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ERASMUS PARK TOWNSHIP DEVELOPMENT, PRETORIA SUPPLEMENTARY DOLOMITE STABILITY ASSESSMENT ACROSS ZONE 2

TITLE Erasmus Park Township Development, Pretoria

Supplementary Dolomite Stability Assessment

across Zone 2

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DATE January 2017

REFERENCE V16/099 – 5324

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STATUS Draft – For Comment by CGS

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Atterbury Property Fund Managers Pty (Ltd)

Erasmus Park Township Development, Pretoria

Supplementary Dolomite Stability Assessment across Zone 2



1. INTRODUCTION

This report details the results of a supplementary dolomite stability investigation conducted by Verdi Consulting Engineers (Verdicon) for the proposed new township development located in Erasmus Park, Pretoria. The investigation was carried out as per an instruction received from Mr Hendri Gelderblom from DG Consulting Engineers on behalf of Atterbury Property Fund Managers (Pty) Ltd.

This investigation was triggered following a letter, Reference F3156.1 of 9 September 2016, submitted by the Council for Geoscience (CGS) to the Tshwane Metropolitan Municipality. This letter indicated that additional drilling would be required to further define the boundaries of the zones assigned during the previous dolomite stability assessment and near surface investigation conducted by Verdicon in 2016:

Report Title: Erasmus Park Township Development, Pretoria

Dolomite Stability Assessment and Near Surface Investigation Report

Report Reference: V16/099 – 4832

Date: July 2016

The July 2016 investigation comprised the excavation of test pits and the drilling of percussion boreholes across the site to supplement the information from previous investigations conducted by Knight Hall Hendry in 1991 and Dr BH Relly in 1973 and 1974. The positions of the test pits and percussion boreholes are indicated on **Drawing V16/099-01** presented in **Appendix A**.

In addition, the CGS commented that the drilling carried out in Zone 2, characterized by hardpan ferricrete with shale at depth, was considered insufficient to allow this area to be classified as Inherent Hazard Class (IHC) 1.

Verdicon recommended, in the June 2016 report, that additional footprint drilling should be carried out once the positions of the structures was known. However, the client is desirous that clarity as to the deeper conditions across Zone 2 be determined at this stage.

2. SITE DESCRIPTION

The site is located at Latitude 25°49'12.61"S and Longitude 28°14'43.80"E and is 57.66 hectares in size. The site is currently undeveloped and slopes to the west at approximately 10°. Several large trees and bushy areas are located along the southern, western and northern boundary. A small stream runs along the western boundary, flowing from the north west to the south east.

The site is bounded by the N1 Highway to the east, Leisure Bay Residential Estate to the south, Bayside Road and Van Ryneveld Avenue to the west and Solomon Mahlangu Drive to the north.

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A locality plan is given in **Figure 1** with the site indicated by the red box. A general site layout is given in **Figure 2**.



Figure 1: LOCALITY PLAN OF THE SITE



Figure 2: GENERAL SITE LAYOUT

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3. REGIONAL GEOLOGY

According to the published 1:50 000 geological map, Sheet 2528CC Lyttelton, the site is underlain by shale locally with conglomerate, breccia and quartzite belonging to the Rooihoogte Formation (T3tS) of the Pretoria Group of the Transvaal Supergroup.

The boundary between the shale of the Rooihoogte formation and Chert and Chert Rubble belonging to the Malmani Sub Group (T2J) of the Chuniespoort Group, Transvaal Supergroup is located to the west of the site. However, this boundary is represented by a dashed line, indicating that the exact location is unknown. In addition, this boundary is highly irregular and some islands of chert and chert rubble from the Malmani Sub Group are located within the shale of the Rooihooghte Formation.

The regional geology is illustrated in **Figure 3**, with the proposed new township development indicated by the red square.

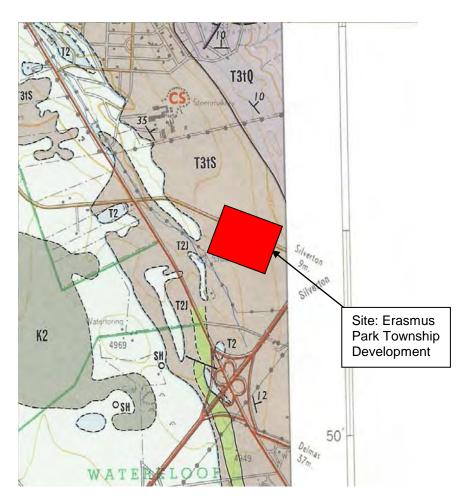


Figure 3: REGIONAL GEOLOGY

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Erasmus Park Township Development, Pretoria
Supplementary Dolomite Stability Assessment across Zone 2



4. METHOD OF INVESTIGATION

During the previous investigation conducted by Verdicon, percussion boreholes VBH8 and VBH9, were drilled in Zone 2 where the tracked excavator and TLB could not penetrate the strongly cemented ferricrete. This was done in order to establish the condition of the material below the ferricrete.

Six additional and supplementary boreholes were drilled on 6 December 2016 in accordance with the requirements of SANS 1936-2, Table A-2, utilising normal percussion drilling.

All boreholes were drilled to a depth of 6m into dolomitic rock, or until at least 15m of competent non dolomitic rock has been proven or to a maximum depth of 60m. Chip samples were taken at 1.0m intervals and logged by a qualified engineering geologist in accordance with the current standard procedures proposed by Brink and Bruin (2002). All the holes were backfilled to within 2.0m of natural ground level and the remainder of the hole filled with concrete.

A schematic layout showing the position of the all the percussion boreholes drilled during the current and previous investigations across Zone 2 is given in **Appendix A** as drawing number V16/099-02.

5. RESULTS OF THE DOLOMITE STABILITY ASSESSMENT

The detailed profiles of the percussion boreholes drilled during the supplementary investigation are provided in **Appendix B** and the driller's logs in **Appendix C**. The percussion borehole profiles and test pits from the previous investigations, across Zone 2, are provided in **Appendix D** and **Appendix E** respectively.

5.1 In situ profile across Zone 2 – Ferricrete Zone

The test pit information relevant to Zone 2 is summarised in **Table 1** and the relevant borehole information is summarised in **Table 2**.

Relevant test pits:

Previous Verdicon investigation - VTP7 to VTP12, VTP14, VTP18, and VTP21

Knight Hall Hendri investigation - TP11, TP12, TP15, TP16, TP21 to TP25, TP30

toTP33, TP36 to TP39, TP42 to TP49, TP55 and TP56.

Relevant boreholes:

Previous Verdicon investigation - VBH8 and VBH9.

Supplementary Verdicon investigation - VBH18 to VBH20, VBH23 to VBH25

The area is blanketed with hillwash/colluvium that comprises loose to medium dense, occasionally pinholed, gravelly silty/clayey sand or soft to stiff, silty clay with minor ferricrete gravel concretions and

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Atterbury Property Fund Managers Pty (Ltd)

Erasmus Park Township Development, Pretoria

Supplementary Dolomite Stability Assessment across Zone 2



very soft rock shale gravel that extends to a depth of between 0.7m and 3.3m. Ferruginisation has occurred, with depth which has created some zones of interconnected cemented ferricrete towards the base.

The ferruginised hillwash grades into cemented to strongly cemented ferricrete that comprises dense, gravelly clayey sand with sandstone and shale gravel that extends to a depth of between 1.7m and 3.8m.

In VTP18, a pebble marker comprising loose clayey sand with gravel and cobbles was encountered above the hillwash material and extends to a depth of 1.1m. In TP12 and TP41 the hillwash material is underlain by a pebble marker that comprises coarse quartzite and chert gravel and cobbles with a firm to very stiff, clayey silty matrix that extends to a depth of between 2.0m and 2.9m.

Refusal and/or near refusal of the TLB occurred on the transition zone between the highly ferruginised and cemented ferricrete at a depth of between 0.7m and 3.1m, except for TP52, which was terminated at 3.1m in residual diabase. Refusal of the tracked excavator occurred in all of the currently excavated test pits on cemented to strongly cemented ferricrete at a depth of between 1.0m and 3.8m.

Slight groundwater seepage was encountered during the previous investigation only in TP11 and TP21 at a depth of between 1.3m and 2.25m. No groundwater was encountered in any of the test pits excavated during the current investigation. The sidewalls appeared stable and in-situ profiling was conducted in all of the test pits

The material encountered in the boreholes comprises silty sand transported material to a depth of between 1.0m to 2.0m. This is followed by strongly cemented ferricrete (hardpan ferricrete) to a depth of between 3.0m and 5.0m.

The strongly cemented ferricrete is directly underlain by very soft rock shale which is present from a depth of between 3.0m and 7.0m. The exception being VBH20 where very soft rock interlayered with soft rock and residual material was present from surface to a depth of 3.0m. This is underlain by soft rock. In the remainder of the boreholes, the very soft rock grades into soft rock and medium hard rock with depth.

In VBH18, soft to hard rock dolerite was encountered from a depth of 32.0m to 60.m.

Within the supplementary boreholes, at least 15m of shale rock has been proven. The exceptions were:-

- VBH24 where 13m of shale rock was proven
- VBH18 where 27m of shale and then 28m of dolerite were proven
- VBH19 where 57m of shale was proven.

No dolomite rock or dolomite residuum was encountered during this supplementary investigation.



Table 1: Summary of test pit profiles across Zone 2

Test Pit No	Hillwash/ Colluvium	Pebble Marker	Ferricrete	Residual shale	Very soft rock shale	Soft rock shale	Excavation depth	Groundwater
VTP7	0.0 – 2.1m	-	2.1 – 3.0m	-	-	-	Refusal at 3.0m on strongly cemented ferricrete.	None
VTP8	0.0 – 1.7m	-	-	1.7 – 4.0m Tending to ferricrete	-	-	Near refusal at 4.0m on stiff to very stiff ferruginised residual shale	None
VTP9	0.0 – 1.1m	-	1.1 – 3.5m	-	-	-	Refusal at 3.5m on strongly cemented ferricrete.	None
VTP10	0.0 – 1.6m	-	1.6 – 3.8m	•	-	-	Refusal at 3.8m on strongly cemented ferricrete	None
VTP11	0.0 – 1.7m	-	1.7 – 3.8m	-	-	-	Refusal at 3.8m on strongly cemented ferricrete	None
VTP12	0.0 – 1.5m	-	1.5 – 2.3m	-	-	-	Refusal at 2.3m on strongly cemented ferricrete	None
VTP14	0.0 – 1.1m	-	1.1 – 1.7m	-	-	-	Refusal at 1.7m on strongly cemented ferricrete	None
VTP18	1.1 – 3.3m	0.0 – 1.1m	-	-	-	-	Near refusal at 3.3m on ferruginised transported.	None
VTP21	0.0 – 1.4m	-	1.4 – 1.7m	-	-	-	Refusal at 1.7m on strongly cemented ferricrete.	None
TP11	0.0 – 2.25m	-	-	-	-	-	Refusal at 2.25m on hardpan ferricrete	Slight seepage from 2.25m
TP12	0.0 – 2.6m	2.6 -2.9m	-	-	-	-	Refusal at 2.9m on closely packed pebble marker	None
TP15	0.0 – 2.6m	-	-	-	-	-	Refusal at 2.6m on ferruginised hillwash tending to ferricrete	None



Table 1: Summary of test pit profiles across Zone 2 (continued)

Test Pit No	Hillwash/ Colluvium	Pebble Marker	Ferricrete	Residual shale	Very soft rock shale	Soft rock shale	Excavation depth	Groundwater
TP16	0.0 – 0.7m	-	-	-	-	-	Refusal at 0.7m on highly ferruginised hillwash tending to ferricrete	None
TP21	0.0 – 1.3m	-	-	-	-	-	Refusal at 1.3m on highly ferruginised hillwash tending to ferricrete	Slight seepage from 1.3m
TP22	0.0 – 2.9m	-	-	-	-	-	Near refusal at 2.9m on weakly cemented ferricrete	None
TP23	0.0 – 1.8m	-	-	-	-	-	Refusal at 1.8m on strongly cemented ferricrete	None
TP24	0.0 – 2.55m	-	-	-	-	-	Near refusal at 2.55m on ferruginised hillwash tending to ferricrete	None
TP25	0.0 – 2.1m	-	-	-	-	-	Refusal at 2.1m on ferruginised hillwash tending to ferricrete	None
TP30	0.0 – 3.0m	-	-	-	-	-	Near refusal at 3.0m on ferruginised hillwash	None
TP31	0.0 – 2.7m	-	-	-	-	-	Near refusal at 2.7m on ferruginised hillwash	None
TP32	0.0 – 3.0m	-	-	-	-	-	Near refusal at 3.0m on ferruginised hillwash tending to ferricrete	None
TP33	0.0 – 3.1m	-	-	-	-	-	Near refusal at 3.1m on ferruginised hillwash	None
TP36	0.0 – 2.8m	-	-	-	-	-	Refusal at 2.8m on very stiff ferruginised hillwash	None
TP37	0.0 – 2.0m	-	-	-	-	-	Refusal at 2.0m on very stiff ferruginised hillwash	None



Table 1: Summary of test pit profiles across Zone 2 (continued)

Test Pit No	Hillwash/ Colluvium	Pebble Marker	Ferricrete	Residual shale	Very soft rock shale	Soft rock shale	Excavation depth	Groundwater
TP38	0.0 – 2.5m	-	-	-	-	-	Near refusal at 2.5m on stiff to very stiff ferruginised hillwash	None
TP39	0.0 – 1.5m	-	-	-	-	-	Refusal at 1.5m on very stiff highly ferruginised hillwash	None
TP42	0.0 – 1.7m	-	-	-	-	-	Refusal at 1.7m on ferruginised hillwash tending to ferricrete	None
TP43	0.0 – 2.2m	-	-	-	-	-	Refusal at 2.2m on stiff to very stiff hillwash	None
TP44	0.0 – 2.0m	-	-	-	-	-	Refusal at 2.0m on very stiff ferruginised hillwash	None
TP45	0.0 – 1.4m	-	-	-	-	-	Refusal at 1.4m on very stiff ferruginised hillwash	None
TP46	0.0 – 1.8m	-	-	•	-	•	Refusal at 1.8m on very stiff hillwash	None
TP47	0.0 – 1.5m	-	-	-	-	-	Refusal at 1.5m on very stiff hillwash	None
TP48	0.0 – 1.0m	-	-	-	-	-	Refusal at 1.0m on ferruginised hillwash tending to ferricrete	None
TP49	0.0 – 1.1m	-	-	-	-	-	Refusal at 1.0m on highly ferruginised hillwash	None
TP55	0.0 – 1.8m	-	-	-	-	-	Refusal at 1.8m on very stiff ferruginised hillwash	None
TP56	0.0 – 1.6m	-	-	-	-	-	Refusal at 1.6m on partially cemented and ferruginised hillwash	None



Table 2: Summary of borehole profile encountered across Zone 2

			THICKNESS OF LAYERS (m)										
	BH No.					Shale			Dole	rite	Penetra	tion Rate	Comment
	БП №0.	Transported Soil	Hard Pan Ferricrete	Very Soft Rock	Interbedded very soft rock and soft rock	Soft Rock	Soft to medium hard rock	Interlayered soft rock and residual material	Soft rock	Hard rock	Depth	Rate Min.sec/m	Comment
ious gation	VBH8	0-2	2-5	5-9							0-2 2-5 5-9	0.22-0.40 0.48-1.18 0.22-0.43	Good sample recovery and no air loss throughout the profile.
Previous Investigation	VBH9	0-2	2-5	5-9							0-2 2-5 5-9	0.30-0.32 0.54-1.20 0.21-0.31	Good sample recovery and no air loss throughout the profile.
Ē	VBH18	0-1	1-5	5-13			13-22	22-32	32-46 55-60	46-55	0-1 1-5 5-13 13-22 22-32 32-46 46-55 55-60	0:18 0:40-0:54 0:19-0:36 0:35-1:20 0:12-0:19 0:40-2:33 4:00-4:41 0:55-1:45	Good sample recovery and no air loss throughout the profile.
Current Supplementary Investigation	VBH19	0-1	1-3	3-33	33-43	43-60					0-1 1-3 3-33 33-43 43-60	0:17 0:23-0:30 0:16-0:34 0:27-0:44 0:29-0:47	Good sample recovery and no air loss throughout the profile.
ıpplementa	VBH20			0-3 Interlayered very soft rock and residual		3-20					0-3 3-20	0:41-0:55 0:40-0:58	Good sample recovery and no air loss throughout the profile.
Current Su	VBH23	0-1	1-3	3-20							0-1 1-3 3-20	0:18 0:30-0:41 0:17-0:46	Good sample recovery and no air loss throughout the profile.
	VBH24	0-1	1-7	7-20							0-1 1-7 7-20	0:29 0:36-0:50 0:18-0:30	Good sample recovery and no air loss throughout the profile.
	VBH25	0-1	1-3	3-20							0-1 1-3 3-20	0:29 0:36-0:41 0:20-0:43	Good sample recovery and no air loss throughout the profile.

