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GEOTECHNICAL CONSULTING (PTY) LTD

Report on the Geotechnical Investigation Carried Out for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal

14 June 2021

Project Number: 21012
Report Number: 21012-R01

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**REPORT ON THE GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE
ADDITIONS PROPOSED TO HEUWELLAND PRIMARY SCHOOL IN EMPANGENI,
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1 INTRODUCTION AND TERMS OF REFERENCE

Mr Rahul Shriram from Shriram Geotechnical Consulting (Pty) Ltd ("Shriram Geotechnical") was approached by Mr Blessing Gororo from Paradox Young & Associates (Pty) Ltd via email on 9 December 2020 to submit a proposal to carry out a geotechnical investigation for the additions proposed to Heuwelland Primary School in Empangeni in KwaZulu-Natal. The scope of work for the geotechnical investigation, comprising Tractor Loaded Backhoe (TLB) test pits along with test pit positions, was provided by Mr Gororo.

Mr Shriram submitted a quotation to Mr Gororo via email on 17 January 2021 following clarifications. The quotation was accepted by Mr Gororo by return email on the same day.

The exact nature of the additions proposed for which the geotechnical investigation was required at Heuwelland Primary School was not known at the time of the field investigation and was assumed to comprise the following:

- 6 No. single storey structures (classroom blocks) following the demolition of the existing blocks;
- New single storey structures (classrooms); and
- 1 No. new caretakers quarters following the demolition of the existing structure.

The aim of the geotechnical investigation was to assess the ground conditions underlying the areas earmarked for development and to provide development guidelines. This report presents the findings of the investigation and provides development guidelines pertaining to excavatability, drainage and foundations.

2 INFORMATION SUPPLIED

A drawing showing the layout of the existing structures and test pit positions was provided to Shriram Geotechnical by Paradox Young & Associates (Pty) Ltd for use in the geotechnical investigation. The information contained in the title block of the site plan is as follows: Project Title "HEUWELLAND PRIMARY SCHOOL STORM DAMAGE PROGRAMME", Drawing Description: "SITE PLAN DEMOLISHING LAYOUT", Drawing Number: HWPS-ST001, Revision Number:00, dated 10/06/19. Received in PDF via email on 9 December 2020.

3 SITE DESCRIPTION

Heuwelland Primary School is situated within Empangeni in KwaZulu-Natal, at the approximate coordinates 28°45'14"S 31°53'09"E, approximately 1.5km north-west of the Five Ways Mall in Fairview.

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The school property is situated on a hilltop which appears to have required reshaping in order to accommodate the existing teaching, administrative, sports and recreational facilities. In general, the property appears to have been sloped downwards from the flatter northern portions towards the school boundaries with several cuts and fills constructed in order to create level platforms.

Several large trees and well-manicured gardens were noted scattered throughout the school property which was generally found to be bound by precast concrete fencing.

Several buried and/or above ground utilities were noted throughout the property.

Three general areas were included in the investigation and are described briefly below.

3.1 Area 1: Existing classrooms, south-eastern portions of the site

A total of six single storey blocks/classrooms were noted within the area investigated within the south-eastern portions of the site. The fifth, or southern-most, row of classrooms (from the north), comprises two structures. The first consists of a conventional single storey structure while the second, western-most structure, comprises that of an unconventional “dome” shaped structure. The school hall and a smaller structure occurs north of the area.

This area is generally flat until the third row of classrooms (from the north), with the fourth and fifth rows of classrooms being constructed on platforms approximately 0.90 to 2.10m higher than the platform on which the third row of classrooms were constructed. The area beyond the fifth row of classrooms comprises a flat playground which is sloped downwards towards the caretakers quarters along the south.

The area occurring between the blocks is surfaced with a mixture of grasses and concrete pavers/flagstone.

3.2 Area 2: Existing caretakers quarters, southern-most portion of the site

This area is occupied by an existing single storey structure which serves as a caretakers quarters. The area is fairly flat becoming moderately to steeply sloped downwards towards the school property boundary along Wildebees Street in a general southerly to south-easterly direction.

The area around the existing structure is generally vegetated with grasses and plants with barren patches occurring.

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3.3 Area 3: Adjacent to existing Administration Block, eastern-most portion of the existing sports field

The third area investigated is situated within the eastern-most portions of an existing grassed sports field. This area is situated partially along the toe of a steep grassed slope towards the south (above which is Area 1 and Area 2) and partially alongside an existing two storey Administration Block (northern portions).

Modular structures were noted within this area.

Photographs of the general site are shown below.



Photo 1: Showing the eastern portions of Area 1 looking from north to south. Note the four northern-most blocks.



Photo 2: Area 1, showing the surfacing between the second and third blocks (referenced from north to south).



Photo 3: Area 1, showing the 0.90m drop in elevation from the fourth to third block (referenced from north to south).



Photo 4: Area 1, showing the 1.20m increase in elevation from the fourth block to the two smaller blocks. Note the unconventional "dome" shape.

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Photo 5: Area 2, showing the eastern portion of the existing caretakers quarters.



Photo 6: Area 2, showing the western portion of the existing caretakers quarters.



Photo 7: Area 3, showing the eastern portion of the sports field, adjacent administration block and grassed slope as well as the modular structures. Taken looking in a general north-easterly direction.



Photo 8: Area 3, showing the portion between the administration block and the modular structures on the sports field.

The locality of the site is shown in the Locality Plan, Figure 1, contained in Appendix A.

4 FIELDWORK

The fieldwork was carried out on 26 and 27 January 2021 and comprised the following:

- Test pits; and
- Dynamic Cone Penetrometer (Light), or DPL, tests.

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Note that the test pit positions were provided by Paradox Young & Associates (Pty) Ltd. Majority of these test pit positions were relocated on site due to the positions provided being inaccessible or being situated within well maintained and/or hard surfaced areas.

All test positions are shown on Figure 2, contained in Appendix A.

All depths and measurements are referenced from existing ground level at the time of the investigation unless otherwise stated.

4.1 Test Pits

Nine test pits, designated TP1 to TP9, were excavated using a tractor loaded backhoe (TLB). The test pits were generally excavated at, or close to, positions provided by Paradox Young & Associates (Pty) Ltd. Where necessary, the test pits were relocated to suitable positions.

No refusal was encountered during excavation of the test pits which were advanced to final depths ranging from 2.80m to 3.30m.

A summary of the test pits is provided in Table 1 below.

Table 1
Summary of Test Pits

Area	Test Pit Number	Final Depth (m)	Refusal	Groundwater Seepage Depth (m)	Sidewall Collapse Depth (m)
Area 1	TP1	2.80	No	No	No
	TP2	2.90	No	No	No
	TP3	2.90	No	No	No
	TP4	3.00	No	No	No
	TP5	3.30	No	No	No
	TP6	3.30	No	No	No
Area 2	TP7	3.00	No	No	No
Area 3	TP8	3.00	No	No	No
	TP9	3.00	No	No	No

The soils exposed in the test pits were profiled¹ by an engineering geologist.

The detailed logs of the test pits are provided in Appendix B.

¹ Geoterminology Workshop (2002) – Guidelines for Soil and Rock Logging, SAIEG-AEG-SAICE (Geotech Div) pp47.

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Photographs of the test pits are shown below.



Photo 9: Showing TP1.



Photo 10: Showing TP2.



Photo 11: Showing TP3.



Photo 12: Showing TP4.

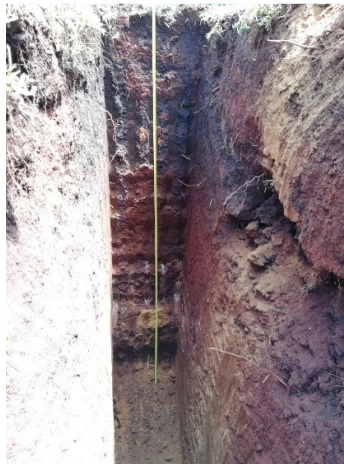


Photo 13: Showing TP5.



Photo 14: Showing TP6.

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Photo 15: Showing TP7.



Photo 16: Showing TP8.



Photo 17: Showing TP9.

4.2 Dynamic Cone Penetrometer (Light) Tests

A total of 23 No. Dynamic Cone Penetrometer (Light), or DPL, tests, designated DPL1 through to DPL23, were conducted. The DPL tests were conducted by allowing a 10kg steel hammer to freefall 550mm driving several steel rods plus cone into the ground. Each of the steel rods comprises three 300mm segments. The number of blows required to drive each 300mm segment into the ground was recorded. This allows for an estimate of the inferred consistency of the in situ soils through which the rod is driven to be made. In addition, the depth at which DPL refusal occurs may allow for the depth to bedrock to be inferred. It must be noted that DPL refusal may also occur on fill material (rubble, boulders, cobbles etc.), and/or dense/stiff soils.

The results of the DPL tests, consisting of blow count and inferred consistency against depth, are given in Appendix C.

A summary of the DPL tests carried out is contained in Table 2 below.

Table 2
Summary of DPL Tests

Area	DPL Number	Final Depth (m)	Refusal
Area 1	DPL1	2.70	No
	DPL2	2.70	No
	DPL3	2.70	No
	DPL4	2.40	Yes
	DPL5	2.70	No

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Area	DPL Number	Final Depth (m)	Refusal
	DPL6	2.70	No
	DPL7	2.10	Yes
	DPL8	2.10	Yes
	DPL9	2.70	No
	DPL10	2.70	No
	DPL11	2.40	Yes
	DPL12	3.90	Yes
	DPL13	2.70	No
	DPL14	3.60	Yes
	DPL15	3.60	No
Area 3	DPL16	2.70	Yes
	DPL17	2.40	Yes
	DPL18	2.70	No
	DPL19	1.50	Yes
Area 2	DPL20	2.70	No
	DPL21	1.80	Yes
	DPL22	2.10	Yes
	DPL23	2.10	Yes

5 GEOLOGY

The 1:250 000 Geological Map of Dundee, Geological Series 2830, indicates that the site investigated is situated along a contact between gneiss of the Swazian age and gneiss of the Lubana Formation. The geotechnical field investigation confirmed that the site was underlain by soils resembling that of residual gneiss. These residual soils were however encountered beneath a layer/s of fill material.

5.1 Fill

Fill material was encountered in all of the test pits excavated. The fill was encountered from ground level to depths ranging from 0.30m to 1.00m. The fill encountered in Area 2 and Area 3 was notably thinner (Area 2: 0.40m; Area 3: 0.30 and 0.60m).

The materials encountered generally comprised variants of slightly moist or moist dark brown or dark red speckled black, yellow, grey, red and/or orange sandy clays with cobbles, brick, pipe and lithic fragments occasionally noted. Fine to large roots were often encountered.



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5.2 Residual Gneiss

Residual gneiss was encountered beneath the fill down to depths of 2.80 to 3.30m in all of the test pits excavated. The residual soils were generally found to be either slightly moist or moist and varied in colour between dark brownish red, orangish brown or yellowish brown speckled, mottled and/or blotched with occasional streaks of grey, red, yellow, orange, black, brown and gold or combinations thereof. The residual material comprised either firm to very stiff slightly gravelly sandy clays or medium dense to very dense gravelly clayey sands with zones of gravelly sandy clay and zones of completely weathered very soft rock gneiss.

In TP7, the residual gneiss encountered was found to consist of dark brown speckled to blotched red, orange, yellow and grey medium dense sandy clayey gravel with angular to sub-angular cobbles and boulders from 0.40-0.90m.

Orangish brown speckled to mottled grey, yellow, red and gold medium dense clayey gravelly sand with abundant zones of completely weathered very soft rock gneiss was encountered at 2.20m to 3.00m in TP4.

In some instances, such as in TP7 and TP8, the lowermost layer of residual gneiss bordered or contained portions that bordered completely weathered very soft rock gneiss bedrock.

Refusal of several DPL tests were encountered at depths shallower than the depths to which nearby test pits were advanced. It is likely that refusal of the DPL tests was encountered on >dense/stiff materials, lithic fragments and/or zones of weathered bedrock. An exception to this may be within Area 2, where DPL refusal may have been encountered on weathered bedrock at depths of 1.80 to 2.10m. This was however not confirmed visually.

6 GROUNDWATER

No groundwater seepage was encountered during the investigation. It is however possible that during or after heavy or prolonged rainfall, that shallow groundwater activity in the form of temporary perched seepage zones can be expected, more so towards the interface between the residual soils and the underlying bedrock, along the interface between the in situ materials and fills and/or within soils that are bound by materials of a lower permeability. Groundwater seepage may also occur along fissures and/or joints within the rock mass.



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7 DEVELOPMENT GUIDELINES

7.1 Proposed Development

It is understood that the following is proposed to be constructed:

- Area 1: 6 No. single storey structures.
- Area 2: 1 No. single storey structure.
- Area 3: single storey structure.

The loads expected to be exerted on the founding stratum by the new structures have not been provided. It is however assumed that these will not exceed 100kPa.

7.2 Excavatability and Excavation Stability

It is assumed that no earthworks are proposed. It is however recommended that earthworks be carried out in accordance with SANS 1200 D should the need arise.

Soft Excavation (SANS 1200 D) may be possible down to depths of 2.80m to 3.30m where the test pits were excavated. Intermediate and/or Hard Excavation may be required beyond these depths. Although not confirmed visually, Intermediate and/or Hard Excavation may be required beyond the DPL refusal depths (see Appendix C). An allowance for Boulder Excavation is to be made, particularly within Area 2.

Given that excavations may be required within confined spaces, hand-held pneumatic and/or power tools may be required to assist with excavations.

It is recommended that all temporary unsupported excavations deeper than 1.20m and of maximum height of 2.50m, be battered to a slope not steeper than 1V to 1.5H in soil and/or incompetent bedrock and/or 1V to 0.5H in competent bedrock, or otherwise supported to ensure their stability over the construction period. Fills are to be battered back at a slope not exceeding 1V to 2H.

All cobbles, boulders and/or similar are to be removed from excavated faces as to safeguard workers while working in excavations. All spoiled material, construction materials and/or similar must be moved at least 1.5m clear of the excavations to minimise the chance of collapse of the sidewalls.

Although groundwater seepage was not encountered during the investigation, dewatering and shoring of the excavations will be required should groundwater seepage be encountered during construction.

