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Technical Report

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ELIDZ - PROPOSED DATA CENTRE AT ERF 60917

Geotechnical investigation for the proposed data centre at Erf 60917 at the East London Industrial Development Zone, Buffalo City Metropolitan Municipality

February 2020

Prepared for: **BVI Border (Pty) Ltd**

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TECHNICAL REPORT:

ELIDZ - PROPOSED DATA CENTRE AT ERF 60917

Geotechnical investigation for the proposed data centre at Erf 60917 at the East London Industrial Development Zone, Buffalo City Metropolitan Province

February 2020

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1 INTRODUCTION

1.1 General

AGES Omega (Pty) Ltd was appointed by BVI Border (Pty) Ltd to conduct a geotechnical investigation for the proposed data centre project on Erf 60917 of the East London Industrial Development Zone, with the aim of determining and evaluating the engineering geological characteristics of the in-situ soil and rock material underlying the project area.

1.2 Terms of reference

The investigation was requested by Mr. Werner de Lange of the firm BVI Border (Pty) Ltd on behalf of their client the ELIDZ. AGES was appointed following a site inspection with the client. Appointment was received on the 24th of January 2020 via email instruction to proceed.

1.3 Specifications for the investigation

No specifications were given regarding the proposed development and information required from the geotechnical investigation was based on previous geotechnical studies conducted near the site.

- Structural Engineering Requirements
 - Foundation indicators
 - Estimated Safe bearing capacity
 - Activity of material
 - Foundation classifications
- Civil Engineering Requirements
 - Generalised soil profiles
 - Water tables
 - Compaction characteristics

1.4 Nature of the investigation

The investigation was conducted on the 28th of January 2020. Commencement of the fieldwork was slightly delayed due to rain and the availability of a TLB-type excavator. The investigation was conducted as follows:

- Site walk over survey and geological mapping.
- Test pit excavation and profiling.
- Dynamic Cone Penetrometer testing.
- Sample selection and submission to laboratory for detailed analysis.
- Data processing and evaluation.
- Preliminary geotechnical report compilation, with no laboratory analysis results.
- Final reporting incorporating laboratory analysis results.

1.5 Location of the project area

The project area comprises Erf 60917 at the ELIDZ, that is located directly adjacent to the western side of the existing Sundale Dairy. The locality of the project area is indicated in Figure 1 below, as exported from Google Earth Professional Edition. The central point of the project is defined by the following coordinate (Decimal Degrees, WGS84):

- ❑ Latitude: -33.056420 ° S
- ❑ Longitude: 27.858796 ° E

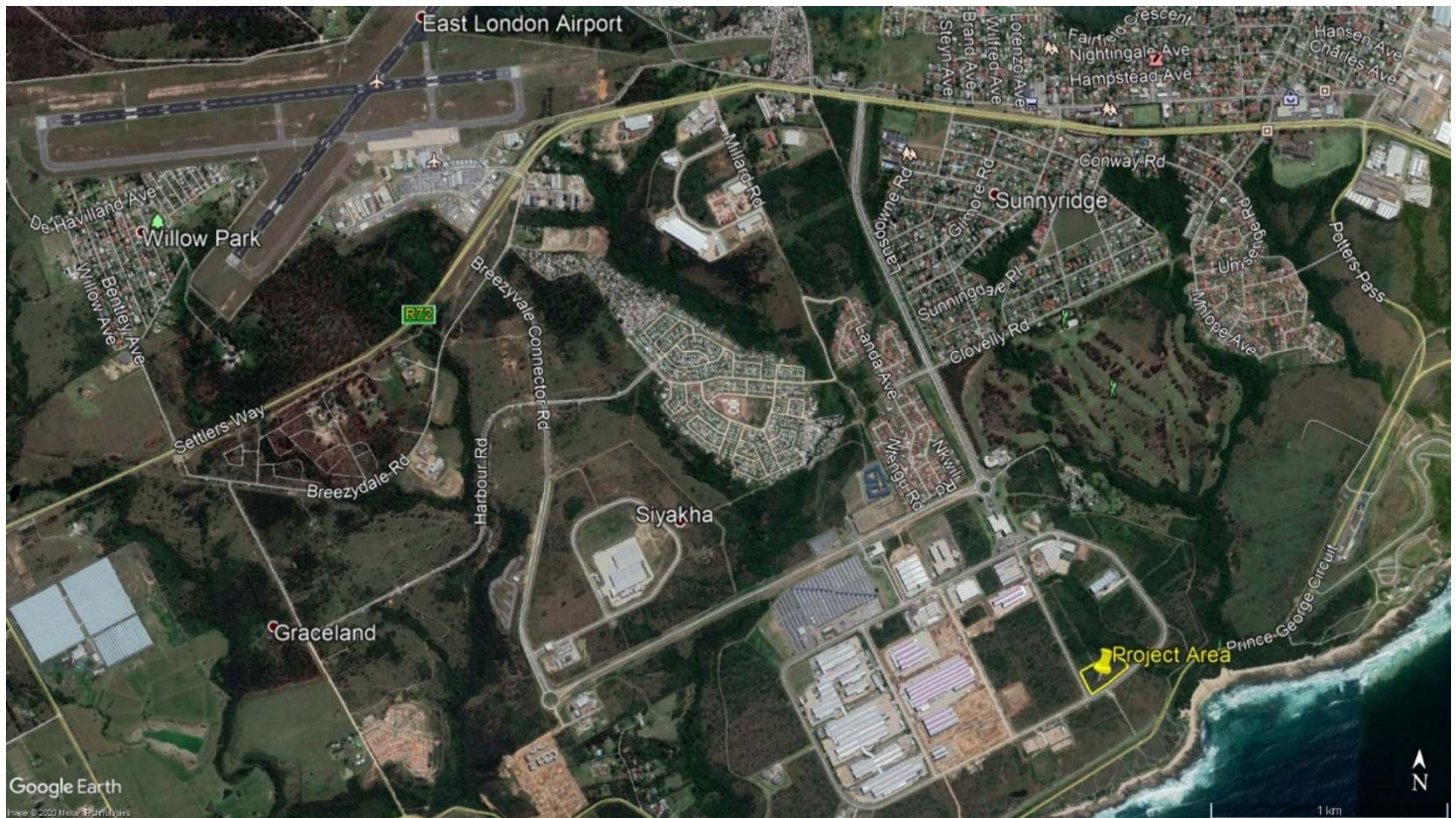


Figure 1: Regional site locality as observed in Google Earth

1.6 Available information

The following sources of information were used during the investigation:

- ❑ Geological maps
 - 3327BB EAST LONDON, scale 1 : 50 000.
- ❑ Hydrogeology map
 - 3126 QUEENSTOWN; scale 1 : 500 000.
- ❑ Electronic maps
 - Site survey supplied by BVI Border (Pty) Ltd.

1.7 Geological Setting

The geological setting of the project area was determined by means of published 1:50 000 scale geological map and the study of aerial imagery.

The project area is underlain by sedimentary rocks of the Middleton and Balfour Formations of the Adelaide Subgroup of the Beaufort Group that is part of the Karoo Supergroup sequence. The lithology comprises of mudstone and sandstone that is locally overlain by soil > 1 m thick.



Figure 2: Geological setting of project area (Pa – Adelaide Subgroup)

Dolerite dykes and sills have intruded the sedimentary strata of the Karoo Supergroup during the late Karoo volcanism. The geology map does not indicate the presence of any dolerite dyke or sill intrusions in the project area. A thin dolerite dyke with a basic east-west trend direction was encountered in the project area during the site investigation.

No other prominent geological structures such as fault zones or LANDSAT derived lineaments occur in the project area.

The area does not reflect any risk for the formation of sinkholes or subsidence caused by the presence of water-soluble rocks (for example: dolomite or limestone).

1.8 Regional Seismic Hazard

According to Fernandez *et al* (1979) the regional seismic hazard in the project area can be defined as follows:

- The area exhibits a 90 % probability of the occurrence of a seismic event not exceeding Class VII-intensity¹ (i.e.: equivalent to a seismic event registering 5.5 to 6.1 on the Richter Scale) within a period of 500 years.

In this light, the natural seismic risk of the project area can be classified as SLIGHT to LOW, and as such requires that Masonry Class B design and construction measures be implemented, incorporating good workmanship and reinforced mortar work, but specific design and construction measures to resist the effect of lateral forces on the proposed development is not deemed necessary.

1 The effects of a Class VII-intensity event (categorized as strong to very strong) can be summarized as follows:

- Difficult to stand
- Noticed by drivers of motorcars
- Hanging objects quiver
- Furniture broken
- Damage to weak materials (such as adobe: poor mortar; low standards of workmanship; weak horizontally) including cracks
- Weak chimneys broken at roof line
- Fall of plaster, loose bricks, stones, tiles, cornices, unbraced parapets and architectural ornaments
- Some cracks in ordinary workmanship and mortar
- Small slides and caving-in along sand or gravel banks and concrete irrigation ditches will be damaged

2 SITE INVESTIGATIONS

2.1 Test Pit Excavation

A total of 6 test pits, numbered DC TP 1 to DC TP6 were excavated on the project area utilising a CAT 428E 4X4 TLB-type excavator on the 28th of January 2020. The position of the test pits was influenced by the thick vegetation on site and pits were placed based on geological site observations and access. The test pits were profiled on the same day according to the Guidelines for soil and rock profiling (2002).

Generalised soil conditions encountered during the investigation are discussed in Chapter 4 of the report with detailed soil profile logs and photographs attached in Appendix A.

2.2 Dynamic Cone Penetrometer Testing

Dynamic Cone Penetrometer (DCP) tests were conducted adjacent to all test pits and in the bottom of selected test pits based on encountered soil conditions.

The DCP testing gives an estimation on the expected excavation conditions and in-situ bearing capacity of the soil materials, with the Unconfined Compressive Strength of the material calculated from the obtained CBR values and mm penetration per blow. The testing is useful to get a basic estimation of existing in-situ soil conditions, but it must be noted that the results are highly influenced by larger soil particles in profile, such as cobbles to boulders, and also by moisture content.

Please note:

- *The moisture content of the soil material is expected to influence the bearing capacity of the material to a large extent, with significant decreases in bearing expected with an increase in material moisture content.*
- *The indicated kPa ranges of the materials are highly influenced by the DCP cone intersecting cobbles and boulders within the alluvium material, that will result in a much higher kPa value than the actual bearing of the material.*

DCP data is discussed in Chapter 4 of the report with detailed data and results attached in Appendix B.

