MATIMBA POWER STATION

ASH DUMP

GEOTECHNICAL INVESTIGATION

PREPARED FOR:

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FINAL GEOTECHNICAL REPORT

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Knight Piésold CONSULTING

TABLE OF CONTENTS

PAGE

TABLES

APPENDICES

FIGURES

1. INTRODUCTION

Knight Piésold was appointed by Umbani Joint Venture on behalf of Eskom for the design and detailed design of the ash dump extension at Matimba Power Station in Limpopo Province.

The existing ash dump (eastern portion) is approximately halfway through deposition on the designated eastern site area and the geotechnical investigation was required for the western part of the ash dump extension. Figure 1 provides the site layout. The foundations of the ash dump will be lined according to national requirements.

The purpose of the geotechnical investigation was to determine the nature and extent of the soils and bedrock across the western open area and to provide recommendations for the foundation preparation of the ash dump. Investigation on the existing ash dump was also conducted to determine the thickness of overburden material placed to limit erosion.

2. GEOLOGY

According to the published geological map of the area (Ellisras 2326), the site is underlain by the Mogalakwena Formation of the Water Group. This formation comprises predominantly coarse-grained sandstone and conglomerate. The formation is near vertical and often dips slightly in a south-west direction, implying that variations of sandstone and conglomerate may be exposed close to surface. Refer to Figure 2 that provides an abstract of the regional geological map of the area.

The Eenzaamheid fault that traverses east to west is located 2km north of the site, where the younger Karoo sediments are present north of the fault and which contains the coal formations. Numerous isolated north-west to south-east striking faults are located south of the investigated site but does not have any influence on the geology underling the investigated site.

According to Weinert's climatic index [1] [1] the site falls in an area classified as more than 5, indicating that the dominant weathering mode of rock is mechanical breakdown as opposed to chemical disintegration in areas classified as higher than 5. The mechanical breakdown of sandstone and conglomerate would typically produce coarse-grained soil horizons and limited in depth of weathering with bedrock often at shallow depths.

The formation of a pedogenic soils are present site in the form of calcrete [2]. Calcrete occurs as a horizon mainly composed of calcium carbonate, resulting from cementation and the introduction of calcite into the soil by groundwater in semi-arid regions. Calcrete is present in various forms:

- Nodular Calcrete: Mixture of silt to gravel nodules of cemented particles.
- Honeycomb Calcrete: Partly fused nodular pedocrete representing an intergrade between nodular and hardpan calcrete. It still may contain loose or soft pockets, but usually requires ripping.

[1] References are indicated thus and are listed at the back of the report.

- Hardpan Calcrete: Indurated and strongly cemented, massive, rock-like material. Consistencies vary but generally occurs with a strength similar to very soft or soft rock but may have a strength similar to medium hard rock.

3. SITE DESCRIPTION

The Matimba Ash dump is located approximately 13km west of the town of Lephalale along Nelson Mandela Drive within the Limpopo Province of South Africa. More specifically, the ash dump is located approximately 5,5km south of the Matimba Power Station and adjacent east of the Medupi Power Station. Three water reclamation dams are located south, east and north of existing ash dump.

The planned extension of the ash dump covers a surface area of approximately 400ha. The site is flat and slopes towards the south-east, with a fall in elevation from 900m above mean sea level (amsl) to 875m amsl in the south-east corner of the open site. Most of this area is fenced off and kept intact as a nature reserve, seen to host natural vegetation and wildlife. See Plate 1 in Appendix A.

Vegetation comprises a typical arid bushveld with a loose sandy topsoil/ colluvium soil cover. The boundaries of the investigated area have been defined by the client, which excludes the south-western corner due to the presence of a natural non-perennial stream and drainage feature. Several smaller dams and channels were noted during fieldwork and serve as water sources for the wildlife in the reserve. Gravel roads were created running east-west and north-south dividing the site into subsequent blocks. Test pit positions were kept next to these roads in order to limit damage to sensitive flora. See Plates 2 and 3.

A soil berm and channel were constructed towards the south-western corner of the ash dump to direct surface runoff into the southern reclamation dam. The area next to the western wall of the existing ash dam advance were cleared of vegetation and stripped of topsoil and transported soil up to bedrock or very dense material in order to accommodate the current ash load, see plate 4. Portions of this area were not accessible due to the soil berm. High voltage powerlines run along the northern and western boundaries of the site. The regional site layout is presented in Figure 1 at the end of the report.

Bedrock outcrop of sandstone/ conglomerate with shallow soil conditions (up to 0,4m thick) occurs within the central western and eastern portions of the site and comprises coarse grained soft to medium hard rock sandstone tending to conglomerate in places. See Plate 5. Deeper soils are located throughout the rest of the site.

The existing ash dump is covered by a loose sandy topsoil and overgrown by natural vegetation comprising grasses, short shrubs and trees resembling a savannah biome.

4. METHOD OF INVESTIGATION

The investigation comprised the excavation of forty-nine test pits by means of a Tractor Loaded Backhoe (TLB) from 3 to 10 April 2019. In addition to the test pits, 12 auger holes were drilled during the same visit to assess the thickness of the topsoil cover across the existing ash dump. Test pits were excavated to maximum reach or to excavation refusal at shallower depths. Test pits and auger holes were profiled by an engineering geologist according to standard practice [3] and the profile logs presented in Appendices B and C respectively.

The positions of the test pits and auger holes are indicated in Figure 1 on the site layout.

The positions of the test pits were recorded with a hand-held GPS with an accuracy of 3 meters. The coordinates of these test pits are in WGS84 Datum, South African coordinate system (27L) as displayed on the test pit logs.

Soil samples were taken from representative soil horizons and submitted to Specialised Testing Laboratories (ST Lab) in Pretoria. The laboratory testing comprised of

- Foundation indicator tests (particle size analysis and Atterberg limits),
- Organic content tests
- Standard proctor compaction tests
- Shear box test on remoulded samples
- Permeability tests on remoulded samples and,
- Consolidation tests on undisturbed samples.

The laboratory test results are contained in Appendix D.

5. INVESTIGATION RESULTS

5.1 TEST PIT PROFILES

A summary of the soil profiles is provided in Table 1 at the end of the report. The general soil profile is described below.

- The investigated area is generally covered by transported soils and sporadically by a thin topsoil cover.
- Transported soil (colluvium) occurs generally from surface to a depth of between 0,4m and 2,9m. It has a pinhole voided soil structure and a loose consistency in the upper 0,5m to 1,0m of the horizon that transitions to medium dense and dense with depth. The soil grading is mostly slightly silty sand.
- The transported soil is underlain by residual sandstone and conglomerate towards bedrock. Residual sandstone has a dense to very dense consistency and an intact to pinhole voided soil

structure. The soil has a grading of gravelly silty sand. Often the residual sandstone is reworked and includes clayey pockets.

- Residual conglomerate comprises abundant gravel matrix supported by loose or medium dense silty sand. The gravel content is often high (>50%) and is mostly rounded. Plates 6 to 10 provides illustrations of typical soil profiles on site.
- A well-developed pedogenic horizon (calcrete) has developed within the transported and residual soils at depths of between 0,4m and 2,6m. The pedogenic horizon has a consistency of between very dense to soft rock strength and comprises honeycomb to hardpan calcrete, with honeycomb being the most persistent across the site. Excavation refusal occurred at the base of most pedogenic horizons present within the investigated area.
- Bedrock occurs as highly weathered very soft to soft rock sandstone and conglomerate. Excavation refusal occurred on the soft rock sandstone/ conglomerate but also on the honeycomb to hardpan calcrete.

Two preliminary geotechnical zones were identified across the investigated area. This includes Zone A and Zone B. Zone A is characterised by shallow bedrock and areas where excavation refusal occurred at depths than less than 1,5m. Zone B comprises deeper residual and transported soils with highly developed pedogenic soils resulting in variable refusal depths, i.e. between 1,5m and 2,9m. Refer to Figure 3 indicating the extent of the zones

No groundwater seepage was encountered across the investigated area.

5.2 EXISTING ASH DUMP TOPSOIL

Twelve auger holes were drilled across the existing ash dump in order to assess the thickness and extent of the topsoil cover. A summary of the auger hole profiles is provided in Table 2, while the auger hole profiles are contained in Appendix C.

The topsoil is described as orange to dark brown, organic rich silty to gravelly sand with gravels comprising of quartz and calcrete nodules. The topsoil is present at variable depths, ranging between 0,2m and 0,8m from surface, which is underlain by coal ash.

At AG1 excavation refusal was encountered on a very dense horizons, presumably on boulders.

5.3 LABORATORY TEST RESULTS

The laboratory test results are provided in Appendix D and summarized in Table 3. Most of the samples comprised colluvium and residual sandstone due their abundancy, while the remainder of samples comprised calcrete and conglomerate.

Colluvium

The colluvium, according to the results, generally comprises slightly clayey silty sand. The sand content averages 80%, and the soil has a Grading Modulus (GM) of 1 to 1,5 (average of 1.26). The clay content

varies between 3% and 10% (average of 5%) and the soil is either non-plastic or has a Plasticity Index (PI) of between 3% and 6%. The soil has a low potential for expansiveness.

One sample that comprises calcareous colluvium (TP45) has a higher gravel content of 44%.

The Standard Proctor Maximum Dry Density (MDD) for colluvium varies between 1942kg/m^3 and 2088kg/m^3 (average of 2055kg/m^3) with an Optimum Moisture Content of 7% to 11%. The soil compacted to 95% of MDD has an internal friction angle of 34° with a zero cohesion. At the same compaction the soil has a coefficient of permeability (k-value) of 1,9 x 10^{-4} cm/s to 2 x 10^{-5} cm/s.

Residual Sandstone

The residual sandstone is relatively variable and comprises a silty clayey sand to silty gravelly sand. The clay content, mostly due to the reworking, varies either from low content but as high as 25% at TP20. The PI varies from slightly plastic to between 9% and 15% (average of 12%) and the GM between 1 and 1,6 (average of 1,15). The soil has a low potential for expansiveness.

Compaction tests yielded an MDD of between 1708kg/m^3 and 2012kg/m^3 (average of 1886kg/m^3) with an OMC of 9% to 18%. One shear box test on the soil at TP40 indicated an internal friction angle of 31% with a cohesion of 8kPa. Permeability tests on samples recompacted to 95% of MDD yielded a coefficient of permeability of between 1,1 x 10^{-7}cm/s to 3 x 10^{-8}cm/s.

Residual Conglomerate

The coarse-grained conglomerate comprises sandy gravel with very little fines content. The PI values are low and the clay content at an average of 4%.

Compaction tests indicates an MDD of between 2258kg/m^3 and 2293kg/m^3 with an OMC of 6% to 7%. Permeability tests indicated similarly a low coefficient of permeability of between 3,1 x 10^{-5}cm/s and 1,3 x 10^{-6}cm/s. No shear box tests were conducted on the material.

Honeycomb Calcrete

One sample at TP7 was tested of the honeycomb calcrete. It comprises a slightly silty gravelly sand with a clay content of 3% (slightly plastic) and has a GM of 1,86. No compaction or permeability tests were conducted on the calcrete.

Organic content tests were conducted on samples comprising mostly colluvium, while two were conducted on residual conglomerate. The results indicate that the organic content is generally low and varies between 0,6% and 3,8%. One sample of the calcareous colluvium indicated an organic content of 10%. Plate 11 provides a typical view of the topsoil.

Consolidation tests were conducted on two undisturbed samples at TP2 and TP31. The results however did not indicate that consolidation will be taking place but rather compaction settlement of the soils during loading [4]. The results indicate that approximately 200mm to 300mm of compaction can take place for loads of up to 500kPa. One collapse potential test at TP29 indicated a collapse at a stress of 200kPa, which reduced the sample volume by 38%.

6. GEOTECHNICAL EVALUATION

6.1 FOUNDATION RECOMMENDATIONS

The current ash dump, that continuously advances towards the west, requires suitable foundations for the extension to limit excessive settlement. The ash material dumped to its optimal height is covered by topsoil to limit any erosion caused by wind of rainfall. It is thus of importance that the settlement is limited to ensure the topsoil cover is not affected. It is assumed that the topsoil material is obtained from within the foundation of the ash dump extension area.

The soil profiles are relatively consistent across the site. The weathering of the underlying sandstone and conglomerate formations are limited, and soil profiles is generally thin and comprise of a sandy nature. Colluvium is the most abundant soil type and covers the site to various depths of between 0,4m and 3,4m and has an average thickness of 1,2m. The underlying residual sandstone or conglomerate is thin and comprises a dense to very dense consistency.

The soil profiles can be divided into two zones, namely soil profiles with a thickness of less than 1,5m, and soil profiles with a thickness of more than 1,5m and limited to 3,5m. These zones (Zone A and B) are illustrated in Figure 3 and labelled in Table 1. The recommendations for the foundations of each zones is as follows:

Zone A: Shallow Bedrock Zone

- Bush clearing is mostly required for access within this zone. The upper 0,2m rarely contains enough organic material suitable for topsoil for cover of the existing ash dump.
- Remove a maximum of 0,5m of colluvium from surface level, which comprises the loose silty sandy soil. The loose consistency soil includes a pinhole voided soil structure and may cause excessive compaction settlements of approximately 200mm to 300mm for every 1m of material thickness. The material should be removed and spoiled.
- Compact the in-situ floor of the foundation to at least 93% of Standard Proctor density at optimum moisture content. A large 12-ton vibratory roller should be suitable.
- Settlement below the foundation is expected to be less than 100mm for loads of up to 500kPa.
- To level the highly undulating areas for the placement of the liner, the colluvium or residual sandstone soils can be utilized. Backfilling should be conducted by placement of layers limited to 250mm thickness, compacted to 93% of Standard Proctor MDD at optimum moisture content.

The following areas has very shallow bedrock and rock outcrop at surface:

- Area covered by test pits TP10, TP11 and TP13, and
- Area covered by test pits TP14, TP21, TP22, TP26 and TP32.

Excavation at these positions is not required, only removal of vegetation and in-situ compaction where rock outcrop is not visible. It is assumed that a slightly undulating floor would not cause detrimental problems for the foundation of the ash dump extension.

If stripping of outcrop rock is required a D9 ripper may be utilized to remove a maximum of 500mm of surface rock. Any deeper excavations in rock may be classified as hard excavation.

Zone B: Deeper Bedrock Zone

The deeper bedrock zone can be divided into two parts, namely the northern and southern areas. These two areas have distinct different in situ consistencies and allowable bearing capacities. Recommendations for each area are as follows:

Northern Area at Zone B:

- This area was covered by test pits TP1 to TP8.
- Removal of at least 1,7m of material is required since the area is covered by loose colluvium with a pinhole voided soil structure to least to 2m depths.
- Compact the in-situ floor at least to least 93% of Standard Proctor density at optimum moisture content with the same roller.
- Settlement below the foundation is expected to be less than 100mm for loads of up to 500kPa.
- Sidewalls of any excavation slopes should be battered at least to 1:2 (V:H) to ensure safe slopes.
- If backfilling is required can the same apply as discussed for Zone A.

Southern Area at Zone B:

- This area has thick soils profiles but the soil consistencies from depths of between 0,5m and 1m is generally medium dense to dense and occasionally very dense towards bedrock.
- The foundation preparations for this southern area can follow the same recommendations as recommended for Zone A, viz. the removal of 0,5m of colluvium and in situ compaction as specified above.

6.2 CONSTRUCTION MATERIALS

6.2.1 ASH DUMP TOPSOIL

The results of the organic content tests indicated relatively low contents from 0,6% to 3,8%, while one sample tested at 10%. The required organic content of topsoil is generally between 12% and 18%, indicating that the topsoil, or upper colluvium material is generally poor in organic content.

The recommendations to increase the organic content to utilize as topsoil on the existing ash dump are as follows:

- Mix the topsoil with fertiliser before placement on the ash dump. The amount of fertilizer required should be recommended by a professional agronomist.
- Fertilize the soil by hydroseeding it.

- Use the vegetation removed during the bush clearing to decompose and form organic rich content suitable to mix with the soil.

6.2.2 IN SITU MATERIALS FROM FOUNDATION

Two materials were mainly tested for reuse of construction materials, namely the upper colluvium covering the site and the lower residual sandstone.

The colluvium may be utilised for embankment construction materials since the material has relatively high strength characteristics (internal friction angle of 34°). However, the clay content of the soil is low, and the material comprises a low coefficient of permeability (less than $1x10^{-5}$cm/s). The colluvium is also suitable as general or bulk fill above the foundations for preparation of the liner.

The colluvium material was not tested for road or platform construction material, however it is assumed that according to the grading and Atterberg limits the material is of poor quality.

The residual sandstone soil has slightly lower strength characteristics but contains suitable clay content. This residual soil appears to be more suitable for the construction of berms or embankments since it has a coefficient of permeability of $1x10^{-8}$cm/s. The residual sandstone is also suitable for backfilling on foundations below the liner.

It is anticipated that the pedogenic soil, honeycomb or hardpan calcrete, is a suitable material for roads or platform construction. This material was difficult to obtain for laboratory testing since excavation refusal was encountered on it. It is widely known that the calcrete can produce materials, classified according to COLTO [5], of G5 to G6 quality and suitable for road and platform construction.

The poor grading and sub-rounded to rounded gravel content of the residual conglomerate makes the material not suitable for construction.

7. REFERENCES

[1] Weinert, H. (1965). A climatic index of weathering. Geotechnique, Vol. 24, No. 4, pp. 475-488.

[2] Engineering Geology of Southern Africa (1983). Volume 3, the Karoo Sequence A.B.A Brink

[3] The South African Institute of Engineering Geologists (1996). Guidelines for Soil and Rock Logging.

[4] R.F. Craig (1998). *Soil Mechanics*, Sixth Edition.

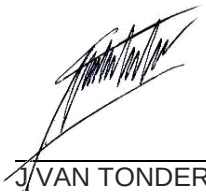
[5] COLTO. (1998). Standard Specification for Road and Bridge Works for State Road Authorities.

8. CERTIFICATION

This report was prepared and reviewed by the undersigned.