Regardless of the above, a suitably qualified professional must be engaged with to assess all excavations and to undertake a formal design for all temporary and permanent lateral support and drainage measures.

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Should bedrock be encountered, special attention must be given to excavations where joint sets are found to be dipping out of the cut face.

7.3 Foundations

The results of the field investigation generally found the site to be underlain by fill material beneath which, residual gneiss occurs. The proposed single storey structures may be founded on conventional strip footings taken into the residual soils of minimum medium dense/firm to stiff consistency. The minimum founding depths at which the estimated allowable bearing pressure may be achieved are provided in Table 3 below. Note that the Structure References provided in Table 3 are shown on Figure 2, included in Appendix A.

Table 3
Minimum Founding Depth at which 100kPa may be Achieved

Area	Test Positions	Structure Reference	Minimum Founding Depth (m)
Area 1	TP1 to TP6 DPL1 to DPL15	Block 1	1.20
		Block 2	1.20
		Block 3	1.20
		Block 4	1.20
		Block 5	1.20
		Block 6	1.20
Area 2	TP7 DPL20 to DPL23	Caretakers Quarters	1.80 (see text below)
Area 3	TP8, TP9 DPL16 to DPL19	Single Storey Structure	DPL16: 1.80 DPL17: 0.60 DPL18: 1.20 DPL19: 0.60 (see text below)

A test pit, TP7, was excavated north of the existing caretakers quarters (Area 2). No additional test pits were excavated south of the existing structure due to limited access. Talks with the caretaker however suggest that the areas south and south-east of the existing structure was backfilled. Although refusal of the DPL tests carried out in this area suggest that bedrock may exist at the suggested founding depth of 1.80m, DPL refusal may also occur on fill comprised of boulders etc.. A substantial drop in elevation exists from the northern to southern portions of the existing caretakers quarters. Steps may be provided for along the strip footings in order to minimise the founding depth while

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ensuring that all foundations are constructed on in situ materials of minimum medium dense/firm to stiff consistency.

With regard to Area 3, where it is assumed that single storey structures are to be constructed, the ground conditions were found to vary in composition and consistency based on the fieldwork carried out. Clays of very soft to soft consistency with firm zones were encountered in TP9, located within the northern portion of Area 3, while medium dense becoming dense with depth clayey sands with abundant zones of completely weathered very soft rock gneiss that bordered gneiss bedrock was encountered in TP8, which was excavated within the southern portions of Area 3. The point at which these layers transition from one to the other was not located on site. It can however be seen through the results of the DPL tests that the depth at which competent materials exist decreases from north (TP9) to south (TP8) with weak zones noted between. Depending on the layout of the structures proposed within this area, stepped strip footings may be provided for to accommodate the varying founding depths. It is however strongly recommended that additional field testing be carried out once the site layout within this Area is confirmed.

All loose debris along the base of the foundation inverts are to be removed prior to foundation construction and the foundation inverts thoroughly compacted. All foundations are to be cage reinforced and are to be constructed on a uniform founding medium in terms of competency and composition. All foundation inverts are to be inspected by an engineering geologist or geotechnical engineer prior to foundation construction to confirm that the excavations are taken into a medium upon which the desired bearing pressures will be achieved. Under no circumstances should foundations be constructed on fills unless designed specifically for this purpose.

All concrete, reinforcement (concrete and masonry) and structural specifications are to be provided by a structural engineer. Where the designer has any uncertainty, further investigations must be carried out prior to final design.

Note that the preceding two paragraphs are applicable to all foundations (Area 1, Area 2 & Area 3).

7.4 Surface Runoff and Drainage

The stability of any site is promoted by the ability to prevent the wetting of the materials which underlie it. Water must be directed away from all excavations and foundations; and must not be allowed to pond.

The wetting of the materials underlying foundations and surface beds may result in heave, settlement and/or a substantial loss in strength which may in turn result in the cracking of the structure. It is

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therefore imperative that the site is kept well drained during and after construction. As such, surface waters must be diverted away from all excavations, footings and surface beds and subsoil drains must be introduced where evidence of groundwater seepage is encountered.

As a minimum, a concrete apron must be provided for around the structures to prevent the ingress of surface waters beneath the foundations as this may compromise the integrity of the founding horizon.

Should soakaways exist or be proposed, these must be located well away from the footings of structures.

All surface and subsoil drainage measures must be designed by a suitably qualified engineer.

8 CONCLUSION

This report sets out the results of the geotechnical investigation carried out for the additions proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal; and provides development guidelines pertaining to excavatability, foundations and drainage.

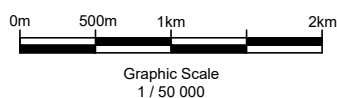
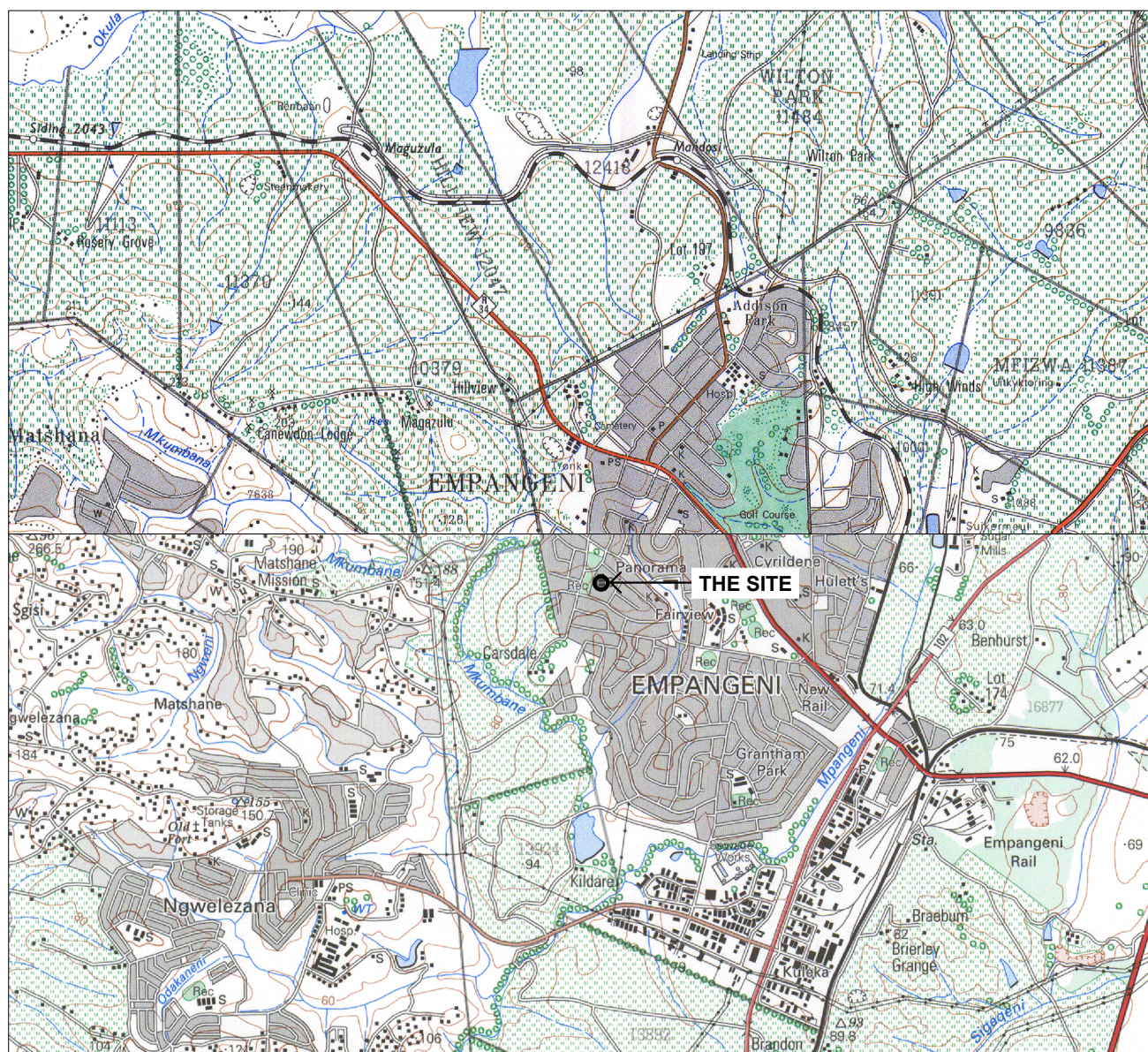
The information given in this report relates specifically to those encountered at the field test positions. It is possible that conditions at variance with those discussed above can be encountered elsewhere. It is therefore important that Shriram Geotechnical Consulting (Pty) Ltd carry out periodic inspections of the open excavations before any construction is carried out. Any change from the anticipated ground conditions could then be taken into account to avoid unnecessary expense and damage to the finished developments. In this regard it is important that the construction phase of the project be treated as an augmentation of the geotechnical investigation


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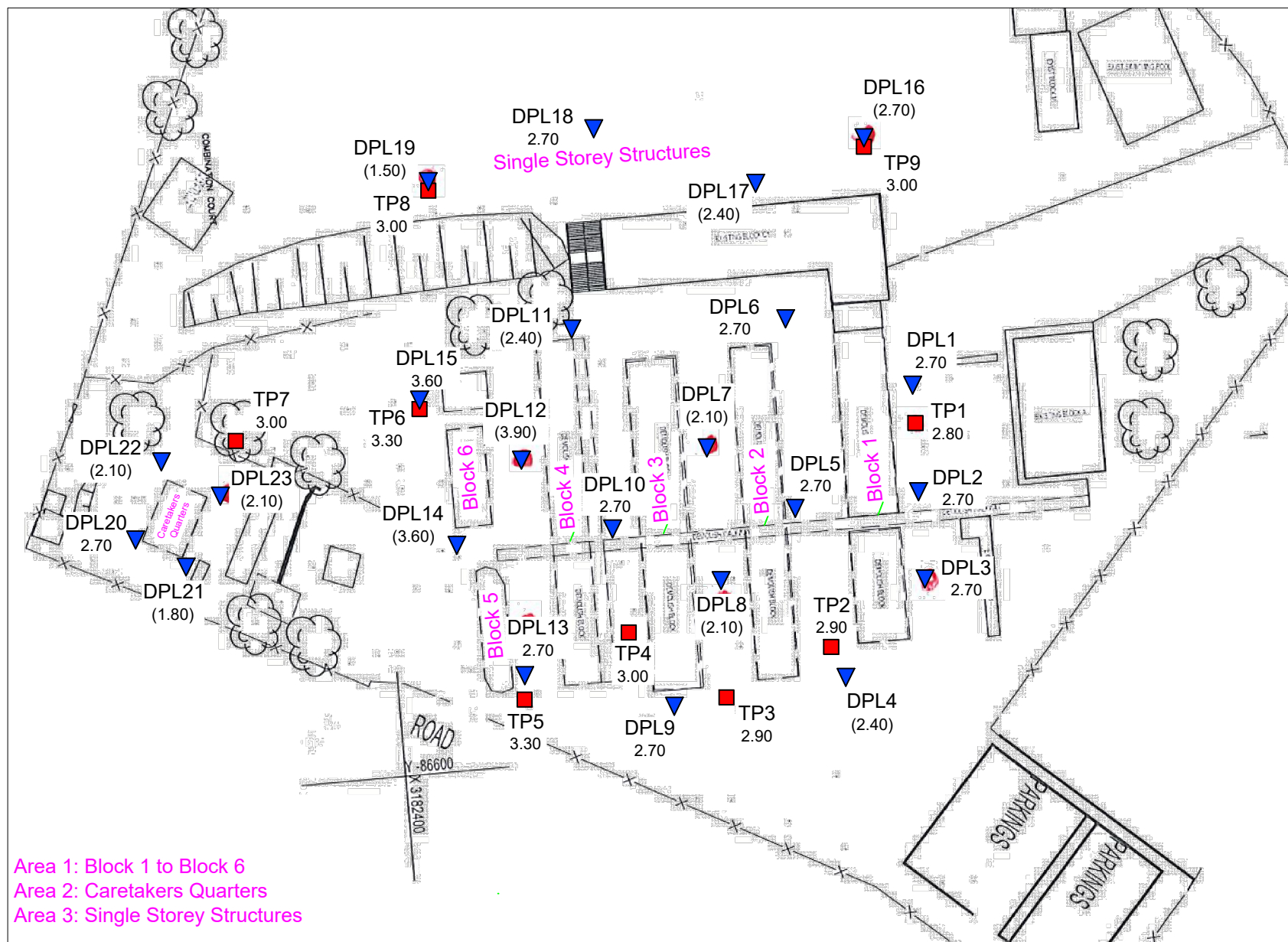
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Appendix A: Figures 1 through 3

- **Figure 1: Locality Plan**
- **Figure 2: Site Plan**
- **Figure 3: Geology Plan**

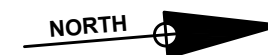


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<p>CLIENT</p> <p style="text-align: center; font-size: 1.2em;">Paradox Young and Associates (Pty) Ltd</p>											
<p>PROJECT</p> <p style="text-align: center; font-size: 1.2em;">Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School, KwaZulu-Natal</p>											
<p>DRAWING DESCRIPTION</p> <p style="text-align: center; font-size: 1.5em; margin-top: 40px;">Locality Plan</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 20px;"> <tr> <td colspan="2" style="padding: 5px;"> SCALE ON A4 <div style="text-align: center; font-size: 1.5em; font-weight: bold;">1 / 50 000</div> </td> <td colspan="2" style="padding: 5px;"> DATE CREATED <div style="text-align: center; font-size: 1.5em; font-weight: bold;">14-06-2021</div> </td> </tr> <tr> <td style="padding: 5px; text-align: center;"> PROJECT REF. NUMBER <div style="font-size: 1.5em; font-weight: bold;">21012</div> </td> <td style="padding: 5px; text-align: center;"> REVISION <div style="font-size: 1.5em; font-weight: bold;">00</div> </td> <td style="padding: 5px; text-align: center;"> DRG. SIZE <div style="font-size: 1.5em; font-weight: bold;">A4</div> </td> <td style="padding: 5px; text-align: center;"> FIG. No. <div style="font-size: 1.5em; font-weight: bold;">1</div> </td> </tr> </table>				SCALE ON A4 <div style="text-align: center; font-size: 1.5em; font-weight: bold;">1 / 50 000</div>		DATE CREATED <div style="text-align: center; font-size: 1.5em; font-weight: bold;">14-06-2021</div>		PROJECT REF. NUMBER <div style="font-size: 1.5em; font-weight: bold;">21012</div>	REVISION <div style="font-size: 1.5em; font-weight: bold;">00</div>	DRG. SIZE <div style="font-size: 1.5em; font-weight: bold;">A4</div>	FIG. No. <div style="font-size: 1.5em; font-weight: bold;">1</div>
SCALE ON A4 <div style="text-align: center; font-size: 1.5em; font-weight: bold;">1 / 50 000</div>		DATE CREATED <div style="text-align: center; font-size: 1.5em; font-weight: bold;">14-06-2021</div>									
PROJECT REF. NUMBER <div style="font-size: 1.5em; font-weight: bold;">21012</div>	REVISION <div style="font-size: 1.5em; font-weight: bold;">00</div>	DRG. SIZE <div style="font-size: 1.5em; font-weight: bold;">A4</div>	FIG. No. <div style="font-size: 1.5em; font-weight: bold;">1</div>								
<p>REFERENCE LIST</p> <p>1:50 000 Topographical Series : 2831DB EMPANGENI 1:50 000 Topographical Series : 2831DD FELIXTON</p>											



LEGEND

- DPL 1 2.70 (Blue triangle) Approximate position of Dynamic Cone Penetrometer (Light) Test showing final depth or depth to refusal () in meters below ground level
- TP 1 1.15 (Red square) Approximate position of Test Pit showing final depth or depth to refusal () in meters below ground level



Note: North is approximate.



