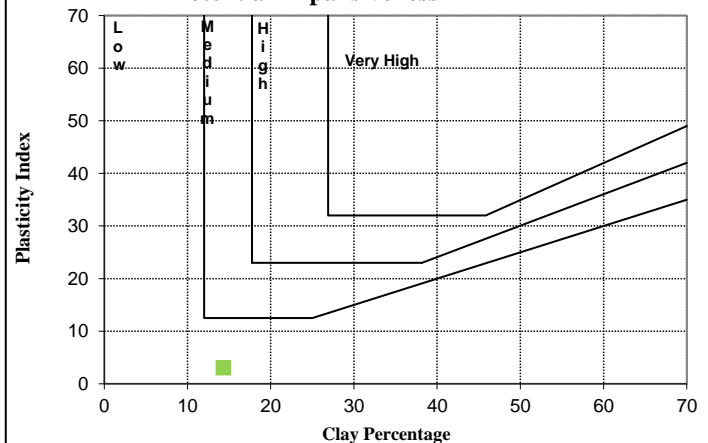
17

% Clay

14

Plasticity Chart
A Line

Potential Expansiveness



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



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Customer : **PeraGage**

Private Bag X5

Century City

7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|-----------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 5 | | |
| Position: | TP12 | Liquid Limit | 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

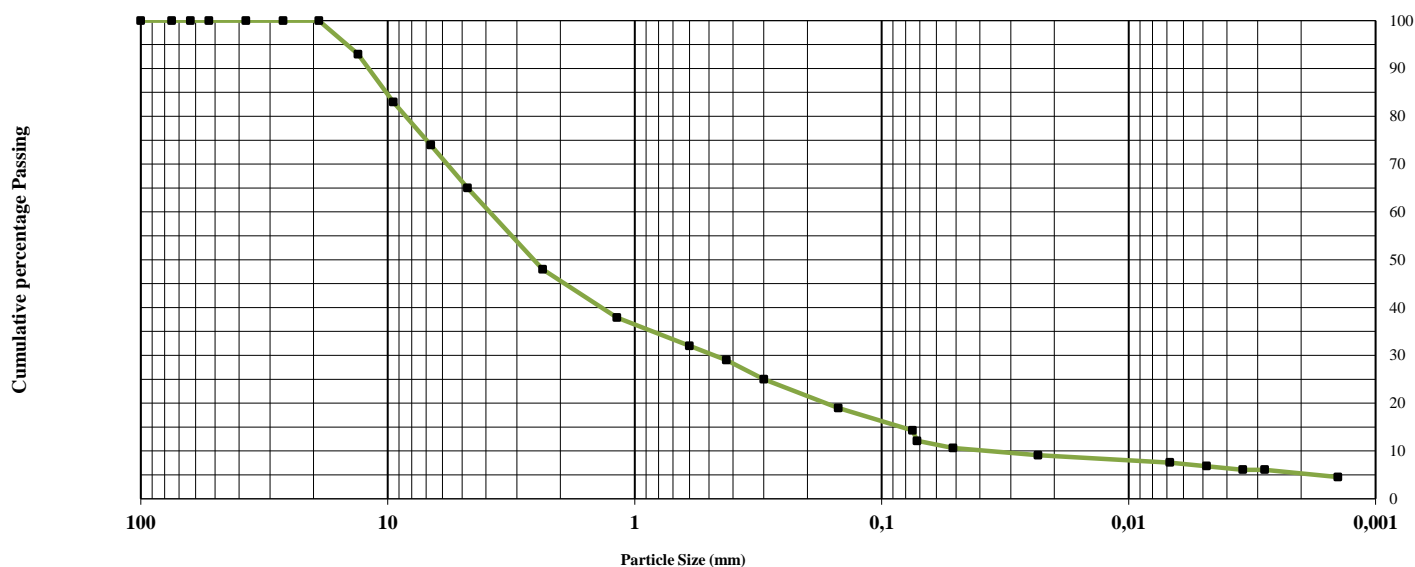
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

35

% Sand

52

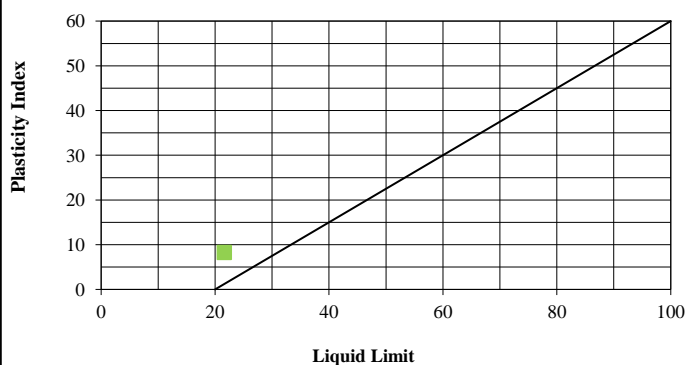
% Silt

7

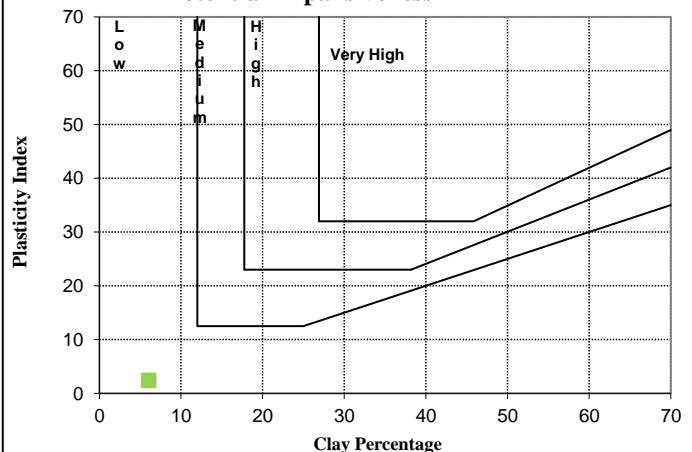
% Clay

6

Plasticity Chart A Line



Potential Expansiveness



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Web: www.steynwilson.co.za

Customer : **PeraGage**

Private Bag X5

Century City

7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|-----------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 6 | | |
| Position: | TP15 | Liquid Limit | 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

