

# KWA THEMA SHOPPING CENTRE NEAR SPRINGS

**Geotechnical Investigation Report** 



#### **PREPARED FOR:**

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	Geotechnical Investigation Report
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R0	18/11/2013	Madaleen Booysen	Alan Parrock	Draft for comment

## **Synopsis**

A field investigation was conducted by Madaleen Booysen and Bronwen Klaas of ARQ (Pty) Ltd to assess the founding conditions for the new Kwa Thema Shopping centre near Springs, South Africa.

According to the 1:250 000 geological map 2628 EAST RAND the site is underlain by sandstone, shale and coal beds of the Vryheid Formation, Ecca Group and Karoo Supergroup.

The field investigation was carried out on the 10th and 11<sup>th</sup> of October 2013. Thirty (30) test pits were excavated by means of a tractor loader backactor (TLB) to an approximate depth of 3m or effective refusal conditions.

The test pits were profiled according to Brink and Bruin (2002).

Recommendations for the development are given in Section 7.

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APPENDIX ASOIL PROFILESAPPENDIX BLABORATORY RESULTS

## LIST OF ABBREVIATIONS AND ACRONYMS

φ	Angle of friction ( <sup>0</sup> )
γ	Bulk density (kN/m <sup>3</sup> )
AASHTO	American Association of State Highway and Transportation Officials
ARQ	ARQ Consulting Engineers (Pty) Ltd
с	Cohesion (kPa)
CBR	California Bearing Ratio
COLTO	Committee of Land Transport Officials
GM	Grading Modules
GPS	Global Positioning System
MAD	Modified AASHTO Density
Mod	Modified
ОМС	Optimum Moisture Content
PI	Plasticity Index
SABS	South African Bureau of Standards
SICOP	Site Investigation Code of Practice
TLB	Tractor Loader Backactor
ТР	Test Pit

## **1. INTRODUCTION**

ARQ (Pty) Ltd was requested by Mr Charles Gibbs of Mamphele Development Planners (Pty) Ltd to carry out a field investigation for the new Kwa Thema Shopping centre near Springs in Gauteng. The field portion of the work was carried out by Madaleen Booysen and Bronwen Klaas of ARQ on 10th and 11th of October 2013. The investigation was aimed at supplying information in terms of:

- Geology of the site,
- Engineering properties of materials excavated,
- Water table,
- Suitability of materials for use as fill/layer works materials,
- Bearing capacity/ suitability for founding in the in-situ soil/soft rock layers, and
- Potential expansiveness/collapsibility of the soils.

## **2. The Site**

The site is located on the corner of Tonk Meter Road and Rhokana Avenue near Springs as shown in Figure 1.



Figure 1: Site location.

The site is relatively flat with no existing structures. However the site is currently vacant and has become the ideal place for the local community to dump unwanted possessions varying from domestic waste to animal remains. It is expected that the following will form part of the development:

- A shopping centre,
- A taxi rank,
- A KFC, and

• A Builders Warehouse.

## **3. METHOD OF INVESTIGATION**

The investigation was carried out in accordance with Site Investigation Code of Practice (SICOP) (2010).

The investigation comprised the excavation of 30 test pits to a depth of 3m or until effective refusal conditions were encountered. The test pits were excavated using a Tractor Loader Backactor (TLB).

The test pits were profiled according to current methods and procedures (Brink and Bruin, 2002). Samples were taken and tested at an accredited soils laboratory. The following tests were conducted:

- Particle size distribution,
- Atterberg limits,
- MOD and CBR,
- pH and conductivity,
- Moisture content, and
- Collapse potential (via one dimensional consolidation).

The positions of the test pits were determined prior to the field investigation to provide representative information of the entire site. No drawings of the proposed structures were made available to ARQ prior to the field investigation. The test pits positions were located on site using a hand-held GPS.

#### **3.1. INVESTIGATION POSITIONS**

Figure 2 below shows the approximate position of the test pits which were investigated on the site.



Figure 2: Site layout showing the test pit positions.

Thirty four test pits were originally planned. However, due to time constrained only 30 test pits were excavated across the site to give an accurate representation of the entire site.

Co-ordinates and elevations noted on the profiles were taken using a GPS on site using the WGS 84 datum, hddd°mm'ss.s" grid.

See **Appendix C** for test pit co-ordinates.

## 4. **GEOLOGY AND TYPICAL SOIL PROFILE**

According to the 1:250 000 geological map 2628 EAST RAND the site is underlain by sandstone, shale and coal beds of the Vryheid Formation, Ecca Group, Karoo Supergroup.

Figure 2 below shows the geology of the area overlain in Google Earth.



Figure 3: Geology overlain in Google Earth.

#### 4.1. SITE SPECIFIC GEOLOGY

A summary of the test pits is presented in Table 2, whilst the comprehensive soil profiles are contained in **Appendix A.** Most of the test pits indicate a very similar profile.

#### Table 1: Summary of test pits.

Test Pit	est Pit (clayey, sandy, gravelly) silt (clayey, silty, (gravelly) silt)		Soft to firm (gravelly, sandy, silty) clay	Soft to firm clayey sand	Refusal
TP1	0.0-0.35 & 0.5 - 3.0	0.35 - 0.5			No
TP3	0.0 - 3.0				No
TP4	0.0 - 3.0				No
TP5	0.0 - 3.0				No
TP6	0.0 - 3.0				No
TP7	0.0 - 3.0				No
TP8	0.0 - 3.0				No
TP9	0.0 - 1.8	1.8 - 2.5			Yes
TP10	0.0 1.7	1.7 - 2.5			Yes
TP11	0.0 - 0.5		0.5 - 3.0		No
TP12	0.0 - 0.5	0.5 - 2.0			Yes
TP13	0.0 - 0.5 & 1.2 -1.8	1.8 -2.5		0.5 - 1.2	Yes
TP14	0.0 -0.8	0.8 - 2.2			Yes
TP16	0.0 - 1.5	1.5 -2.1			Yes
TP18	0.0 - 0.5	0.5 - 3.0			No
TP19	0.0 - 0.5	1.5 - 2.8	0.5 - 1.5		Yes
TP21	0.0 - 2.6				Yes
TP22	0.0 - 1.4	1.4 -2.5			Yes
TP23	0.0 -0.7 & 2.0 - 2.6	0.7 - 2.0			Yes
TP24	0.0 - 1.4	1.4 - 3.0			No
TP25	0.0 - 0.7	0.7 - 0.9			Yes
TP26	0.0 - 1.4	1.4 - 2.2			Yes
TP27	0.0 - 1.7		1.7 - 3.0		No
TP28	0.0 - 3.0				No
TP29	0.0 - 3.0				No
TP30	0.0 -2.5				Yes
TP31	0.0 - 2.1	2.1 - 3.0			No
TP32	0.5 - 1.7	1.7 - 3.0			No
TP33	0.0 - 2.7				Yes
TP34	0.0 - 0.8		0.8 - 3.0		No

## 5. MATERIAL PROPERTIES

Soil samples retrieved during the investigation were sent to an independent soil testing laboratory in Pretoria for the following tests:

- Foundation indicator,
- pH and Conductivity,
- MOD and CBR,
- Collapse, and
- Moisture content.

The laboratory results are presented in **Appendix B**. A summary of the soil tests are presented in Table 3, and discussed below.

Sample No.	TP1	TP8	TP12
Depth (m)	0.5 - 2.7	0.4 - 3.0	0.5 - 2.0
Liquid Limit	27	24	22
Plasticity Index	11	10	8
Linear shrinkage	5.7	5.3	4
Grading modulus	0.49	0.39	0.87
% passing 0.425mm	91	93	74
Expansiveness rating	Low	Low	Low
AASTHO Classification	A-6(5)	A-4(7)	A-4(4)

#### Table 2: Summary of Indicator test results.

#### 5.1. **EXPANSIVE SOILS**

Expansive soils are generally not expected to be problematic on site, with the material tested showing a low expansiveness rating.

#### 5.2. COLLAPSIBLE SOILS

Although a collapsible fabric was identified on site as a pinholed structure in the profile, it is not expected that collapse settlements will be problematic, provided the correct preventative measures are undertaken. These measures will be discussed further in section 7.

An undisturbed sample was taken from TP 34 (0.8 - 1.5m) and sent for collapse potential testing. The test indicated a collapse potential of 0.13% under a load of 200kPa. This ranks the collapse potential of the sample as "no problem".

#### 5.3. PH AND CORROSIVITY

The corrosivity of the material on site was classified as "mildly corrosive" and "very corrosive" with a slightly acidic pH that ranges from 6.00 to 6.22 (a pH of 7.0 indicates a completely neutral material). The electrical conductivity, pH and corrosivity of the soil are presented in Table 4. According to the criteria in Table C7 of the CSIR Report No: BOU/R9705, a conductivity of >0.050 S/m indicates a soil that is very corrosive.

	pH values	Electrical Conductivity (S/m)	Corrosivity				
TP1	6.00	0.076	Very corrosive				
TP8	6.22	0.015	Mildly corrosive				
TP12	6.08	0.057	Very corrosive				

#### Table 3: pH and conductivity results.

#### 5.4. **MOISTURE CONTENT** Table 4: Moisture content.

	Wet weight (g)	Dry weight (g)	Moist weight	% Moist
TP1	2 043.30	1 770.10	273.20	15.43
TP8	2 102.7	1 856.1	246.6	13.29
TP12	2 050	1 836.7	213.3	11.61
TP43	2 016.1	1 765.6	25.5	14.19

Table 4 shows the moisture-density attributes of the material present on site. In order for the maximum density to be achieved in the soil, it should be compacted at moisture content equal to or slightly wet of, it's optimum moisture content.

#### 5.5. COMPACTION AND STRENGTH PROPERTIES

Representative samples on which CBR tests were conducted according to TMH1 (1986) were classified according to COLTO (1998). A summary of the strength and compaction properties of the material sampled are presented in **Table 5**.

TP No and Depth	Parameter	Recorded value	Classification (Colto)
TP1	Optimum moisture content (%)	13.7	
(0.5 - 2.7m)	Max Dry Density (kg/m3)	1848	
	CBR @ 93% Mod AASHTO (%)	3.4	NC
	Max swell @ 100% Mod AASHTO (%)	0.07	
TP8	Optimum moisture content (%)	16	
(0.4 - 3.0m)	Max Dry Density (kg/m3)	1771	NC
	CBR @ 93% Mod AASHTO (%)	7.7	INC
	Max swell @ 100% Mod AASHTO (%)	0.03	
TP12	Optimum moisture content (%)	14.3	
(0.5 - 2.0m)	Max Dry Density (kg/m3)	1840	G10
	CBR @ 93% Mod AASHTO (%)	4.6	610
	Max swell @ 100% Mod AASHTO (%)	0.33	

Table 5: Summary of Strength characteristics.

\*NC = non-classifiable. Due to low strength, GM < 0.77.

## **6. GEOTECHNICAL EVALUATION**

#### 6.1. IN SITU MATERIAL

Expansive soils are generally not expected to be problematic on site due to a low expansiveness rating.

A pinholed structure was identified on site in most of the test pits. This is indicative of some form of collapse potential.

The pinholed (voided) structure of the material must be destroyed. Loose and soft material will benefit from rolling as the density, stiffness and shear strength of the material is improved.

Collapse settlements and/or heave are therefore not deemed to be significant for foundations constructed on this material. Recommendations are given in Section 7 to mitigate any potential large settlements.

#### 6.2. **GROUNDWATER**

Some water seepage was encountered in TP 32. No groundwater was encountered in any of the other test pits excavated during the field visit. The depth to the water table is therefore unknown.

#### 6.3. EXCAVATION CONDITIONS

The TLB used for the field investigation was able to easily excavate most of the soil.

Based on SABS 1200, soft excavation conditions can be expected to at least a depth of 3.0m using a 20 ton excavator.

#### 6.4. SLOPE SUPPORT

An assessment of the safe slope angles was conducted first using chart 3 of the circular failure charts of Hoek & Bray (1981) and an 80% confidence limit on envisaged Mohr-Coulomb shear parameters as derived from Theyse et al (1996) using the following attributes for a G8 quality material:

- c = 6 kPa,
- φ = 27°,
- $\gamma = 18 \, \text{kN/m3}$ ,
- H = 3m, and
- FOS = 1.5

Based on this evaluation a slope batter angle of  $34^{\circ}$  or 1.5:1 (H:V) will be required to generate an FOS = 1.5.

If this batter angle is not possible on site due to space constraints and a vertical face is desired, a soil nail wall or other restraints will need to be designed.

## 7. **Recommendations**

The recommendations contained in this report were made based on the near-surface geotechnical investigation conducted at the site. Visual observations of the in situ material, as well as laboratory test results, are used to provide meaningful recommendations.

#### 7.1. SITE COMPACTION

It is recommended that the following be used to ensure effective site compaction is achieved:

- The topsoil and all organic material must be removed to 300mm below natural ground level (NGL),
- Thereafter the site must be ripped and compacted using 20 passes of a 300kN centrifugal force pad foot roller operating in maximum amplitude vibrating mode so as to include an area extending 2m beyond the footprint boundary of any structure, and
- Import two layers of 150mm commercial G7 quality material placed and compact to 93% of Mod AASHTO density at 0 to +2% of the optimum moisture content (0+2 OMC) using the aforementioned roller. It is likely that some 20 passes will be required per layer.

