



Andon van der Merwe

297 Delphinus Street
Waterkloof Ridge
Pretoria
Gauteng
South Africa
0181

Email andonvdm@outlook.com
Cell +27 74 132 2037
Fax +27 86 685 8369
Web www.andon.co.za

PROJECT No: A24/2113

11 June 2024

Onno Fortuin Consulting (Pty) Ltd

Attention: Mr. Onno Fortuin

Dear Sir,

REPORT ON A GEOTECHNICAL INVESTIGATION CARRIED FOR PROPOSED NEW MINE DEVELOPMENT AT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

1. INTRODUCTION

This report presents the findings of a geotechnical investigation which was conducted in March 2024 for proposed new mine development at Modikwa South 3 OP mine in Steelpoort, Limpopo Province. The new mine development will entail the following:-

- flood berm,
- infrastructure block,
- open cast area,
- haul road conveyor,
- waste rock dump.

The site is located on vacant land immediately north-west of Pelaneng Township and some 3,6km west north-west of Steelpoort CBD.

The investigation was carried out at the request of Mr. Onno Fortuin from Messrs. Onno Consulting Fortuin Consulting (Pty) Ltd, via email communication prior to the investigation on site.

2. TERMS OF REFERENCE

The objective of the geotechnical investigation was to: -

- Determine the engineering properties of the site soils and bedrock including potentially expansive material, low bearing capacity soils, areas difficult to excavate and shallow ground water conditions.
- Determine the geotechnical parameters of the in situ soils in terms of grading analysis, potential expansiveness, shear strength parameters of the soil and permeability and reusability characteristics of the in situ soils for road and pavement construction.

3. INFORMATION CONSULTED

The following information was available and was consulted: -

- The 1: 250 000 scale Geotechnical Series 2420 Pilgrim's Rest.
- A colour aerial photo of the site with the various new mine development structures which was received from the client in Google Earth format.

4. SITE DESCRIPTION

The site is located in a large drainage area containing numerous small dry drainage canals with dongas and highly eroded areas along the drainage area whilst the Tubatsane River borders the western perimeter of the site. The dongas are usually sparse of vegetation whilst the surroundings contain dense indigenous bush and thorn trees such as Sicklebush. Small to large sub-rounded and rounded hard norite boulders were observed above surface level at the northern part of the Infrastructure Block, which were probably transported from the mountains, located north-west thereof, numerous years ago. Hardpan calcrete outcrops were observed due east of the southern part of the Waste Rock Dump adjacent to one of the dry drainage canals. Internal tracks and footpaths intersect the site in numerous areas. *Hard rock* norite outcrops were also observed in this area.

The terrain is generally undulating and surface runoff takes ultimately place by means of sheetwash in a generally south-eastern direction along the various drainage canals and Tubatsane River.

Dark brown and black highly active colluvial clay is present along the central and western parts of the Waste Rock Dump, north and immediately west of the Waste Rock Dump as well as along the eastern parts (north-eastern and central eastern) of the Open Cast area.

Small hard sub-rounded and rounded norite and anorthosite boulders and outcrops are present within the drainage canals along the south-eastern part of the Infrastructure Block. Hard rock norite outcrops were observed immediately east of the south-eastern corner of the Infrastructure Block.

5. SITE INVESTIGATION

Twenty test pits were excavated across the study area by a 20-ton Volvo excavator supplied by Resources of Africa Investments whilst some of the existing donga excavation faces were profiled at the Flood Berm and Haul Road Conveyor area as no access was possible for the excavator. The test pits were excavated/profiled at the following locations of the site:-

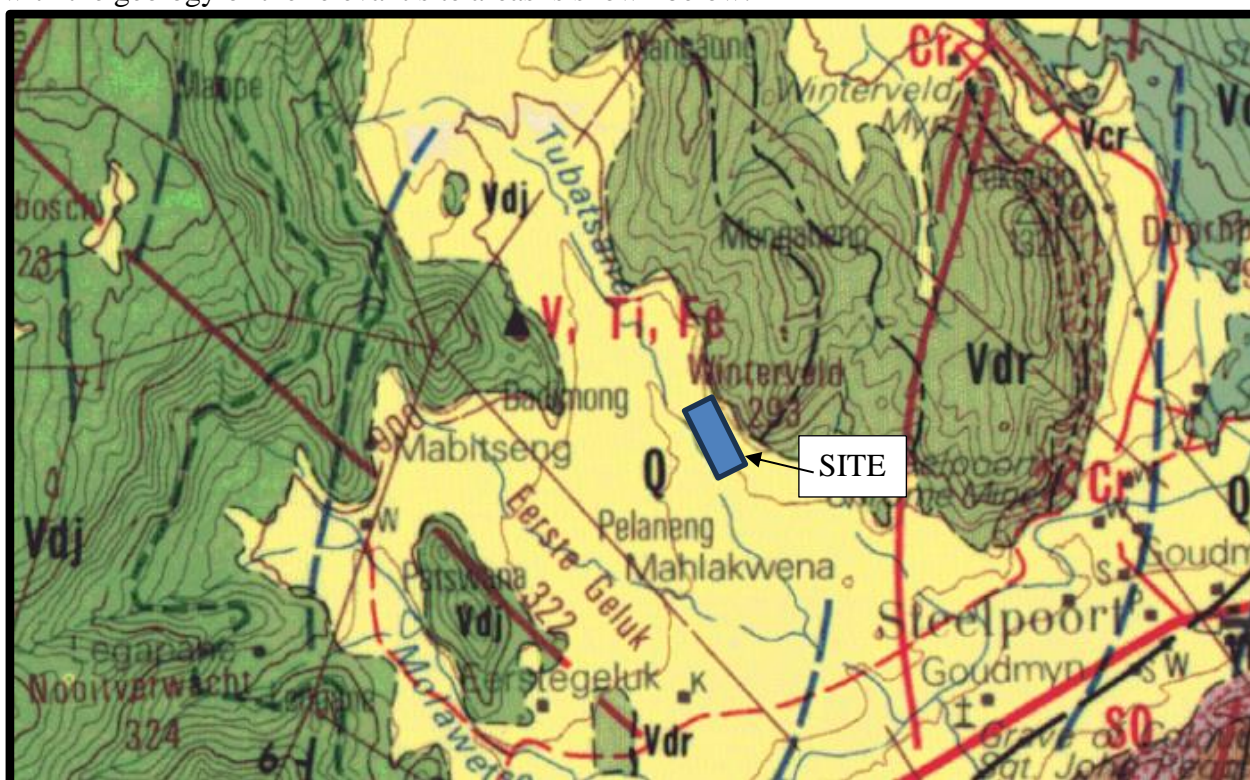
- FB/1 to FB/5 – Flood berm,
- IF/1 to IF/5 – Infrastructure Block,
- OC/1 to OC/3 – Open Cast Area,
- HRC/1 to HRC/4 – Haul Road Conveyor,
- WRD/1 to WRD/3 – Waste Rock Dump.

Some of the test pit locations at the various structures overlapped and therefore test pit information from various areas were used for specific structures. The holes were entered and inspected by the undersigned, a registered professional engineering geologist, who described the soil profile according to the methods advocated by Jennings *et al* (1973). Disturbed soil samples representative of the site soils was taken for analysis and testing at Bakgoni's soils laboratory in Johannesburg during the investigation.

The detailed descriptions of the test pit profiles appear on the Soil Profile Sheets in Appendix 1 of the report whilst a Photographic Record of the test pit profiles and surroundings are contained in Appendix 2. The laboratory soil test results appear in Appendix 3 whilst the location of all exploratory works is shown on the “Site Plan”, Drawing Number A24/2113 at the back of the report.

6. SITE SOILS AND GEOLOGY

The 1:250 000 scale Pilgrim’s Rest 2420 geological map shows that the entire area is underlain by surficial deposits including alluvium and scree of the Quaternary Era. Medium to coarse grained norite and anorthosite of the Dwars River Subsuite, Rustenburg Layered Suite, Bushveld Igneous Complex occurs due east of the site whilst coarse grained norite and anorthosite of the Dsjate Subsuite are present due west. Diabase intrusions are also present in the area as was observed at the Tubatsane River floodplain. An extract of the 1:250 000 scale Regional Geological Map (2420 Pilgrim’s Rest) with the geology of the relevant site areas is shown below.



SITE



Surficial deposit including alluvium and scree of the Quaternary Era.



Medium to coarse grained norite and anorthosite of the Dwars River Subsuite, Rustenburg Layered Suite, Bushveld Igneous Complex.



Coarse grained norite and anorthosite of the Dsjate Subsuite, Rustenburg Layered Suite, Bushveld Igneous Complex.

6.1 Flood Berm Site

Hard rock norite and anorthosite outcrops were observed within the Tubatsane River along the northern part of the Flood berm area. Thin diabase intrusions were also observed along the Tubatsane River bed. The norite and anorthosite bedrock contains vertical joints which are irregular with rough and clean surfaces. The joints follow the direction of flow and strikes south, south-east or south south-east.

Various geotechnical soil conditions were encountered along the lengthy Flood Berm site which ranged from shallow hardpan calcrete to prominent horizons of alluvial soils. The upper alluvial soils contained areas of well cemented alluvium almost tending to a very soft rock consistency, which was underlain by calcareous alluvium in parts. A generalized description of the prominent horizon of alluvial soils across the Flood Berm site is as follows (FB/3): -

- 0,0 – 0,4: *Dry, brown stained grey, very dense, well-cemented medium SAND; alluvium.*
- 0,4 – 1,2: *Slightly moist to dry, brown banded grey, medium dense to dense, relict bedded, poorly cemented medium SAND containing minor sub-rounded GRAVELS; alluvium.*
- 1,2 – 2,0: *Dry, grey blotched white, stiff, sandy SILT containing pockets of powdery CALCRETE and NODULAR CALCRETE; calcareous alluvium.*
- 2,0 – 3,0: *Slightly moist, yellowish brown blotched white, very dense, intact, poorly cemented SAND containing roots; alluvium.*
- 3,0 – 3,7: *Slightly moist, dark greyish brown blotched white, very stiff, slickensided, sandy clayey SILT containing scattered NODULAR CALCRETE; calcareous alluvium.*
- 3,7 – 4,3: *Slightly moist, pale greenish brown, very stiff, sandy SILT containing numerous NODULAR CALCRETE; calcareous alluvium.*

Refusal of the 20-ton excavator was encountered in 40% of the test pits at a depth ranging from 0,9m to 2,0m below surface on either very dense cemented alluvium hardpan calcrete, elsewhere refusal was not encountered to a depth of up to 4,3m below surface. Slight water seepage was encountered in test pit FB/2 from a depth of below 1,4m. This test pit was excavated adjacent to the Tubatsane River.

6.2 Infrastructure Block Site

This site generally contains very dense cemented alluvium and calcareous alluvium which showed relatively shallow refusal of the 20-ton excavator. The south-western part (and perhaps north-western) of this site contained highly active dark brown clayey colluvium overlying very dense sandy colluvium and a generalized description of the typical soil profile that may be encountered across the Infrastructure Block is as follows (IF/4): -

- 0,0 – 0,4: *Slightly moist, dark brown, dense, slightly voided, clayey SAND containing tree roots; colluvium.*
- 0,4 – 1,5: *Slightly moist, dark brown, very stiff, slickensided, sandy silty CLAY containing roots; colluvium.*
- 1,5 – 3,7: *Slightly moist, yellowish brown, very dense, slightly voided, silty SAND containing roots; colluvium.*

Refusal of the 20-ton excavator was encountered in 80% of the test pits at a depth of between 1,0m and 2,2m on very dense calcareous alluvium/alluvium, elsewhere refusal was not encountered to 3,7m depth (IF/4).

Water seepage was not encountered in any of the test pits to a maximum depth of 3,7m below surface.

6.3 Open Cast Site

The test pits of the Open Cast site include OC/1 to OC/3 as well as HRC/2 and HRC/4. The test pit results have shown that the eastern and northern parts of this site are underlain by a thin to moderate horizon of dark brown and black highly active colluvial clay overlying silty and sandy alluvium to considerable depths.

A generalized description of the typical soil profile that may be encountered at the northern part of the Open Cast site is as follows (HRC/2): -

- 0,0 – 0,6: Slightly moist, dark brown, stiff, slickensided and fissured, sandy CLAY containing tree roots; colluvium.
- 0,6 – 1,8: Slightly moist, yellowish brown, dense to very dense, slightly voided, silty SAND containing numerous NODULAR CALCRETE and roots; calcareous alluvium.
- 1,8 – 2,9: Dry, grey mottled white, medium dense, relict layered, SAND; alluvium.
- 2,9 – 4,0: Dry, yellowish brown mottled white and black, very dense, slightly voided, cemented silty SAND; alluvium.

Refusal of the 20-ton excavator was encountered in 60% of the test pits at a depth ranging from 0,7m to 2,1m in very dense alluvium, elsewhere refusal was not encountered to a depth of between 3,0m and 4,0m below surface.

No water seepage was encountered to a maximum depth of 4,0m below surface at the Open Cast site.

6.4 Haul Road Conveyor Site

Various geotechnical conditions are present over the Haul Road Conveyor site, which is blanketed by a thin to prominent horizon of dark brown active clayey colluvium overlying sandy alluvium with varying medium dense to very dense soil consistencies.

A generalized description of the typical soil profile that may be encountered across the site is as follows (HRC/2): -

- 0,0 – 0,6: Slightly moist, dark brown, stiff, slickensided and fissured, sandy CLAY containing tree roots; colluvium.
- 0,6 – 1,8: Slightly moist, yellowish brown, dense to very dense, slightly voided, silty SAND containing numerous NODULAR CALCRETE and roots; calcareous alluvium.
- 1,8 – 2,9: Dry, grey mottled white, medium dense, relict layered, SAND; alluvium.
- 2,9 – 4,0: Dry, yellowish brown mottled white and black, very dense, slightly voided, cemented silty SAND; alluvium.

- Notes:
1. Very dense alluvium occurs at shallow depths in some parts of this site and caused excavator refusal.
 2. The dark brown highly active colluvium was encountered to a depth exceeding 2,2m below surface in test pit HRC/1.

Refusal was not encountered in any of the test pits to a depth of between 2,2m and 4,0m below surface although slow excavation was encountered. No water seepage was encountered to a maximum depth of 4,0m below surface at the Haul Road Conveyor site.

6.5 Waste Rock Dump Site

The test pits for this site include WRD/1 to WRD/3 whilst overlapping test pits of the Haul Road Conveyor (HRC/1) and Infrastructure Block (IF/3) are also applicable to the Waste Rock Dump site. Test pit WRD/3 falls due east of the WRD and was therefore not taken into consideration for the discussion below. The test pit profiles and visual observations of the site have revealed that the extreme eastern part of the WRD is underlain by sandy and silty alluvial and calcareous alluvial materials to a depth of greater than 1,3m and 2,2m below surface. The largest remaining part is blanketed by dark brown highly active clayey colluvium to a depth of greater than 1,5m or 2,2m below surface.

A generalized description of the typical soil profile that may be encountered at the extreme eastern part of the WRD site is as follows (IF/3): -

- 0,0 – 0,5: *Slightly moist, dark brown, loose to medium dense, slightly voided, silty SAND containing tree roots; alluvium.*
- 0,5 – 2,0: *Slightly moist, brown blotched white, stiff to very stiff, slightly voided, sandy clayey SILT containing minor NODULAR CALCRETE; calcareous alluvium.*
- 2,0 – 2,2: *Slightly moist, dark brown, very dense, slightly slickensided, silty clayey SAND; alluvium.*

A generalized description of the typical soil profile that may be encountered at the largest remainder of the WRD site is as follows (HRC/1): -

- 0,0 – 0,5: *Slightly moist, dark brown, stiff, slickensided and fissured, sandy CLAY containing tree roots; colluvium.*
- 0,5 – 2,2: *Slightly moist, dark brown, very stiff, slightly slickensided, sandy silty CLAY containing roots; colluvium.*

Refusal of the 20-ton excavator was encountered in 75% of the test pits at a depth of between 1,3m and 2,2m below surface on very dense/stiff alluvium or colluvium, elsewhere refusal was not encountered to 2,2m depth although excavation became slow (HRC/1). No water seepage was encountered to a maximum depth of 2,2m below surface at the WRD site.

7. GEOTECHNICAL CONSIDERATIONS

7.1 Expansive Soils

The sandy and gravelly site soils tested “low” in the degree of potential expansiveness according to the van der Merwe Method (1964). The silty alluvium tested “low borderline medium” or “medium” whilst the dark brown and black, slickensided clayey colluvium is regarded as “high” in potential expansiveness.

7.2 Collapsible and Compressible Soils

From visual observations of the test pit profiles, it is anticipated that the upper 0,1m to 1,0m of sandy and silty soils may be potentially collapsible and compressible upon load.

A Collapse Potential test was conducted on the dense cemented silty sand alluvium in test pit IF/5 at the Infrastructure Block. The material has a low Collapse Potential of 1,9% and a low to moderate Compressibility Ratio of 3,9%. The rating of the material classifies as “Moderate Trouble” in terms of collapse after Jennings.

7.3 Ground Water and Soil Chemistry

The water table was only encountered in test pit FB/2, adjacent to the Tubatsane River, at a depth of 1,4m below surface. The rest of the test pits were all dry when profiling was done at the end of the wet season.

7.4 Shear Strength Parameters

Disturbed soil samples were collected from various soil horizons at site in order to determine the shear strength parameters of the materials. These samples were remoulded to 93% Proctor density where after consolidated undrained shearbox tests were performed on the material to determine the shear strength parameters under normal stresses of 20, 50 and 150 kPa. A summary of the shear box test results is provided in Table 7.1 below. These parameters should be used by the project engineer for the design of the various structures.

TALE 7.1: SHEAR STRENGTH TEST RESULTS

HOLE NO.	DEPTH (m)	MATERIAL TYPE	NOR-MAL STRESS (kPa)	INITIAL MOISTURE CONTENT AT 150 kPa (%)	INITIAL DRY DENSITY AT 150 kPa (kg/m ³)	VOID RATIO e ₀ AT 150 kPa	REL. DENSITY AT 150 kPa	INITIAL SATURATION AT 150 kPa (%)	COHE-SION (kPa)	ANGLE OF FRICTION (degrees)
WRD/3	0,0 – 1,0	Sand / Gravel	20, 50, 150	20,0	1 584	0,673	2,65	78,6	29	27
IF/4	0,0 – 3,7	Sand / Silt / Clay	20, 50, 150	24,8	1 496	0,771	2,65	85,2	21	20
HRC/4	0,0 – 0,9	Clay / Sand	20, 50, 150	29,7	1 365	0,941	2,65	83,5	18	34

7.5 Permeability of Soils

Disturbed bulk samples were collected of the various soil horizons at site and samples were remoulded to 93% Proctor density for conducting falling head permeability tests. A summary of the permeability and Standard Proctor compaction test results appear in Table 7.2 below: -

TABLE 7.2: SUMMARY OF PERMEABILITY AND PROCTOR COMPACTION TEST RESULTS

HOLE NO	DEPTH (m)	SOIL TYPE	MOISTURE CONTENT (%)	DRY DENSITY (kg/m ³)	MAXIMUM DRY DENSITY (Std. Proctor) (kg/m ³)	OMC (%)	PERMEABILITY (m/sec)
WRD/3	0,0 – 0,1	Sand / Gravel	21,6	1 562	1 697	20,6	2,987 X 10 ⁻⁰⁷
IF/3	0,0 – 2,2	Silty Sand	24,6	1 465	1 572	23,6	4,123 X 10 ⁻⁰⁸
IF/4	0,0 – 3,7	Sand / Silt / Clay	23,8	1 508	1 613	24,4	2,580 X 10 ⁻⁰⁸
HRC/4	0,0 – 1,1	Clay / Sand	29,6	1 367	1 462	30,4	1,16 X 10 ⁻⁰⁶

From the table above it is evident that the site soils to a depth of 3,7m below surface have a coefficient of permeability in the order of 1,16 X 10⁻⁰⁶ to 2,580 X 10⁻⁰⁸ m/s.

Materials which have a coefficient of permeability in the order of 10^{-08} m/s may be considered as a liner in areas required for the proposed new mine development such as the Waste Rock Dump.

7.6 Excavation Characteristics

Soft excavation by a 20-ton excavator was possible at the following locations:-

- flood berm: 0,9m to >4,3m,
- infrastructure block: 1,0m to >3,7m,
- open cast area: 1,3m to >4,0m,
- haul road conveyor: 1,3m to >4,0m,
- waste rock dump: 1,3m to >2,2m.

Very hard excavation by a large excavator combined with hydraulic pecking and ripping is foreseen in the areas underlain by *very dense* cemented alluvium or *very stiff* clayey colluvium or hardpan ferricrete. Blasting is foreseen in the areas underlain by *hard rock* norite, anorthosite or perhaps hardpan calcrete which is very well cemented and contain a *very soft* to *hard rock* consistency.

The sidewalls of all test pit excavations were stable during the investigation. Excavations for Flood Berm construction in close proximity of the Tubatsane River may have unstable sidewall conditions due to the possible presence of ground water seepage.

7.7 Earth Works

The site soils to a depth of 4,0m below surface were tested to determine their Mod AASHTO compaction characteristics for use in construction and a summary of the test results appears below in Table 7.3: -

TABLE 7.3: SUMMARY OF MOD AASHTO COMPACTION TESTS

HOLE NO	DEPTH (m)	SOIL TYPE	PI	GM	CBR @95%	COLTO CLASSIFICATION	SWELL (%)
OC/1	1,0 – 2,7	Sandy SILT	16	1,40	7	<G9	0,3
FB/2	0,0 – 2,0	SAND	7	1,84	9	G9	0,0
FB/3	1,2 – 4,3	Sand / Silt	18	1,66	4	<G9	0,4
WRD/3	0,0 – 1,0	Sand / Gravel	16	1,74	6	<G9	0,4
IF/3	0,0 – 2,2	Silt / Sand	20	1,59	7	<G9	0,0
IF/4	0,0 – 3,7	Sand / Clay	22	1,29	9	<G9	0,4
HRC/2	0,0- 4,0	Sand / Clay	20	1,47	10	<G9	0,3
HRC/4	0,0 – 0,9	Sand / Clay	20	1,47	5	<G9	1,0

Note : PI = Plasticity Index
 GM = Grading Modulus
 CBR = California Bearing Ration at 95% Mod AASHTO compaction

Based on the results of the compaction tests, the site soils exhibit very poor compaction characteristics and tested as <G9 (poorer than G9) according to the COLTO Classification whilst only the sample from FB/2 (sandy material) tested as G9 material. According to the TRH14 Classification system, the materials tested as G10 mostly and may therefore only be used as bulk fill or subgrade layers for roads construction.