2.3 Groundwater Survey

Two sets of groundwater monitoring boreholes occur within 1 km of the site. The positions of the boreholes are indicated in the figure below. The boreholes are utilised for groundwater quality monitoring by the ELIDZ. The static groundwater levels recorded in 2012 was measured at 3.2 - 3.5 mbgl at boreholes EC/033&034/AM respectively approximately 400 m southwest of the site, and 10.02 mbgl at borehole EC/036/AM that occurs approximately 650 m to the north northeast of the site.



Figure 3: Groundwater survey – Position of monitoring boreholes within 1 km radius of project site

3 LABORATORY ANALYSIS

Selected samples were taken of the prominent soil horizons identified during the site investigation for detailed laboratory analysis. The samples were submitted to Messrs. Controlab South Africa (Pty) Ltd, Civil engineering material and geotechnical laboratory on the on the 31st of January 2020 for detailed analysis of the following:

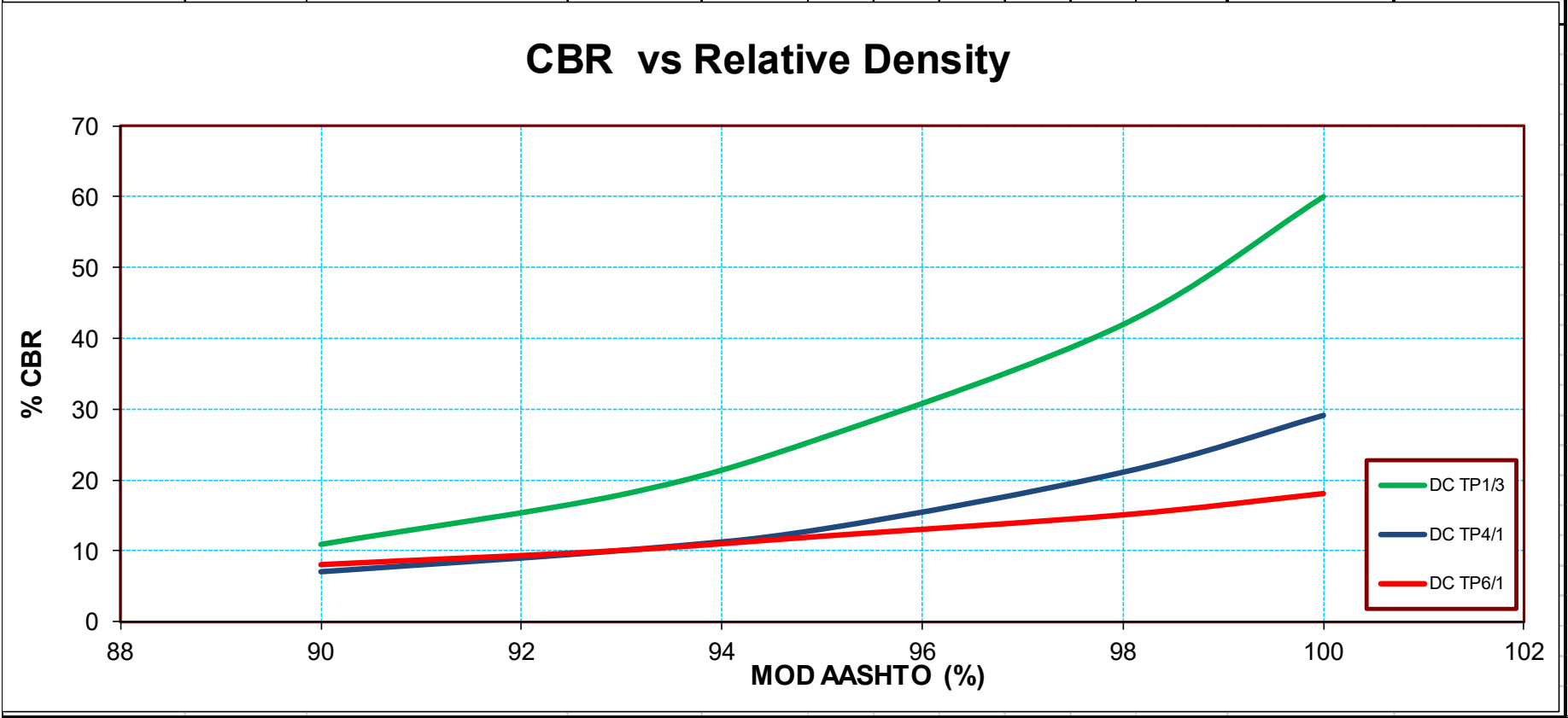
- Disturbed soil samples (4 samples)
 - Sieve Analysis including Hydrometer to determine % clay
 - Atterberg Limits
 - Moisture Content,
 - pH
 - Electrical Conductivity
- Disturbed bulk soil samples (3 samples)
 - Road Indicators
 - Maximum Dry Density
 - Optimum Moisture Content
 - CBR vs MOD AASHTO density
 - % Swell
 - TRH14 Classification
- Undisturbed soil samples (no samples)
 - No testing conducted

Results were received on the 27th of February 2020. Processed laboratory results are summarised in the Tables below and discussed in Chapter 4. Analysis certificates are attached in Appendix C for reference.

Table 1: Detailed summarised and processed laboratory results with classifications

SAMPLE INFORMATION			GRADING ANALYSES				ATTERBERG LIMITS			LS %	SOIL CHEMISTRY				ASTM	POTENTIALLY ADVERSE GEOTECHNICAL CHARACTERISTICS				
Number	Depth (m - m)	Material Origin	Gravel %	Sand %	Silt %	Clay %	LL %	PI	PI'		pH	Conductivity (mS/m)	Soil Resistivity (Ohm/m)	Moisture Content	Soil Classification	Expansiveness	Collapse / Compressibility	Erodibility / Dispersivity	Soil pH Class & Soil Corrosiveness (Conductivity)	Cathodic Protection Classification & Remarks (Resistivity)
DC TP1/1	0.20 - 0.45	Hillwash	0	56.4	27.6	16	20	7	6.9	3.5	5.54	1.160	862	17.7	SC-SM: Silty, clayey sand	Low Risk	Very High Risk	High Risk	Strongly Acid / Generally not corrosive	Not generally corrosive / Not generally required
DC TP2/1	0.70 - 0.85	Ferr Residual Siltstone	48	39.9	10.1	2	40	12	3.0	6.0	6.11	0.505	1980	20.7	GM: Silty gravel with sand	Low Risk	Low Risk	High Risk	Slightly Acid / Generally not corrosive	Not generally corrosive / Not generally required
DC TP4/1	1.20 - 2.80	Residual Dolerite	2	13.4	33.6	51	64	30	28.7	15.0	6.79	0.494	2024	34.1	MH: Elastic silt with sand	High Risk	Low Risk	High Risk	Neutral / Generally not corrosive	Not generally corrosive / Not generally required
DC TP5/1	0.40 - 0.80	Residual Siltstone	19	35.3	23.7	22	36	14	8.1	7.0	6.05	0.443	2257	19.1	SC: Clayey sand with gravel	Low Risk	Medium Risk	High Risk	Moderately Acid / Generally not corrosive	Not generally corrosive / Not generally required
DC TP1/3	0.85 - 1.15	Siltstone Bedrock	60	29.7	10.3		31	15	2.3	7.5	-	-	-	-	-	-	-	-	-	-
DC TP4/1	1.20 - 2.80	Residual Dolerite	7	37.7	55.3		48	16	12.2	8.0	-	-	-	-	-	-	-	-	-	-
DC TP6/1	0.45 - 0.75	Ferr Residual Siltstone	34	29.4	36.6		31	15	6.6	6.0	-	-	-	-	-	-	-	-	-	-

Sample Number	Depth	Origin	MOD. AASHTO		CBR at % MOD.AASHTO					Swell	TRH14 Class	TRH 20 Class
	m-m		MDD Kg/m ³	OMC %	100	98	95	93	90	%		
DC TP1/3	0.85 - 1.15	Siltstone Bedrock	2059	8.8	60	42	26	18	11	0.1	G6	Class E
DC TP4/1	1.20 - 2.80	Residual Dolerite	1436	24.4	29	21	13	10	7	0.5	G10	Class D
DC TP6/1	0.45 - 0.75	Ferr Residual Siltstone	1941	12.4	18	15	12	10	8	0.3	G8	Class E



4 RESULTS

4.1 Test pit excavation and profiling

A total of 6 test pits, numbered DC TP 1 to DC TP6 were excavated on the project area utilising a CAT 428E 4X4 TLB-type excavator on the 28th of January 2020. The position of the test pits was influenced by the thick vegetation on site especially towards the drainage on the east, and pits were placed based on geological site observations and access. The test pits were profiled on the same day according to the Guidelines for soil and rock profiling (2002).

The positions of the test pits are indicated in the Figure below, with detailed test pit logs attached in Appendix A.



Figure 4: Detailed layout of test pits

4.2 Excavatability Conditions

It was possible to excavate the test pits utilising a CAT 428E 4x4 TLB-type excavator to a depth between 1.10 and 2.80 mbgl (mean 1.72 mbgl) after which excavation refused in all test pits on moderately hard rock to hard rock siltstone bedrock material, with the exception of test pit DC TP4 where excavation was stopped in residual dolerite material with a firm consistency. The rockhead of the soft rock siltstone bedrock material was encountered from a depth between 0.80 and 1.10 mbgl (mean 0.89 mbgl).

Excavatability conditions can be summarised as follow:

- From Surface to 1.0 mbgl - Soft Excavation Class with pockets of Intermediate Excavation
- From 1.0 mbgl to 2.0 mbgl - Intermediate Excavation Class with pockets of Hard Rock

Table 2: Excavatability details - Depth to rock, depth to refusal and seepage

TP	EXCAVATION DEPTH	ROCK HEAD	REFUSAL	MATERIAL	SEEPAGE
DC TP1	1.15	0.85	Refusal	Siltstone	-
DC TP2	1.10	0.85	Refusal	Siltstone	-
DC TP3	1.30	0.85	Refusal	Siltstone	-
DC TP4	2.80		Stopped	Residual Dolerite	-
DC TP5	2.60	0.80	Refusal	Siltstone	-
DC TP6	1.35	1.10	Refusal	Siltstone	-
MIN	1.10	0.80			-
MAX	2.80	1.10			-
AVERAGE	1.72	0.89			-

4.3 Generalised soil conditions

The following generalised soil conditions can be expected based on limited point source test pit information obtained from test pits.