#### 7.2. FOUNDING OF STRUCTURES

The client stated that the shopping centre will consist of a single storey building. As such recommendations contained in this report are only valid for a single story building with no basement excavations.

Conventional 2.0 x 2.0 m pad footings can be considered for loads (up to 130kPa). The pad footings must have a 1m embedment. Another possibility is 0.75m strip foundations for light loads (up to 90kPa/m). Compaction in base of footing excavations is imperative. Compaction at the base of footings can be achieved by ripping and re-compacting the area beneath the footing using a Wacker to 93% of Mod AASHTO density at 0 to +2% of the optimum moisture content (0+2 OMC).

#### 7.3. FLOOR SLABS

The area under the slab should be slightly moist and clear of all debris prior to the placement of concrete.

#### 7.4. CONCRETE COVER

A concrete cover over reinforcing should be a minimum of 50mm due to the mildly corrosive to very corrosive nature of the soil. In addition, admixtures may prove beneficial and economic. "Xypex" concrete waterproofing may be considered. ARQ can assist with these contact details if required.

#### 7.5. ROADS AND PARKING AREAS

The in situ material is sufficient for fill material, but not for layer works. Selected subgrade, sub base, base course and surfacing must be obtained from commercial sources. Block paving can also be considered but only if the sub base below the paving is stabilised.

#### 7.6. **DRAINAGE**

It is essential that proper site drainage and plumbing/service precautions be taken, i.e., proper down pipes which eject away from the proposed structure must be installed in conjunction with a concrete or a paved apron with a width of at least 1m. Due to the pin holed structure that is evident in the in situ material, it is advised that all water be diverted away from the buildings. As good construction practice, damp-proofing measures should be incorporated into the foundations of the structures to prevent the ingress of water from the underlying material.

### **8. GENERAL**

The comments and recommendations contained within this report are based on a limited number of test pits excavated which we believe are representative. Therefore, conditions at variance with those described in this report should not be overlooked.

## **9. REFERENCES**

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APPENDIX A SOIL PROFILES



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Test					1000
				Dijalo Property Development	17.87.
	Date Profiled:			: Kwa Thema shopping centre - 6796	1 2
				26°18'14.70"S, 28°25'45.60"E	
					and and
				Bronwen & Madaleen .	e e
		T			
		fer			1.1.3
Ê	ĝ	Ground Water		tion	
Depth (m)	Sampling	pund	Symbol	Description	1 million to
Dep	Sar	0 D	Syr		
				FIRM, CLAYEY SILT	
0.1 -				Slightly moist, brown to red brown, firm, pinholed, clayey silt Fill	
0.2 -					
0.3 -			J.J.	MEDIUM DENSE, SILTY GRAVEL	(0.35 m)
0.4 -			00	Dry, light grey with angular pebbles of all colours, medium dense, martrix supported, silty gravel	
0.5 -				Fill FIRM, FINE SANDY CLAYEY SILT WITH SLIGHT FERRUGINATION AT 1.9-2.1M	(0.5 m)
0.0				Slightly moist, redbrown mottled black, firm, pinholed, fine sandy clayey silt with slight ferrugination at 1.9-2.1m Transported	
0.8 -					
0.9 -					
1.0 -		<u> </u>			
1.1 -		<u> </u>			
1.2 -		<u> </u>			
1.3 -		<u> </u>			
1.4 -		<u> </u>			
1.5 —		-			
1.6 -	D	-			
1.7 -					
1.8 -					
1.9 -					
2.0 -					
2.1 – 2.2 –					
2.2 -					
2.3					
2.5 -		L			
2.6 -		<u> </u>			
2.7 -				STIFF, GRAVELLY CLAYEY SILT	(2.7 m)
2.8 -				Slightly moist, orange brown mottled grey and red, stiff, intact, gravelly clayey silt	
2.9 -				Transported	
3.0 -					(3 m)
3.1 -					
3.2 -					
3.3 –					
3.4 -					
	Fxcav	ation M	lethod:		
	LAGAV		efusal:		
				: None	
			100101	Page 1 of 30	



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lest	- IL. I				
				Dijalo Property Development	NA SAMA
	-		-	Kwa Thema shopping centre - 6796	
				2013/10/11	A Ban Do the
			26°18'15.60"S, 28°25'43.80"E	N. D. S. B. S. Alt	
	Elevation				
		Profil	ed By:	Madaleen Booysen	
					ANN BEAM
		Ground Water		c	
(m)	ling	∧   q	Ы	iptio	
Depth (m)	Sampling	loun	Symbol	Description	
Ď	S	Ū	ŝ	ă	
				FIRM, CLAYEY SILT	
0.1 -				Slightly moist, brown mottled black, firm, pinholed, clayey silt Transported	
0.2 -					
0.3 -					
0.4 -					(0.5 m)
0.5 -				FIRM TO SOFT, FINE SANDY CLAYEY SILT	
0.6 -				Slightly moist, light brown slightly mottled black, firm to soft, pinholed, fine sandy clayey silt Transported	
0.7 -					
0.8 -					
0.9 -					
1.0 -					
1.1 -					
1.2 -					
1.3 -					
1.4 -					
1.5 -					
1.6 -					
1.7 -					
1.8 -					
1.9 -					(2 m)
2.0 -				FIRM TO STIFF, FINE SANDY CLAYEY SILT	(2 m)
2.1 -				Slightly moist, redbrown mottled black, firm to stiff, pinholed, fine sandy clayey silt Residual shale	
2.2 -					
2.3 -					
2.4 -					
2.5 -					
2.6 -					
2.7 – 2.8 –					
2.8 -					
					(3 m)
3.0 -					
3.1 – 3.2 –					
3.2 -					
3.3 -					
3.4 -					
	Excav	ation M	ethod:	TLB	
				None	
			Table:		
				Dogo 2 of 20	



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			Client	- Dijala Property Development
				: Dijalo Property Development : Kwa Thema shopping centre - 6796
Elevation:				26°18'17.60"S, 28°25'43.70"E
	1	Profil	ea By:	: Bronwen & Madaleen .
		Ground Water		
(E	ling	∧ p	0	iptio
Depth (m)	Sampling	Lour	Symbol	Description
Õ	ů	U U	Ś	
0.1 –				SOFT, FINE SANDY SILT Dry, brown, soft, pinholed, fine sandy silt
0.1 -				Transported
0.2 -				
				(0.4 m)
0.4 -				FIRM, FINE SANDY SILT Slightly moist, light brown, firm, pinholed, fine sandy silt
0.5 -				Transported
0.6 -				
0.7 -				
0.8 –				
0.9 –				
1.0 -				
1.1 –				
1.2 –				(1.3 m)
1.3 –				FIRM, FINE SANDY CLAYEY SILT
1.4 -				Slightly moist, red brown mottled black, firm, pinholed, fine sandy clayey silt Transported
1.5 –				
1.6 -				
1.7 –				
1.8 –				
1.9 –				
2.0 -				
2.1 –				
2.2 –				
2.3 –				
2.4 –				
2.5 –				
2.6 -				
2.7 –				(2.7 m) STIFF, GRAVELLY SANDY SILT
2.8 –				Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt Transported
2.9 –				
3.0 –				(3 m)
3.1 –				
3.2 –				
3.3 –				
3.4 –				
	_			
	Excav	ation M		
				None
		Water	Table	None Page 3 of 30



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		P 05			108 - 3 <b>2</b>
				Dijalo Property Development	15
		Date Profiled:		: Kwa Thema shopping centre - 6796	1
					1.1
				: 26°18'17.70"S, 28°25'41.50"E	
				: 1636 m	1 7 7
	1	Profil	ea By:	Madaleen Booysen	
		L _			1 7
		Ground Water		E CONTRACTOR	
E e	ling	≥	ō	big	
Depth (m)	Sampling	Lour	Symbol	Description	
	S	U U	Š.		
0.1 -				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt	
0.2 -				Transported	
0.3 -					
0.4 -					
0.5 -					(0.5 m)
0.6 -				FIRM, SANDY SILT Slightly moist, light brown to orange, firm, pinholed, sandy silt	
0.0				Transported	
0.8 -					
0.9 -					
1.0 -					
1.1 -					
1.2 –					
1.3 -					
1.4 -					
1.5 –					
1.6 -					
1.7 -					
1.8 -					(1.8 m)
1.9 -				STIFF, CLAYEY SANDY SILT Slightly moist, brown to yellow mottled black, stiff, pinholed, clayey sandy silt	
2.0 -				Transported	
2.1 -					
2.2 -					
2.3 -					
2.4 -					
2.5 -					
2.6 -					
2.7 -					
2.8 -					
2.9 -					
3.0 -			μL		(3 m
3.1 -					
3.2 -					
3.3 -					
3.4 -					
	Excav	ation M	ethod:	: TLB	
		R	efusal:	: None	
		Water	Table:	None	



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	Pit: 1		•	
				Dijalo Property Development
			-	Kwa Thema shopping centre - 6796
	Date Profiled:			
				26°18'19.10"S, 28°25'43.40"E
	Elevation:			
		Profi	led By:	Madaleen Booysen
		Ground Water		
<u>ع</u>	ing	N N		btio
Depth (m)	Sampling	no	Symbol	Description
De	Sa	้อ	Ś	De
				FIRM, CLAYEY SILT
0.1 –				Slightly moist, brown, firm, pinholed, clayey silt Transported
0.2 –				
0.3 –				
0.4 -				(0.5 m
0.5 –				FIRM, CLAYEY SILT
0.6 -				Slightly moist, light brown mottled yellow, firm, pinholed, clayey silt Transported
0.7 –				
0.8 –				
0.9 —				
1.0 -				
1.1 –				
1.2 –				
1.3 -				
1.4 -				
1.5 –				
1.6 -				(1.6 m FIRM TO STIFF, CLAYEY SANDY SILT WITH FERIGIOUNOUS NODULES
1.7 –				Slightly moist, brown to yellow mottled black, firm to stiff, pinholed, clayey sandy silt with ferigiounous nodules Transported
1.8 –				Transporteu
1.9 —				
2.0 -				
2.1 –				
2.2 –				
2.3 –				
2.4 –				
2.5 –				
2.6 –				
2.7 –				
2.8 –		-		
2.9 –				
3.0 –			μι	(3 m
3.1 –				
3.2 –				
3.3 –				
3.4 –				
	Excav	ation M	lethod:	TLB
			efusal:	
		Water	Table:	None



Test	PIC: I				
				: Dijalo Property Development	
				: Kwa Thema shopping centre - 6796	1 2 2 1 1
		Date P	rofiled:	: 2013/10/11	
		Coord	inates:	: 26°18'19.70"S, 28°25'41.20"E	11 1734
	Elevation:			: 1633 m	
		Profi	led By:	Madaleen Booysen	. PARE
		ater			
Depth (m)	Sampling	Ground Water	Symbol	Description	
				FIRM, CLAYEY SILT	1. 1. 1.
0.1 -				Slightly moist, brown, firm, pinholed, clayey silt	
0.2 -				Transported	
0.3 -					
0.4 -					
0.5 -					(0.5 m
0.6 -				FIRM, SANDY SILT Slightly moist, light brown to orange, firm, pinholed, sandy silt	
0.7 -				Transported	
0.8 -					
0.9 -					
1.0 -					
1.1 -					
1.2 -					
1.3 -					
1.4 -					(1.5 m
1.5 -				FIRM TO STIFF, SANDY SILT WITH COBBLES OF QUARTZITE AND FERRUGINOUS	
1.6 -				Slightly moist, light brown, firm to stiff, pinholed, sandy silt with cobbles of quartzite and ferruginous Residual shale	
1.7 -					
1.8 -			11		
1.9 —			11		
2.0 -					
2.1 –					
2.2 -					
2.3 -					
2.4 -					
2.5 -			11		
2.6 -			11		
2.7 -			11		
2.8 -					
2.9 —			11		(3 m
3.0 -					(3111
3.1 —					
3.2 -					
3.3 -					
3.4 -			-		
	Ever	l .		- TIP	
	Excav	ation M			
		water	lable:	: None	



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Testr	- IL. I	1 00			
			Client:	Dijalo Property Development	
		P	roject:	Kwa Thema shopping centre - 6796	
		Date Pi	rofiled:	2013/10/10	the second second
		Coord	inates:	26°18'18.70"S, 28°25'39.60"E	
				1632 m	
				Bronwen & Madaleen .	
		/ate		ç	
E)	ling	≤   p		iptio	2
Depth (m)	Sampling	Ground Water	Symbol	Description	
ă	ŝ	Ū	ගි	ă	
				FIRM, SANDY SILT	
0.1 —				Dry, brown, firm, pinholed, sandy silt Transported	
0.2 —				Tansported	
0.3 —					
0.4 —			+	FIRM TO STIFF, FINE SANDY SILT	(0.4 m)
0.5 —		-		Dry, light brown, firm to stiff, pinholed, fine sandy silt	
0.6 -				Transported	
0.7 –					
0.8 -					
0.9 -					
1.0 -			11		
1.1 –					
1.2 –					
1.3 –		-			
1.4 -		-			
1.5 —					
1.6 -		<u> </u>			
1.7 –	D				
1.8 -	_				
1.9 —					
1 1					
2.0 -					
2.1 –					
2.2 –					
2.3 –					
2.4 –					
2.5 —					
2.6 —					
2.7 –		-			
2.8 –					
2.9 —					
3.0 —					(3 m)
3.1 -					
3.2 -					
3.3 -					
3.4 —					
	Excav	ation M	lethod:	ТІВ	
			efusal:		
			Table:		
		water	able:	Page 7 of 30	