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Erasmus Park Township Development, Pretoria
Supplementary Dolomite Stability Assessment on Zone 2



6. DOLOMITE STABILITY ASSESSMENT

During the previous investigation conducted by Verdicon, a 20 ton excavator was unable to penetrate the strongly cemented ferricrete present across Zone 2. As a result, two percussion boreholes were drilled in **Zone 2**, and these two borehole profiles confirmed that the cemented ferricrete was underlain by shale rock.

Although the previous near surface investigation and dolomite stability assessment conducted across the site confirmed the presence of dolomitic residuum only in Zone 3, the CGS required additional verification of the absence of dolomitic residuum in the profile across Zone 2.

During the previous and supplementary investigations, no dolomitic residuum was encountered in any of the test pits or boreholes across Zone 2, and we deem this Zone to be classifiable as non-dolomitic land.

7. RECOMMENDATIONS

7.1. Founding Recommendations

It is understood that the proposed new township development will comprise a mixed use development with structures ranging from single storey to multi storey buildings and from residential to commercial use.

The investigations which have been carried out are of a regional or feasibility level rather than a structure specific or design level. As such a review of available information should take place for the development when the final layout is known. Site specific investigations may be required especially for heavily loaded structures.

ZONE 2 – FERRUGINISED HILLWASH AND FERRICRETRE

OPTION 1 - FOUND ON STRONGLY CEMENTED FERRICRETE

Foundations

- Found lightly loaded structures conventionally on the strongly cemented ferricrete present at a depth of between 0.5m and 1.5m.
- Bearing pressure of 350kPa is allowable on the strongly cemented ferricrete.
- Heavily loaded structures will need to be founded on the very soft to soft rock shale, indicated as being present below the ferricrete.
- All foundation trenches to be inspected to verify presence of rock and bearing capacity.
- Site drainage and plumbing/service precautions.



Floors

- Either cast directly onto rock where rock is present
- Or where soil is present,
 - Remove 450mm of material from below the floors.
 - Compact base of excavation to approximately 90% Modified AASHTO
 - Replace with G7, or better, material compacted in 150mm layers to 95% Modified AASHTO density at optimum moisture content up to the required founding level.
- Site drainage and plumbing/service precautions.

OPTION 2 – LIMITED REMOVAL AND REPLACEMENT

- Remove material below the individual foundations to a depth and width of 1.5x foundation width below the proposed foundation level or to the well cemented ferricrete.
- Compact in-situ material, to an approximately 90% Modified AASHTO.
- Replace with G7 quality material or better, compacted in 150mm layers to 95% Modified AASHTO density at optimum moisture content to the required founding level.
- Normal construction with reinforced spread footings and reinforcement in the masonry if required.
- Bearing pressures not to exceed 150kPa.
- Site drainage and plumbing/service precautions.

Floors

- Remove 450mm of the in-situ material.
- · Compact the base, if in soil.
- Replace with G7 or better quality material compacted in 150mm layers to 95% Modified AASHTO density at optimum moisture content.

8. CONCLUDING REMARKS

It is recommended that all excavations for founding purposes should be checked by a qualified geotechnical engineer or engineering geologist to ensure that the required bearing pressures will be achieved and conditions at variance to those described herein are not present elsewhere on the site.

9. REFERENCES

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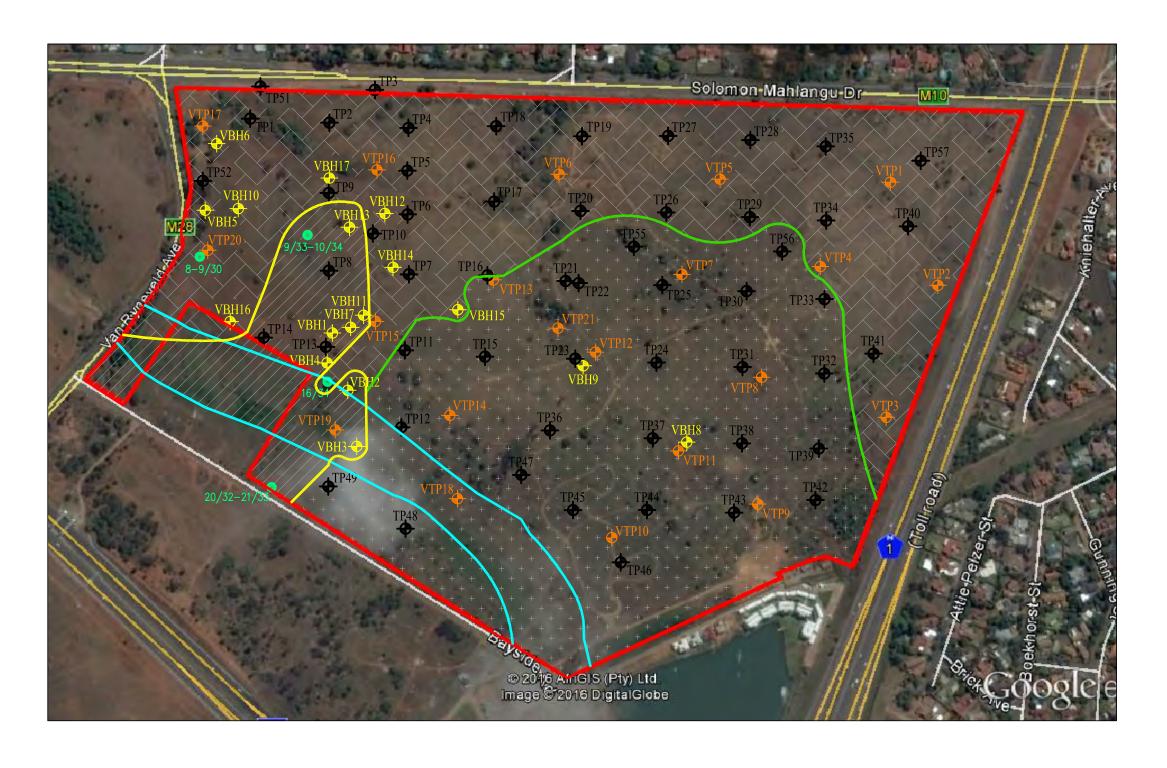
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APPENDIX A DRAWINGS



SYMBOL	DESCRIPTION					
	AREA UNDER INVESTIGATION					
	ZONE 1: SHALE PROFILE					
	ZONE 2: FERRICRETE ZONE					
<u>//</u>	ZONE 3: DOLOMITIC LAND					
₽ TP	PREVIOUS INVESTIGATION TEST PITS					
VTP	CURRENT INVESTIGATION TEST PITS					
6/23	PREVIOUS INVESTIGATION BOREHOLES					
VBH	CURRENT INVESTIGATION BOREHOLES					
	50 YEAR FLOODLINE					



					Co
0	09/02/17	ISSUED FOR INFORMATION	PT	RJ	-
NO	DATE	REVISION	DRAWN	CHECKED	

VERDICOL Consulting Engineers

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OJECT :

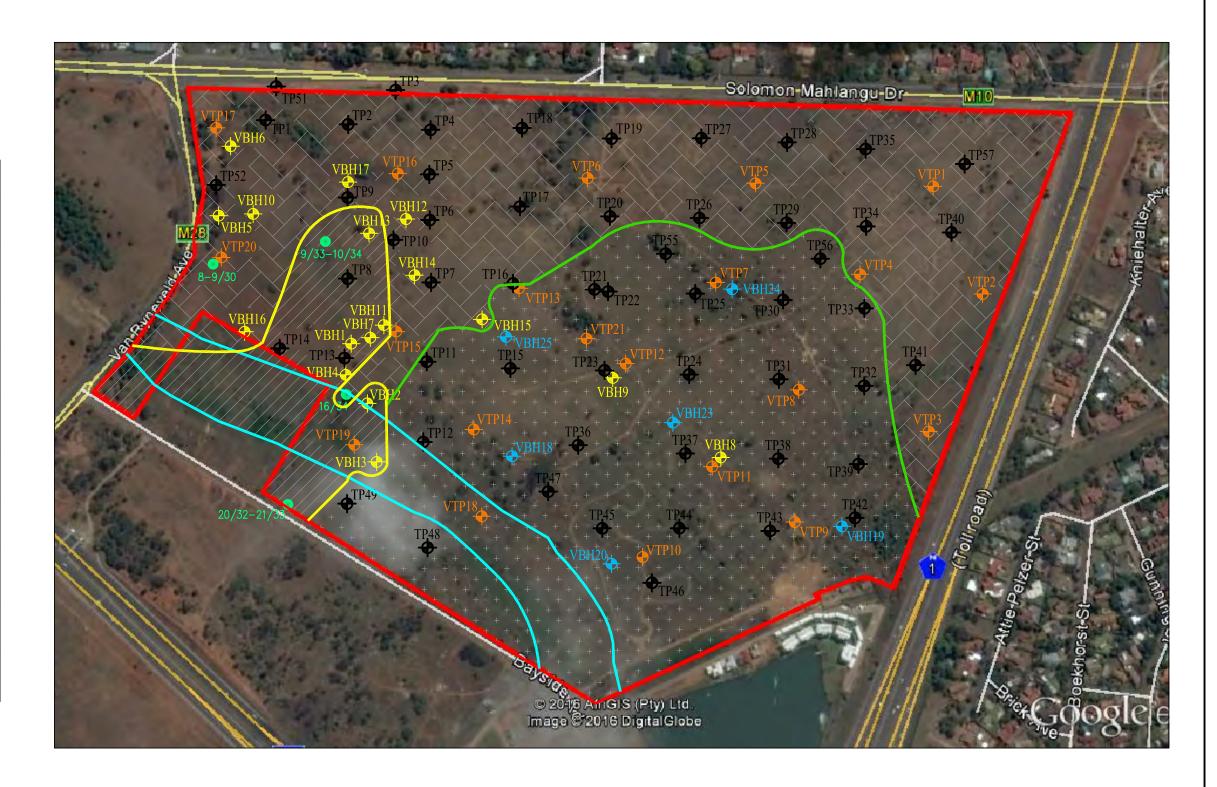
ERASMUS PARK

TEST PITS & BOREHOLES LAYOUT

DESIGNED	r Jooste	DATE 2017/02/09	SCALE NOT TO SCALE PROJECT NO. V16/099		
DRAWN	P TODANKAR	SHEET SIZE A1			
CHECKED	H DAVIS	DRAWING NUMBER V16/099-01			



	T				
SYMBOL	DESCRIPTION				
	AREA UNDER INVESTIGATION				
	ZONE 1: SHALE PROFILE				
••••	ZONE 2: FERRICRETE ZONE				
<u>///</u>	ZONE 3: DOLOMITIC LAND				
→ ^{TP}	PREVIOUS INVESTIGATION TEST PITS				
VTP	CURRENT INVESTIGATION TEST PITS				
6/23	PREVIOUS INVESTIGATION BOREHOLES				
VBH	PREVIOUS INVESTIGATION BOREHOLES				
VBH	CURRENT INVESTIGATION BOREHOLES				
	50 YEAR FLOODLINE				



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ATTERBURY PROPERTIES

ERASMUS PARK

TEST PITS & BOREHOLES LAYOUT

DESIGNED	r Jooste	DATE 2017/02/09	SCALE NOT TO SCALE
DRAWN	P TODANKAR	SHEET SIZE A1	PROJECT NO. V16/099
CHECKED	H DAVIS	DRAWING V16/0	

APPENDIX B PERCUSSION BOREHOLE PROFILES SUPPLEMENTARY INVESTIGATION

Project Number: V16/099

Drilling operator

Jack

Project Name: Erasmus Park Date:

VERDICO

Investigation: Supplementary Dolomite Stability BH18 Sheet 1 of 2

06/12/2016

ga	оприления,				
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DЕРТН (m)	DESCRIPTION	INTERPRETATION
0:	18 None 40 None	Good		Dark greyish brown, clayey silty SAND	Transported material
0:	46 None	Good Good Good	5,0	Orange brown, fine gravelly(2-4mm) silty SAND	Cemented Ferricrete.
0:	24 None 20 None 22 None 19 None	Good Good Good Good		Greyish light pink brown, silty clay with minor sub angular very soft rock shale fragments(2-10mm)	Very Soft Rock Shale.
0:	30 None 25 None 29 None	Good Good Good	10,0		
0:	51 None	Good Good Good Good	15,0	Light grey brown, moderately weathered, baked shale fragments (5- 30mm) with minor silty	Soft to Medium Hard Rock Baked Shale.
0 :	20 None 52 None 54 None 57 None	Good Good Good Good	20,0	clay.	
0:	14 None	Good Good Good		Dark brown, silty clay with abundant soft rock baked	Interpreted as interlayered soft rock
0:	16 None 19 None 14 None 16 None	Good Good Good Good	25,0	shale fragments (5- 35mm).	baked shale and residual shale.
0:	17 None 14 None 13 None 16 None	Good Good Good Good	30,0		
0:	12 None 43 None 56 None	Good Good Good		Blueish dark grey, slightly weathered, medium hard rock dolerite gravel (5-	Soft Rock Dolerite.
1:	40 None 14 None 07 None 54 None	Good Good Good Good	35,0	30mm) with minor sandy clay.	
0:	41 None 07 None 06 None	Good Good Good	40,0		
1 : 2 :	22 None 43 None 33 None 20 None	Good Good Good Good	45,0		
Profiled by: Drilling Contractor	Riaan Jooste Hennie Erwee	Compr		19 Bar Coordinates 165 mm x	