Prepared: 

P VAN ROOYEN
Junior Engineering Geologist

Reviewed: 

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Lead Engineering Geologist

TABLE 1. SUMMARY OF TEST PIT PROFILES

Zonation	TEST PIT No.	TOTAL DEPTH (m)	LAYER DEPTHS (m) – (m)						
			TRANSPORTED SOIL		RESIDUAL SOIL		Pedogenic	BEDROCK	
			Topsoil	Colluvium	Sandstone	Conglomerate	Nodular/ *Honeycomb/ **Hardpan	Sandstone	Conglomerate
B	TP1	2,9		0 - 2,2	2,2 - 2,9+				
	TP2	2,9		0 - 2,1	2,1 - 2,9+				
	TP3	1,6		0 - 1,1		1,1 - 1,6	*1,6+R		
	TP4	1,8		0 - 1,5		1,5 - 1,8		1,8+	
	TP5	2,2		0 - 2,2			*2,2+R		
A	TP6	0,6			0 - 0,6			0,6+R	
B	TP7	2,6		0 - 2,3			2,3 - 2,6+R		
	TP8	2,4		0 - 2,4		2,4+R			
A	TP9	1,4		0 - 0,8	0,8 - 1,4			1,4+	
	TP10	1,0		0 - 0,5		0,5 - 1,0			1,0+R
	TP11	0,35			0 - 0,35			0,35+R	
	TP12	1,3		0 - 1,3			*1,3+R		
	TP13	0,1				0 - 0,1			0,1+R
	TP14	0,7				0 - 0,5			0,5 - 0,7+R
	TP15	1,5		0 - 1,5			**1,5+R		
	TP16	1,0		0 - 1,0			*1,0+R		
	TP17	1,4		0 - 1,2		1,2 - 1,4	*1,4+R		
	TP18	1,5		0 - 1,1		1,1 - 1,5			1,5+ R
	TP19	1,3		0 - 1,3		1,3+R			
	TP20	1,4		0 - 0,3	0,3 - 1,4			1,4+	
	TP21	0,6				0 - 0,4			0,4 - 0,6+R
	TP22	0,6				0 - 0,6			0,6+R
	TP23	1,1		0 – 1,1				1,1+R	
	TP24	1,1		0 - 0,9	0,9 - 1,1+				

TABLE 1. SUMMARY OF TEST PIT PROFILES (continued)

Zonation	TEST PIT No.	TOTAL DEPTH (m)	LAYER DEPTHS(m) – (m)						
			TRANSPORTED SOIL		RESIDUAL SOIL		Pedogenic	BEDROCK	
			Topsoil	Colluvium	Sandstone	Conglomerate	Nodular/ *Honeycomb/ **Hardpan	Sandstone	Conglomerate
B	TP25	2,4		0 - 2,1	2,1 - 2,4+				
A	TP26	0,5				0 - 0,5			0,5+R
	TP27	1,1	0 - 0,3			0,3 - 1,1+			1,1+
B	TP28	3,4	0 - 0,3	0,3 - 3,4+					
	TP29	2,0		0 - 2,0			*2,0+R		
	TP30	1,7		0 – 0,2	0,2 – 1,7+				
A	TP31	1,5		0 - 1,3		1,3 - 1,5			1,5+R
	TP32	0,3		0 - 0,3				0,3+R	
	TP33	1,5		0 - 1,0		1,0 - 1,5			1,5+R
	TP34	0,7		0 - 0,4	0,4 - 0,7+				
	TP35	1,0		0 - 0,4	0,4 - 1,0+				
	TP36	0,9		0 - 0,4	0,4 - 0,9+				
	TP37	1,4		0 - 0,4	0,4 - 1,4+				
B	TP38	2,1		0 - 1,1	1,1 – 1,9	1,9 – 2,1			2,1+
	TP39	1,8		0 -1,6		1,6 - 1,8			1,8+
	TP40	2,3		0 - 0,8	0,8 - 2,3+				
A	TP41	1,2		0 - 0,9	0,9 - 1,2+				
	TP42	1,1		0 - 0,6	0,6 - 1,1+				
B	TP43	2,2		0 - 2,2	2,2+				
A	TP44	0,6		0 - 0,4		*0,4 – 0,6	0,6+R		
B	TP45	2,3		0 - 1,7		1,7 - 2,3			2,3+
A	TP46	1,0		0 - 1,0			**1,0+R		
	TP47	1,4		0 - 0,7	0,7 – 1,4		1,4+		
B	TP48	2,6	0 - 0,2	0,2 - 2,2		2,2 - 2,6+			
	TP49	1,6		0 - 1,5		1,5 – 1,6	**1,6+R		

R Denotes excavation refusal

TABLE 2. SUMMARY OF AUGER HOLES ON ASH DUMP

AUGER HOLE No.	TOTAL DEPTH (m)	THICKNESS OF LAYERS (m) – (m)		COMMENTS
		Topsoil	Coal Ash	
AG1	0,4	0 – 0,4+R	-	Refusal on boulders
AG2	0,8	0 – 0,8	0,8+	-
AG3	0,65	0 – 0,65	0,65+	-
AG4	0,3	0 – 0,23	0,23 – 0,3+	-
AG5	0,7	0 – 0,7	0,7+	-
AG6	0,2	0 – 0,2	0,2+	-
AG7	0,3	0 – 0,2	0,2 -0,3+	-
AG8	0,36	0 – 0,3	0,3 – 0,36+	-
AG9	0,15	0 – 0,15	0,15+	-
AG10	0,4	0 – 0,3	0,3 – 0,4+	-
AG11	0,5	0 – 0,35	0,35 – 0,5+	-
AG12	0,2	0 – 0,2	0,2+	-

Note: R - Refusal

TABLE 3: SUMMARY OF LABORATORY TEST RESULTS

SAMPLE		GRADING (%)				ATTERBERG LIMITS (%)			GM	PE	USC	STANDARD PROCTOR		PEAK SHEAR STRENGTH PARAMETERS		Coefficient of Permeability (k-value) (cm/s)	MATERIAL DESCRIPTION
No,	Depth (m)	Gravel	Sand	Silt	Clay	LL	PI	LS				MDD (kg/m³)	OMC (%)	Friction Angle (°)	Cohesion (kPa)		
TP1/1	0 – 2,2	4	74	15	6	21	6	3.0	1.09	Low	SC-SM	1942	11	-	-	-	Colluvium
TP1/2	2,2 – 2,9	25	61	13	1	-	SP	1.0	1.56	Low	SM	-	-	-	-	-	Residual Sandstone
TP2/1	0 – 2,1	3	85	6	6	-	NP	0.0	1.26	Low	SM	-	-	-	-	-	Colluvium
TP7/1	0 – 2,3	2	87	6	5	-	SP	0.5	1.26	Low	SM	2088	7	-	-	1,9E-04	Colluvium
TP7/2	2,3 – 2,6	36	56	5	3	-	SP	0.0	1.86	Low	SP-SM	-	-	-	-	-	Honeycomb Calcrete
TP9/1	0 – 0,8	1	82	7	10	17	4	2.0	1.04	Low	SC-SM	2080	9	34	0	2E-05	Colluvium
TP9/2	0,8 – 1,4	3	69	8	20	29	15	7.0	1.10	Low	SC	-	-	-	-	-	Reworked Residual Sandstone
TP14/1	0 – 0,5	68	29	2	1	-	SP	0.5	2.43	Low	GW - GM	2258	7	-	-	3,1E-05	Residual Conglomerate
TP16/1	0 – 0,8	1	88	5	6	17	3	1.5	1.27	Low	SM	-	-	-	-	-	Colluvium
TP17/1	0 – 1,2	3	88	4	5	-	SP	0.5	1.44	Low	SC	2080	8	34	0	-	Colluvium
TP17/2	1,2 – 1,4	51	42	3	4	21	9	4.0	2.18	Low	GP-GC	-	-	-	-	-	Residual Conglomerate
TP18/1	0 – 1,1	2	86	6	6	-	SP	0.5	1.24	Low	SM	-	-	-	-	-	Colluvium
TP20/1	0,3 – 1,4	2	67	6	25	28	13	6.0	1.01	Low	SM	-	-	-	-	-	Reworked Residual Sandstone
TP22/1	0 – 0,6	61	32	4	3	-	SP	0.5	2.24	Low	GP-GC	2293	6	-	-	1,3E-06	Residual Conglomerate
TP25/1	0 – 2,1	10	78	8	4	-	SP	0.5	1.46	Low	SM	-	-	-	-	-	Colluvium
TP28/1	0,3 – 3,4	4	74	18	4	29	10	5.0	1.02	Low	SC	1708	18	-	-	1.1E-07	Reworked Residual Sandstone

SAMPLE		GRADING (%)				ATTERBERG LIMITS (%)			GM	PE	USC	STANDARD PROCTOR		PEAK SHEAR STRENGTH PARAMETERS		Coefficient of Permeability (k-value) (cm/s)	MATERIAL DESCRIPTION
No,	Depth (m)	Gravel	Sand	Silt	Clay	LL	PI	LS				MDD (kg/m³)	OMC (%)	Friction Angle (°)	Cohesion (kPa)		
TP29/1	0,6 – 0,9	1	89	7	3	-	NP	0.0	1.32	Low	SW-SM	-		-	-	-	Colluvium
TP30/2	1,1 – 1,7	2	70	13	15	25	11	5.5	1.04	Low	SC	1939	11	-	-	2,9E-08	Reworked Residual Sandstone
TP31/1	0,5 – 0,85	3	81	10	6	17	4	1.5	1.24	Low	SC-SM	-	-	-	-	-	Colluvium
TP39/1	0 – 1,6	2	87	8	3	-	SP	1.0	1.24	Low	SM	2086	8	-	-	1,6E-05	Colluvium
TP40/1	0,8 – 2,3	10	72	10	8	22	9	4.0	1.31	Low	SC	2012	9	31	8	7,2E-08	Reworked Residual Sandstone
TP40/2	0 – 0,8	2	89	6	3	-	NP	0.0	1.30	Low	SM	-	-	-	-	-	Colluvium
TP45/1	0 – 1,1	44	35	14	7	31	18	8.5	1.71	Low	GC	-	-	-	-	-	Calcareous Colluvium
TP47/1	0,7 – 1,4	4	64	10	22	30	14	6.5	1.01	Low	SC	-	-	-	-	-	Reworked Residual Sandstone
TP48/1	2,2 – 2,6	60	26	7	7	54	31	20.5	2.09	Low	GC	-		-	-	-	Residual Conglomerate

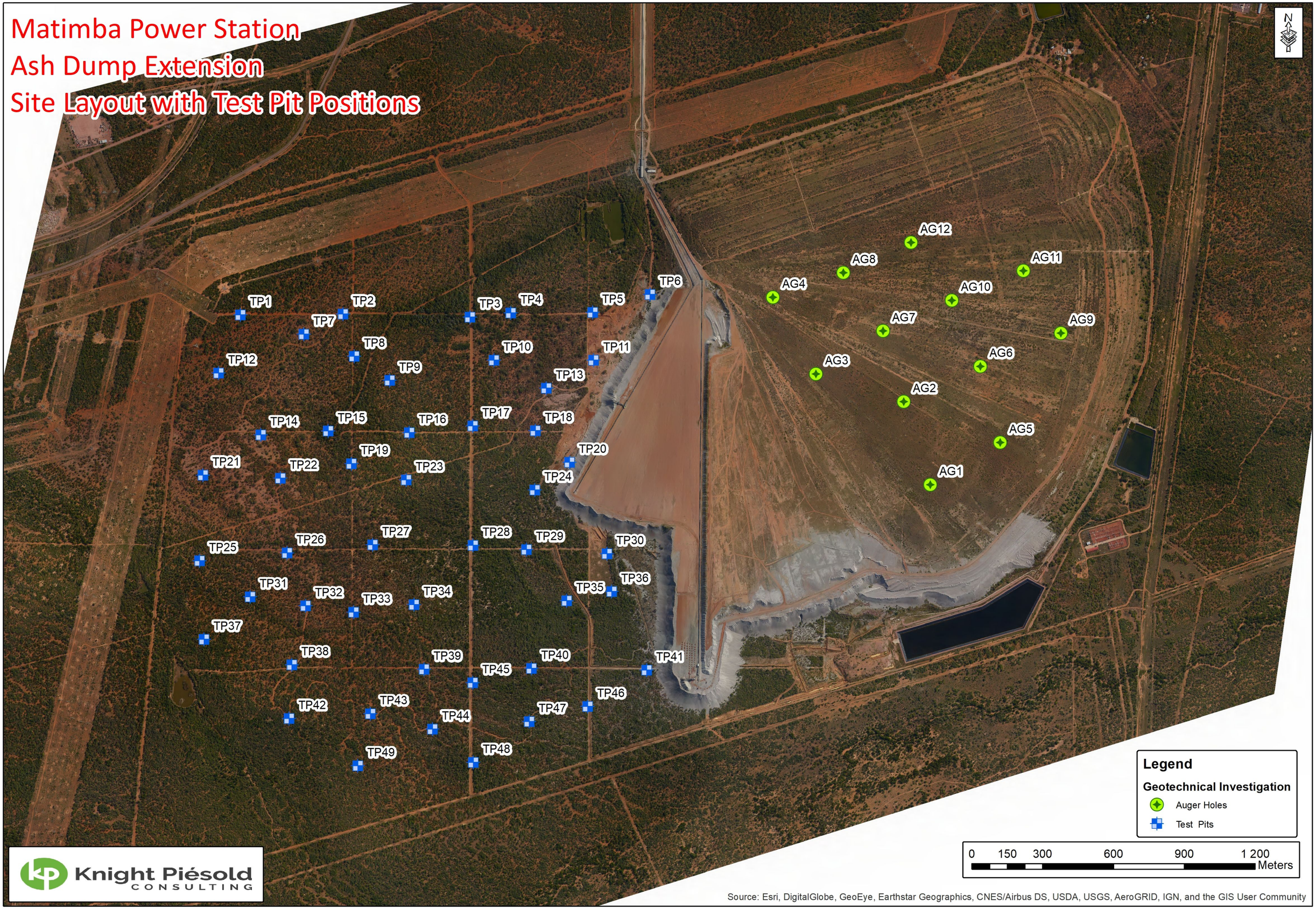
Note: * Falling Head Tests on Samples Remoulded to 95% of Modified AASHTO Density.

LL : Liquid Limit
PI : Plasticity Index of Whole Sample
LS : Linear Shrinkage
GM : Grading Modulus

PE : Potential Expansiveness
USC : Unified Soil Classification
MDD : Maximum Dry Density
OMC : Optimum Moisture Content

CBR : California Bearing Ratio
SC : Clayey Sand
SM : Silty Sand
GP : Poorly graded Gravel
GC : Poorly graded gravel-sand mixtures
SP : Poorly graded sands

Matimba Power Station
Ash Dump Extension
Site Layout with Test Pit Positions



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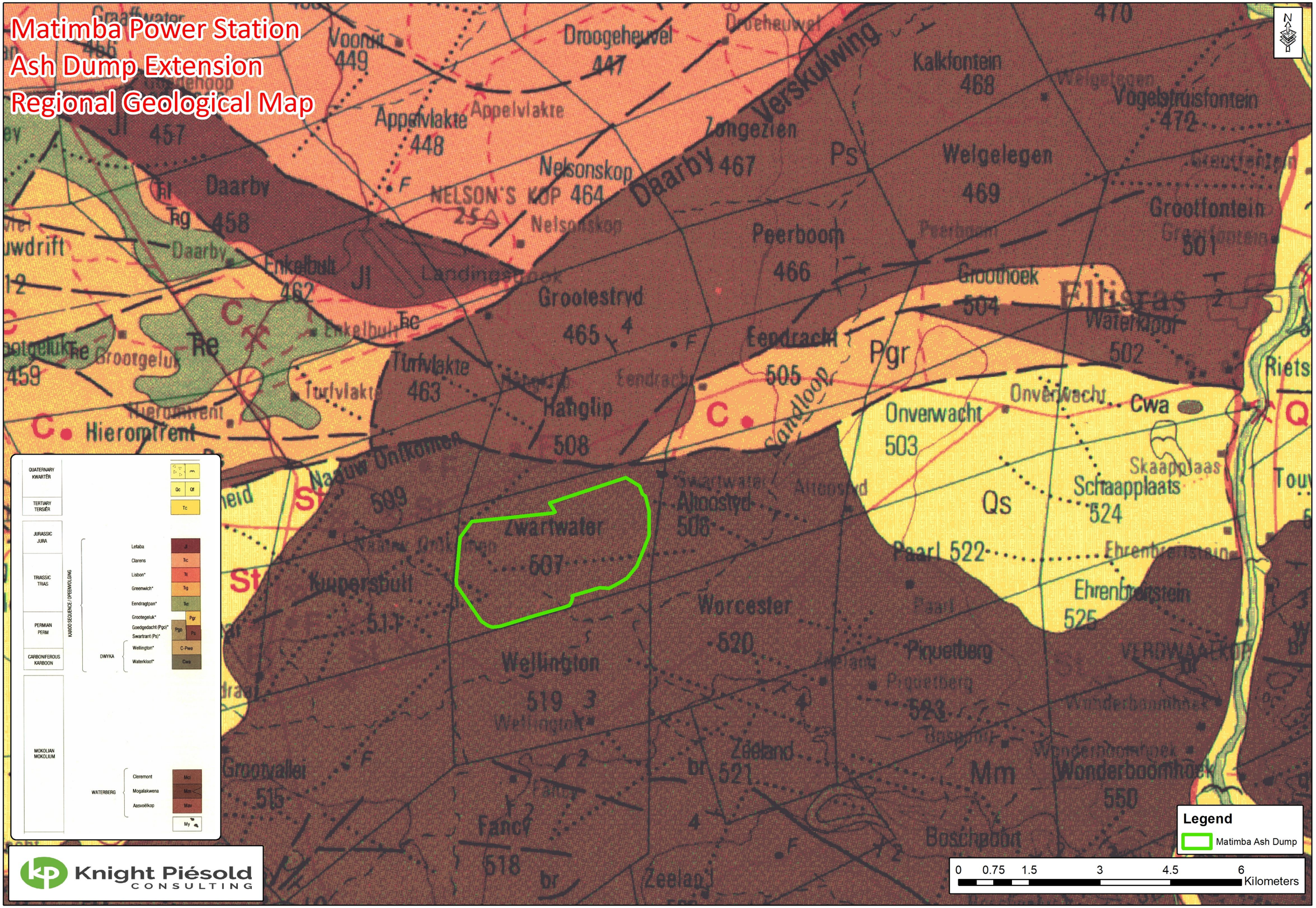
Matimba Power Station
Ash Dump Extension
Regional Geological Map



QUATERNARY KWARTÊR		Qc, Qf
TERTIARY TERSIÊR		Tc
JURASSIC JURA	KAROO SEQUENCE / OPEENVOLGING	Letaba — Jl
TRIASSIC TRIAS		Clarens — Trc
		Lisbon* — Tl
		Greenwich* — Trg
		Eendragtpan* — Tre
PERMIAN PERM		Grootegeluk* — Pgr
		Goedgedacht (Pgo)* — Pgo
		Swartrant (Ps)* — Ps
CARBONIFEROUS KARBOON	DWYKA	Wellington* — C-Pwe
		Waterkloof* — Cwa
MOKOLIAN MOKOLIUM		My
	WATERBERG	Cleremont — Mcl
		Mogalakwena — Mm
		Aasvoëlkop — Mav