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Test					
				Dijalo Property Development	No. And State
				Kwa Thema shopping centre - 6796	
				2013/10/11	
				26°18'20.80"S, 28°25'38.70"E	
				1632 m	
		Profil	ed By:	Madaleen Booysen	
					State Head
		ater			Real And And
(E	bu	Ň	_	tion	
Depth (m)	Sampling	Ground Water	Symbol	Description	
Del	Sar	Ъ	Syr	D O	
				FIRM, CLAYEY SILT	And the second of the second s
0.1 -				Slightly moist, brown, firm, pinholed, clayey silt	
0.2 -				Transported	
0.3 –					
0.4 -					
0.5 -			+	FIRM, SANDY SILT	(0.5
0.6 -				Slightly moist, light brown to orange, firm, pinholed, sandy silt	
0.7 —				Transported	
0.8 -					
0.9 -					
1.0 -					
1.1 -					
1.2 -					
1.3 -					
1.4					
1.5 —					
1.6 -					
1.7 –					
1.8 —			JJ	MEDIUM DENSE TO DENSE, SANDY SILTY GRAVEL	(1.8
1.9 -			00	Dry, yellow brown mottled black, medium dense to dense, pinholed, sandy silty gravel	
2.0 -			00	Residual shale	
2.1 -			00		
2.2 -			00		
2.3 -			00		
2.4			00		
2.5 —			0	Befueed on Ferruginous gravel	(2.5
2.6 -				Refused on: Ferruginous gravel	
2.7 -					
2.8 -					
2.9 -					
3.0 -					
3.1 -					
3.2 -					
3.3 -					
3.4 -					
	Excav	ation M	ethod:	TLB	
		R	efusal:	2.5 m on Ferruginous	
		Water			
				Page 8 of 30	



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lest	<u> </u>		Client:	Dijalo Property Development	
				Kwa Thema shopping centre - 6796	S AND COMMENT
		Date Pi	ofiled:	2013/10/11	
				26°18'22.30"S, 28°25'40.30"E	
			vation:	1627 m	
		Profi	ed By:	Madaleen Booysen	
(		Ground Water			
m) (	oling	> ₽	ō	riptic	
Depth (m)	Sampling	srou	Symbol	Description	
	0		<i>.</i>		
0.1 —				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt	
0.2 -				Transported	
0.3 –					
0.4 -					
0.5 -					(0.5 m
0.6 -				FIRM, SANDY SILT Slightly moist, light brown to orange, firm, pinholed, sandy silt	
0.7 —				Transported	
0.8 -					
0.9 —					
1.0 —					
1.1 –					
1.2 —					
1.3 —					
1.4 -					
1.5 —					
1.6 —					
1.7 –			J.J.	MEDIUM DENSE TO DENSE, SANDY SILTY GRAVEL	(1.7 m
1.8 –			00	Dry, yellow brown mottled black, medium dense to dense, pinholed, sandy silty gravel	
1.9 —			00	Residual shale	
2.0 -			00		
2.1 –			00		
2.2 –			00		
2.3 –			00		
2.4 –			00		
2.5 —			252 (200	Refused on: Residual shale	(2.5 m
2.6 —					
2.7 –					
2.8 –					
2.9 —					
3.0 -					
3.1 —					
3.2 –					
3.3 –					
3.4 —					
	Execut	ation M	othed	TIR	
	Excav			1LB 2.5 m on Residual shale	
				None	
		Tatel	Table.	Pogo 0 of 20	



Test	11. 1				SHENDEN I CARL
			Client:	Dijalo Property Development	
		P	roject:	Kwa Thema shopping centre - 6796	
		Date Pi	ofiled:	2013/10/11	50 (14)
	Elevation:			26°18'21.10"S, 28°25'42.90"E	
				1634 m	
		Profi	ed By:	Madaleen Booysen	A A A
		fer			
(F	D	Mai		l	*****
th (r	nllqr	pur	lod		
Depth (m)	Sampling	Ground Water	Symbol	Description	
	•,			FIRM, CLAYEY SILT	
0.1 -				Slightly moist, brown, firm, pinholed, clayey silt	
0.2 -				Transported	
0.3 -					
0.4 -					
0.5 -					(0.5 m)
0.6 -				SOFT TO FIRM, FINE SANDY SILTY CLAY Slightly moist, light brown to yellowish, soft to firm, pinholed, fine sandy silty clay	
0.7 -				Transported	
0.8 -					
0.9 -					
1.0 -					
1.1 -					
1.2 -					
1.3 -					(1.4 m)
1.4 -				SOFT, SILTY CLAY	(1.4 11)
1.5 —				Slightly moist, reddish brown mottled grey and black, soft, pinholed, silty clay Residual shale	
1.6 -					
1.7 -					
1.8 -					
1.9 —					
2.0 -					
2.1 -					
2.2 -					
2.3 -					
2.4 -					
2.5 –					
2.6 -					
2.7 –					
2.8 -					
2.9 -					
3.0 -					(3 m)
3.1 -					
3.2 -					
3.3 -					
3.4 -					
0.7					
	Excav	ation M	ethod:	TLB	
				None	
				None	



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lest	<u>-11. 1</u>		Client:	Dijalo Property Development
				Kwa Thema shopping centre - 6796
			-	2013/10/10
				26°18'23.50"S, 28°25'41.20"E
	Elevation:			
				Bronwen & Madaleen .
Depth (m)	Sampling	Ground Water	Symbol	Description
0.1 0.2 0.3 0.4				FIRM, FINE SANDY SILT Dry, brown, firm, pinholed, fine sandy silt Transported
0.5 -			JJ	(0.5 m) MEDIUM DENSE BECOMING VERY DENSE, SANDY SILTY FERRUGINOUS GRAVEL
0.6 -			00	Dry, yellow brown, medium dense becoming very dense, pinholed, sandy silty ferruginous gravel
0.7 —			00	Transported
0.8 -			00	
0.9 —			00	
1.0 -			00	
1.1 -			00	
1.2 -	D		00	
1.3 -			00	
1.4 1.5			00	
1.6 -			00	
1.7 -			00	
1.8 -			00	
1.9 -			00	
2.0 -			0	(2 m) Refused on: very dense ferruginous gravel
2.1 -				Refused on: very dense ferruginous graver
2.2 -				
2.3 -				
2.4 -				
2.5 -				
2.6 -				
2.7 –				
2.8 -				
2.9 -				
3.0 -				
3.1 -				
3.2 -				
3.3 -				
3.4 -				
	Excav	ation M	ethod:	TLB
				2 m on very dense
			Table:	
				Page 11 of 30



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Test	11. 1		<b>a</b>		
				Dijalo Property Development	
			-	Kwa Thema shopping centre - 6796	
	l			2013/10/11	
	Elevation:			26°18'23.50"S, 28°25'38.30"E	
				1625 m	
	Profiled By:		led By:	Madaleen Booysen	
Depth (m)	Sampling	Ground Water	Symbol	Description	
0.1 -				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt	
0.1				Transported	
0.2 -					
0.4 -				(0.5 m)	
0.5 —				SOFT TO FIRM, CLAYEY SAND	
0.6 -				Slightly moist, light brown, soft to firm, pinholed, clayey sand Transported	
0.7 –					
0.8 -					
0.9 —					
1.0 -					
1.1 -					
1.2 -				(1.2 m)	
1.3 -				Slightly moist, reddish brown, firm, pinholed, fine sandy clayey silt	
1.4 -				Transported	
1.5 —					
1.6 -					
1.7 –					
1.8 —			J.J.	(1.8 m) MEDIUM DENSE, CLAYEY SILTY GRAVEL AND FERRICRETE NODULES	
1.9 -			00	Slightly moist, brown mottled grey, yellow, red and black, medium dense, martrix supported, clayey silty gravel and ferricrete	
2.0 -			00	nodules Residual shale	
2.1 -			00		
2.2 -			00		
2.3 -			00		
2.4 -			00		
2.5 -			0	(2.5 m)	
2.6 -				Refused on: Residual shale	
2.0					
2.8 -					
2.0					
3.0 -					
3.1 -					
3.2 -					
3.3 -					
3.4			1		
	Freak	ation M	lethod:	TIB	
				2.5 m on Residual shale	
			Table:		
		water	Table:	None Page 12 of 30	



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		Р		Dijalo Property Development Kwa Thema shopping centre - 6796	Fall Parts
	I			Rwa mena shopping centre - 0750	
				26°18'21.70"S, 28°25'36.30"E	
		Elev	vation:	1628 m	
		Profil	ed By:	Madaleen Booysen	
		ater		c	
(E	ing	Ground Water		Description	
Depth (m)	Sampling	loun	Symbol	se	
ă	ŝ	Ū	ŝ		
0.1 —				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt	
0.2 -				Transported	
0.3 —					
0.4 —					
0.5 —					
0.6 —					
0.7 —					
0.8 —			J.J.	VERY DENSE, SANDY SILTY GRAVEL	(0.8 m)
0.9 —			00	Slightly moist, light brown, very dense, pinholed, sandy silty gravel	
1.0 —			00	Transported	
1.1 —			00		
1.2 —			00		
1.3 —			00		
1.4 —			00		
1.5 —			00		
1.6			00		
1.7 — 1.8 —			00		
1.9			00		
2.0 -			00		
2.1			00		
2.2 —					(2.2 m)
2.3 —				Refused on: very dense sandy silty gravel	
2.4 —					
2.5 —					
2.6 —					
2.7 —					
2.8 —					
2.9 —					
3.0 —					
3.1 —					
3.2 —					
3.3					
3.4 —					
E	Excava	ation M	ethod:	TLB	
		R	efusal:	2.2 m on very dense sandy	
		Water	Table:	None	



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lest	FIL. I			1997
			Client:	Dijalo Property Development
		P	Project:	Kwa Thema shopping centre - 6796
		Date P	rofiled:	2013/10/11
		Coord	inates:	26°18'25.20"S, 28°25'36.40"E
				1631 m
				Bronwen & Madaleen .
		FION		
		Ground Water		
(E)	bu	Š	_	Description
Depth (m)	npli	nuc	oqu	sol
Dep	Sampling	0 D	Symbol	Dee
				STIFF, FINE SANDY SILT
0.1 -				Dry, brown, stiff, pinholed, fine sandy silt
0.2 -				Transported
0.3 -				(0.3 m)
0.4 -				FIRM, FINE SANDY SILT Dry, light brown, firm, pinholed, fine sandy silt
			11	Transported
0.5 —			11	
0.6 -				
0.7 —				
0.8 -				
0.9 -				
1.0 -				
1.1 -				
1.2 -			11	
1.3 -				
1.4 -				(4.5
1.5 —			JU	(1.5 m) MEDIUM DENSE BECOMING VERY DENSE, SANDY SILTY FERRUGINOUS GRAVEL
1.6 -			00	Dry, yellow brown, medium dense becoming very dense, pinholed, sandy silty ferruginous gravel
1.7 –			00	Transported
1.8 -			00	
1.9 -			00	
2.0 -			00	
2.0			0	(2.1 m)
				Refused on: very dense ferruginous gravel
2.2 -			1	
2.3 -				
2.4 -				
2.5 -				
2.6 -			1	
2.7 –			-	
2.8 -			-	
2.9 -				
3.0 -				
3.1 -				
3.2 -			1	
3.3 -			1	
3.4 -			1	
	Excav	ation M		
		R	efusal:	2.1 m on very dense
		Water	Table:	None
1				