Cognizance should be taken in the design of roads and paved areas of the potentially collapsible, compressible and expansive nature of the upper sandy site soils.

7.8 Recommendations and Conclusions

7.8.1 General

- The sandy and gravelly site soils tested “low” in the degree of potential expansiveness according to the van der Merwe Method (1964). The silty alluvium tested “low borderline medium” or “medium” whilst the dark brown and black, slickensided clayey colluvium is regarded as “high” in potential expansiveness.
- From visual observations of the test pit profiles, it is anticipated that the upper 0,1m to 1,0m of sandy and silty soils may be potentially collapsible and compressible upon load.
- The site soils tested poorer than G9 quality materials whilst only one sample tested as G9 (according to COLTO) and therefore the site soils showed poor compaction characteristics. The materials (G10 according to TRH14) may be used as subgrade and bulk fill in road construction.
- Soft excavation by a 20-ton excavator was possible to depths of between 0,7m and >4,3m below surface. Very difficult excavation by a large excavator combined with heavy dozer ripping, hydraulic pecking and blasting (soft to hard rock conditions) will be required below the refusal depths of the excavator.
- The test pits over the entire investigated area showed stable sidewalls although slight instabilities of sidewalls may occur along the Flood Berm site where possible water seepage may be expected within the foundation trenches.
- Proper drainage should be implemented at the entire site and ponding near foundations must not be permitted.

7.8.2 Flood Berm

- Very dense/dense or stiff soil conditions are present from surficial depths of between 0,6m and 1,8m below surface along the Flood Berm site.
- Therefore, the upper potentially collapsible and compressible horizons (say upper 0,6m to 1,8m) should be removed until the dense/very dense or stiff soil conditions have been encountered.
- The Flood Berm may then be constructed by using good quality granular materials which must comply with the specifications of the engineer sourced. These materials should be durable and able to withstand erosion.
- Water seepage challenges may be present along foundation excavations and therefore dewatering measures will have to be in place.

7.8.3 Infrastructure Block

- Very dense/dense or very stiff soil conditions are present from near surface locations to a surficial depth of 0,5m below surface along the Infrastructure Block.
- The dark brown/black **potentially highly active** clayey colluvium covers large parts of this site to a depth of >1,5m or >2,2m below surface. Most or all of the dark brown/black colluvial clay will have to be removed from below foundations as well as slightly beyond the footprint area of the new Infrastructure Block.
- Soil Raft construction with Pad footings or conventional foundations are proposed for the Infrastructure Block as a preliminary solution. The soil raft should be constructed with imported G5 material well compacted in layers of say 150mm.
- It is however recommended that additional test pits be done along the western part of the Infrastructure Block in order to verify soil conditions and to determine the thickness of the dark brown/black colluvial material.
- The allowable bearing capacity of the very dense/dense or very stiff foundation soils at depths discussed above should be limited to say 150kPa (dense) to 200 kPa (very dense/very stiff).

7.8.4 Haul Road Conveyor Site

- Very dense/dense or very stiff soil conditions are present from surficial depths of between 0,5m and 0,9m below surface along the Haul Road Conveyor Site.
- The dark brown/black **potentially highly active** clayey colluvium covers the entire site to a depth of 0,5m to 2,2m (or deeper) below surface. Most or all of the dark brown/black colluvial clay will have to be removed from below the foundations as well as slightly beyond the footprint area of the foundations.
- Pad footings are proposed for the Infrastructure Block as a preliminary solution and may be founded onto the dense to very dense sandy alluvium at depths ranging from generally 0,6m to 1,8m. Over excavation and backfilling of G5/G6 materials are recommended for foundation preparation where the dark brown/black colluvial clay are too thick, such as HRC/1.
- The allowable bearing capacity of the dense to very dense/stiff foundation soils at depths discussed above should be limited to say 150kPa (dense) to 200 kPa (very dense/very stiff).

7.8.5 Waste Rock Dump Site

- From visual observations of the test pit profiles, it is anticipated that the upper 0,1m to 0,5m of in situ soils may be potentially collapsible and compressible upon load. Therefore, these materials as well as all organic materials should be removed over the footprint of the WRD and the base of the excavation should be in situ densified according to the engineer's specification.
- The materials tested at site tested to have a coefficient of permeability (k -value) of 10^{-8} m/s may be considered for liner underneath the WRD.

8. GENERAL

While every effort has been made to ensure that representative test pitting and sampling have been undertaken to probe the soils on-site, guaranteeing that isolated zones of either poor foundation material or hard rock excavation have not been identified, is impossible under the constraints of an investigation of this nature.

The investigation has sought to highlight general areas of potential foundation and excavation problems, and to provide early warning to the design engineer for the proposed new mine development at Modikwa South 3 OP near Steelpoort.

It is recommended that foundation excavations for proposed structures be inspected by a competent person during construction in order to verify that the materials thus exposed are not at variance with those described in the report. The placement of the fill must be controlled with suitable field tests to confirm that the required densities are achieved during compaction and that the quality of fill material is within specification.

Trusting that the above information will meet with your immediate requirements, please do not hesitate to contact this office, should additional information be required.

Yours faithfully



ANDON VAN DER MERWE (Pr. Sci. Nat.)
Engineering Geologist

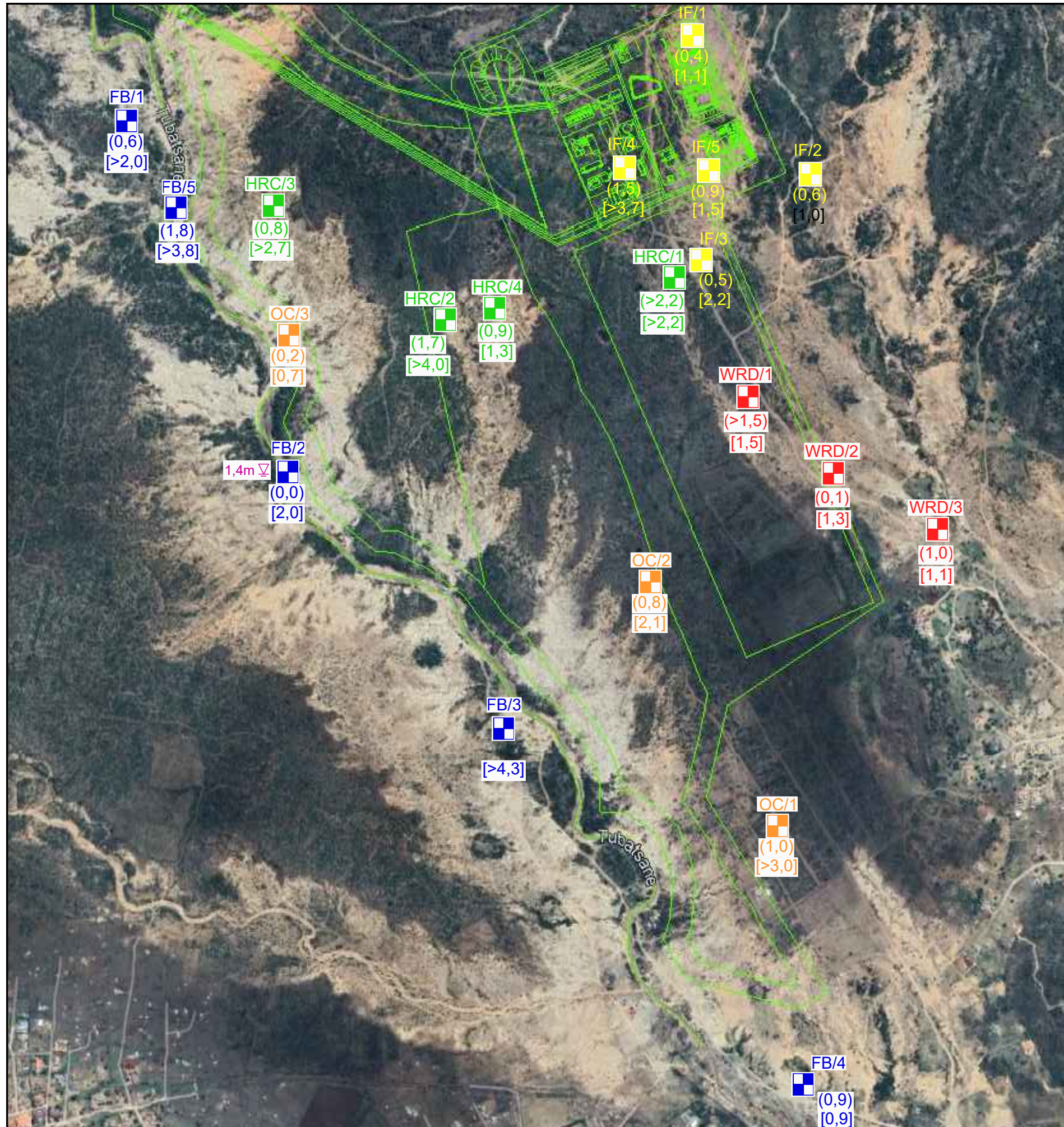
9. APPENDICES

Site Plan – Drawing Nu. A24/2113

Appendix 1: Test Pit Profiles

Appendix 2: Photographic Record

Appendix 3: Laboratory Soil Test Results



LEGEND:

FB/1
 TEST PIT BY 22 TON EXCAVATOR, POSITION AND NUMBER SHOWING.

(0,6)
 THICKNESS OF POTENTIALLY COLLAPSIBLE, COMPRESSIBLE AND / OR EXPANSIVE HORIZON HORIZON IN METERS BELOW SURFACE.

[>2,0]
 REFUSAL DEPTH OF 22 TON EXCAVATOR IN METERS BELOW SURFACE.

1,4m WATER SEEPAGE AT 1,4m

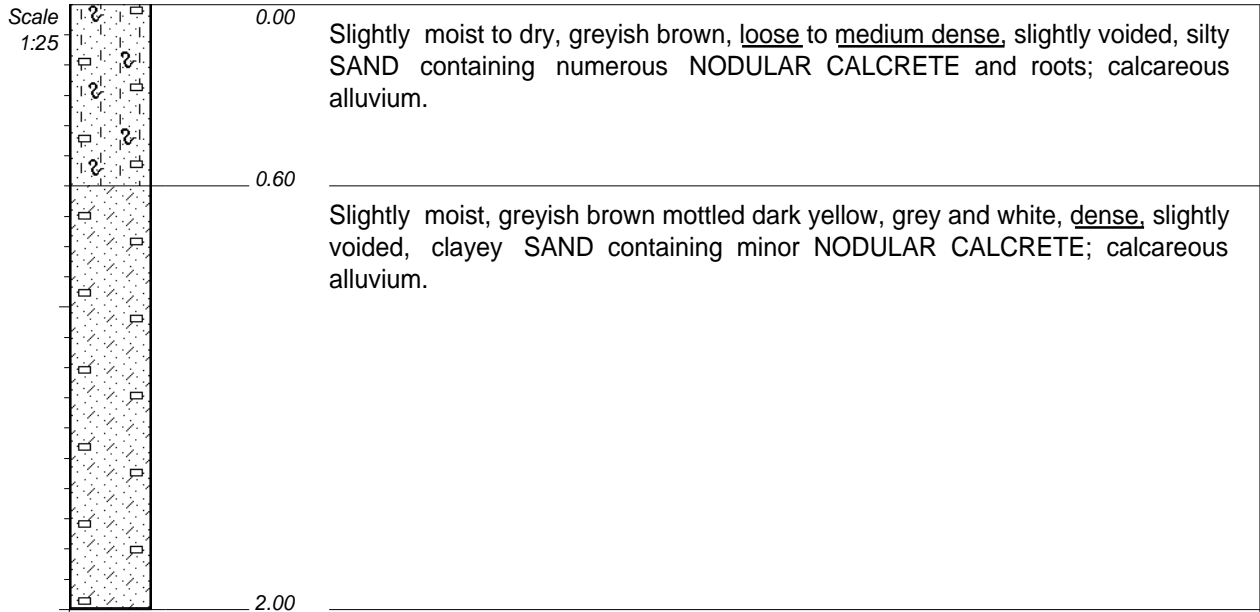
ANDON VAN DER MERWE CONSULTING ENGINEERING GEOLOGIST	
POSBUS 95562 WATERKLOOF 0145 PO. BOX 95562 WATERKLOOF 0145	TEL: 074 132 2037 EPOS / EMAIL : andonvdm@outlook.com
TITEL / TITLE SITE PLAN	TEK. NO. / DRG. NO. A24/2113
LIGGING / LOCALITY MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE	DATUM / DATE APRIL 2024
KLIENT / CLIENT Onno Fortuin Consulting (Pty) Ltd	SKAAL / SCALE ~ 1 : 10 000 ON A3



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: FB/1
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Test pit profiled from a donga.
- 2) No water seepage encountered.
- 3) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments *INCLINATION : Vertical*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 42 50.1

Y-COORD : E30 09 05.1

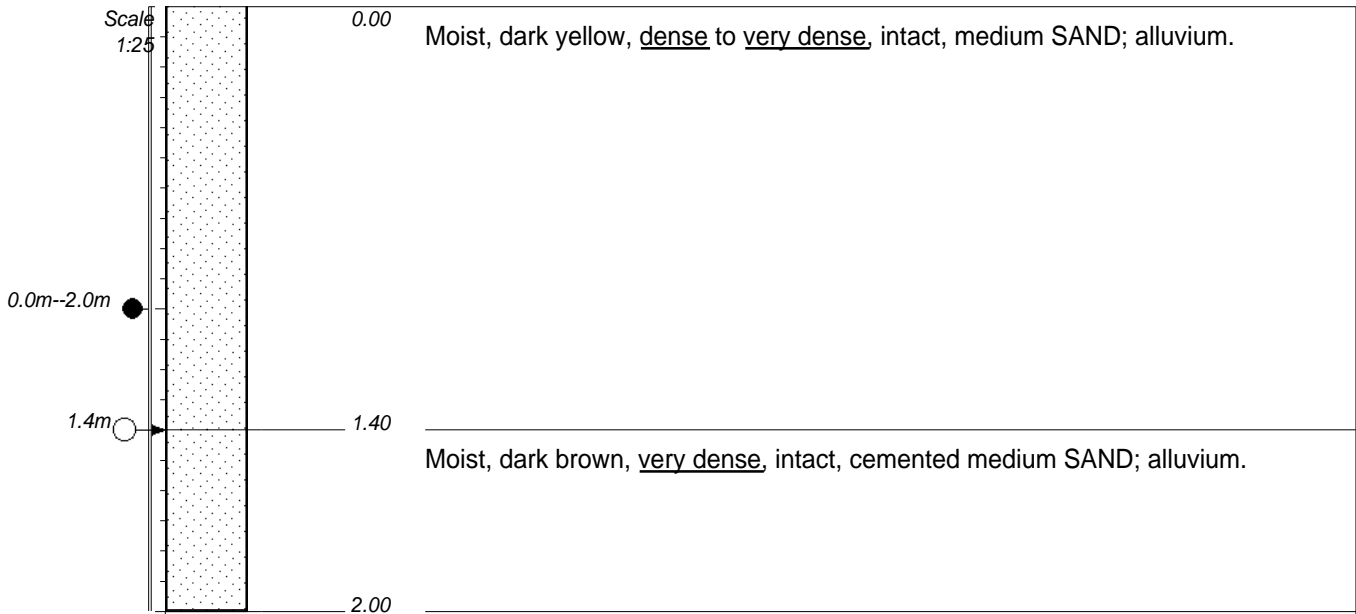
HOLE No: FB/1



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: FB/2
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 2,0m in very dense alluvium.
- 2) Slight water seepage encountered from below 1,4m.
- 3) Disturbed bulk sample taken from 0,0m--2,0m.
- 4) Test pit has stable sidewalls.
- 5) Test pit excavated in the Tubatswe river.
- 6) Hard rock norite bedrock areas 50m downstream of the test pit and 150m upstream. Joint surfaces are rough, closely to medium jointed, vertically orientated and clean.

CONTRACTOR : Resources of Africa Investments	INCLINATION :	ELEVATION :
MACHINE : 20-ton Volvo Excavator	DIAM : Trench	X-COORD : S24 43 17.0
DRILLED BY :	DATE :	Y-COORD : E30 09 18.5
PROFILED BY : avdm	DATE : 25/03/2024	
TYPE SET BY : avdm	DATE : 27/05/2024 06:35	
SETUP FILE : STANDARD.SET	TEXT : ..th3OPTestPitProfiles.txt	

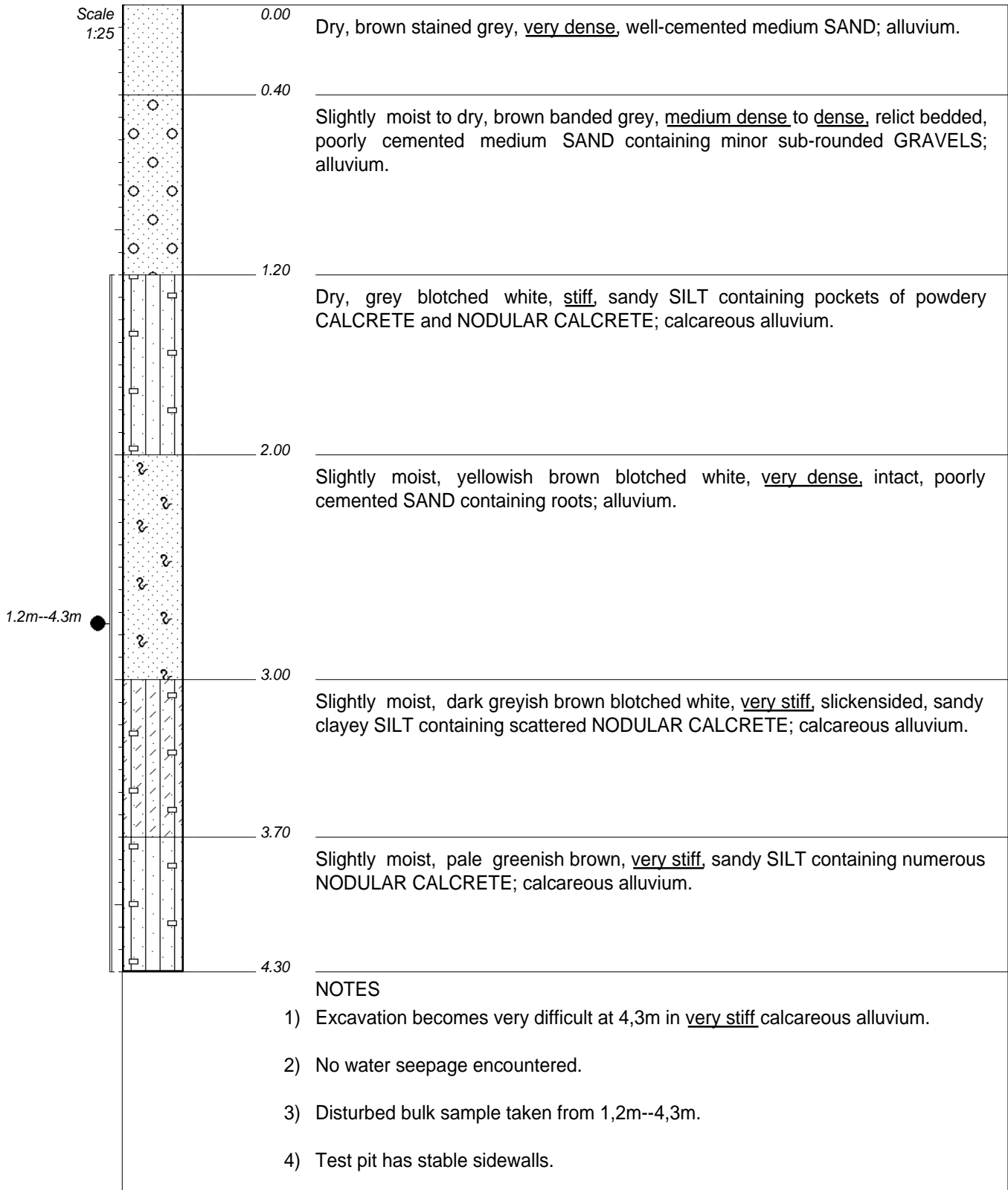
HOLE No: FB/2



Onno Fortuin Consulting (Pty) Ltd
 Modikwa South 3 OP, Steelpoort, Gauteng Province
 GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: FB/3
 Sheet 1 of 1

JOB NUMBER: A24/2113



CONTRACTOR : Resources of Africa Investments
 MACHINE : 20-ton Volvo Excavator
 DRILLED BY :
 PROFILED BY : avdm
 TYPE SET BY : avdm
 SETUP FILE : STANDARD.SET

INCLINATION :
 DIAM : Trench
 DATE :
 DATE : 25/03/2024
 DATE : 27/05/2024 06:35
 TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :
 X-COORD : S24 43 36.5
 Y-COORD : E30 09 36.6

HOLE No: FB/3

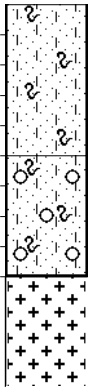


Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: FB/4
Sheet 1 of 1

JOB NUMBER: A24/2113

Scale
1:25



0.00 Slightly moist, brown becoming greenish brown, loose, silty SAND containing roots and scattered GRAVELS; alluvium.

0.50 Slightly moist, dark brown, medium dense, slightly voided, silty SAND containing minor GRAVELS and COBBLES and roots; alluvium.

0.90 White mottled brown, slightly weathered, closely jointed, medium hard rock NORITE containing HARDPAN CALCRETE pockets.