Legend

Matimba Ash Dump

0 0.75 1.5 3 4.5 6 Kilometers

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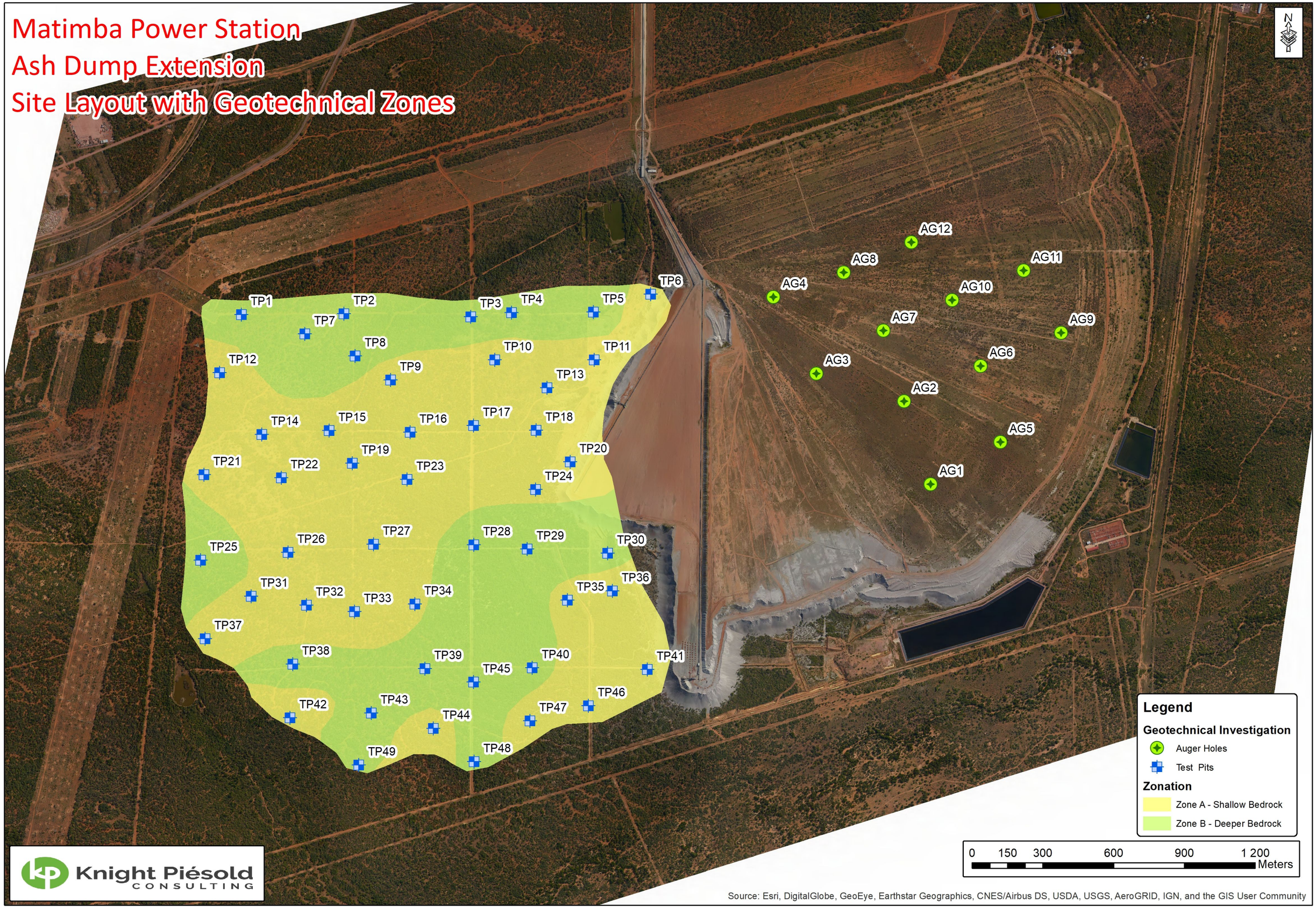
Matimba Power Station
Ash Dump Extension
Site Layout with Geotechnical Zones



APPENDIX A

SITE PHOTOGRAPHS

Plate 1: View of Nature Reserve Area

Plate 2: Vegetation on site

Plate 3: Test Pits kept mostly to access roads

Plate 4: Area stripped of vegetation next to existing ash dump

Plate 5: Bedrock outcrop

Plate 6: Soil profile of TP5 comparing colluvium

Plate 7: Soil Profile at TP46

Plate 8: Shallow soil profile at TP3

Plate 9: Soil profile in residual conglomerate

Plate 10: Soil Profile at TP42

Plate 11: View of low organic rich soil

APPENDIX B

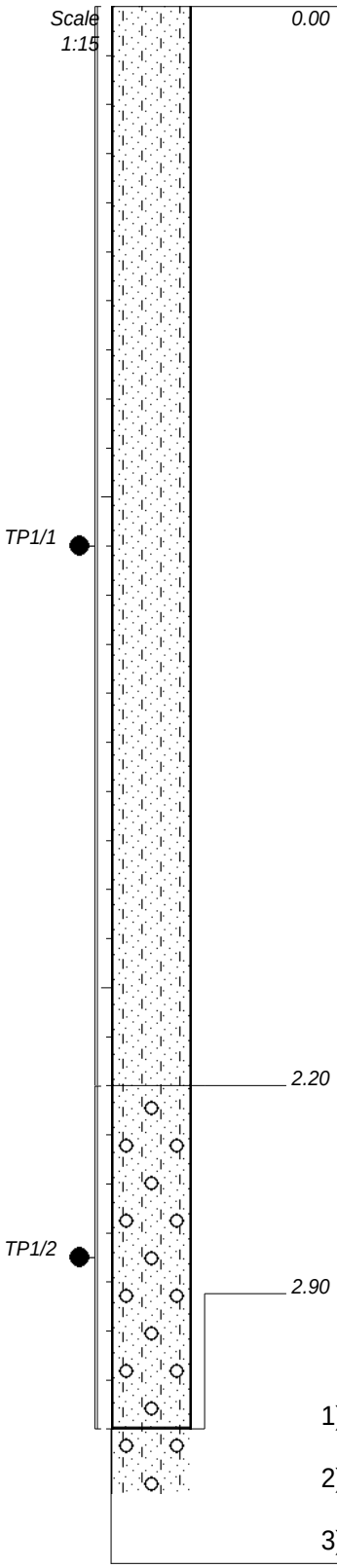
Test Pit Logs

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP1
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, reddish brown, medium dense to dense, pinholed, slightly silty fine, medium and coarse SAND with traces of roots. Slightly cemented **COLLUVIUM**.

2.20

Slightly moist, orange brown blotched reddish brown, medium dense with loose pockets, silty gravelly SAND with pockets of the above. **RESIDUAL SANDSTONE**.

2.90

EOH: Not to refusal.

NOTES

1) No groundwater seepage encountered.

2) Bulk sample TP1/1 taken between 0,0m--2,2m.

3) Small bag sample TP1/2 taken between 2,2m--2,9m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623302
Y-COORD : -59506

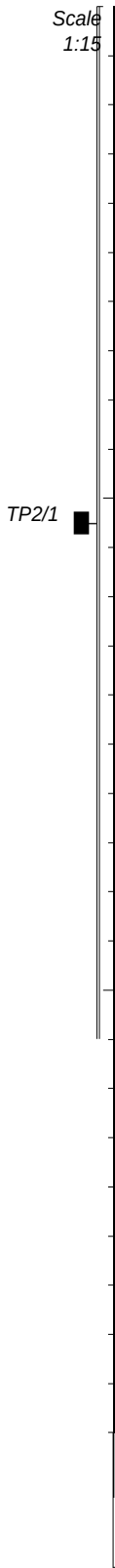
HOLE No: TP1

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP2
Sheet 1 of 1

JOB: 30100825/01



0.00 Slightly moist, greyish brown grading to orange brown at depth, medium dense to dense, pinholed, silty SAND. **COLLUVIUM**.

2.10 Slightly moist, yellow brown, loose to medium dense, silty SAND borderline sandy SILT. **RESIDUAL SANDSTONE**.

2.90 EOH: Slow excavation on slightly moist, orange to reddish brown, very dense, pinholed, silty SAND. **RESIDUAL SANDSTONE**.

NOTES

1) No groundwater seepage encountered.

2) Undisturbed sample TP2/1 taken between 0,0m--2,1m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623299
Y-COORD : -59942

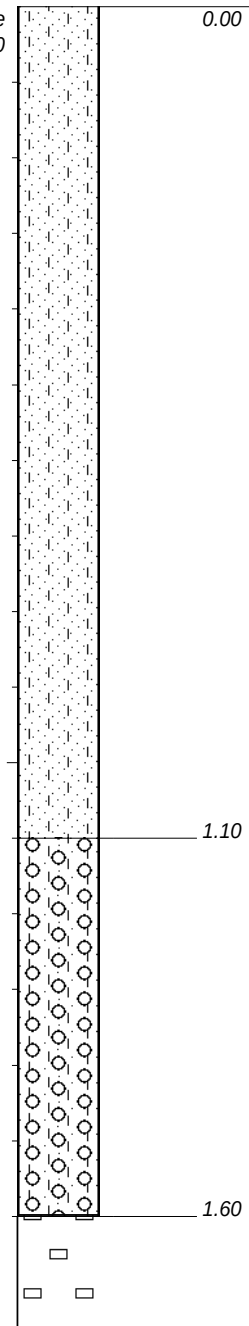
HOLE No: TP2

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP3
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, greyish brown grading to orange brown with depth, medium dense, pinholed, silty fine to coarse SAND with abundant roots. **COLLUVIUM**.

1.10

Slightly moist, orange brown blotched red and black, overall dense to very dense at base, clast supported with intact matrix, silty sandy GRAVEL comprising fine, medium and coarse, subrounded to rounded quartzite and calcrete nodules. **RESIDUAL CONGLOMERATE**.

1.60

EOH: Refusal on very dense, strongly cemented HONEYCOMB CALCRETE, with soft rock strength.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623311
Y-COORD : -60480

HOLE No: TP3

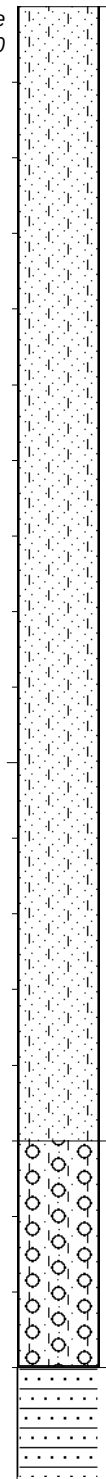
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP4
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00

Slightly moist, light greyish brown becoming reddish orange brown below 0,8m, medium dense, slightly pinholed, silty fine and medium SAND with traces of roots. **COLLUVIUM**.

1.50

Slightly moist, reddish brown, dense with very dense pockets, clast supported with slightly pinholed matrix, silty sandy GRAVEL comprising fine and medium size becoming coarse at base, subrounded to rounded quartzite, sandstone and calcrete nodules with matrix containing minor roots. **RESIDUAL CONGLOMERATE**.

1.80

EOH: Slow excavation on completely to highly weathered, red purplish brown, coarse grained, bedded, soft rock SANDSTONE.

NOTES

1) No groundwater seepage encountered.

2) No samples taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623293
Y-COORD : -60653

HOLE No: TP4

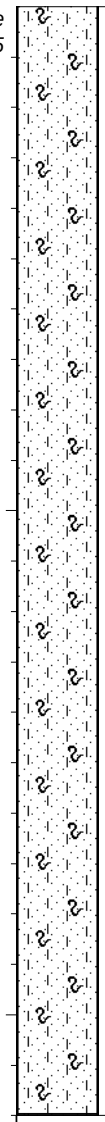
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP5
Sheet 1 of 1

JOB: 30100825/01

Scale 1:15



0.00

Wet up to 0,2m tending to moist, grey orange brown, loose, slightly pinholed, silty SAND with traces of roots and biotic action. **COLLUVIUM**.

2.20

EOH: Refusal on moderately to strongly cemented Ferruginised HONEYCOMB CALCRETE.

NOTES

1) No groundwater seepage encountered.

2) No samples taken.

3) Profiled in the rain

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623291
Y-COORD : -61000

HOLE No: TP5

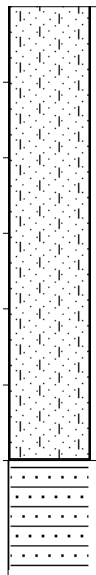
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP6
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00

Slightly moist, orange brown, dense becoming medium dense at base, intact, silty medium and coarse SAND. **RESIDUAL SANDSTONE**.

Note:
1. Pockets of orange brown mottled red moderately cemented ferruginised residual sandstone at base comprise nodular calcrete.

0.60

EOH: Refusal on highly weathered, grey blotched purple, bedded, soft rock SANDSTONE.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

3) Thin ash dust cover across test pit area.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623216
Y-COORD : -61244

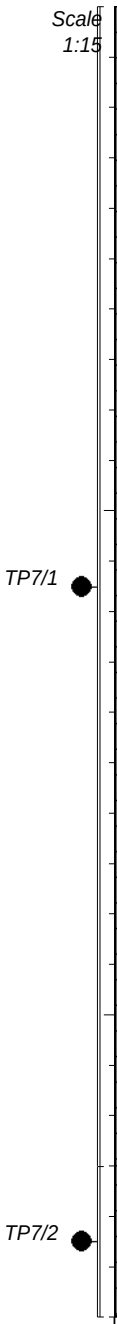
HOLE No: TP6

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP7
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, orange brown, medium dense, pinholed, silty SAND with traces of roots. **COLLUVIUM** with gradual transition into below.

2.30

Slightly moist, light grey blotched black and dark orange, overall dense to very dense, honeycombed, silty gravelly SAND. Slightly cemented NODULAR CALCRETE.

2.60

EOH: Refusal on moderately to strongly cemented HONEYCOMB CALCRETE.

NOTES

1) No groundwater seepage encountered.

2) Bulk sample TP7/1 taken between 0,0m--2,3m.

3) Small bag sample TP7/2 taken between 2,3m--2,6m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623384
Y-COORD : -59775

HOLE No: TP7

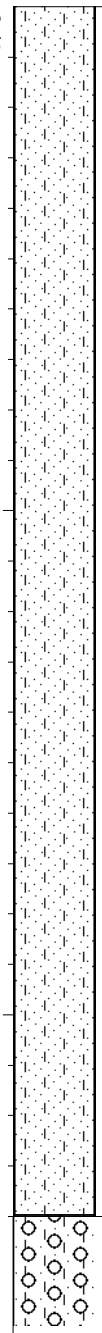
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP8
Sheet 1 of 1

JOB: 30100825/01

Scale 1:15



0.00 Slightly moist, orange brown, loose, slightly pinholed, silty with fine and coarse SAND with traces of roots. **COLLUVIUM**.

2.40 EOH: Slow excavation on very dense, silty sandy GRAVEL. **RESIDUAL CONGLOMERATE**.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623477
Y-COORD : -59989

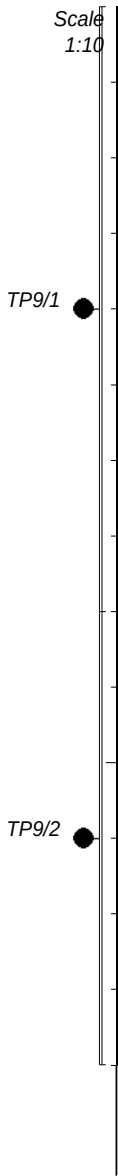
HOLE No: TP8

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP9
Sheet 1 of 1

JOB: 30100825/01



0.00 Slightly moist, greyish brown, pinholed, loose to medium dense, silty clayey SAND with minor roots. **COLLUVIUM**

0.80 Slightly moist, grey brown blotched dark orange streaked grey, dense to very dense at base, pinhole voided, slightly silty clayey SAND. **REWORKED RESIDUAL SANDSTONE** with evidence of clay infill along root channels.

1.40 EOH: Slow excavation in material as above.

NOTES

1) No groundwater seepage encountered
2) Bulk sample TP9/1 taken between 0,0m--0,8m.
3) Small bag sample TP9/2 taken between 0,8m--1,4m.
4) Bush clearing up to test pit position required.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623579
Y-COORD : -60140

HOLE No: TP9

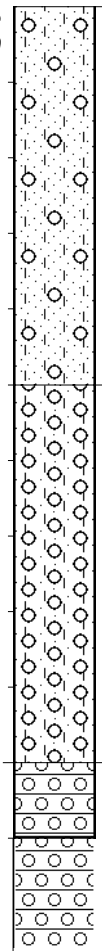
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP10
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, light orange brown, loose to medium dense, pinholed, medium and coarse gravelly silty SAND with traces of roots. **COLLUVIM**.

0.50 Slightly moist, orange brown mottled red and purple, overall medium dense to dense at base, clast supported with intact matrix, silty sandy GRAVEL comprising fine, medium and coarse rounded quartzite and calcrete nodules. RESIDUAL CONGLOMERATE**.**

1.00 EOH: Refusal on highly weathered, pink streaked purple and grey, thickly bedded, soft to medium hard rock CONGLOMERATE.

NOTES

1) No groundwater seepage encountered.

2) No samples taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623494
Y-COORD : -60582

HOLE No: TP10

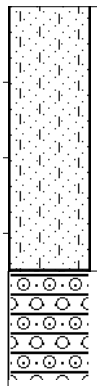
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP11
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, orange brown blotched maroon stained grey, dense with very dense pockets, intact with relict rock texture, silty medium and coarse SAND. Ferruginised **RESIDUAL SANDSTONE**.

0.35 Refusal on highly weathered, grey blotched purple, thickly bedded, coarse grained, soft to medium hard rock SANDSTONE tending to CONGLOMERATE at base.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

3) Excavated in cleared area, most of the topsoil, transported and residual material removed. Material removed approximately 1.3m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623493
Y-COORD : -61004

HOLE No: TP11

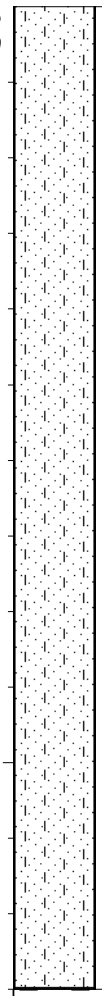
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP12
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, dark reddish brown to reddish brown, loose, slightly pinholed, silty SAND with minor roots. **COLLUVIUM**.

1.30 EOH: Refusal on strongly cemented HONEYCOMB CALCRETE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623548
Y-COORD : -59414

HOLE No: TP12

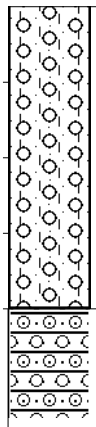
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP13
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00

Slightly moist, light greyish brown, overall medium dense with soft rock pockets, intact and relict jointed, silty sandy GRAVEL comprising highly weathered, very soft to soft rock Sandstone tending to Conglomerate. **RESIDUAL SANDSTONE** borderline **RESIDUAL CONGLOMERATE**

0.40

EOH: Refusal on highly weathered, grey blotched purple stained red, massive, widely jointed, coarse grained with minor to abundant gravels comprising medium and coarse rounded quartzite, soft to medium hard rock SANDSTONE borderline CONGLOMERATE.

NOTES

1) No groundwater encountered seepage.

2) No sample taken.

3) Sandstone outcrop encountered 1,5m east of test pit.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623612
Y-COORD : -60803

HOLE No: TP13

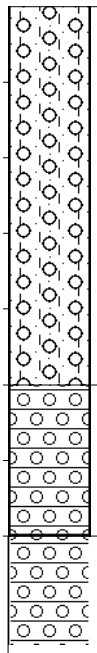
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP14
Sheet 1 of 1

JOB: 30100825/01

TP14/1
Scale 1:10



0.00 Slightly moist, grey brown, overall loose, clast supported with intact matrix, silty sandy GRAVEL comprising sub-rounded to rounded quartzite. **RESIDUAL CONGLOMERATE**.

0.50 Highly weathered, grey blotched purple stained red and orange, bedded, very soft rock CONGLOMERATE.

0.70 EOH: Refusal on highly weathered, soft to medium hard rock CONGLOMERATE.

NOTES

1) No groundwater seepage encountered.