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 rahul@shriram.co.za
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P.O. BOX 21055
 BLUFF 4036

CLIENT

**Paradox Young and Associates
 (Pty) Ltd**

PROJECT

**Geotechnical Investigation for the
 Additions Proposed to Heuwelland
 Primary School, KwaZulu-Natal**

DRAWING DESCRIPTION

Site Plan showing:

1. Dynamic Cone Penetrometer (Light) Tests
2. Hand Augered Boreholes

SCALE ON A4

1 / 1000

DATE CREATED

14-06-2021

PROJECT REF. NUMBER

21012

REVISION

00

DRG. SIZE

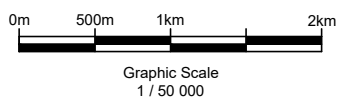
A4

FIG. No.

2


REFERENCE LIST

Site Plan background provided by Client. Drawing
 No.: HWPS-ST001, Revision 00, Dated 10/16/2019



LEGEND

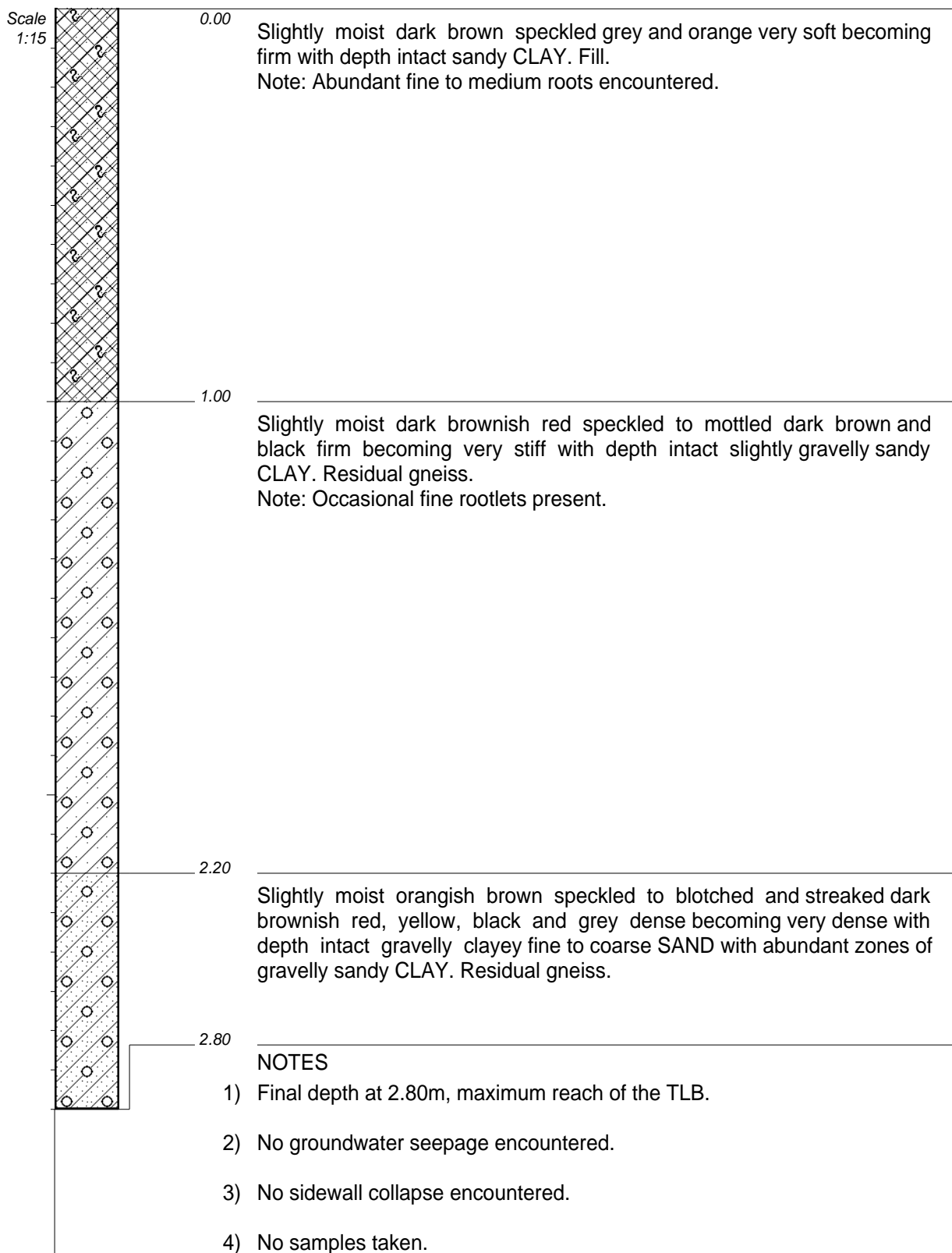
Qb	Red sand - Berea Formation
JI	Basalt - Letaba Formation
Nhb	Olivine norite - Hlobane Complex
Nmt	Amphibolite - Mtengu Formation
Zgn	Granitic Gneiss - Swazium
ZI	Granoblastite, interbedded gneiss - Lubana Formation

		SHRIRAM GEOTECHNICAL CONSULTING (PTY) LTD	
+27(0)84 506 0920 rahul@shriram.co.za www.shriram.co.za		P.O. BOX 21055 BLUFF 4036	
CLIENT Paradox Young and Associates (Pty) Ltd			
PROJECT Geotechnical Investigation for the Additions Proposed to Heuwelands Primary School, KwaZulu-Natal			
DRAWING DESCRIPTION Geology Plan			
SCALE ON A4 1 / 50 000		DATE CREATED 14-06-2021	
PROJECT REF. NUMBER 21012	REVISION 00	DRG. SIZE A4	FIG. No. 3
REFERENCE LIST 1:250 000 Geological Series 2830 Dundee			

PARADOX YOUNG & ASSOCIATES (PTY) LTD

**REPORT ON THE GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE
ADDITIONS PROPOSED TO HEUWELLAND PRIMARY SCHOOL IN EMPANGENI,
KWAZULU-NATAL**