NOTES

- 1) Abrupt refusal at 0,9m on medium hard rock norite.
- 2) No water seepage encountered.
- 3) Test pit has stable sidewalls.
- 4) Test pit excavated in close proximity of a drainage canal.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 44 03.6

Y-COORD : E30 10 01.7

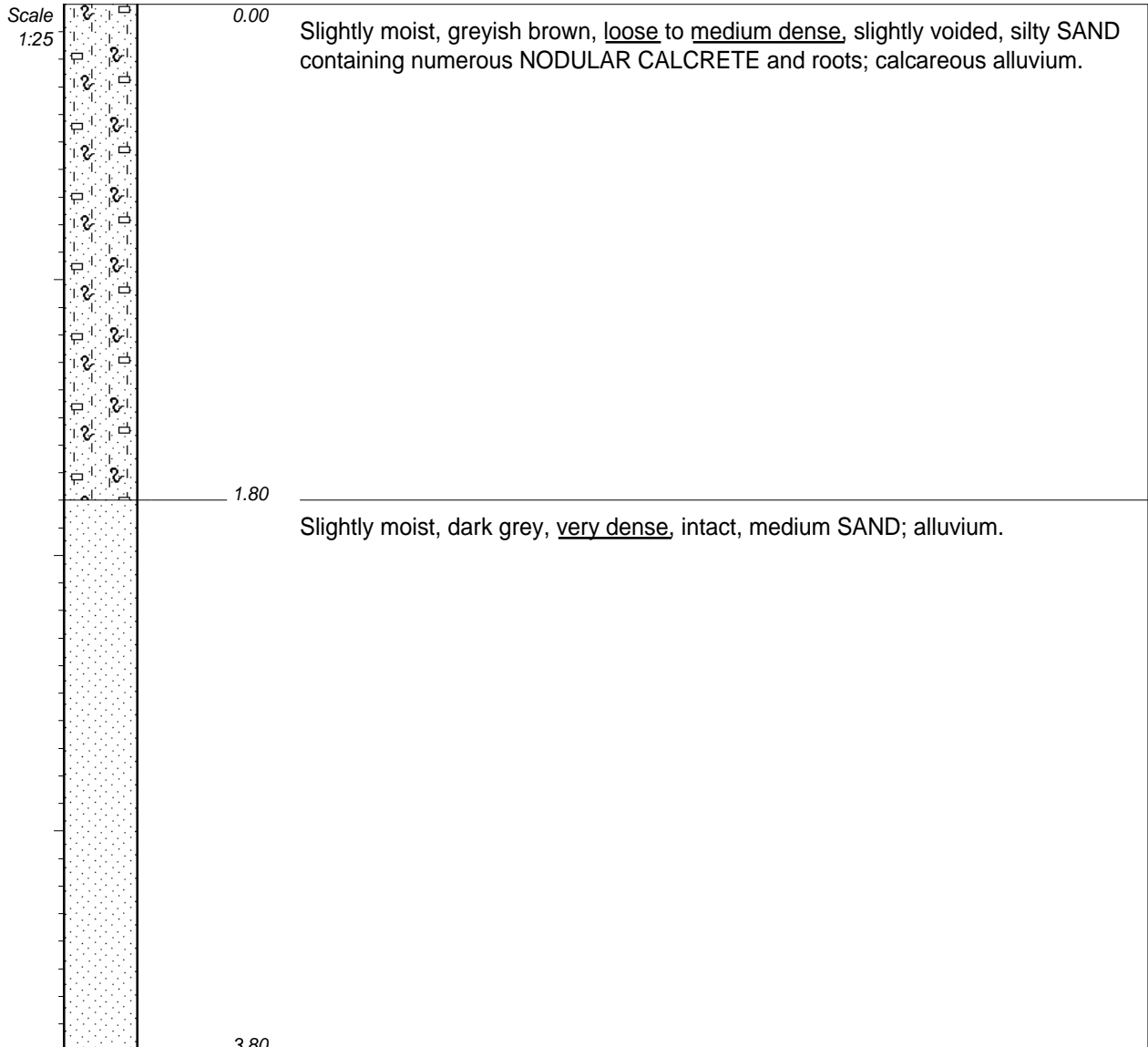
HOLE No: FB/4



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: FB/5
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Test pit profiled from a donga.
- 2) No water seepage encountered.

CONTRACTOR : Resources of Africa Investments	INCLINATION :	ELEVATION :
MACHINE : 20-ton Volvo Excavator	DIAM : Trench	X-COORD : S24 42 56.7
DRILLED BY :	DATE :	Y-COORD : E30 09 09.3
PROFILED BY : avdm	DATE : 25/03/2024	
TYPE SET BY : avdm	DATE : 27/05/2024 06:35	
SETUP FILE : STANDARD.SET	TEXT : ..th3OPTestPitProfiles.txt	

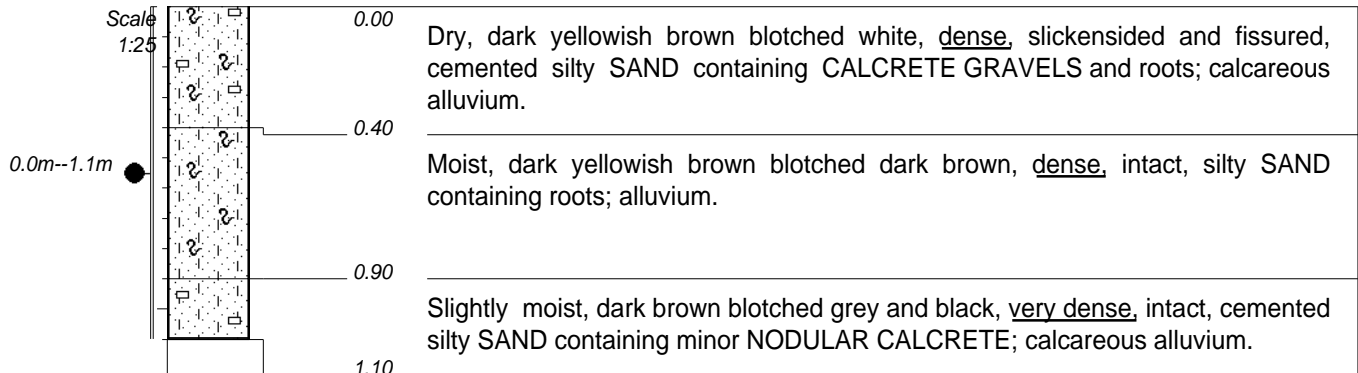
HOLE No: FB/5



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: IF/1
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 1,1m in very dense calcareous alluvium.
- 2) No water seepage encountered.
- 3) Disturbed foundation indicator sample taken from 0,0m--1,1m.
- 4) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments **INCLINATION :**
MACHINE : 20-ton Volvo Excavator **DIAM :** Trench **ELEVATION :**
DRILLED BY : **DATE :** **X-COORD :** S24 42 43.7
PROFILED BY : avdm **DATE :** 25/03/2024 **Y-COORD :** E30 09 52.6
TYPE SET BY : avdm **DATE :** 27/05/2024 06:35
SETUP FILE : STANDARD.SET **TEXT :** ..th3OPTestPitProfiles.txt

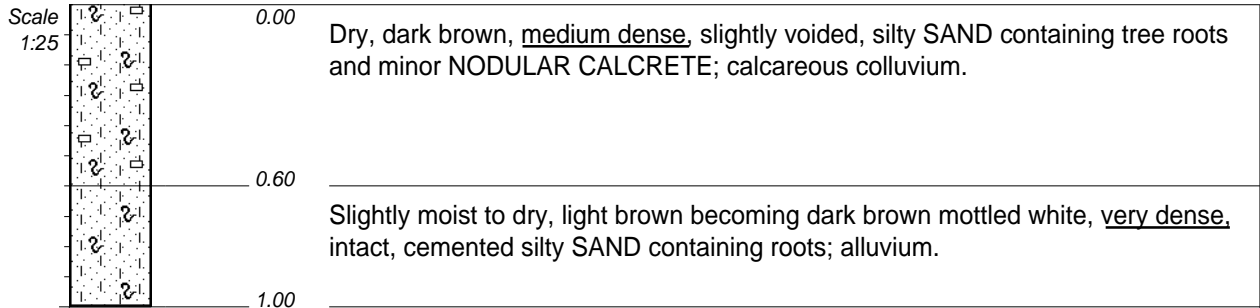
HOLE No: IF/1



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: IF/2
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 1,0m in very dense alluvium.
- 2) No water seepage encountered.
- 3) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 42 54.2

Y-COORD : E30 10 02.4

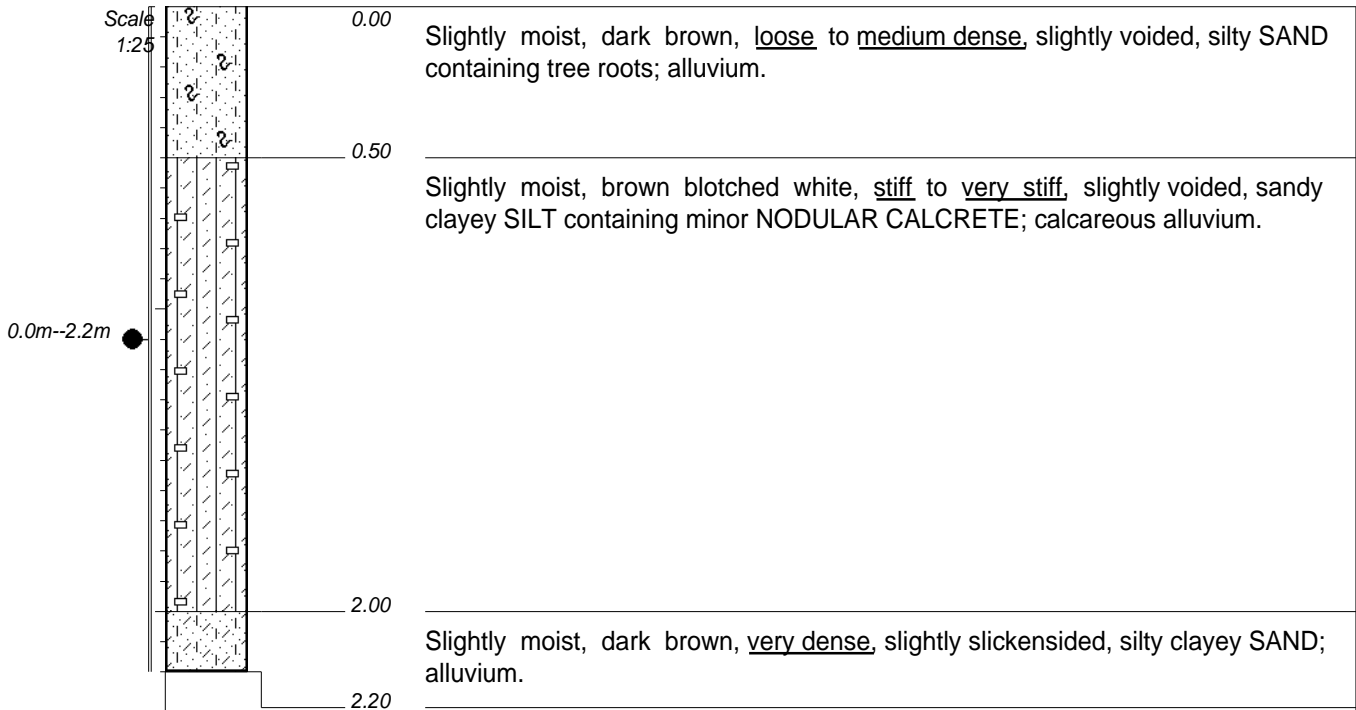
HOLE No: IF/2



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: IF/3
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 2,2m in very dense alluvium.
- 2) No water seepage encountered.
- 3) Disturbed bulk sample (3 bags) taken from 0,0m--2,2m.
- 4) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 00.8

Y-COORD : E30 09 53.2

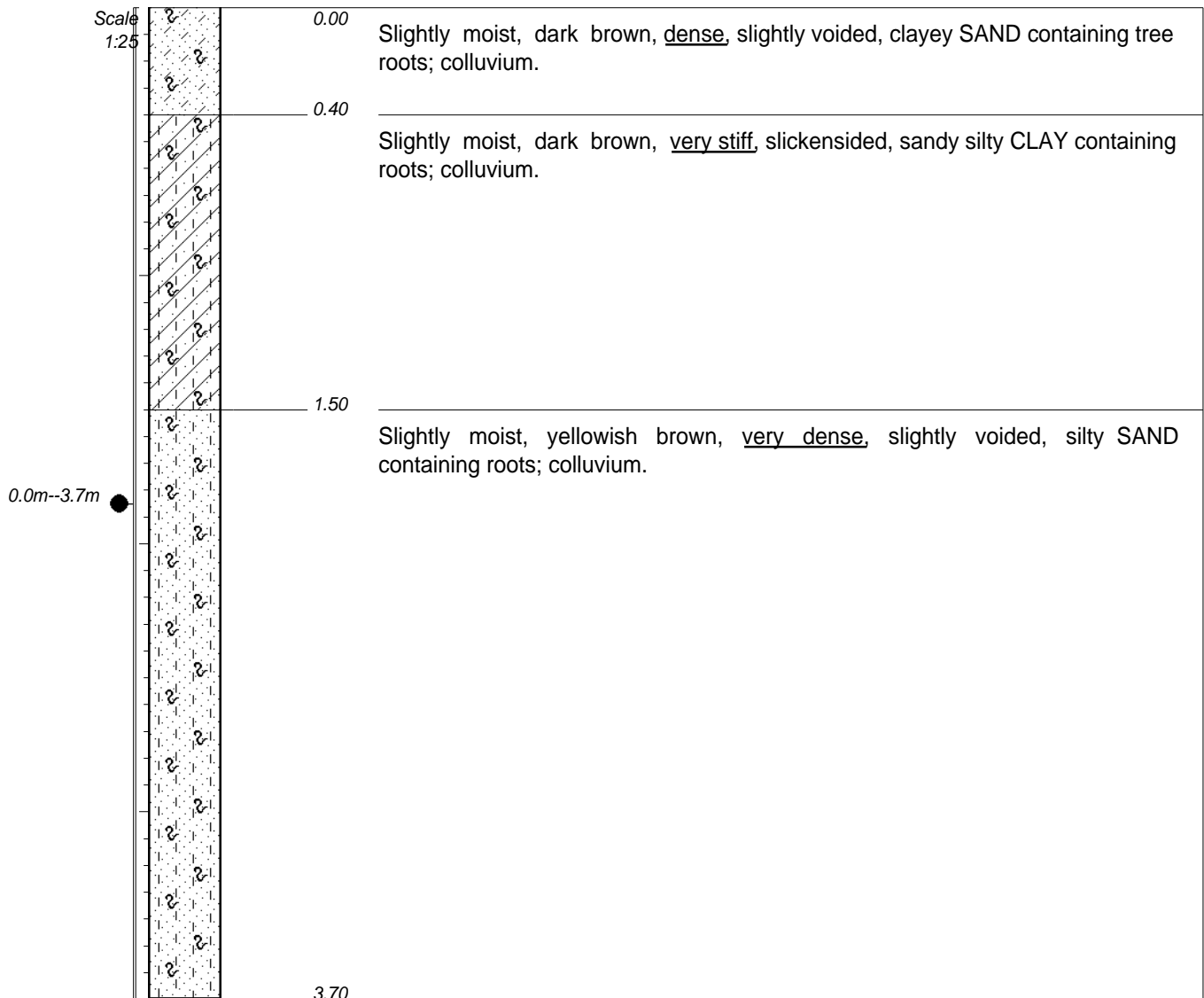
HOLE No: IF/3



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: IF/4
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) No refusal at 3,7m.
- 2) No water seepage encountered.
- 3) Disturbed bulk sample (3 bags) taken from 0,0m--3,7m.
- 4) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 42 53.7

Y-COORD : E30 09 46.9

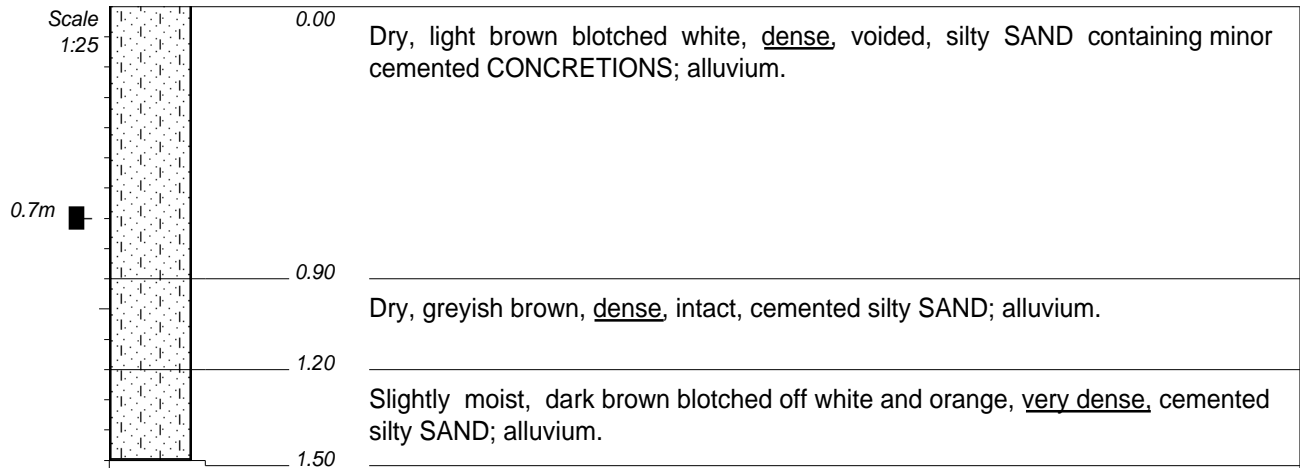
HOLE No: IF/4



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: IF/5
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 1,5m in very dense alluvium.
- 2) No water seepage encountered.
- 3) Test pit has stable sidewalls.
- 4) Undisturbed sample taken at 0,7m.
- 5) Test pit profiled and excavated in a drainage canal.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*
MACHINE : 20-ton Volvo Excavator *DIAM :* Trench *ELEVATION :*
DRILLED BY : *DATE :* *X-COORD :* S24 42 54.0
PROFILED BY : avdm *DATE :* 25/03/2024 *Y-COORD :* E30 09 53.8
TYPE SET BY : avdm *DATE :* 27/05/2024 06:35
SETUP FILE : STANDARD.SET *TEXT :* ..th3OPTestPitProfiles.txt

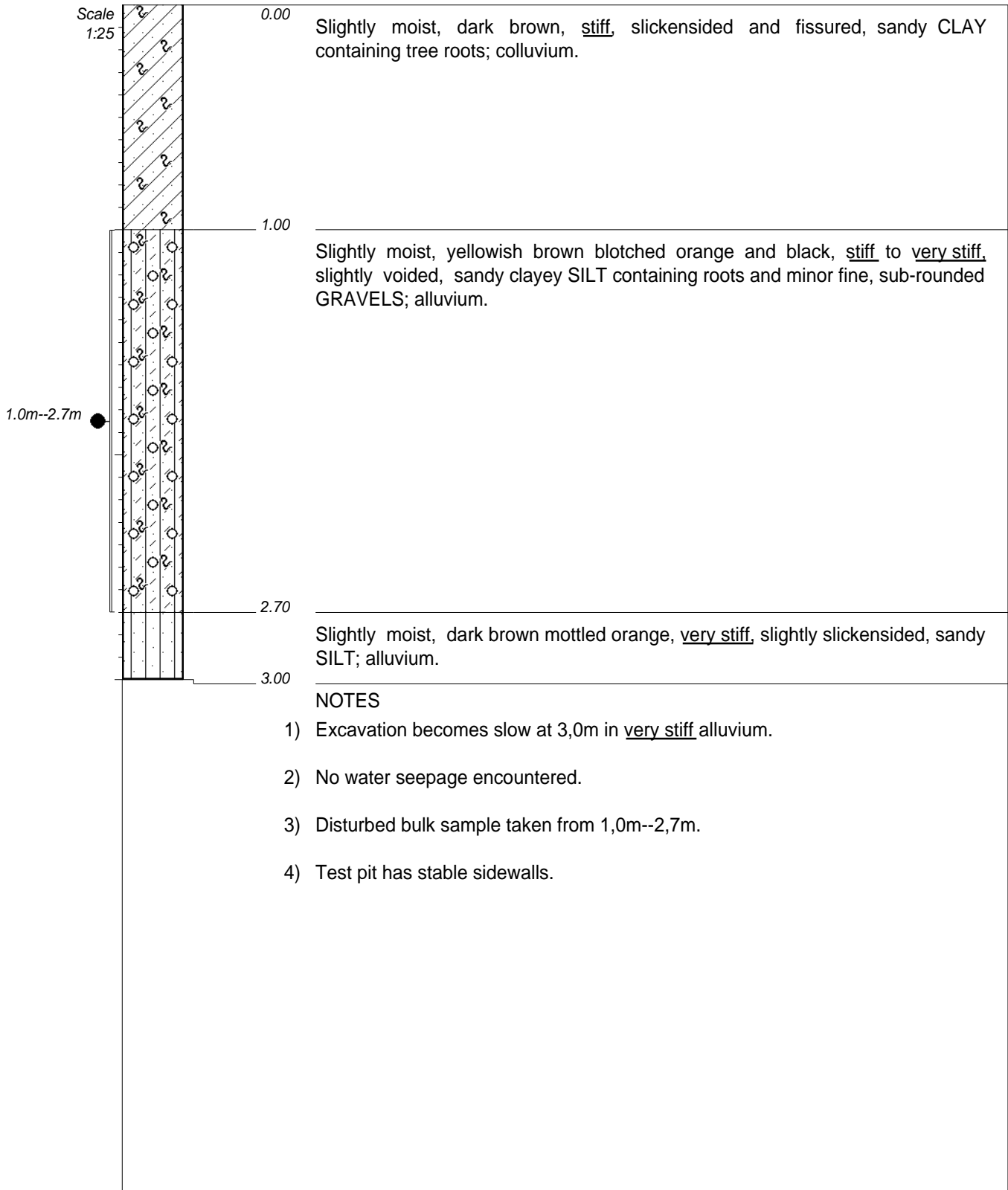
HOLE No: IF/5



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: OC/1
Sheet 1 of 1

JOB NUMBER: A24/2113



CONTRACTOR : Resources of Africa Investments INCLINATION :

MACHINE : 20-ton Volvo Excavator

DIAM : Trench

ELEVATION :

DRILLED BY :

DATE :

X-COORD : S24 43 43.9

PROFILED BY : avdm

DATE : 25/03/2024

Y-COORD : E30 09 59.6

TYPE SET BY : avdm

DATE : 27/05/2024 06:35

SETUP FILE : STANDARD.SET

TEXT : ..th3OPTestPitProfiles.txt

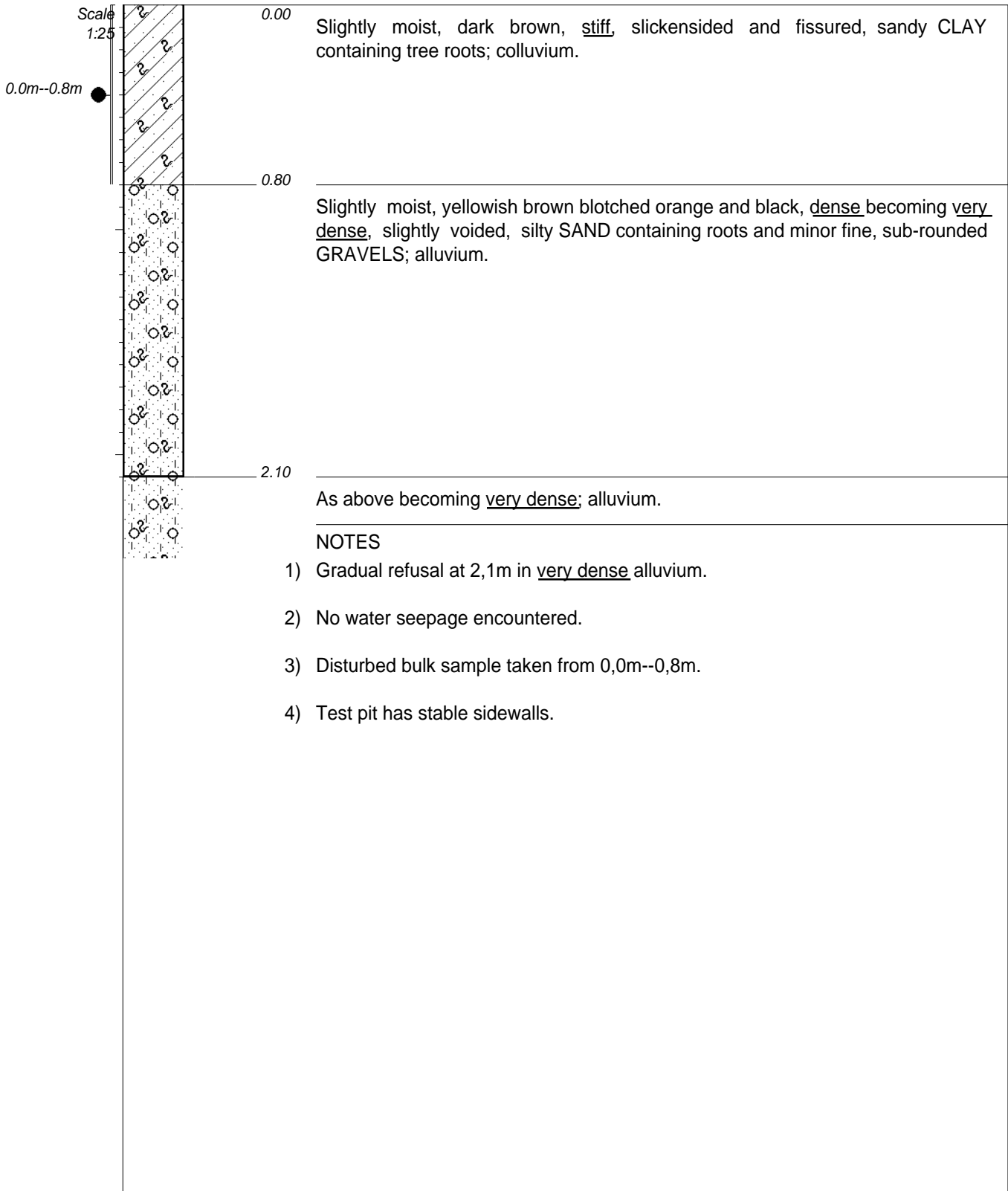
HOLE No: OC/1



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: OC/2
Sheet 1 of 1

JOB NUMBER: A24/2113



CONTRACTOR : Resources of Africa Investments INCLINATION :

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 25.4

Y-COORD : E30 09 48.8

HOLE No: OC/2

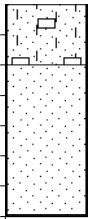


Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: OC/3
Sheet 1 of 1

JOB NUMBER: A24/2113

Scale
1:25



0.00 Abundant NODULAR CALCRETE in a matrix of moist, yellowish brown, silty SAND; calcareous alluvium.
Overall consistency is medium dense.