2) Bulk sample TP14/1 taken between 0,0m?0,5m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623811
Y-COORD : -59593

HOLE No: TP14

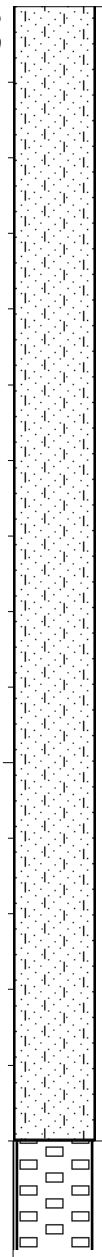
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP15
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00

Slightly moist, light greyish brown grading to yellowish brown below 0,7m, medium dense to loose at places, pinholed, silty fine to medium SAND with abundant roots. **COLLUVIUM**.

1.50

EOH: Refusal on strongly cemented HARDPAN CALCRETE, with soft rock strength.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623793
Y-COORD : -59879

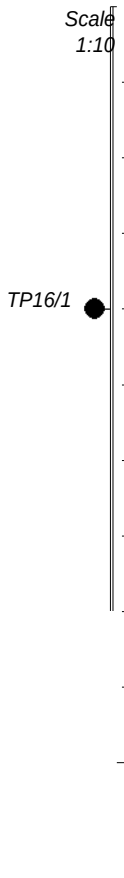
HOLE No: TP15

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP16
Sheet 1 of 1

JOB: 30100825/01



0.00 — Slightly moist, greyish brown to yellowish at base, loose to medium dense with depth, pinholed, silty fine, medium and coarse SAND. **COLLUVIUM**

0.80 — Slightly moist, greyish brown blotched orange and grey, very dense tending to very soft rock at base, pinholed, slightly clayey silty SAND. **COLLUVIUM**.

1.00 — EOH: Refusal on moderately to strongly cemented, HONEYCOMB CALCRETE, with soft rock strength.

NOTES

1) No groundwater seepage encountered.

2) Small bag sample TP16/1 taken between 0,0m--0,8m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623801
Y-COORD : -60222

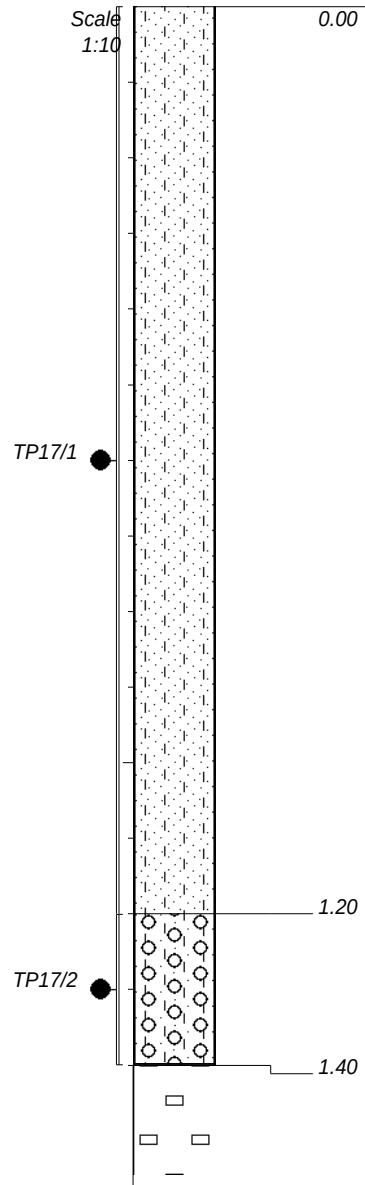
HOLE No: TP16

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP17
Sheet 1 of 1

JOB: 30100825/01



0.00 – Slightly moist, light greyish grading orange brown with depth, loose to medium dense, pinholed, silty medium to coarse SAND with traces of roots. **COLLUVIUM**.

1.20 – Slightly moist, greyish brown blotched orange and red, dense to very dense at base, clast supported with pinholed matrix, silty sandy GRAVEL comprising coarse and medium, rounded quartzite. Ferruginised **RESIDUAL CONGLOMERATE**.

1.40 – EOH: Refusal on strongly cemented HONEYCOMB CALCRETE.

NOTES

1) No groundwater seepage encountered.

2) Bulk sample TP17/1 taken between 0,0m--1,2m.

3) Small bag sample TP17/2 taken between 1,2m--1,4m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623773
Y-COORD : -60492

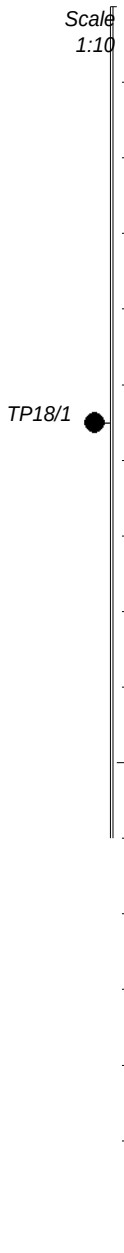
HOLE No: TP17

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP18
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, light grey brown becoming reddish brown below 0.6, medium dense, pinholed, silty SAND with scattered roots. **COLLUVIUM**.

1.10

Slightly moist, light greyish brown mottled black, overall medium dense with dense pockets, clast supported with intact matrix, silty sandy medium and coarse GRAVEL, comprising rounded quartzite and sandstone. **RESIDUAL CONGLOMERATE**.

1.50

EOH: Refusal on very dense RESIDUAL CONGLOMERATE, tending to very soft rock.

NOTES

1) No groundwater seepage encountered.

2) Small bag sample TP18/1 taken between 0,0m--1,1m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623793
Y-COORD : -60757

HOLE No: TP18

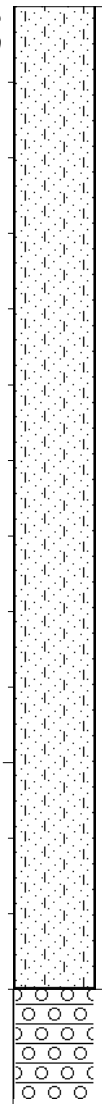
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP19
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, greyish brown, loose to medium dense at base, pinholed, silty SAND. **COLLUVIUM**.

1.30 EOH: Refusal on highly weathered CONGLOMERATE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623932
Y-COORD : -59977

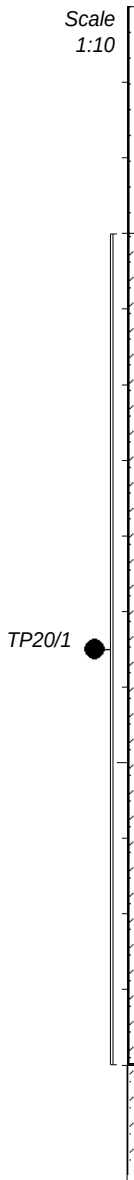
HOLE No: TP19

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP20
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, light yellow brown, loose, pinholed, silty SAND with abundant roots. **COLLUVIUM**.

0.30

Slightly moist, orange to greyish brown streaked grey, very dense, pinhole voided, relict jointed, slightly silty clayey SAND. Reworked **RESIDUAL SANDSTONE**.

1.40

EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered.
2) Small bag sample TP20/1 taken between 0,3m--1,4.
3) Area cleared by bulldozer.
4) Test pit excavated 5m from ash dump toe.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623927
Y-COORD : -60902

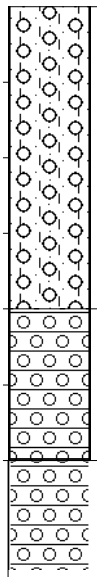
HOLE No: TP20

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP21
Sheet 1 of 1

JOB: 30100825/01



0.00 Slightly moist, grey brown, overall loose, clast supported with intact matrix, silty sandy GRAVEL comprising sub-rounded to rounded medium and coarse quartzite. **RESIDUAL CONGLOMERATE**.

0.40 Highly weathered, grey blotched purple stained red and orange, bedded, very soft rock CONGLOMERATE.

0.60 EOH: Refusal on highly weathered, soft rock CONGLOMERATE.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623981
Y-COORD : -59348

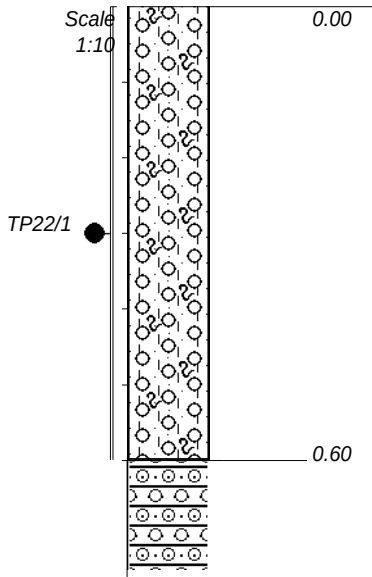
HOLE No: TP21

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP22
Sheet 1 of 1

JOB: 30100825/01



Slightly moist, dark brown, overall loose with medium dense pockets, matrix supported with pinholed matrix, silty sandy GRAVEL comprising pink and white, medium and coarse, subrounded to rounded quartzite and sandstone with minor roots. **RESIDUAL CONGLOMERATE**.

Note:
1. Abundant termite activity.

EOH: Refusal on highly weathered, pinkish brown blotched and streaked purple, bedded, soft to medium hard rock SANDSTONE borderline CONGLOMERATE. Abundant gravel as above.

NOTES

1) No groundwater encountered seepage.

2) Bulk sample TP22/1 taken between 0,0m--0,6m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2623995
Y-COORD : -59676

HOLE No: TP22

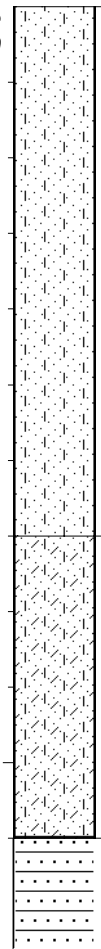
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP23
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, dark brown to light grey speckled black at base, loose to medium dense, pinhole voided, silty fine and medium SAND with minor roots. **COLLUVIUM**.

0.70 Slight moist, light grey mottled red and orange brown streaked grey along root channels, very dense, pinhole voided with biotic action resulting in voids up 0,2m, slightly clayey silty SAND. **COLLUVIUM**.

1.10 EOH: Slow excavation on very dense reworked RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624002
Y-COORD : -60210

HOLE No: TP23

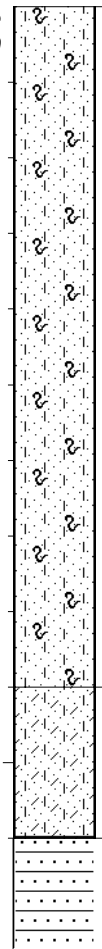
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP24
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, yellowish brown, medium dense, pinholed, silty SAND with minor roots. **COLLUVIUM**. Gradual transition into below.

0.90 Slightly moist, orange brown streaked and blotched grey, dense to very dense, pinhole voided, slightly clayey silty SAND with evidence of clay infill along root channels. **REWORKED RESIDUAL SANDSTONE**.

1.10 EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624044
Y-COORD : -60755

HOLE No: TP24

D079 E Mouton

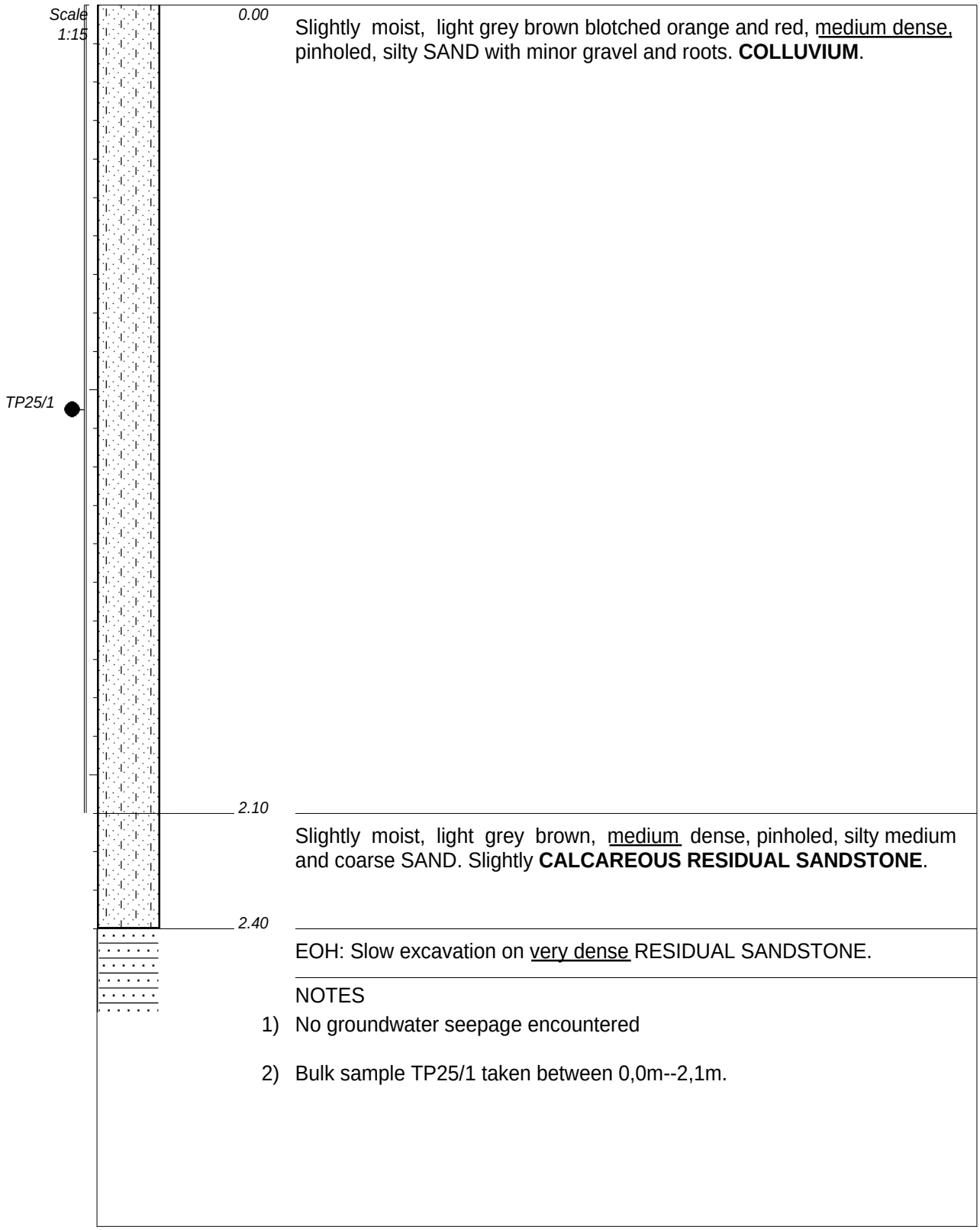
dotPLOT 7022 PBpH7

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP25
Sheet 1 of 1

JOB: 30100825/01



Slightly moist, light grey brown blotched orange and red, medium dense, pinholed, silty SAND with minor gravel and roots. **COLLUVIUM**.

Slightly moist, light grey brown, medium dense, pinholed, silty medium and coarse SAND. Slightly **CALCAREOUS RESIDUAL SANDSTONE**.

EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) Bulk sample TP25/1 taken between 0,0m--2,1m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624344
Y-COORD : -59333

HOLE No: TP25

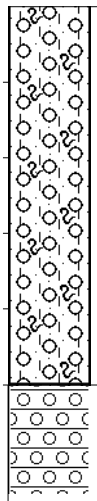
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP26
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00

Moist, dark greyish brown, loose, clast supported with pinholed matrix, silty sandy GRAVEL comprising medium and coarse subrounded to rounded quartzite and traces of roots. **RESIDUAL CONGLOMERATE**.

0.50

EOH: Refusal on highly weathered, grey blotched and streaked purple, bedded, coarse grained with minor abundant matrix supported gravel as above, very soft to soft rock CONGLOMERATE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624311
Y-COORD : -59705

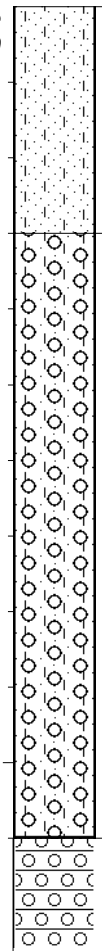
HOLE No: TP26

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP27
Sheet 1 of 1

JOB: 30100825/01



0.00 Moist, dark grey brown, loose, pinholed, silty SAND. **TOPSOIL**.

0.30 Slightly moist, greyish brown blotched orange and red, overall medium dense to dense at base, clast supported with slightly pinholed matrix, silty sandy GRAVEL comprising medium and coarse of quartzite gravel. **RESIDUAL CONGLOMERATE**.

1.10 EOH: Slow excavation on very dense RESIDUAL CONGLOMERATE**.**

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624276
Y-COORD : -60067

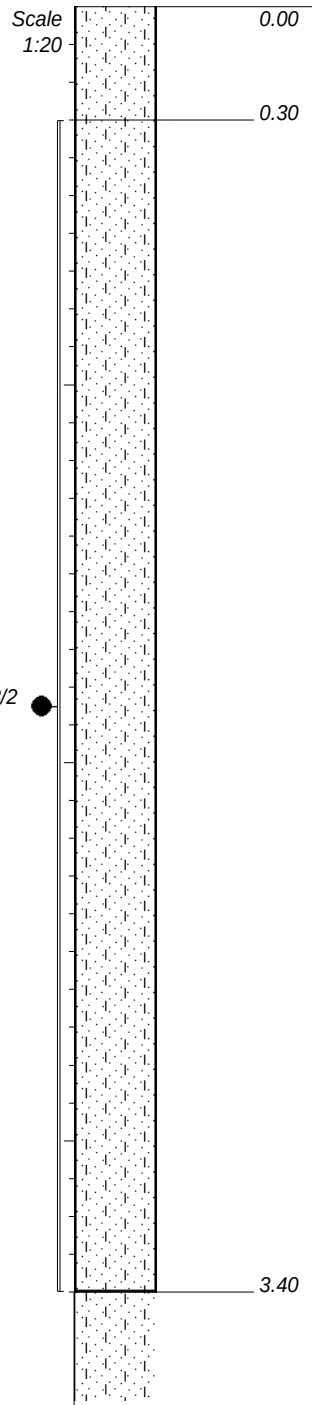
HOLE No: TP27

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP28
Sheet 1 of 1

JOB: 30100825/01



0.00 Slightly moist, greyish brown, medium dense, pinholed, silty SAND with minor roots. **TOPSOIL**.

0.30 Slightly moist, brown blotched and streaked white, medium dense becoming dense below 2,3 m, pinholed, silty medium and coarse SAND. Calcareous **REWORKED RESIDUAL SANDSTONE**.

3.40 EOH: Not to refusal.

NOTES

1) No groundwater seepage encountered.