A portion of the site at test pits DC TP1, DC TP2 and DC TP3 is covered by fill / spoil material generally composed of clayey sand that exhibits a firm consistency and micro-shattered structure, extending to a depth of approximately 0.20 mbgl. This material is likely spoil topsoil material from the installation of roads and services at the IDZ.

The remainder of the site is covered by transported material of hillwash / colluvium origin that is generally composed of sandy clay. The material exhibits an intact to micro-shattered soil structure and a firm consistency. The material extends to a depth between 0.40 and 0.7 mbgl.

The transported material is underlain by ferruginised residual siltstone that is generally composed of sandy clay with frequent siltstone gravel and abundant gravel in localised portions. The material exhibits a firm to stiff consistency and inherent soil structure. The material is slightly ferruginised in localised portions, characterised in profile by the occurrence of ferricrete nodules, mostly in the upper portions of the horizon. The material has a thickness of up to approximately 0.65 m.

Siltstone bedrock material was encountered in all test pits. The material is highly weathered to moderately weathered, fine grained, thinly bedded and highly to medium fractured with a soft rock to moderately hard rock hardness. The material was encountered from a depth between 0.80 and 1.10 mbgl (mean 0.89 mbgl) with refusal occurring from a depth between 1.10 and 2.60 mbgl (mean 1.50 mbgl).

A dolerite structure (dyke) was intersected in DC TP4. The dolerite material is composed of sandy clay with frequent cobbles to boulders and ferricrete nodules in the upper portion of the horizon. The material exhibits a firm consistency and shattered structure, extending to a depth in excess of 2.80

mbgl. No dolerite bedrock was encountered.

The generalised soil profile and sections are indicated in the figures below.

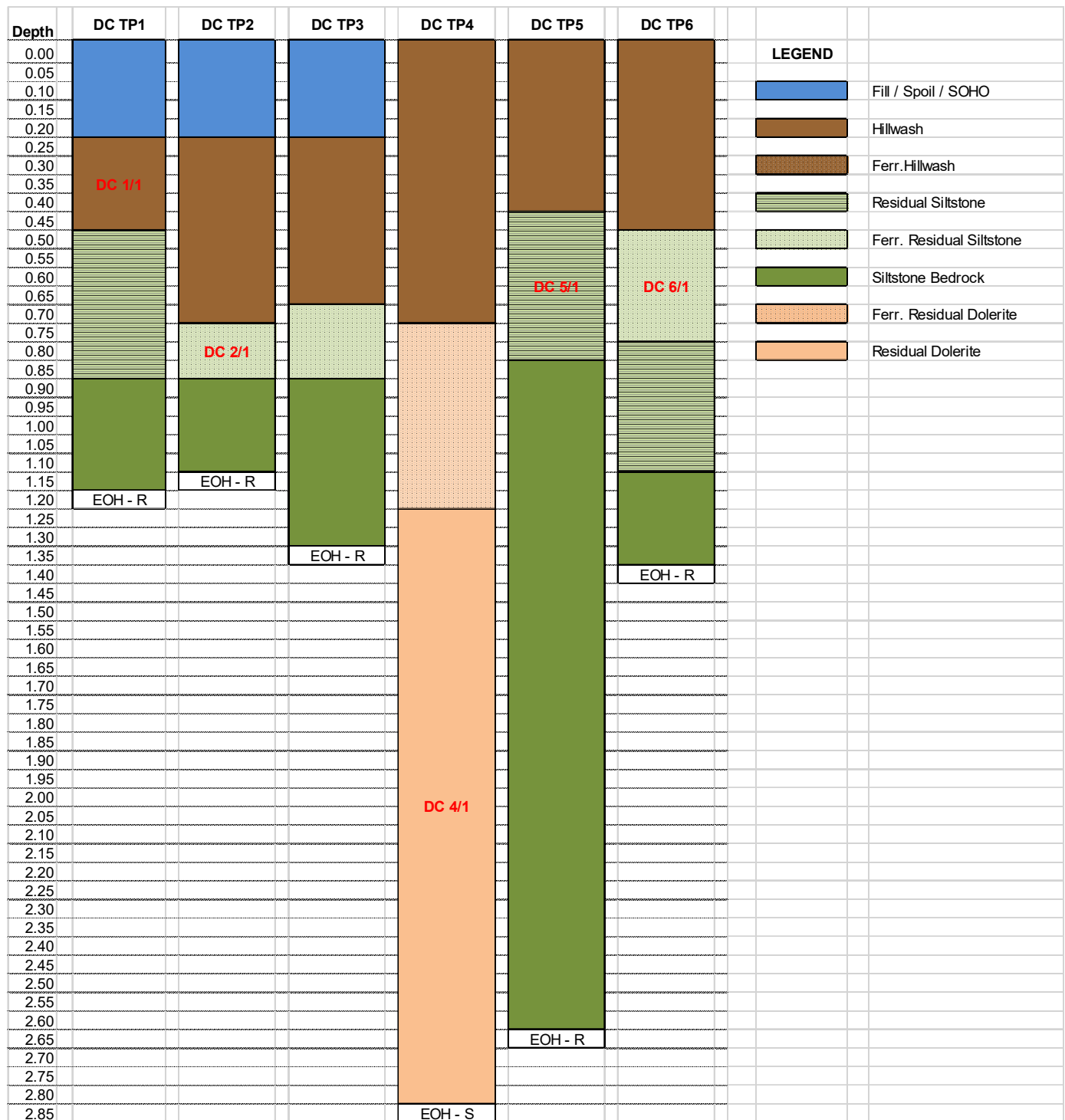


Figure 5: Generalised soil conditions

4.4 Groundwater Occurrences

No groundwater seepage was encountered in any of the test pits.

Pedogenic soil in the form of ferricrete was encountered all 4 of the 6 test pits. The pedogenic soil material is indicative that the soil horizons are not suitably drained and that the seasonal occurrence of perched groundwater conditions is highly likely to occur over the site. Suitable subsoil drainage and dampness measures will have to be implemented.

4.5 Dynamic Cone Penetrometer (DCP) testing

Dynamic Cone Penetrometer (DCP) tests were conducted adjacent to test pits and in the bottom of selected test pits based on encountered soil conditions as deemed necessary.

The DCP testing gives an estimation on the expected excavation conditions and in-situ bearing capacity of the soil materials that was intersected with the test. The calculated Unconfined Compressive Strength of the materials as obtained from the penetration of the cone in mm per blow is averaged and can be summarised as follow:

- Fill material has a UCS of 33 to 163 kPa (average 114 kPa)
- Hillwash material has a UCS of 62 to 640 kPa (average 337 kPa)
- Residual siltstone material has a UCS of 156 to 876 kPa (average 526 kPa)
- Ferruginised residual siltstone material has a UCS of 221 to 764 kPa (average 576 kPa)
- Weathered siltstone bedrock material has a UCS of 383 to >1000 kPa
- Ferruginised residual dolerite material has a UCS of 132 to 900 kPa (average 548 kPa)
- Residual dolerite material has a UCS of 8 to 607 kPa (average 170 kPa)

4.6 Corrosivity testing

Corrosivity testing was conducted on selected soil samples. The measured pH and Electrical Conductivity values of the soil materials are summarised in the Table below. The soils in the project area classify as strongly acid to neutral with a pH between 5.54 and 6.79 and generally not corrosive with a conductivity well below 50 mS/m.

Table 3: Summarised soil corrosivity data

SAMPLE INFORMATION			SOIL CHEMISTRY				SOIL CORROSIVITY	
Number	Depth (m - m)	Material Origin	pH	Conductivity (mS/m)	Soil Resistivity (Ohm/m)	Moisture Content	Soil pH Class & Soil Corrosiveness (Conductivity)	Cathodic Protection Classification & Remarks (Resistivity)
DC TP1/1	0.20 - 0.45	Hillwash	5.54	1.160	862	17.7	Strongly Acid / Generally not corrosive	Not generally corrosive / Not generally required
DC TP2/1	0.70 - 0.85	Ferr Residual Siltstone	6.11	0.505	1980	20.7	Slightly Acid / Generally not corrosive	Not generally corrosive / Not generally required
DC TP4/1	1.20 - 2.80	Residual Dolerite	6.79	0.494	2024	34.1	Neutral / Generally not corrosive	Not generally corrosive / Not generally required
DC TP5/1	0.40 - 0.80	Residual Siltstone	6.05	0.443	2257	19.1	Moderately Acid / Generally not corrosive	Not generally corrosive / Not generally required

4.7 Construction materials

The materials encountered and tested exhibit variable qualities. It is essential that proper quality control be conducted on all in-situ materials utilised during construction. Based on laboratory analysis the materials exhibit the following general properties:

- The hillwash material is expected to classify as G10 according to TRH14 and is not suitable for use during construction.
- The residual siltstone (including ferruginised materials) classifies as G8 according to TRH14 and is generally not suitable for any use during construction. Potential use of the material can be discussed and will depend on the application of the material and required parameters. The material tested ideal for use as gravel wearing coarse (TRH20 Class E) and can be utilised for temporary gravelling of construction roads / areas.
- The residual dolerite (including ferruginised) materials classify as G10 according to TRH14 and is not suitable for use during construction. The material is also potentially highly expansive and should be avoided in any construction application, with the exception of use in water retention areas.
- The slightly weathered to fresh siltstone bedrock material classifies as G6 according to TRH14 and is suitable for use during construction. Note that the material is non-durable and prone to slaking and will break down rapidly when exposed to changing moisture conditions, with a resulting decreasing strength and downgraded classification. This material cannot be stockpiled for long as the quality will degrade rapidly and is not suitable for use as erosion control / durable material. The material tested ideal for use as gravel wearing coarse (TRH20 Class E) and can be utilised for temporary gravelling of construction roads / areas.

Utilisation of any of the materials can be discussed based on design requirements.

4.8 Safe bearing pressures

The following estimated safe bearing capacities are estimated based on the site investigation and interpretation of DCP results.

- Hillwash materials - 40 kPa
- Residual siltstone (incl. Ferruginised) - 75 kPa
- Residual dolerite (incl. Ferruginised) - 50 kPa
- Siltstone bedrock (very soft rock) - 100 kPa
- Siltstone bedrock (refusal of TLB) => 400 kPa

4.9 Heave potential

Sedimentary material:

The foundation indicator results indicate that the transported and sedimentary materials encountered in the project area all have low expansive properties, indicating that these materials will have a low potential for heave on wetting up or shrinkage on drying out.