Appendix B: Test Pit Logs

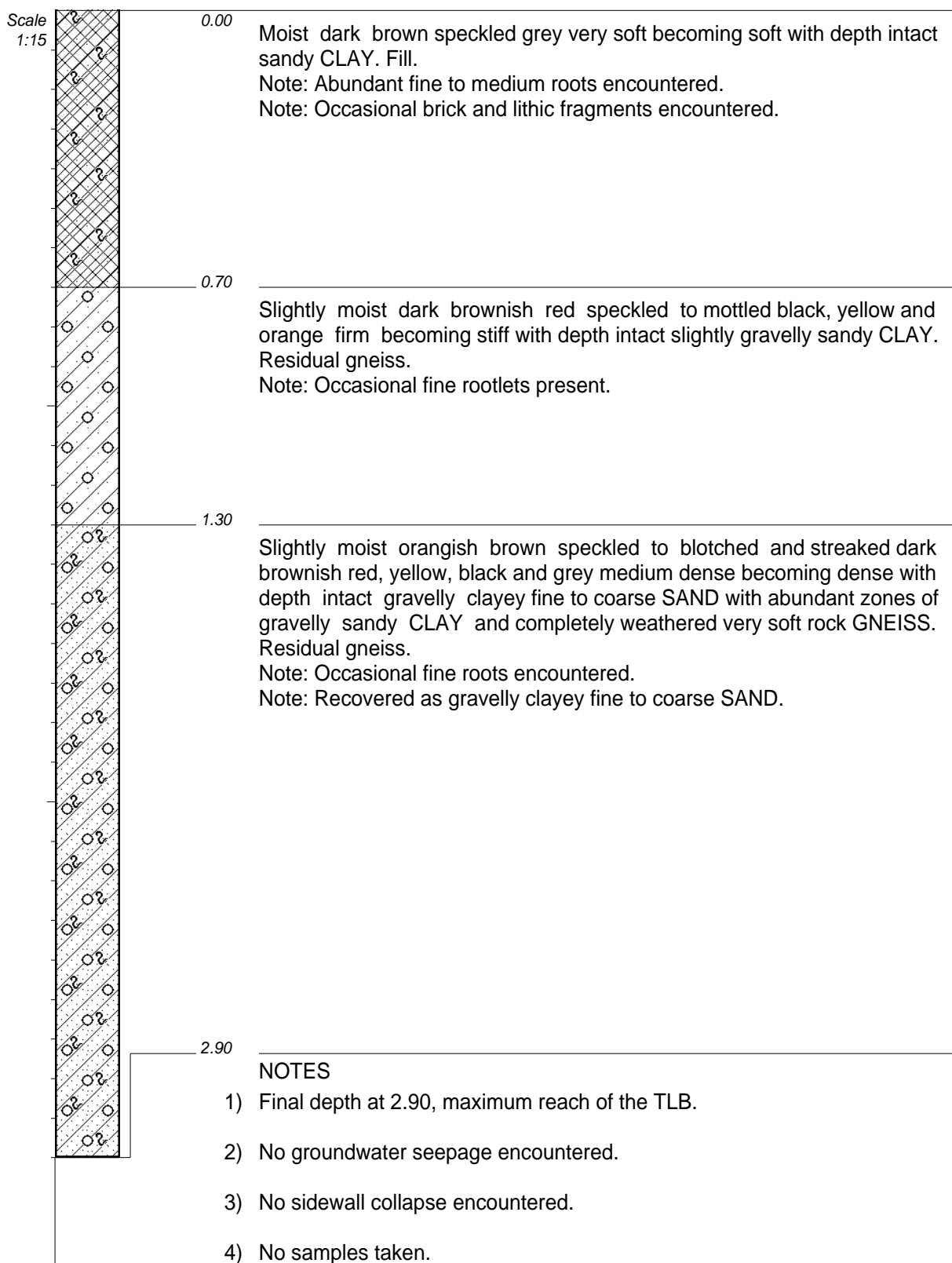


CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP1

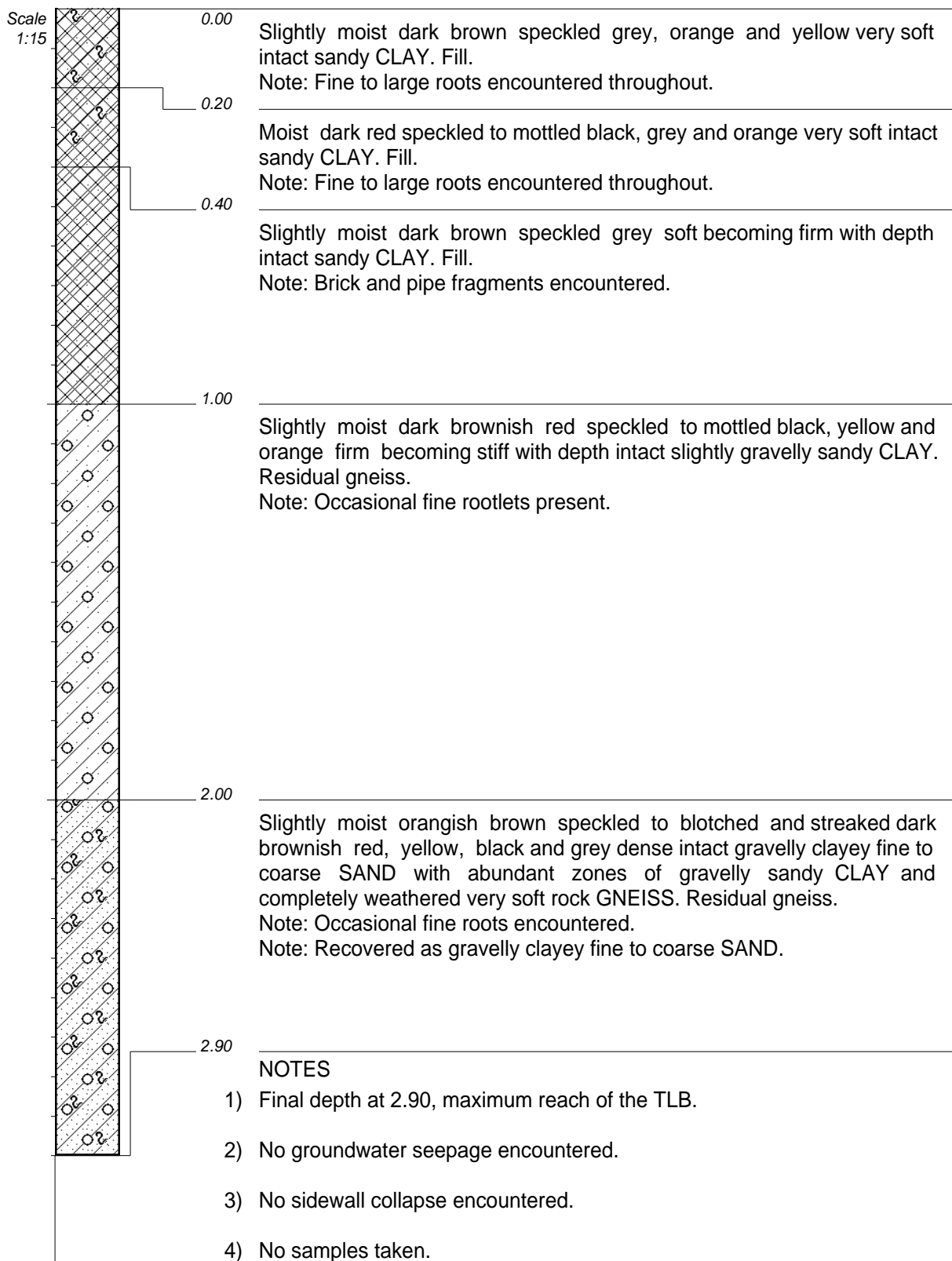


CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP2

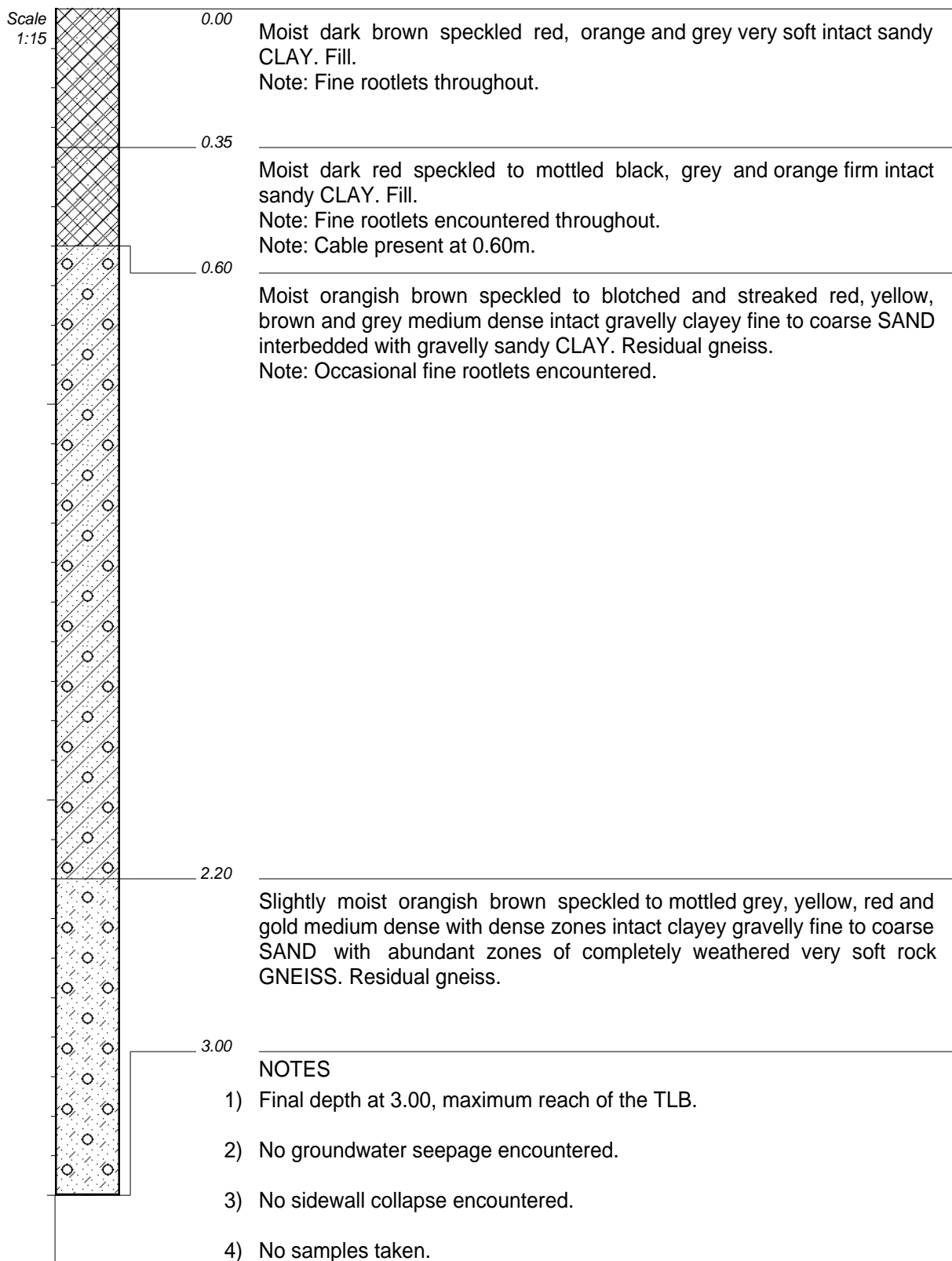


CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP3

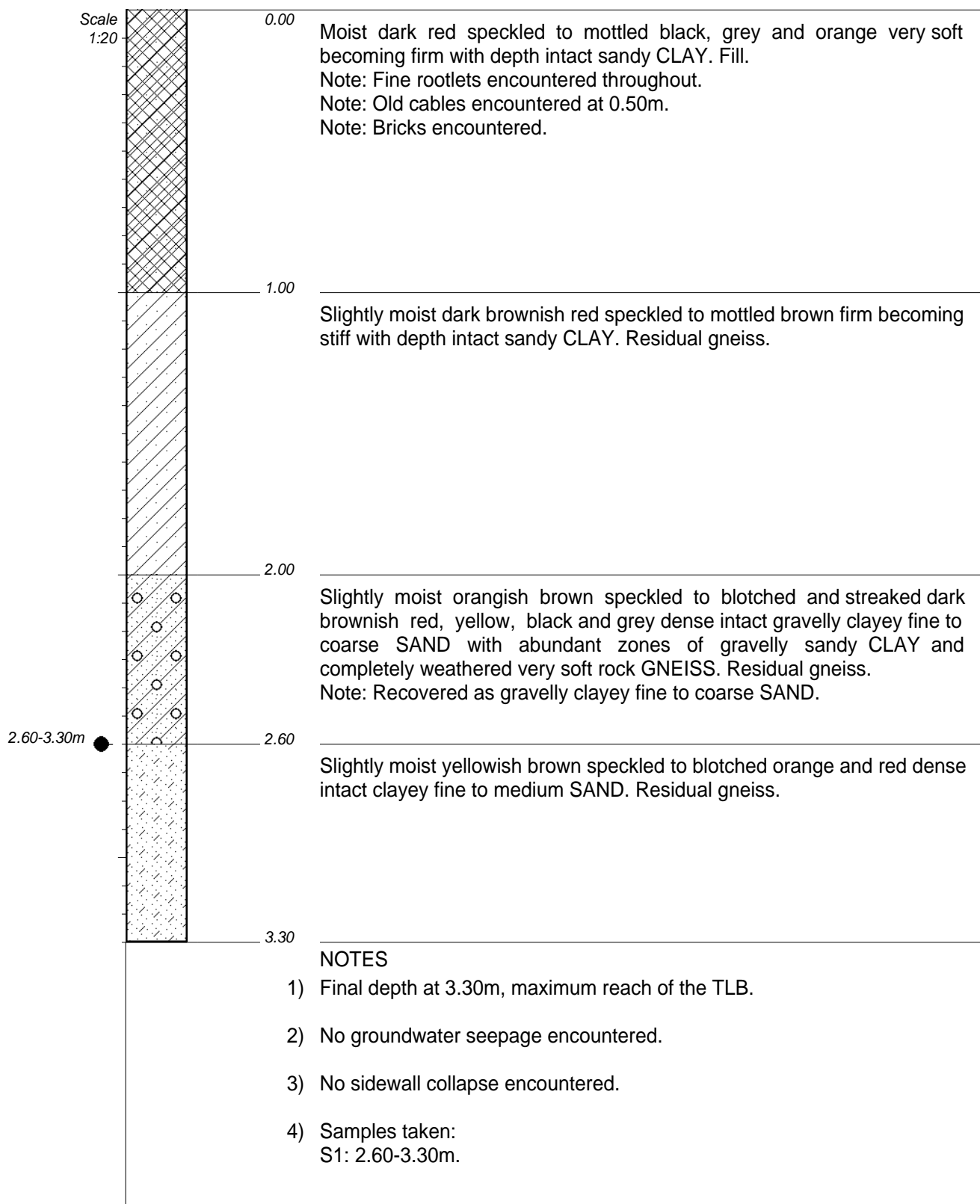


CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP4

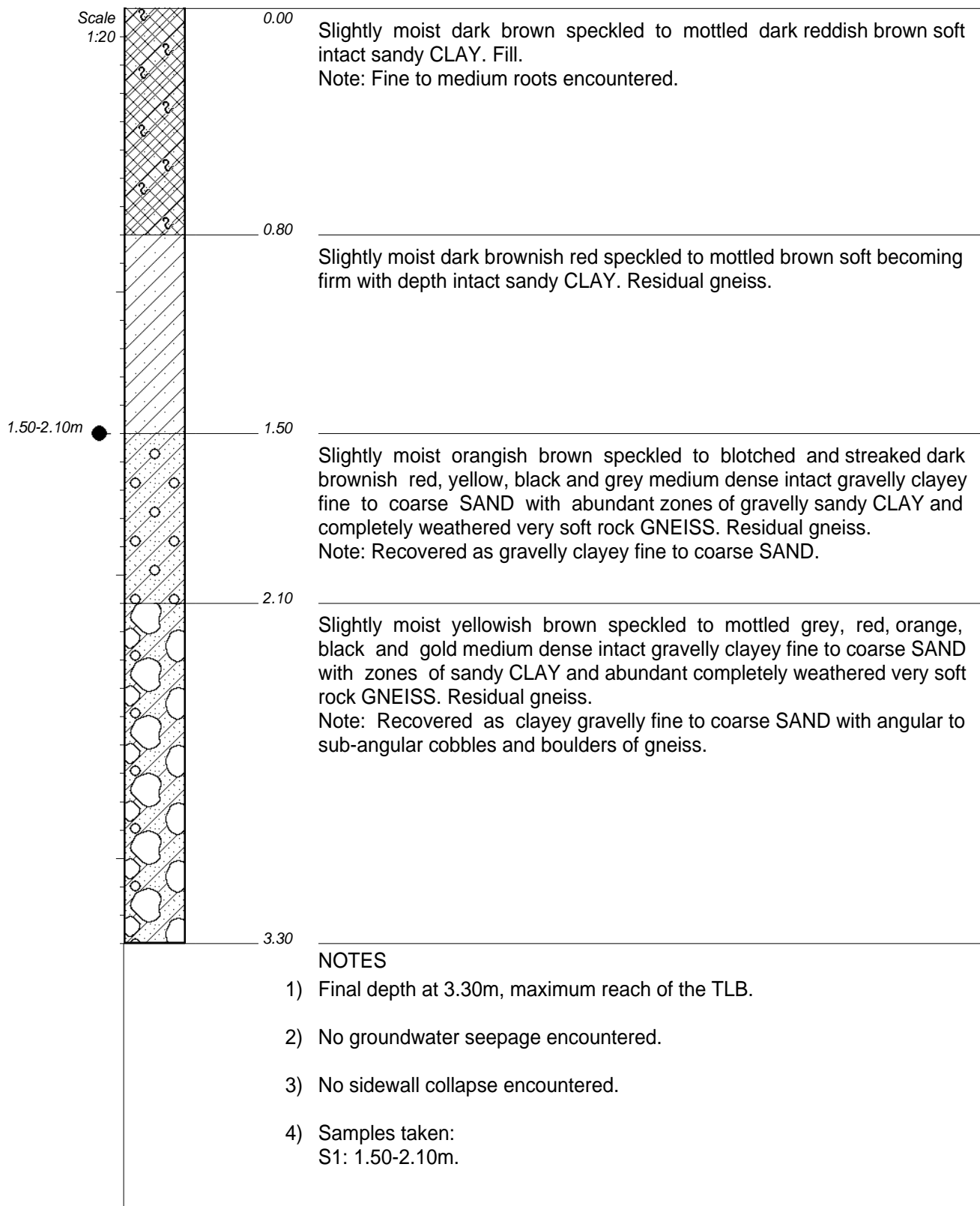


CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP5

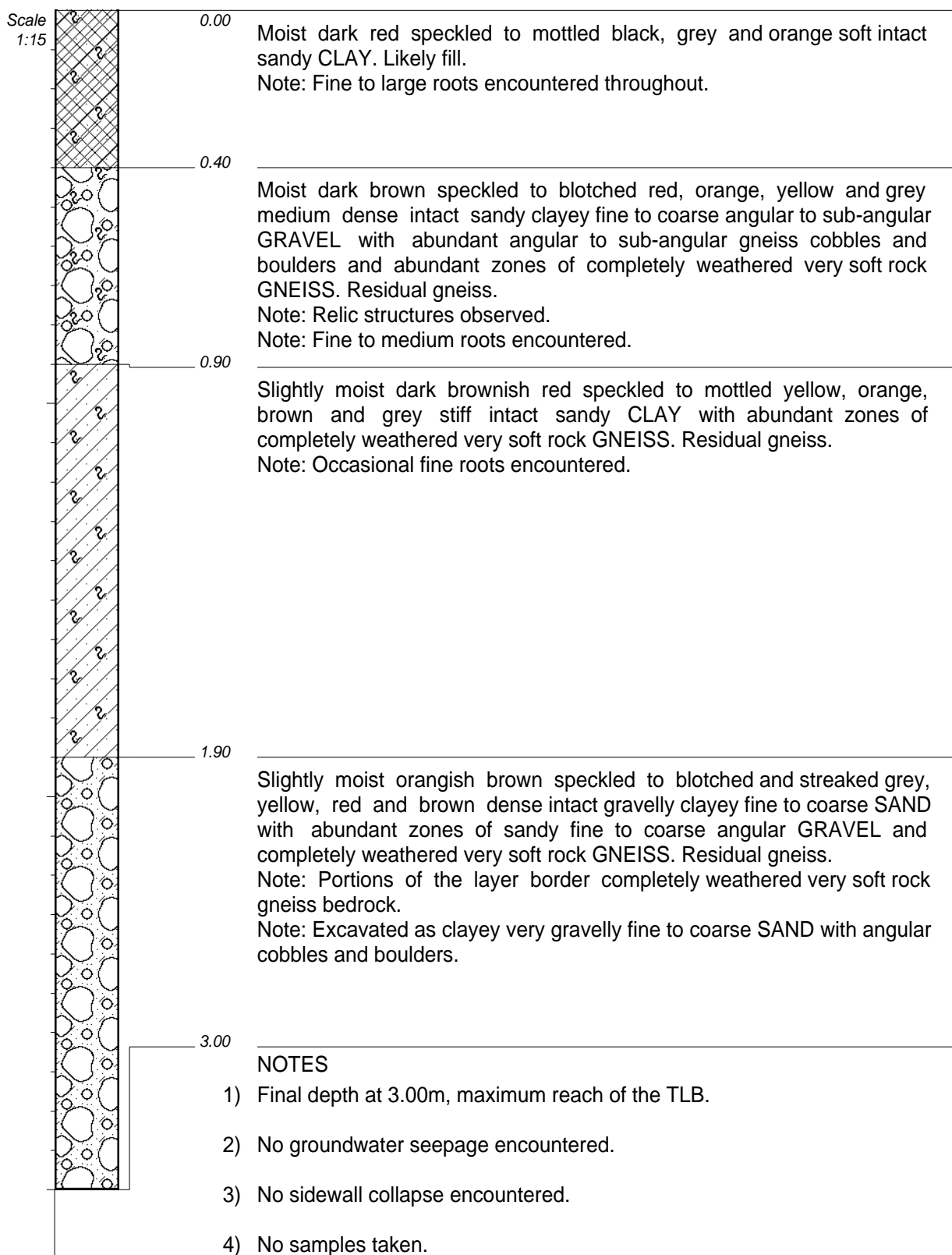


CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP6



CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFILED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP7