2) Small bag sample and bulk samples TP28/1&TP28/2 taken between 0,3m--3,4m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624278
Y-COORD : -60493

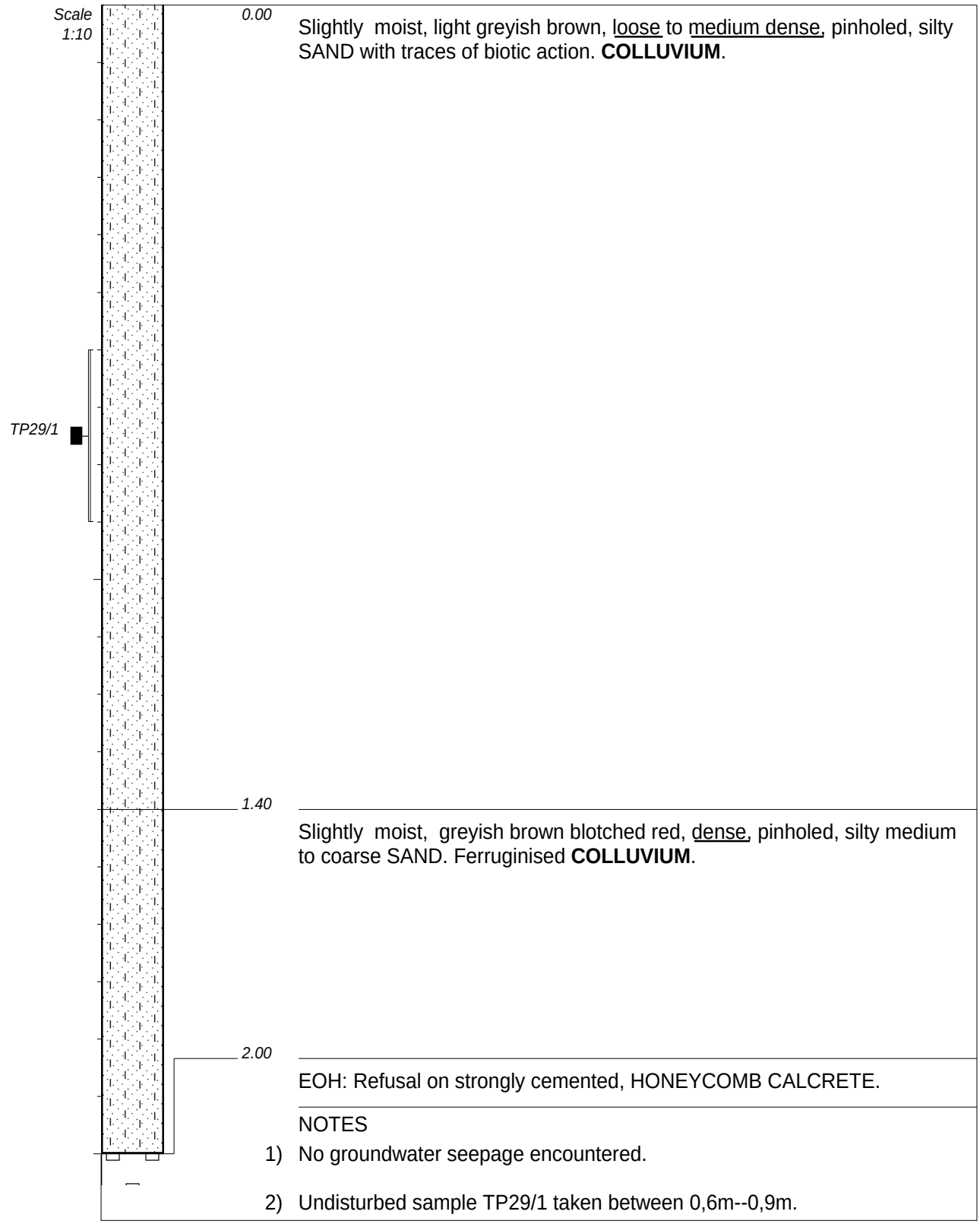
HOLE No: TP28

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP29
Sheet 1 of 1

JOB: 30100825/01



Slightly moist, light greyish brown, loose to medium dense, pinholed, silty SAND with traces of biotic action. **COLLUVIUM**.

Slightly moist, greyish brown blotched red, dense, pinholed, silty medium to coarse SAND. Ferruginised **COLLUVIUM**.

EOH: Refusal on strongly cemented, HONEYCOMB CALCRETE.

NOTES

1) No groundwater seepage encountered.

2) Undisturbed sample TP29/1 taken between 0,6m--0,9m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624297
Y-COORD : -60720

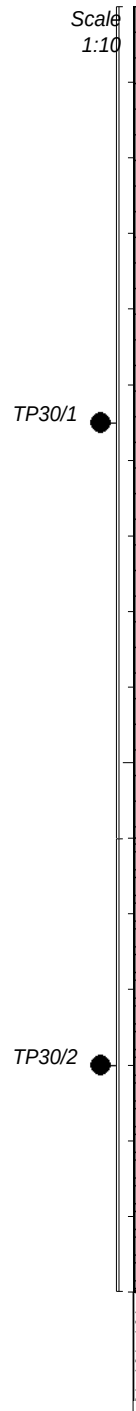
HOLE No: TP29

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP30
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, light yellow to grey brown, medium dense to dense at base, pinholed, silty SAND with minor roots. **COLLUVIUM**.

1.10

Slightly moist, orange brown streaked grey, very dense, pinholed, slightly silty clayey SAND with evidence of clay washed along root channels. **REWORKED RESIDUAL SANDSTONE**.

1.70

EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered.
2) Small bag sample TP30/1 taken between 0,0m--1,1m.
3) Bulk bag sample TP30/2 taken between 1,1m--1,7m.
4) Test pit excavated in area cleared of vegetation by bulldozer.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624315
Y-COORD : -61061

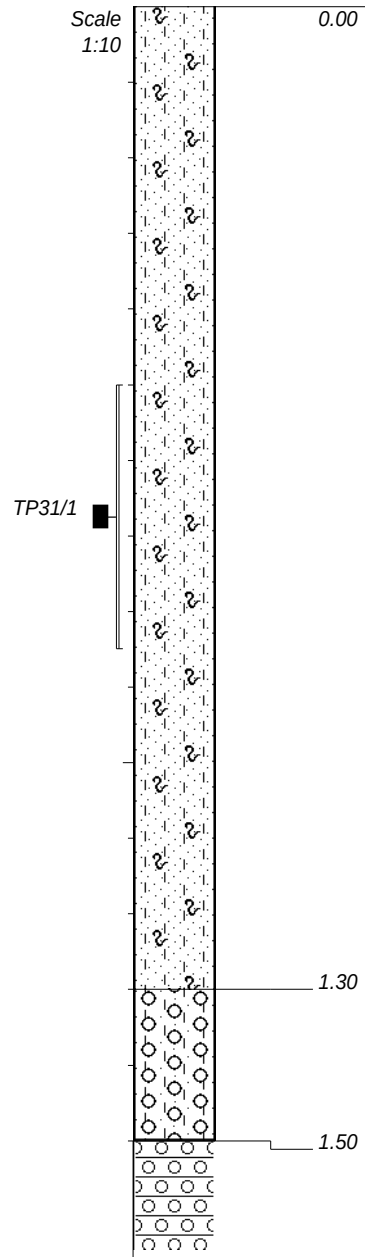
HOLE No: TP30

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP31
Sheet 1 of 1

JOB: 30100825/01



Slightly moist, grey brown to orange brown with depth, loose to medium dense to dense with depth, pinhole voided, silty SAND with minor roots. **COLLUVIUM**.

Slightly moist, greyish brown mottled and blotched orange and black, overall dense to very dense, clast supported with pinholed matrix, silty sandy GRAVEL comprising medium and coarse subrounded to rounded quartzite gravel.

EOH: Refusal on strongly cemented RESIDUAL CONGLOMERATE.

NOTES

1) No groundwater seepage encountered

2) Undisturbed sample TP31/1 taken between 0,5m--0,85m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624497
Y-COORD : -59548

HOLE No: TP31

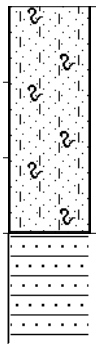
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP32
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Moist, dark greyish brown, loose, slightly pinholed, silty SAND with minor roots and gravel comprising medium and coarse quartzite. **COLLUVIUM**.

0.30 EOH: Refusal on highly weathered, grey stained red blotched and streaked purple, bedded, very soft to soft rock SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624535
Y-COORD : -59783

HOLE No: TP32

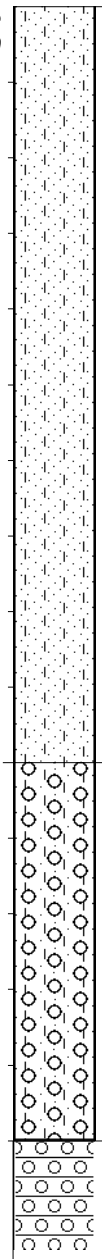
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP33
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, greyish brown to orange brown, medium dense to dense at base, slightly pinholed, silty SAND with traces of roots. **COLLUVIUM**.

1.00 Slightly moist, orange to greyish brown, overall dense, clast supported with intact matrix, silty sandy GRAVEL comprising medium and coarse subrounded to rounded quartzite. **RESIDUAL CONGLOMERATE**.

1.50 EOH: Refusal on very dense RESIDUAL CONGLOMERATE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

3) Biotic action on boundary of colluvium and residual conglomerate in form of termite cavity up to 0,3m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624562
Y-COORD : -59987

HOLE No: TP33

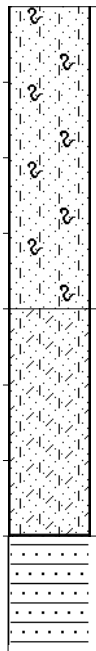
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP34
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Very moist, dark greyish brown to light greyish brown, loose to medium dense at base, pinholed and root voided, silty SAND with minor roots. **COLLUVIUM**.

0.40 Slightly moist, greyish brown blotched dark orange streaked grey, very dense, pinhole voided, slightly clayey silty SAND. **Reworked Residual SANDSTONE**.

0.70 EOH: Slow excavation in very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered
2) No sample taken.
3) Bush clearing required to reach position

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624531
Y-COORD : -60243

HOLE No: TP34

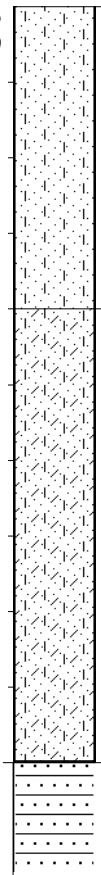
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP35
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, greyish brown, loose to medium dense, pinholed with minor roots, silty SAND. **COLLUVIUM**.

0.40 Slightly moist, orange brown streaked and blotched grey, dense to very dense at base, pinholed and root voided, slightly clayey silty SAND with traces of roots. **REWORKED RESIDUAL SANDSTONE**.

1.00 EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

3) Bush clearing up to test pit, thick bush.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624513
Y-COORD : -60890

HOLE No: TP35

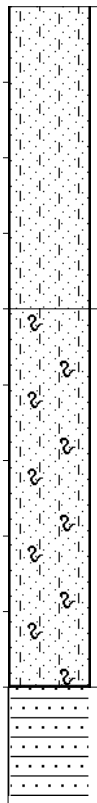
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP36
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, greyish brown, loose to medium dense, pinholed, silty SAND with abundant roots. **COLLUVIUM**.

0.40 Slightly moist, grey to orange brown streaked grey blotched dark grey, dense to very dense at base, pinhole voided, slightly clayey silty SAND with minor roots. **REWORKED RESIDUAL SANDSTONE** with evidence of clay infill along root channels.

0.90 EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624475
Y-COORD : -61081

HOLE No: TP36

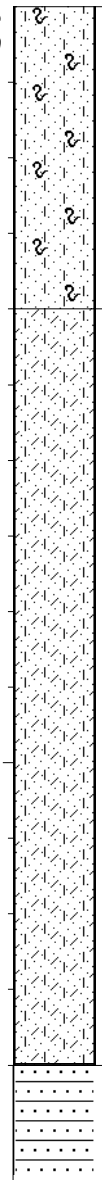
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP37
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Moist, greyish brown, loose to medium dense at base, pinholed, silty SAND with abundant roots. **COLLUVIUM**.

0.40 Slightly moist, greyish brown blotched dark orange streaked grey, dense to very dense at base, pinhole voided, slightly clayey silty SAND. Moderately to strongly cemented **Reworked Residual SANDSTONE**.

1.40 EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624678
Y-COORD : -59352

HOLE No: TP37

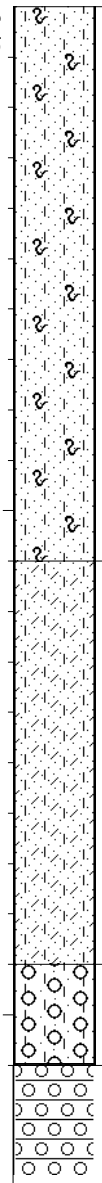
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP38
Sheet 1 of 1

JOB: 30100825/01

Scale 1:15



0.00 Slightly moist, greyish brown loose to medium dense at base, pinholed, silty SAND with minor roots. **COLLUVIUM**.

1.10 Slightly moist, greyish brown blotched dark orange, dense, pinhole voided, slightly clayey silty SAND with evidence of clay infill along root channels. **Reworked Residual SANDSTONE**.

1.90 Slightly moist, greyish brown blotched orange, very dense, overall clast supported with slightly pinholed matrix, silty sandy GRAVEL comprising medium to coarse subrounded to rounded quartzite. **RESIDUAL CONGLOMERATE**.

2.10 EOH: Slow excavation on very dense RESIDUAL CONGLOMERATE, tending to soft rock.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624785
Y-COORD : -59725

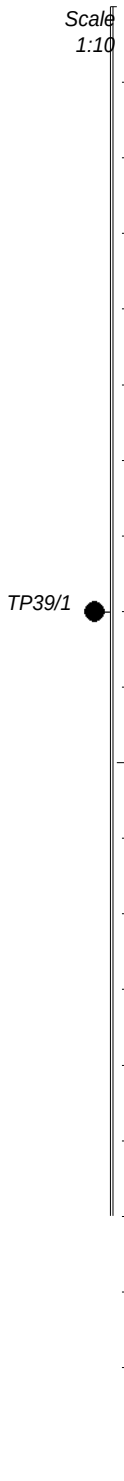
HOLE No: TP38

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP39
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, orange to greyish brown to reddish brown below 0,9 m, loose in upper 0,3m then medium dense to dense, slightly pinholed, silty SAND with traces of roots. **COLLUVIUM**.

1.60

Slightly moist, greyish brown blotched dark orange, dense to very dense, overall clast supported with slightly pinholed matrix, silty sandy GRAVEL comprising medium to coarse subrounded to rounded quartzite. **RESIDUAL CONGLOMERATE**.

1.80

EOH: Slow excavation on very dense RESIDUAL CONGLOMERATE.

NOTES

1) No groundwater seepage encountered

2) Sample TP39/1 taken between 0,0m--1,6m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624804
Y-COORD : -60286

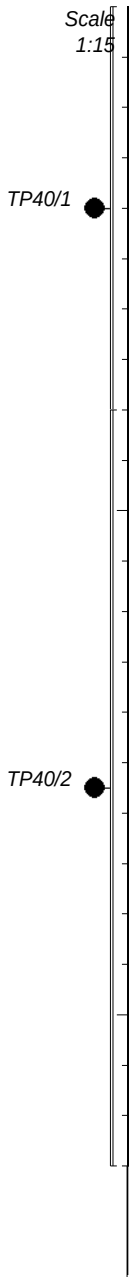
HOLE No: TP39

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP40
Sheet 1 of 1

JOB: 30100825/01



0.00

Slightly moist, light orange brown, medium dense, pinholed, silty SAND, with minor gravel. **COLLUVIUM**.

0.80

Slightly moist, greyish brown blotched and mottled orange and dark red, dense to very dense, pinholed, slightly clayey and silty medium and coarse SAND. **REWORKED RESIDUAL SANDSTONE**.

2.30

EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered.

2) Bulk and small bag sample TP40/1 taken between 0,0m--0,8m.

3) Small bag sample TP40/2 taken between 0,8m--2,3m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624800
Y-COORD : -60741

HOLE No: TP40

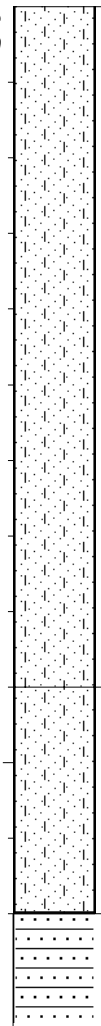
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP41
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, brown to light greyish brown mottled red, medium dense to dense, pinholed and root voided with minor roots, silty fine and medium SAND. **COLLUVIUM**.

0.90 Slightly moist, blotched and mottled orange brown stained black along root channels, very dense, pinholed, slightly clayey slightly silty SAND. **REWORKED RESIDUAL SANDSTONE**.

1.20 EOH: Slow excavation on very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624807
Y-COORD : -61229

HOLE No: TP41

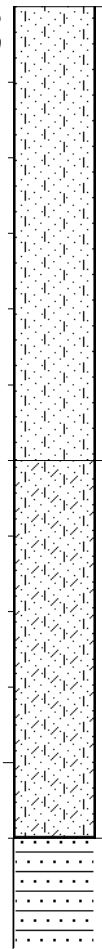
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP42
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, greyish brown loose to medium dense at base, pinholed, silty SAND with minor roots. **COLLUVIUM**.

0.60 Slightly moist, greyish brown mottled and blotched dark orange, dense to very dense at base, pinhole voided, slightly clayey silty SAND. Cemented **REWORKED RESIDUAL SANDSTONE**.

1.10 EOH: Slow excavation very dense RESIDUAL SANDSTONE.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2625012
Y-COORD : -59713

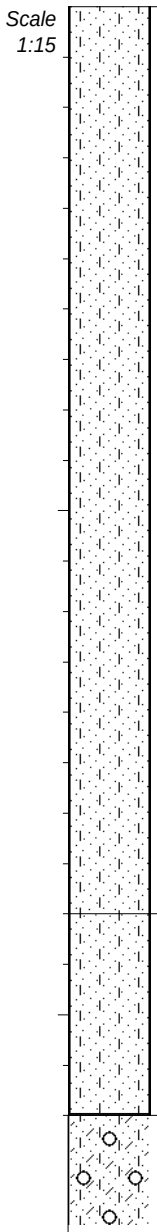
HOLE No: TP42

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP43
Sheet 1 of 1

JOB: 30100825/01



0.00 Slightly moist, orange brown, loose, slightly pinholed, silty SAND with traces of roots. **COLLUVIUM**.

1.80 Slightly moist, light grey, loose, pinholed, silty SAND. **CALCAREOUS COLLUVIUM**

2.20 EOH: Slow excavation on slightly moist, light grey blotched and mottled dark orange and black, very dense, pinholed, slightly clayey silty gravelly SAND comprising medium to coarse round quartzite. **REWORKED RESIDUAL SANDSTONE**.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624992
Y-COORD : -60057

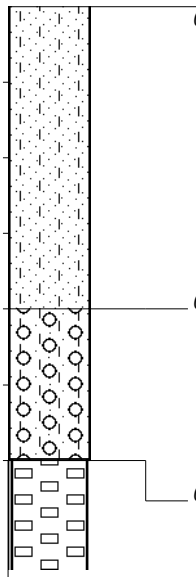
HOLE No: TP43

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP44
Sheet 1 of 1

JOB: 30100825/01



Wet, greyish brown, loose to medium dense at base, pinholed, silty SAND with minor roots. **COLLUVIUM**.

Slightly moist, greyish brown mottled and blotched orange and maroon, overall dense to very dense at base, clast supported to honeycombed, silty sandy GRAVEL comprising medium and coarse of quartzite. Cemented **RESIDUAL CONGLOMERATE** tending to HONEYCOMB CALCRETE.