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3.0          3.1          3.2          3.3          3.4          Excavation Method:       TLB         Refusal:       None         Water Table:       None	Testr	Test Fit. IF 10						
Date Profiled 2013/01/1 Coordinates: 2013/07/05, 28/23/23/07/E Elevation: 16/27 // Profiled By: Madaleon Booyeen								
Coordinate:         28/16/27.00°S, 28/26/30.70°E           Lievation:         19/27           Periodical Str.         Madaleen Booyeen           Image: Strate St		Project:						
Everytien: 1827 m Profiled By: Maddeon Booysen		l	Date Pr	ofiled:	2013/10/11			
PotHied By       Madaleen Booysen         u       y       y       y         u       y								
u         u		Elevati						
Image: state in the image in the i			Profil	ed By:	Madaleen Booysen			
Image: state in the image in the i								
Image: state of the s			ater					
Image: state in the image in the i	Ê	bu	N Ne	_	tion of the second s			
Image: state of the s	oth (	npli	ounc	oqu	scription of the second se			
0.1       Silghtly molet, brown, firm, pinholed, clayey silt         0.2          0.3          0.4          0.5          0.6          0.6          0.6          0.6          0.7          0.8          0.9          1.0          1.1          1.2          1.3          1.4          1.5          1.6          1.7          1.8          1.9          2.1          2.2          2.3          2.4          2.5          2.6          2.7          2.8          2.9          2.1          2.2          2.3          2.4	Del	Saı	gr	Syr				
0.2       Image: classic clastic classiclastic clastic classic clasticlastic classic classic c					FIRM, CLAYEY SILT			
03         04         (0.5 m)           04         05         (0.5 m)           05         0         Sightly molt, brow motiled grey, yellow, red and black, medium dense, pinholed, clayey silty gravel with femicrete nodules           07         0         Sightly molt, brow motiled grey, yellow, red and black, medium dense, pinholed, clayey silty gravel with femicrete nodules           08         0         0           09         0         0           10         0         0           12         0         0           13         0         0           14         0         0           15         0         0           16         0         0           20         0         0           21         0         0           22         0         0           23         0         0           24         0         0           25         0         0           26         0         0           27         0         0           28         0         0           29         0         0           31         0         0					Slightly moist, brown, firm, pinholed, clayey silt			
04         04         05         (0.5 m)           06         00         Sightly moles, clayey slity GRAVEL WITH FERRICRETE NODULES         Sightly moles, brinnelid grey, yellow, red and black, medium dense, pinholed, clayey slity gravel with ferricrete nodules           08         00         00         Sightly moles, clayey slity gravel with ferricrete nodules           08         00         00         Sightly moles, clayey slity gravel with ferricrete nodules           09         00         00         Sightly moles, clayey slity gravel with ferricrete nodules           10         00         00         Sightly moles, clayey slity gravel with ferricrete nodules           11         00         Sightly moles, clayey slity gravel with ferricrete nodules           12         00         Sightly moles, clayey slity gravel with ferricrete nodules           13         00         Sightly moles, clayey slity gravel with ferricrete nodules           14         00         Sightly moles, clayey slity gravel with ferricrete nodules           20         00         Sightly moles, clayey slity gravel with ferricrete nodules           21         00         Sightly moles, clayey slity gravel with ferricrete nodules           22         00         Sightly moles, clayey slity gravel with ferricrete nodules           23         00         Sightly slity slity gravel with ferricre	0.2 —							
0.5         MEDIUM DENSE, CLAYEY SILTY GRAVEL WITH FERRICRETE NODULES         Slightly moist, brown mottled grey, yellow, red and black, medium dense, pinholed, clayey silty gravel with ferricrete nodules           0.7         0.0         Slightly moist, brown mottled grey, yellow, red and black, medium dense, pinholed, clayey silty gravel with ferricrete nodules           0.8         0         0           0.9         0         0           1.0         0         0           1.1         0         0           1.2         0         0           1.3         0         0           1.4         0         0           1.5         0         0           1.6         0         0           1.7         0         0           1.8         0         0           2.0         0         0           2.1         0         0           2.2         0         0           2.4         0         0           2.5         0         0           2.6         0         0           2.7         0         0           2.8         0         0           3.1         0         0 <td< td=""><td>0.3 —</td><td></td><td></td><td></td><td></td></td<>	0.3 —							
0					(0.5 m)			
07       Residual shale         08       00         10       00         11       00         12       00         13       00         14       00         15       00         16       00         17       00         18       00         20       00         21       00         22       00         23       00         24       00         25       00         26       00         27       00         28       00         30       0         31       0         32       0         33       0         34       0         Kzavation Method: TLB         Refusal:       None         Water Table:       None	0.5 —			5	MEDIUM DENSE, CLAYEY SILTY GRAVEL WITH FERRICRETE NODULES			
07       00         08       00         10       00         11       00         12       00         13       00         14       00         15       00         16       00         17       00         18       00         19       00         20       00         21       00         22       00         23       00         24       00         25       00         28       00         29       00         30       00         31       00         32       00         33       00         34       00         8       00         10       00         10       00         11       00         12       00         13       00         14       00         15       00         16       00         17       00         18       00         19       00	0.6 —			00	Slightly moist, brown mottled grey, yellow, red and black, medium dense, pinholed, clayey silty gravel with ferricrete nodules			
0.9       0         1.1       0         1.2       0         1.3       0         1.4       0         1.5       0         1.6       0         1.7       0         1.8       0         1.9       0         2.0       0         2.1       0         2.2       0         2.3       0         2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         3.0       0         3.1       0         3.2       0         3.3       0         3.4       None	0.7 —			00				
10       0         11       0         12       0         13       0         14       0         15       0         16       0         17       0         18       0         19       0         20       0         21       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       0         31       0         32       0         33       0         34       0         Excavation Method:       TLB         Refusal:       None         Water Table:       None				00				
1.1       0         1.2       0         1.3       0         1.4       0         1.5       0         1.6       0         1.7       0         1.8       0         2.0       0         2.1       0         2.2       0         2.3       0         2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         2.9       0         3.0       0         3.1       0         3.3       0         3.4       0         Excavation Method: TLB         Refusal: None         Water Table: None	0.9 —			00				
12       0         13       0         14       0         15       0         16       0         17       0         18       0         19       0         20       0         21       0         22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       (3n)         31       (3n)         32       (3n)         33       (3n)         34       0         Excavation Method: TLB         Refusal: None         Water Table: None	1.0 —			00				
13       0         14       0         15       0         16       0         17       0         18       0         19       0         20       0         21       0         22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       0         31       0         32       0         33       0         34       0         Excavation Method:       TLB         Refusat:       None	1.1 —			00				
14       0         15       0         16       0         17       0         18       0         19       0         20       0         21       0         22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       0         31       (3n         31       (3n         33       34         Excavation Method: TLB         Refusal:       None         Water Table:       None	1.2 —			00				
1.5       0         1.6       0         1.7       0         1.8       0         1.9       0         2.0       0         2.1       0         2.2       0         2.3       0         2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         2.9       0         3.0       (3 m)         3.1       (3 m)         3.2       3.3         3.4       None         Water Table: None	1.3 —			00				
16       0         17       0         18       0         19       0         20       0         21       0         22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       (3 m)         31       (3 m)         32       33         34       (3 m)         Excavation Method:       TLB         Refusal:       None         Water Table:       None	1.4 —			00				
17       0         18       0         19       0         20       0         21       0         22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       0         31       34         22       0         33       0         34       0         Kefusai       None         Water Table       None	1.5 —			00				
18       0         19       0         20       0         21       0         22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       0         31       31         32       0         33       0         34       0         Excavation Method:       TLB         Refusal:       None         Water Table:       None				00				
1.9       0         2.0       0         2.1       0         2.2       0         2.3       0         2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         2.9       0         3.0       (3 m)         3.1       (3 m)         3.2       (3 m)         3.3       (3 m)         3.4       (3 m)         Excavation Method: TLB         Refusal: None         Water Table: None	1.7 —			00				
2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.6 2.7 2.8 2.9 3.0 3.0 3.1 3.2 3.3 3.4 Excavation Method: TLB Refusal: None Water Table: None	1.8 —			00				
2.1       0         2.2       0         2.3       0         2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         2.9       0         3.0       0         3.1       0         3.2       0         3.3       0         3.4       0         (3 m         (3 m <td>1.9 —</td> <td></td> <td></td> <td>00</td> <td></td>	1.9 —			00				
22       0         23       0         24       0         25       0         26       0         27       0         28       0         29       0         30       0         3.1       0         3.2       0         3.3       0         3.4       0         Excavation Method: TLB         Refusal: None         Water Table: None	2.0 —			00				
2.3       0         2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         2.9       0         3.0       0         3.1       0         3.2       0         3.3       0         3.4       0         Excavation Method:         TLB         Refusal:         None         Water Table:       None	2.1 —			00				
2.4       0         2.5       0         2.6       0         2.7       0         2.8       0         2.9       0         3.0       0         3.1       0         3.2       0         3.3       0         3.4       0         Excavation Method: TLB         Refusal: None         Water Table: None	2.2 —			00				
2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 Excavation Method: TLB Refusal: None Water Table: None	2.3 —			00				
2.6       0	2.4 —			00				
2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 Excavation Method: TLB Refusal: None Water Table: None	2.5 —			00				
2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 Excavation Method: TLB Refusal: None Water Table: None	2.6 —			00				
2.8       0       0       (3 m)         3.0       0       0       (3 m)         3.1       0       0       (3 m)         3.2       0       0       (3 m)         3.3       0       0       (3 m)         3.4       0       0       (3 m)         Excavation Method: TLB         Refusal: None         Water Table: None       None	2.7 —			000,000				
2.9       3.0       (3 m)         3.1       3.1       (3 m)         3.2       3.3       (3 m)         3.3       3.4       (3 m)         Excavation Method: TLB         Refusal: None         Water Table: None       None	2.8 —			C				
3.0	2.9 —							
3.2	3.0 —				(3 m)			
3.3 3.4 Excavation Method: TLB Refusal: None Water Table: None	3.1 —							
3.4 Excavation Method: TLB Refusal: None Water Table: None	3.2 —							
Excavation Method: TLB Refusal: None Water Table: None	3.3 —							
Refusal: None Water Table: None	3.4							
Refusal: None Water Table: None								
Water Table: None	I	Excava						
Page 15 of 30			Water	Table:				



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	Test Pit: TP 19					
				Dijalo Property Development		
				Kwa Thema shopping centre - 6796		
				2013/10/11		
				26°18'27.80"S, 28°25'36.90"E		
				1635 m		
	I	Profi	led By:	Madaleen Booysen		
		Ground Water				
E)	ing	N N	_	Description		
Depth (m)	Sampling	no	Symbol	SCT:		
Ľ۵	Sa	<u>م</u>	Sy			
				FIRM, CLAYEY SILT		
0.1 -				Slightly moist, brown, firm, pinholed, clayey silt Transported		
0.2 -						
0.3 -						
0.4 -				(0.5)		
0.5 -				FIRM, SILTY GRAVELLY CLAY		
0.6 -			-	Slightly moist, brown mottled orange and black, firm, pinholed, silty gravelly clay Residual shale		
0.7 -						
0.8 -						
0.9 -			-			
1.0 -						
1.1 -			-			
1.2 -			-			
1.3 -			-			
1.4 -			-			
1.5 -			, 0	(1.5) MEDIUM DENSE, SILTY CLAYEY GRAVEL WITH FERRICRETE NODULES		
1.6 -			00	Slightly moist, yellow brown mottled grey orange and black, medium dense, pinholed, silty clayey gravel with ferricrete nodules		
1.7 -			00	Residual shale		
1.8 -			00			
1.9 -			00			
2.0 -			00			
2.1 -			00			
2.2 -			00			
2.3 -			00			
2.4 -			00			
2.5 -			00			
2.6 -			00			
2.7 -			00			
2.8 -			-	(2.8) Refused on: Residual shale		
2.9 -						
3.0 -						
3.1 -						
3.2 -						
3.3 -						
3.4 -						
	Excav		lethod:			
				2.8 m on Residual shale		
		Water	Table:	None		



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10511	Test Pit: TP 21						
				Dijalo Property Development			
				Kwa Thema shopping centre - 6796			
				2013/10/11			
				26°18'27.00"S, 28°25'34.70"E			
				1628 m			
		Profil	ed By:	Madaleen Booysen			
Depth (m)	Sampling	Ground Water	Symbol	Description			
0.1 —				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt			
0.1				Transported			
0.2							
1							
0.4				(0.5 m			
1				FIRM, CLAYEY SILT Slightly moist, yellow brown mottled black, firm, pinholed, clayey silt			
0.6				Transported			
0.7							
0.8							
1.0							
1.2							
1.3 — 1.4 —							
1.4							
1.6 -							
1.7				(1.7 m			
1.8 -				STIFF, GRAVELLY SILT Slightly moist, yellow motled red and grey, stiff, pinholed, gravelly silt			
1.9 -				Residual shale			
2.0 -							
2.1							
2.2 -							
2.3 -							
2.4							
2.5 —							
2.6 —				(2.6 m Refused on: Residual shale			
2.7 —				תבועשבע טון. תבשוענוגן שוומוש			
2.8 —							
2.9							
3.0 —							
3.1 —							
3.2 —							
3.3 —							
3.4 —							
E	Excava	ation M					
				2.6 m on Residual shale			
		Water	Table:	None			



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	Test Pit: TP 22					
				Dijalo Property Development		
				Kwa Thema shopping centre - 6796		
				2013/10/11		
				26°18'24.70"S, 28°25'33.80"E		
				1627 m		
		Profi	led By:	Madaleen Booysen		
				The second s		
		Ground Water		E C C C C C C C C C C C C C C C C C C C		
٦ ٤	ing	≥ P	_	btio		
Depth (m)	Sampling	no	Symbol	Description		
ď	Sa	Δ	l S	ă		
				FIRM, CLAYEY SILT		
0.1 -				Slightly moist, brown, firm, pinholed, clayey silt Transported		
0.2 -						
0.3 –						
0.4 -				(0.5 г		
0.5 –				FIRM, CLAYEY SILT		
0.6 -				Slightly moist, yellowish light brown mottled orange, firm, pinholed, clayey silt Residual shale		
0.7 –		1				
0.8 –						
0.9						
1.0 -						
1.1 –						
1.2 –						
1.3 -						
1.4 -			JJ	(1.4 r MEDIUM DENSE TO DENSE, SANDY SILT GRAVEL		
1.5 –			00	Slightly moist, yellowish brown mottled red and grey, medium dense to dense, pinholed, sandy silt gravel Residual shale		
1.6 -			00			
1.7 –			00			
1.8 -			00			
1.9 —			00			
2.0 -			00			
2.1 –			00			
2.2 –			00			
2.3 –			00			
2.4 –			00			
2.5 –			-	(2.5 r Refused on: Residual shale		
2.6 –						
2.7 –						
2.8 –		+				
2.9 —						
3.0 -						
3.1 –						
3.2 –						
3.3 –						
3.4 -		-				
	Excav	ation N				
				2.5 m on Residual shale		
		Water	Table	None Page 18 of 30		