SHRIRAM
GEOTECHNICAL CONSULTING (PTY) LTD

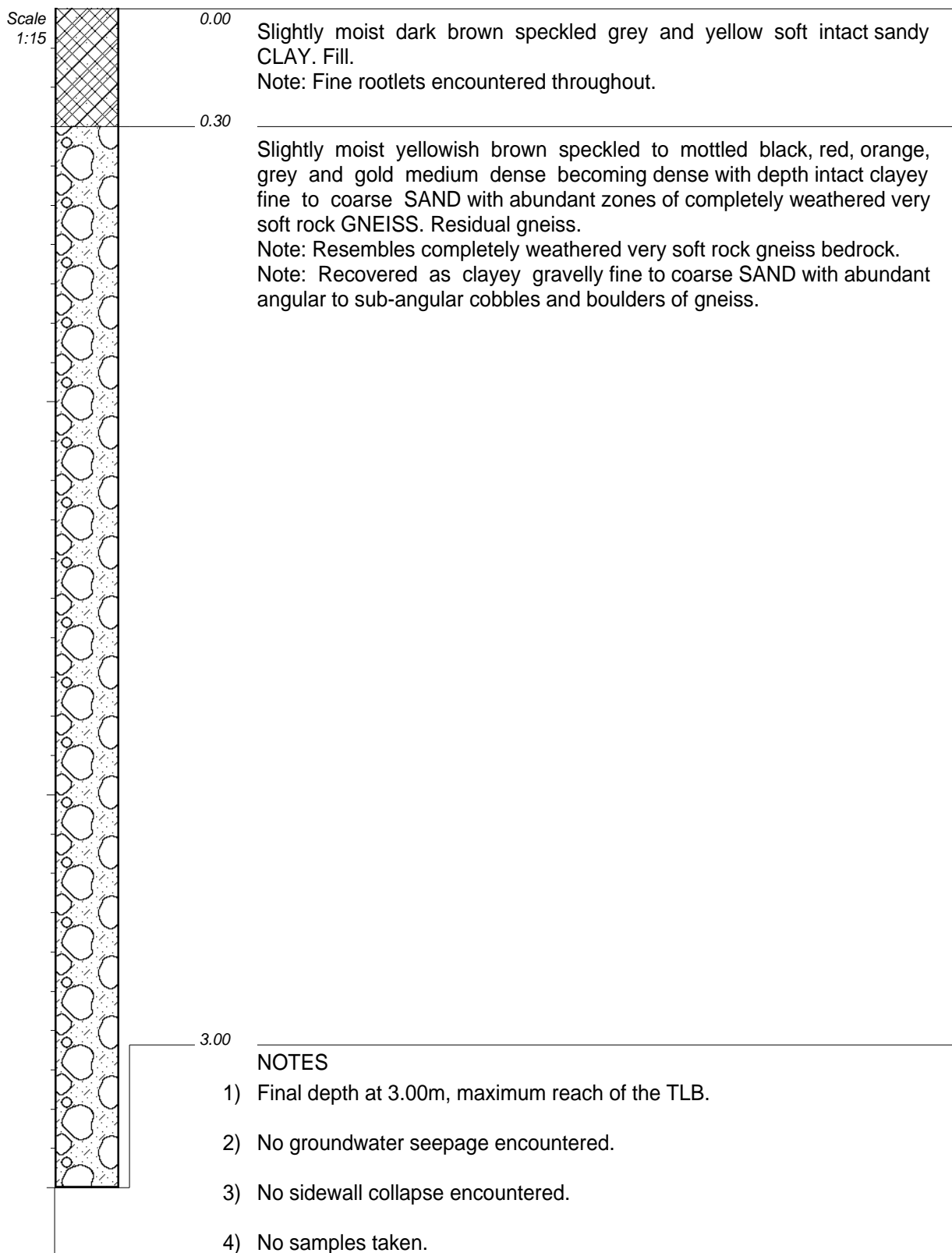
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Bluff 4036

Paradox Young & Associates (Pty) Ltd
Geotechnical Investigation for the
Additions Proposed to Heuwelands
Primary School in Empangeni,
KwaZulu-Natal

HOLE No: TP8
Sheet 1 of 1

JOB NUMBER: 21012

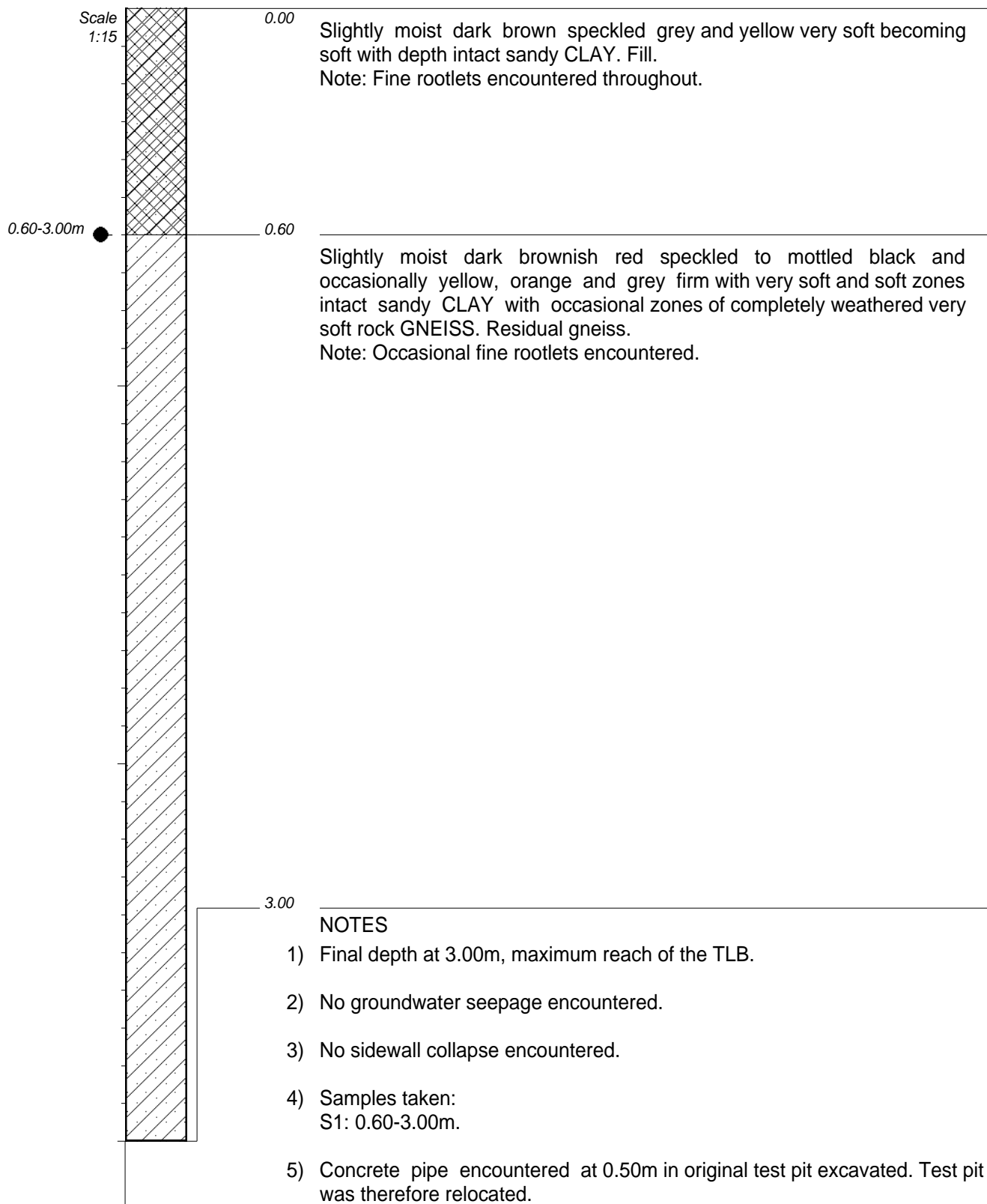


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DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP8



CONTRACTOR : N/A
MACHINE : TLB (Volvo BL71B)
DRILLED BY :
PROFIED BY : A. Govender
TYPE SET BY : A. Govender
SETUP FILE : SGC1.SET

INCLINATION :
DIAM :
DATE :
DATE : 27 January 2021
DATE : 14/06/2021 17:33
TEXT : ..ieldwork\21012TP1TP8.doc

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP9

PARADOX YOUNG & ASSOCIATES (PTY) LTD

**REPORT ON THE GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE
ADDITIONS PROPOSED TO HEUWELLAND PRIMARY SCHOOL IN EMPANGENI,
KWAZULU-NATAL**

Appendix C: Dynamic Cone Penetrometer (Light) Test Results

Client: Paradox Young & Associates (Pty) Ltd
 Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
 Project Number: 21012

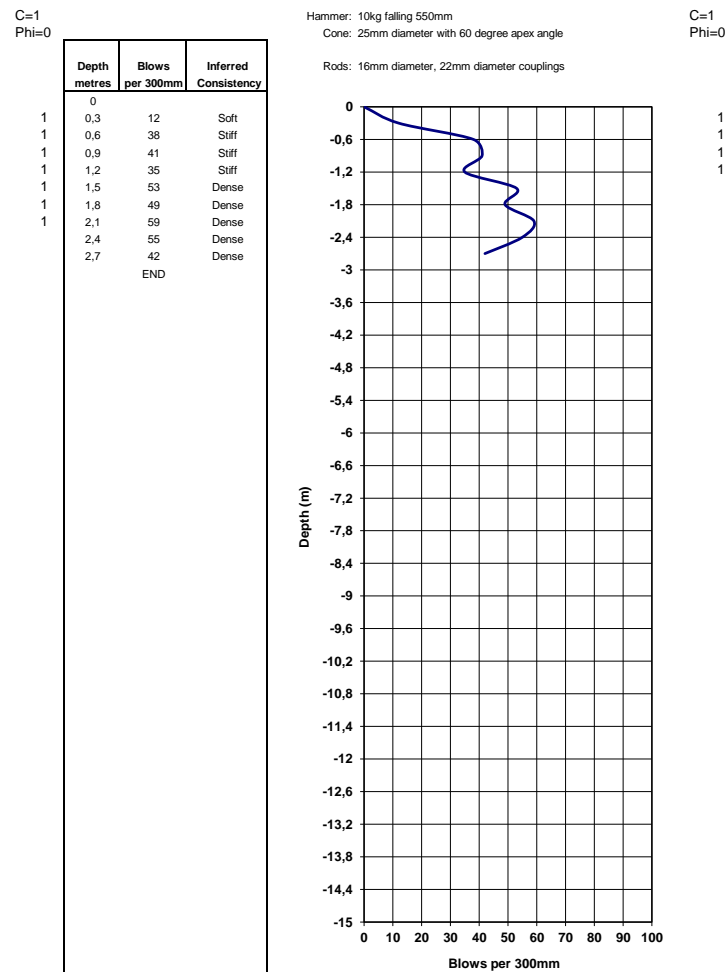
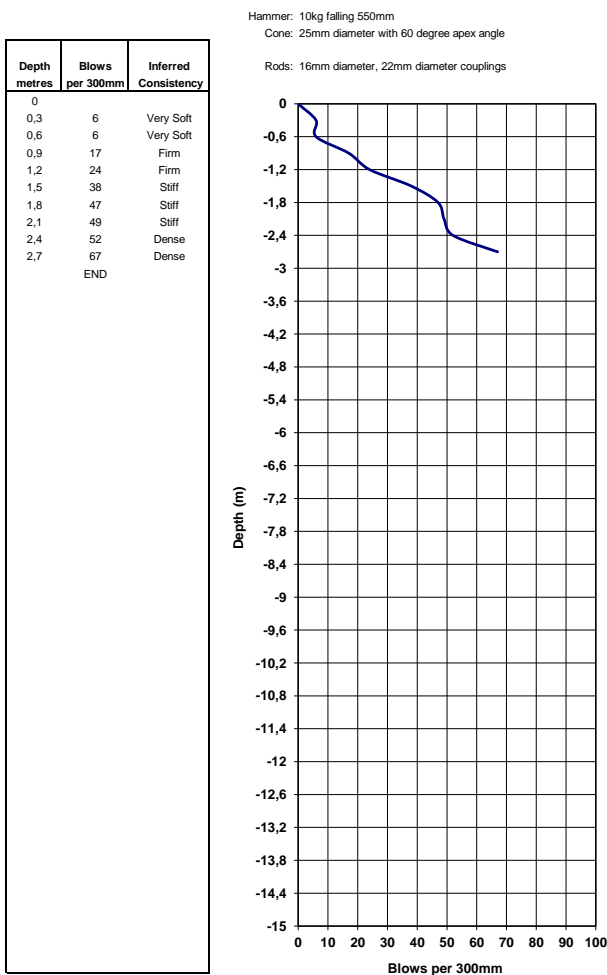
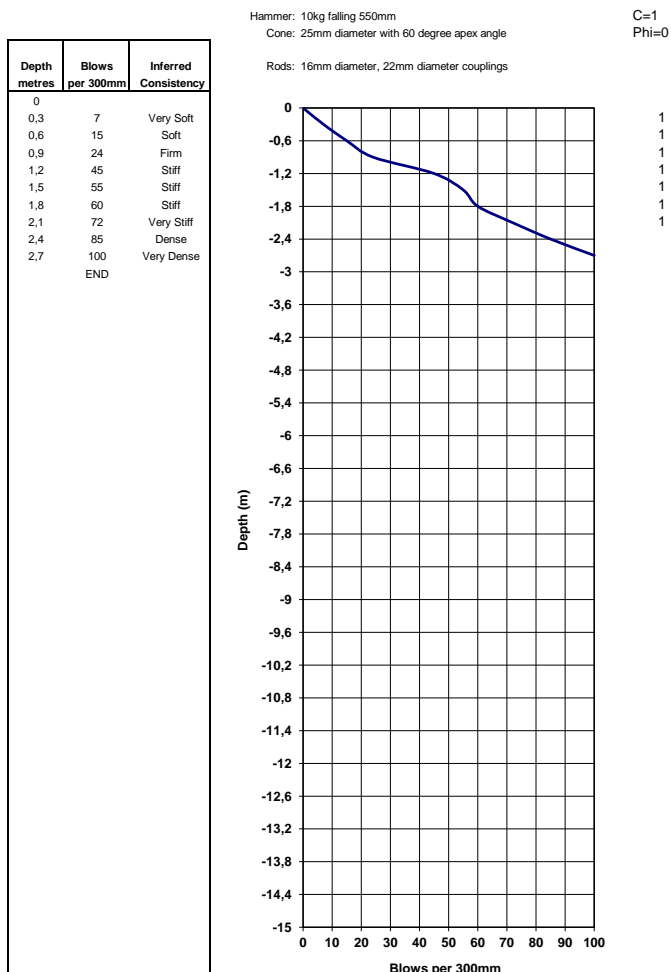
Date: 26-Jan-2021
 Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 1