Date drilled

Date profiled

06/12/2016

06/12/2016

У

Z

Project Number:	V16/099					ERDICOL Consulting Engineers
Project Name:	Erasmus Park	Date:	06/12/	2016		Consuling Engineers
Investigation:	Supplementary D	Polomite Stability	BH18			Sheet 2 of 2
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DЕРТН (m)		DESCRIPTION	INTERPRETATION
1:4		Good			Same as above	
4 : 1 4 : 3 4 : 4 4 : 1 4 : 2 4 : 0 4 : 3 4 : 0 4 : 2 1 : 4 1 : 1 1 : 0 0 : 5	0 None 0 None 1 None 6 None 9 None 6 None 0 None 1 None 5 None 0 None 0 None 0 None 0 None 0 None 1 None 0 None 1 None	Good Good Good Good Good Good Good Good	55,0		Blueish dark grey, slightly weathered hard rock sandy gravel. Blueish dark grey, slightly weathered soft rock sandy gravel.	Soft Rock Dolerite
Drilling Contractor H	iaan Jooste ennie Erwee ack	Compre Diamete Date dr Date pr	er illed	19 Ba 165 m 06/12 06/12	nm x /2016 y	

Project Number: V16/099

Project Name: **Erasmus Park**

Date: 06/12/2016

Investigation:	Supplementary Dolomite	Stability	BH19		Sheet 1 of 2
PENETRATION TIME	LOSS RECO	MPLE OVERY	DЕРТН (m)	DESCRIPTION	INTERPRETATION
0:1	7 None	Good		Light brown, clayey silt SAND.	Y Transported Material.
0:3	0 None None O None	Good Good	5,0	Orange brown, silty sar with minor rounded, ferricrete gravel concretions.	Cemented Ferricrete.
0 : 2 0 : 1 0 : 2 0 : 2	9 None None None None	Good Good Good Good		Pinkish red brown, silty clay with minor highly weathered, very soft ro shale fragments (<4mr	ck
0 : 1 0 : 2 0 : 1 0 : 2 0 : 1	0 None 9 None None None	Good Good Good	5,0		
0 : 1 0 : 1 0 : 2 0 : 2	6 None None None None	Good Good Good Good			
0 : 1 0 : 2 0 : 2 0 : 2 0 : 3	0 None None None None	Good 20 Good Good Good	0,0		
0 : 2 0 : 2 0 : 2 0 : 2 0 : 2	None None None	=	5,0		
0 : 1 0 : 2 0 : 3 0 : 2	None None None	Good Good	0,0		
0 : 2 0 : 4 0 : 3 0 : 3 0 : 4 0 : 3	1	Good Good Good Good Good Good Good	5,0	Yellow pinkish brown, s clay, with minor highly weathered, very soft to soft rock shale fragmen (<5mm).	and soft rock shale.
0 : 4 0 : 3 0 : 3 0 : 3 0 : 3 0 : 2	4	Good	0,0		
0:3		Good Good 4	5,0	Yellow pinkish brown, s clay with abundant soft rock shale fragments (s 30mm).	
Drilling Contractor H	iaan Jooste lennie Erwee ack	Compress Diameter Date drille Date profi	ed	19 Bar Coordina 165 mm 06/12/2016 06/12/2016	tes X Y Z

Project Number: V16/099

Project Name: Erasmus Park Date: 06/12/2016

Investigation: Supplementary Dolomite Stability BH19 Sheet 2 of 2

		,		
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DEPTH (m)	DESCRIPTION INTERPRETATION
0 : 35	None	Good		Same as above
0 : 29 0 : 31 0 : 34 0 : 36 0 : 30 0 : 31 0 : 39 0 : 40	None None None None None None None None	Good Good Good Good Good Good Good Good	50,0	Light red brown and grey brown, high to moderately weathered, soft rock shale gravel (5-15mm) with minor pinkish red brown silty clay.
0 : 30 0 : 29 0 : 36 0 : 47 0 : 35 0 : 40	None None None None None None None	Good Good Good Good Good Good	60,0	Grey brown, high to moderately weathered, shale gravel (5-15mm) with minor grey brown, silty clay. Terminated at 60,0m
Profiled by: Ria	an Jooste	Compre	essor	19 Bar Coordinates

Drilling Contractor Henr Drilling operator Jack

Riaan Jooste Hennie Erwee

Diameter
Date drilled
Date profiled

19 Bar 165 mm 06/12/2016

06/12/2016

x y

Z

Project Number: V16/099

Drilling operator

Jack

Project Name: Erasmus Park Date:



Investigation: Supplementary Dolomite Stability BH20 Sheet 1 of 1

06/12/2016

investigation:	Supplementary D	olomite Stability	ВП20		Sneet 1 of 1
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DЕРТН (m)	DESCRIPTION	INTERPRETATION
Sign Sign	None None None None None None None None	Good Good Good Good Good Good Good Good	10,0	Red orange brown, silty clay with minor to abundant very soft rock shale gravel. Orange red brown, silty clay with trace amounts of fine very soft rock shale gravel (2mm).	Interpreted as interbedded residual shale and very soft rock shale.
•	ean Jooste	Compre		19 Bar Coordinate 165 mm	S X

Date drilled

Date profiled

06/12/2016

06/12/2016

У

z

Project Number: V16/099

Project Name: **Erasmus Park** Date: 06/12/2016



Sheet 1 of 1

Investigation: **Supplementary Dolomite Stability BH23**

gae	- Сирринин (
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DЕРТН (m)	DESCRIPTION	INTERPRETATION
0 : 18		Good		Dark brown silty sand.	Transported Material.
0 : 18 0 : 30 0 : 41 0 : 46 0 : 44 0 : 30 0 : 40 0 : 27 0 : 24 0 : 19 0 : 21 0 : 26 0 : 24 0 : 19 0 : 21 1 : 0 : 29 1 : 0 : 29 1 : 0 : 30 0 : 40 0 : 17	None None None None None None None None	Good Good Good Good Good Good Good Good	5,0	Orange brown, gravelly silty sand with the gravel being ferricrete concretions (2-8mm). Pinkish Purple, silty clay with minor very soft rock shale fragments.	Very Soft Rock Shale.
	aan Jooste ennie Erwee ck	Compre Diamet Date di Date pi	er rilled	19 Bar Coordinates 165 mm 06/12/2016	(/

Date profiled

06/12/2016

Project Number: V16/099

Project Name: **Erasmus Park** Date: 06/12/2016

Investigation: **Supplementary Dolomite Stability** BH24 Sheet 1 of 1

gae	очьь	,			
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DЕРТН (m)	DESCRIPTION INT	ERPRETATION
0:29	None	Good		Red brown, clayey silty sand.	ported Material.
0 : 41 0 : 49 0 : 44	None None	Good Good Good	5,0	with ferricrete gravel concretions.	nted Ferricrete.
0 : 46 0 : 50 0 : 26 0 : 30 0 : 21 0 : 20 0 : 18 0 : 20 0 : 26 0 : 19 0 : 21 0 : 23 0 : 23 0 : 25 0 : 20	None None None None None None None None	Good Good Good Good Good Good Good Good	10,0	Yellow Brown, becoming pinkish purple, silty clay with with minor sub angular shale rock gravel (2-5mm).	Soft Rock Shale.
0:18	None	Good	25,0 30,0 35,0 40,0 45,0	Terminated at 20,0m due to 15 overburden.	
Profiled by: Ria	aan Jooste	Compre		19 Bar Coordinates	

Drilling Contractor Drilling operator

Hennie Erwee Jack

Diameter Date drilled Date profiled

165 mm 06/12/2016

Х У

06/12/2016 z Project Number: V16/099

Project Name: Erasmus Park Date: 06/12/2016



Investigation: Supplementary Dolomite Stability BH25 Sheet 1 of 1

mvestigation.	oupplementary b	ololline olability	BHZ		Sheet 1 of 1
PENETRATION TIME	AIR LOSS	SAMPLE RECOVERY	DЕРТН (m)	DESCRIPTION	INTERPRETATION
0 : 29	None	Good		Light brown, silty sand	Transported Material.
0 : 29 0 : 41 0 : 36 0 : 24 0 : 20 0 : 30 0 : 24 0 : 30 0 : 24 0 : 31 0 : 26 0 : 32 0 : 29 0 : 24 0 : 22 0 : 29 0 : 43 0 : 38	None None None None None None None None	Good Good Good Good Good Good Good Good	5,0		Transported Material. Cemented Ferricrete. Very Soft Rock Shale. Very Soft Rock Shale. ue to 15.0m of competent burden.
•	aan Jooste	Compre		19 Bar Coordinates	

Drilling Contractor
Drilling operator

Riaan Jooste Hennie Erwee Jack

Compressor Diameter Date drilled Date profiled 19 Bar 165 mm 06/12/2016 06/12/2016 Coordinates x

y z

APPENDIX C DRILLERS LOGS SUPPLEMENTARY INVESTIGATION

Kliënt: VERDICON Client: Projek/Terrein: ERASMAS PARIS Project/Site: ERASMAS PARIS Gat Nr.: Hole No.: Gatposisie:	
Hole position:	
1170	

SLAGBOORSTAAT
PERCUSSION BORE HOLE RECORD

Total depth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

Datum: 06 DEC 30/6
Date:
Lugdruk:
Air pressure:
Beiteldeursnee (mm):
Bit diameter (mm):
Water aangetref (m):
Water struck (m):
Rusvlak (m):
Rest level (m):

	Pene- trasie			rma mai	tion		Ha	ame empe emm rate	o er	Lú	igve	erlie oss	s		tos	Vog esta oisti ndit	ind ure	Gat val toe Hole collap- sing		Voe- ring Ca- sing	he	Mon erwi San	nnii nple vere	ng	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of material)
tyd Penetra- tion time (m) min: sek/ m	Depth	Holte/Cavity	Bale sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Very irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Totaal/Total	Water aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	Diepte geïnstalleer Depth installed	Goed/Good	Medium	Swak/Poor	Geen/None	
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8-9	019		1/2	1					12	p	1					1					1	1	1	-	4
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Opmerkings: Remarks:	

DRILLING CONTRACTOR
Hennie Erwee
Her

BOORKONTRAKTEUR

Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

DATA BESKRYF DEUR: Part DATA DESCRIPTION BY: Part DESCRIPTION BY: Drukkery L3187 *Tel: (012) 252 1370

OPERATEUR: Jesel (

Kliënt: 110	10.
Client: V Z	201CON
Projek/Terrein:	905 - 15 050
Project/Site:	Chitomas paris
Gat Nr.:	1.64.13
Hole No.:	V134 18
Gatposisie:	
Hole position:	

SLAGBOORSTAAT PERCUSSION BORE HOLE RECORD

Totale diepte:
Total depth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

Datum: 06 Dec 2016
Lugdruk: Air pressure: 100km | Lugvolume: 15Mzjm |
Air capacity: 15Mzjm |
Beiteldeursnee (mm): | Lugvolume: 15Mzjm |
Air capacity: 15Mzjm |
Water aangetref (m): |
Water struck (m): |
Rusvlak (m):

Formasia						Ha	mer	1				erma		Vo	g	Gat val		Voe	-	Мо	ns	ter	t level (m):	
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Remarks:	
DATA BESKRYF DEUR: PauloS DATA DESCRIPTION BY: PauloS Brits Drukkery L3187 *Tel: (012) 252 1370	OPERATEUR: JC/C/C

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee

30069
Wonderboom Poort
Pretoria 0033
Fax: 086 503 9981
Cell: 082 553 9291

Kliënt: VERDICOM Projek/Terrein: BASMASPABIS Gat Nr.: Hole No.: VB4 19 Gatposisie: Hole position:	SLAGBOORSTAAT PERCUSSION BORE HOLE RECORD Totale diepte: Total depth: Voering - In en Uit (m): Casing - In & Out (m): Voering gelaat (m): Casing installed (m): Voering permanent beskadig (m): Casing permanently damaged (m):
---	---

Datum: OBDECO/6

Lugdruk:
Air pressure: 100197 Lugvolume: 16m2

Beiteldeursnee (mm):
Bit diameter (mm):
Water aangetref (m):
Water struck (m):
Rusvlak (m):
Rest level (m):

	Pene- trasie tyd		Formasie Formation				ame mpo mm ate	0	Lug	gverlies ir loss			M	Vo esta oist ondi	and	collan	al	Voe ring Ca- sing	t	Mo erw Sar	nst	er ing le	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of material)
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11-12	020	10			+	+	V	1		H	+	+	+	1	4	-	1		1	4		1	41
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13-14	7-7/10	10			1	+	1/	1	-	+	+	+	1	4	4	-	+		1	1	1		И
14-15	219	11	6	+	+	+	V	1	1	+	+	+	L	1	+		+		4	1	1	1	И
15-16	016	10		-	+	+	0	N	-	+	+	+	L	4	+		1		1	1		1	4
16-17		10	\Box	+	+	+	1/	1	-	-	+	+	L	4	+		1		1				1
17-18	00/6	10		+	+	+	V	W	-	+	+	1	1	1	1		1		1	1			Ì
	220	10		+	+	-	1	N	4	4	+	1	V		1				1				V
18-19 (0010	1,0		+	+	+	1		,	1	1	1	V	1	1				1				V
19-20	0/8	10	+	4	+	1	1	11	/		1	1	1		1				1				ų.
	200	10	+	+	+		V	1		1	1	1	1	1	1				1				
21-22	101	10	1	+	+		1	4		1	1	L	V	1	L			1	1				11
22-23	JOH	40	0	1	+		1	V	-		1		V	1					V				V
23-24	190	100		1	1		V	N				L	U	1				1	1	T			V
24-25	1010	M)		1		V	1	1				1	1					1				1)
25-26 (98	10					1	1					V	1				V	1			1	U
26-27	00	10			L		1		1				1	1				-	1		1	1	1
27-28	219	00					1	N		1			V	1					1	1	T	1	1
28-29 (217	60					1	1					1				1		1	1	-	-	4
29-30	223	NO					1	V					1					U	1		1	1	U.
Opmerkin	us.			1		-		_	-	-	-	_	_	1	_	_	_					1	1/

Opmerkings: Remarks:

DATA BESKRYF DEUR: DATA DESCRIPTION BY: Brits Drukkery L3187 *Tel: (012) 252 1370

OPERATEUR: Jeule

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee 30069 Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

A CONTRACTOR OF THE CONTRACTOR
Kliënt: VERDICON
Client: U C 19 1 1/(1) 1 V
Gleric.
Projek/Terrein: // // / / - / / / / / / / / / / /
Projek/Terrein: ERASMAS PARK
Gat Nr.:
Hole No.: 19919
Gatposisie:
Hole position:

SLAGBOORSTAAT PERCUSSION BORE HOLE RECORD

Total depte:
Total depth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

Datum: Ob DEC 30/6
Lugdruk:
Air pressure: 900/6/11 Air capacity 7,001/7/19
Beiteldeursnee (mm):
Bit diameter (mm):
Water aangetref (m):
Water struck (m):
Rusviak (m):
Rest level (m):