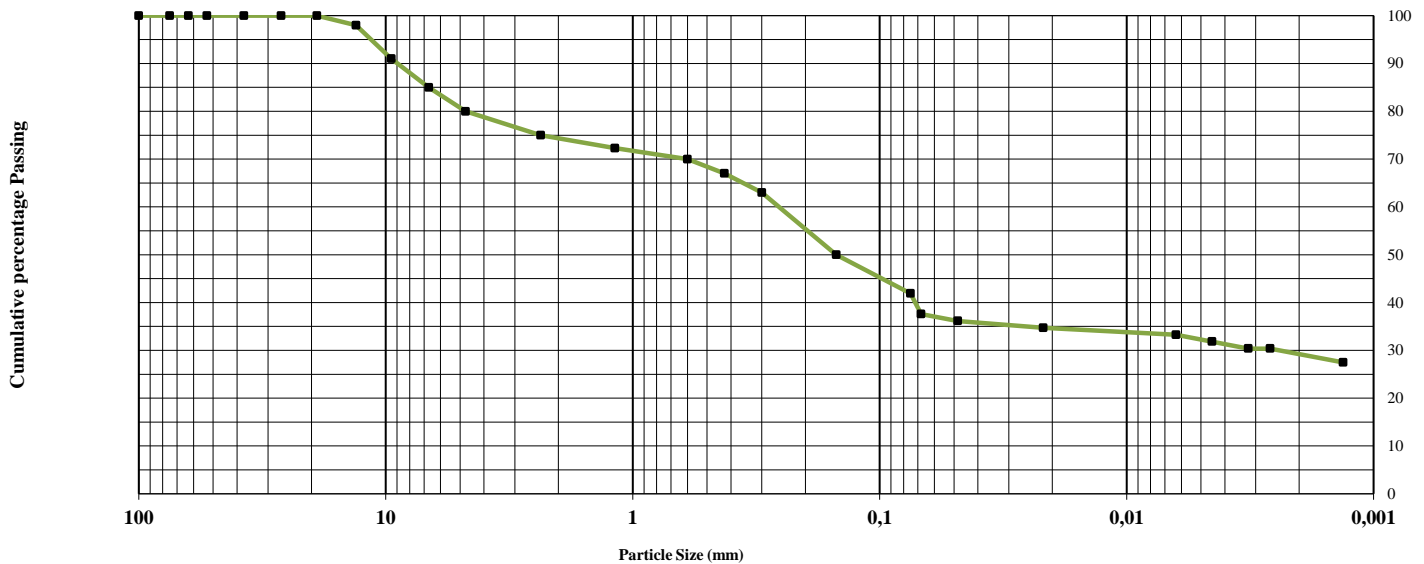
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

20

% Sand

40

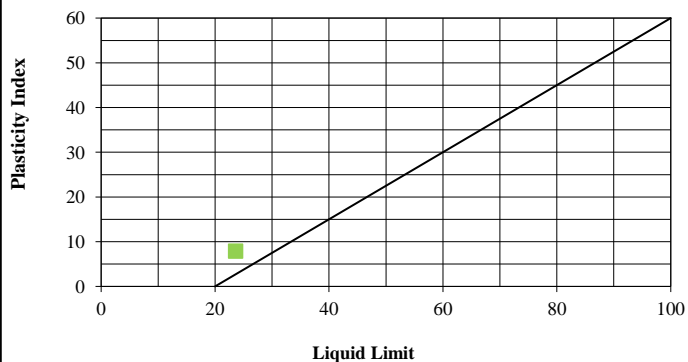
% Silt

10

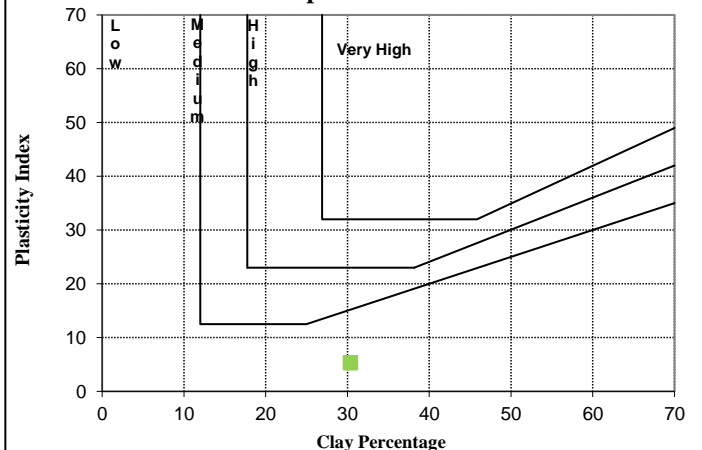
% Clay

30

Plasticity Chart A Line



Potential Expansiveness



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



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Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

Customer : **PeraGage**

Private Bag X5

Century City

7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|-----------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 7 | | |
| Position: | TP16 | Liquid Limit | 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

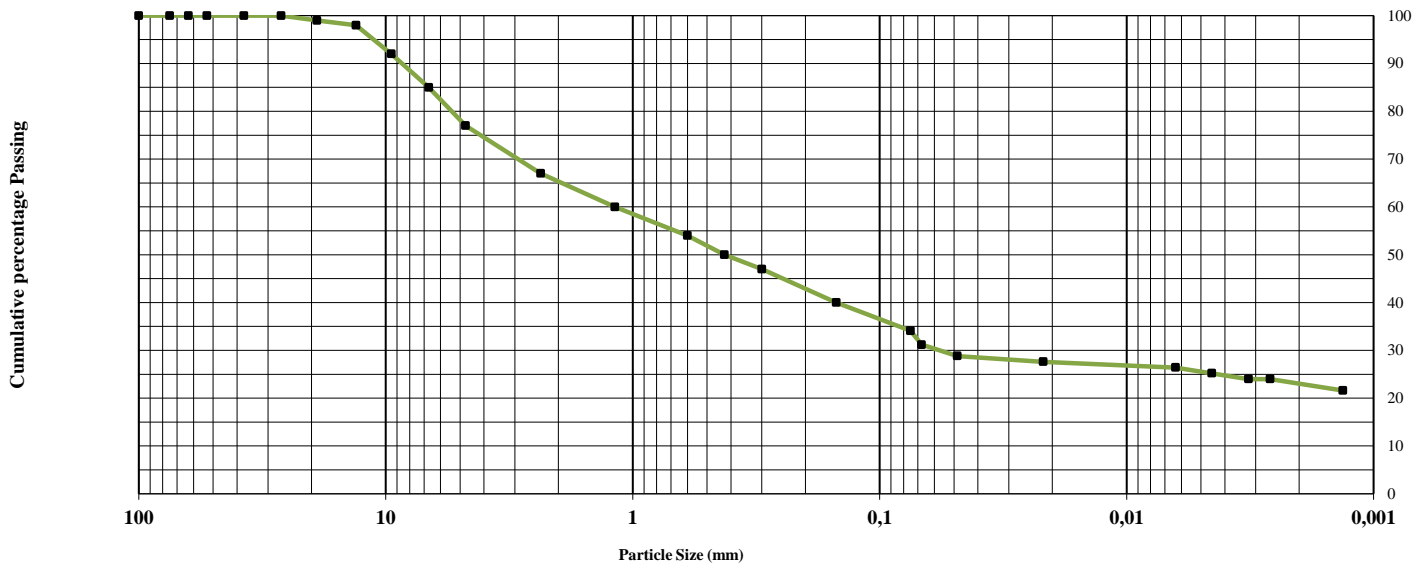
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