0.20 Slightly moist, dark yellow speckled black, very dense, intact, cemented SAND; alluvium.

0.70 NOTES

- 1) Gradual refusal at 0,7m in very dense alluvium.
- 2) No water seepage encountered.
- 3) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments INCLINATION :

MACHINE : 20-ton Volvo Excavator

DIAM : Trench

ELEVATION :

DRILLED BY :

DATE :

X-COORD : S24 43 06.5

PROFILED BY : avdm

DATE : 25/03/2024

Y-COORD : E30 09 18.7

TYPE SET BY : avdm

DATE : 27/05/2024 06:35

HOLE No: OC/3

SETUP FILE : STANDARD.SET

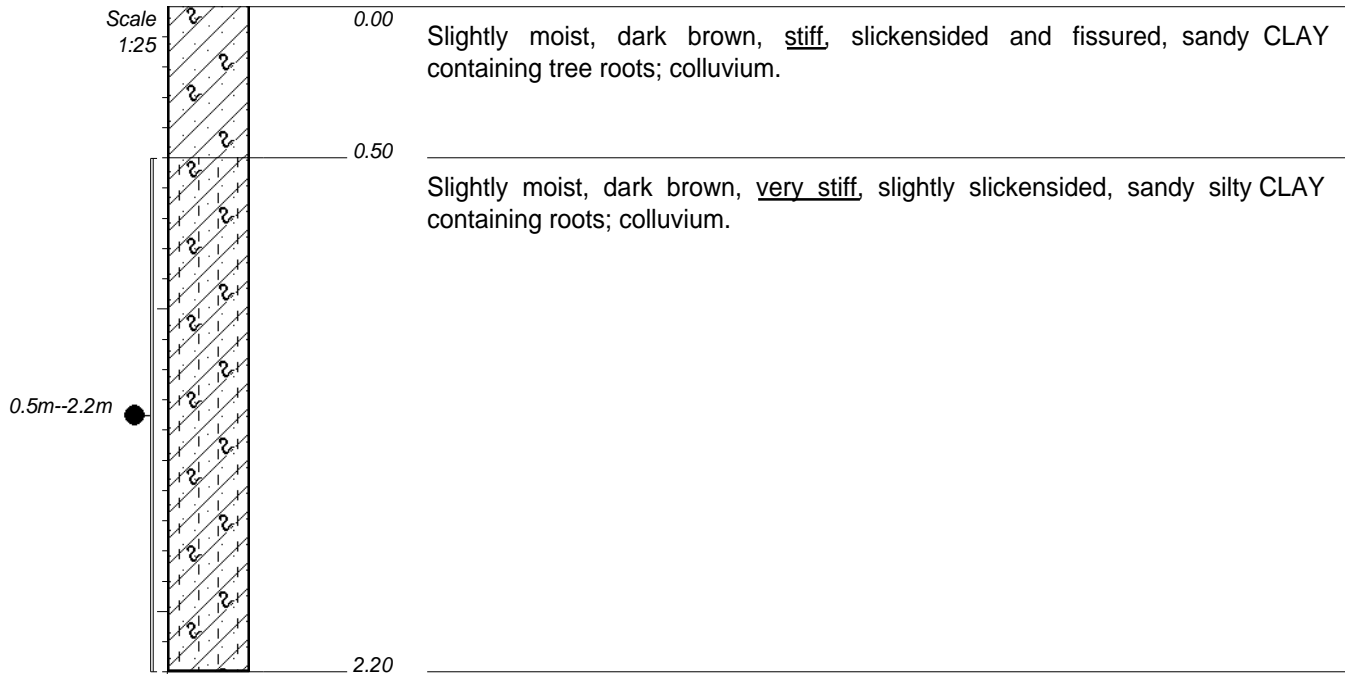
TEXT : ..th3OPTestPitProfiles.txt



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: HRC/1
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Excavation becomes very slow but no refusal at 2,2m.
- 2) No water seepage encountered.
- 3) Disturbed foundation indicator sample taken from 0,5m--2,2m.
- 4) Test pit has stable sidewalls.
- 5) Test pit excavated next to a dry stream.

CONTRACTOR : Resources of Africa Investments **INCLINATION :**

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 02.1

Y-COORD : E30 09 51.1

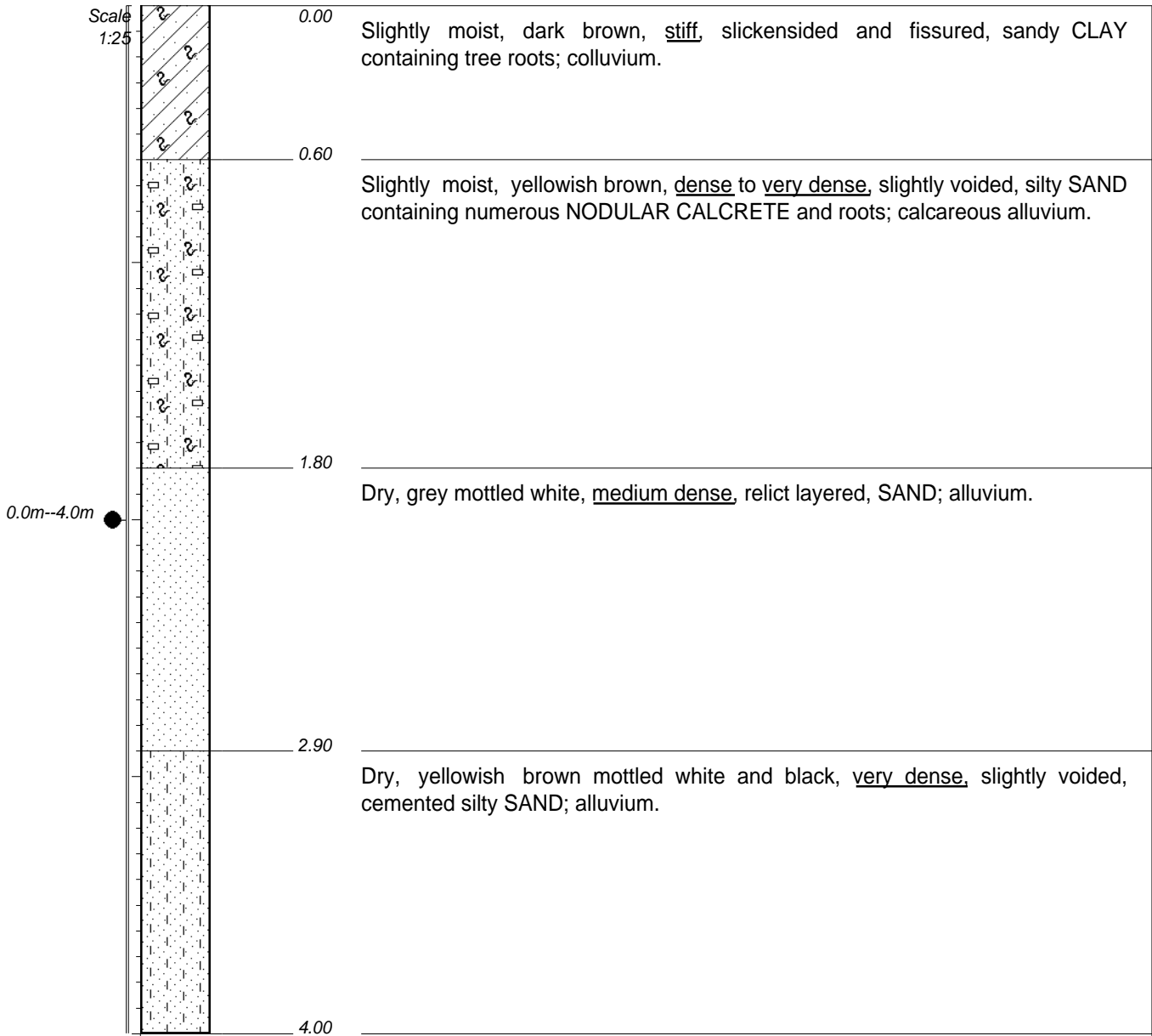
HOLE No: HRC/1



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: HRC/2
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Slow excavation but no refusal at 4,0m.
- 2) No water seepage encountered.
- 3) Disturbed bulk sample taken from 0,0m--4,0m.
- 4) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments INCLINATION :

MACHINE : 20-ton Volvo Excavator

DIAM : Trench

DRILLED BY :

DATE :

PROFILED BY : avdm

DATE : 25/03/2024

TYPE SET BY : avdm

DATE : 27/05/2024 06:35

SETUP FILE : STANDARD.SET

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 05.3

Y-COORD : E30 09 31.8

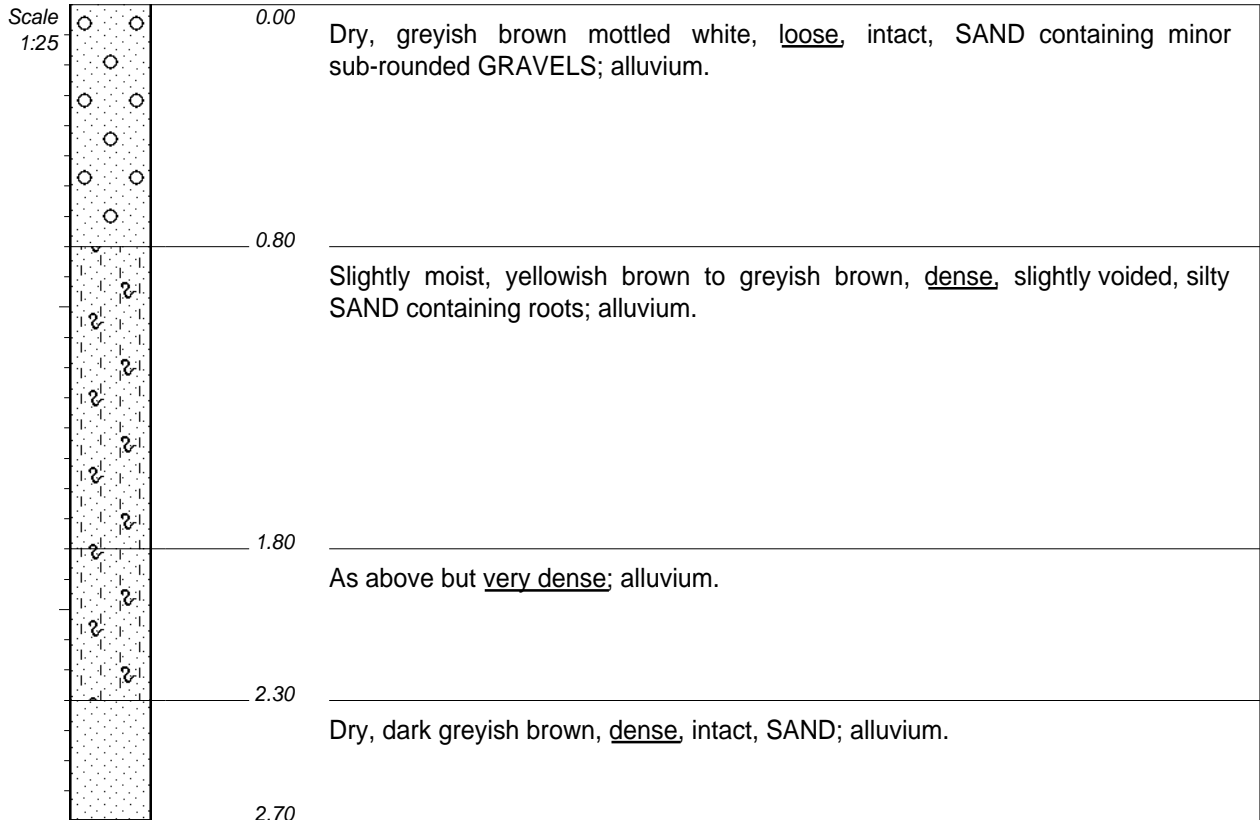
HOLE No: HRC/2



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: HRC/3
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Test pit profiled from a donga.
- 2) No water seepage encountered.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*
MACHINE : 20-ton Volvo Excavator *DIAM :* Trench *ELEVATION :*
DRILLED BY : *DATE :* *X-COORD :* S24 42 56.6
PROFILED BY : avdm *DATE :* 25/03/2024 *Y-COORD :* E30 09 17.4
TYPE SET BY : avdm *DATE :* 27/05/2024 06:35
SETUP FILE : STANDARD.SET *TEXT :* ..th3OPTestPitProfiles.txt

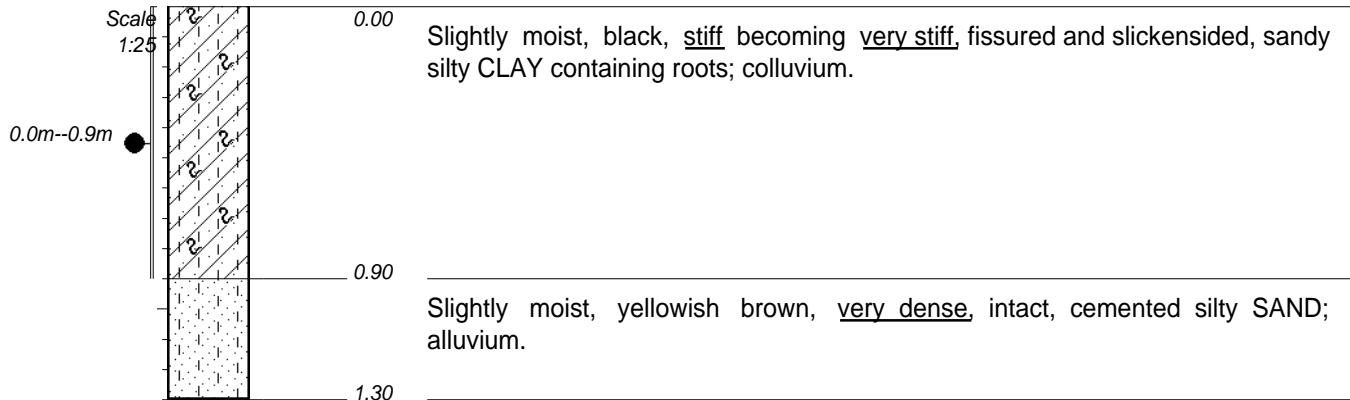
HOLE No: HRC/3



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: HRC/4
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 1,3m in very dense alluvium.
- 2) No water seepage encountered.
- 3) Disturbed bulk sample taken from 0,0m--0,9m.
- 4) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 04.4

Y-COORD : E30 09 35.9

HOLE No: HRC/4

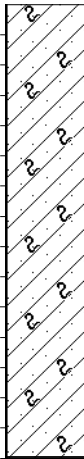


Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: WRD/1
Sheet 1 of 1

JOB NUMBER: A24/2113

Scale
1:25



0.00

Moist, dark brown, stiff becoming very stiff, slickensided and fissured, sandy CLAY containing tree roots; colluvium.

1.50

NOTES

- 1) Gradual refusal at 1,5m in very stiff colluvium.
- 2) No water seepage encountered.
- 3) Test pit has stable sidewalls.

CONTRACTOR: Resources of Africa Investments **INCLINATION:**

MACHINE: 20-ton Volvo Excavator

DIAM: Trench

ELEVATION:

DRILLED BY:

DATE:

X-COORD: S24 43 11.3

PROFILED BY: avdm

DATE: 25/03/2024

Y-COORD: E30 09 57.0

TYPE SET BY: avdm

DATE: 27/05/2024 06:35

SETUP FILE: STANDARD.SET

TEXT: ..th3OPTestPitProfiles.txt

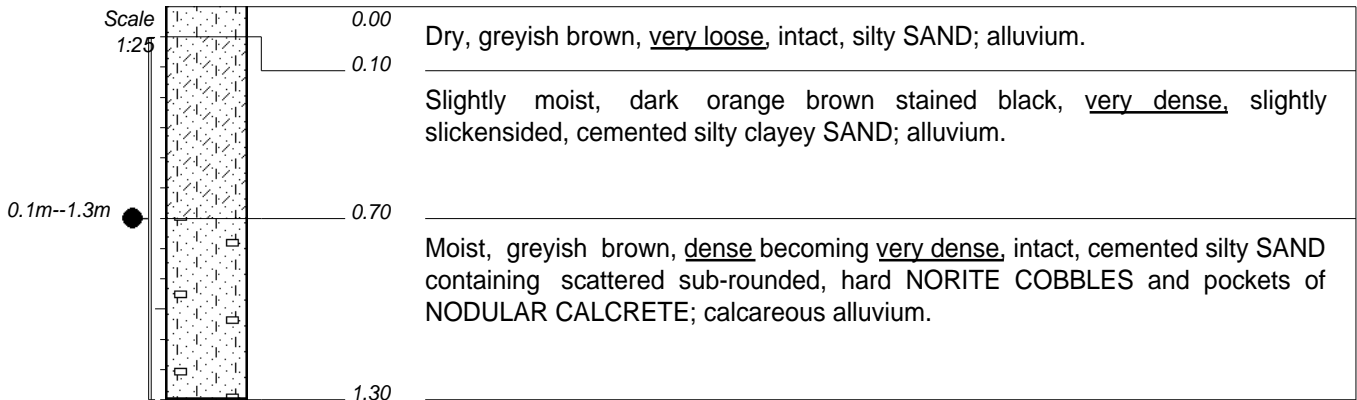
HOLE No: WRD/1



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: WRD/2
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 1,3m in very dense calcareous alluvium.
- 2) No water seepage encountered.
- 3) Disturbed bulk sample taken from 0,1m--1,3m.
- 4) Test pit has stable sidewalls.
- 5) Test pit excavated within a dry stream.

CONTRACTOR : Resources of Africa Investments **INCLINATION :**

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 17.1

Y-COORD : E30 10 04.1

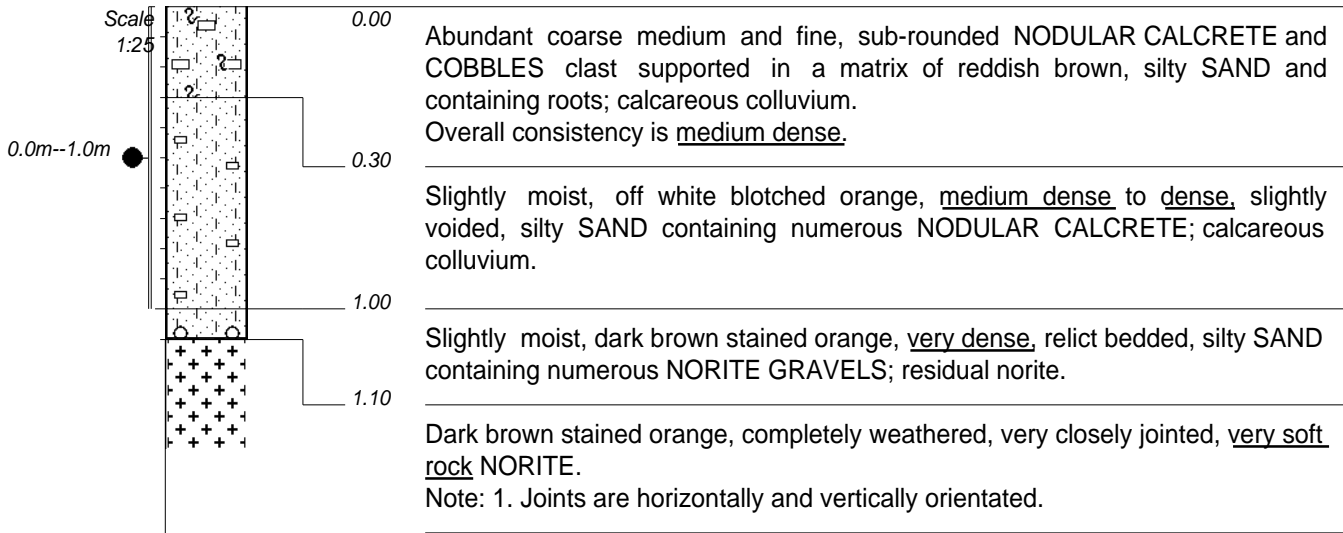
HOLE No: WRD/2



Onno Fortuin Consulting (Pty) Ltd
Modikwa South 3 OP, Steelpoort, Gauteng Province
GEOTECHNICAL INVESTIGATION CARRIED OUT FOR:
PROPOSED NEW MINE DEVELOPMENT

HOLE No: WRD/3
Sheet 1 of 1

JOB NUMBER: A24/2113



NOTES

- 1) Gradual refusal at 1,1m on completely weathered, very soft rock norite.
- 2) No water seepage encountered.
- 3) Disturbed bulk sample (3 bags) taken from 0,0m--1,0m.
- 4) Test pit has stable sidewalls.