	Pene- trasie tyd Penetra-		Formasie Formation					lam emp amr	ner		ugv Air	erlic	es		to M	Vo esta oist		collan	ı	Voe- ring Ca- sing	h	Mo erw Sai	nste inni mpl	er ng	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of material)	
Diepte Depth (m)	Depth (m) min: sek/ m	min: sek/ m	Holte/Cavity	Baie sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Yery irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Totaal/Total	Water aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	Diepte geïnstalleer Depth installed	Goed/Good	Medium	Swak/Poor	Geen/None	
31	031		10					Ĭ	11	N	1			V		V			>	00	V	_	(0)		Shale	
332	0028		10						V	V	/					V			П		V				1/10/02	
33	009		10	2					V	N		I				1			П		1				1	
34	041		1,0	7					1	N					1						1				1	
3.5	036		10	1					1	/						1	13				1				N N	
36	032		Vic				1		1	1	,					1					1					
37	0/1		W	7					V	7						1		1 - 1			1					
3-8	039		10						V	V					V						1				W.	
3-91	044	, (lic	2			U		1	/					V	1					1				N.	
2/10	037	h	10						V	1					1						1				į,	
10/1/1	032		he	7					1		,				V	/					V	1			И	
1412	030		10						V	V					1						V				Ù	
12/13	201		10						1						1			[. 31	1				N	
1369A	351		10	7				-	1						1						1		Y		Bolovika Estrele Engle Shale	
1443	033		10						1						1										Esheve.	
25-18	099		40	7					1	1					V						V				4herto	
16-17	Och		40	7		1			1	1					V						1				Shig 6	
1418	001		10	7	4				1	1					1						2	1			Shale	
18/19	23H		40			_	4	(1	V	4	1	1	1	1						V				И	
49-20	036		10	7				į	1	1			1		4						1				4	
20,21	030		10		4	1		-	1		4		1		1	4					V				4	
21,22	0:51	4	0			1	1	1	1	1	4	4	1	1	1		1		1		4	9			11	
22-23	034		14		4	-	1	l	1		4	4	4	1	4				1		/				и	
23-24	ONU		0	1		1	1	L	4	1		1	1	t	1						V			1	4	
	030	1	90			1		-	1	1				L	4						1				4	
25,20	029	1	10			1	-	1	1	1	1		1		1	1	1		1		1				¥	
26,27	036	1	0	-		-	1	0	1	1	1		1	1	1		1		1		1				y	
27-28	24	1	0					1	1	1			1	1	И		1		1		1				1	
28-29	255	114				1	1	1	12	1			1	1	1		1				1				4	
29(3)	140	1	10					į	1	7					4		\perp	1.0			1				И	

Opmerkings	
Remarks:	

DATA BESKRYF DEUR:
DATA DESCRIPTION BY:
Brits Drukkery L3187 *Tel: (012) 252 1370

OPERATEUR: Fines

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee 30069 Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

MICHAL	
701007	
ancionas sas	3.
ハフトノングログアイル	15
1184 70	*******
00100	

	SUCON BASMASPAR VB4 J O

SLAGBOORSTAAT

PERCUSSION BORE HOLE RECORD
Total diepte:
Total depth: Total depth:

Voering - In en Uit (m):

Casing - In & Out (m):

Voering gelaat (m):

Casing installed (m):

Voering permanent beskadig (m):

Casing permanently damaged (m):

Datum:

	Pene- trasie tyd Diepte Penetra-		Fo	orm	asie	n	Н	rat	po ner e		ugv Air	erli	es		to M	Vo est oist		Gat va toe Hole collap- sing		Voe ring Ca- sing	ŀ	Mo	nsi	ter ning le	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of mater	
Depth (m)	Penetra- tion time	tion time	Holte/Cavity	Baie sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Very irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Total/Total	Water aangetref/found	/at/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	Diepte geïnstalleer Depth installed	Goed/Good	Medium	Swak/Poor	Geen/None	GC Skum
0-1	041		1,0	1					11	1				2	_	7			\$		0	2	(C)	O	7.	
1-2	055		le	5					1	V				1			1				V			H	cay	
2-3	049	11	1,C)		T			1	1			1	1			,	-			7		-		il.	
3-4	051	-	1,0	>					1	V			1	1		1		-	1		Y	-	-	H	il	
4-5	352	Ý	1,0				1.5			1		1	1	+		1	+		1		1		H	H	- ll	
5-6	047	-	21	99				1	7	1		1	1	1	1	1	1		+				+	Н	01 :	
6-7	OHE	2	1,0	51					1	1		+	1	1	+	4	-	-	+		1	1	H		Shale 4.	
7-8	0.574		1						1	1		1	+	1	1	4	+		1	-	1	+		H	И.	
8-9	250	j	10					1	1	1	+	+	+	+	1	+	+	- 1	4	i	/	-	÷			
9-10	143		40					1	1	1	+	+	+	~	1	+	+	h	4			,	-	4	4-	
10-11	745	1	10			1	1	- 1	1	1	+	+	+	-	1	+	+	L	4		1	-		+	1	
11-12	2/19	1	10)		1			1	1	1	+	+	19		7	+	i	1		1	+	-	+	ij ·	
12-13	500	1	H			1	1	1	1	V	+	+	+	- L	1	+	+	L	1	-	1	-	-		И	
13-14	055	1	1		1	1	+	-	1	1	+	+	+	10	1	+	+	D	1		W	-	-	+	1	
4-15	747	1	H	1			1	1	1	X	+	+	+	1	1	+	+	v	1	-	1	1	1	+	Ч	
5-16	2/07	1	0	1	1	1	+	6	h	1	+	+	+	1	+	+	+	1	1		V	+	1	-	1	
6-17	290	7	0	+	+	+	+	C	1	1	+	+	+	V	1	+	+	V	1		4	0	4	1	Y	
7-18	2/11	1	0	,	+	+	+	-6	4	1	+	+	+	1	-	+	+	L	4	-	4	+	1		u.	
8-19	351	1	1	+	+	+	+	-	1	+	+	+	╀	1	1	4	+	10	1	-	1	+	1	V		
9-20	240	1	0	+	+	+	1	+	h	4	+	+	+	1	1	+	+		1	-		4	-	1	Y	
0-21	70	700	1	+	+	+	+	Y	+	+	+	+	+	V	1	+	+	-	+	L	1	1			W U	
1-22		-	+	+	+	+	+	+	+	+	+	H	-	H	+	+	+	-	+	4	4	+	1		1	
2-23	3	t	+	+	+	+	+	+	+	+	+	-	-	⊦	-	+	+		╀	-	+	+		1		
3-24		t	+	+	+	+	+	+	t	+	+		+	-	-	+	+	-4	1	-	-	1	-	1		
4-25		t	+	+	+	+	+	+	╀	+	+		-	-	-	-	+	-		-	1	L	L	1		
5-26	4	+	+	1	+	+	+	+	+	-	-	-	-	H	-	-	-		-	4	1	-				
3-27	: 1	-	+	+	+	+	+	+	+	-	-	-		-		-	1	-	-				1			
7-28		-	+	+	1	+	-	-	+	-	-	-					-	-	-		1	1	-			
3-29	;	-	+	+	+	+	-	+	+	-	-		_				-			-			-			
-30		-	-	+	-	+	-	-	-	-	-												L			

Opmerkings:	
Remarks:	

DATA BESKRYF DEUR: Paules
DATA DESCRIPTION BY: Paules Brits Drukkery L3187 *Tel: (012) 252 1370

OPERATEUR: OPERATOR: Jalle

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee

30069 Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

Kliënt: 1/8	11010	MOM	
Projek/Terrein Project/Site: Gat Nr.:	ERAS	MASPA	RIS .
Hole No.: Gatposisie: Hole position:			**********

SLAGBOORSTAAT

Totale diepte:
Total depth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

		1	_	-	-	_	-	_		_	Ca	sing	pe	rma	nen	itly	dam	aged (m):	egeny			1440		Rest	level (m):
	Pene- trasie tyd		Fo	orm	asie atio	n	H	em ami rat	po mer	L	ugv Air	erli los:	S		CC	lois ond	og tand sture dition	collar	-	1	Voe- ring Ca- sing	b	Mo erw Sa eco	ini	ter ning le	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of material
Diepte Depth (m)	Penetra- tion time	Holte/Cavity	Bale sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Very irregular	Ongereeld/Irrequiar	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Totaal/Total	Vater aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aandwend/applied	Double Transfer of the	Depte geinstalleer Depth installed		Medium			
0-1	0:18		10						11	N		_		>	_	×	1		15	15	۵۵	0	Σ	S	9	
1-2	030		40			-			1	N						0	1		H	H		V		-	H	Clay,
2-3	041	-	10						1	N	-	-	-			1	-			╁	-	/				y ~
3-4	OLL		-	Q k	2			100	~	V		-		-		/	-		-	-	-				H	4
4-5	0 1.06	1	11	- A		-		1		2	-	+	+	+	4	/	-	-		-		1				Shale
5-6	030		10)					4	,	1	+	+	-	-	/	-			L		1				d
6-7	(2) 110	-	1	-			-	-	4	2	4	-	1	1	-	/	-				-	1		Ц		U
7-8	200	-	0			-	-	-	4		1	1	+	-	-	/		11		L		1				U
8-9	(2) 2/14	-	4	,	-	+	-	1	4		1	4	+	1		1					i	1				U
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10-11	918	-1	RI	-	4	4			4	2			1	1	-	1					Ç	1	1			1/
11-12	019	1	0		4	1	1	1	1		1	1		-	1	1		1		I	i	1				U
12-13	034	1	4	1	4	1	1		V	4					1	V					Ĺ	1				y
13-14	billo	11	9	1		1		1	1	1						V	1	E !			0	1				4
14-15	24	6	0	1	1			L	1	1						1					1	1				4
15-16	019	1	00	1				L	p	1	1		1		C	1			1			1	T	1		1
16-17	2011	4	10					1	1	1			T	1	2	1			1		-	1	1	1	+	
7-18 (P	1	0					V	P	1				1		1			1			1	Ť	+	+	"
8-19	026	1	0			1	-		p	1			1	1		1			1	-	-	1	+	+	+	
9-20	017	Vil				1		1	p	1	1	+	1	1	1	1	+	-	+	-		1	+	+	+	
0-21	-:-	1	T			1	1	1	1	1	T	T	1	+	1	+	1		+	_	-	-	+	+	+	ψ
1-22	4	1		1		1	1	T	+	1	1	+	1	t	+	+	+	-	+	-	+	+	+	+	+	
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3-24					1	+	T	\dagger	+	1	+	+	+	H	+	+	+		+	_	+	+	+	+	+	
4-25	-3-5		+	+	t	+	+	1	t	-	-	-	-	H	+	+	+	-	+	_	+	+	-	-	+	
5-26	:	-	-	+	+	1	-	+	+	-	-	-	-	-	-	+	+	-	+		-	1	-	1	1	
6-27		1	+	1	+	+	+	-	+	-	-		-	-	-	+	+	-	1			-		1		
7-28	1	-	-	+	-	+	-	+	1	-	-	-	-			+	+	-	1					1		
3-29		-	-	+	+	+	1	-	1	-	-	-		Щ	L	-	+		1							
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merking																										

Opmerkings:	
Remarks:	
, so-therman the state of the s	

OPERATEUR: FUE



⊠ 30069 Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

Kliënt: 1800 Con	
WILL ROSE LICEN	
Client: Vers U/COH	
Projek/Terrein C 0 5 000 5 00 5	
Project/Site: CRASMAS PARK	
Sat Nr.:	
fole No.: UHJ4	
Satposisie:	
lole position:	
iolo positiona	

SLAGBOORSTAAT
PERCUSSION BORE HOLE RECORD

Totale diepte:
Total deipth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

Datum: 06 Dec Jo6
Lugdruk: Air pressure: 900 Kpm Lugvolume: 756 Ms/Mm
Air capacity F6 Ms/Mm
Beiteldeursnee (mm): /65 mm
Water aangetref (m): Water struck (m):
Rusvlak (m):
Rest level (m):

Diant	Pene- trasie tyd		Fo	orm	atic	on		Ha	am emp mr	oo ner	1	Lug		lies		to	voes lois	og stand sture dition	collan	al	1	Voe- ring Ca- sing	h	Mo erw Sa	ns	ter	(by tipe materiaal/eg, type of material)
Diepte Depth (m)	tion time	Holte/Cavity	Baie sag/Very soft	Sag/Soft	Redelik hard/Fairly ham	Solied/Solid	Dillocation	Baie ongereeld/Very irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	ffens/Slightly	Medium	Totaal/Total	/ater aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	anto collection of on	Depth installed	poog/pac	Medium	vak/Poor	Geen/None	
0-1	029		10			1	Ť				2	-	2	F	5	Z	×			Š	C			Ž	S	Ö	
1-2	036		10			1	1	1	1		v				H		V	-	-	H	H	-	1	1	-	+	Clay
2-3	041		lú			T	t	+	1		N	-				-	1	-		Н	-	- 1	4		_	-	4
3-4	049		10	,			t	1	1	1	V	1	- I- I				V	1		Н		-	1	-	-	L	4
4-5	(9:44		C			1	1	+	1	4	N	9						-	-	H		-1		4			-
5-6	246	-	0				1	1	1	1	1				-		0	H		-		- 1	4	-		-	ĺ.
6-7	950		20	2			+	1	1	1	1	1		-	-		V			+	_	1	1	-			И
7-8	026	1	0				t	1	1	1	V	1		1			V			+	-	V	1	+			4
8-9	030	1	0					+	1		1	1	+	+	+		/	H	-	+	_	L	1	+			Shale
9-10	271		0	1			H	1	1	1	1	1	1	1	+		V		-	+	-	- 1	1	+			V .
10-11	770		0	1				+	1	1	V	9	+	+	+	1	1	-	-	+	-	V	1	1	-		4
11-12	91:0	4		1					1	h	1	+	+	+	+	-	4	+	-	+	_	-	1	+	-	-	
12-13	270	i	-	1	-		1		1	h	1	+	+	+	+	-	1	+	-	+	_	-	1	+	-		4
13-14	226	14		+	1				K	1	1	+	+	+	+	-	1	+	-	+	-	Y		+			ų.
14-15 (7:19	10	0	1	1	1			V	1	1	1	+	+	+	- 6	1	+		+		- K	-	1	-	-	Ú.
5-16	5021	4	d	+	1				1	1	1	+	+	+	+	-	1	+	-	+	_	1	1	+	+	-	y .
6-17	223	42	1	1	1	1			V	h	1	+	+	+	+	1	4		-	+	_	1	-	+	+	-	V
7-18	225	40		1	1	1			1	1	1	+	+	+	+	1	1	+		+	_	1	-	-	+	1	· ·
8-19	220	1.1	10	+	1	1	H		1	h	1	+	+	+	+	-	1	+	-	+	_	1	-	+	1	1	4
9-20	218	w		1	1	1				N	1	+	+	+	+	1	1	4	-	+	_	1	-	-	+	4	1
0-21	;	1	1	1	t	1			V	-	+	F	+	+	+	15	1	+	-	+	_	V		-	1	+	W
1-22	3			1	1	1					-	+	+	+	t	+	+	+	-	+	_	+	_	-	-	+	
2-23	-3-			T	t	+	1		H		-	+	H	+	+	-	+	+	+	+		+			-	+	
3-24	9	-			1	1	1		i			-	1	1	+	+	+	+	-	-	-	+		-	-	+	
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Opmerkings:	
Domarka.	