EOH: Refusal on very dense HARDPAN CALCRETE, with soft rock strength.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2625058
Y-COORD : -60321

HOLE No: TP44

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP45
Sheet 1 of 1

JOB: 30100825/01

0.00 Slightly moist, light greyish brown mottled white, medium dense, pinholed, silty sandy GRAVEL, comprising fine quartzite and calcrete nodules. Calcareous **COLLUVIUM**.

1.10 Slightly moist, light greyish brown mottled purplish brown, dense, pinholed, silty SAND with minor gravel. **COLLUVIUM**.

1.70 Slightly moist, light brown mottled purplish brown, overall dense, clast supported with pinholed matrix, silty sandy GRAVEL comprising medium and fine subrounded to rounded quartzite and sandstone gravel. **RESIDUAL CONGLOMERATE**.

2.30 EOH: Slow excavation on RESIDUAL CONGLOMERATE, tending to soft rock.

NOTES

1) No groundwater seepage encountered.

2) Bulk sample TP45/1 taken between 0,0m--1,1m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624860
Y-COORD : -60492

HOLE No: TP45

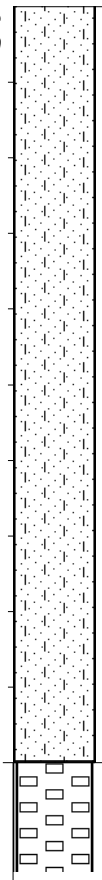
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP46
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00 Slightly moist, orange brown, medium dense, pinholed, silty SAND. **COLLUVIUM**.

1.00 EOH: Refusal on strongly cemented HARDPAN CALCRETE.

NOTES

1) No groundwater seepage encountered.

2) No sample taken.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2624961
Y-COORD : -60979

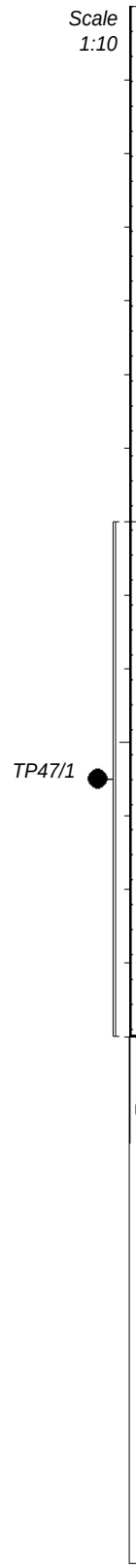
HOLE No: TP46

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP47
Sheet 1 of 1

JOB: 30100825/01



0.00 — Slightly moist, light greyish brown mottled red, medium dense to dense at base, pinholed, silty fine, medium and coarse SAND. **COLLUVIUM**.

0.70 — Slightly moist, light greyish brown mottled black and red streaked orange brown, dense to very dense, pinholed, gravelly silty SAND. **REWORKED RESIDUAL SANDSTONE**.

1.40 — EOH: Slow excavation on very dense, strongly cemented, HONEYCOMB CALCRETE.

NOTES

1) No Groundwater seepage encountered.

2) Small bag sample TP47/1 taken between 0,7m--1,4m.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2625026
Y-COORD : -60731

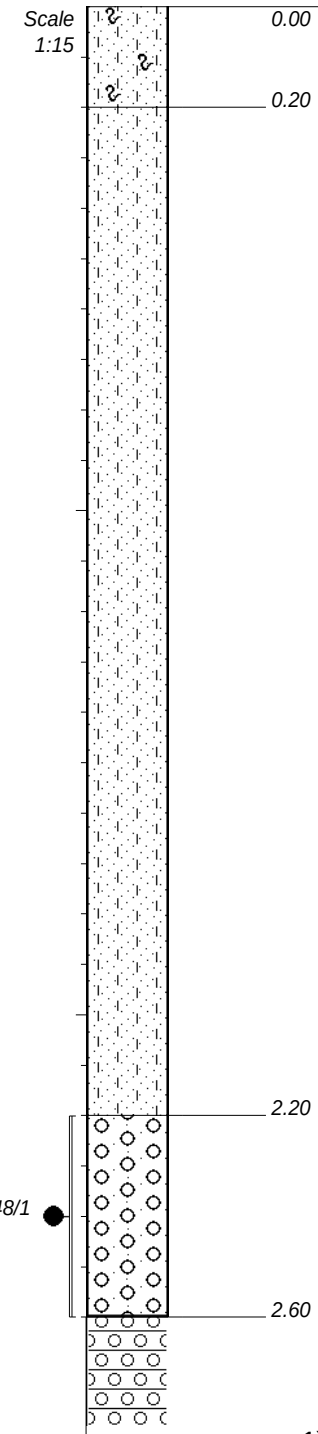
HOLE No: TP47

Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP48
Sheet 1 of 1

JOB: 30100825/01



0.00 — Slightly moist, light greyish brown, medium dense, pinholed, silty SAND with abundant roots. **TOPSOIL**.

0.20 — Slightly moist, orange to greyish brown, dense to very dense, pinholed with biotic action, silty medium and coarse SAND. **COLLUVIUM**.

2.20 — Slightly moist, greyish brown, overall very dense, clast supported with pinholed matrix, sandy GRAVEL comprising fine, medium and coarse rounded quartzite. **RESIDUAL CONGLOMERATE**.

2.60 — EOH: Slow excavation on very dense RESIDUAL CONGLOMERATE.

NOTES

1) No groundwater seepage encountered.

2) Small bag sample TP48/1 taken between 2,2m--2,6.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2625199
Y-COORD : -60494

HOLE No: TP48

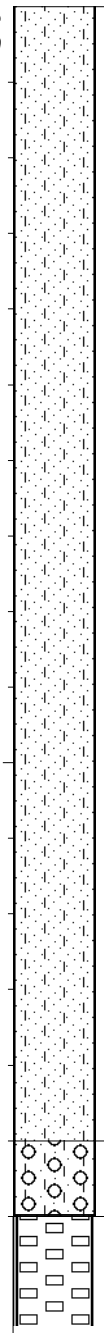
Knight Piésold CONSULTING

MATIMBA ASH DUMP
GEOTECHNICAL INVESTIGATION

HOLE No: TP49
Sheet 1 of 1

JOB: 30100825/01

Scale 1:10



0.00

Very moist to wet up to 0,4m then slightly moist, orange brown, medium dense, slightly pinholed and root voided, silty SAND with traces of roots. **COLLUVIUM**.

1.50

Slightly moist, grey mottled and blotched dark orange and black, very dense, honeycombed, slightly clayey silty sandy GRAVEL comprising subrounded quartzite and calcrete nodules. **RESIDUAL CONGLOMERATE**.

1.60

EOH: Refusal on strongly cemented HONEYCOMB to HARDPAN CALCRETE, with soft rock strength.

NOTES

1) No groundwater seepage encountered

2) No sample taken.

3) Bush clearing was required to reach test pit.

CONTRACTOR : Olifantskop Boerdery
MACHINE : 3DX Super
DRILLED BY : Lucas
PROFILED BY : PvR

TYPE SET BY : CR
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM : 0.55m
DATE :
DATE : 04/04/2019

DATE : 23/07/2019 17:35
TEXT : C\WP51\PROFILES\OLCTP.TXT

COORDINATE SYSTEM : WGS84 (Lo27)
X-COORD : 2625213
Y-COORD : -60004

HOLE No: TP49

APPENDIX C

Auger Hole Logs

Knight Piésold CONSULTING

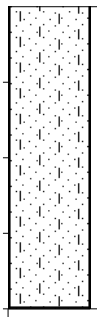
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG1
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00

Slightly moist, orange brown, silty SAND with minor medium and coarse gravel comprising quartz and ferricrete nodules. **TOPSOIL**.

Note:
1. Auger repeated 3 times.

0.40

EOH: Refusal on very dense material, possibly boulders.

NOTES

1) No groundwater encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION : 90
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM : WGS84 (Lo
X-COORD : 2624021
Y-COORD : -62431

HOLE No: AG1

D079 E Mouton

dotPLOT 7022 PBpH7

Knight Piésold CONSULTING

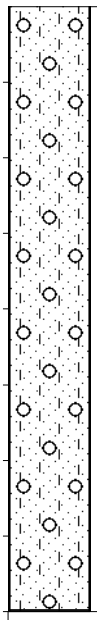
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG2
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00

Moist up to 0,3 tending to slightly moist at base, dark brown up to 0,3m tending to light orange brown, gravelly silty SAND with traces of roots and gravel comprising subrounded quartz. **TOPSOIL**.

0.80

EOH: Not to refusal. Ash encountered below 0,8m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623669
Y-COORD : -62319

HOLE No: AG2

Knight Piésold CONSULTING

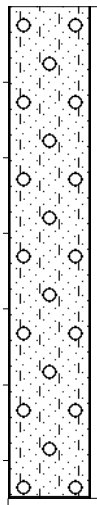
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG3
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00

Moist to slightly moist with depth, orange dark brown, gravelly silty SAND with traces of roots and gravel comprising pink medium and coarse, subrounded to rounded quartz. **TOPSOIL**.

0.65

Not to refusal. Ash encountered below 0,65m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623552
Y-COORD : -61946

HOLE No: AG3

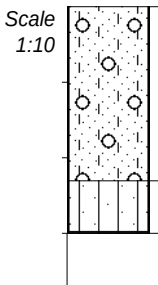
Knight Piésold CONSULTING

MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG4
Sheet 1 of 1

JOB: 3010082501



0.00 Moist, orange dark brown mottled grey, slightly gravelly silty fine and coarse SAND with gravel comprising fine rounded quartz. **TOPSOIL**.

0.23 Slightly moist, light grey, slightly fine and medium coarse sandy SILT. **ASH**.

0.30 EOH: Not to refusal.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623228
Y-COORD : -61765

HOLE No: AG4

Knight Piésold CONSULTING

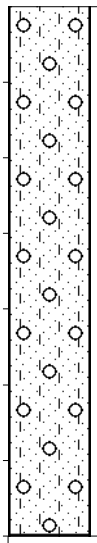
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG5
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00

Moist up to 0,3m tending to slightly moist with base, dark brown up to 0,3m tending to light orange brown with base, gravelly silty SAND with traces of roots and gravel comprising pink and white, medium and fine subrounded to rounded quartz. **TOPSOIL**.

0.70

EOH: Not to refusal. Ash encountered below 0,7m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623843
Y-COORD : -62728

HOLE No: AG5

Knight Piésold CONSULTING

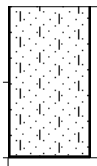
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG6
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00 Moist, orange dark brown, silty medium and fine SAND with traces of roots. **TOPSOIL**.

0.20

EOH: Not to refusal. Ash encountered below 0,2m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623520
Y-COORD : -62644

HOLE No: AG6

Knight Piésold CONSULTING

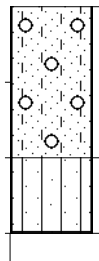
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG7
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00 Moist, orange dark brown mottled dark grey, gravelly silty SAND with gravel comprising pink, coarse, subrounded to rounded quartz. **TOPSOIL**.

0.20 Slightly moist, light grey, slightly fine and medium coarse sandy SILT. **ASH**.

0.30 EOH: Not to refusal. Ash encountered below 0,2m.

NOTES

1) Auger conducted on an area covered by abundant rounded to subrounded medium and coarse quartz gravel.

2) No water encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623369
Y-COORD : -62231

HOLE No: AG7

Knight Piésold CONSULTING

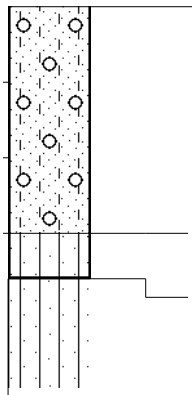
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG8
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00 Moist, orange dark brown mottled light grey speckled black, gravelly silty SAND with gravel comprising fine and coarse rounded to subrounded quartz. **TOPSOIL**.

0.30 Slightly moist, light grey, slightly fine and medium sandy SILT. **ASH**.

0.36 Not to refusal.

NOTES

1) Auger hole done within bushy area.

2) No water encountered.

3) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623123
Y-COORD : -62063

HOLE No: AG8

Knight Piésold CONSULTING

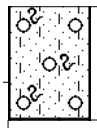
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG9
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00

Moist, orange dark brown, gravelly silty medium and coarse SAND with minor roots and gravel comprising fine and coarse subrounded quartz. **TOPSOIL**.

0.15

Not to refusal. Ash encountered below 0,15m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623379
Y-COORD : -62985

HOLE No: AG9

Knight Piésold CONSULTING

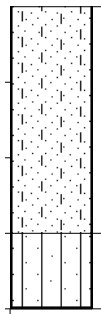
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG10
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00 Moist, light brown, slightly clayey silty medium and coarse SAND. **TOPSOIL**.

0.30 Slightly moist, light grey, slightly fine and medium coarse sandy SILT. **ASH**.

0.40 EOH: Not to refusal. Ash encountered below 0,3m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623240
Y-COORD : -62523

HOLE No: AG10

Knight Piésold CONSULTING

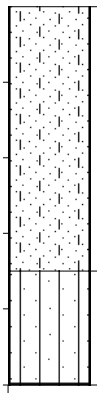
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG11
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00 Moist to slightly moist with depth, dark brown where moist becoming light brown where slightly moist, silty medium SAND with traces of roots. **TOPSOIL**.

0.35 Slightly moist, light grey, slightly fine and medium coarse sandy SILT. **ASH**.

0.50 EOH: Not to refusal. Ash encountered below 0,35m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2623114
Y-COORD : -62826

HOLE No: AG11

Knight Piésold CONSULTING

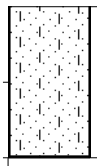
MATIMBA POWER STATION
MATIMBA ASH DUMP
AUGER HOLES

GEOTECHNICAL INVESTIGATION

HOLE No: AG12
Sheet 1 of 1

JOB: 3010082501

Scale 1:10



0.00 Moist, orange dark brown mottled and blotched grey, silty medium and fine SAND with traces of roots. **TOPSOIL**.

0.20

EOH: Not to refusal. Ash encountered below 0,2m.

NOTES

1) No water encountered.

2) No sample taken.

CONTRACTOR :
MACHINE : Auger
DRILLED BY : Mondli
PROFILED BY : CM

TYPE SET BY : CM
SETUP FILE : KPTP8.SET

INCLINATION :
DIAM :
DATE : 08/04/2019
DATE :

DATE : 16/05/2019 11:39
TEXT : C\WP51\PROFILES\OLCPVR.TXT

COORDINATE SYSTEM :
X-COORD : 2622995
Y-COORD : -62350

HOLE No: AG12

APPENDIX D

Laboratory Test Results

Specialised Testing Laboratory (Pty) Ltd
Asphalt | Aggregate | Bitumen | Geotechnical
Quality | Excellence | On Time

Unit 1, 13 Bloubokkie Street, Koedoespoort 0186
Roelof | 072 674 6343 | roelof@stlab.co.za
Gerrie | 082 309 4448 | gerrie@stlab.co.za
www.stlab.co.za

Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Job Number: KNP-03
Date: 17-Jul-19
Method: SANS 3001 GR1, GR3, GR10, GR12 GR20, GR30, GR31, GR40, GR50, GR53, GR54 & BS 1377 (where applicable)

SUMMARY OF TEST DATA

Grading & Hydrometer Analysis (% Passing)

Sample	TP1/1	TP1/2	TP2/1	TP7/1	TP7/2	TP9/1	TP9/2	TP14/1
Depth (m)	0 - 2.2	2.2 - 2.9	0.6 - 0.9	0 - 2.3	2.3 - 2.6	0 - 0.8	0.8 - 1.4	0 - 0.5
Lab No	KNP-03-15	KNP-03-16	KNP-03-17	KNP-03-18	KNP-03-19	KNP-03-20	KNP-03-21	KNP-03-22
53.0	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
37.5	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
26.5	**100**	**100**	**100**	**100**	**85**	**100**	**100**	**87**
19.0	**100**	**100**	**100**	**100**	**74**	**100**	**100**	**82**
13.2	**100**	**97**	**100**	**100**	**72**	**100**	**100**	**68**
9.5	**100**	**94**	**100**	**100**	**70**	**100**	**100**	**62**
6.7	**100**	**89**	**99**	**100**	**68**	**100**	**100**	**52**
4.75	**100**	**84**	**99**	**100**	**67**	**100**	**100**	**45**
2.00	**96**	**75**	**97**	**98**	**64**	**99**	**97**	**32**
1.00	**85**	**65**	**84**	**86**	**56**	**93**	**82**	**27**
0.425	**65**	**49**	**59**	**59**	**38**	**74**	**60**	**20**
0.250	**53**	**41**	**46**	**44**	**27**	**55**	**49**	**14**
0.150	**44**	**33**	**34**	**31**	**21**	**39**	**41**	**10**
0.075	**30**	**20**	**18**	**17**	**12**	**23**	**33**	**5**
0.060	**22**	**14**	**12**	**11**	**8**	**17**	**28**	**3**
0.050	**20**	**12**	**10**	**10**	**7**	**16**	**27**	**3**
0.035	**17**	**8**	**8**	**8**	**5**	**14**	**25**	**2**
0.020	**13**	**5**	**7**	**7**	**5**	**12**	**23**	**2**
0.006	**9**	**3**	**7**	**6**	**4**	**11**	**21**	**1**
0.002	**6**	**1**	**6**	**5**	**3**	**10**	**20**	**1**
GM	**1.09**	**1.56**	**1.26**	**1.26**	**1.86**	**1.04**	**1.10**	**2.43**

Atterberg Limits

LL (%)	**21**	**-**	**-**	**-**	**-**	**17**	**29**	**-**
PI (%)	**6**	**SP**	**NP**	**SP**	**NP**	**4**	**15**	**SP**
LS (%)	**3.0**	**1.0**	**0.0**	**0.5**	**0.0**	**2.0**	**7.0**	**0.5**

pH & Conductivity

pH								
EC (S/m)								

MDD / OMC (Proctor Effort)

MDD (kg/m^3)	**1942**			**2088**		**2080**		**2258**
OMC (%)	**10.7**			**6.7**		**8.8**		**6.9**

CBR

100%								
98%								
97%								
95%								
93%								
90%								
Swell (%)								

UCS (MPa)

100%								
97%								
90%								

COLTO Classification

Remarks:

Specialised Testing Laboratory (Pty) Ltd
Asphalt | Aggregate | Bitumen | Geotechnical
Quality | Excellence | On Time

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Date: 17-Jul-19
Method: SANS 3001 GR1, GR3, GR10, GR12 GR20, GR30, GR31, GR40, GR50, GR53, GR54 & BS 1377 (where applicable)

SUMMARY OF TEST DATA

Grading & Hydrometer Analysis (% Passing)