CONTRACTOR : Resources of Africa Investments *INCLINATION :*

MACHINE : 20-ton Volvo Excavator

DRILLED BY :

PROFILED BY : avdm

TYPE SET BY : avdm

SETUP FILE : STANDARD.SET

DIAM : Trench

DATE :

DATE : 25/03/2024

DATE : 27/05/2024 06:35

TEXT : ..th3OPTestPitProfiles.txt

ELEVATION :

X-COORD : S24 43 21.4

Y-COORD : E30 10 12.9

HOLE No: WRD/3

PROJECT NUMBER – A24/2113

**PROJECT – MODIKWA SOUTH 3 OP MINE, STEELPOORT,
LIMPOPO PROVINCE**

PHOTOGRAPHIC RECORD



Plate 1. Soil profile of test pit WRD/1.



Plate 2. Spoil from test pit WRD/1.



Plate 3. Soil profile of test pit WRD/2.



Plate 4. Spoil from test pit WRD/2.



Plate 5. Soil profile of test pit WRD/3.



Plate 6. Spoil from test pit WRD/3.



Plate 7. Soil profile of test pit IF/1.



Plate 8. Spoil from test pit IF/1.



Plate 9. Soil profile of test pit IF/2.



Plate 10. Spoil from test pit IF/2.



Plate 11. Soil profile of test pit IF/3.



Plate 12. Spoil from test pit IF/3.



Plate 13. Soil profile of test pit IF/4.



Plate 14. Spoil from test pit IF/4.



Plate 15. Soil profile of test pit IF/5.



Plate 16. Soil profile of test pit HRC/1.



Plate 17. Spoil from test pit HRC/1.



Plate 18. Spoil from test pit HRC/2.



Plate 19. Soil profile of test pit HRC/3.



Plate 20. Soil profile of test pit HRC/4.



Plate 21. Spoil from test pit HRC/4.



Plate 22. Soil profile of test pit FB/1.

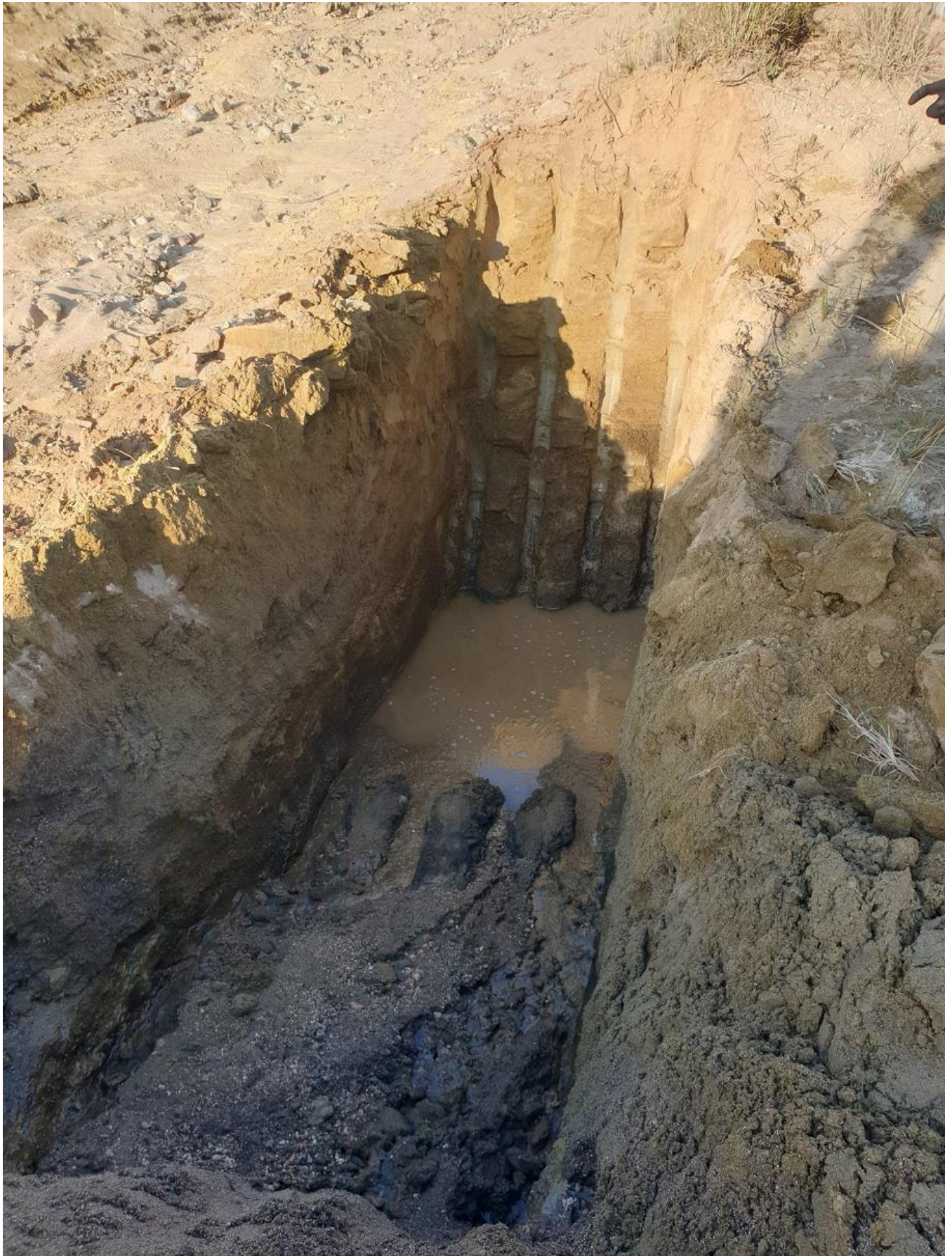


Plate 23. Soil profile of test pit FB/2.



Plate 24. Spoil from test pit FB/2.



Plate 25. Spoil from test pit FB/3.



Plate 26. Spoil from test pit FB/4.



Plate 27. Spoil from test pit OC/1.



Plate 28. Soil profile of test pit OC/2.



Plate 29. Soil profile of test pit OC/3.

NORITE AND ANORTHOSITE BEDROCK OUTCROPS AT THE TUBATSANE RIVER IN THE NORTHERN PART OF THE FLOOD BERM AREA





CLIENT: Andon Van Der Merwe

PROJECT: Modikwa South 3 OP, Steelpoort, Limpopo Province.

JOB NO: BJ1260/24

DATE ISSUED: 10/05/2024

SAMPLE DATA				SUMMARY OF TEST RESULTS																															
Sample Origin	Depth (mm)	Sample No	DESCRIPTION /TREATMENT	SIEVE ANALYSIS % PASSING SIEVES (mm)										SOIL MORTAR ANALYSIS				ATTERBERG CONSTANTS			MOD AASHTO			C.B.R (%)					T.R.B.	T.R.H. (14)	COLTO 1998	USCS			
				75	53	37,5	26,5	19,0	13,2	4,75	2,0	0,425	0,075	GS/CS	F.S	<0,075	VGILL (%)	PI	LK / LS (%)	G.M.	MDD (kg/m³)	DVG / OMC (%)	Wrd. V og (%)	Comp. Moist.	Swell (%)	100%	98%	97%	95%	93%	90%	CLASS	CLASS	CLASS	CLASS
OC/1	1,0-2,7	SN3034	Silty Sand	100	100	100	100	100	100	97	90	46	24	39	33	25	45	16	8,0	1,40	1617	23,3	23,5	0,3	11	9	8	7	5	4	A-2-7(1)	G10	Unsuitable	SM	
FB/2	0,0-2,0	SN3036	Poorly Graded Sand with Silty Clay	100	100	100	100	100	100	99	93	18	5	12	8	6	25	7	3,5	1,84	1962	8,6	8,5	0,0	17	13	12	9	8	5	A-2-4(0)	G9	G9	SP-SC	
FB/3	1,2-4,3	SN3037	Silty Sand with Gravel	100	100	100	99	98	98	82	68	38	28	36	32	29	48	18	9,0	1,66	1478	30,2	30,7	0,4	9	6	5	4	3	2	A-2-7(1)	G10	Unsuitable	SM	
WRD/3	0,0-1,0	SN3038	Silty Sand	100	100	100	100	100	100	99	91	75	28	23	26	25	24	52	16	10,0	1,74	1697	20,6	20,5	0,4	11	8	6	6	5	4	A-2-7(0)	G10	Unsuitable	SM
IF/3	0,0-2,2	SN3040	Silty Sand	100	100	100	100	100	100	97	91	31	19	29	24	19	53	20	10,0	1,59	1572	23,7	23,5	0,0	13	9	8	7	5	3	A-2-7(0)	G10	Unsuitable	SM	
IF/4	0,0-3,7	SN3041	Silty Sand	100	100	100	100	100	100	96	84	47	40	45	42	40	56	22	11,0	1,29	1613	24,4	24,7	0,4	17	15	11	9	7	4	A-7-6(4)	G10	Unsuitable	SM	
HRC/2	0,0-4,0	SN3044	Silty Sand	100	100	100	100	100	100	94	84	51	18	38	26	19	51	20	10,0	1,47	1989	13,6	13,7	0,3	14	12	11	10	9	6	A-2-7(0)	G10	Unsuitable	SM	
HRC/4	0,0-0,9	SN3045	Silty Sand with Gravel	100	100	100	100	100	100	67	44	17	14	16	14	14	57	23	11,5	2,25	1462	30,4	30,4	1,0	10	8	6	5	3	2	A-2-7(0)	G10	Unsuitable	SM	

ite only to the samples tested or sampled.
responsibility or liability of Bakgoni Geotechnical Engineering.
written permission from Bakgoni Geotechnical Engineering (Pty) Ltd.
e not considered in the evaluation of this report.
technical Engineering Scope of Accreditation. # (COLTO, COTO,TRH, USCS & TRB)

DOCUMENT TYPE:	MANAGEMENT SYSTEM PROCEDURE		
DOCUMENT NUMBER:	REP 07	REVISION :	2
COMPILER:	QUALITY MANAGER	APPROVER:	EXECUTIVE DIRECTOR
			EFFECTIVE DATE 2023/12/22

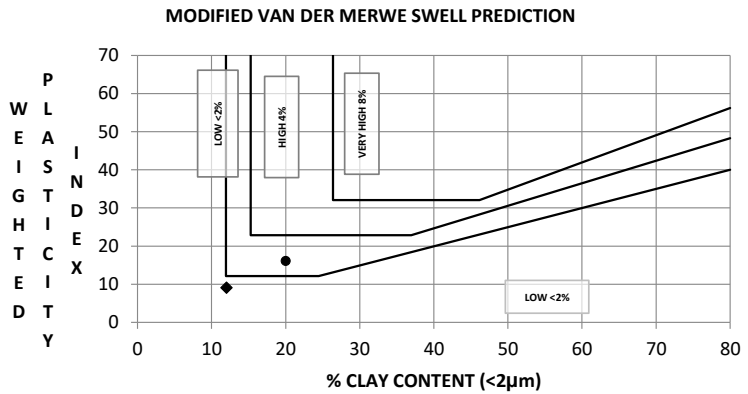
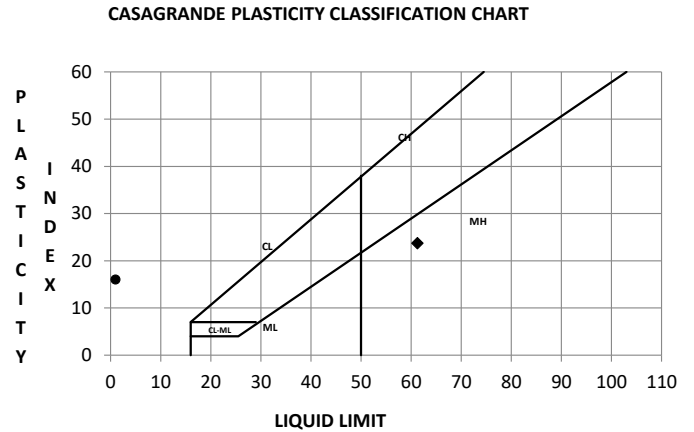
CLIENT: Andon van der Merwe
PROJECT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

DATE: 3-Apr-24
PROJECT NO: BJ1260/24

SAMPLE DETAILS

SAMPLE No	CODES	TRIAL PIT	DEPTH (m)	DESCRIPTION
SN3034	●	OC/1	1,0-2,7	
SN3035	◆	OC/2	0,0-0,8	

SAMPLE	(mm)		●	◆
	SIEVE ANALYSIS (SANS 3001-GR1)	%	75,0	100
P A S S A G E		37,5	100	100
		19,0	100	100
		9,5	100	100
		4,75	100	56
		2,000	100	48
		0,425	100	38
		0,300	96	38
B Y		0,150	84	35
	0,075	73	33	
HYDROMETER (SANS 3001-GR3)	DATE TESTED	24/04/03	24/04/03	
	(µm) 60	64	29	
	(µm) 20	36	20	
	(µm) 6	23	14	
	(µm) 2	20	12	
ATTERBERG LIMITS (SANS 3001-GR10)	GRADING MODULUS	0,27	1,81	
	LIQUID LIMIT (%)	45	61	
	PLASTICITY INDEX	16	24	
	LINEAR SHRINKAGE (%)	8,0	12,0	
	WEIGHTED PI	16	9	
SOIL MORTAR ANALYSIS	SG	2,650	2,650	
	Coarse Sand (<2.0>0.425)	0	21	
	Fine Sand (<0.425>0.075)	27	10	
	Silt (<0.075>0.002)	53	44	
ELECTRO-CHEMICAL	Clay (<0.002)	20	25	
	pH			
	Conductivity(S/m)			



DOCUMENT TYPE:	MANAGEMENT SYSTEM PROCEDURE		
DOCUMENT NUMBER:	REP-06 FI	REVISION:	2
COMPILER:	Quality Manager	APPROVER:	Managing Director
		EFFECTIVE DATE:	2018-08-02

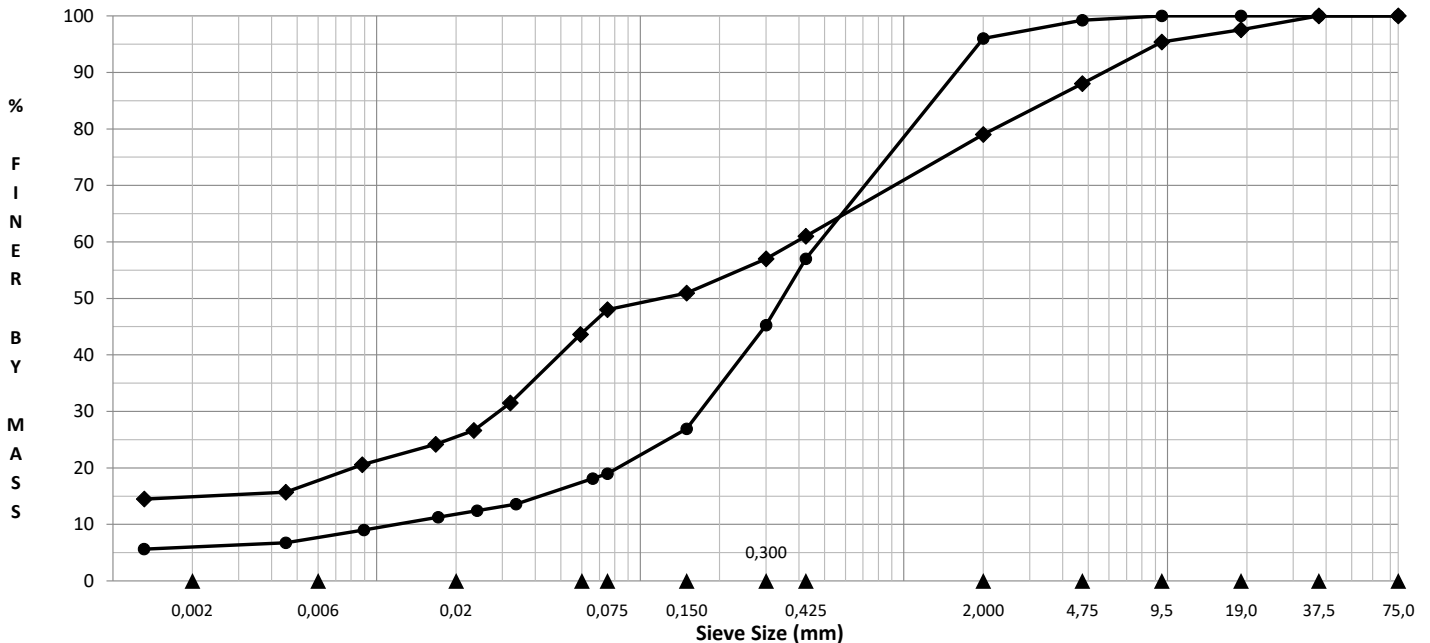
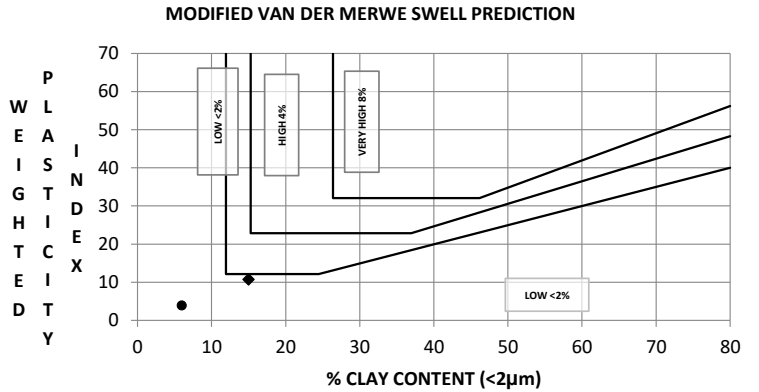
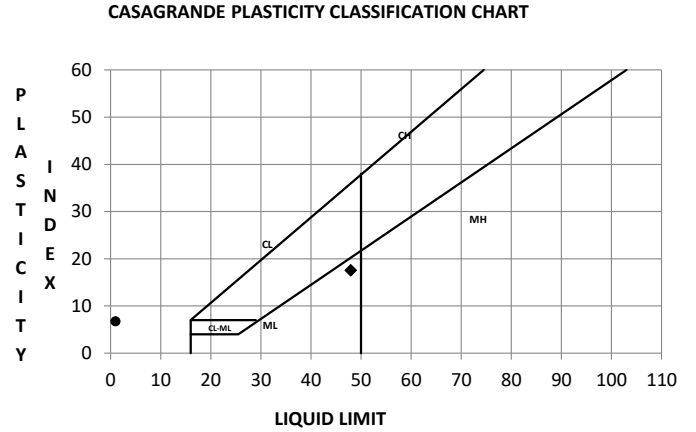
CLIENT: Andon van der Merwe
PROJECT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

DATE: 3-Apr-24
PROJECT NO: BJ1260/24

SAMPLE DETAILS

SAMPLE No	CODES	TRIAL PIT	DEPTH (m)	DESCRIPTION
SN3036	●	FB/2	0,0-2,0	
SN3037	◆	FB/3	1,2-4,3	

SAMPLE	(mm)		●	◆
	SIEVE ANALYSIS (SANS 3001-GR1)	%	75,0	100
		37,5	100	100
P		19,0	100	98
A		9,5	100	95
S		4,75	99	88
M		2,000	96	79
S		0,425	57	61
A		0,300	45	57
N		0,150	27	51
HYDROMETER (SANS 3001-GR3)	DATE TESTED	24/04/03	24/04/03	
	(µm) 60	17	44	
	(µm) 20	12	25	
	(µm) 6	7	17	
	(µm) 2	6	15	
ATTERBERG LIMITS (SANS 3001-GR10)	GRADING MODULUS	1,28	1,12	
	LIQUID LIMIT (%)	25	48	
	PLASTICITY INDEX	7	18	
	LINEAR SHRINKAGE (%)	3,5	9,0	
	WEIGHTED PI	4	11	
SOIL MORTAR ANALYSIS	SG	2,650	2,650	
	Coarse Sand(<2.0>0.425)	41	23	
	Fine Sand(<0.425>0.075)	40	16	
	Silt(<0.075>0.002)	14	42	
ELECTRO-CHEMICAL	Clay (<0.002)	6	19	
	pH			
	Conductivity(S/m)			