Light Dynamic Penetrometer Probe ----- Test No. DPL 2

Light Dynamic Penetrometer Probe ----- Test No. DPL 3

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



Client: Paradox Young & Associates (Pty) Ltd
 Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
 Project Number: 21012

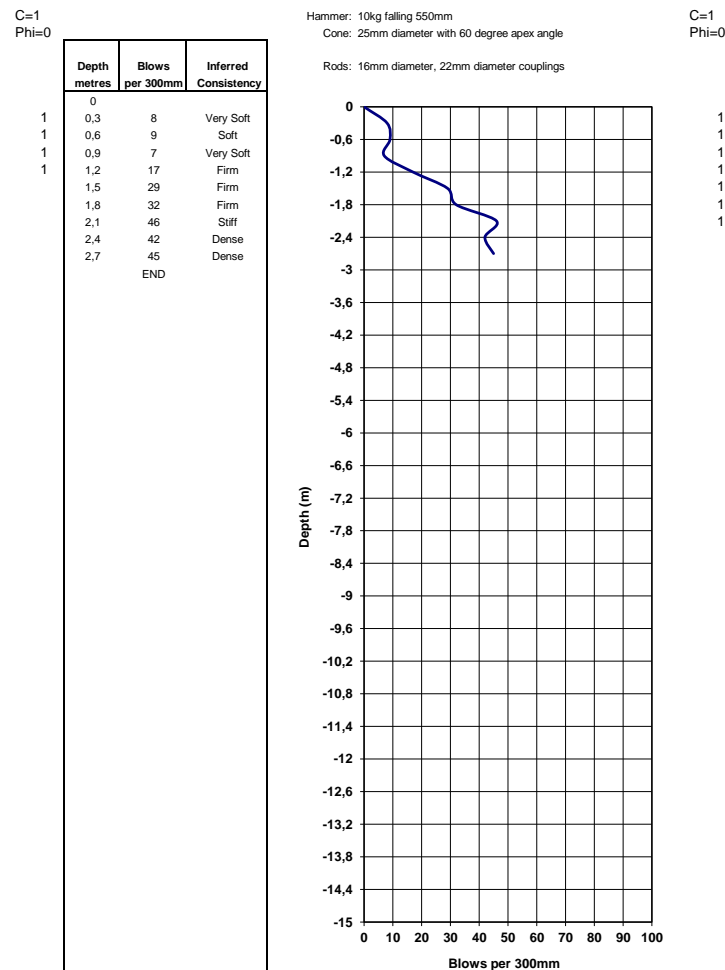
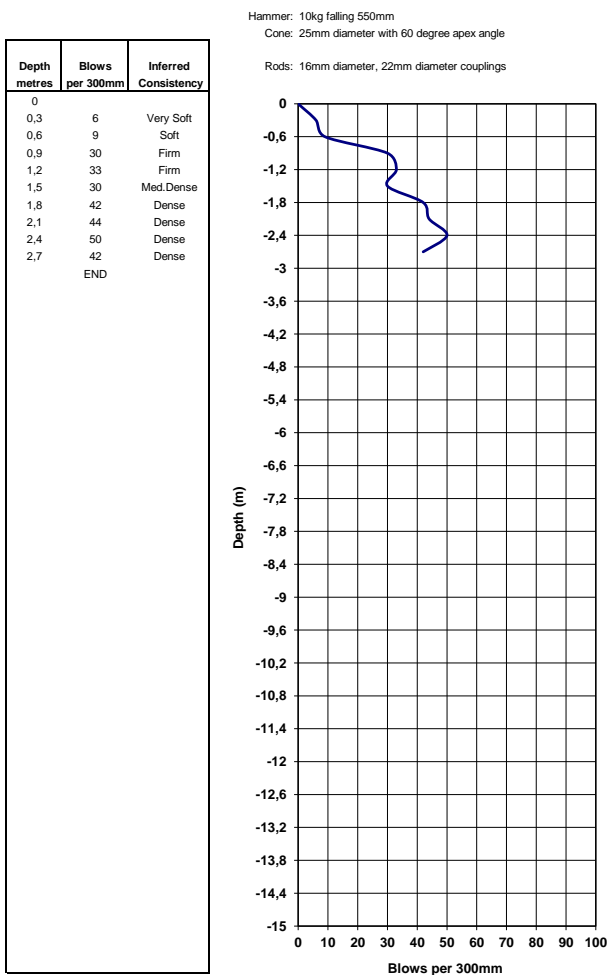
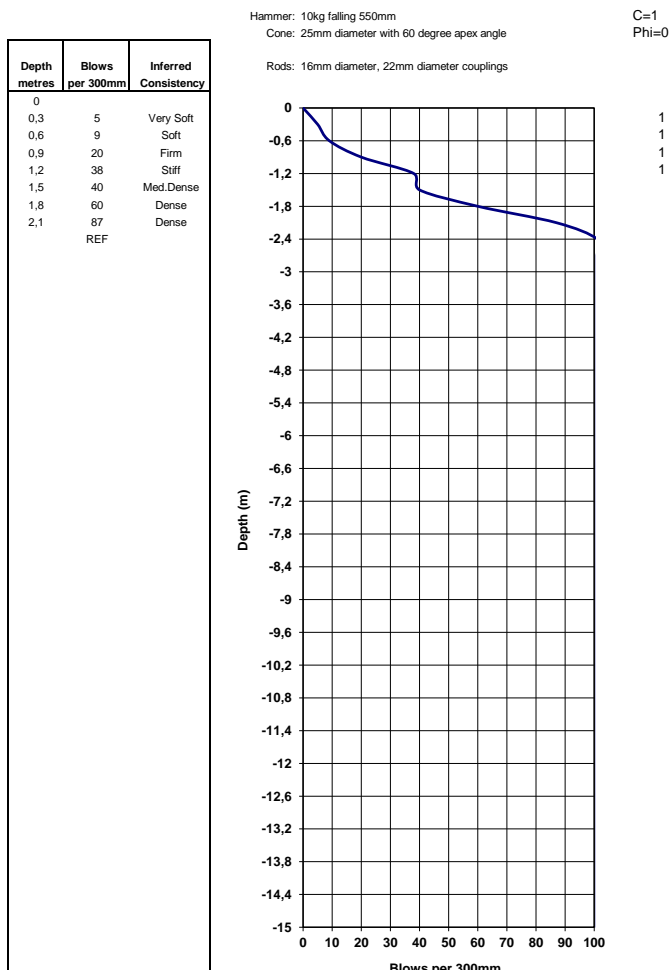
Date: 26-Jan-2021
 Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 4

Light Dynamic Penetrometer Probe ----- Test No. DPL 5

Light Dynamic Penetrometer Probe ----- Test No. DPL 6

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



Client: Paradox Young & Associates (Pty) Ltd
 Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
 Project Number: 21012

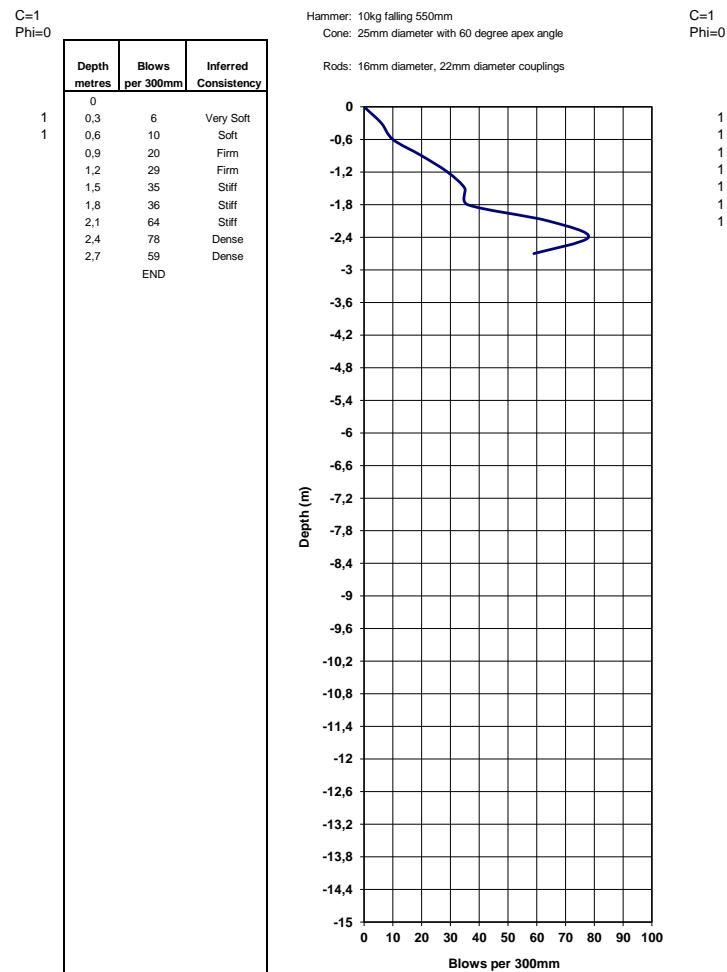
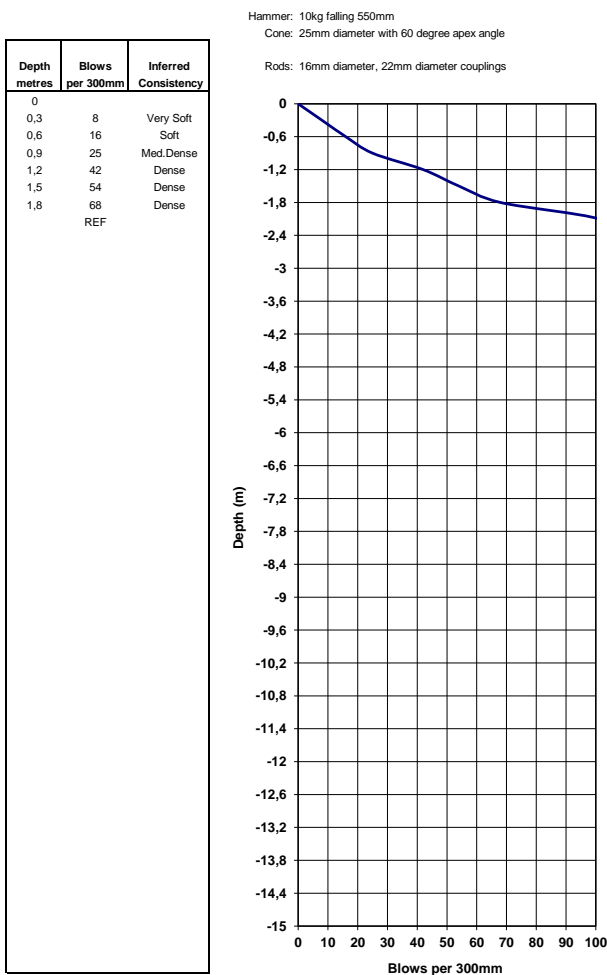
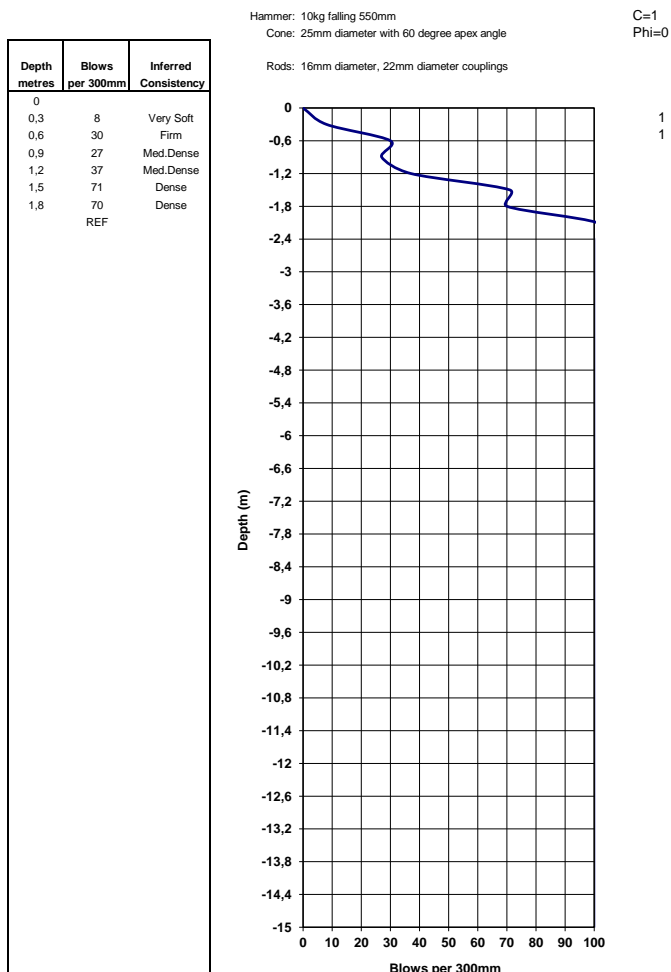
Date: 26-Jan-2021
 Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 7