Sample	TP16/1	TP17/1	TP17/2	TP18/1	TP20/1	TP22/1	P25/1	TP28/1
Depth (m)	0 - 0.8	0 - 1.2	1.2 - 1.4	0 - 1.1	0.3 - 1.4	0 - 0.6	0 - 2.1	0.3 - 3.4
Lab No	KNP-03-23	KNP-03-24	KNP-03-25	KNP-03-26	KNP-03-28	KNP-03-29	KNP-03-30	KNP-03-32
53.0	**100**	**100**	**93**	**100**	**100**	**100**	**100**	**100**
37.5	**100**	**100**	**80**	**100**	**100**	**98**	**100**	**100**
26.5	**100**	**100**	**77**	**100**	**100**	**88**	**100**	**100**
19.0	**100**	**100**	**69**	**100**	**100**	**79**	**100**	**100**
13.2	**100**	**100**	**63**	**100**	**100**	**68**	**100**	**100**
9.5	**100**	**100**	**58**	**100**	**100**	**62**	**97**	**100**
6.7	**100**	**100**	**54**	**100**	**100**	**54**	**96**	**100**
4.75	**100**	**100**	**52**	**100**	**100**	**48**	**95**	**100**
2.00	**99**	**97**	**49**	**98**	**98**	**39**	**90**	**96**
1.00	**86**	**73**	**41**	**88**	**89**	**35**	**75**	**87**
0.425	**57**	**46**	**24**	**61**	**67**	**28**	**50**	**70**
0.250	**42**	**33**	**17**	**43**	**53**	**22**	**34**	**59**
0.150	**30**	**23**	**13**	**31**	**44**	**17**	**24**	**49**
0.075	**17**	**13**	**9**	**17**	**34**	**9**	**14**	**32**
0.060	**11**	**9**	**7**	**12**	**31**	**7**	**12**	**22**
0.050	**10**	**8**	**7**	**11**	**30**	**6**	**11**	**19**
0.035	**9**	**7**	**6**	**9**	**28**	**5**	**8**	**14**
0.020	**8**	**6**	**5**	**7**	**27**	**4**	**6**	**11**
0.006	**7**	**6**	**5**	**6**	**26**	**3**	**5**	**7**
0.002	**6**	**5**	**4**	**6**	**25**	**3**	**4**	**4**
GM	**1.27**	**1.44**	**2.18**	**1.24**	**1.01**	**2.24**	**1.46**	**1.02**

Atterberg Limits

LL (%)	**17**	**-**	**21**	**-**	**28**	**-**	**-**	**29**
PI (%)	**3**	**SP**	**9**	**SP**	**13**	**SP**	**SP**	**10**
LS (%)	**1.5**	**0.5**	**4.0**	**0.5**	**6.0**	**0.5**	**0.5**	**5.0**

pH & Conductivity

pH								
EC (S/m)								

MDD / OMC (Proctor Effort)

MDD (kg/m^3)		**2080**				**2293**		**1708**
OMC (%)		**8.3**				**6.1**		**17.6**

CBR

100%								
98%								
97%								
95%								
93%								
90%								
Swell (%)								

UCS (MPa)

100%								
97%								
90%								

COLTO Classification

Remarks:

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Asphalt | Aggregate | Bitumen | Geotechnical
Quality | Excellence | On Time

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SUMMARY OF TEST DATA

Grading & Hydrometer Analysis (% Passing)

Sample	TP29/1	TP30/2	TP31/1	TP39/1	TP40/1	TP40/2	TP45/1	TP47/1
Depth (m)	0.6 - 0.9	1.1 - 1.7	0.5 - 0.85	0 - 1.6	0.8 - 2.3	0 - 0.8	0 - 1.1	0.7 - 1.4
Lab No	KNP-03-33	KNP-03-35	KNP-03-36	KNP-03-37	KNP-03-38	KNP-03-39	KNP-03-40	KNP-03-41
53.0	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
37.5	**100**	**100**	**100**	**100**	**100**	**100**	**96**	**100**
26.5	**100**	**100**	**100**	**100**	**100**	**100**	**91**	**100**
19.0	**100**	**100**	**100**	**100**	**100**	**100**	**86**	**100**
13.2	**100**	**100**	**100**	**100**	**99**	**100**	**77**	**100**
9.5	**100**	**100**	**100**	**100**	**99**	**100**	**73**	**100**
6.7	**100**	**100**	**100**	**100**	**99**	**100**	**67**	**99**
4.75	**100**	**100**	**100**	**100**	**98**	**100**	**63**	**99**
2.00	**99**	**98**	**97**	**98**	**90**	**98**	**56**	**96**
1.00	**90**	**88**	**86**	**87**	**79**	**86**	**52**	**87**
0.425	**57**	**65**	**60**	**60**	**58**	**58**	**45**	**66**
0.250	**39**	**54**	**44**	**42**	**41**	**41**	**40**	**54**
0.150	**27**	**45**	**33**	**30**	**32**	**28**	**35**	**46**
0.075	**12**	**33**	**19**	**18**	**21**	**14**	**28**	**37**
0.060	**10**	**28**	**16**	**11**	**18**	**9**	**21**	**32**
0.050	**9**	**27**	**14**	**10**	**17**	**8**	**19**	**31**
0.035	**6**	**24**	**11**	**7**	**15**	**6**	**16**	**28**
0.020	**5**	**21**	**9**	**6**	**13**	**5**	**14**	**26**
0.006	**4**	**17**	**7**	**4**	**10**	**4**	**9**	**23**
0.002	**3**	**15**	**6**	**3**	**8**	**3**	**7**	**22**
GM	**1.32**	**1.04**	**1.24**	**1.24**	**1.31**	**1.30**	**1.71**	**1.01**

Atterberg Limits

LL (%)	**-**	**25**	**17**	**-**	**22**	**-**	**31**	**30**
PI (%)	**NP**	**11**	**4**	**SP**	**9**	**NP**	**18**	**14**
LS (%)	**0.0**	**5.5**	**1.5**	**1.0**	**4.0**	**0.0**	**8.5**	**6.5**

pH & Conductivity

pH								
EC (S/m)								

MDD / OMC (Proctor Effort)

MDD (kg/m^3)		**1939**		**2086**	**2012**			
OMC (%)		**10.7**		**8.4**	**9.4**			

CBR

100%								
98%								
97%								
95%								
93%								
90%								
Swell (%)								

UCS (MPa)

100%								
97%								
90%								

COLTO Classification

Remarks:

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Quality | Excellence | On Time

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Date: 17-Jul-19
Method: SANS 3001 GR1, GR3, GR10, GR12 GR20, GR30, GR31, GR40, GR50, GR53, GR54 & BS 1377 (where applicable)

SUMMARY OF TEST DATA

Grading & Hydrometer Analysis (% Passing)

Sample	TP48/1							
Depth (m)	2.2 - 2.6							
Lab No	KNP-03-42							
53.0	**100**							
37.5	**93**							
26.5	**89**							
19.0	**86**							
13.2	**76**							
9.5	**67**							
6.7	**58**							
4.75	**50**							
2.00	**40**							
1.00	**36**							
0.425	**32**							
0.250	**27**							
0.150	**23**							
0.075	**19**							
0.060	**14**							
0.050	**13**							
0.035	**11**							
0.020	**9**							
0.006	**8**							
0.002	**7**							
GM	**2.09**							

Atterberg Limits

LL (%)	**54**							
PI (%)	**31**							
LS (%)	**20.5**							

pH & Conductivity

pH								
EC (S/m)								

MDD / OMC (Proctor Effort)

MDD (kg/m^3)								
OMC (%)								

CBR

100%								
98%								
97%								
95%								
93%								
90%								
Swell (%)								

UCS (MPa)

100%								
97%								
90%								

COLTO Classification

Remarks:

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Job Number: KNP-03
Date: 2019-07-17
Method: SANS 3001 GR1, GR3, GR10 GR12 & BS 1377 (where applicable)

FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP1/1	TP1/2	TP2/1	Sample	TP1/1	TP1/2	TP2/1
Depth (m)	0 - 2.2	2.2 - 2.9	0.6 - 0.9	Depth (m)	0 - 2.2	2.2 - 2.9	0.6 - 0.9
Lab No	KNP-03-15	KNP-03-16	KNP-03-17	Lab No	KNP-03-15	KNP-03-16	KNP-03-17
53.0	**100**	**100**	**100**	Liquid Limit (%)	**21**	**-**	**-**
37.5	**100**	**100**	**100**	Plastic Limit (%)	**15**	**-**	**-**
26.5	**100**	**100**	**100**	Plasticity Index (%)	**6**	**SP**	**NP**
19.0	**100**	**100**	**100**	Linear Shrinkage (%)	**3.0**	**1.0**	**0.0**
13.2	**100**	**97**	**100**	PI of whole sample	**4**	**-**	**-**
9.5	**100**	**94**	**100**				
6.7	**100**	**89**	**99**	% Gravel	**4**	**25**	**3**
4.75	**100**	**84**	**99**	% Sand	**74**	**61**	**85**
2.00	**96**	**75**	**97**	% Silt	**16**	**13**	**6**
1.00	**85**	**65**	**84**	% Clay	**6**	**1**	**6**
0.425	**65**	**49**	**59**	Activity	**1.0**	**0.0**	**0.0**
0.250	**53**	**41**	**46**				
0.150	**44**	**33**	**34**	% Soil Mortar	**96**	**75**	**97**
0.075	**30**	**20**	**18**				
0.060	**22**	**14**	**12**	Grading Modulus	**1.09**	**1.56**	**1.26**
0.050	**20**	**12**	**10**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**17**	**8**	**8**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**13**	**5**	**7**				
0.006	**9**	**3**	**7**	Unified (ASTM D2487)	**SC-SM**	**SM**	**SM**
0.002	**6**	**1**	**6**	AASHTO (M145-91)	**A - 2 - 4**	**A - 1 - b**	**A - 2 - 4**

Remarks: *: Assumed
N / T: Not Tested

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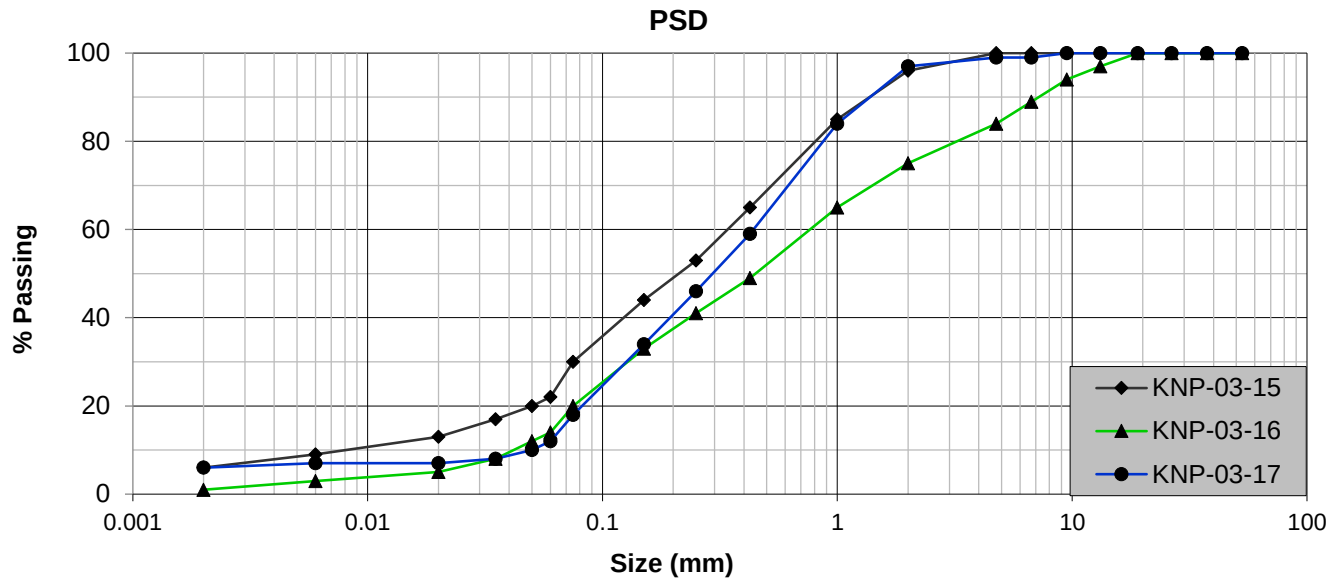
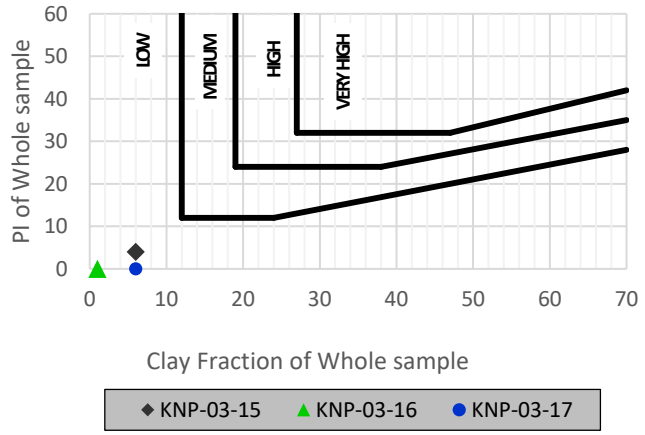
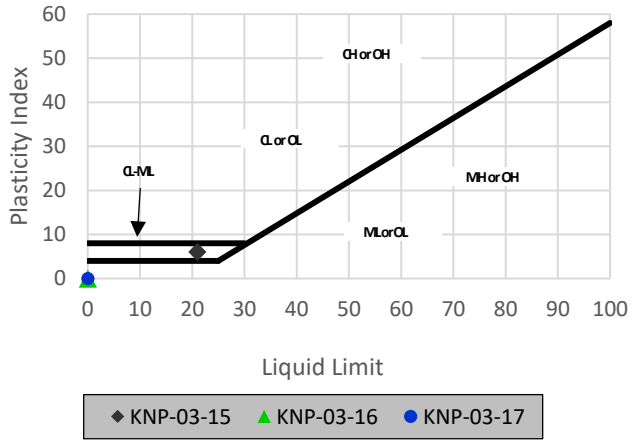
FOUNDATION INDICATOR



Potential Expansiveness



Casagrande Plasticity Chart



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FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP7/1	TP7/2	TP9/1	Sample	TP7/1	TP7/2	TP9/1
Depth (m)	0 - 2.3	2.3 - 2.6	0 - 0.8	Depth (m)	0 - 2.3	2.3 - 2.6	0 - 0.8
Lab No	KNP-03-18	KNP-03-19	KNP-03-20	Lab No	KNP-03-18	KNP-03-19	KNP-03-20
53.0	**100**	**100**	**100**	Liquid Limit (%)	**-**	**-**	**17**
37.5	**100**	**100**	**100**	Plastic Limit (%)	**-**	**-**	**13**
26.5	**100**	**85**	**100**	Plasticity Index (%)	**SP**	**SP**	**4**
19.0	**100**	**74**	**100**	Linear Shrinkage (%)	**0.5**	**0.0**	**2.0**
13.2	**100**	**72**	**100**	PI of whole sample	**-**	**-**	**3**
9.5	**100**	**70**	**100**				
6.7	**100**	**68**	**100**	% Gravel	**2**	**36**	**1**
4.75	**100**	**67**	**100**	% Sand	**87**	**56**	**82**
2.00	**98**	**64**	**99**	% Silt	**6**	**5**	**7**
1.00	**86**	**56**	**93**	% Clay	**5**	**3**	**10**
0.425	**59**	**38**	**74**	Activity	**0.0**	**0.0**	**0.4**
0.250	**44**	**27**	**55**				
0.150	**31**	**21**	**39**	% Soil Mortar	**98**	**64**	**99**
0.075	**17**	**12**	**23**				
0.060	**11**	**8**	**17**	Grading Modulus	**1.26**	**1.86**	**1.04**
0.050	**10**	**7**	**16**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**8**	**5**	**14**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**7**	**5**	**12**				
0.006	**6**	**4**	**11**	Unified (ASTM D2487)	**SM**	**SP-SM**	**SC-SM**
0.002	**5**	**3**	**10**	AASHTO (M145-91)	**A - 2 - 4**	**A - 1 - b**	**A - 2 - 4**

Remarks: *: Assumed
N / T: Not Tested

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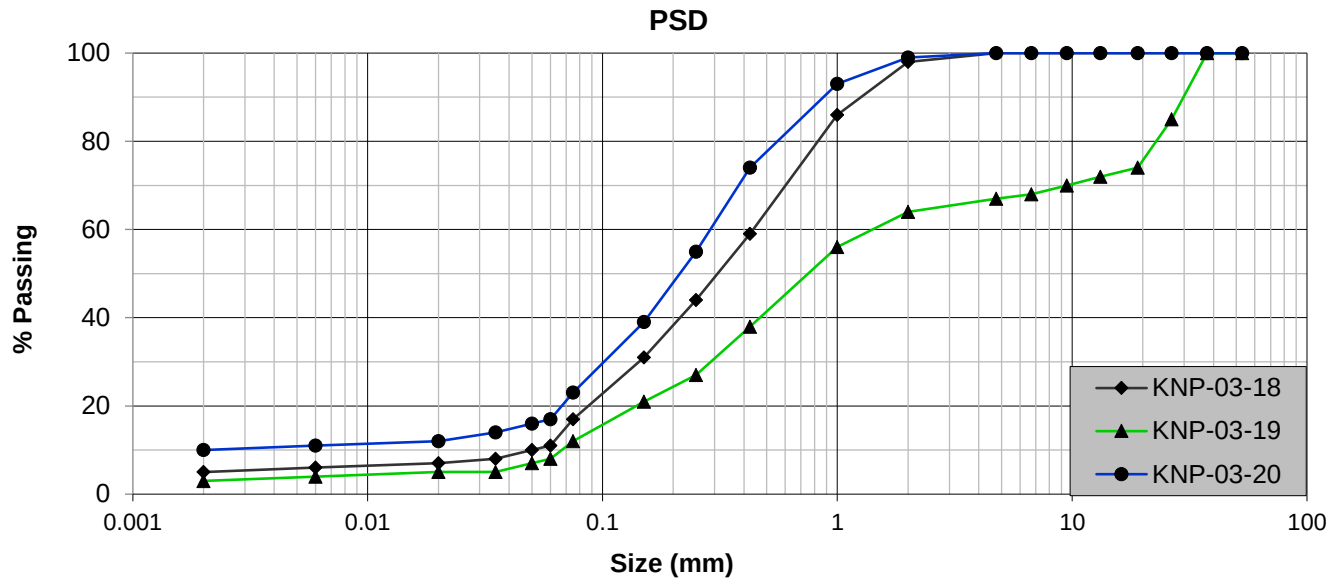
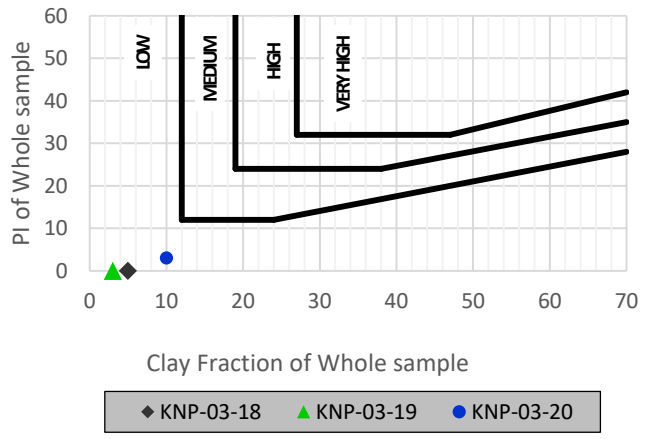
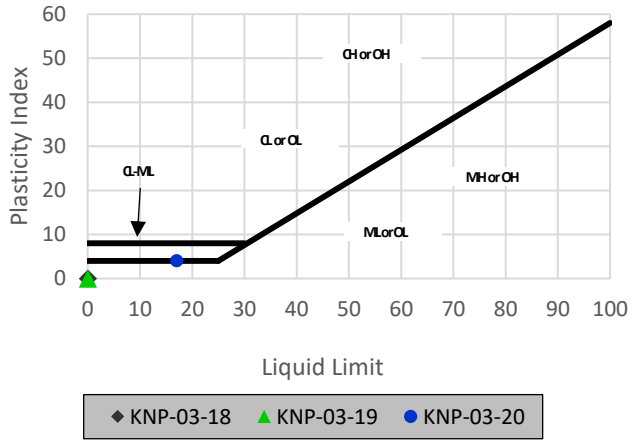
FOUNDATION INDICATOR