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lest	<u>r II. I</u>	P	roject:	Dijalo Property Development Kwa Thema shopping centre - 6796 2013/10/10	
	Coordii Elev		vation:	26°18'26.10"S, 28°25'31.80"E 1628 m Bronwen & Madaleen .	
Depth (m)	Sampling	Ground Water	Symbol	Description	
0.1 0.2 0.3 0.4				FIRM, SANDY SILT Dry, brown, firm, pinholed, sandy silt Transported	
0.5 -				FIRM TO STIFF, FINE SANDY SILT	(0.5 m)
0.6 -				Dry, light brown, firm to stiff, pinholed, fine sandy silt Transported MEDIUM DENSE BECOMING VERY DENSE, SANDY SILTY FERRUGINOUS GRAVEL	(0.7 m)
0.8 -			00	Dry, yellow brown, medium dense becoming very dense, pinholed, sandy silty ferruginous gravel	
0.9 -			00	Transported	
1.0 -			00		
1.1 -					
1.2 -			00		
1.4 -			00		
1.5 -			00		
1.6 -			00		
1.7 –			00		
1.8 -			00		
1.9 -			00		(2 m)
2.0 -				STIFF, GRAVELLY SANDY SILT Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt Transported	
2.2 – 2.3 –					
2.4 -					
2.5 -					
2.6 -				Refused on: Stiff gravelly sandy silt	(2.6 m)
2.7 -					
2.8 -					
2.9 -					
3.0 - 3.1 -					
3.2 -					
3.3 -					
3.4 -					
	<b>-</b>	 	 		
	Excav	ation M		TLB 2.6 m on Stiff gravelly	
			Table:		
		mater	Table.	Page 19 of 30	



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Client: Dijalo Property Development						
				Kwa Thema shopping centre - 6796		
				2013/10/11		
				26°18'27.70"S, 28°25'32.10"E		
				1633 m		
		Profi	led By:	Madaleen Booysen		
Depth (m)	Sampling	Ground Water	Symbol	Description		
0.1 -				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt		
0.2 —				Transported		
0.3 —						
0.4 -						
0.5 —			$\parallel \mid$	(0.5 m) FIRM, FINE SANDY SILT		
0.6 -				Slightly moist, yellowish brown mottled black, firm, pinholed, fine sandy silt		
0.7 —				Transported		
0.8 —						
0.9 —						
1.0 -						
1.1 –						
1.2 -						
1.3 -						
1.4 -			JJ	(1.4 m) MEDIUM DENSE TO DENSE, SANDY SILTY GRAVEL		
1.5 —			00	Slightly moist, light brown mottled red, black and grey, medium dense to dense, pinholed, sandy silty gravel		
1.6 -			00	Residual shale		
1.7 –			00			
1.8 —			00			
1.9 —			00			
2.0 -			00			
2.1 –			00			
2.2 –			00			
2.3 -			00			
2.4 -			00			
2.5 -			00			
2.6 -			00			
2.7 -			00			
2.8 – 2.9 –			00			
2.9 – 3.0 –			00	(3 m)		
3.0 -						
3.2 -						
3.3 -						
3.4 -						
	Excav	ation M				
			efusal:			
		Water	Table:	None Page 20 of 20		



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Test	1 11. 1			
				Dijalo Property Development
			-	Kwa Thema shopping centre - 6796
		Date P	rofiled:	2013/10/11
		Coord	inates:	26°18'31.10"S, 28°25'37.50"E
		Ele	vation:	1632 m
		Profi	led By:	Madaleen Booysen
(	0	Water		ug
Depth (m)	Sampling	Ground Water	Symbol	Description
0.1 -				FIRM, CLAYEY SILT Slightly moist, brown, firm, pinholed, clayey silt
0.2 -				Transported
0.3 -				(0.3 m
0.4 -				STIFF, SILT Slightly moist, light grey speckled dark grey, stiff, intact, silt
0.5 -				Transported
0.6 -				
0.7 -				(0.7 m
0.8 -			00	DENSE, SILTY GRAVEL WITH FURRUGINOUS NODULES Slightly moist, yellow brown mottled grey, orange and black, dense, pinholed, silty gravel with furruginous nodules
0.9 -			0	Residual shale (0.9 m
1.0 -				
1.1 -			1	
1.2 -			1	
1.3 -				
1.4 -				
1.5 -				
1.6 -				
1.7 -				
1.8 -				
1.9 —				
2.0 -				
2.1 -				
2.2 -				
2.3 -				
2.4 -		1		
2.5 —				
2.6 -				
2.7 –				
2.8 -		1		
2.9 -		1		
3.0 -				
3.1 -				
3.2 -				
3.3 -				
3.4 -				
	Eve		lother	
	Excav	ation M		have a read on this test nit
			efusal:	0.9 m
		water	Table:	None Dage 21 of 20



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Test	est Pit: TP 26 Client: Dijalo Property Development						
				: Kwa Thema shopping centre - 6796	19/11.4		
				: 2013/10/10			
				26°18'29.40"S, 28°25'35.40"E	1		
Elevation							
				Bronwen & Madaleen .			
Depth (m)	Sampling	Ground Water	Symbol				
0.1 -				FIRM, SANDY SILT Dry, brown, firm, pinholed, sandy silt			
0.2 -				Transported			
0.3 —							
0.4 —							
0.5 —					(0.5 m		
0.6 —				FIRM, FINE SANDY SILT Dry, light brown, firm, pinholed, fine sandy silt			
0.7 -				Transported			
0.8							
0.9							
1.0 -							
1.1 –							
1.2 -							
1.3 -							
1.4 -			JJ	(	(1.4 m		
1.5 —			00	MEDIUM DENSE BECOMING VERY DENSE, SANDY SILTY FERRUGINOUS GRAVEL Dry, yellow brown, medium dense becoming very dense, pinholed, sandy silty ferruginous gravel			
1.6 -			00	Transported			
1.7 -			00				
1.8 —			00				
1.9 —			00				
2.0 —			00				
2.1 –			00				
2.2 —				Perfused on very dense ferrugineus gravel	(2.2 m		
2.3 —				Refused on: very dense ferruginous gravel			
2.4 —							
2.5 —							
2.6 —							
2.7 —			-				
2.8 —							
2.9 —							
3.0 -							
3.1 –							
3.2 –							
3.3 —							
3.4 —							
	Excav	ation M					
				2.2 m on very dense			
	Water Table: None						



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Test	1 11. 1		<b>.</b>		1
				Dijalo Property Development	A A
				Kwa Thema shopping centre - 6796	
				2013/10/11	E.A.
				26°18'29.50"S, 28°25'32.60"E	1
				1631 m	•
		Profi	led By:	Madaleen Booysen	
Depth (m)	Sampling	Ground Water	Symbol	Description	
ă	Sa	δ	ŝ		
				FIRM, CLAYEY SILT	- Anda
0.1 -				Slightly moist, brown, firm, pinholed, clayey silt Transported	
0.2 -					
0.3 -					
0.4 -					
0.5 —				FIRM, CLAYEY SILT	0.5 m
0.6 -				Slightly moist, reddish brown, firm, pinholed, clayey silt	
0.7 -				Transported	
0.8 -					
0.9					
1.0 -					
1.1 -					
1.2 -					
1.3 -					
1.4 -					
1.5 -					
1.6 -			11	(*	1.7 m)
1.7 -				FIRM TO SOFT, GRAVELLY CLAY	
1.8 -				Slightly moist, yellowish brown mottled grey, red and black, firm to soft, pinholed, gravelly clay Residual shale	
1.9 —					
2.0 -					
2.1 -					
2.2 -					
2.3 -					
2.4 -		+			
2.5 —					
2.6 -					
2.7 —					
2.8 -		-			
2.9 —					
3.0 -					(3 m
3.1 —					
3.2 -					
3.3 -					
3.4 -		-			
	Excav	ation M	lethod:	TLB	
		R	efusal:	None	
		Water	Table:	None	
				Dage 22 of 20	



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	IC. 1		Client	Dijalo Property Development
				: Kwa Thema shopping centre - 6796
				2013/10/10
				26°18'27.80"S, 28°25'29.80"E
				1628 m
				Bronwen & Madaleen .
Depth (m)	Sampling	Ground Water	Symbol	Description
				FIRM, SANDY SILT
0.1 -				Slight <sup>i</sup> y moist, brown, firm, pinholed, sandy silt Transported
0.2 -				Transported
0.3 –				
0.4 -				
0.5 —				(0.6 m)
0.6 -				FIRM, SANDY CLAYEY SILT
0.7 —				slightly moist, light orange brown, firm, pinholed, sandy clayey silt Transported
0.8 -				
0.9 -				
1.0 -				
1.1 -				
1.2 -				
1.3 -				
1.4 1.5				
1.6 -				(1.6 m)
1.7 -				FIRM, GRAVELLY SANDY SILT Slightly moist, reddish brown mottled grey, black and yellow, firm, pinholed, gravelly sandy silt
1.8 -				Transported
1.9 -				
2.0 -				
2.1 -				
2.2 -				
2.3 -				
2.4 -				
2.5 —				
2.6 -				
2.7 -				
2.8 -				
2.9 -				
3.0 -				(3 m)
3.1 -				
3.2 -				
3.3 —				
3.4 -				
	Freak	ation M	ethod	
				None
Water Table:				



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Client:       Diplo Propert:       Kwa Thema shopping centre - 6796         Date Profile:       2013/10/10         Coordinate:       26*1825.0975, 28*2528.90*E         Elevation:       Not specified         Profiled 'D:       Brown A Madaleen .         Image: Stripping of the specified 'D:       Forward A Madaleen .         Image: Stripping of the specified 'D:       Forward A Madaleen .         Image: Stripping of the specified 'D:       Strown A Madaleen .         Image: Stripping of the specified 'D:       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .         Image: Strown A Madaleen .       Strown A Madaleen .	Sec. 13					
Date Profiled:       2013/10/10         Coordinate:       2018/125.09/5.28*25/28.90/E         Elevation:       Not specified         Profiled By:       Brownen & Madaleen.         (i)       gg       igg         01						
Coordinates:       28'1825.90'S, 28'25'28.90'E         Elevatio:       Not specified         Profiled By:       Browen & Madaleen .         Image:	Let in					
Elevation:       Not specified         Profiled By:       Bronwen & Madaleen .         u <th>an to the</th>	an to the					
Profiled By: Browen & Madaleen .         u <thu< th="">       u       u       <thu< th=""> <thu< th=""><th></th></thu<></thu<></thu<>						
Image: Second						
O.1     FIRM, SANDY SILT       02     03       03     04       05     06       06     FIRM, SANDY CLAYEY SILT       07     Slightly moist, light orange brown, firm, pinholed, sandy clayey silt       08     Transported       09     10       10     11       12     13       14     14       15     STIFF, GRAVELLY SANDY SILT       16     Slightly moist, reddsh brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt       17     Slightly moist, reddsh brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt       17     16       18     19       19     11       20     21       21     23       22     23       23     24       24     25       25     26       26     27       28     14	a vall					
0.1       Slightly moist, brown, firm, pinholed, sandy silt         0.3       Image: Constraint of the second						
0.2						
0.3						
0.4       -						
0.5       0.6       0.6         0.6       0.7       0.8         0.7       0.8       0.9         1.0       0.9         1.0       0.9         1.1       0.9         1.2       0.9         1.3       0.9         1.4       0.9         1.5       0.9         1.6       0.9         1.7       0.9         1.8       0.9         1.9       0.9         2.0       0.9         2.1       0.9         2.2       0.9         2.3       0.9         2.4       0.9         2.5       0.9         2.6       0.9         2.7       0.9         2.8       0.9						
0.6						
0.7     0.8     Slightly moist, iight orange brown, firm, pinholed, sandy clayey silt       0.9     0.9       1.0     0.9       1.1     0.9       1.2     0.9       1.3     0.9       1.4     0.9       1.5     0.9       1.4     0.9       1.5     0.9       1.6     0.9       1.7     0.9       1.8     0.9       1.9     0.9       2.0     0.9       2.1     0.9       2.3     0.9       2.4     0.9       2.7     0.9       2.8     0.9	(0.6 m					
0.8	(0.0 11					
0.8       0.9         1.0       1         1.1       1.1         1.2       1.3         1.3       1.4         1.5       1.5         1.6       1.5         1.7       1.6         1.8       1.9         2.0       2.1         2.1       2.1         2.2       2.3         2.4       2.5         2.6       2.7         2.8       0						
1.0          1.1          1.2          1.3          1.4          1.5          1.6          1.7          1.8          1.9          2.0          2.1          2.2          2.3          2.4          2.5          2.6          2.7          2.8						
1.1       1.1         1.2       1.3         1.3       1.4         1.4       1.5         1.6       STIFF, GRAVELLY SANDY SILT         Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         1.7       Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         1.7       Interview         1.8       Interview         1.9       Interview         2.0       Interview         2.1       Interview         2.3       Interview         2.4       Interview         2.5       Interview         2.6       Interview         2.7       Interview         2.8       Interview						
12						
1.3						
1.4						
1.5       STIFF, GRAVELLY SANDY SILT         1.6       Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly Sandy silt         1.7       Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly Sandy silt         1.8       Transported         1.9       Transported         2.0       Transported         2.1       Transported         2.2       Transported         2.3       Transported         2.4       Transported         2.5       Transported         2.6       Transported         2.7       Transported         2.8       Transported						
1.6     Image: Simple state	<i></i> –					
1.6       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         1.7       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         1.8       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         1.9       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.0       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.1       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.1       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.2       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.1       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.2       Image: Slightly moist, reddish brown mottled grey, black and yellow, stiff, pinholed, gravelly sandy silt         2.3       Image: Slightly mottly sandy slit         2.4       Image: Slightly mottled grey, slit         2.5       Image: Slit         2.6       Image: Slit         2.7       Image: Slit         2.8       Image: Slit	(1.5 m					
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c} 1.9 \\ 2.0 \\ 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.8 \\ \end{array} $						
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$						
$ \begin{array}{c} 2.1 \\ 2.2 \\ 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.8 \\ \end{array} $						
2.2						
$ \begin{array}{c} 2.3 \\ 2.4 \\ 2.5 \\ 2.6 \\ 2.7 \\ 2.8 \\ \end{array} $						
2.4						
2.5       2.6       2.7       2.8						
2.6						
2.8						
3.0	(3 m					
3.1						
3.2						
3.3						
3.4						
Excavation Method: TLB Notes: Raining						
	Refusal: None					
Water Table: None						