DATA BESKRYF DEUR: DATA DESCRIPTION BY: PCLUS

Brits Drukkery L3187 *Tel: (012) 252 1370

OPERATEUR: OPERATOR:

Jack

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee

30069 Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

Kliënt: VERIOICON	
Projek/Terrein: ZRASm/ASPARIS.	**
Project/Site: ZhH JMM JYTIS S	
Gat Nr.: , . 0 0	* 1
Hole No.: UDA 25	
Gatposisie:	
Hole position:	

SLAGBOORSTAAT PERCUSSION BORE HOLE RECORD

PERCUSSION BORE HO
Total depth:
Total depth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

Datum: 06 DEC 2016

Lugdruk:
Air pressure: 900KM Air capacity 16 Majnum
Beiteldeursnee (mm):
Bit diameter (mm): 65 mm
Water aangetref (m):
Water struck (m):
Rusylak (m): Rusvlak (m):

		,									Ca	sing	per	mai	nen	lly d	ama	ged (m):			a		F	Rest	evel (m):	
	Pene- trasie		Fo	rma	tion	1	Ha	lam emp amr rate	oo ner	L	ugv	erlie	es s		to M	Voj esta oist indi		Gat va toe Hole		Voe- ring Ca- sing	h	Moi erw Sai eco	nste	er ng	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of material)	
Diepte Depth (m)	tyd Penetration time min: sek/ m	Holte/Cavity	Baie sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Very irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Totaal/Total	Water aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	Diepte geïnstalleer Depth installed	Goed/Good	Medium	Swak/Poor	Geen/None		
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23-24	3/1									1	1		1	1					1							
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26-27	1	1			1	+	1	1	1	1	1	+	+	1	1	1	1		+			+	+	+		
27-28	8	1			+	1			+	+	+	1	+	+		+	+		+			+	+	+		
28-29	:		+		+	+	+	1	+	1	+		+	+	+	+	+		+			+	-	+		
29-30		+	+		+	+	+	-	1		+	+	+	1	+	+	+		+		-	+	-	+		
29-30			_			_1									- 1			2.3.3								

Opmerkings:

Remarks:

DATA BESKRYF DEUR: DATA DESCRIPTION BY:... Brits Drukkery L3187 *Tel: (012) 252 1370

OPERATEUR: SEMIG

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee

≥ 30069 Wonderboom Poort Pretoria 0033 Fax: 086 503 9981 Cell: 082 553 9291

APPENDIX D PERCUSSION BOREHOLE PROFILES PREVIOUS INVESTIGATION

Project Number: V16/099 **Project Name: Erasmus Park** Sheet 1 of 1 Investigation: **Dolomite Stability** BH No. VBH8 **PENETRATION** SAMPLE AIR DEPTH (m) TIME LOSS **RECOVERY DESCRIPTION** INTERPRETATION TRANSPORTED SOIL Light brown silty sand Good : 40 None Yellow brown sandy silty **FERRUGNISED** 0 : 22 None Good clay with gravel TRANSPORTED SOIL Good 0:48 None Orange brown silty clay HARDPAN FERRICRETE 1:08 Good None with subrounded gravel Good 5.0 1:18 None Purple red brown silty clay VERY SOFT ROCK Good 0:43 None with shale gravel SHALE 0 : 31 None Good 0 : 22 None Good 0:26 None Good END OF BOREHOLE 10.0 (Terminated at the required depth) 15.0 20.0 25.0 30.0 35.0 40.0 45.0

Profiled by: Drilling Contractor Drilling operator R Govender Hennie Erwee Boorkontrakteur William Compressor 19Bar Diameter 165 mm Date drilled 3/5/2016 Date profiled 3/5/2016 Coordinates 25°49'19.12"S 28°14'48.57"E

Project Number: V16/099 **Project Name: Erasmus Park** Sheet 1 of 1 Investigation: **Dolomite Stability** BH No. VBH9 **PENETRATION** SAMPLE AIR DEPTH (m) TIME LOSS **RECOVERY DESCRIPTION** INTERPRETATION TRANSPORTED SOIL Light brown to orange Good 0:30 None brown silty sand with 0:32 None Good ferricrete gravel Orange brown silty sand HARDPAN FERRICRETE Good 1 : 20 None with ferricrete nodules 0:54 None Good 0:58 None Good 5.0 0 : 31 Good Purple red brown silty clay VERY SOFT ROCK None with minor angular grey SHALE 0 : 29 Good None gravel Good 0 : 21 None Light purple silty clay with VERY SOFT ROCK 0 : 27 None Good angular grey fragments SHALE 10.0 **END OF BOREHOLE** (Terminated at the required depth) 15.0 20.0 25.0 30.0 35.0 40.0 45.0 Profiled by: R Govender Compressor 19Bar Coordinates Drilling Contractor Hennie Erwee Boorkontrakteur Diameter 165 mm 25°49'14.74"S Drilling operator William Date drilled 3/5/2016 28°14'45.20"E Date profiled 3/5/2016

Klient: Werdicon	
Client: UEV CACCOON	
Projek/Terrein: C.	Da N
Project/Site: CVCISVVUS	LCM K
Gat Nr.: 0 1489	
Hole No.: 5175	
Gatposisie:	
Hole position:	

SLAGBOORSTAAT

SLAGBOORSTAAT
PERCUSSION BORE HOLE RECORD
Totale diepte:
Total depth:
Voering - In en Uit (m):
Casing - In & Out (m):
Voering gelaat (m):
Casing installed (m):
Voering permanent beskadig (m):
Casing permanently damaged (m):

Datum: Oil Lugdruk: Air pressure: 100 km Lugvolumes.
Air pressure: 100 km Lugvolumes.
Air capacity.
Beiteldeursnee (mm):
Bit diameter (mm):
Water aangetref (m):
Water struck (m):
Rusylak (m):

Rusvlak (m): Rest level (m):

	Pene- trasie		For				te Ha	ame emp emm mm rate	o ner		ugv Air l				toe	Vog esta pistu nditi	nd ire	Gat val toe Hole collap- sing		Voe- ring Ca- sing	her	lons rwin Samp cove	nin	ıg	OPMERKINGS/REMARKS (bv tipe materiaal/eg. type of material)
Diepte Depth (m)	tyd Penetra- tion time min: sek/ m	Holte/Cavity	Baie sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Very irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Totaal/Total	Water aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	Depth installed	Goed/Good	Medium	SWak/Poor	Geen/None	
0-1	040		1						L	-						U	し				4	-			Klei.
1-2	022		10													L					~				· y
2-3	048		10		T				1	L						U					4				- 10
3-4	108		92	S					1	1			7			i	/	1-1			U				10
4-5	118			1,0					1	2	-					C					U				Alei
5-6	04-3		9	01				1							-	i	L				-				Shale
6-7	031		10	1					U	1							1				1				Shale
7-8	092		10						L	L						1	L				U				Shede
8-9	026		1.0	0					L	L						i	~				1				Shede
9-10	1		1																						
10-11	1.																								
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13-14	-:-																								
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21-22	(3)																								
22-23	2																								
23-24	15																								
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25-26	- 1																								
26-27																									
27-28	8.																								
28-29	1																								
29-30	:				9	N,	1																		

Opmerkings: Remarks:

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee

39068

Kliënt: Verdicon	PE
Projek/Terrain:	· orange Tot
Project/Site: C/VCCS/VL	Tot
Gat Nr.: 0110	Voi
Hole No.: S.T.	Ca
Gatposisie:	Vo
Hele position:	Ca

SLAGBOORSTAAT RCUSSION BORE HOLE RECORD

Total ediepte:
-Total depth:
-

	- N
Datum:	2 AHL
Date: 04 -05	ω
Lugdruk:	Lugvolume:
Air pressure:	Air capacity:
Beiteldeursnee (mm):	Annual State of State
Bit diameter (mm):	******
Water aangetref (m):	
Water struck (m):	
Rusvlak (m):	
Rest level (m):	

	Pene- trasie		For	mat	tion		Ha	ame emp imm	o ier	Lu	ıgve Air I	erlie oss			toe Mo	Vog esta oistu ndit	nd ure	Gat val toe Hole collap- sing		Voe- ring Ca- sing	he	Sar	nste innir nple vere	ng e	OPMERKINGS/REMARKS (bv tipe material)	
Depth (m)	tyd Penetra- tion time min: sek/ m	Penetra- tion time min: sek/ m	Holte/Cavity	Baie sag/Very soft	Sag/Soft	Redelik hard/Fairly hard	Solied/Solid	Baie ongereeld/Very irregular	Ongereeld/Irregular	Gereeld/Regular	Geen/None	Effens/Slightly	Medium	Totaal/Total	Water aangetref/found	Nat/Wet	Klam/Moist	Droog/Dry		Water aangwend/applied	Diepte geïnstalleer Depth installed	Goed/Good	Medium	Swak/Poor	Geen/None	
0-1	030	-	10						L	U							i				-				Klei	
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2-3	120		bi	og				1		1							1				1	1			10	
3-4	054		1.0	31					L	-							1	_			1				Chei	
4-5	058		10	-					L	L							L	-			L				Sheile	
5-6	031		l, c						1	-							1	/			-	-			1/	
6-7	029		C						1	1	1						(i				Chesten Sheds Shewill	
7-8	021		10	1					1	c	1						-	7			1	-			Chesten Sheds	
8-9	027		Le	-					L	1								h			-	-			Shoule	
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17-18	1														1						1	L	-	1		
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20-21	3	L			1		1			L				1	1	1	1			-	+			-		
21-22	:									1				1	1				1		1					
22-23	:	1								1				1	1		1		1		1		1	-		
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24-25	:										1			1	1	1	-		1		1		1	-		
25-26	:													1	1		1		1		1	1		-		
26-27	12						1							1	1				1		1			1		
27-28	3					1					1			1	1		1			1	1	-	1	1		
28-29	1								1	1			1	1	1	-					1			1		
29-30	:																									

Opmerkings: Remarks:.....

BOORKONTRAKTEUR DRILLING CONTRACTOR Hennie Erwee

Wonderboom Poort Pretoria 0033 Fax: 086 503 9981

APPENDIX E TEST PIT PROFILES PREVIOUS INVESTIGATIONS

Note 4: D = Disturbed Sample U = Undisturbed Sample

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste



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Cell: +27 (082) 684 5621
E-mail: trevor@verdicon.co.za

Description Description Description Slightly moist, dark brown, loose, pinholed, gravelly silty SAND.	
Transported Soil.	
0,5 _ Moist, red orange brown, loose, pinholed, fine sandy silty CLAY. Transported Soil.	
1,0 -	
Moist, orange brown mottled black, loose to medium dense, gravelly silty SAND Farryginised Transported Soil	
Ferruginised Transported Soil.	
2,0 – Moist, orange brown mottled black, dense, pinholed, gravelly clayey SAND.	
Cemented Ferricrete.	
Refusal at 3.0m on strongly cemented ferricrete.	
3,5 —	
4,0 —	
4,5 —	
5,0	
Excavation method: Hitachi Excavator Coordinates: 25°49'12.61"S	
Note 1: No groundwater Coordinates: 28°14'51.02"E	
Note 2: Stable sidewalls Elevation: Note 3: Profiled in-situ Sheet: 1 of 1	

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste



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Depth (m)	Sampling	Ground water	Symbol		Description	
- - - 0,5 -				Slightly moist, light brown, loose, silty SA Transported Soil.	AND.	
-				Moist, yellow brown, firm, intact, gravelly Slightly Ferruginised Soil.	silty CLAY.	
1,0 -	D/U					
1,5 — — —				Moist, red brown mottled yellow brown,		f cemented ferricrete.
2,0 — — —				Ferruginised Residual Shale tending	to ferricrete.	
2,5 —						
3,0 —						
3,5 —						
4,0 —				Near I	refusal at 4.0m on residual sha	ale tending to ferricrete.
4,5 —						
				od: Hitachi Excavator	Coordinates:	25°49'17.78"S
N N	lote 2 lote 3	Sta	ble s	ndwater idewalls in-situ urbed Sample U = Undisturbed Sample	Elevation: Sheet:	28°14'52.74"E 1 of 1

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste

Note 1: No groundwater

Note 2: Stable sidewalls

Note 4: D = Disturbed Sample U = Undisturbed Sample

Note 3: Profiled in-situ



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Depth (m)	Sampling	Ground water	Symbol	Description
- - - 0,5 -				Moist, yellow khaki brown, very soft, sandy clayey SILT with minor gravel. Slightly Ferruginised Transported Soil.
1,0 —				
1,5 —				Moist, red brown, mottled grey and yellow brown, dense, clayey gravelly SAND. Cemented Ferricrete.
2,0 —				
2,5				
3,0				Moist to wet, red brown mottled grey and yellow brown, very dense, gravelly SAND with Hard Rock Sandstone cobbles. Strongly Cemented Ferricrete.
3,5 — — — 4,0 —				Refusal at 3.5m. Excavator started to struggle at 1.9m
4,5				
5,0 —				
E	xcava	ation i	metho	od: Hitachi Zaxis 200 Excavator Coordinates: 25°49'22.65"S

Coordinates:

Elevation:

Sheet:

28°14'50.53"E

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste

Note 1: No groundwater

Note 2: Stable sidewalls

Note 4: D = Disturbed Sample U = Undisturbed Sample

Note 3: Profiled in-situ

VERDICOL Consulting Engineers

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Depth (m)	Sampling	Ground water	Symbol	Description
				Slightly moist, light brown, loose, silty SAND. Transported Soil.
0,5 —				Moist, yellow brown, soft, intact, silty CLAY with trace amounts of gravel. Slightly Ferruginised Transported Soil.
1,0 —				Moist, yellow brown mottled red brown, soft to firm, intact, silty CLAY with minor gravel ferricrete nodules. Ferruginised Transported Soil.
1,0 — 1,5 — 2,0 — 2,5 — 3,0 — 3,0 —				Moist, orange yellow brown mottled black, dense, gravelly clayey SAND. Cemented Ferricrete.
3,0 — 3,5 — 4,0 —				
4,0 —				Near refusal at 3.8m (very slow excavation).
E	xcava	ation r	netho	od: Hitachi Zaxis 200 Excavator Coordinates: 25°49'21.78"S

Coordinates:

Elevation:

Sheet:

28°14'43.67"E

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste

Note 1: No groundwater

Note 2: Stable sidewalls

Note 4: D = Disturbed Sample U = Undisturbed Sample

Note 3: Profiled in-situ

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Depth (m)	Sampling	Ground water	Symbol	Description
0,5 —				Slightly moist, light brown, loose, silty SAND. Transported Soil.
1,0 —				Moist, yellow brown, soft, intact, silty CLAY with trace amounts of gravel. Slightly Ferruginised Transported Soil.
1,5 —				Moist, yellow brown mottled red brown, soft to firm, intact, clayey sandy silt with minor gravel ferricrete nodules. Ferruginised Transported Soil.
2,0 —	D			Moist, orange yellow brown mottled black, dense, gravelly clayey SAND. Cemented Ferricrete.
2,5 —				
3,0 —				
-				Near refusal at 3.8m in (very slow excavation).
4,0 —				Total Total at 0.0.1. II (Toty 510W 0.004 at 0.1).
4,5 —				
	xcava	ation	metho	od: Hitachi Zaxis 200 Excavator Coordinates: 25°49'19.40"S

Coordinates:

Elevation:

Sheet:

28°14'48.02"E

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste



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Depth (m)	Sampling	Ground water	Symbol	Description
				Slightly moist, light brown, loose, silty SAND. Transported Soil.
0,5 —			XXXXXXX	Moist, yellow brown mottled red brown, loose, pinholed, gravelly clayey SAND. Ferruginised Transported Soil.
1,0 —				
1,5 —				Moist, orange and yellow brown mottled black, dense, gravelly clayey SAND. Cemented Ferricrete.
2,0 —				
2,5 —			220	Refusal at 2.3m on strongly cemented ferricrete.
3,0 —				
3,5 —				
4,0 —				
4,5 —				
5,0 —				

Excavation method: Hitachi Zaxis 200 Excavator Coordinates: 25°49'14.37"S

Note 1: No groundwater Coordinates: 28°14'46.03"E

Note 2: Stable sidewalls Elevation:

Note 3: Profiled in-situ Sheet: 1 of 1

Note 4: D = Disturbed Sample U = Undisturbed Sample

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste

Note 1: No groundwater

Note 2: Stable sidewalls

Note 4: D = Disturbed Sample U = Undisturbed Sample

Note 3: Profiled in-situ

VERDICOL Consulting Engineers

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E-mail: trevor@verdicon.co.za

Depth (m)	Sampling	Ground water	Symbol	Description
_				Slightly moist, light brown, loose, silty SAND. Transported Soil.
0,5 —				Moist, yellow brown mottled red brown, loose, pinholed, gravelly clayey SAND. Ferruginised Transported Soil.
1,5	D			Moist, orange and yellow brown mottled black, dense, gravelly clayey SAND. Cemented Ferricrete.
2,0 —				Refusal at 1.7m on strongly cemented ferricrete.
2,5 —				
3,0 —				
4,0 —				
4,5 —				
5,0 —	xcava	ation	metho	od: Hitachi Zaxis 200 Excavator Coordinates: 25°49'15.29"S

Coordinates:

Elevation:

Sheet:

28°14'40.41"E

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste



Rosen Office Park, 8 Invicta Road, Erand Gardens x49, Midrand
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E-mail: trevor@verdicon.co.za

Depth (m)	Sampling	Ground water	Symbol	Description
De	Sa	Gre	Syı	
-				Slightly moist, brown, loose, clayey SAND with gravel and cobbles. Pebble Marker Roots.
_				
0,5 —			26	
_				
1,0 —				
			10 to 10 10 to 10 10 10 to 10 10 10 to 10 10 10 to 10 10 10 10 10 10 10 10 10 10 10 10 10 1	Slightly moist, olive brown blotched black, dense, sandy clayey GRAVEL. Ferruginised Transported Material.
_				rerruginised transported material.
1,5 —			10000	
-			1000	
_				
2,0 —				
_			\$0000 \$1000 \$1000	
-			1000	
2,5 —			1714.I 1717.I 1717.I	
-			2000	
-			1000	
3,0 —				
_				
				Near refusal at 3.3m.
3,5 —				
_				
_				
4,0 —				
-				
-				
4,5 —				
-				
5,0 —				
E	xcava	ation	meth	od: Hitachi Zaxis 200 Excavator Coordinates: 25°49'18.01"S

Excavation method: Hitachi Zaxis 200 Excavator Coordinates: 25°49'18.01"S

Note 1: No groundwater Coordinates: 28°14'37.72"E

Note 2: Stable sidewalls Elevation:

Note 3: Profiled in-situ Sheet: 1 of 1

Note 4: D = Disturbed Sample U = Undisturbed Sample

Project: Erasmus Park

Client: Atturbury Properties

Date: 2016/04/30

Profiled by: Riaan Jooste

Note 1: No groundwater

Note 2: Stable sidewalls

Note 4: D = Disturbed Sample U = Undisturbed Sample

Note 3: Profiled in-situ

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Depth (m)	Sampling	Ground water	Symbol	Description
_				Slightly moist, grey, medium dense, gravelly silty SAND. Topsoil.
0,5 —				Slightly moist, yellow brown blotched black, loose, clayey SAND and gravel. Ferruginised Transported Soil.
1,0 —				
-				
1,5 —			William .	Yellow brown blotched black, dense, sandy GRAVEL.
			0000	Cemented Ferricrete.
-				Refusal at 1.7m on Strongly cemented ferricrete.
2,0				
_				
2,5 —				
_				
3,0 —				
_				
3,5 —				
4,0 —				
_				
4,5 —				
-				
5,0 —				
	xcava	ation	metho	od: Hitachi Zaxis 200 Excavator Coordinates: 25°49'12.90"S

Coordinates:

Elevation:

Sheet:

28°14'44.80"E

	K	NIGHT	HALL H	ENDRY CHNICAL ENG	& ASSO	CIATES	SOIL P	PROFILE
LIENT	sco	OTT AND	DE WAAL	INC	-		PROFILE NUMBER	TP 11
ROJE	CT ER	ASMUSPA	ARK OFFIC	E PARK			PROJECT NUMBER	SW-85G
ample or test	depth m	legend				description		
	_	XXX		CLAY with		ofile yellow brown spec nedium and fine GRA		
	0,5	N. X.X.X	black), ; coarse, ;	<u>firm,</u> micros medium and	hattered (cru	orofile yellow brown months, SILTY CLAY LL of FERRICRETE (matrix to angula	ckled to mottled r to subangular
V	2,25	2 2 2 2	yellow),	very stiff, or	ist, red brown pen texture, c HILLWASH.	(in profile red brown bemented, FERRICRET	lotched, mottled b E becoming very	olack, orange an <u>soft rock</u> .
					very stiff to so VISED HILL	ft rock, HARDPAN F WASH.	ERRICRETE.	
			Notes:					
			1.	Rootlets to	1,4 m.			
	-		2.	Clay filled v	oids in open	texture of ferricrete (ye	llow brown, stiff	to firm).
			3.	Seepage at	2,25 m.			
			4.	Difficult to	excavate belo	w 2,25 m.		
	actor		ground level		ground water		depth of water in h	nole
	COMTR	ON	-	-	Si	EEPAGE AT 2,25 m	after hours	
machi	CAT L	TD	profiled by	CMCK	end of hole re	2,25 m	TRENCH	
date e	executed	30.1.91	date profiled	31.1.91	symbols		undisturbdisturbed	ed sample sample

_

· · · · · · · · · · · · · · · · · · ·	K	NIGHT	FHALL HENDRY GEOTECHNICAL ENG	& ASSOCIATES	SOIL PROFILE
CLIENT	r sco	OTT AND	DE WAAL INC		PROFILE TP 12
PROJE	CT ER	ASMUSP	ARK OFFICE PARK		PROJECT NUMBER SW-85G
sample or test	depth m	legend		description	
	0,3	7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7, 7	Slightly moist, dark CLAY with abundar HILLWASH.		grey brown), <u>firm</u> , microshattered, SILTY
	0,6		microshattered to slip GRAVEL (60%),(n		file yellow brown speckled red, black), <u>firm,</u> AY matrix to fine and medium, subrounded
			stiff, partially cement Nodules are hard are	ted, FERRICRETE with a	mottled black, yellow orange), stiff to very slight open texture and CLAY filled voids.
又	2,6		SILT matrix to well CHERT.		own), stiff to very stiff, fissured, CLAYEY (80%) to COBBLES of QUARTZITE /
	2,9	90		EBBLE MARKER zone (p	ossibly large boulders).
	-		NOTE:		
			1. Water level	at 2,6 m.	
	-				
contra	ctor COMTR		ground level	ground water YES	depth of water in hole 2,6 m after 24. hours
machii			profiled by CMCK	end of hole refusal 2,9 m	size of hole TRENCH
date e	vecuted	0.1.91	date profiled 31.1.91	symbols	■ undisturbed sample

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE
CLIENT	sco	OTT AND	DE WAAL INC	<u>.</u>		PROFILE NUMBER	TP 15
PROJEC	T ER	ASMUSPA	ARK OFFICE PARK			PROJECT NUMBER	SW-85G
ample or	depth m	legend			description		
test		2-12-12-12-12-12-12-12-12-12-12-12-12-12	Slightly moist, dark to stiff with soft zone GRAVEL. LIGHTLY FERRU	es, microshattere	d, SILTY CLAY		
	1,1 - 	31 2	Slightly moist, red by partially cemented, S	SILTY CLAY to	HARDPAN FE), very stiff to sti
	2,6 -		EOH: Refusal on tending towa		ally cemented, hi th soft rock zone		SED HILLWAS
			Notes: 1. Roots to 1,2				
				excavate below? ones to 0,2 m.	1,0 m - retusal pro	obably on soft - ver	y soft fock.
		_		e, quartzite boule	der at 0,9 m.		
			5. Gravel more	e abundant towa	rds base.		
contract C	or OMTR	ON	ground level	ground water	NIL	depth of water in after hour	
machine			profiled by CMCK	end of hole refus	sal 2,6 m	size of hole TRENCH	
date exe	ecuted a	0.1.91	date profiled 31.1.91	symbols		undistur	bed sample d sample

	K	NIGHT	HALL GEOT	HENDRY ECHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE
CLIENT	sco	TT AND	DE WAAI	LINC			PROFILE NUMBER	TP 16
PROJE	CT ERA	SMUSPA	ARK OFFIC	E PARK			PROJECT NUMBER	SW-85G
sample or test	depth m	legend				description		
		1000 X	Slightly CLAY HILLY	with occasion:	yellow brown (al subrounded, fi	in profile light yone GRAVEL.	ellow brown), <u>firm</u>	, fissured, SILTY
	0,7	A CR	EOH:	HARDPAN	rown (in profile FERRICRETE ERRUGINISED	with manganese	ale yellow brown, o	orange), <u>soft rock</u>
	_							
		_						
	_	-	Notes	:		•		
			1.	Becoming 8	0 % gravel at 0,6	m with subroun	ded quartzite grave	el.
			2.	Roots to 0,7	7 m.			
	_	-	3.	Ferricrete w	vell developed, ve	ery difficult to exc	cavate below 0,7 m	ie
	-							
	_							
		_						
	_							
contra			ground leve	el	ground water	NIL	depth of water in	
machii	COMT	KON	profiled by	-	end of hole refusa		afterhour	
datas	CAT	426		CMCK	symbols	0,7 m		rbed sample
cate e	XECUIEU	30.1.91	date profile	31.01.91	Symbols			rbed sample id sample

	K	NIGH'	HALL P	HENDRY CHNICAL ENG	& ASSOCIA	ATES	SOIL PROFILE	
CLIENT	sco	TT AND	DE WAAL	INC			PROFILE TP 21 NUMBER	
PROJE	CT ERA	SMUSPA	ARK OFFIC	E PARK			PROJECT SW-85G NUMBER	
sample or test	depth m	legend				description		
		X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-X-	soft, shat	ttered to micr led, FERRIC	it, dark yellow br oshattered, SILT CRETE NODUL	Y CLAY with occ	llow brown mottled orange), <u>firn</u> asional, fine to medium, subroun	<u>a to</u> ded
マ	1,3		EOH:	REFUSAL a	at 1,3 m on dark	yellow brown (in	profile yellow brown mottled	red,
		••	1	brown, yellov HONEYCO! HIGHLY F	w, orange, black; MB FERRICRE ERRUGINISED), <u>very stiff</u> , ceme TE.	nted, with CLAY filled open vo	oids,
			1.	Seepage at 1	,3 m. Abundant	thick vegetation is	vicinity suggests perched watert	able.
			2.	Very difficu	lt excavation belo	ow 1,3 m.		
			3.	Abundant r	ubble around sur	face concrete, bri	cks etc.	
contrac	tor		ground level		ground water		depth of water in hole 1,3 m	
1	COMTR	ON	profiled by	-	end of hole refusa	YES	after hours	
	CAT 4	126		CMCK		1,3 m	size of hole TRENCH	- <u>-</u>
date ex	ecuted	31.1.91	date profiled	31.1.91	symbols		undisturbed sampledisturbed sample	

	K	NIGHT	HALL HI	ENDRY HNICAL ENG	& ASSOC	IATES	SOIL	PROFILE
CLIENT	sco	TT AND	DE WAAL II	NC			PROFILE NUMBER	TP 22
PROJE	CT ERA	ASMUSPA	RK OFFICE	PARK			PROJECT NUMBER	SW-85G
ample or test	depth m	legend				description	•	
1001	0,3	12 K	Slightly m. CLAY. HILLWA		rey brown (in)	profile dark grey b	rown), <u>firm</u> , micro	oshattered, SILTY
	_	2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7 2 7	SILTY CI	LAY matri FERRICRE	in profile yello k to medium an ETE NODULE GINISED HILL	nd fine, subrounde S.	light orange), <u>firr</u> d to well rounded	n, microshattered GRAVELS (60 ·
	1,10	2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	stiff with s	stiff pockets ly weathere	: nartially ceme	nted, probably fissi soft to hard rock,	ed yellow brown, nured, SILTY CLAY QUARTZITE CO	r, with sparse puit
		100 100 100 100 100 100 100 100 100 100						
	-	0 60 00 00 00 00 00 00 00 00 00 00 00 00						
	2,9		EOH : 1	Near refusa	l on <u>soft</u> FERR	ICRETE with son	ne BOULDERS.	
			Notes:					
	-		1.	Large quar	tzite boulders a	t 2,8 m, could be	close to pebble ma	rker zone.
			2.	Difficult to	excavate below	1,10 m.		
	-		3.	Rootlets to	1,6 m.			
contra	actor COMT	RON	ground level	-	ground water	NIL	depth of water in	
machi			profiled by	CMCK	end of hole refu	sal 2,9 m	size of hole TRENC	TH .
date e	xecuted	31.1.91	date profiled	31.1.91	symbols			orbed sample ed sample

	K	NIGHT	HALL H	ENDRY CHNICAL ENG	& ASSOCIA	ATES	SOIL	PROFILE
CLIENT	sco	TT AND	DE WAAL	INC			PROFILE NUMBER	TP 23
PROJEC	T ERA	SMUSPA	ARK OFFIC	E PARK			PROJECT NUMBER	SW-85G
ample or test	depth m	legend				description		
	_	がなった。		ndant roots.		e yellow brown),	firm, microshattere	ed, SILTY CLAY
		20 8 20 1 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	firm to s	tiff microsh	attered to shatter	ed SILTY CLA	k yellow brown mot Y. ; very GRAVELLY	
	1,7		highly c CLAY I HIGHL	emented HC filled and ma Y FERRUC	ONEYCOMB FE anganese staining GINISED HILLW	RRICRETE with /ASH.	red, orange, yellow h abundant (20%) FERRICRETE as	voids, occasional
			Notes : 1. 2.		excavate below 1 1,4 m.	,7 m.		
contracti	or COMTR	RON	ground level	· -	ground water	NIL	depth of water in afterhours	
machine	CAT 4	426	profiled by	CMCK	end of hole refusa	1,8 m	size of hole TRENCH	I
date exe		31.1.91	date profiled	31.1.91	symbols		undisturt disturbed	oed sample I sample