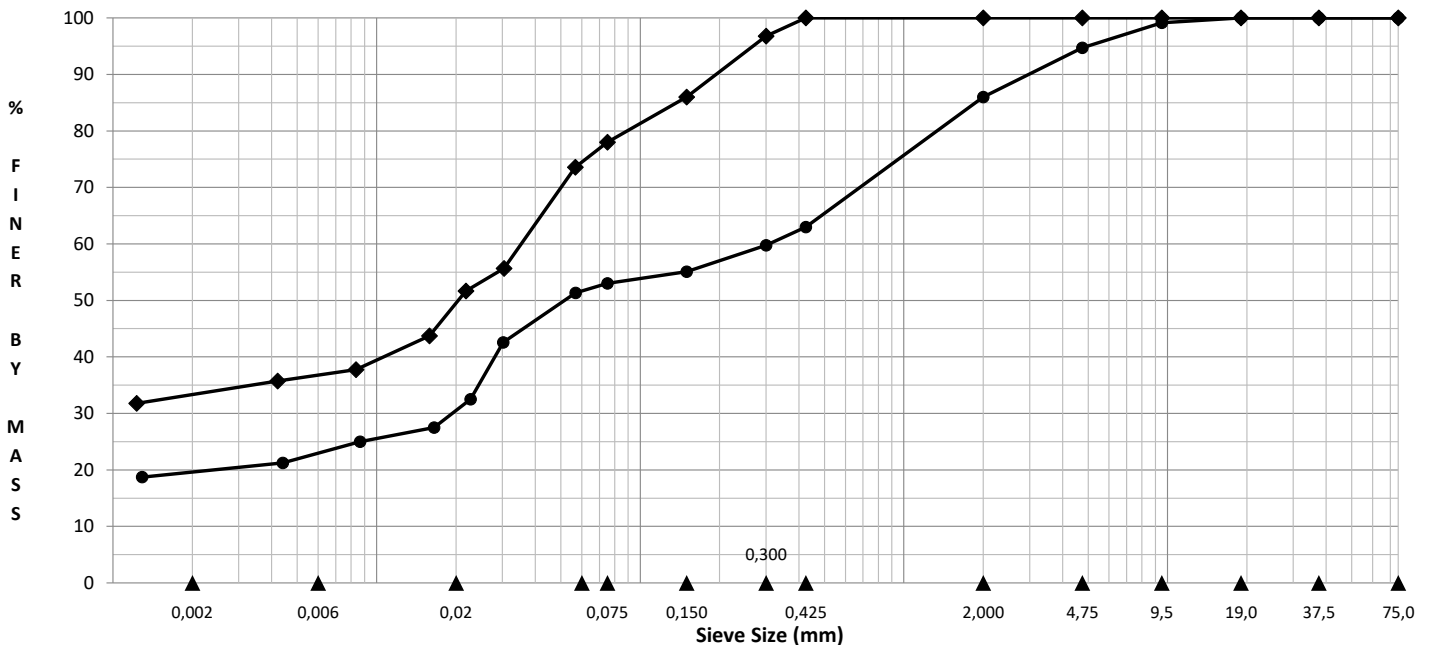
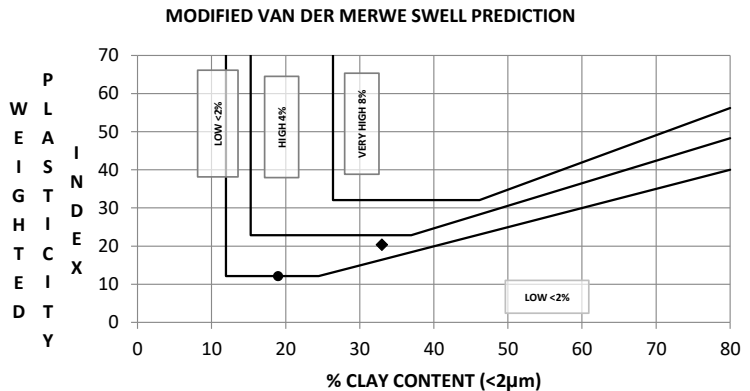
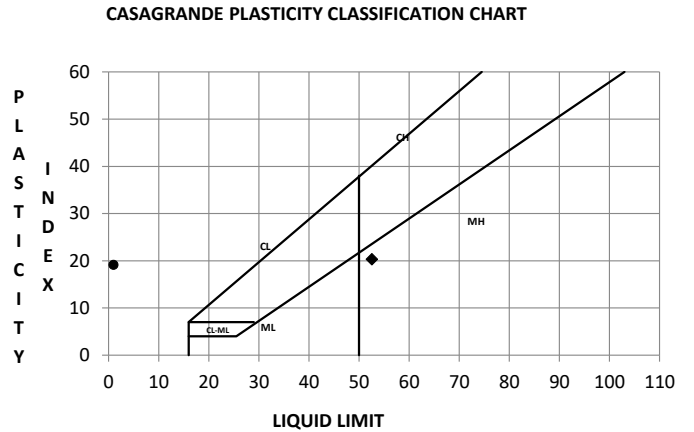
CLIENT: Andon van der Merwe
PROJECT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

DATE: 3-Apr-24
PROJECT NO: BJ1260/24

SAMPLE DETAILS

SAMPLE No	CODES	TRIAL PIT	DEPTH (m)	DESCRIPTION
SN3038	●	WRD/2	0,1-1,3	
SN3040	◆	IF/3	0,0-2,2	

SAMPLE	(mm)		●	◆
	SIEVE ANALYSIS (SANS 3001-GR1)	%	75,0	100
		37,5	100	100
P		19,0	100	100
A		9,5	99	100
S		4,75	95	100
M		2,000	86	100
S		0,425	63	100
A		0,300	60	97
N		0,150	55	86
G	0,075	53	78	
HYDROMETER (SANS 3001-GR3)	DATE TESTED	24/04/03	24/04/03	
	(µm) 60	53	76	
	(µm) 20	30	49	
	(µm) 6	23	37	
	(µm) 2	19	33	
ATTERBERG LIMITS (SANS 3001-GR10)	GRADING MODULUS	0,98	0,22	
	LIQUID LIMIT (%)	51	53	
	PLASTICITY INDEX	19	20	
	LINEAR SHRINKAGE (%)	9,0	10,0	
	WEIGHTED PI	12	20	
SOIL MORTAR ANALYSIS	SG	2,650	2,650	
	Coarse Sand(<2.0>0.425)	27	0	
	Fine Sand(<0.425>0.075)	12	22	
	Silt(<0.075>0.002)	40	45	
ELECTRO-CHEMICAL	Clay (<0.002)	22	33	
	pH			
	Conductivity(S/m)			



DOCUMENT TYPE:	MANAGEMENT SYSTEM PROCEDURE			
DOCUMENT NUMBER:	REP-06 FI	REVISION:	2	EFFECTIVE DATE:
COMPILER:	Quality Manager	APPROVER:	Managing Director	2018-08-02

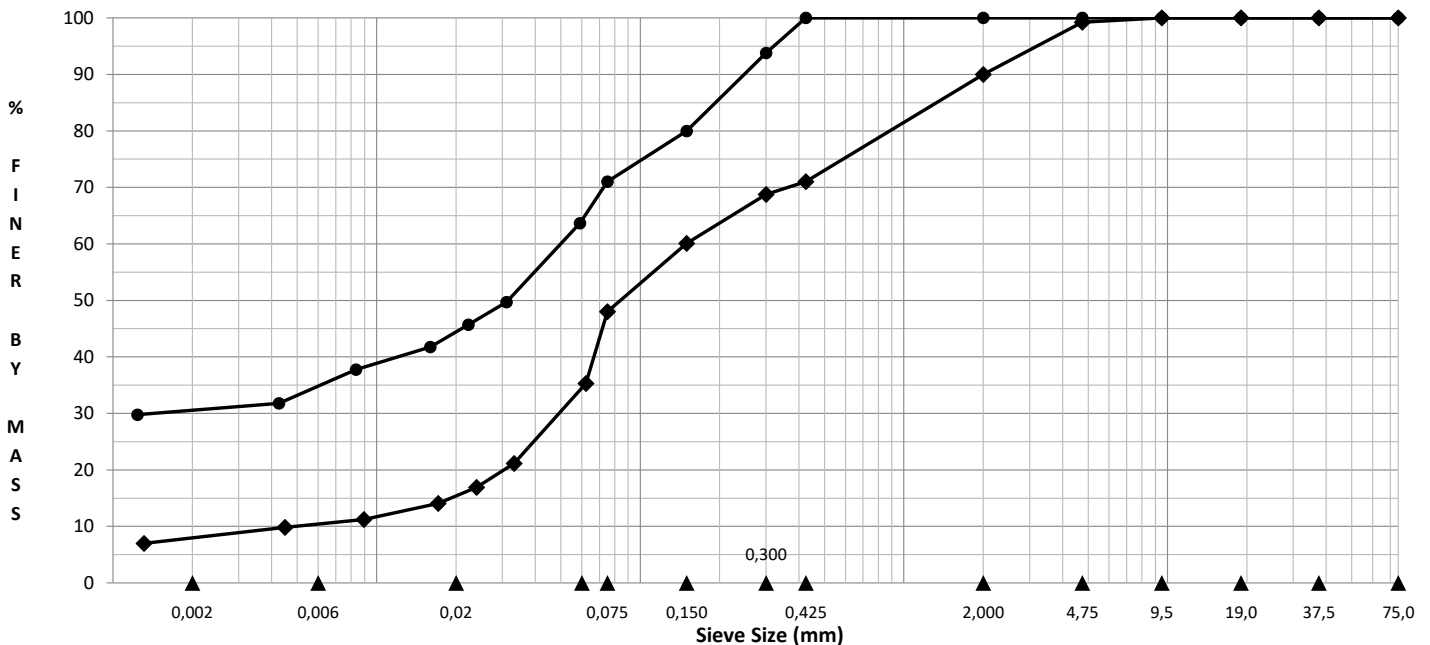
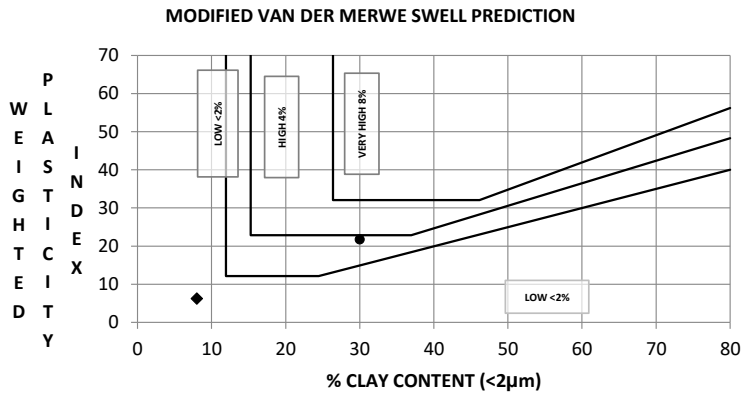
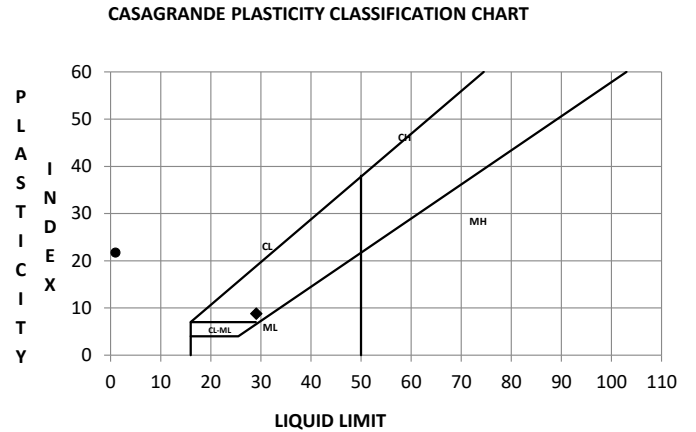
CLIENT: Andon van der Merwe
PROJECT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

DATE: 3-Apr-24
PROJECT NO: BJ1260/24

SAMPLE DETAILS

SAMPLE No	CODES	TRIAL PIT	DEPTH (m)	DESCRIPTION
SN3041	●	IF/4	0,0-3,7	
SN3042	◆	IF/5	0,7	

SAMPLE	(mm)		●	◆
	SIEVE ANALYSIS (SANS 3001-GR1)	%	75,0	100
P A S S A G E		37,5	100	100
		19,0	100	100
		9,5	100	100
		4,75	100	99
		2,000	100	90
		0,425	100	71
		0,300	94	69
0,150		80	60	
0,075	71	48		
HYDROMETER (SANS 3001-GR3)	DATE TESTED	24/04/03	24/04/03	
	(µm) 60	64	34	
	(µm) 20	44	15	
	(µm) 6	34	10	
	(µm) 2	30	8	
ATTERBERG LIMITS (SANS 3001-GR10)	GRADING MODULUS	0,29	0,91	
	LIQUID LIMIT (%)	56	29	
	PLASTICITY INDEX	22	9	
	LINEAR SHRINKAGE (%)	11,0	4,5	
	WEIGHTED PI	22	6	
SOIL MORTAR ANALYSIS	SG	2,650	2,650	
	Coarse Sand(<2.0>0.425)	0	21	
	Fine Sand(<0.425>0.075)	29	26	
	Silt(<0.075>0.002)	41	44	
ELECTRO-CHEMICAL	Clay (<0.002)	30	9	
	pH	8,2		
	Conductivity(S/m)	0,098		



DOCUMENT TYPE:	MANAGEMENT SYSTEM PROCEDURE		
DOCUMENT NUMBER:	REP-06 FI	REVISION:	2
COMPILER:	Quality Manager	APPROVER:	Managing Director
		EFFECTIVE DATE:	2018-08-02

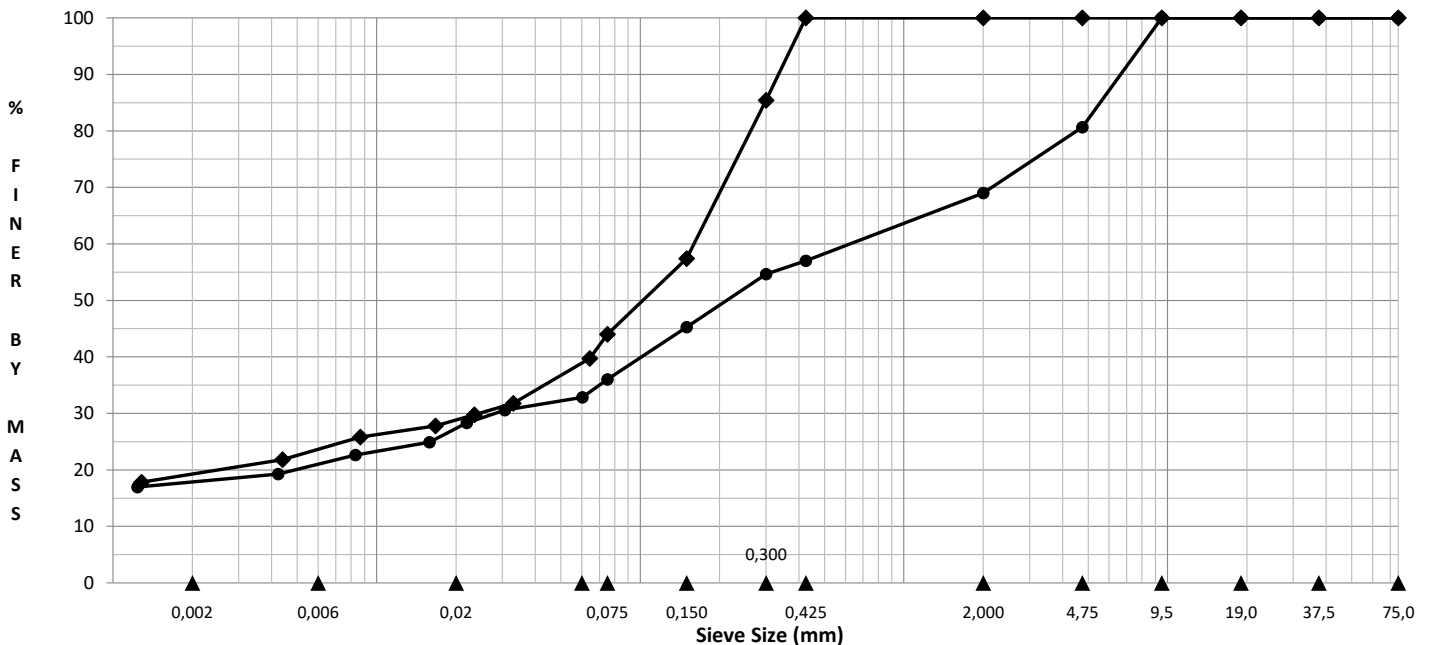
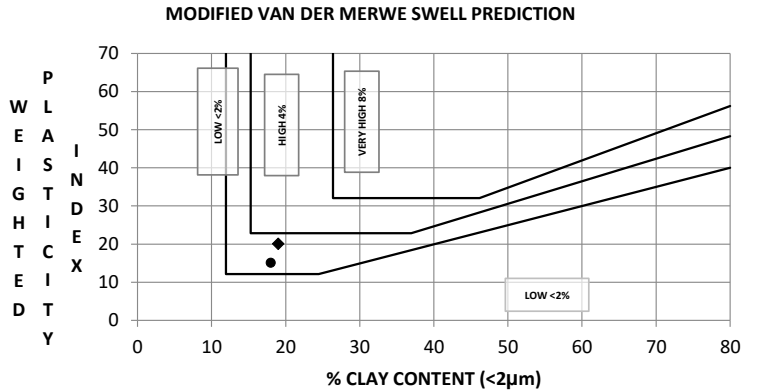
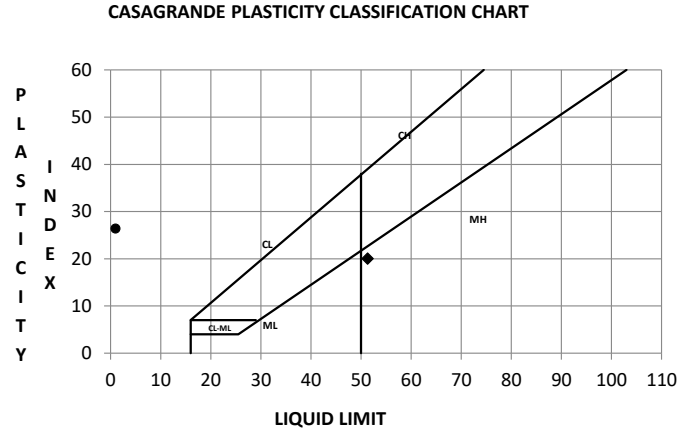
CLIENT: Andon van der Merwe
PROJECT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

DATE: 3-Apr-24
PROJECT NO: BJ1260/24

SAMPLE DETAILS

SAMPLE No	CODES	TRIAL PIT	DEPTH (m)	DESCRIPTION
SN3043	●	HRC/1	0,5-2,2	
SN3044	◆	HRC/2	0,0-4,0	

SAMPLE	(mm)		●	◆
	SIEVE ANALYSIS (SANS 3001-GR1)	%	75,0	100
		37,5	100	100
P		19,0	100	100
A		9,5	100	100
S		4,75	81	100
M		2,000	69	100
S		0,425	57	100
A		0,300	55	85
N		0,150	45	57
S	0,075	36	44	
HYDROMETER (SANS 3001-GR3)	DATE TESTED	24/04/03	24/04/03	
	(µm) 60	33	39	
	(µm) 20	27	29	
	(µm) 6	21	23	
	(µm) 2	18	19	
ATTERBERG LIMITS (SANS 3001-GR10)	GRADING MODULUS	1,38	0,56	
	LIQUID LIMIT (%)	61	51	
	PLASTICITY INDEX	26	20	
	LINEAR SHRINKAGE (%)	13,0	10,0	
	WEIGHTED PI	15	20	
SOIL MORTAR ANALYSIS	SG	2,650	2,650	
	Coarse Sand (<2.0>0.425)	17	0	
	Fine Sand (<0.425>0.075)	30	56	
	Silt (<0.075>0.002)	26	25	
ELECTRO-CHEMICAL	Clay (<0.002)	26	19	
	pH			
	Conductivity(S/m)			



DOCUMENT TYPE:	MANAGEMENT SYSTEM PROCEDURE		
DOCUMENT NUMBER:	REP-06 FI	REVISION:	2
COMPILER:	Quality Manager	APPROVER:	Managing Director
		EFFECTIVE DATE:	2018-08-02

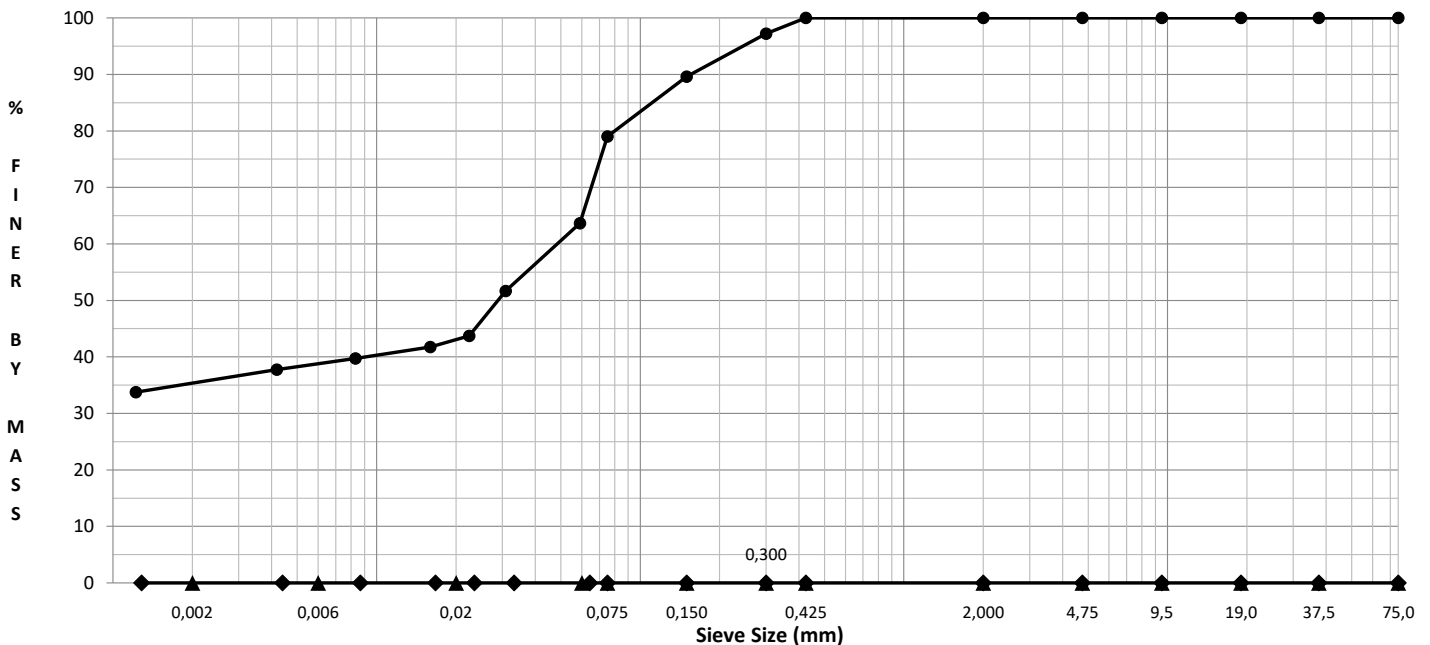
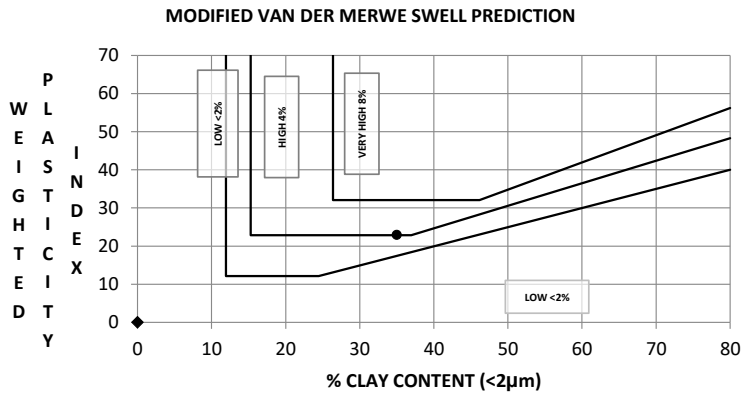
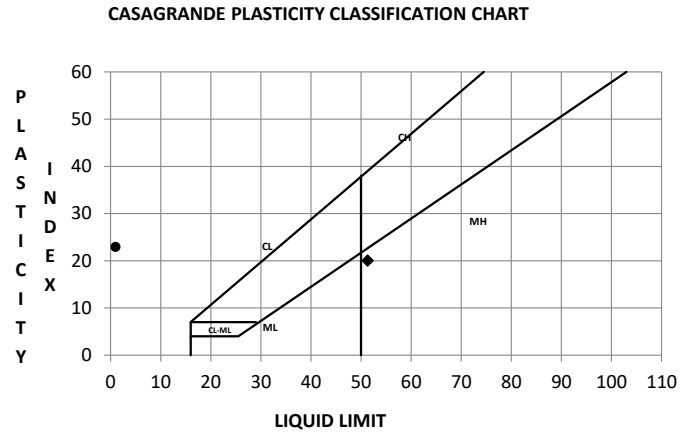
CLIENT: Andon van der Merwe
PROJECT: MODIKWA SOUTH 3 OP, STEELPOORT, LIMPOPO PROVINCE