23

% Sand

44

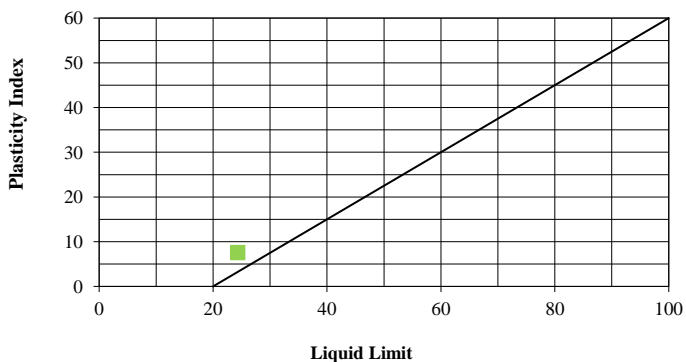
% Silt

9

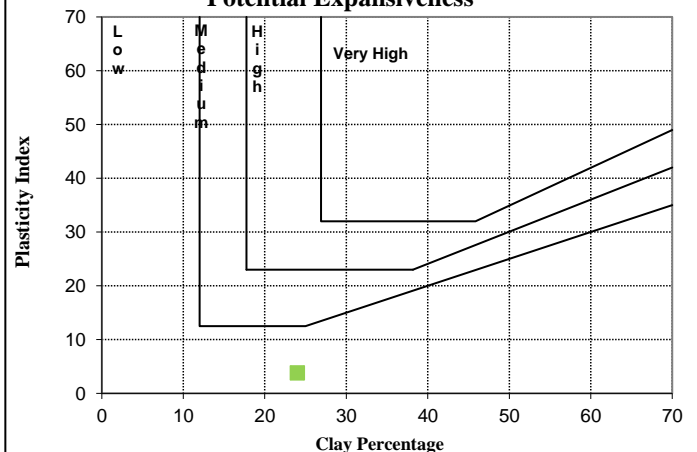
% Clay

24

Plasticity Chart A Line



Potential Expansiveness



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



11 Gooderson Road Blackheath

PO Box 58 Blackheath 7581

Tel: 021 905 0435

Fax: 086 499 9482

Email: info@steynwilson.co.zaWeb: 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.
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- 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)



STEYN-WILSON
LABORATORIES

CIVIL ENGINEERING TESTING LABORATORIES



11 Gooderson Road Blackheath
PO Box 58 Blackheath 7581
Tel: 021 905 0435
Fax: 086 499 9482
Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

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 | 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

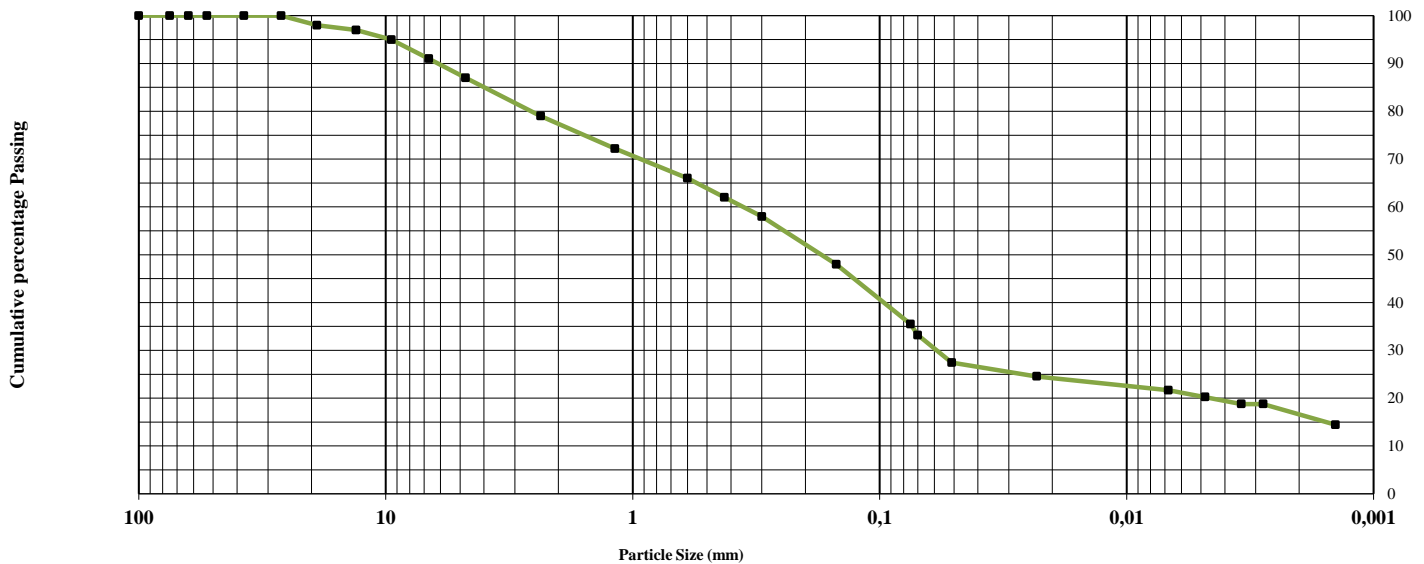
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