	K	NIGH	T HALL H	ENDRY CHNICAL ENG	& ASSOC	IATES	SOIL PROFIL	E
CLIENT	SCO	TT AND	DE WAAL	INC	17 2"		PROFILE TP 24 NUMBER	
PROJE	CT ERA	SMUSP	ARK OFFICE	PARK			PROJECT SW-85G	
sample or test	depth m	legend				description		
	0,3	7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Slightly r SILTY C HILLWA	LAY with a	ist, grey brown abundant rootle	(in profile grey ts.	brown), <u>firm to soft</u> , microshatte	ered,
		2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1	Slightly r to stiff, f HILLW/	issured, SIL	st, light orange TY CLAY with	brown (in profile occasional roots.	orange brown mottled pale red),	, <u>firm</u>
	1,3	مو اکو اس المو اس المو اس المو الموالمو	black), s	<u>tiff,</u> fissured	, orange brown , SILTY CLAY GINISED HIL	•	ge brown mottled pale red, spe	ckled
<u>\times_\</u>	2,0	100 100 100 100 100 100 100 100 100 100	Below 2	,0 m becom	ing stiff to very	stiff.		
	2,55			HONEYCC occasionally)MB FERRIC CLAY filled a	RETE of <u>very s</u>	ted, SILTY CLAY tending to oft rock consistency. 20 %	wards Voids,
			Notes : 1. 2. 3.	Rainwater Difficult to	in bottom of pile excavate below ecreases when v	2,50 m.	,2 m during storm.	
contrac	ctor COMTF	RON	ground level	-	ground water	YES	depth of water in hole 2,0 m afterhours	i
machin	ne CAT	426	profiled by	CMCK	end of hole refu	2,55 m	size of hole TRENCH	
date ex	xecuted	31.1.91	date profiled	01.02.91	symbols		undisturbed sample disturbed sample	

	K	NIGHT	HALL H	ENDRY CHNICAL ENG	& ASSOCI	IATES	SOIL	PROFILE
CLIENT	sco	TT AND	DE WAAL	INC		·	PROFILE NUMBER	TP 25
PROJE	CT ERA	SMUSPA	ARK OFFICE	E PARK			PROJECT NUMBER	SW-85G
sample or test	depth m	legend				description		
1661		2 1 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2	Slightly r CLAY. HILLWA		ist, grey brown	(in profile grey l	brown), <u>firm</u> , micro	shattered, SILTY
	ō,4 	100 00 00 00 00 00 00 00 00 00 00 00 00	with abu	indant, coar d, fine grain	rse GRAVELS	ile orange brown and sparse CC rock, QUARTZ), <u>firm,</u> microshatter DBBLES of pinkish ITTE	red, SILTY CLAY or red, completely
	1,3	2012 PG 2012 PG 1012 P	speckled	black), stiff	orange brown, (in to very stiff, fish HILLWASH.	n profile orange l sured, SILTY CI	brown mottled oran LAY.	ge, red and yellow,
		مرامهم المحد مرامهم درامهم	Below 1	,8 m becomi	ing very stiff.			
	2,1		•	HARDPAN	FERRICRETE	d, <u>very stiff</u> , fer E. D HILLWASH.	rruginised, SILTY	CLAY tending to
		-	Notes :					
	-			Difficult to	excavate below	1,8 m.		
			2.	Roots to 1,0	5 m			
	-		3.	Block samp	le at 1,3 m - 1,5	5 m.		
	_							
contra	ctor COMTI	RON	ground level	-	ground water	NIL	depth of water in afterhour	
machir			profiled by	CMCK	end of hole refus	al 2,1 m	size of hole TRENC	
date e	xecuted	31.01.91	date profiled	01.02.91	symbols	∀ seepage ▼ water table		toed sample d sample

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENG	& ASSOCIA	ATES	SOIL	PROFILE
CLIEN	T SC	OTT AND	DE WAAL INC			PROFILE NUMBER	TP 30
PROJE	CT ER	ASMUSP	ARK OFFICE PARK			PROJECT NUMBER	SW-85G
sample or test	depth m	legend			description		
	0,3	20,000	Slightly moist, grey l frequent (10 %), fin HILLWASH.	brown (in profile ne, subrounded G	grey brown), <u>firm.</u> RAVEL.	, microshattered, S	SILTY CLAY wit
		3-4-20-4-20-40-40-40-40-40-40-40-40-40-40-40-40-40	Moist to slightly mo firm to stiff with o scattered purple, co and medium GRAV HIGHLY FERRUG	ccasional <u>very st</u> mpletely weather EL with voids.	iff pockets, micro ed, hard to soft re	ofissured, SILTY	CLAY, with rai
Y	3,0	90000000000000000000000000000000000000	EOH: Near refusa	l in <u>very stiff</u> , hig	bly FERRUGINIS	SED HILLWASH	as above.
	_		Notes: 1. Waterlevel: 2. Below 2.8 n	·	ater tal atom a		
	ļ		2. Deiuw 4,8 II	r occoming <u>very s</u>	stiff with stiff pock	.CLS.	
			3. Difficult to	excavate below 1,	2 m.		
contra		ON	3. Difficult to	ground water		depth of water in	
	COMTR			ground water	YES	depth of water in after hours size of hole TRENCH	

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE
CLIENT	SCC	TT ANI	DE WAAL INC			PROFILE NUMBER	TP 31
PROJE	CT ER	ASMUSP.	ARK OFFICE PARK			PROJECT NUMBER	SW-85G
ample or test	depth m	legend			description		
	_	W. W.	Moist, grey brown (i	in profile grey b	rown), <u>firm</u> , micre	oshattered, SILTY	CLAY.
	0,40	00000000000000000000000000000000000000	Moist, dark orange m), stiff to firm, n GRAVEL with part FERRUGINISED I	nicrofissured, Sl ly clay filled voice	LTY CLAY with	h frequent (20%),	
		وه اس	Below 1,2 m become	ing <u>stiff.</u>			
		را کور در کور در کور	Below 2,0 m becom	ing <u>very stiff.</u>			
▼.		مول مول المو موا الموم					
	_	امي مورهم مرومو					
	27 -	دراهار اموار سامو		·			
		والروي موالي	EOH: Near refusal	l on <u>very stiff</u> , h	ghly FERRUGIN	IISED HILLWASH	Ĺ
	_		Notes:				
		_	1. Difficult to	excavate below:	2,0 m.	·	
	-		2. Ferruginise	d material softer	ns when wet.		
	_						
contrac	ctor COMTR	ON	ground level	ground water	YES	depth of water in after24 hours	
machir			profiled by CMCK	end of hole refus		size of hole TRENCH	· · · · · · · · · · · · · · · · · · ·
date ex	xecuted	1.01.91	date profiled 01.02.91	symbols	✓ seepage ▼ water table	undisturl disturbed	ped sample

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENGI	& ASSOCIAT NEERS	ES	SOIL PRO	FILE
CLIENT	T SCC	TT AND	DE WAAL INC			PROFILE TP	32
PROJE	CT WA	TERKLO	OF TOWNSHIP			PROJECT SW-	85G
ample or test	depth m	legend		de	scription		
	_	S Wage	Slightly moist to moist SILTY CLAY, HILLWASH with about			own), <u>firm to stiff</u> , micr	oshattered,
	0,4	2000 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1	L marklad bloc	b) firm to stiff mi	icrofissured. Sl	dark orange brown mot LTY CLAY with scatte , <u>hard rock</u> , QUARTZIT	icu, waisi
▼	1,75	100 × 400 ×	11 / 1 /h-1 - al-\ at	<u>tiff to very stiff</u> , micr EL and voids often (ochattered SII	rofile dark orange brow TY CLAY with frequent manganese lined. Make	[(10%), III
	3,0	Ond Von	EOH : Near refusal	on <u>very stiff</u> , FERR	JGINISED HI	LLWASH tending to FE	RRICRET
	-			icult to excavate be	low 1,75 m.		
			2. Rootlets to	1,12 ш.			
contra	actor COMT	RON	ground level	ground water	YES	depth of water in hole afterhours	2,8 m
machi	nine CAT	426	profiled by CMCK	end of hole refusal	3,0 m	size of hole TRENCH	
date e	executed 31.1	01	date profiled 04.02.91		seepage water table	undisturbed sampdisturbed samp	nple

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENGI	& ASSOCI NEERS	ATES	SOIL PROFILE
CLIENT	sco	TT AND	DE WAAL INC			PROFILE TP 33 NUMBER
PROJE	CT WAT	TERKLO	OF TOWNSHIP			PROJECT SW-85G NUMBER
sample or test	depth m	legend			description	
	_	مواصلو مواصلو	Slightly moist, light gr stiff (where no vegetat HILLWASH.	rey brown (in p tion), microfissu	rofile light grey br red with elongated	own to pale yellow brown), firm to voids to 5 mm wide, SILTY CLA
	0,4	1000 PG	Slightly moist to moist firm pockets, microfic purple, completely we HILLWASH.	ssured. SILTY	CLAY with sparse	n mottled orange brown), stiff wind, coarse, subrounded GRAVEL of QUARTZITE.
	1 ,0 –	00000000000000000000000000000000000000	Slightly moist to moist orange brown, speckle GRAVEL. FERRUGINISED H	ed black), <u>stiff</u> , n	rown to yellow bro ucrofissured, SILT	own (in profile yellow brown mottle Y CLAY with scattered, subrounde
_		20 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		ry stiff, possibly	below 2,0 m with led, anastomosing	large black, manganese blotches a voids.
		0000 0000 0000 0000				
	3,1	100 101 100 100 100 100 100 100 100 100	EOH : Near refusal	on stiff to very	stiff, material as ab	ove, FERRUGINISED HILLWAS
		- - -	Notes:			
	-		1. Difficult to	excavate below	1,8 m.	
			2. Waterlevel	at 1,8 m.		
		-				
contra	actor COMT	PON	ground level	ground water	YES	depth of water in hole 1,8 m after96 hours
machi			profiled by CMCK	end of hole refus		size of hole TRENCH
date e	executed	31.1.91	date profiled 04.02.91	symbols	♥ seepage water table	undisturbed sample disturbed sample

	K	NIGHT	HALL H	ENDRY HNICAL ENGI	& ASSOCIA NEERS	TES	SOIL	PROFILE				
LIENT	sco	TT AND	DE WAAL I	NC			PROFILE NUMBER	TP 36				
ROJE	CT WA	TERKLO	OF TOWNSH	IIP			PROJECT NUMBER	SW-85G				
mple or test	depth m	legend	description									
	_	2 12 12 12 12 12 12 12 12 12 12 12 12 12	Slightly m with abun HILLWA	dant roots.	ey brown (in prof	ile grey brown),	<u>firm</u> , microshatter	ed, SILTY CLAY				
	0,5	00 00 00 00 00 00 00 00 00 00 00 00 00	4 - 4:00 -	Slightly moist, dark orange brown (in profile dark orange brown mottled yellow brown), to stiff, microshattered, SILTY CLAY with sparse, scattered, subrounded to subangu coarse, medium and fine GRAVEL of QUARTZ, QUARTZITE AND CHERT.								
V		100m						·				
<u>¥</u>	1,3	40	Material	possibly bed	coming <u>stiff to ver</u> all, subrounded, (y stiff below 1,4 COBBLES and	5 m with black mot angular BOULDE	tling, CLAY fille RS.				
		well are	FERRU	GINISED H	IILLWASH.							
		Don										
	_	Ware!										
		1 July										
	-	/Q										
	2,8		EOH:	REFUSAL (on very stiff, SILT	TY CLAY, FER	RUGINISED HII	LWASH.				
	_											
			Notes:		I'm a avenu	nta below 20 m						
	_			_	difficult to excave							
					oricks and ash sca							
			3. 4.		vegetation.	<u>-</u>	•					
			4 . 5.	Waterlevel								
			J.	,,	,							
	-	-										
ontra	actor COMT	RON	ground level	-	ground water	YES	depth of water in after72	hole 1,3 m				
nachi			profiled by	CMCK	end of hole refusal	2,8m	size of hole TRENCH					
	LAI	441	!	CTATOTZ	I	•	1					

	K	NIGH	F HALL H	ENDRY CHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE		
CLIENT	SCO	TT AND	DE WAAL	INC			PROFILE NUMBER	TP 37		
PROJE	CT WA	rerklo	OF TOWNS	HIP			PROJECT NUMBER	SW-85G		
sample or test	depth m	legend				description				
***	0,3	0 P	Slightly r sparse, fi HILLWA	ine to mediu	rown (in profile and m, subrounded, (grey brown) <u>firn</u> GRAVEL.	n, microshattered, S	ILTY CLAY with		
	_	0 10 10 10 00 00 00 00 00 00 00 00 00 00	speckled subround	black), <u>stiff</u> ded, GRAVI	to very stiff, micr	vn (in profile o ofissured, SILT	orange brown mottly CLAY with spars	ed yellow brown, e, fine to medium,		
Y	1,5	م المواق مواليما مواليما مواليما مواليما	Below 1	"5 m mottled	l black with abur	dant CLAY lin	ed voids (often filled	i with roots).		
	EOH: REFUSAL on very stiff, partly FERRUGINISED SILTY CLAY, I									
			Note:	Difficult to	excavate below 1	,5 m.				
contrac	ctor COMTE	RON	ground level	-	ground water	YES	depth of water in after72 hours	hole 1,5 m		
machin	ne <u>CAT</u>	426	profiled by	CMCK	end of hole refusa	2,0 m	size of hole TRENCI	Н		
date ex	xecuted 03	L.02.91	date profiled	04.02.91	symbols.			bed sample d sample		

	K	NIGH'	FHALL H	ENDRY CHNICAL ENG	& ASSOCIA	ATES	SOIL P	ROFILE
CLIENT	sco	TT AND	DE WAAL	INC			PROFILE NUMBER	TP 38
PROJEC	T WA	TERKLO	OF TOWNS	HIP			PROJECT NUMBER	SW-85G
emple or test	depth m	legend				description		
	_	A PARTY AND	Slightly r CLAY. HILLWA		ist, grey brown (i	n profile grey b	rown), <u>firm</u> , microsh	attered, SILT
	0,4	ممامیل ممامیل ممامیل ممامیل	to stiff, r	nicrofissurec	orown (in profile d i, SILTY CLAY. IIILWASH.	ark orange brov	vn, blotched orange/b	olack/red), <u>fir</u>
<u>¥</u>		مول دا• مول مولممل مولممل	Below 1,	,2 m domina	antly <u>stif</u> f.			
		مراه دراه امر دراه امر						
	2,5	و مملم موراه درامهم						
		المراب	EOH:	Near refusal	l at 2,5 m in <u>stiff t</u>	o very stiff, FEI	RRUGINISED HILL	WASH.
			Notes:					
			1.	Difficult to	excavate below 1,4	4 m due to very	stiff material.	
	_		3.	Waterlevel	at 1,4 m.			
		-						
contract	or COMTR	ON	ground level	-	ground water	YES	depth of water in hol after2 hours	_e 1,4 m
nachine			profiled by	CMCK	end of hole refusal	2,5 m	size of hole TRENCH	
date ex	ecuted	1.02.91	date profiled	01.02.91			undisturbed disturbed sa	I sample