DATE: 3-Apr-24
PROJECT NO: BJ1260/24

SAMPLE DETAILS

SAMPLE No	CODES	TRIAL PIT	DEPTH (m)	DESCRIPTION
SN3045	•	HRC/4	0,0-0,9	

SAMPLE	(mm)	•	◆
SIEVE ANALYSIS (SANS 3001-GR1)	75,0	100	
	37,5	100	
	19,0	100	
	9,5	100	
	4,75	100	
	2,000	100	
	0,425	100	
	0,300	97	
HYDROMETER (SANS 3001-GR3)	DATE TESTED	24/04/03	
	(µm) 60	64	
	(µm) 20	43	
	(µm) 6	39	
	(µm) 2	35	
ATTERBERG LIMITS (SANS 3001-GR10)	GRADING MODULUS	0,21	
	LIQUID LIMIT (%)	57	
	PLASTICITY INDEX	23	
	LINEAR SHRINKAGE (%)	11,5	
	WEIGHTED PI	23	
SOIL MORTAR ANALYSIS	SG	2,650	
	Coarse Sand (<2.0>0.425)	0	
	Fine Sand (<0.425>0.075)	21	
	Silt (<0.075>0.002)	44	
ELECTRO-CHEMICAL	Clay (<0.002)	35	
	pH		
	Conductivity(S/m)		



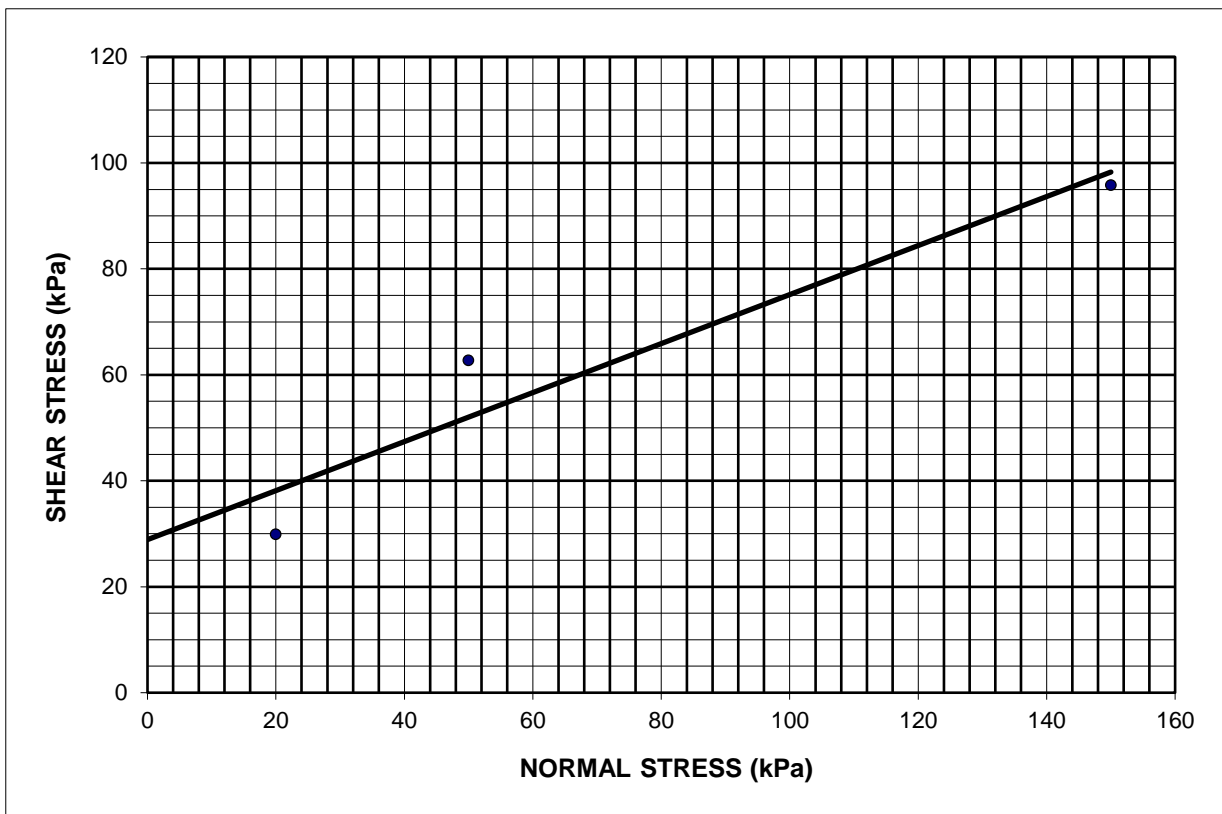
DOCUMENT TYPE:	MANAGEMENT SYSTEM PROCEDURE		
DOCUMENT NUMBER:	REP-06 FI	REVISION: 2	EFFECTIVE DATE: 2018-08-02
COMPILER:	Quality Manager	APPROVER:	Managing Director

Client: : Andon van der Merwe	Spl. No: SN3039
Client : Modikwa South 3 OP, Steelpoort, Limpopo Province	Test Pit: WRD/3
Prj. No. : BJ1260/24	Depth (m) 0.0-1,0
Date : 03/04/2024	S.G: 2,650

SHEAR BOX TEST RESULTS

Test No.	1	2	3		
Normal Stress (kPa)	20	50	150		
Shear Stress (kPa)	30	63	96		
Residual Stress (kPa)					

SHEAR STRESS PARAMETERS		
	PEAK STRENGTH	RESIDUAL STRENGTH
Angle of Internal Friction (°)	27	
Cohesion (kPa)	29	



Project : Andon van der Merwe
 Client : Modikwa South 3 OP, Steelpoort, Limpopo Province

Prj. No. : BJ1260/24

Date : 03/04/2024

SHEAR BOX TEST RESULTS

Spl. No SN3039 Test Pit WRD/3 Depth(m) 0.0-1.0

Type of test done : Consolidated Undrained (0,060mm/Min)

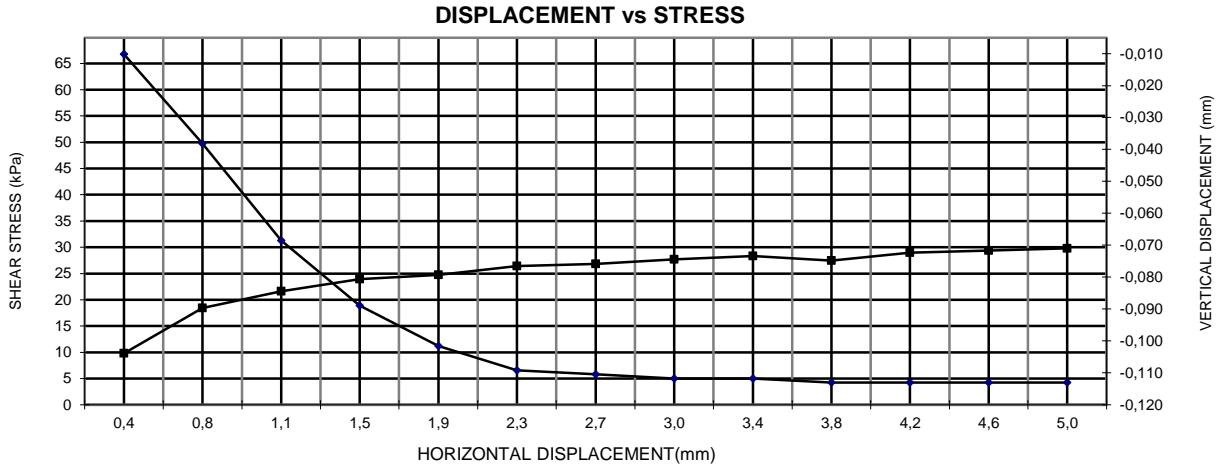
Normal Stress (kPa)		20	Box Type : Square (60.4x60.4mm)										Sample Height :20mm			
T e s t e r e s t	Displacement (mm)															
	Horizontal		0,38	0,76	1,14	1,52	1,91	2,29	2,67	3,05	3,43	3,81	4,19	4,57	4,95	
	Vertical		-0,010	-0,038	-0,069	-0,089	-0,102	-0,109	-0,110	-0,112	-0,112	-0,113	-0,113	-0,113	-0,113	
T D		Shear Stress (kPa)		9,9	18,5	21,7	24,0	24,8	26,5	27,0	27,8	28,4	27,6	29,1	29,5	29,9
C M	Initial	19,8	Dry Den. (g/cm ³) [Intial]					1,590					Saturation [Initial]			78,8 %
	Final	34,9	Dry Den. (g/cm ³) [At end of test]					1,619					Saturation [At end of test]			145,2 %
Void Ratio e _o		0,667	Void Ratio e					0,637					Rel. Density	2,650	Shear Rate (mm/min)	0,400

Normal Stress (kPa)		50	Box Type : Square (60.4x60.4mm)										Sample Height :20mm			
T e s t e r e s t	Displacement (mm)															
	Horizontal		0,38	0,76	1,14	1,52	1,91	2,29	2,67	3,05	3,43	3,81	4,19	4,57	4,95	
	Vertical		-0,010	-0,038	-0,061	-0,079	-0,094	-0,103	-0,109	-0,114	-0,116	-0,117	-0,119	-0,122	-0,124	
T D		Shear Stress (kPa)		10,7	29,3	36,8	41,3	45,7	49,1	51,8	54,3	56,9	59,0	60,6	62,3	62,7
C M	Initial	20,1	Dry Den. (g/cm ³) [Intial]					1,578					Saturation [Initial]			78,6 %
	Final	34,4	Dry Den. (g/cm ³) [At end of test]					1,606					Saturation [At end of test]			140,3 %
Void Ratio e _o		0,679	Void Ratio e					0,650					Rel. Density	2,650	Shear Rate (mm/min)	0,400

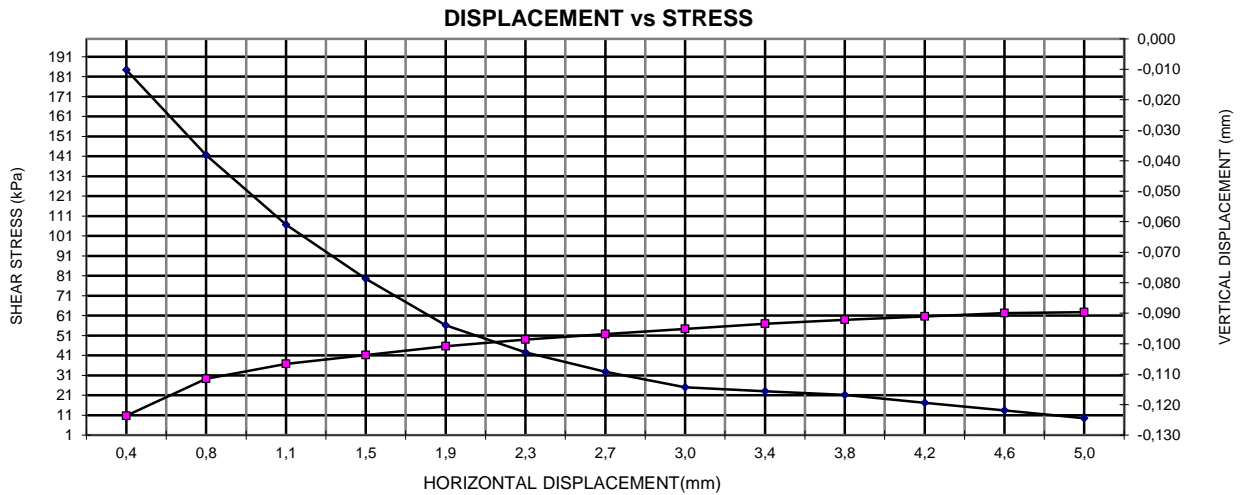
Normal Stress (kPa)		150	Box Type : Square (60.4x60.4mm)										Sample Height :20mm			
T e s t e r e s t	Displacement (mm)															
	Horizontal		0,38	0,76	1,14	1,52	1,91	2,29	2,67	3,05	3,43	3,81	4,19	4,57	4,95	
	Vertical		0,000	-0,008	-0,020	-0,036	-0,041	-0,046	-0,048	-0,051	-0,053	-0,056	-0,056	-0,058	-0,058	
T D		Shear Stress (kPa)		11,6	40,0	52,2	61,1	66,5	71,6	76,9	81,1	85,5	89,1	92,2	95,4	95,8
C M	Initial	20,0	Dry Den. (g/cm ³) [Intial]					1,584					Saturation [Initial]			78,6 %
	Final	33,9	Dry Den. (g/cm ³) [At end of test]					1,608					Saturation [At end of test]			138,6 %
Void Ratio e _o		0,673	Void Ratio e					0,648					Rel. Density	2,65	Shear Rate (mm/min)	0,400

Spl. No SN3039 Test Pit WRD/3 Depth(mm) 0.0-1,0

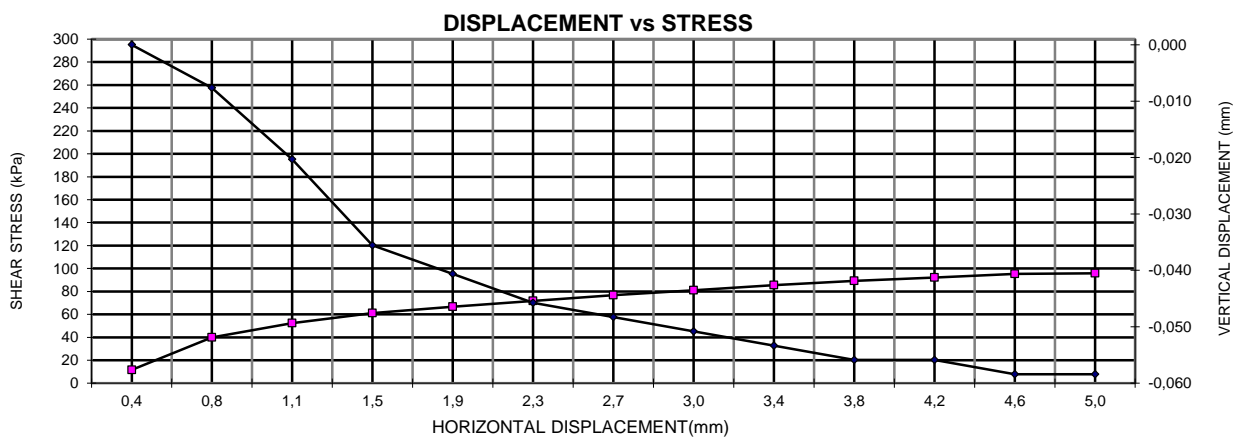
NORMAL STRESS (kPa) 20



NORMAL STRESS (kPa) 50



NORMAL STRESS (kPa) 150



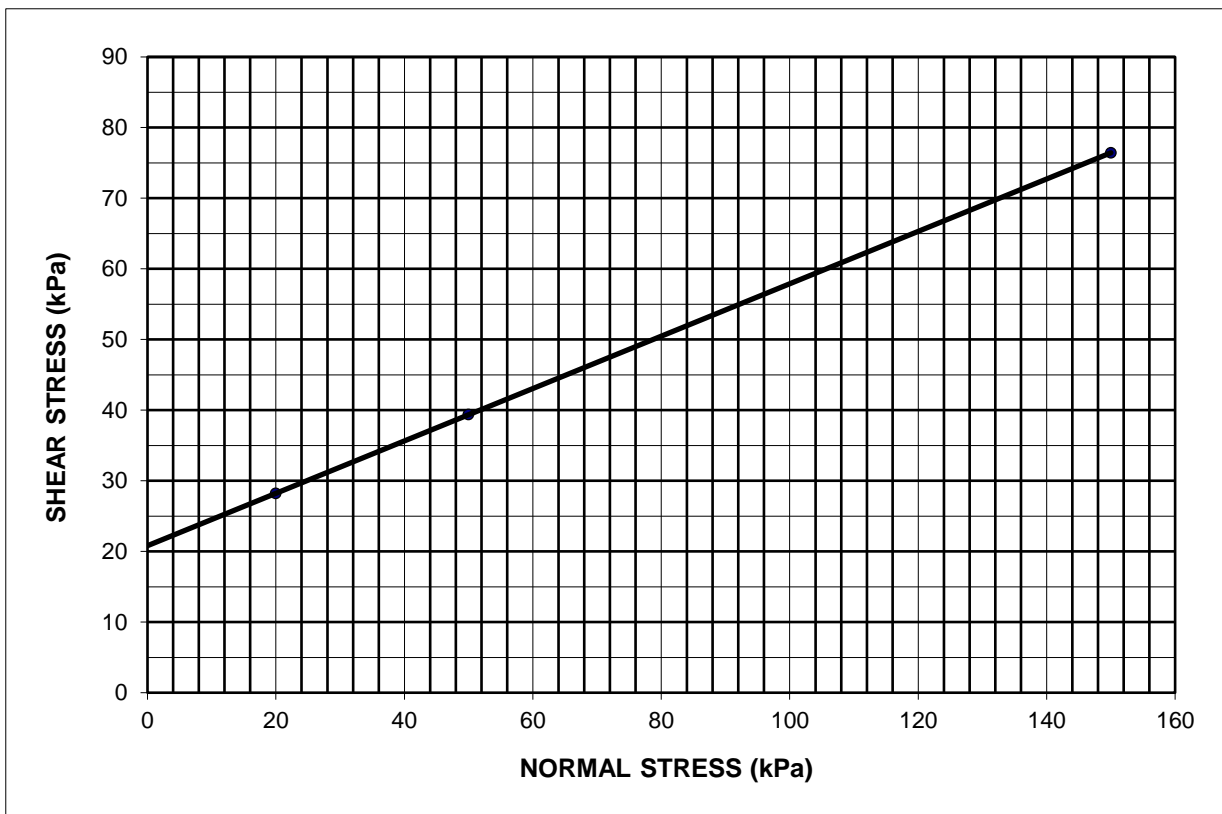
Client: : Andon van der Merwe
Client : Modikwa South 3 OP, Steelpoort, Limpopo Province
Prj. No. : BJ1260/24
Date : 03/04/2024

Spl. No: SN3041
Test Pit: IF/4
Depth (m) 0.0-3,7
S.G: 2,650

SHEAR BOX TEST RESULTS

Test No.	1	2	3		
Normal Stress (kPa)	20	50	150		
Shear Stress (kPa)	28	39	76		
Residual Stress (kPa)					

SHEAR STRESS PARAMETERS		
	PEAK STRENGTH	RESIDUAL STRENGTH
Angle of Internal Friction (°)	20	
Cohesion (kPa)	21	



Project : Andon van der Merwe
Client : Modikwa South 3 OP, Steelpoort, Limpopo Province

Prj. No. : BJ1260/24

Date : 03/04/2024

SHEAR BOX TEST RESULTS

Spl. No SN3041 **Test Pit** IF/4 **Depth(m)** 0.0-3,7

Type of test done : Consolidated Undrained (0,060mm/Min)

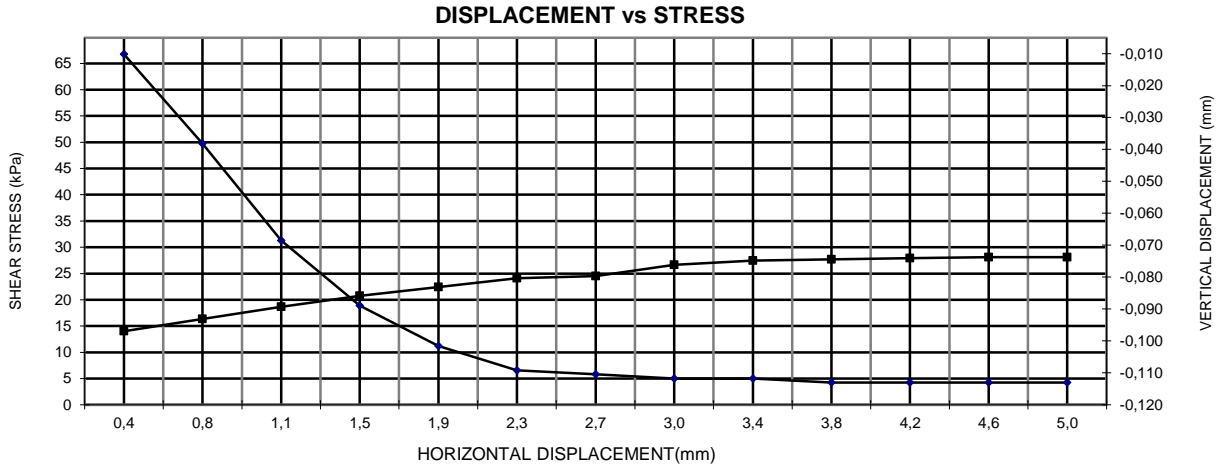
Normal Stress (kPa)		20	Box Type		: Square (60.4x60.4mm)					Sample Height :20mm					
T e s t e r e s t	Displacement (mm)														
	Horizontal		0,38	0,76	1,14	1,52	1,91	2,29	2,67	3,05	3,43	3,81	4,19	4,57	4,95
	Vertical		-0,010	-0,038	-0,069	-0,089	-0,102	-0,109	-0,110	-0,112	-0,112	-0,113	-0,113	-0,113	-0,113
Shear Stress (kPa)		14,1	16,4	18,7	20,8	22,5	24,2	24,6	26,7	27,6	27,8	28,0	28,2	28,2	
C o n d i t i o n s	Initial	25,1	Dry Den. (g/cm³) [Initial]				1,501				Saturation [Initial]				86,9 %
	Final	36,6	Dry Den. (g/cm³) [At end of test]				1,527				Saturation [At end of test]				132,1 %
Void Ratio e_o		0,765	Void Ratio e				0,735				Rel. Density	2,650	Shear Rate (mm/min)		0,400