13

% Sand

52

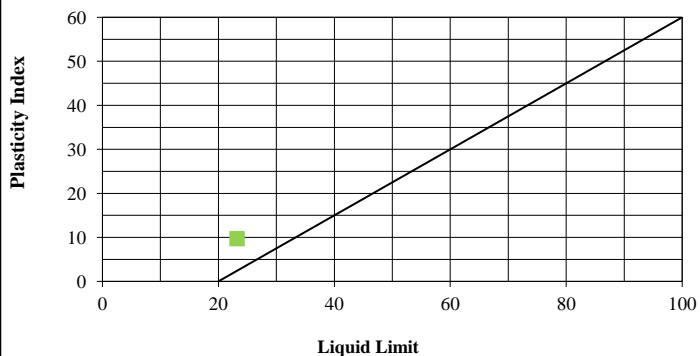
% Silt

16

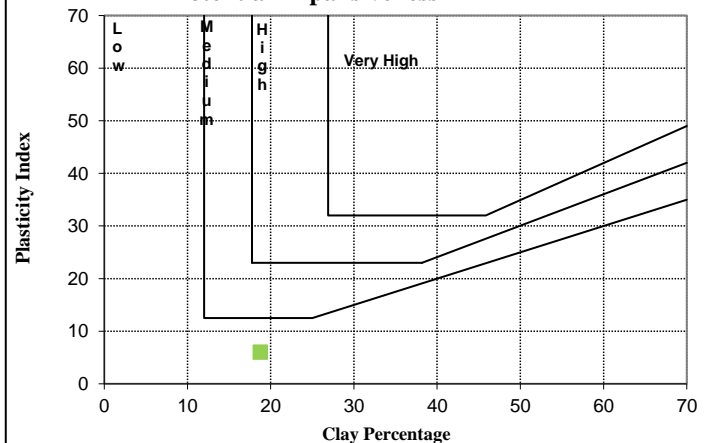
% Clay

19

Plasticity Chart A Line



Potential Expansiveness



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



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Customer : **PeraGage**

Private Bag X5

Century City

7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|-----------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 9 | | |
| Position: | TP20 | Liquid Limit | 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

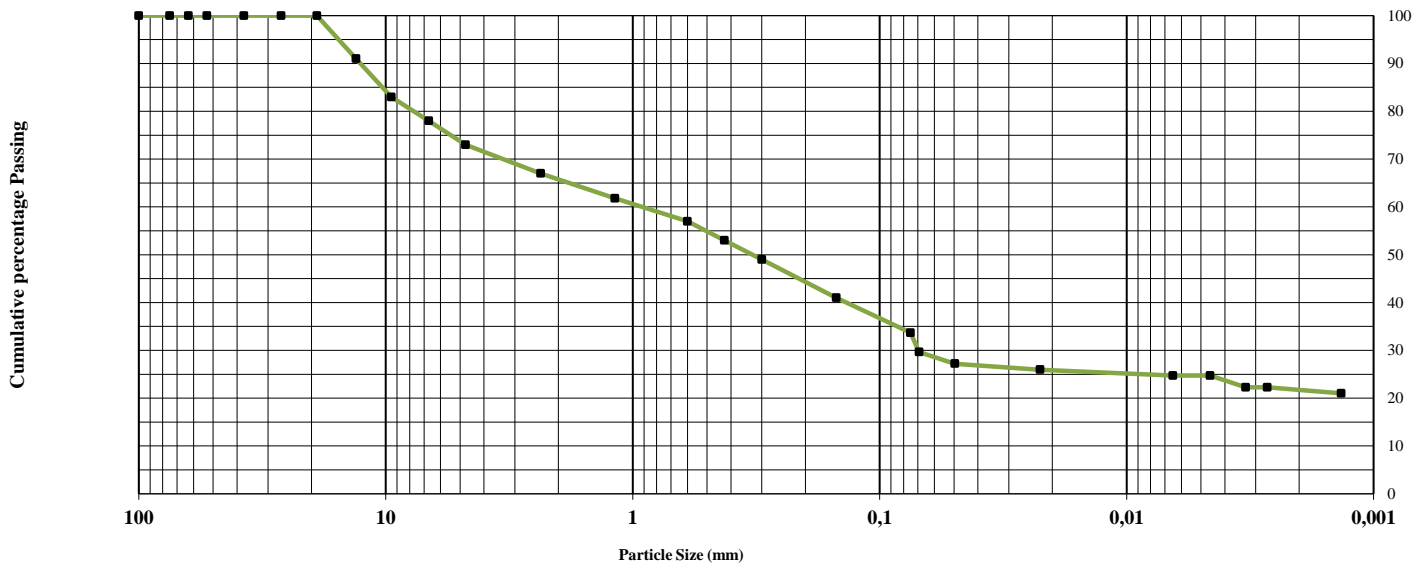
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

27

% Sand

41

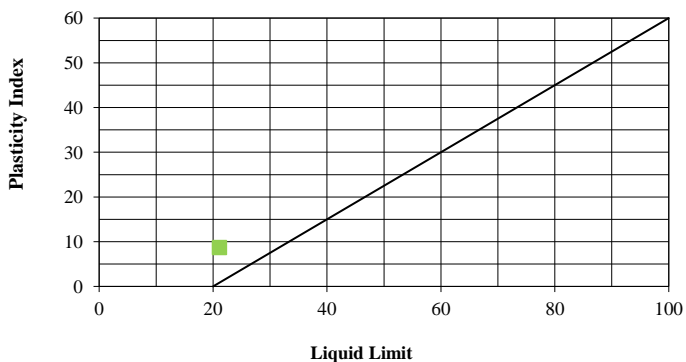
% Silt

10

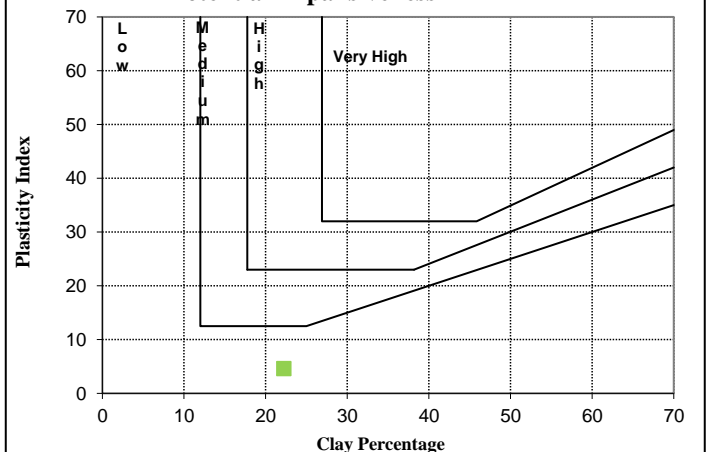
% Clay

22

Plasticity Chart A Line



Potential Expansiveness



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



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7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|------------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 10 | | |
| Position: | TP21 | Liquid Limit | 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