	K	NIGHT	FHALL HENDRY GEOTECHNICAL EN	Y & ASSOCIATES GINEERS	SOIL PROFILE
CLIENT	sco	TT AND	DE WAAL INC		PROFILE TP 39 NUMBER
PROJE	CT WAT	TERKLO	OF TOWNSHIP		PROJECT SW-85G NUMBER
sample or test	depth m	legend		description	
	 1,0	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	loose pockets, micro HILLWASH. Moist, dark orange stiff, microfissured.	brown (in profile dark yellow brown months oshattered, SILTY CLAY, with sparse brown (in profile dark orange brown resilty CLAY. HILLWASH with 10 % voids often C	nottled light yellow brown, black),
	1,5	مراه المو المامو			
	_	منه امر مراه امر مراه امر	EOH : REFUSAL FERRICRI	on <u>yery stiff</u> , highly ferruginised HILI ETE.	.WASH as above tending towards
		• •	Notes:		
			1. Will be diff	ficult to excavate below 1,5 m - very st	iff SILTY CLAY
			2. Roots to 1,	2 m.	
contrac	tor COMTR	RON	ground level	ground water NIL	depth of water in hole "after" hours
machin	e CAT	4 26	profiled by CMCK	end of hole refusal 1,5 m	size of hole TRENCH
date ex		1.02.91	date profiled 01.02.91	symbols	undisturbed sample disturbed sample

	K	NIGH	HALL F	ENDRY CHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE
CLIENT	SC	OTT AN	D DE WAAI	LINC		******	PROFILE NUMBER	TP 42
PROJEC	T ER	ASMUSI	PARK OFFIC	E PARK			PROJECT NUMBER	SW-85G
sample or test	depth m	legend				description		
	0,5	5 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 / 2 /	Moist, o	dark yellow g	grey (in profile o	lark yellow grey	, <u>firm</u> , microshattere	d, SILTY CLAY
	-	200 X 00		microshatter EL.			ow brown mottled lig at (20 %), fine to me	
	1,1 -	9	black), BOULJ abunda	stiff to very s DERS of point (20 %), co	<u>stiff,</u> microfissur	ed, SILTY CLA y weathered, <u>h</u>	dark red brown mot Y with occasional la ard to soft rock, C EL.	rge COBBLES
					on <u>very stiff</u> , hig I tending to HA			
		1						
	_		Notes:					
		-	1.	Difficult to	excavate below:	L,7 m.		
	_	-	2.	Roots to 1,2	2 m.			
			3.	Disturbed s	amples taken fro	om spoils.		
			4.	Undisturbed	d sample taken a	ıt 1,3 m.		
contract	tor COMTR	ON	ground level		ground water	NIL	depth of water in afterhours	hole -
machine			profiled by	CMCK	end of hole refus		size of hole TRENCH	
date ex	ecuted	.02.91	date profiled	01.02.91	symbols	✓ seepage ▼ water table		ned sample

	K	NIGHT	HALL H	ENDRY CHNICAL ENG	& ASSOC	IATES	SOIL	PROFILE
CLIENT	SC	INA TIC	DE WAAI	. INC			PROFILE NUMBER	TP 43
PROJE	CT ER	ASMUSP	ARK OFFIC	E PARK			PROJECT NUMBER	SW-85G
sample or test	depth m	legend				description		
	0,6	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Slightly abundar HILLW	nt roots.	orown (in profi	le grey brown), <u>firr</u>	<u>n</u> , microshattered, S	ILTY CLAY with
Y		900	speckled or lined	d black), <u>stiff</u> l (with rootle	, microshattere	d, SILTY CLAY v	inge brown mottled with abundant voids, and fine, subrounded	often CLAY filled
		65.00 "S. 20.	HILLW	ASH.				
		242	ЕОН:	REFUSAL (on stiff to very	stiff material as a	bove.	-
			Notes:					
	_	_	1.	Will be diffi	cult to excavate	e below 2,0 m.		
		-	2.	No residual	material noted	L		
	-	-	3.	Rootlets bel	low 1,2m.			
			4.	- Large		to 5 mm in diame voids, generally o	eter, often associated pen.	with rootlets.
	_		5.	Waterlevel a	at 1,2 m.			
contra	ctor COMTR	ON	ground level	-	ground water	YES	depth of water in after 72 hours	hole 1,2 m
machi			profiled by	CMCK	end of hole refu		size of hole TRENCH	
date e	xecuted	L.02.91	date profiled	04.02.91	symbols	✓ seepage ▼ water table		ped sample I sample

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENG	& ASSOCIATES	SOIL PROFILE
CLIENT	SO	OTT ANI	DE WAAL INC		PROFILE TP 44
PROJEC	T ER	ASMUSP	ARK OFFICE PARK		PROJECT SW-85G
ample or test	depth m	legend		description	-
	-	メング	Slightly moist, grey HILLWASH with a		firm, microshattered, CLAYEY SILT.
	0,5	2000		TY CLAY with abundant pinh	mottled yellow brown), firm to stift to local voids and abundant (20 %), fine to
	_	0 1 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	speckled black), stif	f, microfissured, SILTY CLAY ed and roots present.	ge brown mottled grey, pale red brown with abundant pinhole voids, large ope
Y		مراس وراس مراس دراس دراس دراس	Below 1,6 m becom	ing <u>very stiff</u> with large FERR	UGINISED NODULES.
	2,0 - -	2 2		on very stiff, partly cemented, statements of the control of the c	SILTY CLAY.
	_				
		_			
	_		Notes:		
				icult to excavate below 1,6 m.	
	_	_	 Rootlets to Waterlevel 	base of the hole.	
			o. Waterlever		
	-				
contract	tor COMTR	ON	ground level	ground water YES	depth of water in hole 1,9 m after72 hours
machine	e CAT 4	126	profiled by CMCK	end of hole refusal 2,0 m	size of hole TRENCH
date ex	ecuted ₀₁	1.02.91	date profiled 04.02.91	symbols	undisturbed sample disturbed sample

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENGI	& ASSOCIA	ATES	SOIL PROFILE
CLIENT	SC	OTT AND	DE WAAL INC			PROFILE TP 45
PROJE	CT ER	ASMUSP	ARK OFFICE PARK			PROJECT SW-85G
ample or test	depth m	legend			description	
	0,5	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Slightly moist, grey SILT with abundant HILLWASH.		e grey brown), <u>fi</u>	rm to stiff, microfissured, CLAYE
		12 00 ~ C		tiff, SILTY CLAnt CLAY lined f	Y with occasions	mottled red, orange yellow speckle al scattered, coarse, medium and fin
	1,4		EOH : REFUSAL o	on very stiff, high	nly ferruginised, p	partially cemented HILLWASH.
	_					
	_					
			Notes:			
	-		 Will be diffi- Roots to 1,1 	cult to excavate	below 1,7 m.	
			2. 1.000 to 3,1	· ·		
	-					
contra	ctor COMTR	ON	ground level	ground water	NIL	depth of water in hole - after hours
machi	CAT 4		profiled by CMCK	end of hole refus	al 1,4 m	size of hole TRENCH
date e	xecuted 01	.02.91	date profiled 04.02.91	symbols		undisturbed sample disturbed sample

.

	K	NIGHT	FHALL H	ENDRY CHNICAL ENGI	& ASSOC NEERS	IATES	SOIL	PROFILE			
CLIENT	SC	OTT ANI	DE WAAI	INC			PROFILE NUMBER	TP 46			
PROJEC	CT ER	ASMUSP	ARK OFFIC	E PARK			PROJECT NUMBER	SW-85G			
ample or test	depth m	legend		description							
▼.	0,2 _	\$ 10 mm	to CLA	YEY SILT.	grey brown (in pundant roots.	profile grey brown	n), <u>firm</u> , microshatte	red, SILTY CLA			
	_	100 m	to very sparse,	stiff, microf	issured, SILTY coarse and me		mottled red yellow, oundant, large CLA				
	1,8			REFUSAL HILLWASH		SILTY CLAY, hi	ighly ferruginised p	partially cemente			
			Notes:								
			1.	Very high w	atertable, close	to dam.					
		1	2.	Probably a v	very deep trans	ported profile.					
	-		3.	Some lamin	ations within th	e clays, appears b	pioturbated.				
		-	4.	Probably dif	ficult to excava	te below 1,8 m.					
	-		5.	Disturbed sa	ample taken fro	om spoils.					
contrac	ctor COMTR	ON	ground level	-	ground water	YES	depth of water in after72 hours				
machir			profiled by	CMCK	end of hole refu	1,8 m	size of hole TRENCH	<u></u>			
date e	xecuted 01		date profiled	01.02.91	symbols	✓ seepage ▼ water table	<u>L</u>	bed sample			

	K	NIGHT	HALL HENDRY GEOTECHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE	
CLIENT	SC	OTT ANI	D DE WAAL INC			PROFILE NUMBER	TP 47	
PROJEC	T ER	ASMUSP	PARK OFFICE PARK			PROJECT NUMBER	SW-85G	
sample or test	depth m	legend			description			
	0,5	2 h 2 2 2 2 4 2 4 2 4 2 4 2 4 2 4 2 4 2	Slightly moist, dark CLAY. HILLWASH with a	` -	file dark brown),	firm to loose, mi	erofissured, SILT	
		2 ~ 1 ~ 1 ~ 1 ~ 1 ~ 1 ~ 1 ~ 1 ~ 1 ~ 1 ~	Slightly moist, red/orange.brown/b HILLWASH with sp			Ÿ.	brown mottle	
	1,3 -	2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Slightly moist. light orange brown (in profile orange brown mottled yellow brown, orange brown, black), stiff to very stiff, fissured, partially cemented, SILTY CLAY. HILLWASH.					
	_	2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	EOH: REFUSAL rootlets asso	on very stiff mociated with CL		with abundant, ferr	ricrete nodules ar	
			Notes :					
			1. Very difficu	dt to excavate b	elow 1,5 m.			
contrac	ctor		ground level	ground water		depth of water in		
	COMTR		profiled by	end of hole refu		after hour	8	
	CAT 4		CMCK date profiled 05.02.91	symbols	1,5 m ✓ seepage ▼ water table	TRENCE	rbed sample	

	K	NIGHT	HALL I	HENDRY ECHNICAL ENGI	& ASSO(NEERS	SATES	SOIL	PROFILE
CLIENT SCOTT AND DE WAAL INC PROJECT ERASMUSPARK OFFICE PARK							PROFILE NUMBER	TP 48
							PROJECT NUMBER	SW-85G
sample or test	depth m	legend				description		
		0, 80 1 06 O6		ed, coarse, me	rown (in profi	le red brown), <u>firm</u> e GRAVEL.	1, microfissured, Cl	LAYEY SILT with
	1,0	1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	ЕОН :	yellow/brown	n/orange/blac	vellow brown (in the control of the	ed, SILTY CLAY.	
	_							
			Notes	:				
			1.	Abundant bi	ricks on surfa	ce.		
			2.	Very difficul	t to excavate	below 1,0 m.		
	-	-	3.	Ferricrete or	utcrops on roa	ad to dam.		
contra	ctor COMTR	ON	ground leve	l -	ground water	-	depth of water in	
machi	ne CAT 4	26	profiled by	CMCK	end of hole ref	usal 1,0 m	size of hole TRENCH	· · · · · · · · · · · · · · · · · · ·
date e	xecuted 0.5	5.02.91	date profiled	05.02.91	symbols	♥ water table		rbed sample id sample

	K	NIGHT	THALL HENDRY GEOTECHNICAL EN	& ASSOCIATES	6	SOIL	PROFILE		
CLIENT	SC	OTT AN	D DE WAAL INC			PROFILE NUMBER	TP 49		
PROJEC	T ER	ASMUSI	PARK OFFICE PARK			PROJECT NUMBER	SW-85G		
ample or test	depth m	legend	description						
	0,3		Slightly moist, darl HILLWASH with	k brown (in profile dark labundant, coarse, mediu	brown), <u>firm</u> , fiss m and fine GRA	sured, CLAY VEL and CC	EY SILT. OBBLES.		
		20-20-00 20-00 20 20-00 20 20 20-00 20 20-00 20 20-00 20 20-00 20 20-00	stiff, fissured, SIL7	c orange brown (in profile TY CLAY. occasional scattered, coa		•	•		
	1,1	مهر المرام مر المحلو مرام مراف مركو المرام	EOH : REFUSAL HILLWAS	on <u>very stiff</u> materi	al as above.	HIGHLY 1	FERRUGINISE		
	<u></u>	-							
	_								
	_		Notes :						
			1. Brick piles	on surface.					
	_			excavate below 1,1 m.	· ••				
			3. Large distr	urbed sample taken from	spoils.				
				Ţ	······································				
contract	or COMTR	ON	ground level	ground water NII	, ,	epth of water in h	ole -		
machine	CAT 4	26	profiled by CMCK	end of hole refusal 1,1		re of hole TRENCH			
date exe	ecuted 06	5.02.91	date profiled 06.02.91	symbols		undisturb disturbed	ed sample sample		

	K	NIGHT	HALL H	ENDRY CHNICAL ENG	& ASSOCI	ATES	SOIL	PROFILE
CLIENT	SC	OTT AN	D DE WAA	L INC			PROFILE NUMBER	TP 55
PROJEC	T EF	RASMUSI	PARK OFFI	CE PARK	- V-400-0 Haland		PROJECT NUMBER	SW-85G
ample or test	depth m	legend			,,,, <u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>	description		
<u></u>				undant roots		brown), <u>firm to</u>	loose, microshattere	ed, CLAYEY SIL
		100 mm		I, SILTY CL			brown to orange brum and fine, subrou	
	_	07-00 07-00 04-00	Below	1,0 m becom	es blotched pale	red.		
	1.5	901 x	and occ	asional black	speckles), stiff t	o very stiff, fissur	yellow orange brown ed SILTY CLAY wi	
	1,8	000	PARTI	ALLY FER	d fine, subrounde RUGINISED \	HILLWASH.		
			EUH :		on <u>very stiff</u> NISED HILLWA		above, PARTIALI	LY CEMENT
	-		Notes:					
			1.	Roots to 1,				
			2.	Difficult to	excavate below	L,5 m.		
	_							
contract	tor COMTR	ON	ground level	-	ground water	NIL	depth of water in afterhours	
machin	CAT 4		profiled by	CMCK	end of hole refus	1,8 m	size of hole TRENCH	
date ex	ecuted 00	5.02.91	date profiled	06.02.91	symbols		undisturi	ped sample

	K	NIGHT	FHALL HENDRY GEOTECHNICAL ENG	& ASSOCIA	ATES	SOIL PROFILE
CLIENT SCOTT AND DE WAAL INC						PROFILE NUMBER TP 56
PROJECT	ER	ASMUSP	ARK OFFICE PARK			PROJECT NUMBER SW-85G
ample or test	depth m	legend			description	
	_	X.X.X.X.X.X.X.X.X.X.X.X.X.X.X.X.X.X.X.	Slightly moist, dark with abundant pinho HILLWASH.			to loose, shattered, CLAYEY SIL
-		10 10 10 10 10 10 10 10 10 10 10 10 10 1	Slightly moist, orang CLAY with sparse s HILLWASH.	ge yellow brown (scattered, coarse,	in profile orange medium and fine	yellow brown), <u>stiff</u> , fissured, SILT GRAVEL.
1	.,2	۵۵م روسهو روسهو	Slightly moist, light black), stiff to very PARTIALLY CEM	stiff, fissured, SIL	TY CLAY.	wn mottled red brown/yellow brow
]	.,6 —	اور در اور در اور در اور	EOH : REFUSAL			
-						
-						
-						
-			Note:			
				bed sample taker	L	
	_	-				
contracto	r)MTR()N	ground level	ground water	NIL	depth of water in hole - after hours
machine (CAT 42	26	profiled by CMCK	end of hole refusa	1,6 m	size of hole TRENCH
date exec	betus On.	02.91	date profiled 06.02,91	symbols		undisturbed sample disturbed sample