Experience of other nearby sites indicate that the residual siltstone and ferruginised residual siltstone

materials can be medium expansive. Although potential heave of the residual materials cannot be completely ruled out, the general problems with heave and shrinkage of these materials are expected to be minor

Igneous material:

The foundation indicator results indicate that the igneous materials, i.e. residual dolerite, encountered in test pit DC TP4, is potentially highly expansive with a clay content of 51% and a weighted PI of 28.7.

The calculated heave of the material, based on Van Der Merwe Method, is up to and potentially exceeding 50 mm. Suitable design and precautionary measures have to be implemented to any structures that will be developed on this material. AGES can consult and advise on construction methods and foundation options in areas where this material will be encountered as soon as a site development plan is available.

4.10 Collapse / compressibility settlement potential

The transported and residual soil materials are potentially moderately to very highly compressible / collapsible, with general settlement of 8% of layer thickness expected.

Consolidation test results utilised from a nearby geotechnical site investigation was utilised and indicate the following:

- The material is normally consolidated with a pre-consolidation pressure of 40-60 kPa
- 200 kPa load – settlement of 8 – 12 % of layer thickness
- 400 kPa load – settlement of 10 – 14 % of layer thickness

These results can be utilised as an indication of expected differential settlement under load.

4.11 Site Classification

Based on the results of the investigation the platform can be classified as follow:

- C2 – expected collapse / consolidation settlement > 10 mm
- H3 – potential heave / expansiveness up to 7.5 mm
- P(perched gw) – seasonal perched groundwater conditions expected
- [R] – shallow bedrock conditions < 1.20 mbgl [in localised portions]
- The transported and residual soil materials are potentially moderately to very highly compressible / collapsible.
- The residual dolerite material is potentially highly expansive.

The NHBRC site classification designation is: **Site Class C2 – P – [H3 – [R]**

5 SUMMARY

- AGES Omega (Pty) Ltd was appointed by BVI Border (Pty) Ltd to conduct a geotechnical investigation for the proposed data centre project on Erf 60917 of the East London Industrial Development Zone, with the aim of determining and evaluating the engineering geological characteristics of the in-situ soil and rock material underlying the project area.
- No specifications were given regarding the proposed development and information required from the geotechnical investigation was based on previous geotechnical studies conducted near the site.
 - Structural Engineering Requirements
 - Foundation indicators
 - Estimated Safe bearing capacity
 - Activity of material
 - Foundation classifications
 - Civil Engineering Requirements
 - Generalised soil profiles
 - Water tables
 - Compaction characteristics
- A total of 6 test pits, numbered DC TP 1 to DC TP6 were excavated on the project area utilising a CAT 428E 4X4 TLB-type excavator on the 28th of January 2020. The position of the test pits was influenced by the thick vegetation on site especially towards the drainage on the east, and pits were placed based on geological site observations and access. The test pits were profiled on the same day according to the Guidelines for soil and rock profiling (2002).
- Disturbed and undisturbed soil samples was taken during the site investigation and submitted for detailed laboratory analysis for foundation indicators, atterberg limits, compaction characteristics and soil corrosivity. Processed data is discussed in Chapter 3 of this report.
- Two sets of groundwater monitoring boreholes occur within 1 km of the site. The boreholes are utilised for groundwater quality monitoring by the ELIDZ. The static groundwater levels recorded in 2012 was measured at 3.2 - 3.5 m at boreholes EC/033&034/AM respectively southwest of the site, and approximately 10 mbgl at boreholes EC/036/AM that occurs to the north-northeast of the site.
- Results of the investigation are discussed per platform in Chapter 4 of the report.
- The dolerite dyke encountered on site could not be completely mapped out in the project area. It will be required that this zone be mapped out over the entire area to be developed to ensure adequate foundation design measures and mitigations against differential movement are implemented.
- It is recommended that on-site inspections of piling solutions, open foundation trenches and excavations be carried out by AGES in order to identify and evaluate soil conditions at variance with those encountered during the investigation.

6 BIBLIOGRAPHY

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APPENDIX A

Detailed test pit profile logs & photos

PROJECT: GTEC ELIDZ Data Center		TEST PIT NO.: DC 1	
CLIENT: BVI Border	LATITUDE: 33.05642° S	LOGGED BY: Mahwande Busakwe	
CONTRACTOR: Plus Plant Hire	LONGITUDE: 27.85865° E	DATE EXCAVATED: 28 January 2019	
MACHINE TYPE: CAT 425E 4x4 TLB-type excavator	ELEVATION: 22 mamsl	DATE PROFILED: 28 January 2019	

Depth	Lithology	Description	Sampling
0		Moist, brown, in profile dusky brown, firm, clayey sand. FILL.	
100			
200		Moist, dark brown, in profile dark greyish brown, firm, intact to micro-shattered, sandy clay. HILLWASH.	DC 1/1
300			
400			
500		Moist, brown, in profile brown blotched yellowish brown, firm, inherent, sandy clay with frequently gravel. RESIDUAL SILTSTONE.	
600			
700		Abundant gravel moderately densely packed in a matrix of Moist, yellowish brown, sandy clay. RESIDUAL SILTSTONE.	
800			
900		Khaki, highly wto moderately weathered, fine grained, thickly jointed, soft rock to moderately hard rock. SILTSTONE BEDROCK.	
1000			
1100			
1200		Excavation refused on moderately hard rock SILTSTONE BEDROCK.	
1300			
1400			
1500			
1600			
1700			
1800			
1900			
2000			
2100			
2200			
2300			
2400			
2500			
2600			
2700			
2800			
2900			
3000			


	18 Sanson Road Vincent Postnet 203, PBag X9063 EAST LONDON, 5200 Tel. No.: +27 (0)18 188 8609 e-mail: omega@ages-group.com www.ages-omega.co.za	Notes: No groundwater seepage Good sidewall stability 1 disturbance sample taken

DC 1



PROJECT: GTEC ELIDZ Data Center		TEST PIT NO.: DC 2	
CLIENT: BVI Border	LATITUDE: 33.05612° S	LOGGED BY: Mahwande Busakwe	
CONTRACTOR: Plus Plant Hire	LONGITUDE: 27.85842° E	DATE EXCAVATED: 28 January 2019	
MACHINE TYPE: CAT 428E 4x4 TLB-type excavator	ELEVATION: 22 mamsl	DATE PROFILED: 28 January 2019	

Depth	Lithology	Description	Sampling
0		Moist, brown, in profile dusky brown, firm, clayey sand. FILL.	
100			
200		Moist, dark brown, in profile dark greyish brown, firm, intact to micro-shattered, sandy clay. HILLWASH.	
300			
400			
500			
600			
700		Moist, dark brown, in profile dark brown blotched yellowish brown, firm, micro-shattered to inherent, sandy clay with frequently gravel and ferricrete nodule. FERRUGINISED RESIDUAL SILTSTONE.	DC 1/2
800			
900		Khaki, highly wto moderately weathered, fine grained, thickly jointed, soft rock to moderately hard rock. SILTSTONE BEDROCK.	
1000			
1100		Excavation refused on moderately hard rock SILTSTONE BEDROCK.	
1200			
1300			
1400			
1500			
1600			
1700			
1800			
1900			
2000			
2100			
2200			
2300			
2400			
2500			
2600			
2700			
2800			
2900			
3000			


	10 Sanson Road Vincent Postnet 203, PBag X9063 EAST LONDON, 5200 Tel. No.: +27 (0)18 188 8609 e-mail: omega@ages-group.com www.ages-omega.co.za	Notes: No groundwater seepage Good sidewall stability 1 disturbed sample taken

DC 2



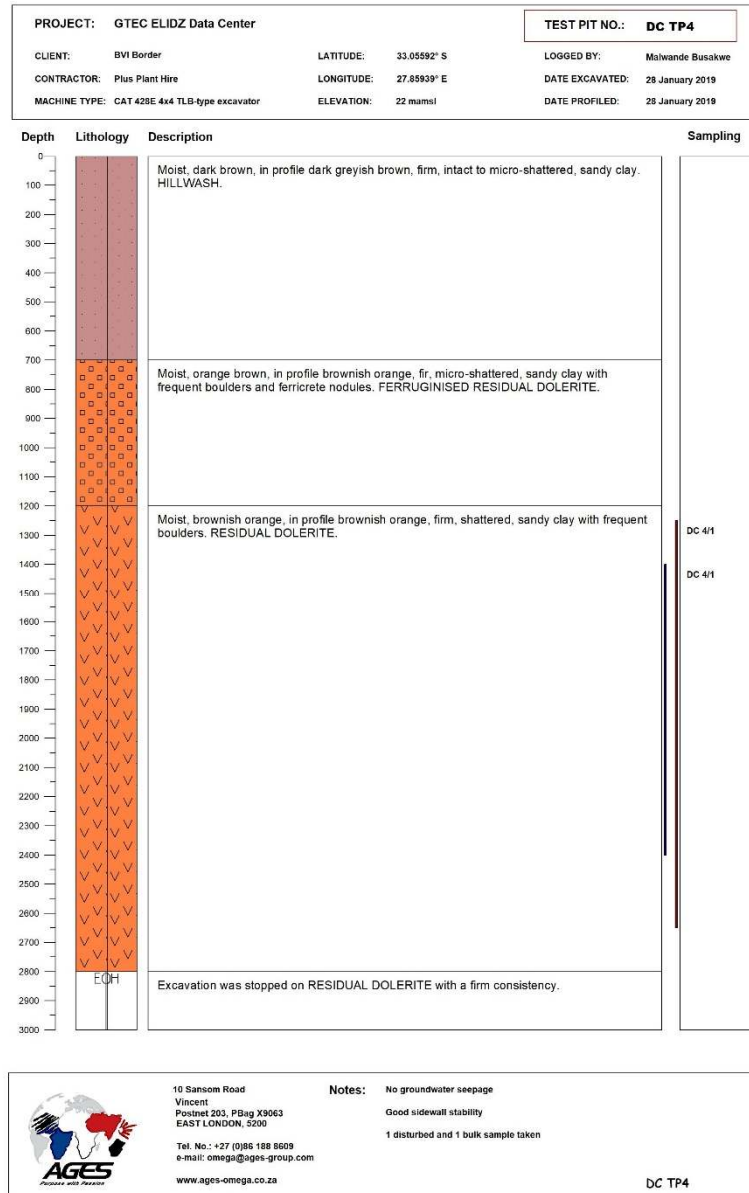
PROJECT: GTEC ELIDZ Data Center		TEST PIT NO.: DC 3	
CLIENT: BVI Border	LATITUDE: 33.05601° S	LOGGED BY: Mahwande Busakwe	
CONTRACTOR: Plus Plant Hire	LONGITUDE: 27.85900° E	DATE EXCAVATED: 28 January 2019	
MACHINE TYPE: CAT 428E 4x4 TLB-type excavator	ELEVATION: 22 mamsl	DATE PROFILED: 28 January 2019	