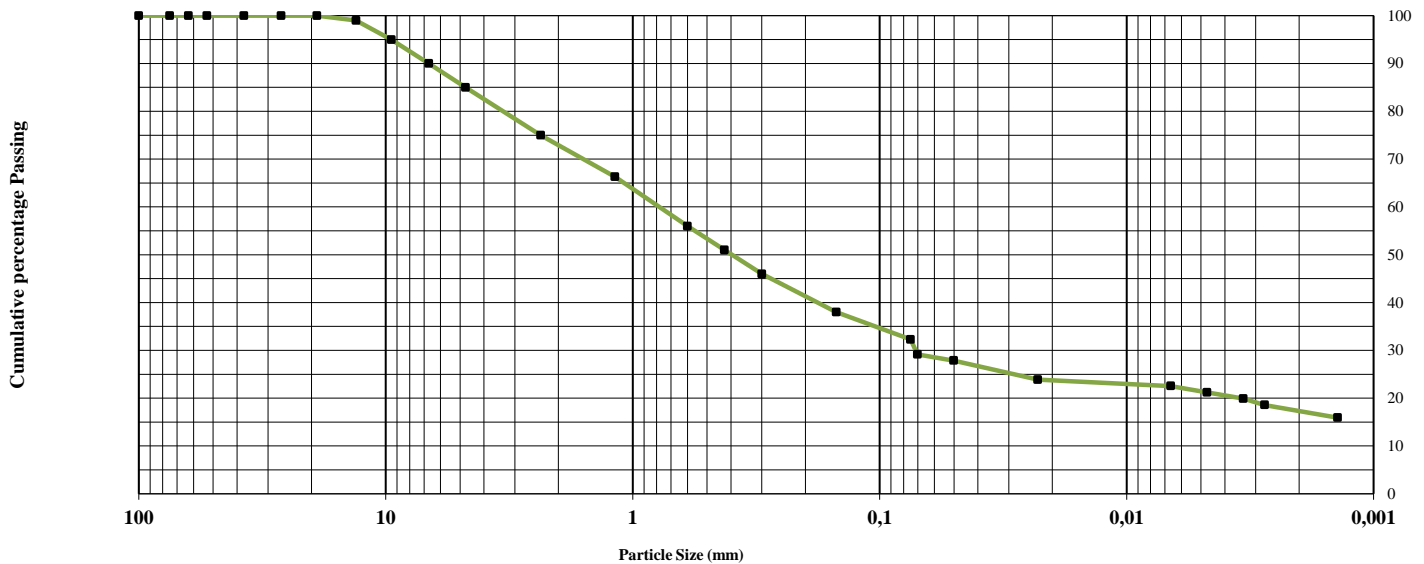
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

15

% Sand

54

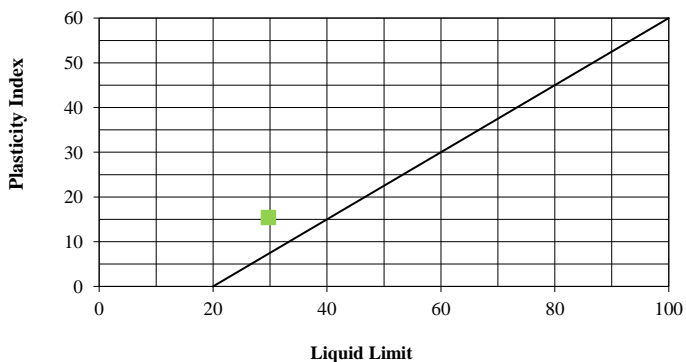
% Silt

12

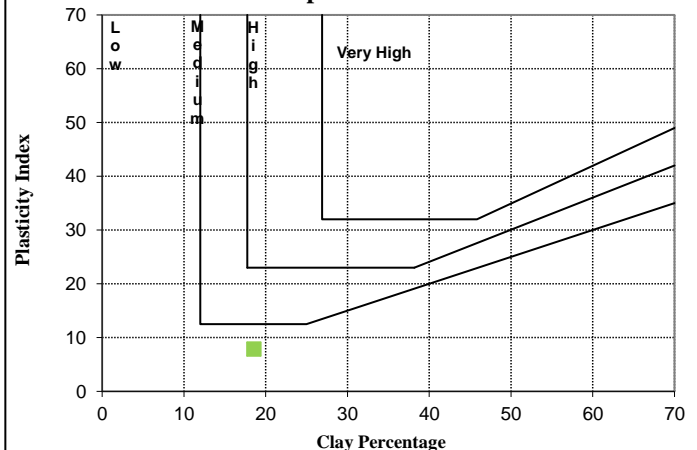
% Clay

19

Plasticity Chart A Line



Potential Expansiveness



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



STEYN-WILSON
LABORATORIES

CIVIL ENGINEERING TESTING LABORATORIES



11 Gooderson Road Blackheath
PO Box 58 Blackheath 7581
Tel: 021 905 0435
Fax: 086 499 9482
Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

Customer : **PeraGage**

Private Bag X5

Century City

7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|------------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 11 | | |
| Position: | TP23 | Liquid Limit | 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