Light Dynamic Penetrometer Probe ----- Test No. DPL 8

Light Dynamic Penetrometer Probe ----- Test No. DPL 9

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



Client: Paradox Young & Associates (Pty) Ltd
Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
Project Number: 21012

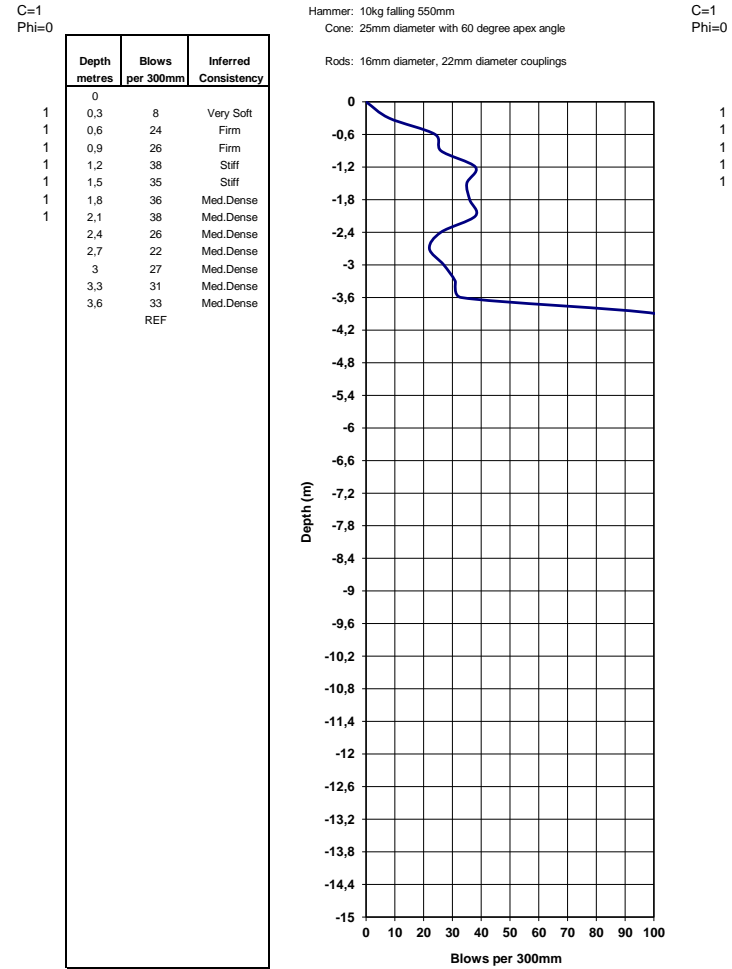
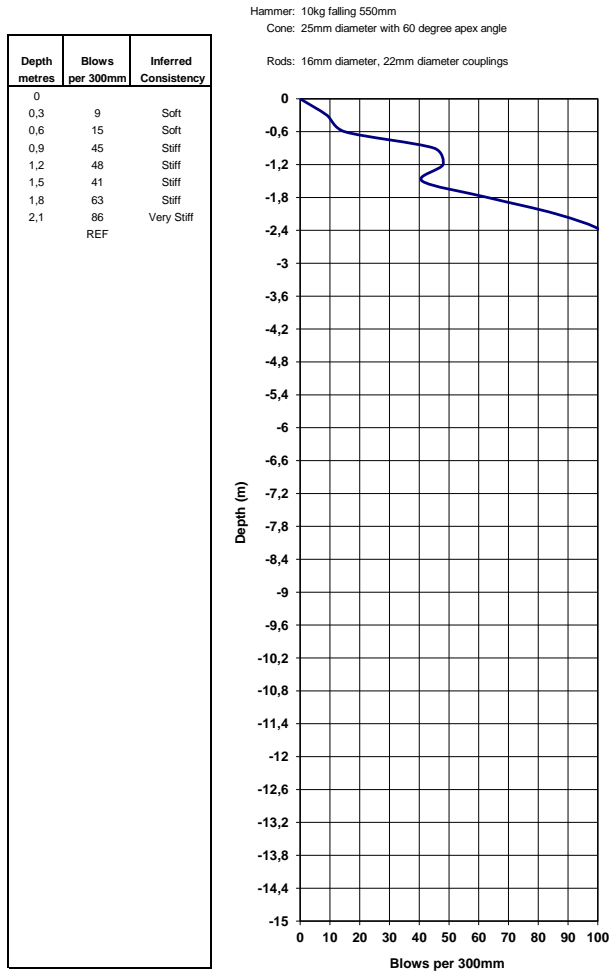
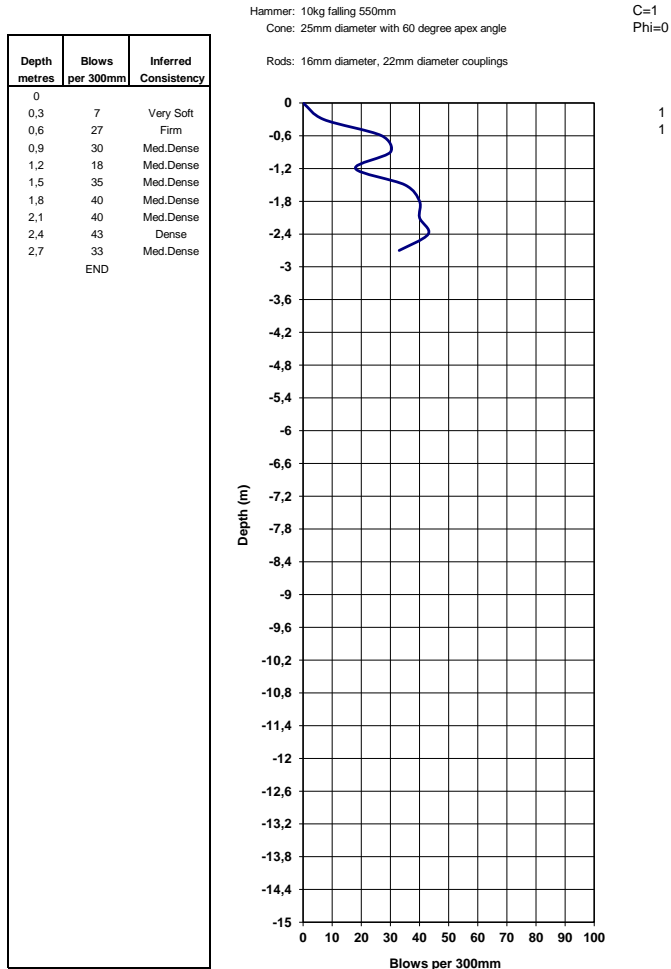
Date: 26-Jan-2021
Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 10

Light Dynamic Penetrometer Probe ----- Test No. DPL 11

Light Dynamic Penetrometer Probe ----- Test No. DPL 12

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



Client: Paradox Young & Associates (Pty) Ltd
 Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
 Project Number: 21012

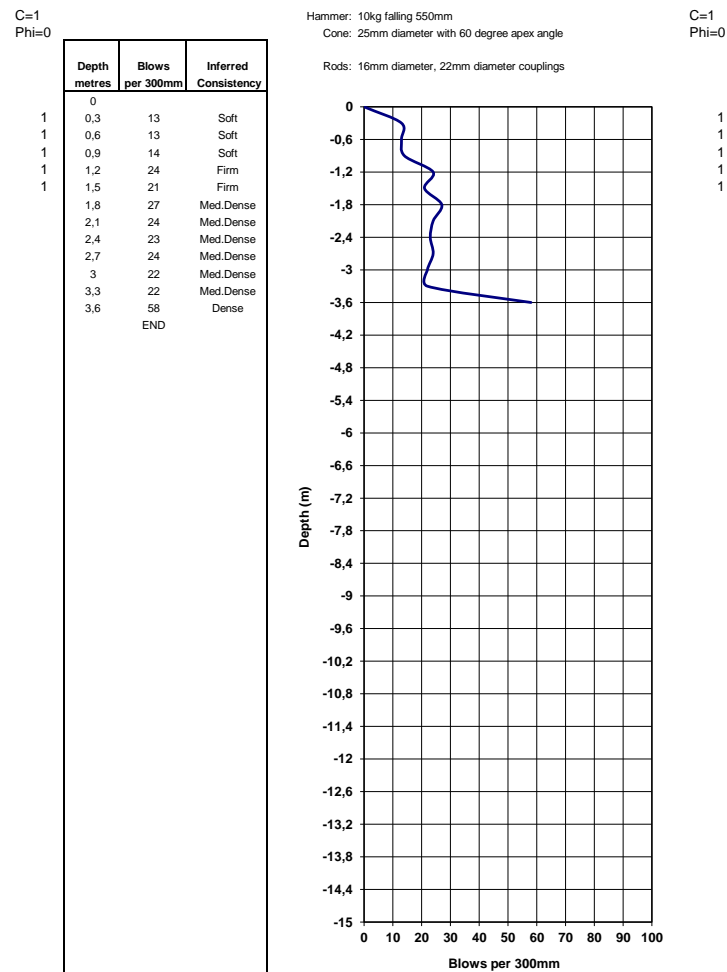
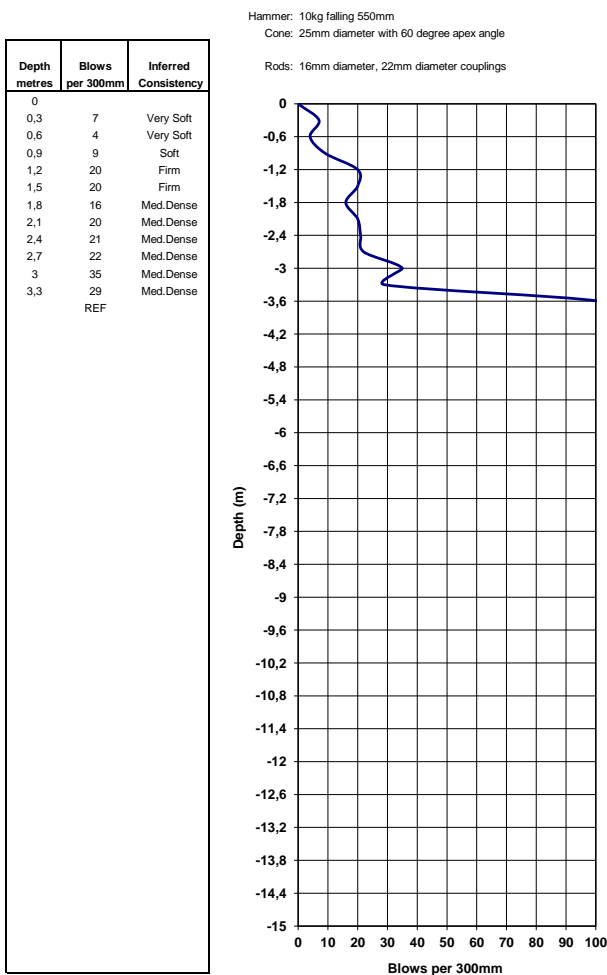
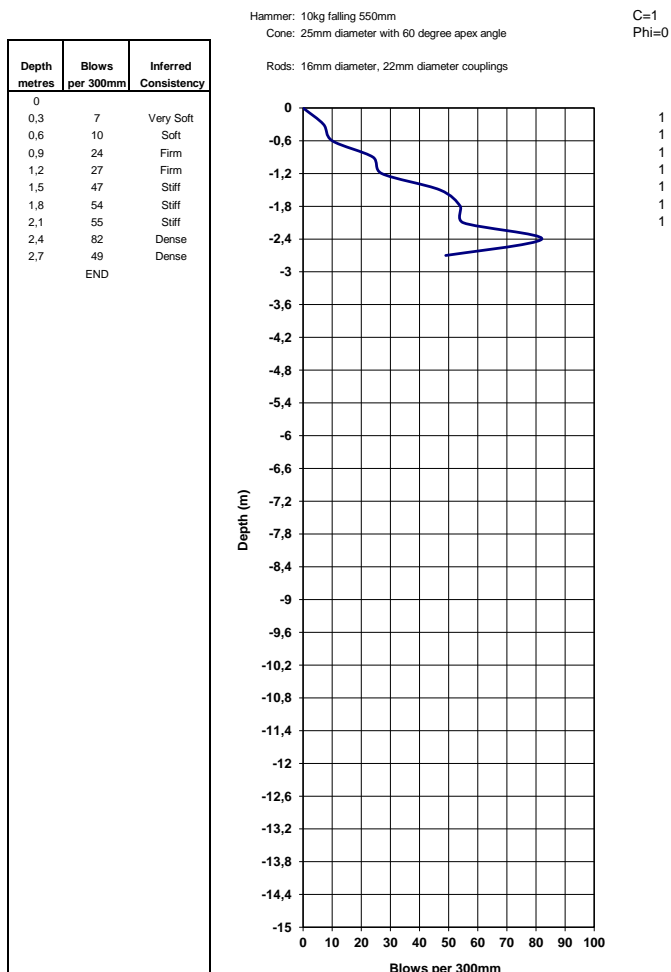
Date: 26-Jan-2021
 Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 13