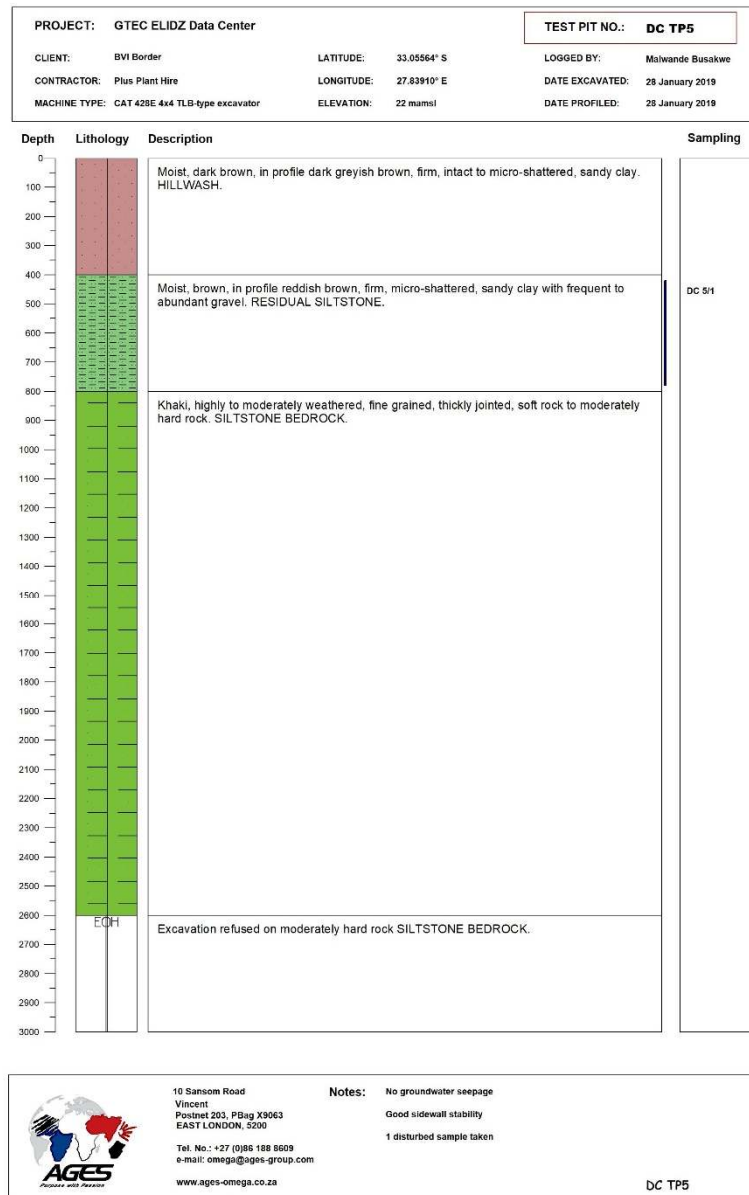
Depth	Lithology	Description	Sampling
0		Moist, brown, in profile dusky brown, firm, clayey sand with frequent gravel. FILL.	
100			
200		Moist, dark brown, in profile dark greyish brown, firm, intact to micro-shattered, sandy clay, HILLWASH.	
300			
400			
500			
600			
700		Moist, dark brown, in profile dark brown blotched yellowish brown, firm, micro-shattered to inherent, sandy clay with frequently gravel and ferricrete nodule. FERRUGINISED RESIDUAL SILTSTONE.	
800			
900		Khaki, highly wto moderately weathered, fine grained, thickly jointed, soft rock to moderately hard rock. SILTSTONE BEDROCK.	
1000			
1100			
1200			
1300		Excavation refused on moderately hard rock SILTSTONE BEDROCK.	
1400			
1500			
1600			
1700			
1800			
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2700			
2800			
2900			
3000			

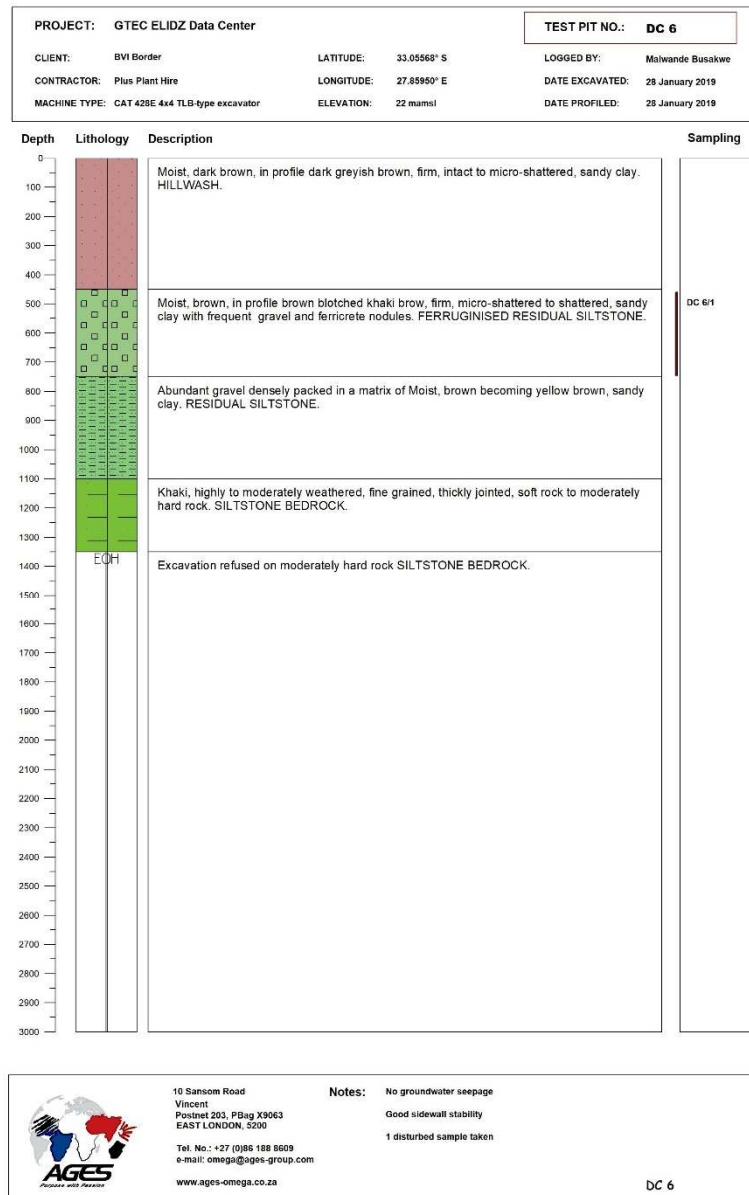
	10 Sanson Road Vincent Postnet 203, PBag X9063 EAST LONDON, 5200 Tel. No.: +27 (0)86 188 8609 e-mail: omega@ages-group.com www.ages-omega.co.za	Notes: No groundwater seepage Good sidewall stability No sample taken

DC 3









APPENDIX B

Dynamic Cone Penetrometer data

ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT: ELIDZ Data Centre

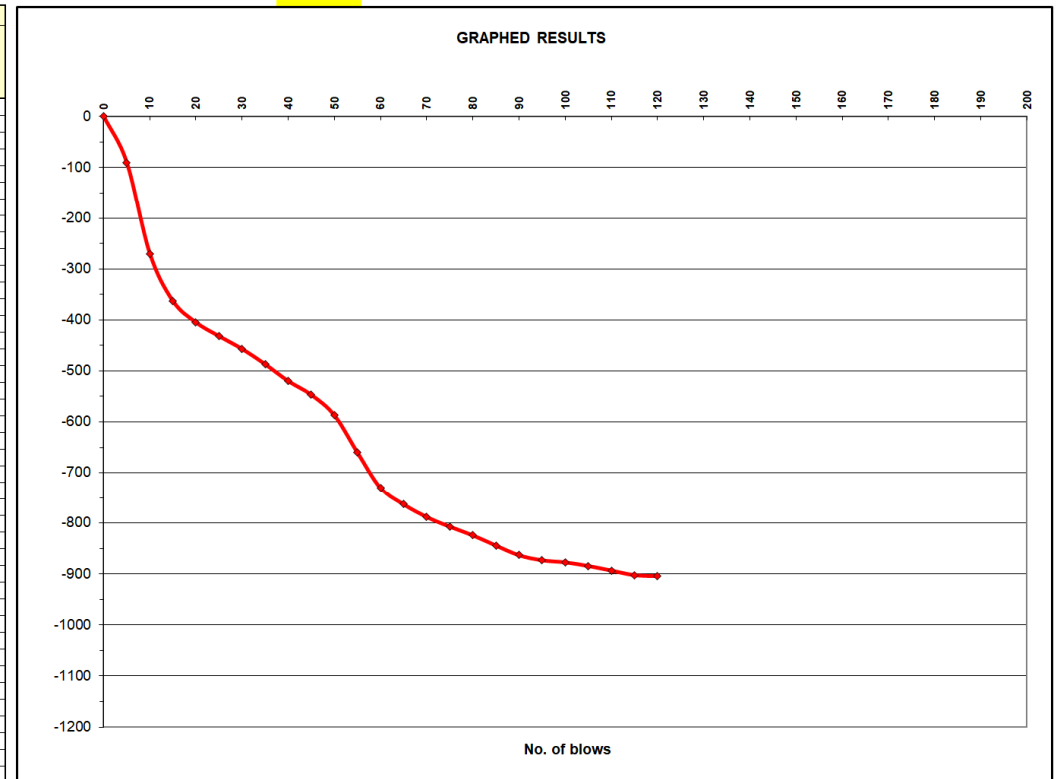
DEPTH: Surface

Traffic Stress σ'_v 250 kPa

CONDUCTED ON: Tuesday, January 28, 2020

Thickness D 150 mm

NO. OF BLOWS	DCP 1									
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR% (Kleyn, 1984)	E (MPa) (Packard, 1973)	E (De Beer, 1991) MPa	E (Jianzhou et al., 1999)	ρ (mm)	k (kN/m ³)
0	88	0	0.0							
5	178	-90	18.0	124	10	29	52	109	0.0003	730
10	358	-270	36.0	58	4	17	25	84	0.0004	557
15	451	-363	18.6	120	10	28	50	108	0.0003	721
20	493	-405	8.4	285	27	51	116	147	0.0003	983
25	520	-432	5.4	461	48	72	186	175	0.0002	1167
30	545	-457	5.0	502	53	77	202	180	0.0002	1203
35	575	-487	6.0	411	42	67	167	168	0.0002	1120
40	608	-520	6.6	371	37	62	150	162	0.0002	1079
45	635	-547	5.4	461	48	72	186	175	0.0002	1167
50	675	-587	8.0	301	29	53	123	150	0.0002	1001
55	748	-660	14.6	156	14	34	65	119	0.0003	792
60	818	-730	14.0	163	14	35	68	121	0.0003	805
65	851	-763	6.6	371	37	62	150	162	0.0002	1079
70	876	-788	5.0	502	53	77	202	180	0.0002	1203
75	895	-807	3.8	677	75	95	270	201	0.0002	1339
80	912	-824	3.4	764	87	104	304	210	0.0002	1398
85	932	-844	4.0	640	70	91	256	197	0.0002	1312
90	951	-863	3.8	677	75	95	270	201	0.0002	1339
95	961	-873	2.0	1362	170	156	535	258	0.0001	1720
100	965	-877	0.8	3699	342	239	1414	369	0.0001	2458
105	972	-884	1.4	2010	232	189	781	296	0.0001	1976
110	981	-893	1.8	1528	185	165	598	269	0.0001	1792
115	990	-902	1.8	1528	185	165	598	269	0.0001	1792
120	992	-904	0.4	7873	442	279	2952	483	0.0001	3221
125										
130										
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ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT: ELIDZ Data Centre