Normal Stress (kPa)		50	Box Type		: Square (60.4x60.4mm)					Sample Height :20mm					
T e s t e r e s t	Displacement (mm)														
	Horizontal		0,38	0,76	1,14	1,52	1,91	2,29	2,67	3,05	3,43	3,81	4,19	4,57	4,95
	Vertical		-0,010	-0,038	-0,061	-0,079	-0,094	-0,103	-0,109	-0,114	-0,116	-0,117	-0,119	-0,122	-0,124
Shear Stress (kPa)		15,6	20,4	23,0	25,7	28,6	31,8	34,3	36,6	37,9	39,2	39,4	39,4	39,2	
C o n d i t i o n s	Initial	24,7	Dry Den. (g/cm³) [Initial]				1,499				Saturation [Initial]				85,4 %
	Final	36,6	Dry Den. (g/cm³) [At end of test]				1,526				Saturation [At end of test]				131,6 %
Void Ratio e_o		0,768	Void Ratio e				0,737				Rel. Density	2,650	Shear Rate (mm/min)		0,400

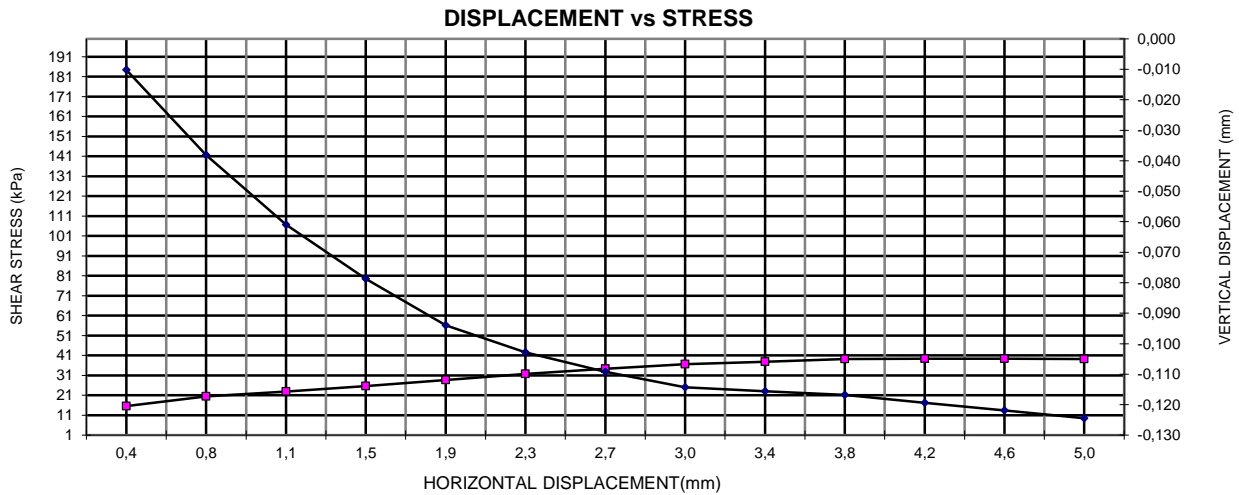
Normal Stress (kPa)		150	Box Type		: Square (60.4x60.4mm)					Sample Height :20mm					
T e s t e r e s t	Displacement (mm)														
	Horizontal		0,38	0,76	1,14	1,52	1,91	2,29	2,67	3,05	3,43	3,81	4,19	4,57	4,95
	Vertical		0,000	-0,008	-0,020	-0,036	-0,041	-0,046	-0,048	-0,051	-0,053	-0,056	-0,056	-0,058	-0,058
Shear Stress (kPa)		34,7	54,7	61,9	67,8	71,2	73,5	75,4	76,2	76,4	76,4	73,7	73,9	73,9	
C o n d i t i o n s	Initial	24,8	Dry Den. (g/cm³) [Initial]				1,496				Saturation [Initial]				85,2 %
	Final	34,2	Dry Den. (g/cm³) [At end of test]				1,518				Saturation [At end of test]				121,5 %
Void Ratio e_o		0,771	Void Ratio e				0,746				Rel. Density	2,65	Shear Rate (mm/min)		0,400

Spl. No SN3041 Test Pit IF/4 Depth(mm) 0.0-3,7

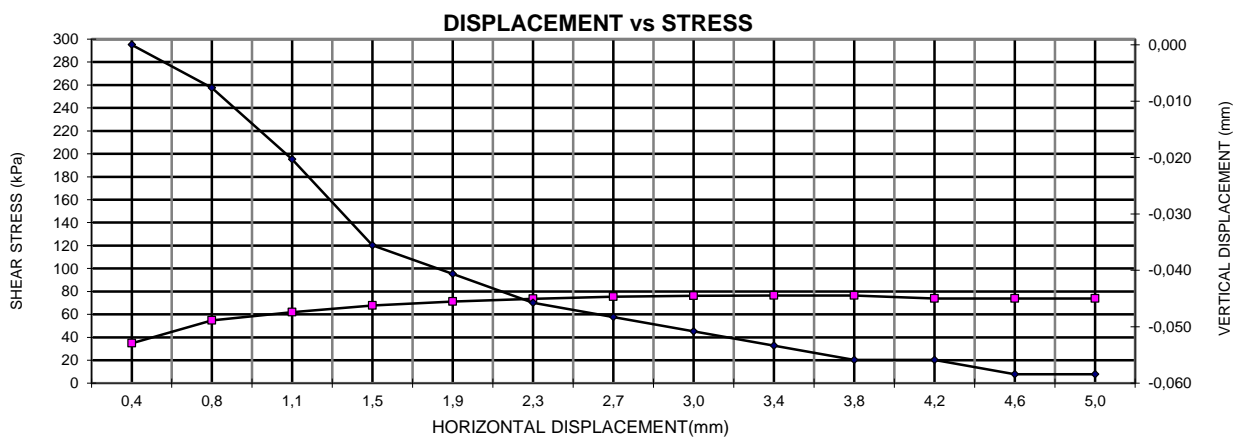
NORMAL STRESS (kPa) 20



NORMAL STRESS (kPa) 50



NORMAL STRESS (kPa) 150



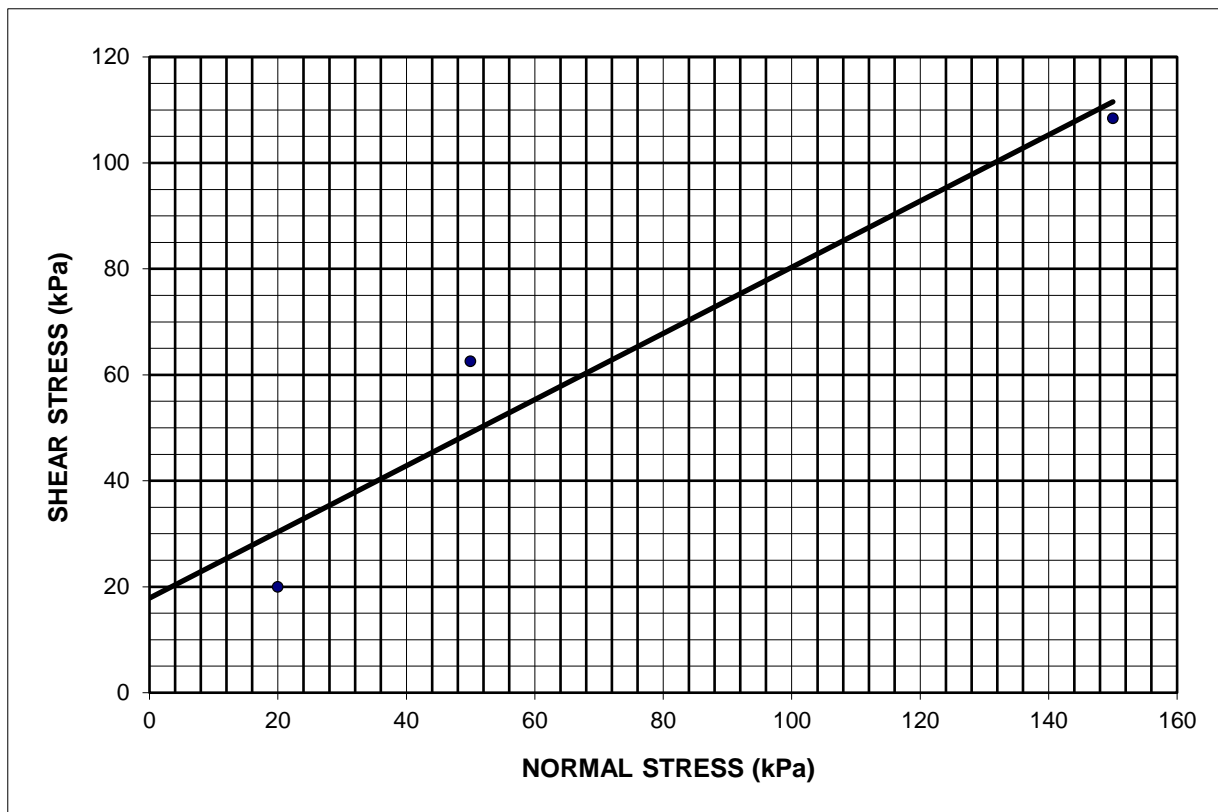
Client: : Andon van der Merwe
Client : Modikwa South 3 OP, Steelpoort, Limpopo Province
Prj. No. : BJ1260/24
Date : 03/04/2024

Spl. No: SN3045
Test Pit: HRC/4
Depth (m) 0.0-0,9
S.G: 2,650

SHEAR BOX TEST RESULTS

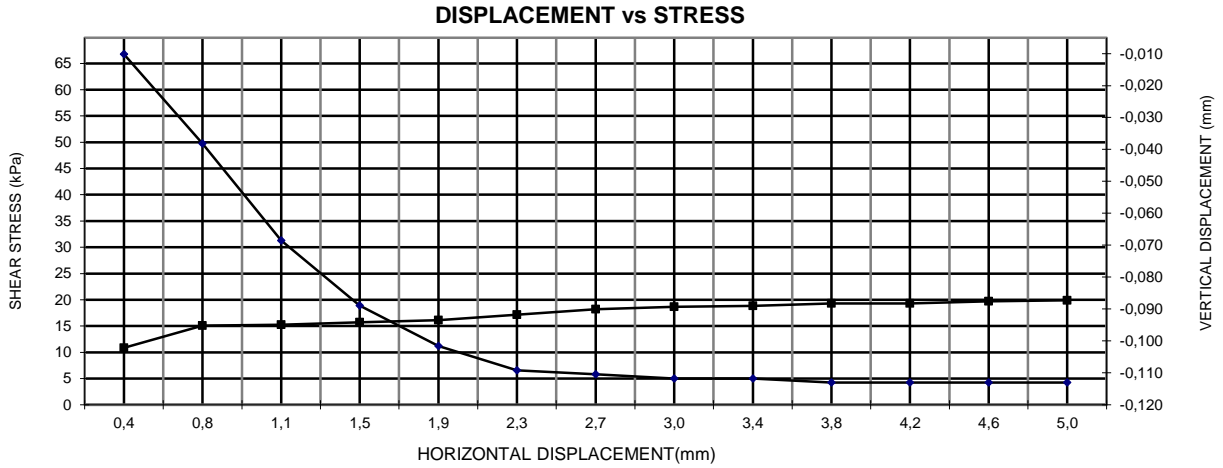
Test No.	1	2	3		
Normal Stress (kPa)	20	50	150		
Shear Stress (kPa)	20	63	108		
Residual Stress (kPa)					

SHEAR STRESS PARAMETERS		
	PEAK STRENGTH	RESIDUAL STRENGTH
Angle of Internal Friction (°)	34	
Cohesion (kPa)	18	

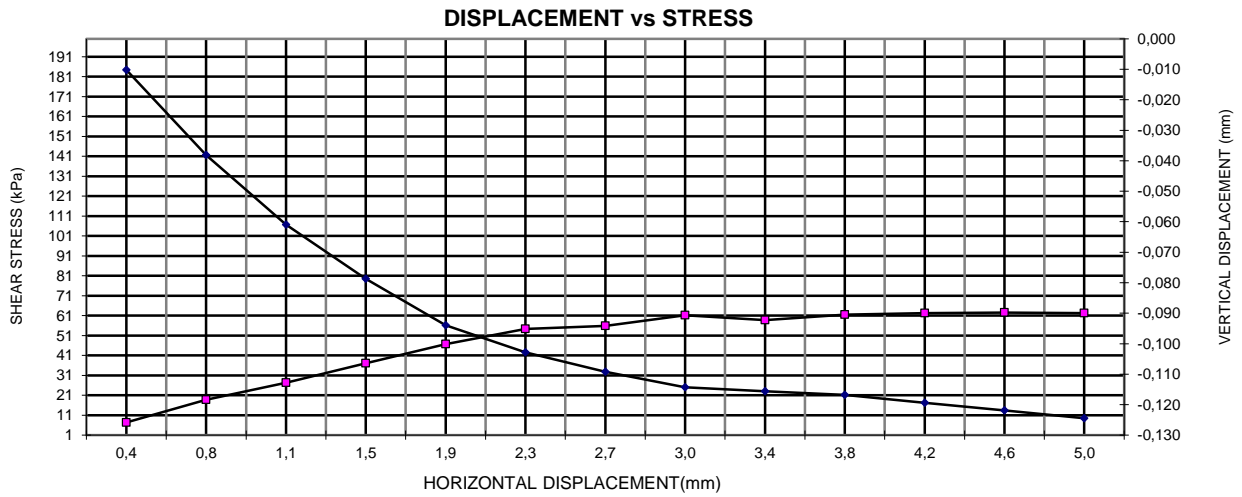


Spl. No SN3045 Test Pit HRC/4 Depth(mm) 0.0-0,9

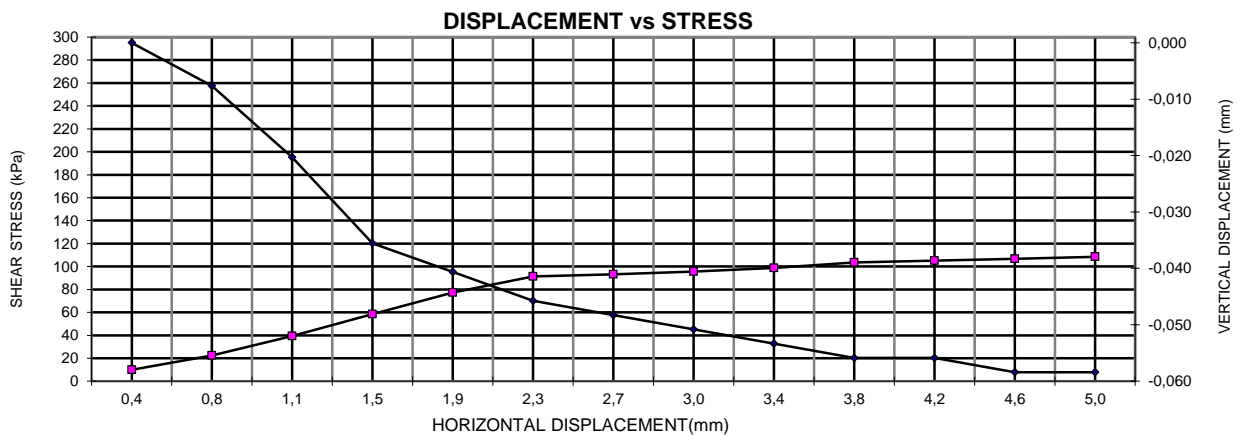
NORMAL STRESS (kPa) 20



NORMAL STRESS (kPa) 50



NORMAL STRESS (kPa) 150



Consolidation Test / Konsolidasie Toets

CLIENT: : Andon van der Merwe

JOB REQ NO: BJ1260/24

PROJECT : Modikwa South 3 OP, Steelpoort, Limpopo Province.

SAMPLE NO: SN3042

DATE: : 2024/04/03

Sample Origin: IF/5

DEPTH: 0.7m

Sample Parameters

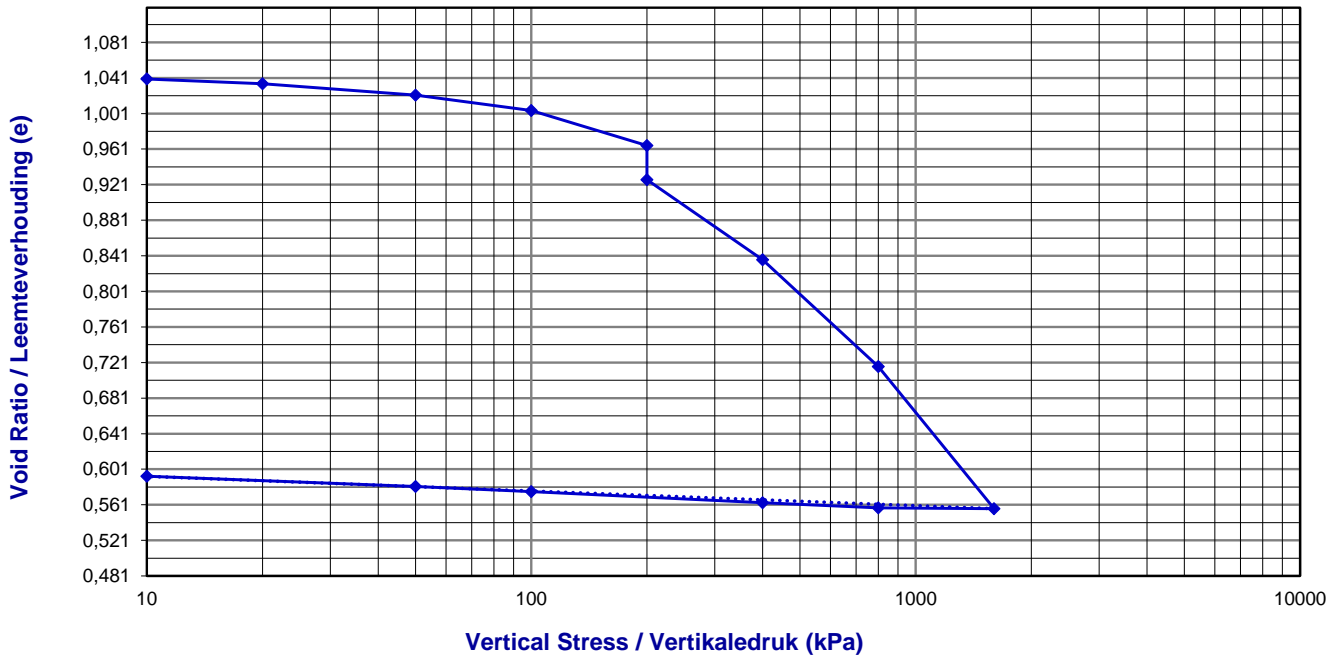
Machine	E	Mass of Ring + wet sample (start of test)	244,4 g
Ring No	2	Mass of Ring + dry sample	225,0 g
Ring Ht	19,10 mm	Mass of Ring + wet sample (end of test)	260,8 g
Ring Diam.	75,00 mm	Mass of ring	115,6 g
Ring Vol.	84,38 cm ³	Dry Density	1,296 kg/m ³
M/C at Start	17,7 %	M/C at End of Test	32,7 %
Sat. at Start	45,01 %	Sat. at End	146,2 %
Initial Voids Ratio	1,044	S.G.	2,650
Initial Ht. of Voids	9,76 mm	Ht. Of Solids	9,34 mm

TEST WAS DONE ON A SPECIMEN PREPARED FROM AN UNDISTURBED SAMPLE AND SATURATED @ 200 kPa

Test Parameters

V.Strs (kPa)	1	10	20	50	100	200	200	400	800	1600	800	400	100	50	10
Dial (u)	10000	9961	9912	9792	9630	9262	8902	8063	6940	5446	5454	5509	5624	5680	5786
Strain (%)		0,20	0,46	1,09	1,94	3,86	5,75	10,14	16,02	23,84	23,80	23,51	22,91	22,62	22,06
Void Ratio	1,044	1,040	1,035	1,022	1,004	0,965	0,926	0,837	0,717	0,557	0,557	0,563	0,576	0,582	0,593
Cc		0,004	0,017	0,032	0,058	0,131		0,298	0,399	0,531	0,003	0,020	0,020	0,020	0,016
Mv (1/Mpa)		0,227	0,257	0,209	0,170	0,193		0,220	0,147	0,098	0,001	0,007	0,020	0,059	0,139

Collapse Potential **1,9 %**



CLIENT: Andon van der Merwe
PROJECT: Modikwa South 3 OP, Steelpoort, Limpopo Province
PRJ. No: BJ1260/24
ISSUE DATE: 03/04/2024

SAMPLE No:	SN3039	SN3040	SN3041	SN3045		
SAMPLE REFERENCE	Modikwa South 3 OP	Modikwa South 3 OP	Modikwa South 3 OP	Modikwa South 3 OP		
TRAIL PIT / SAMPLE ORIGIN	WRD/3	IF/3	IF/4	HRC/4		
DEPTH (m)	0,0-1,0	0,0-2,2	0,0-3,7	0,0-0,9		
MATERIAL DESCRIPTION						
OPTIMUM MOISTURE CONTENT (%)	20,6	23,6	24,4	30,4		
MOISTURE CONTENT (%)	21,6	24,6	23,8	29,6		
MAX. DRY DEN. [Std. PROCTOR] (kg/m ³)	1697	1572	1613	1462		
DRY DENSITY (kg/m ³)	1562	1465	1508	1367		
RELATIVE COMPACTION (%)	92,0	93,2	93,5	93,5		
VOID RATIO (e)	-	-	-	-		
TEST TEMPERATURE °C	22	23	22	19		
*PERMEABILITY @ 15 °C (cm/sec)	2.987x10⁻⁰⁵	4.123x10⁻⁰⁶	2.580x10⁻⁰⁶	1.16x10⁻⁰⁴		

** Falling Head Method @ 100% of Undisturb sample.*