Light Dynamic Penetrometer Probe ----- Test No. DPL 14

Light Dynamic Penetrometer Probe ----- Test No. DPL 15

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



Client: Paradox Young & Associates (Pty) Ltd
 Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
 Project Number: 21012

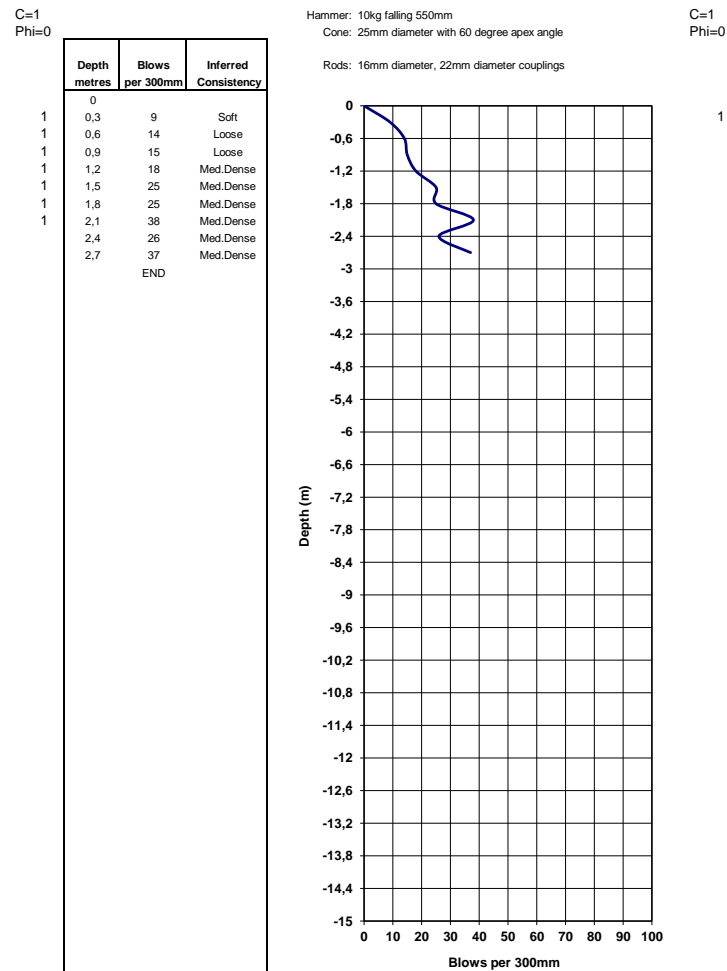
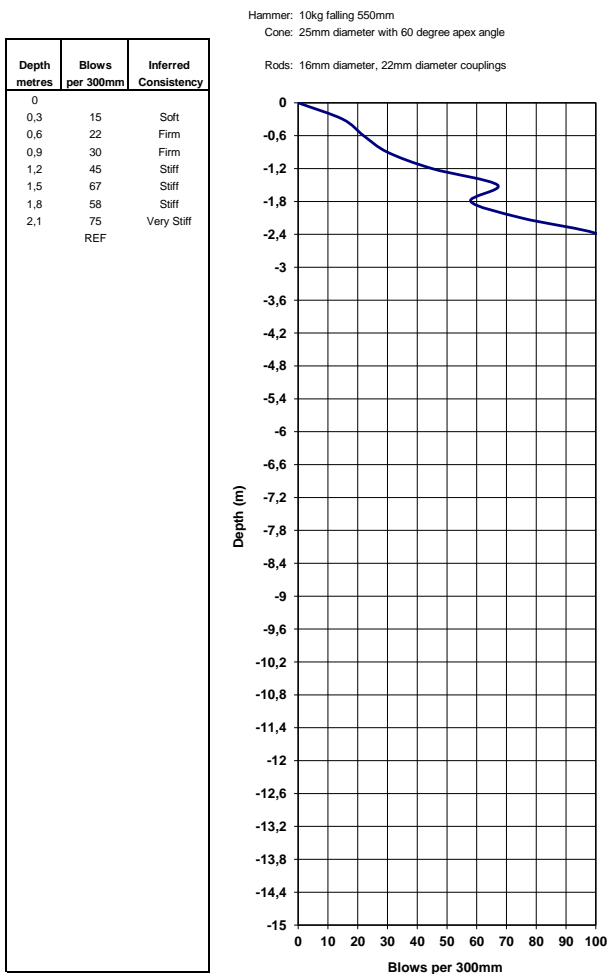
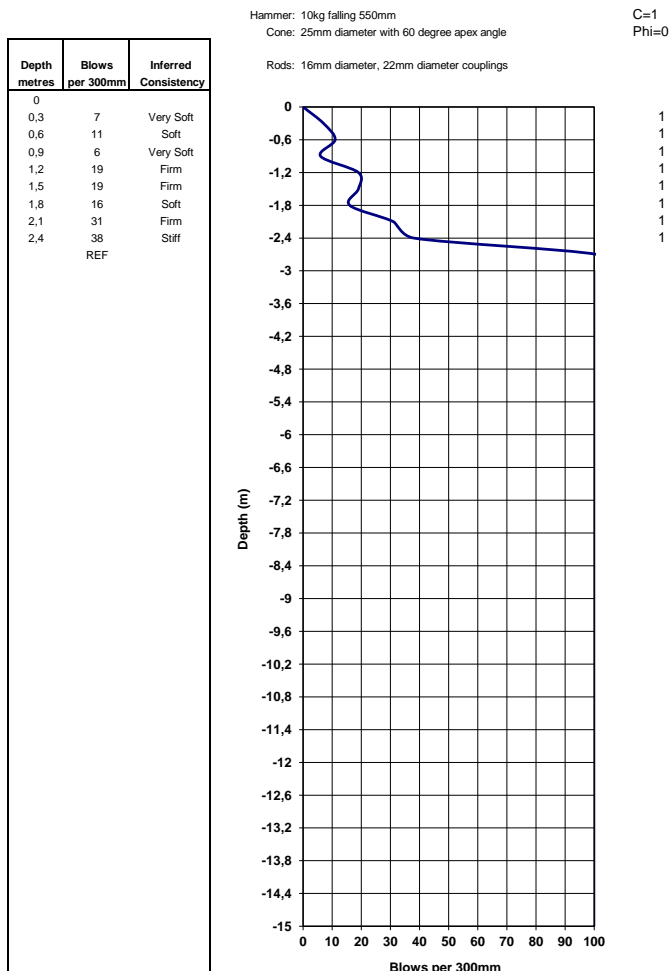
Date: 26-Jan-2021
 Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 16

Light Dynamic Penetrometer Probe ----- Test No. DPL 17

Light Dynamic Penetrometer Probe ----- Test No. DPL 18

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



Client: Paradox Young & Associates (Pty) Ltd
 Project: Geotechnical Investigation for the Additions Proposed to Heuwelland Primary School in Empangeni, KwaZulu-Natal
 Project Number: 21012

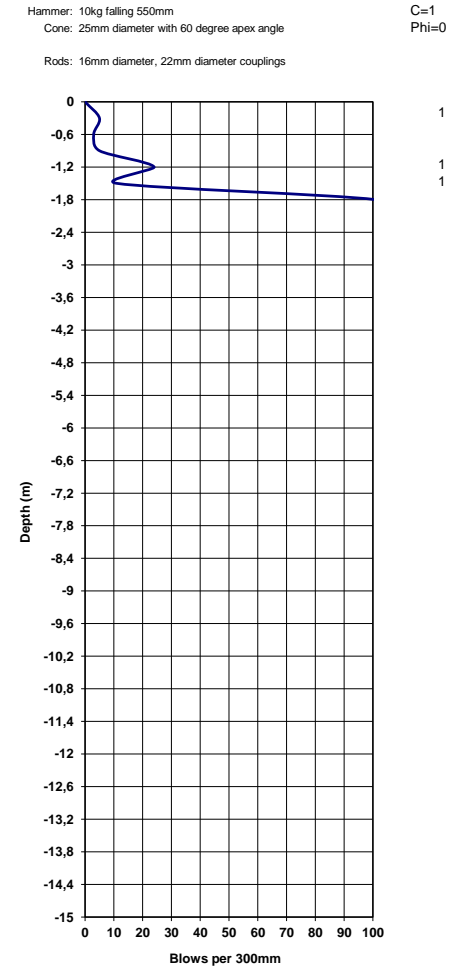
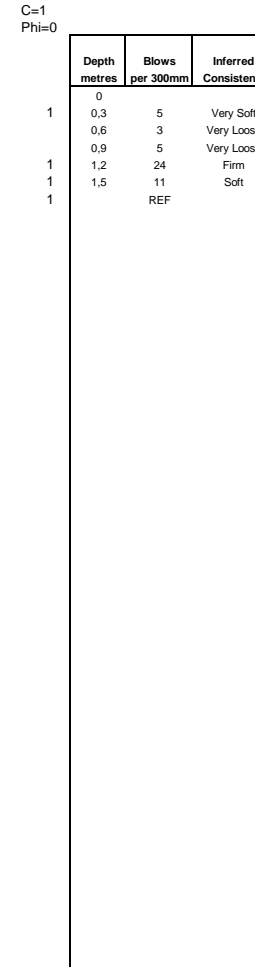
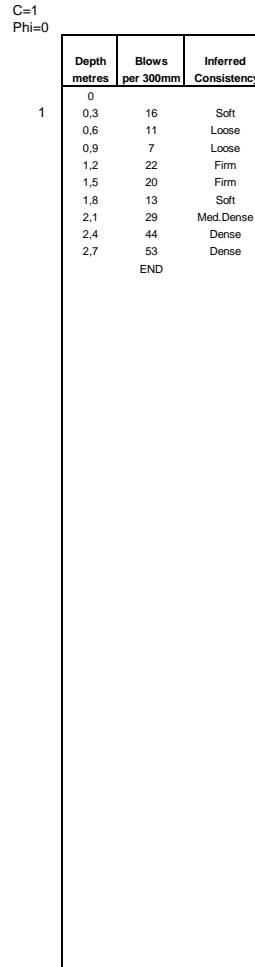
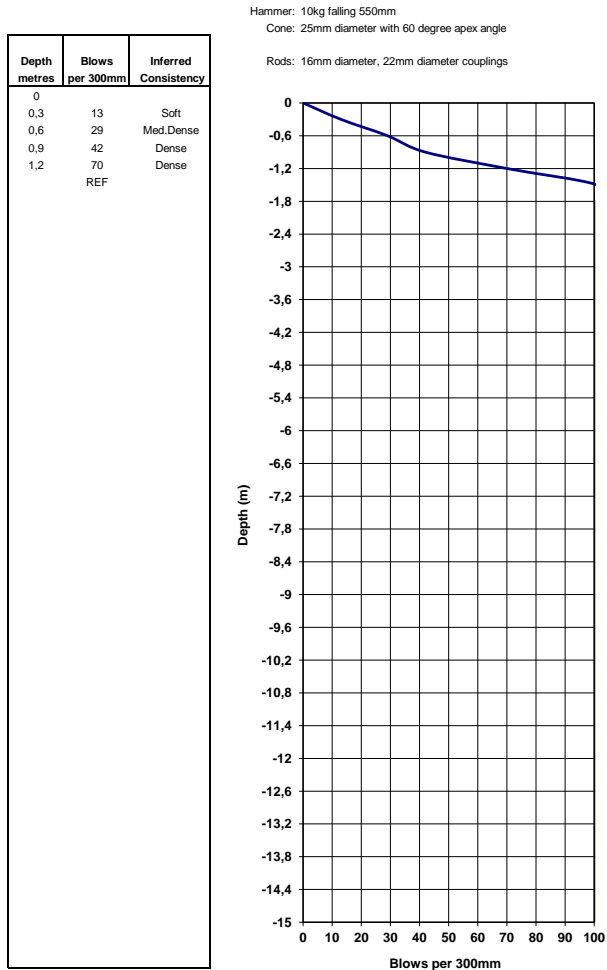
Date: 26-Jan-2021
 Operator: ACG

Light Dynamic Penetrometer Probe ----- Test No. DPL 19

Light Dynamic Penetrometer Probe ----- Test No. DPL 20

Light Dynamic Penetrometer Probe ----- Test No. DPL 21

THE INSITU STRENGTH DEPENDS ON SOIL MOISTURE CONTENT AND GRAIN STRUCTURE WHICH HAVE NOT BEEN ASSESSED AND MAY CHANGE. THE VALUES GIVEN ARE THEREFORE INDICATIVE ONLY AND SHOULD BE VERIFIED BY TEST OR OBSERVATION



C=1
Phi=0

PARADOX YOUNG & ASSOCIATES (PTY) LTD

**REPORT ON THE GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE
ADDITIONS PROPOSED TO HEUWELLAND PRIMARY SCHOOL IN EMPANGENI,
KWAZULU-NATAL**

Appendix D: Important Information on the Interpretation, Use and Liability of this Report

PARADOX YOUNG & ASSOCIATES (PTY) LTD**REPORT ON THE GEOTECHNICAL INVESTIGATION CARRIED OUT FOR THE ADDITIONS PROPOSED TO HEUWELLAND PRIMARY SCHOOL IN EMPANGENI, KWAZULU-NATAL**

This report has been prepared in accordance with a specific brief and scope of work. It should be read in its entirety.

The responsibility of Shriram Geotechnical Consulting (Pty) Ltd is solely to Paradox Young & Associates (Pty) Ltd. This report is not intended for, and should not be relied upon, by any third party. No liability is undertaken to any third party.

Ground conditions are subject to continuing natural and man-made processes. They can exhibit a variety of properties that vary from place to place and can change with time.

Site investigation involves gathering and assimilating data by means such as inspection, drilling, excavation, probing, sampling and testing. The collected data is only directly relevant to the ground at the place where and at the time when the investigation was performed.

Any interpretation or recommendation given in the report shall be understood to be based on judgment and experience, not on greater knowledge of facts other than those reported.

If different ground or site conditions are encountered during construction activities or subsequent to the investigation performed for the report, either due to natural variability of subsurface conditions or previous construction activities, Shriram Geotechnical Consulting (Pty) Ltd should be notified of the differences and provided with an opportunity to review the recommendations contained in this report.