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			Client:	Dijalo Property Development	
		Р	roject:	Kwa Thema shopping centre - 6796	
		Date Pr	ofiled:	2013/10/10	
				26°18'27.90"S, 28°25'26.90"E	
				1629 m	
		Profil	ed By:	Bronwen & Madaleen .	
Depth (m)	Sampling	Ground Water	Symbol	Description	F
0.1 -				FIRM, SANDY SILT Slightly moist, brown, firm, pinholed, sandy silt	
0.2 -				Transported	
0.2					
0.4 -					
0.5 -					(0.5 m)
0.6 -				SOFT, SANDY CLAYEY SILT Slightly moist, light orange brown, soft, pinholed, sandy clayey silt	
0.7 -				Transported	
0.8 -					
0.9 -					
1.0 -					
1.1 -					
1.2 –					
1.3 -					
1.4 -					
1.5 -					
1.6					
1.7 –					
1.8 -					
1.9 -			$\parallel \mid$	STIFF, CLAYEY SILT WITH FERRUGINATION	(1.9 m)
2.0 -				Slightly moist, red brown, stiff, pinholed, clayey silt with ferrugination	
2.1 -				Transported	
2.2 -					
2.3 -					
2.4 -					
2.5 –			μι		(2.5 m)
2.6 -					
2.7 –					
2.8 -		-			
2.9 -		-			
3.0 -					
3.1 –		-			
3.2 –					
3.3 –					
3.4 –					
	Excav	ation M	ethod:	TLB	
Refusal: None					
		Water	Table:	None Page 26 of 30	



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Test	Test Pit: TP 31					
				Dijalo Property Development		
			-	Kwa Thema shopping centre - 6796		
				2013/10/10		
				26°18'27.80"S, 28°25'25.00"E		
				1631 m		
		Profil	ed By:	Bronwen & Madaleen .		
		Ground Water				
(u)	ing	Ň	_	bio contraction of the second s		
Depth (m)	Sampling	no	Symbol	Description		
ă	Sa	Q	s,	ă		
				FIRM, SANDY SILT		
0.1 -				Slightly moist, brown, firm, pinholed, sandy silt Transported		
0.2 -						
0.3 -				(0.4 m)		
0.4 -				FIRM, CLAYEY SILT Slightly moist, redbrown, firm, pinholed, clayey silt		
0.5 -				Transported		
0.6 -						
0.7 0.8						
0.8 -						
0.9 -						
1.1 -						
1.2 -						
1.3 -						
1.4 — 1.5 —						
1.6 -						
1.7 -						
1.8 -						
1.9 -						
2.0 -				(2.1 m)		
2.1 -			00	VERY DENSE, SANDY SILTY FERRUGINOUS GRAVEL Dry, yellow brown, very dense, pinholed, sandy silty ferruginous gravel		
2.2			00	Transported		
2.3 -						
2.4			00			
2.6 -			00			
2.0			00			
2.8 -			00			
2.9 -			10010001			
3.0 -			00	(3 m)		
3.1 -						
3.2 -						
3.3 -						
3.4 -						
	Excava	ation M	ethod:	TLB		
		R	efusal:	None		
		Water	Table:	None		
				Page 27 of 20		



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Test	Pit: I		<b>a</b> :	
				Dijalo Property Development
				Kwa Thema shopping centre - 6796
				26°18'25.60"S, 28°25'26.20"E
				1626 m
		Profi	lea By:	Madaleen Booysen
		Ground Water		E CONTRACTOR OF
<u> </u>	ling	≥	ō	
Depth (m)	Sampling	Lour	Symbol	Description
	S	U U	S I	
0.1				FIRM, SANDY SILT Slightly moist, brown, firm, pinholed, sandy silt
0.2 -				Transported
0.3 -				
0.4 -				
0.5 -				(0.5 m
0.6 -				SOFT, CLAYEY SILT Slightly moist, red brown, soft, intact, clayey silt
0.7 -				Transported
0.8 -				
0.9 -				
1.0 -				
1.1 -				
1.2 -				
1.3 -				
1.4 -				
1.5 -				
1.6 -				
1.7 -			J.J.	(1.7 m
1.8			00	MEDIUM DENSE, SANDY SILTY FERRUGINOUS GRAVEL Dry, yellow brown, medium dense, pinholed, sandy silty ferruginous gravel
1.9			00	Transported
2.0 -			00	
2.1 -			00	
2.2			00	
2.3 -			00	
2.4			00	
2.5 —			00	
2.6			00	
2.7 —			00	
2.8 -			00	
2.9 —			00	
3.0		<b>\</b>		(3 m
3.1 -				
3.2				
3.3 -				
3.4				
	Excav	ation N	lethod:	TLB Notes: Minor seepage
		R	efusal:	None
		Water	Table:	3 m
				Page 28 of 30



Test			Client:	Dijalo Property Development	Net and the second s
				: Kwa Thema shopping centre - 6796	
				: 2013/10/10	
				26°18'29.40"S, 28°25'29.00"E	
Elevation: 1626 m					
		Profi	led By:	Bronwen & Madaleen .	
Depth (m)	Sampling	Ground Water	Symbol	Description	
De	Sa	Ū	Sy		ALC: LEVEL AND
0.1 -				FIRM, CLAYEY SILT Dry to slightly moist, brown, firm, pinholed, clayey silt	
0.1				Transported	
0.2					
0.0 -					
0.4					
0.6 -					(0.6 m
0.0				FIRM, CLAYEY SILT Slightly moist, orange brown mottled black, firm, pinholed, clayey silt	
0.7				Transported	
0.8 -					
0.9 1.0					
1.1 -					
1.2 -					
1.3 -					
1.4 -					(1.5 m
1.5 — 1.6 —				FIRM, SANDY GRAVELLY SILT Slightly moist, reddish brown mottled grey and black, firm, pinholed, sandy gravelly silt	
1.0 -				Transported	
1.7 -					
1.0 -					
2.0 2.1					
2.1 -					
2.2 -					
2.3 2.4					
2.4 -					
2.5 -					
2.0					(2.7 n
2.8 -				Refused on: firm sandy gravelly silt	
2.9 -					
2.0 3.0 -					
3.0					
3.2 -					
3.2 –					
3.3 - 3.4 -					
5. 1					
	Excav	ation M	lethod:	TLB	
		R	efusal:	2.7 m on firm sandy	
		Water	Table:	None	
_				Page 20 of 20	



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0.9	lest					
Date Profiles: 2013/01/0       Coordinates: 2013/02/01/2 (2013/25/25/25/25/25/25/25/25/25/25/25/25/25/						THE DINY IT -
Coordinates: 24°12.8.70°S, 28°2528.70°E Elevation: 1626 m Profield By: Mudaleen Booysen						
Eccavation Methods TLB Refusite TLB Refusite TLB Refusite Tals Tals Tals Tals Tals Tals Tals Tals						
Protiled By       Madaleon Booysen         (a)       (b)       (b)         (a)       (b)       (c)         (a)       (c)       (c)         (a)       (c) <td< th=""><th></th><th></th><th>Coord</th><th>inates:</th><th>26°18'26.70"S, 28°25'28.70"E</th><th></th></td<>			Coord	inates:	26°18'26.70"S, 28°25'28.70"E	
Image: Second			Elev	vation:	1626 m	
0.1       FIRM. CLAYEY SILT         0.3       Slightly moist, brown, firm, pinholed, clayey silt         0.3       Slightly moist, brown, firm, pinholed, clayey silt         0.4       Slightly moist, reduced, silty clay         0.5       Slightly moist, reduced, silty clay         0.6       Slightly moist, reduced, silty clay         1.1       U         1.2       Slightly moist, reduced, silty clay         1.3       Slightly moist, reduced, silty clay         1.4       Slightly moist, reduced, silty clay         1.5       FIRM, FINE SANDY SILTY CLAY         Slightly moist, reduced brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.6       FIRM, FINE SANDY SILTY CLAY         Slightly moist, reddeth brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.6       FIRM, FINE SANDY SILTY CLAY         Slightly moist, reddeth brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.6       FIRM, FINE SANDY SILTY CLAY         2.1       Slightly moist, reddeth brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.2       Slightly moist, reddeth brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.3       Slightly moist, reddeth brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4			Profil	ed By:	Madaleen Booysen	
0.1       FIRM. CLAYEY SILT         0.1       Slightly moist, brown, firm, pinholed, clayey silt         0.3       Image: Clayey silt         0.4       Image: Clayey silt         0.5       Image: Clayey silt         0.6       Image: Clayey silt         0.7       Image: Clayey silt         0.8       Image: Clayey silt         1.1       Image: Clayey silt         1.2       Image: Clayey silt         1.3       Image: Clayey silt         1.4       Image: Clayey silt         1.5       FIRM, FINE SANDY SILTY CLAY         Slightly moist, reddish brown mottled gray and black, firm, pinholed, fine sandy silty clay         1.7       Image: Clayey silt         1.8       Image: Clayey silt         2.9       Image: Clayey silt         2.1       Image: Clayey silt         2.2       Image: Clayey silt </th <th></th> <th></th> <th>/ater</th> <th></th> <th>ç</th> <th></th>			/ater		ç	
0.1       FIRM, CLAYEY SILT         0.2       Sightly most, brown, firm, pinholed, clayey silt         0.3       FIRM, SILTY CLAY         0.8       Sightly most, red brown, firm, pinholed, silty clay         1.3       FIRM, SILTY CLAY         0.8       Sightly most, red brown, firm, pinholed, silty clay         1.4       FIRM, FINE SANDY SILTY CLAY         1.5       FIRM, FINE SANDY SILTY CLAY         1.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.7       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.7       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4       Sightly most, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay         2.4       Sightly most, reddish br	Depth (m)	Sampling	Ground W	Symbol	Descriptio	
0.1       Slightly moist, brown, firm, pinholed, clayey slit         0.2       1         0.3       1         0.4       1         0.5       1         0.6       1         0.7       1         0.8       1         0.8       1         0.8       1         1.1       1         1.2       1         1.3       1         1.4       1         1.5       FIRM, FINE SANDY SILTY CLAY         Slightly moist, red dish brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.6       Slightly moist, red dish brown mottled grey and black, firm, pinholed, fine sandy silty clay         1.8       1         1.9       1         2.0       1         2.1       1         2.2       1         2.3       1         2.4       1         2.5       1         2.6       1         2.7       1         2.8       1         2.4       1         2.5       1         2.6       1         2.7       1         2.8 <t< th=""><th></th><th></th><th>_</th><th></th><th></th><th></th></t<>			_			
0.3       0.4       0.6       0.8 m         0.4       0.8 m       0.8 m         0.7       0.8 m       0.8 m         0.8       0.8 m       0.8 m         0.9       0.8 m       0.8 m         0.9       0.8 m       0.8 m         1.1       0       0.8 m         1.2       0       0.8 m         1.4       0       0.8 m         1.5       0.8 m       0.8 m         1.6       0.8 m       0.8 m         1.7       0.8 m       0.8 m         1.8       0.8 m       0.8 m         1.9       0.8 m       0.8 m         2.1       0.8 m       0.8 m         2.2       0.8 m       0.8 m         2.3       0.8 m       0.8 m         2.4       0.8 m       0.8 m         2.5	0.1 -				Slightly moist, brown, firm, pinholed, clayey silt	
0.4	0.2 -				Transported	
0.5	0.3 -					
0.5	0.4 -					
0.6	0.5 -					
0.7						
0.8         0.8 <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
0.9         Image: Sightly molet, red brown, firm, pinholed, silty clay           1.1         Image: Sightly molet, red brown, firm, pinholed, silty clay           1.3         Image: Sightly molet, red brown, firm, pinholed, silty clay           1.4         Image: Sightly molet, red site, red site, red site, red site, firm, pinholed, fine sandy silty clay           1.6         Image: Sightly molet, red site, red site, red site, firm, pinholed, fine sandy silty clay           1.7         Image: Sightly molet, red site, red site, red site, firm, pinholed, fine sandy silty clay           1.8         Image: Sightly molet, red site, red site, red site, firm, pinholed, fine sandy silty clay           1.8         Image: Sightly molet, red site, red site, red site, firm, pinholed, fine sandy silty clay           2.0         Image: Sightly molet, red site, red site, red site, firm, pinholed, fine sandy silty clay           2.4         Image: Sightly molet, red site, red sit						(0.8 m)
1.0       Image: Constraint of the second seco					FIRM, SILTY CLAY	
1.1       U					Transported	
12       U						
1.3		U				
1.4						
1.5         FIRM, FINE SANDY SILTY CLAY         (1.5 m)           1.6         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           1.7         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           1.8         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.0         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.1         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.1         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.1         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.1         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.2         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.1         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.2         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.4         Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay           2.4         Slightly moist, reddish brown mottled grey and black, firm, pinholed, firm, pinholed, firm, pinholed, fi						
18     FIRM, FINE SANDY SILTY CLAY       16     Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       17     Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       18     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       20     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       20     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       20     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       21     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       21     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       22     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       23     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       24     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       25     Image: Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay       26     Image: Slightly mottly						(1.5 m)
1.7        Residual shale         1.9           2.0           2.1           2.2           2.3           2.4           2.5           2.6           2.7           2.8           2.9           3.0           3.1           3.2           3.3           3.4           Excavation Method: TLB         Refusal: None					FIRM, FINE SANDY SILTY CLAY	(1.5 m)
1.7       1.8         1.9       1.9         2.0       2.1         2.1       2.2         2.3       2.4         2.4       2.5         2.6       2.7         2.8       2.9         2.9       2.9         3.0					Slightly moist, reddish brown mottled grey and black, firm, pinholed, fine sandy silty clay Residual shale	
1.9						
20 21 22 22 22 22 22 22 22 22 22 22 22 22						
2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9	1.9 -					
22	2.0 -					
2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9 2.9	2.1 -					
2.4	2.2 -					
2.5 2.6 2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 Excavation Method: TLB Refusal: None	2.3 -					
2.6	2.4 -					
2.7 2.8 2.9 3.0 3.1 3.2 3.3 3.4 Excavation Method: TLB Refusal: None (3 m)	2.5 -					
2.8	2.6 -					
2.9 (3 m) 3.0 (3 m) 3.1 (3 m) 3.2 (3 m) 3.3 (3 m) 3.4 (3 m) 3.4 (1 m) Excavation Method: TLB Refusal: None	2.7 -					
3.0	2.8 -					
3.0          3.1          3.2          3.3          3.4          Excavation Method:       TLB         Refusal:       None	2.9 -					
3.2	3.0 -					(3 m)
3.3 3.4 Excavation Method: TLB Refusal: None	3.1 -					
3.4 Excavation Method: TLB Refusal: None	3.2 -					
Excavation Method:     TLB       Refusal:     None	3.3 -					
Refusal: None	3.4 -					
Refusal: None						
		Excava				
Water Table: None						
			Water	Table:	None	