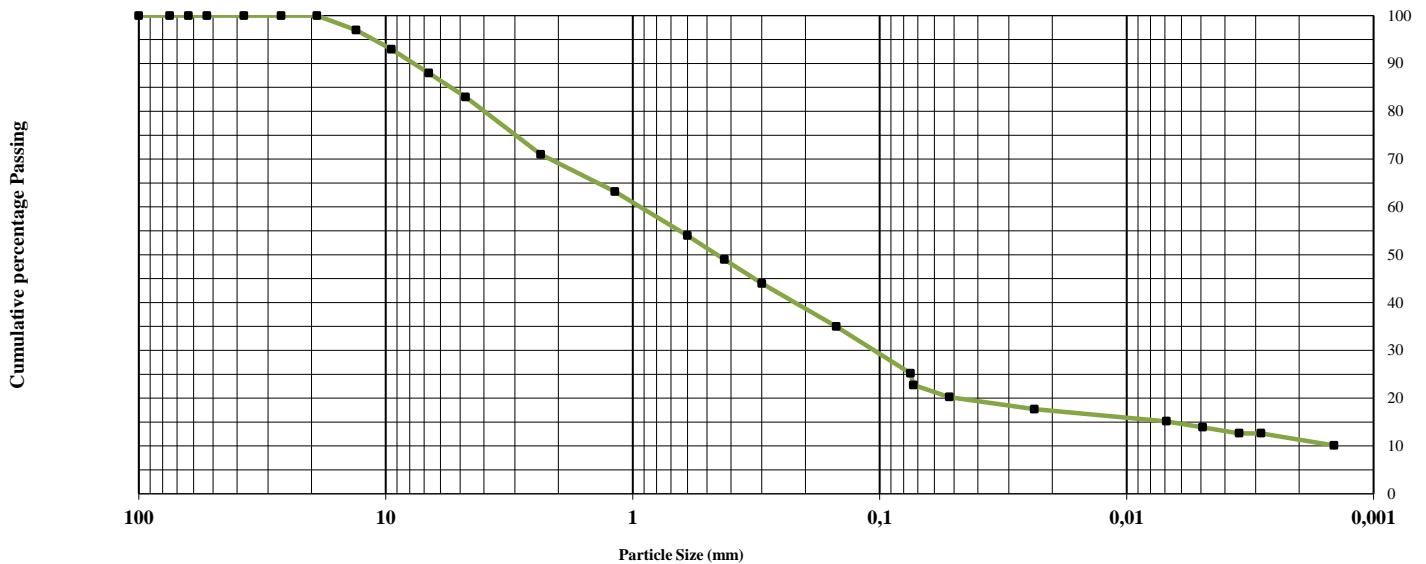
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

17

% Sand

59

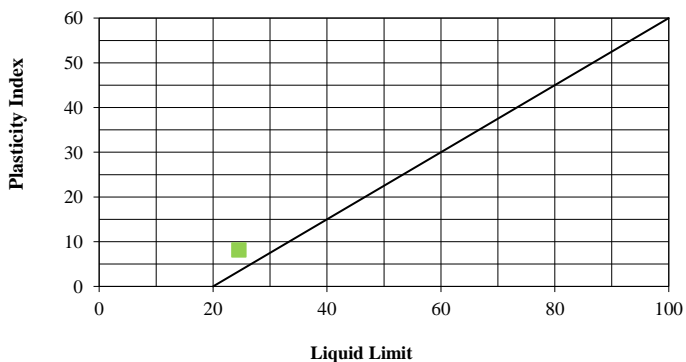
% Silt

12

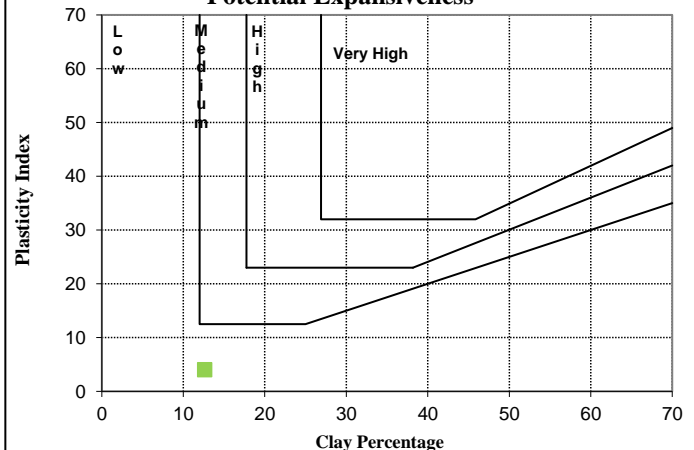
% Clay

13

Plasticity Chart A Line



Potential Expansiveness



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



11 Gooderson Road Blackheath

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Tel: 021 905 0435

Fax: 086 499 9482

Email: info@steynwilson.co.zaWeb: 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.
- 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)



STEYN-WILSON
LABORATORIES

CIVIL ENGINEERING TESTING LABORATORIES



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PO Box 58 Blackheath 7581
Tel: 021 905 0435
Fax: 086 499 9482
Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

Customer : **PeraGage**
Private Bag X5
Century City
7441
Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien
Date Received : 09/06/23
Date Reported : 20/06/23
Req. Number : -
Date Sampled: 09/06/23

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|------------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 12 | | |
| Position: | TP25 | Liquid Limit | 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

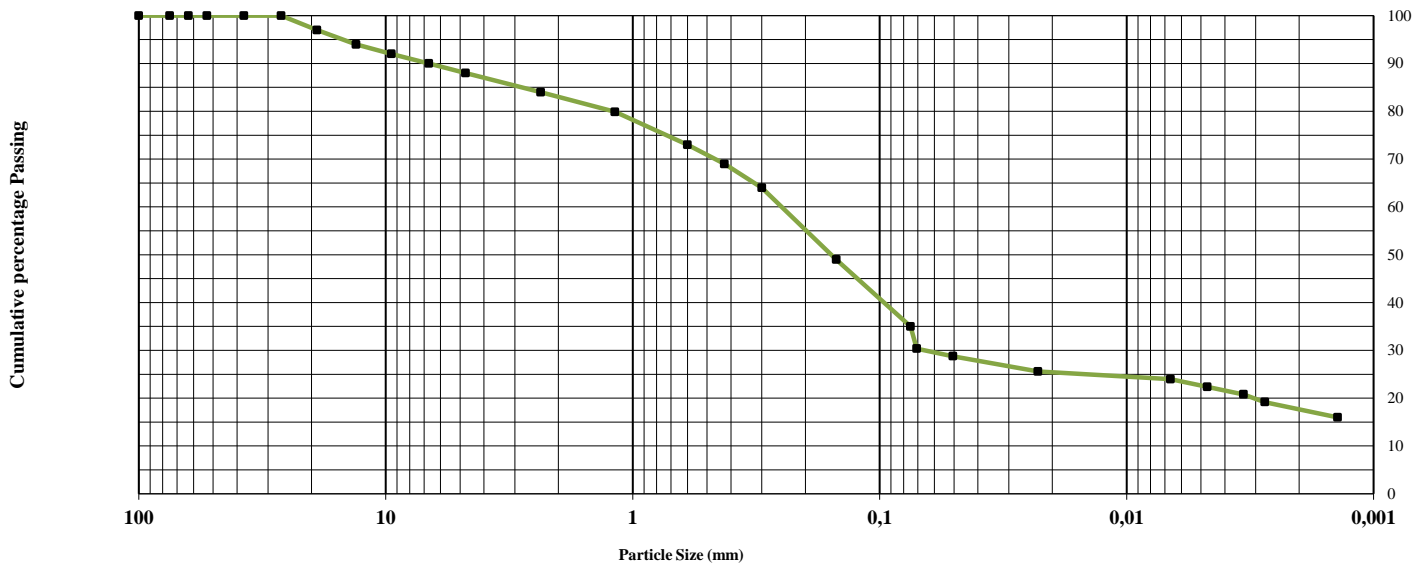
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