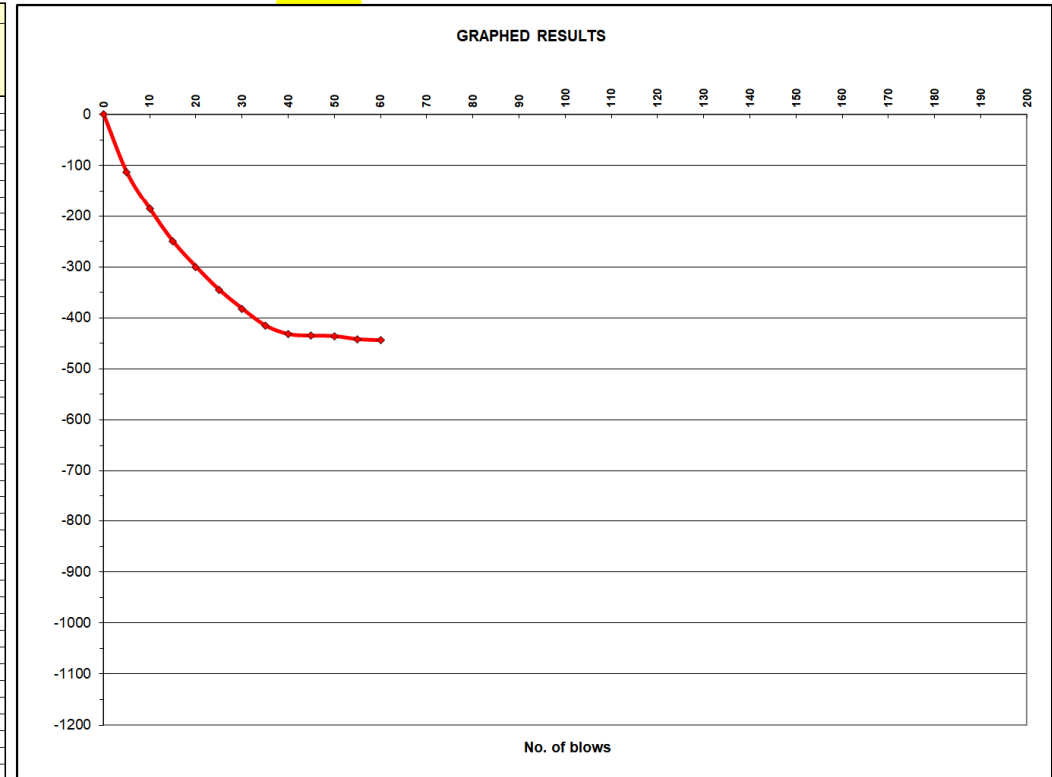
DEPTH: Surface

Traffic Stress σ'_v 250 kPa

CONDUCTED ON: Tuesday, January 28, 2020

Thickness D 150 mm

NO. OF BLOWS	DCP 2								
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR% (Kieyn, 1984)	E (MPa) (Packard, 1973)	E (De Beer, 1991) MPa	E (Jianzhou et al., 1999)	k (kN/m ³)
0	110	0	0.0						
5	223	-113	22.6	97	8	24	41	100	0.0004
10	296	-186	14.6	156	14	34	65	119	0.0003
15	360	-250	12.8	180	16	37	74	125	0.0003
20	410	-300	10.0	236	22	45	97	138	0.0003
25	455	-345	9.0	264	25	49	108	143	0.0003
30	492	-382	7.4	327	32	57	133	155	0.0002
35	525	-415	6.6	371	37	62	150	162	0.0002
40	542	-432	3.4	764	87	104	304	210	0.0002
45	545	-435	0.6	5061	389	259	1919	413	0.0001
50	546	-436	0.2	16760	500	301	6161	633	0.0001
55	552	-442	1.2	2377	263	204	919	315	0.0001
60	554	-444	0.4	7873	442	279	2952	483	0.0001
65									
70									
75									
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175									
180									
185									
190									
195									
200									



ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT: ELIDZ Data Centre

DEPTH: Surface

Traffic Stress σ'_v 250 kPa

CONDUCTED ON: Tuesday, January 28, 2020

Thickness D 150 mm

NO. OF BLOWS	DCP 3									
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR% (Kieyn, 1984)	E (MPa) (Packard, 1973)	E (De Beer, 1991) MPa	E (Jianzhou et al., 1999)	ρ (mm)	k (kN/m ³)
0	105	0	0.0							
5	175	-70	14.0	163	14	35	68	121	0.0003	805
10	250	-145	15.0	152	13	33	63	118	0.0003	784
15	350	-245	20.0	111	9	26	46	105	0.0004	701
20	420	-315	14.0	163	14	35	68	121	0.0003	805
25	465	-360	9.0	264	25	49	108	143	0.0003	956
30	505	-400	8.0	301	29	53	123	150	0.0002	1001
35	542	-437	7.4	327	32	57	133	155	0.0002	1032
40	587	-482	9.0	264	25	49	108	143	0.0003	956
45	610	-505	4.6	550	59	82	221	186	0.0002	1243
50	642	-537	6.4	383	39	64	155	164	0.0002	1092
55	675	-570	6.6	371	37	62	150	162	0.0002	1079
60	710	-605	7.0	348	35	59	141	158	0.0002	1055
65	741	-636	6.2	397	40	65	161	166	0.0002	1106
70	770	-665	5.8	427	44	69	173	170	0.0002	1135
75	806	-701	7.2	337	33	58	137	157	0.0002	1043
80	842	-737	7.2	337	33	58	137	157	0.0002	1043
85	882	-777	8.0	301	29	53	123	150	0.0002	1001
90	922	-817	8.0	301	29	53	123	150	0.0002	1001
95	962	-857	8.0	301	29	53	123	150	0.0002	1001
100	981	-876	3.8	677	75	95	270	201	0.0002	1339
105	1001	-896	4.0	640	70	91	256	197	0.0002	1312
110	1020	-915	3.8	677	75	95	270	201	0.0002	1339
115	1042	-937	4.4	577	62	85	231	190	0.0002	1264
120	1062	-957	4.0	640	70	91	256	197	0.0002	1312
125	1088	-983	5.2	481	51	75	194	178	0.0002	1185
130	1120	-1015	6.4	383	39	64	155	164	0.0002	1092
135										
140										
145										
150										
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160										
165										
170										
175										
180										
185										
190										
195										
200										



ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT:

ELIDZ Data Centre

DEPTH:

Surface

Traffic Stress

 σ'_v

250 kPa

CONDUCTED ON:

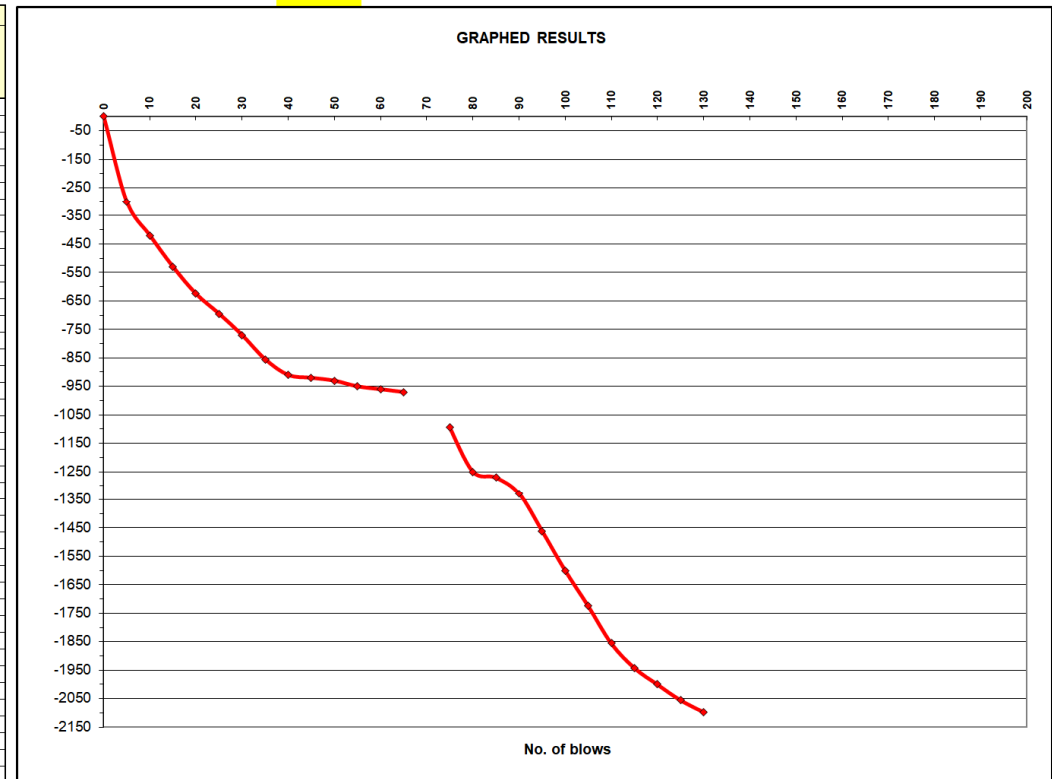
Tuesday, January 28, 2020

Thickness

D

150 mm

NO. OF BLOWS	DCP 4									
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR% (Kieyn, 1984)	E (MPa) (Packard, 1973)	E (De Beer, 1991) MPa	E (Jianzhou et al., 1999)	ρ (mm)	k (kN/m ³)
0	115	0	0.0							
5	415	-300	60.0	33	2	11	14	68	0.0005	456
10	535	-420	24.0	91	7	23	38	98	0.0004	652
15	645	-530	22.0	100	8	24	42	101	0.0004	675
20	740	-625	19.0	117	10	27	49	107	0.0003	715
25	810	-695	14.0	163	14	35	68	121	0.0003	805
30	885	-770	15.0	152	13	33	63	118	0.0003	784
35	970	-855	17.0	132	11	30	55	112	0.0003	746
40	1025	-910	11.0	212	20	42	87	133	0.0003	884
45	1035	-920	2.0	1362	170	156	535	258	0.0001	1720
50	1045	-930	2.0	1362	170	156	535	258	0.0001	1720
55	1065	-950	4.0	640	70	91	256	197	0.0002	1312
60	1075	-960	2.0	1362	170	156	535	258	0.0001	1720
65	1085	-970	2.0	1362	170	156	535	258	0.0001	1720
70										
75	1095	-1095	219.0	8	0	4	4	41	0.0009	275
80	1250	-1250	31.0	69	5	19	29	89	0.0004	590
85	1271	-1271	4.2	607	66	88	243	193	0.0002	1288
90	1328	-1328	11.4	204	19	41	84	131	0.0003	872
95	1461	-1461	26.6	81	6	21	34	94	0.0004	627
100	1600	-1600	27.8	77	6	20	33	92	0.0004	616
105	1725	-1725	25.0	87	7	22	37	96	0.0004	642
110	1856	-1856	26.2	82	6	21	35	95	0.0004	631
115	1942	-1942	17.2	131	11	30	54	111	0.0003	743
120	2000	-2000	11.6	201	18	40	83	130	0.0003	866
125	2055	-2055	11.0	212	20	42	87	133	0.0003	884
130	2097	-2097	8.4	285	27	51	116	147	0.0003	983
135										
140										
145										
150										
155										
160										
165										
170										
175										
180										
185										
190										
195										
200										



ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT:

ELIDZ Data Centre

DEPTH:

Surface

Traffic Stress

 σ'_v

250 kPa

Thickness

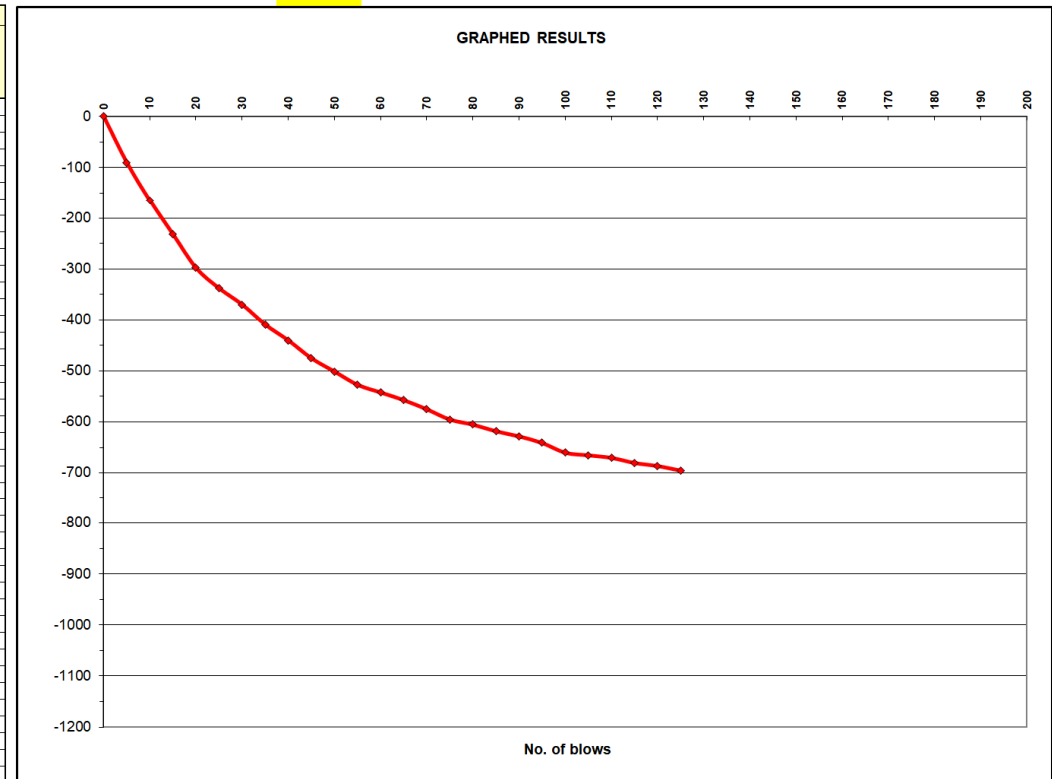
D

150 mm

CONDUCTED ON:

Tuesday, January 28, 2020

NO. OF BLOWS	DCP 5									
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR% (Kieyn, 1984)	E (MPa) (Packard, 1973)	E (De Beer, 1991) MPa	E (Jianzhou et al., 1999)	ρ (mm)	k (kN/m ³)
0	100	0	0.0							
5	190	-90	18.0	124	10	29	52	109	0.0003	730
10	265	-165	15.0	152	13	33	63	118	0.0003	784
15	332	-232	13.4	171	15	36	71	123	0.0003	819
20	398	-298	13.2	174	15	36	72	124	0.0003	824
25	438	-338	8.0	301	29	53	123	150	0.0002	1001
30	470	-370	6.4	383	39	64	155	164	0.0002	1092
35	509	-409	7.8	309	30	55	126	152	0.0002	1011
40	540	-440	6.2	397	40	65	161	166	0.0002	1106
45	575	-475	7.0	348	35	59	141	158	0.0002	1055
50	601	-501	5.2	481	51	75	194	178	0.0002	1185
55	627	-527	5.2	481	51	75	194	178	0.0002	1185
60	642	-542	3.0	876	102	114	348	220	0.0002	1468
65	657	-557	3.0	876	102	114	348	220	0.0002	1468
70	675	-575	3.6	718	81	99	286	205	0.0002	1367
75	695	-595	4.0	640	70	91	256	197	0.0002	1312
80	705	-605	2.0	1362	170	156	535	258	0.0001	1720
85	718	-618	2.6	1023	122	127	405	233	0.0002	1552
90	728	-628	2.0	1362	170	156	535	258	0.0001	1720
95	741	-641	2.6	1023	122	127	405	233	0.0002	1552
100	760	-660	3.8	677	75	95	270	201	0.0002	1339
105	765	-665	1.0	2900	300	221	1116	338	0.0001	2253
110	770	-670	1.0	2900	300	221	1116	338	0.0001	2253
115	780	-680	2.0	1362	170	156	535	258	0.0001	1720
120	786	-686	1.2	2377	263	204	919	315	0.0001	2099
125	795	-695	1.8	1528	185	165	598	269	0.0001	1792
130										
135										
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190										
195										
200										