# APPENDIX B LABORATORY RESULTS

#### 2013/11/15

W.	1. 5.10.1	(a)

SNALAB	CIVIL ENGINEERING LABORATORY	462026				
		<b>Fsanas</b>				
SNA CIVIL AND STRUCTURAL ENGIN		- envgraboolog				
191 VONKPROP ROAD SAMCORPAR	( PRETORIA	"a SANAS Accredited				
PO Box 72727 Lynnwood Ridge '0040 Tel :(012) 842-0060     Fax: (012) 803-46	220	Testing Laboratory, No.				
E-MAIL : snalabpta@mweb.co.za		T0345"				
REG. NO. 2005/006128/07						
	TEST REPORT					
		REPORT NUMBER				
Client :	ARQ	14332				
Address:	P.O.BOX					
	LYNNWOOD RIDGE					
	0040					
Cell :						
Tel:	123 486 669					
Fax:	123 486 668					
ATTENTION:	MADALEEN BOOYSEN					
Project/Order:	KWA THEMA					
Brief :	GRAD, PI, HYDRO, MDD, CBR, PH, COI					
Date requested	14/10/2013	ND, WOIST, COLLAFSE				
Date sampled	14/10/2013					
Date received	14/10/2013					
Test date/dates	15/11/2013					
Location of sampling	KWA THEMA					
Sampling method/methods#/	SAMPLED BY CLIENT					
Sampled by	SAMPLED BY CLIENT					
Sample number/numbers	REFER TO TEST SHEET					
Sample Condition/Description	REFER TO TEST SHEET					
Sampling Environmental condition	SAMPLED BY CLIENT					
Test Method/Methods used	REFER TO TEST SHEET					
Test done at	SNALAB					
Deviation to test methods :	NONE					
Tests marked # Not SANAS Accred						
The regults relate only to the items to						
within the scope of our SANAS accred	ested. Any opinions ,classifications , comments as	nd interpretations do not fall				
	redited in this report are not included in the SAN					
for this laboratory.	conted in this report are not included in the SAN	AS Schedule of Accreditation				
Test report/reports shall not be repro	oduced except in full, without written approval of	of the Laboratory.				
If the report is referred to an in Thirds						
	RIM REPORT it is not fit for publication.					
$\sim$	contained on the reverse side of the report.					
AL						
1p	15 11 2013					
Hendrik Diederiks. Pr Tech Eng	DATE:	_				
Laboratory Manager						
assoratory manager		ae l of 5				
	pag					

SVALAB CVILENG	CIVIL ENGINEERING LABORATORY	Project Rd/Sect/BP Layer/Holes		KWA THEMA	HEMA																			Lab No : Client No Date :			14332 7400 14/10/2013
							NDIC		۲.	ГО	RS																
Methods:								ТМН	TMH 1: Method A1 - A5	thod	A1 -	A5								The	TMH	TMH 1: A2 + A3 and A4	+ A3 1	TMH 1: A20	TMH 1: A21T	÷.	
						%		PASSING	NG						SOIL	MORTAR ANAL vs # mm)	AR AN # mm)	IAL	%)		AT	ATTERBERG LIMITS (%)	RG		EFEC	-	
HOLE & / SAMPLE No. MATERIALS DESCRIPTION	DEPTH (m)	106.0	90.0	75.0	63.0	53.0	37.5	26.5	19.0	13.2	4.75	2.0	0.425	0.075	0.425 2.0 -	0.250 0.425 -	0.150 0.250 -	0.075 0.150 -	<0.075	GM	Е	LS	Ē	Hd	TRIC CONDUC. (S/m)		AASTHO Classification #
TP 1	0.5 - 2.7									100	100 100	66	91	61	∞	7	13 11	11	62	0.49	27	5.7	11	6.00	0.076	3 A-6	3 (5) <sub>(1)</sub>
BROWN																											
TP 8	0.4 - 3.0							_		100	100	66	93	70	7	ц	6	6	70	0.39	24	5.3	10	6.22	0.015	5 A-4	( 2 ) t
TP 12	0.5 - 2.0									100	92	84	74	55	12	9	6	œ	65	0.87	22	4.0	œ	6.08	0.057	7 A-4	t (4) <sub>(3)</sub>
YELLOW BROWN SAND																											
																											() (4)
																			-							+	1
					ý														-							-	
																			$\square$								( ) (6)
																			H								( ) W
																			-								
																											224
																							_				(6)
																			H								() (10)
REMARKS:																											TECH:
																					*******						

Page Zof S

14332-7400-Rd\_F-Ind.CHR-25-quinten-final-SNA-09C-IND-SUM-2013/11/15

										Ľ	Lab ING.		1004
CIVIL CIVIL	CIVIL ENGINEERING LABORATORY		Rd name / No :							0	Client No :		7400
			Section from :								Date :		15/10/2013
	2	MDD	/ O M C				C B	R / UC	1 5	က		1	
		TMH 1: N	1: METHOD A7				TMH 1: ME	1: METHODS A8	/ A13T,	A14, /	A16T		
Sample No.			MDD / OMC	( MOD.AASHTO. )		Cor	Compaction			-	Summary	ary	
Description			Density					6 Cor	CBR %	Rel	Strengths	ths	G- Classification COLTO
Stabilising agent % and	d Mc %	_	Dry		Swell % Comp	Dry dens ka/m³	Comp % (UCS ITS		( UCS	L	CBR UCS	ITS	Table 3400-
type	-	kg/m³	kg/m³	MC %		-	(kPa)) (kPa))	) / (kPa)	(kPa))	%	% kPa	kPa	
TP 1	10.3	1968	1784 1900		MOD					100	15.6		
RED BROWN SAND	11.2	2018	1815	- 44-	0.07 15.6	1852	100.2 16.0	0.37	16.4	86	9.9		
0.5-2.7	12.6	2071	1839 1850		NRB					97	7.8		S
	13.9	2105	1848 1800		0.15 13.5	1758	95.1 5.0	0.11	5.1	95	5.0		
	14.5	-			PROC					93	3.4		
			1750	00 44 0 40 6 40 0	0.28	1670	90.4 2.0	0.04	2.0	90	1.9		
Ō	OMC 13.7	MDD	1848	7.11	AV.MC 13.4		CBR(1), UCS(2) or ITS(3)	·ΠS(3) ⇔		1	Curing regime	le	
TP 8	14.3	2003	1752 1800		MOD					100 ,	12.6		
RED BROWN SAND	15.5		1771		0.03 16.2	1789	101.0 13.0	0.34	13.3	-	11.2		
0.4-3.0	16.6	2053	1761 1750		NRB					97	10.6		NC
	17.4	2055	1750 1700	1	0.07 17.1	1675	94.6 9.0	0.22	9.2	95	9.4		
	18.5	2026	1710		PROC					93	7.7		
			1650	10 11 10 10 10 10 10 10 10 10 10 10 10 1	0.14 17.2	1610	90.9 6.0	0.15	6.2	06	5.6		
O	OMC 16.0	MDD	1771	10.0	AV.MC 16.8		CBR(1), UCS(2) or ITS(3)	ITS(3) ⇔		0 -	Curing regime	Je	
TP 12	13.4	1990	1755 1850		MOD					100	25.3		
YELLOW BROWN GRAVE		2103	1840 1800		0.33 13.7	1831	99.5 22.0	0.15	22.2	98	14.7		
0.5-2.0	15.2	2089		+	NRB					67	11.2		S
	16.1	2063	1777 1700	*	0.65 14.0	1732	94.1 5.0	0.11	5.1	95	6.5		
	17.4	2010	1712 1650		PROC					93	4.6		
			1600	13 4 143 153 164 174	0.72 14.1	1630	88.6 3.0	0.07	3.1	-	3.5		
NO	OMC 14.3	MDD	1840	1.01 2.01 0.41	AV.MC 13.9		CBR(1), UCS(2) or ITS(3)	ITS(3) ⇔		Ū	Curing regime	e	
			ξŪ		MOD					100			
			2										
					NRB					67			
										95			
					PROC					93			
	_	_	•							06			
OMC	Ç	MDD		0.0	AV.MC		CBR(1), UCS(2) or ITS(3) ⇔	ΠS(3) ⇔		Ō	Curing regime	e	11
Remarks :		W/nto	. oddod	Water added weighed and not measured								TECH	A
		AVALE		A Incerting and not measure	a by volume			•					

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14332-7400-Rd\_CBR-4 testreport-25-final.CUI-SNA-05C-CBR-UCS-ITS-REP- 2013/11/15