12

% Sand

55

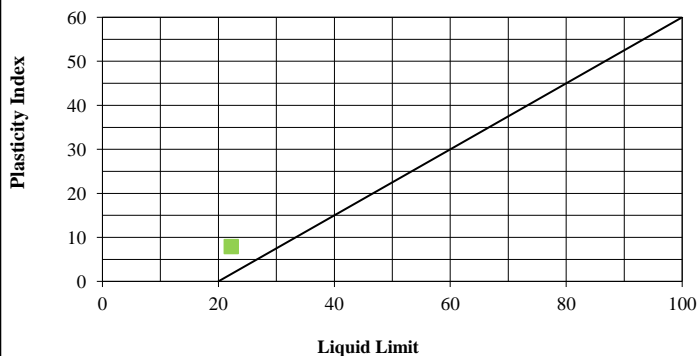
% Silt

14

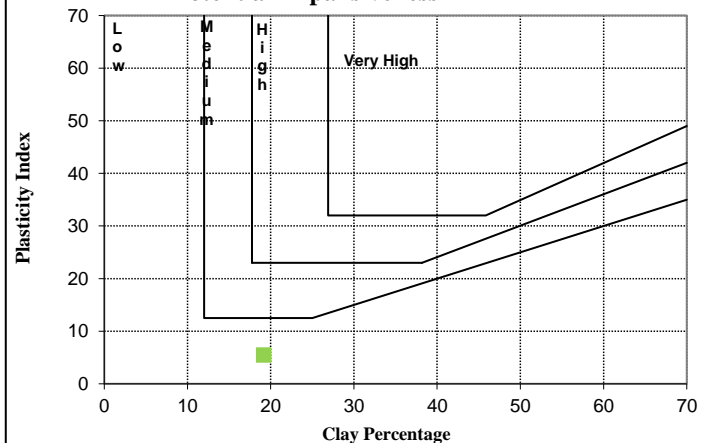
% Clay

19

Plasticity Chart A Line



Potential Expansiveness



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Customer : **PeraGage**

Private Bag X5

Century City

7441

Attention : Steven Bok

Project : 23123G SANSA Matjiesfontien

Date Received : 09/06/23

Date Reported : 20/06/23

Req. Number : -

FOUNDATION INDICATOR ASTM D422

| | | | | | |
|-----------------------|-------------------------------|------------------|------------|------------------|-----|
| Material Description: | Dark Reddish Brown Silty Soil | Sample Number: | 28376 / 13 | | |
| Position: | TP26 | Liquid Limit | 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