ANALYSES OF DYNAMIC CONE PENETRATION TEST RESULTS

PROJECT: ELIDZ Data Centre

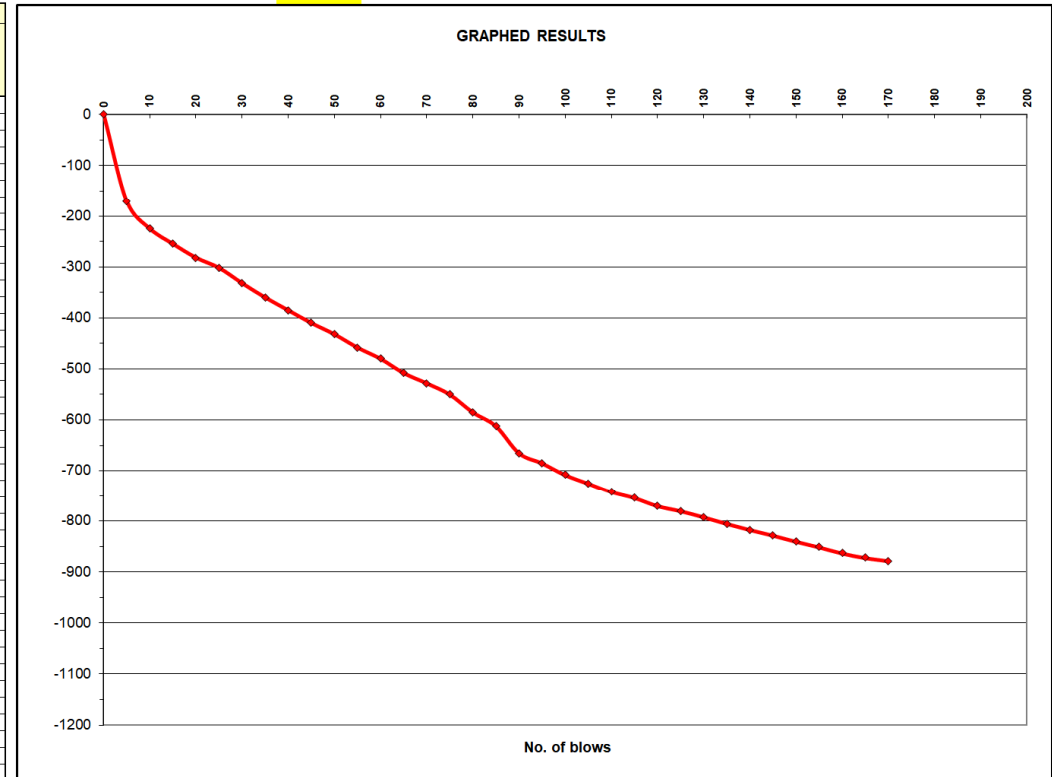
DEPTH: Surface

Traffic Stress σ'_v 250 kPa

CONDUCTED ON: Tuesday, January 28, 2020

Thickness D 150 mm

NO. OF BLOWS	DCP 6									
	Values (mm)	Cumulative penetration (mm)	mm/blow	UCS (kPa)	CBR% (Kieyn, 1984)	E (MPa) (Packard, 1973)	E (De Beer, 1991) MPa	E (Jianzhou et al., 1999)	ρ (mm)	k (kN/m ³)
0	110	0	0.0							
5	281	-171	34.2	62	5	17	26	85	0.0004	568
10	335	-225	10.8	217	20	42	89	134	0.0003	891
15	365	-255	6.0	411	42	67	167	168	0.0002	1120
20	392	-282	5.4	461	48	72	186	175	0.0002	1167
25	412	-302	4.0	640	70	91	256	197	0.0002	1312
30	442	-332	6.0	411	42	67	167	168	0.0002	1120
35	470	-360	5.6	443	46	70	179	173	0.0002	1151
40	495	-385	5.0	502	53	77	202	180	0.0002	1203
45	520	-410	5.0	502	53	77	202	180	0.0002	1203
50	542	-432	4.4	577	62	85	231	190	0.0002	1264
55	568	-458	5.2	481	51	75	194	178	0.0002	1185
60	590	-480	4.4	577	62	85	231	190	0.0002	1264
65	618	-508	5.6	443	46	70	179	173	0.0002	1151
70	638	-528	4.0	640	70	91	256	197	0.0002	1312
75	660	-550	4.4	577	62	85	231	190	0.0002	1264
80	695	-585	7.0	348	35	59	141	158	0.0002	1055
85	722	-612	5.4	461	48	72	186	175	0.0002	1167
90	775	-665	10.6	221	20	43	91	135	0.0003	897
95	795	-685	4.0	640	70	91	256	197	0.0002	1312
100	818	-708	4.6	550	59	82	221	186	0.0002	1243
105	835	-725	3.4	764	87	104	304	210	0.0002	1398
110	852	-742	3.4	764	87	104	304	210	0.0002	1398
115	864	-754	2.4	1117	135	136	440	240	0.0002	1602
120	880	-770	3.2	816	94	109	325	215	0.0002	1432
125	890	-780	2.0	1362	170	156	535	258	0.0001	1720
130	902	-792	2.4	1117	135	136	440	240	0.0002	1602
135	915	-805	2.6	1023	122	127	405	233	0.0002	1552
140	927	-817	2.4	1117	135	136	440	240	0.0002	1602
145	938	-828	2.2	1228	151	145	483	249	0.0002	1657
150	950	-840	2.4	1117	135	136	440	240	0.0002	1602
155	961	-851	2.2	1228	151	145	483	249	0.0002	1657
160	973	-863	2.4	1117	135	136	440	240	0.0002	1602
165	982	-872	1.8	1528	185	165	598	269	0.0001	1792
170	988	-878	1.2	2377	263	204	919	315	0.0001	2099
175										
180										
185										
190										
195										
200										



APPENDIX C

Soil laboratory analysis certificates


ControlLab South Africa (Pty) Ltd

CIVIL ENGINEERING MATERIALS AND GEOTECHNICAL LABORATORY

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OTHER BRANCH OFFICES: Cape Town, Kokstad, Mthatha, Queenstown, Lusaka - Zambia

CLIENT : AGES Omega (Pty) Ltd

Postnet Suite 203

Private Bag X9063

EAST LONDON, 5200

ATT: Mr F de Jager

PROJECT: GTEC E20 - 010 DC

DATE RECEIVED: 2020-01-31

DATE TESTED: 2020-02-25

DATE REPORTED: 2020-02-27

TEST REPORT NO.: 98499

MATERIALS TEST REPORT

SAMPLE NO:	807	808	809			
POSITION / CHAINAGE	DC					
	1/3	4/1	6/1			
DESCRIPTION	lt Ol	dk Y O	lt G			
	Sh	dec Dol	Sh			

Sieve Analysis (Wet Preparation) SANS 3001 - Part GR1

% PASSING 75 mm	97					
63 mm	95					
50 mm	93					
37.5 mm	90					
28 mm	85	100				
20 mm	81	99	100			
14 mm	73	98	95			
5 mm	40	93	66			
2.00 mm	25	85	51			
0.425 mm	15	76	44			
0.075 mm	10.3	55.3	36.6			

Soil Mortar Analysis - SANS 3001 - PR5

COURSE SAND (%)	40	11	14			
FINE SAND (%)	19	24	15			
SILT / CLAY (%)	41	65	72			
GRADING MODULUS	2.50	0.84	1.68			

Atterberg Limits - SANS 3001 - GR10 & GR11

LIQUID LIMIT (%)	31	48	31			
PLASTICITY INDEX (%)	15	16	15			
LINEAR SHRINKAGE (%)	7.5	8.0	6.0			

Maximum Dry Density & Optimum Moisture Content - SANS 3001 - GR30 / California Bearing Ratio - SANS 3001 - GR40

Maximum Dry Density (kg/m ³)	2059	1436	1941			
Optimum Moisture Content (%)	8.8	24.4	12.4			
C.B.R. @ 100% COMPACTION	60	29	18			
C.B.R. @ 98 % COMPACTION	42	21	15			
C.B.R. @ 95 % COMPACTION	26	13	12			
C.B.R. @ 93 % COMPACTION	18	10	10			
C.B.R. @ 90 % COMPACTION	11	7	8			
SWELL @ 100% COMP. (%)	0.10	0.50	0.30			
Collo / TRH 14 Classification	G6	G10	G8			

The above test results are pertinent to the samples tested only. While the tests are carried out according to recognized standards, ControlLab shall not be liable for erroneous testing or reporting thereof. This report may not be reproduced except in full without prior consent of ControlLab.

Technical Signatory:

J Aterbur

Remarks:

Sample Delivered by Customer



Sampled by ControlLab

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STR001



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Private Bag X9063
EAST LONDON, 5200

ATT: Mr F de Jager

PROJECT: GTEC E20 - 010 DC
DATE RECEIVED: 2020-01-31
DATE TESTED: 2020-02-25
DATE REPORTED: 2020-02-27
TEST REPORT NO.: 98499

GRAVEL ROADS MATERIAL REPROT (TRH 20)

SAMPLE NO:	807	808	809				SPEC
POSITION (Chainage)	DC						
	1/3	4/1	6/1				
DESCRIPTION:	lt Ol	dk Y O	lt G				
	Sh	dec Dol	Sh				

GRAVEL CHARACTERISTICS (in Accordance With T R H 20)

PASSING	75 mm	97					
	63 mm	95					
	50 mm	93					
	37.5 mm	90					
	28 mm	85	100				
	20 mm	81	99	100			
	14 mm	73	98	95			
	5 mm	40	93	66			
	2.00 mm	25	85	51			
	0.425 mm	15	76	44			
	0.075 mm	10.3	55.3	36.6			
GRADING MODULUS		2.50	0.84	1.68			
LIQUID LIMIT		31	48	31			
PLASTICITY INDEX		15	16	15			
LINEAR SHRINKAGE		7.5	8.0	6.0			
M.D.D.		2059	1436	1941			
O.M.C.		8.8	24.4	12.4			
C.B.R. @ 95%		26	13	12			Min 15
SWELL (MAX)		0.10	0.50	0.30			
OVER SIZE INDEX (37.5 mm)		10	0	0			Max 10
GRADING COEFFICIENT *		30	14	32			16 - 34
SHRINKAGE PRODUCT *		125	608	264			100 - 365
CLASS (TRH 20) *		E	D	E			

Note!

Calculated in accordance to TRH20 Appendix A

CLASS (TRH 20)	A	----	ERRODIBLE MATERIAL	(AVOID OR BLEND)
	B	----	RAVELS & CORRUGATES	(AVOID OR BLEND)
	C	----	RAVELS	(AVOID OR BLEND)
	D	----	SLIPPERY WHEN WET	(AVOID OR BLEND)
	E	----	IDEAL - provided Oversize material is restricted to recommended limits	

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Technical Signatory: _____
J Atterbury

Sample Delivered by Customer: YES

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Sampled by Controlab

TR012



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CLIENT: AGES Omega (Pty) Ltd
Postnet Suite 203
Private Bag X9063
EAST LONDON, 5200

PROJECT: GTEC E20 - 010 DC

DATE RECEIVED: 2020-01-31

DATE TESTED: 2020-02-18

DATE REPORTED: 2020-02-27

ATT : Mr F de Jager

TEST REPORT NO.: 98499

FOUNDATION INDICATOR REPORT

SAMPLE NO	803	804	805	806		
POSITION	DC					
	1/1	2/1	4/1	5/1		
DESCRIPTION	dk R Br	lt R O	dk Y	dk R Br		
	sdv st	Qtzte +	cly s	Calc +		
		cly st		cly s		

SIEVE ANALYSIS % PASSING SIEVES: Method :SANS 3001-AG1

% PASSING	75 mm					
	63 mm					
	50 mm					
	37.5 mm		100			
	28 mm		72			
	20 mm		61		100	
	14 mm		58		99	
	10 mm		55	100	96	
	7.1 mm		53	99	89	
	5.00 mm		52	98	81	
	2.00 mm	100	47	97	66	
	1.00 mm	100	40	96	61	
	0.600 mm	99.4	31.8	95.7	59.0	
	0.425 mm	98.1	24.6	95.5	57.6	
	0.300 mm	91.1	22.6	93.0	55.1	
	0.150 mm	54.0	17.3	87.5	48.8	
	0.075 mm	43.6	12.1	84.6	45.7	
GRADING MODULUS	0.6	2.2	0.2	1.3		

HYDROMETER ANALYSIS: Method: SANS 3001-GR3

	0.060 mm	39	9	82	44	
	0.020 mm	24	4	62	36	
	0.006 mm	18	2	54	36	
	0.002 mm	16	2	51	22	

ATTEMBERG LIMITS: Method: SANS 3001-GR10

LIQUID LIMIT	20	40	64	36		
PLASTICITY INDEX	7	12	30	14		
LINEAR SHRINKAGE	3.5	6.0	15.0	7.0		

PREDICTION OF HEAVE (VAN DER MERWE METHOD)

MOISTURE CONTENT	17.7	20.7	34.1	19.1		
PI WHOLE SAMPLE	7.0	3.0	28.0	8.0		
POTENTIAL EXPANSIVENESS	LOW	LOW	MED	LOW		

The above test results are pertinent to the samples received and tested only.

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Remarks:

Samples Delivered by Customer: YES

Sampled by ControlLab

Technical Signatory:

J. Atterbury

STR0032A

**ControlLab South Africa (Pty) Ltd**

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EAST LONDON, 5200

ATT : Mr F de Jager

PROJECT: GTEC E20-010 DC

DATE RECEIVED: 2020-01-31

DATE TESTED: 2020-02-16

DATE REPORTED: 2020-02-18

TEST REPORT NO: 98499

pH & CONDUCTIVITY

[illegible]

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Laboratory Manager:

Knight