	Project	KWA THEM	A			Lab No :	14332
	Rd/Sect/BP					Client No :	
	Layer/Holes		2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 -	Sector and		Date :	14/10/2013
		DROMET	ER ANA	LYSIS #			
OLE & / SAMPLE No		TP 1	Modified) TP 8	(Na <sub>4</sub> P <sub>2</sub> O TP 12	7)		
						••••••••	
Description		RED BROWN SAND	RED BROWN SAND	YELLOW BROWN SAND			-
Depth		0.5 - 2.7	0.4 - 3.0	0.5 - 2.0			-
			GRADING	ANALYSI	S. (CUM	% PASSIN	1G)
	SIEVE# (mm) 106.0		(01-2)	(02-3)	(02-4)	(03-5)	-
	90.0						
	75.0						
	63.0						
	53.0						
	26.5						
	19.0						
	13.2		100	100			
	4.75		100	92			
	0.425		99 93	84 74			
	0.075		70	55			
GRADING MODULUS GM		0.49	0.39	0.87			
	1 11	07		TERBERG	CONSTA	ANTS.	
	LL PI	27 11	24 10	22 8			
	LS	5.7	5.3	4.0			1
(PI < 20, use 100 g. PI > 20 use 50 g)				DROMETE	R ANAL	YSIS	
JSED 50 / 100 g		100	100	100			
SOIL FINES				_			
STARTING TIME FINE SAND	18 sek.	56.0	60.0	58.0			
SILT	40 sek.	50.0	54.0	51.0			
CLAY	1 hr.	27.0	34.0	27.0			
EXPANSIVE CLAY	6 hrs.	24.0	30.0	23.0			
TEMPERATURE. (18 - 22) (°C)		21.0	21.0	21.0			
CORRECTION		0.4	0.4	0.4	NA	NA	NA
FINE SAND	18 sek.	56.4	60.4		OMETER	READIN	IGS
SILT	40 sek.	50.4	54.4	58.4 51.4			
CLAY	1 hrs.	27.4	34.4	27.4			
EXPANSIVE CLAY	6 hrs.	24.4	30.4	23.4			
SOIL FINES % OF	0.075	51.4	55.9	43.3			
TOTAL SAMPLE	0.05	46.0	50.4	38.1 INTAGE O	E COU	MODIAE	
C.SAND	2,0 TO 0,425	7.9	6.5	12.3	SUIL		1
F.SAND	0,425 TO 0,05	45.7	42.6	42.6			
SILT	0,05 TO 0,005	21.2	18.7	21.0			
	0,005 TO 0,002	2.8	3.7	3.5			
CLAY			28.4	20.5			
CLAY EXP. CLAY (C)	< 0,002	<b>22.5</b>	100.0	100.0			
CLAY EXP. CLAY (C) MORTAR CHECK SUM	<pre> &lt; 0,002 = 100</pre>	100.0	100.0 50.9	100.0 45 1			
CLAY EXP. CLAY (C) MORTAR CHECK SUM SILT-CLAY FRACT.	< 0,002		50.9	45.1	YINFOR	MATION	
CLAY EXP. CLAY (C) MORTAR CHECK SUM SILT-CLAY FRACT. ACTIVITY INDEX K EXP. CLAY FRACT % = 0,4x C	<pre> &lt; 0,002 = 100</pre>	100.0	50.9		YINFOR	MATION.	
CLAY           EXP. CLAY         (C)           MORTAR CHECK SUM           SILT-CLAY FRACT.           ACTIVITY INDEX K           EXP. CLAY FRACT % = 0,4x C           EFFECTIVE PI = %<0,425 X PI	<pre> &lt; 0,002 = 100</pre>	100.0 <b>46.4</b> 9.0 9.7	50.9 SUPPL	45.1 E M E N T A R	YINFOR	MATION.	
CLAY           EXP. CLAY         (C)           MORTAR CHECK SUM         SILT-CLAY FRACT.           ACTIVITY INDEX K         EXP. CLAY FRACT % = 0,4x C           EFFECTIVE PI = %<0,425 x PI	<pre> &lt; 0,002 = 100 &lt; 0.05</pre>	100.0 46.4 9.0 9.7 18	<b>50.9</b> <b>S U P P</b> L 11.4 8.9	<b>45.1</b> E M E N T A R 8.2 5.9	YINFOR	MATION.	
CLAYEXP. CLAY (C)MORTAR CHECK SUMSILT-CLAY FRACT.ACTIVITY INDEX KEXP. CLAY FRACT % = $0.4x$ CEFFECTIVE PI = $%_{<0.425} \times PI$ K = 5(( P-0.4C )(C-10 ))^{ $n.6}$ ACTIVITY CLASSIFICATION*	<pre> &lt; 0,002 = 100 &lt; 0.05 (P)</pre>	100.0 46.4 9.0 9.7 18 LOW	50.9 SUPPL 11.4 8.9 LOW	45.1 E M E N T A R 8.2 5.9 LOW	YINFOR	MATION.	
CLAY         EXP. CLAY (C)         MORTAR CHECK SUM         SILT-CLAY FRACT.         ACTIVITY INDEX K         EXP. CLAY FRACT % = 0,4x C         EFFECTIVE PI = $%_{<0,425} \times PI$ K = 5(( P-0,4C )(C-10 ))^{A_0.6}         ACTIVITY CLASSIFICATION*         ACTIVITY CLASSIFICATION (<50), LOW; (50-120), MM	<pre> &lt; 0,002 = 100 &lt; 0.05 (P)</pre>	100.0 46.4 9.0 9.7 18 LOW 200), VERY HIGH, 8	50.9 SUPPL 11.4 8.9 LOW	45.1 E M E N T A R 8.2 5.9 LOW	YINFOR	MATION.	
CLAY         EXP. CLAY (C)         MORTAR CHECK SUM         SILT-CLAY FRACT.         ACTIVITY INDEX K         EXP. CLAY FRACT % = 0,4x C         EFFECTIVE PI = $%_{<0,425} \times PI$ K = 5((P-0,4C)(C-10))^{A^0.6}         ACTIVITY CLASSIFICATION*         ACTIVITY CLASSIFICATION (<50), LOW; (50-120), MM	<pre> &lt; 0,002 = 100 &lt; 0.05 (P)</pre>	100.0 46.4 9.0 9.7 18 LOW	50.9 SUPPL 11.4 8.9 LOW	45.1 E M E N T A R 8.2 5.9 LOW	YINFOR	MATION.	
CLAYEXP. CLAY (C)MORTAR CHECK SUMSILT-CLAY FRACT.ACTIVITY INDEX KEXP. CLAY FRACT % = $0.4x$ CEFFECTIVE PI = $%_{<0.425} \times PI$ K = 5(( P-0.4C )(C-10 ))^{ $A^{0.6}}$ ACTIVITY CLASSIFICATION*	<pre> &lt; 0,002 = 100 &lt; 0.05 (P)</pre>	100.0 46.4 9.0 9.7 18 LOW 200, VERY HIGH, & 0.0763	50.9 S U P P L 11.4 8.9 LOW (where #NUM! = neg. v 0.015	45.1 E M E N T A R 8.2 5.9 LOW al), LOW. 0.0567	YINFOR	MATION.	R=

Initial district Content Timit : METHOD A17         Moisture Content Timit : METHOD A17         Moist Moist         Day weight gram         Moist weight gram         Moist weight gram         Moist weight gram         Moist weight gram         Moist weight gram         Moist gram		Project : Rd name / No :	KWA THEMA					Lab No: 14332 Client No : 7400
Moisture Content TMH 1: METHOD AT TMH 1: METHOD AT           Sample number         Description         weight gram gram gram gram weight weight gram gram gram gram gram gram gram gram		Section from :						Date : 14/10/2013
Sample number         Description         Wet         Dynamic weight we			Moisture Content TMH 1: METHOD A17					
TP1         RED BEOWN SAND         2043.3         1770.1         273.2         16.43         1           TP8         RED BROWN SAND         2102.7         1856.1         246.6         13.29         1           TP12         VELLOW BROWN SAND         2102.7         1856.1         246.6         13.29         1         1         1           TP13         VELLOW BROWN SAND         2050         1836.7         213.3         11.61         1 <td>Sample number</td> <td></td> <td>Description</td> <td>Wet weight gram</td> <td>Dry weight gram</td> <td>Moist. weight</td> <td>% Moist</td> <td>Comments</td>	Sample number		Description	Wet weight gram	Dry weight gram	Moist. weight	% Moist	Comments
TP8       RED BROWN SAND       2102.7       1856.1       246.6       13.29         TP 12       YELLOW BROWN SAND       2050       1836.7       213.3       11.61         TP 34       YELLOW BROWN SAND       2050       1836.7       213.3       11.61         TP 34       RED BROWN SAND       2016.1       1765.6       260.5       14.19	TP 1		NMO	2043.3	1770.1	273.2	15.43	
TP 12         YELLOW BROWN SAND         2050         1836.7         213.3         11.61           TP 34         TP 34         2016.1         1765.6         260.5         14.19	TP 8		RED BROWN SAND	2102.7	1856.1	246.6	13.29	
TP 34       RED BROWN SAND       2016.1       1765.6       250.5       14.19         1	TP 12		N SAND		1836.7	213.3	11.61	
	TP 34			2016.1	1765.6	250.5	14.19	
			÷	1				
	Nelliar KS.				2		тесн	2
								( 1

2013/11/15

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OF OSTRADA

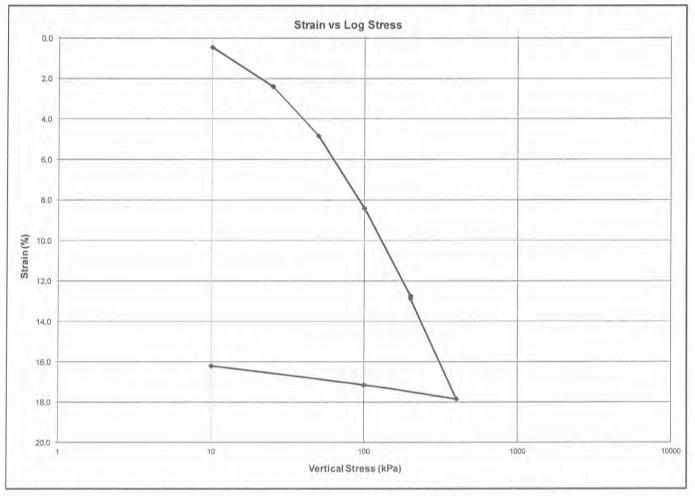
## CONSOLIDATION TESTS: COLLAPSE POTENTIAL

BS 1377 Part 5

Client SNA Civil & Struct. Eng. Project Project 14332 Sample no TP 34 Depth (m) 0.8 - 1.5 Lab no 3/10781 Job no 2013-C-1402 Date 04/11/2013

Sample Par	ameters	Unit	Value	Remarks	Test Remarks
Moisture Content	Before Test	%	15.8	Complete test specimen	Soaked @ 200kPa
	After Test	%	22.6	Complete test specimen	Collapse Potential: 0.13%
Dry Der	nsity	Kg/m³	1369		
Void R	atio	-	0.936		
Degree of Sa	aturation	%	44.7		
Initial Specim	en Height	mm	25.4		
Relative Den	sity (SG)		2.650	Assumed	

the second state		-		Test P	aramete	ors	_				 _	_
Vertical Stress	kPa	10	25	50	100	200	200	400	100	10		
Time Elapsed H <sub>100</sub>	hr mm	1 25.284	1 24.792	1 24.171	1 23.263	1 22.166	24 22.132	1 20.867	1 21.046	1 21.285		
Strain	%	0.455	2.396	4.837	8.413	12.733	12.865	17.846	17.140	16.200	_	_
Void Ratio	-	0.927	0.890	0.842	0.773	0.690	0.687	0.591	0,604	0.622	 _	
Mv (1/Mpa)		1.4	1.3	1.001	0.751	0.472	1.00	0.286	0.029	0.126		



Everything possible is done to ensure that tests are representative and are performed accurately, and that reports and conclusions are quoted correctly. Geostrada or its officials can in no way be held liable for consequential damage or loss due to any error made in carrying out the tests, nor for any erroneous statement or opinion contained in a report based on such tests. If a test report is published or reproduced by the client, it will be done in full, without any omittance.

## CONSOLIDATION TESTS: COLLAPSE POTENTIAL

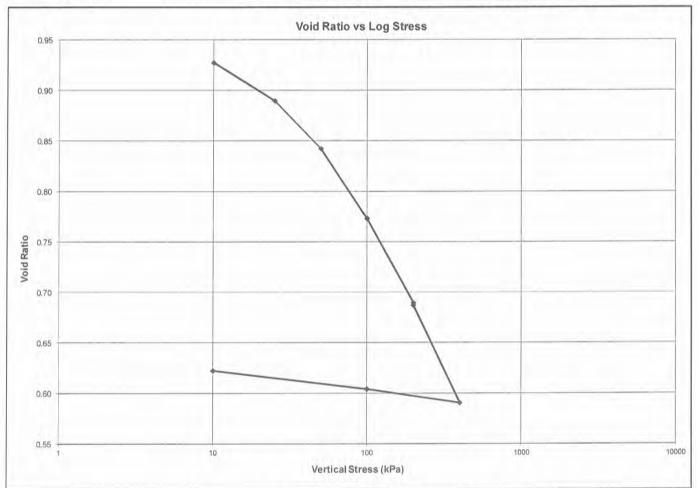
BS 1377 Part 5

Client SNA Civil & Struct. Eng. Project Project 14332 Sample no TP 34 Depth (m) 0.8 - 1.5 Lab no 3/10781 Job no 2013-C-1402

Date 04/11/2013

Sample Par	ameters	Unit	Value	Remarks	Test Remarks
Moisture Content	Before Test	%	15.8	Complete test specimen	Soaked @ 200kPa
molotare contoint	After Test	%	22.6	Complete test specimen	Collapse Potential: 0.13%
Dry Der	nsity	Kg/mª	1369		
Void R	atio	-	0.936		
Degree of Sa	aturation	%	44.7		
Initial Specim	en Height	mm	25.4		
Relative Den	sity (SG)		2,650	Assumed	

		-		Test P	aramete	ers	-		-		 	-
Vertical Stress	kPa	10	25	50	100	200	200	400	100	10	 	_
Time Elapsed	hr	1	1	1	1	1	24	1	1	1		_
H <sub>100</sub>	mm	25.284	24.792	24.171	23.263	22,166	22.132	20.867	21.046	21.285	 	_
Strain	%	0.455	2.396	4.837	8.413	12.733	12.865	17.846	17.140	16.200	 _	
Void Ratio	-	0.927	0.890	0.842	0.773	0.690	0.687	0.591	0.604	0.622	 	-
Mv (1/Mpa)			1.3	1.001	0.751	0.472	-	0.2858	0.029	0.126		



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