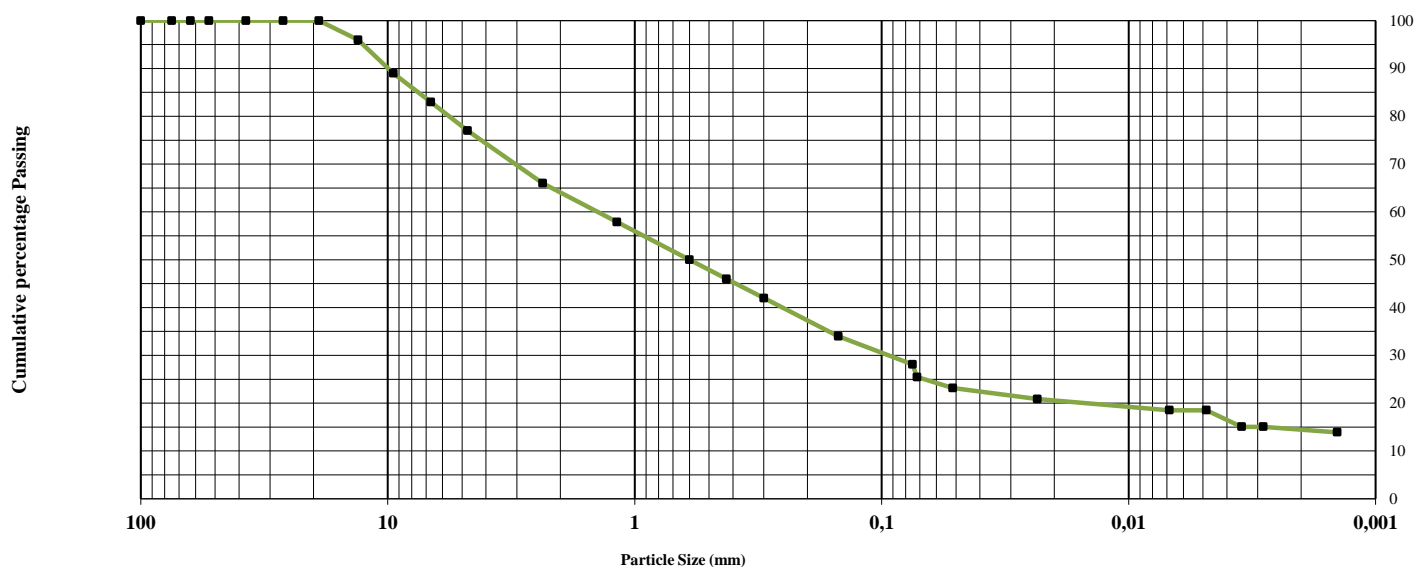
SIEVE ANALYSIS (TMH 1 A1a)*

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

Particle Size Distribution



% Gravel

23

% Sand

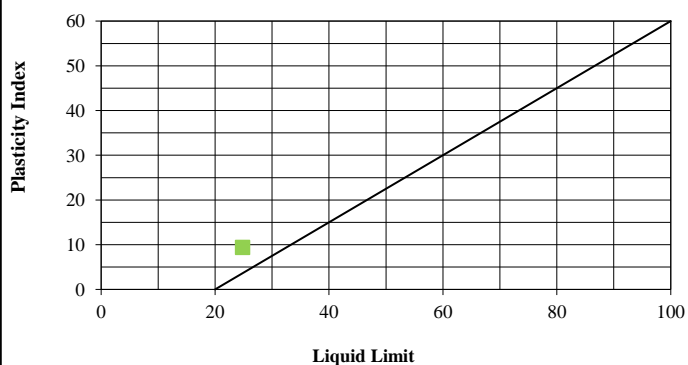
50

% Silt

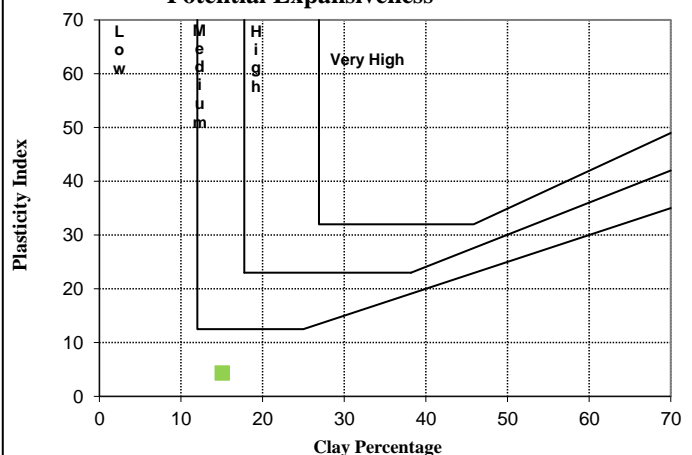
12

% Clay

15

Plasticity Chart
A Line

Potential Expansiveness



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CIVIL ENGINEERING TESTING LABORATORIES



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Email: info@steynwilson.co.za

Web: www.steynwilson.co.za

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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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

CIVIL ENGINEERING TESTING LABORATORIES

| 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 | | 28376 / 3 | | SPEC | | | |
| HOLE No. / SV. / CHAINAGE | | | TP3 | | COTO - G10 | | TP6 | | COTO - G8 | | TP9 | | COTO - G10 | | | |
| ROAD No. OR NAME | | | - | | | | - | | | | - | | | | | |
| LAYER TESTED / SAMPLED FROM | | | 0.20 - 0.40m | | | | 0.20 - 0.55m | | | | 0.00 - 0.40m | | | | | |
| DATE RECEIVED | | | 09/06/23 | | | | 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% | | 0,06 | | < 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 | | % | | | | | | | | | | | |
| 10 % FACT Wet / Dry ratio | | | | | kN | | | | | | | | | | | |
| FLAKINESS INDEX | | | SANS AG4 | | % | | | | | | | | | | | |
| FRACTURED FACES | | | *COTO | | % | | | | | | | | | | | |
| ATTERBERG LIMITS | | | LL% - 0,425mm | | 22 | | - | | 24 | | - | | 28,1 | | - | |
| SANS 3001 GR10, GR12 | | | P.I. - 0,425mm | | 6,9 | | - | | 6,6 | | $\leq (3\alpha GM) + 10$ | | 11,4 | | - | |
| | | | LS% - 0,425mm | | 3,7 | | - | | 3,3 | | - | | 6,5 | | - | |
| | | | P.I. - 0,075mm | | | | | | | | | | | | | |
| | | | GM | | 2,10 | | - | | 2,35 | | $0,75 \geq GM \leq 2,7$ | | 1,80 | | - | |
| SOIL-MORTAR PERCENTAGES | | | Coarse sand | | 12 | | | | 21 | | | | 23 | | | |
| SANS 3001 PR5 | | | 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 | | | OMC | | % | | 7,5 | | | | 8,5 | | | | 6,4 | |
| SANS 3001 GR30 | | | MDD | | (kg/m³) | | 2000 | | | | 2111 | | | | 2165 | |
| APPARENT & BULK DENSITY / WATER ABSORPTION | | | AD | | (kg/m³) | | | | | | | | | | | |
| SANS 3001 AG20/21 | | | BD | | (kg/m³) | | | | | | | | | | | |
| | | | WA | | % | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| C.B.R. | | | COMP MC | | % | | 7,4 | | | | 8,4 | | | | 6,3 | |
| SANS 3001 GR40 | | | SWELL | | % | | 0,0 | | - | | 0,0 | | $\leq 1,5$ | | 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 | | % | | | | | | | | | | | |

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Email: info@steynwilson.co.za

Web: www.steynwilson.co.za

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

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Mr. R. Wilson
Technical Signatory


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



STEYN-WILSON

LABORATORIES

CIVIL ENGINEERING TESTING LABORATORIES



sanas

Testing Laboratory

T0835

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PO Box 58 Blackheath 7581
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Fax: 086 499 9482
Email: info@steynwilson.co.za
Web: www.steynwilson.co.za

JOB NO:SWL28376Your Ref-Date20/06/23

CLIENT:PeraGage
Private Bag X5
Century City
7441

PROJECT:23123G SANSA Matjiesfontein

BALANCE:AC1/0003

OVEN:AB1/0001

AUTO COMPACTOR:AD1/0002

CBR PRESS:AA1/0002

ATTENTION:Steven Bok

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 | | COTO - G10 | | | |
| ROAD No. OR NAME | | - | | | | | |
| LAYER TESTED / SAMPLED FROM | | 0.00 - 1.60m | | | | | |
| DATE RECEIVED | | 09/06/23 | | | | | |
| 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 | SANS AG10 | % | | | | | |
| 10 % FACT | | 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/m³) | 2041 | | | | |
| APPARENT & BULK DENSITY / WATER ABSORPTION SANS 3001 AG20/21 | AD | (kg/m³) | | | | | |
| | BD | (kg/m³) | | | | | |
| | 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) | SANS AG16 | - | | | | | |
| % passing 0,425mm sieve after Test | | % | | | | | |

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

Compiled By: M.Steyn

Approved By: J.Steyn / R. Wilson

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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 | | | | | |

| DCP10 | | | | | |
|--------------|------------|-----------------|------------------|---------------------------------------|---------|
| 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 | | | | |

| DCP11 | | | | | |
|--------------|------------|-----------------|------------------|---------------------------------------|---------|
| 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 | | | | |

| DCP16 | | | | | |
|--------------|------------|-----------------|------------------|---------------------------------------|---------|
| 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 | | | | |

| DCP17 | | | | | |
|--------------|------------|-----------------|------------------|---------------------------------------|---------|
| 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 |