Potential Expansiveness



Casagrande Plasticity Chart



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Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Job Number: KNP-03
Date: 2019-07-17
Method: SANS 3001 GR1, GR3, GR10 GR12 & BS 1377 (where applicable)

FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP9/2	TP14/1	TP16/1	Sample	TP9/2	TP14/1	TP16/1
Depth (m)	0.8 - 1.4	0 - 0.5	0 - 0.8	Depth (m)	0.8 - 1.4	0 - 0.5	0 - 0.8
Lab No	KNP-03-21	KNP-03-22	KNP-03-23	Lab No	KNP-03-21	KNP-03-22	KNP-03-23
53.0	**100**	**100**	**100**	Liquid Limit (%)	**29**	**-**	**17**
37.5	**100**	**100**	**100**	Plastic Limit (%)	**14**	**-**	**14**
26.5	**100**	**87**	**100**	Plasticity Index (%)	**15**	**SP**	**3**
19.0	**100**	**82**	**100**	Linear Shrinkage (%)	**7.0**	**0.5**	**1.5**
13.2	**100**	**68**	**100**	PI of whole sample	**9**	**-**	**2**
9.5	**100**	**62**	**100**				
6.7	**100**	**52**	**100**	% Gravel	**3**	**68**	**1**
4.75	**100**	**45**	**100**	% Sand	**69**	**29**	**88**
2.00	**97**	**32**	**99**	% Silt	**8**	**2**	**5**
1.00	**82**	**27**	**86**	% Clay	**20**	**1**	**6**
0.425	**60**	**20**	**57**	Activity	**0.8**	**0.0**	**0.5**
0.250	**49**	**14**	**42**				
0.150	**41**	**10**	**30**	% Soil Mortar	**97**	**32**	**99**
0.075	**33**	**5**	**17**				
0.060	**28**	**3**	**11**	Grading Modulus	**1.10**	**2.43**	**1.27**
0.050	**27**	**3**	**10**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**25**	**2**	**9**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**23**	**2**	**8**				
0.006	**21**	**1**	**7**	Unified (ASTM D2487)	**SC**	**GW-GM**	**SM**
0.002	**20**	**1**	**6**	AASHTO (M145-91)	**A - 2 - 6**	**A - 1 - a**	**A - 2 - 4**

Remarks: *: Assumed
N / T: Not Tested

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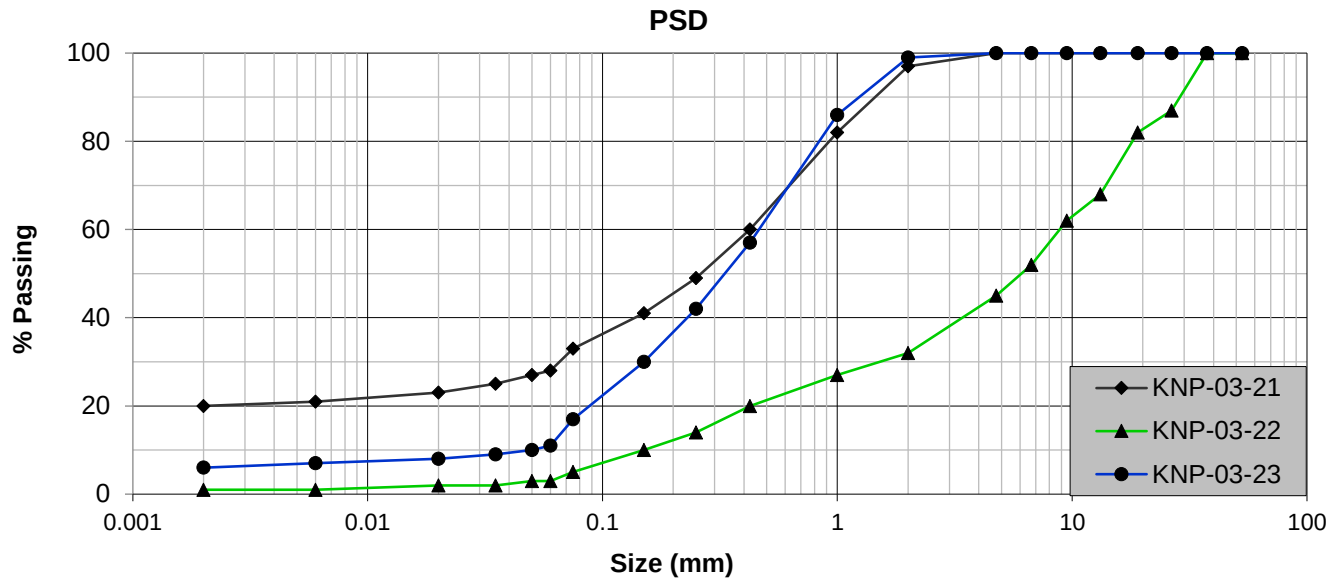
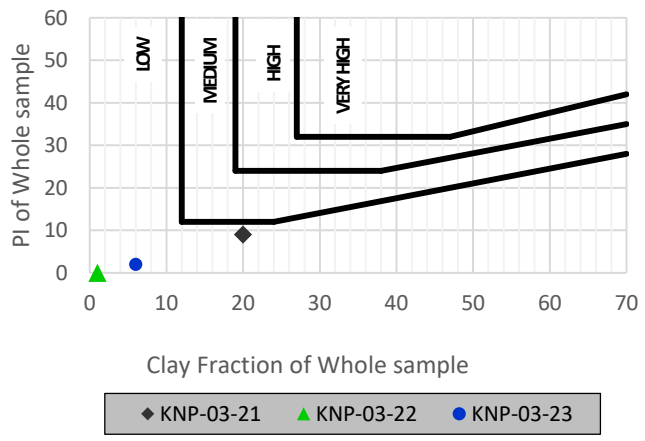
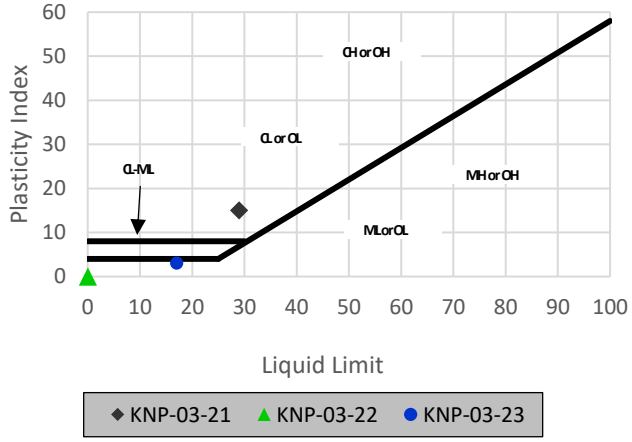
FOUNDATION INDICATOR



Potential Expansiveness



Casagrande Plasticity Chart



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FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP17/1	TP17/2	TP18/1	Sample	TP17/1	TP17/2	TP18/1
Depth (m)	0 - 1.2	1.2 - 1.4	0 - 1.1	Depth (m)	0 - 1.2	1.2 - 1.4	0 - 1.1
Lab No	KNP-03-24	KNP-03-25	KNP-03-26	Lab No	KNP-03-24	KNP-03-25	KNP-03-26
53.0	**100**	**93**	**100**	Liquid Limit (%)	**-**	**21**	**-**
37.5	**100**	**80**	**100**	Plastic Limit (%)	**-**	**12**	**-**
26.5	**100**	**77**	**100**	Plasticity Index (%)	**SP**	**9**	**SP**
19.0	**100**	**69**	**100**	Linear Shrinkage (%)	**0.5**	**4.0**	**0.5**
13.2	**100**	**63**	**100**	PI of whole sample	**-**	**2**	**-**
9.5	**100**	**58**	**100**				
6.7	**100**	**54**	**100**	% Gravel	**3**	**51**	**2**
4.75	**100**	**52**	**100**	% Sand	**88**	**42**	**86**
2.00	**97**	**49**	**98**	% Silt	**4**	**3**	**6**
1.00	**73**	**41**	**88**	% Clay	**5**	**4**	**6**
0.425	**46**	**24**	**61**	Activity	**0.0**	**2.3**	**0.0**
0.250	**33**	**17**	**43**				
0.150	**23**	**13**	**31**	% Soil Mortar	**97**	**49**	**98**
0.075	**13**	**9**	**17**				
0.060	**9**	**7**	**12**	Grading Modulus	**1.44**	**2.18**	**1.24**
0.050	**8**	**7**	**11**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**7**	**6**	**9**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**6**	**5**	**7**				
0.006	**6**	**5**	**6**	Unified (ASTM D2487)	**SM**	**GP-GC**	**SM**
0.002	**5**	**4**	**6**	AASHTO (M145-91)	**A - 1 - b**	**A - 2 - 4**	**A - 2 - 4**

Remarks: *: Assumed
N / T: Not Tested

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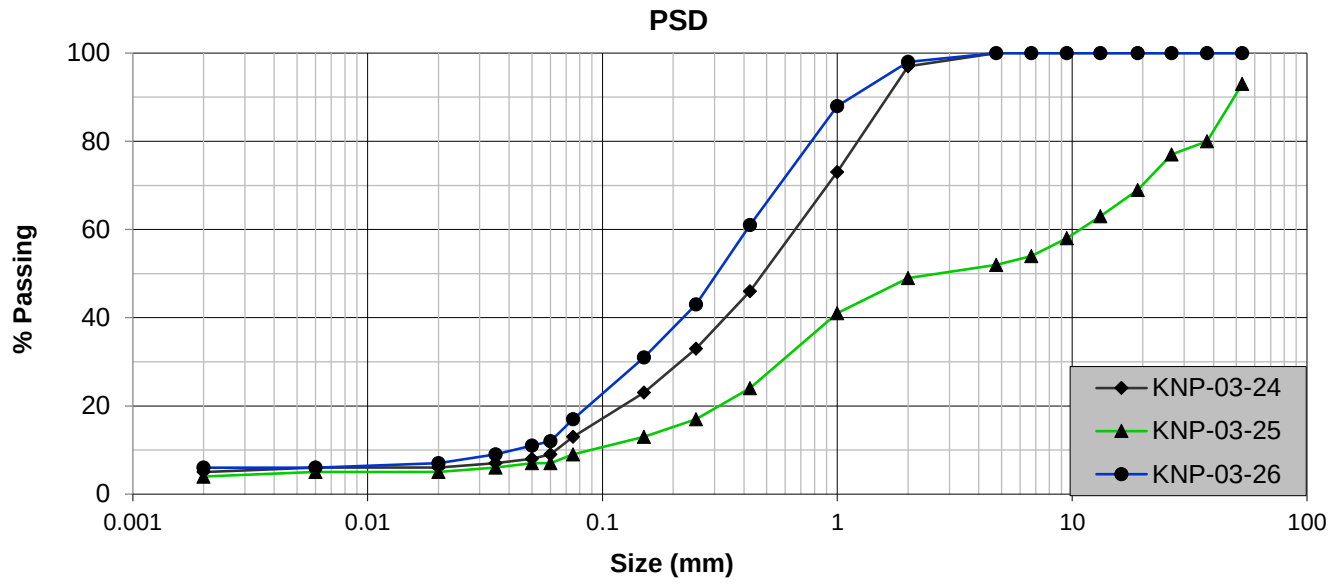
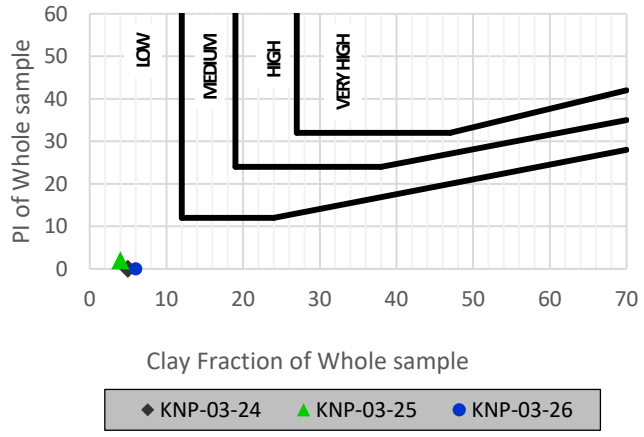
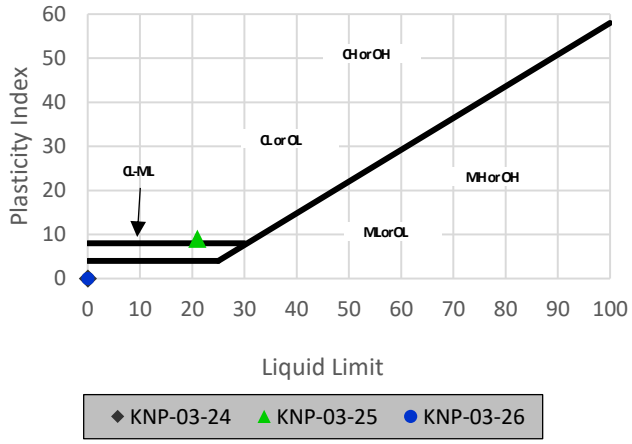


Potential Expansiveness



Casagrande Plasticity Chart



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FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP20/1	TP22/1	P25/1	Sample	TP20/1	TP22/1	P25/1
Depth (m)	0.3 - 1.4	0 - 0.6	0 - 2.1	Depth (m)	0.3 - 1.4	0 - 0.6	0 - 2.1
Lab No	KNP-03-28	KNP-03-29	KNP-03-30	Lab No	KNP-03-28	KNP-03-29	KNP-03-30
53.0	**100**	**100**	**100**	Liquid Limit (%)	**28**	-	-
37.5	**100**	**98**	**100**	Plastic Limit (%)	**15**	-	-
26.5	**100**	**88**	**100**	Plasticity Index (%)	**13**	**SP**	**SP**
19.0	**100**	**79**	**100**	Linear Shrinkage (%)	**6.0**	**0.5**	**0.5**
13.2	**100**	**68**	**100**	PI of whole sample	**9**	-	-
9.5	**100**	**62**	**97**				
6.7	**100**	**54**	**96**	% Gravel	**2**	**61**	**10**
4.75	**100**	**48**	**95**	% Sand	**67**	**32**	**78**
2.00	**98**	**39**	**90**	% Silt	**6**	**4**	**8**
1.00	**89**	**35**	**75**	% Clay	**25**	**3**	**4**
0.425	**67**	**28**	**50**	Activity	**0.5**	**0.0**	**0.0**
0.250	**53**	**22**	**34**				
0.150	**44**	**17**	**24**	% Soil Mortar	**98**	**39**	**90**
0.075	**34**	**9**	**14**				
0.060	**31**	**7**	**12**	Grading Modulus	**1.01**	**2.24**	**1.46**
0.050	**30**	**6**	**11**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**28**	**5**	**8**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**27**	**4**	**6**				
0.006	**26**	**3**	**5**	Unified (ASTM D2487)	**SM**	**GP-GC**	**SM**
0.002	**25**	**3**	**4**	AASHTO (M145-91)	**A - 2 - 6**	**A - 1 - a**	**A - 1 - b**

Remarks: *: Assumed
N / T: Not Tested

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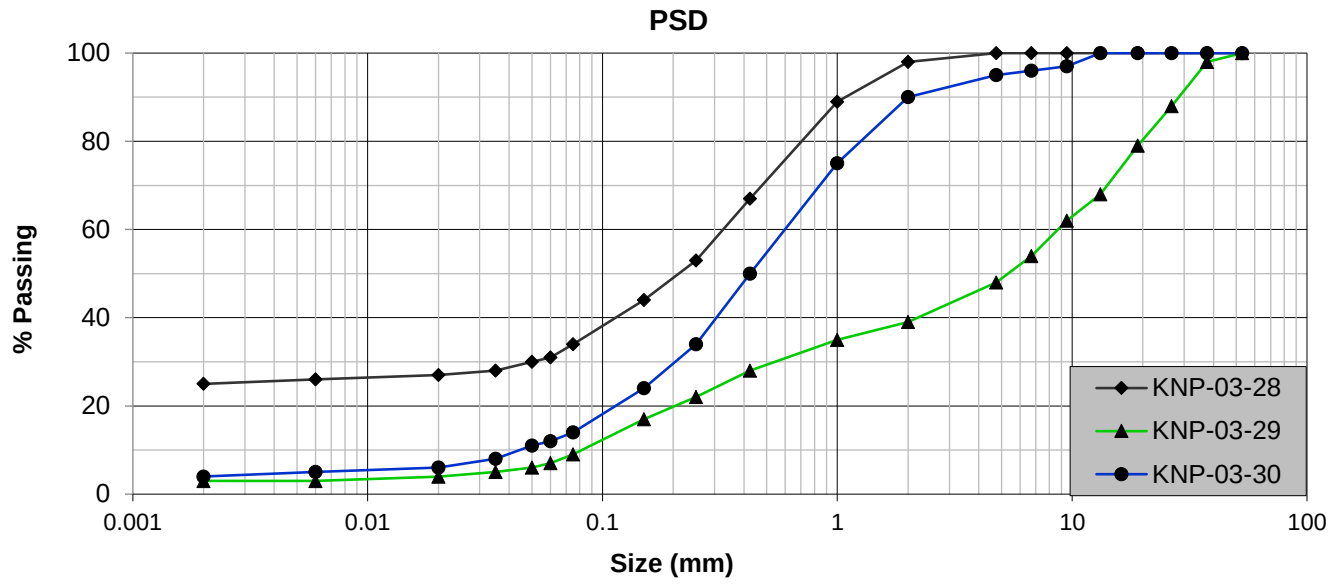
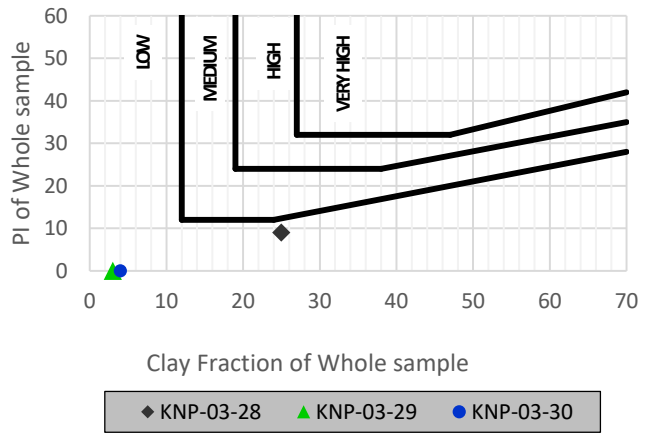
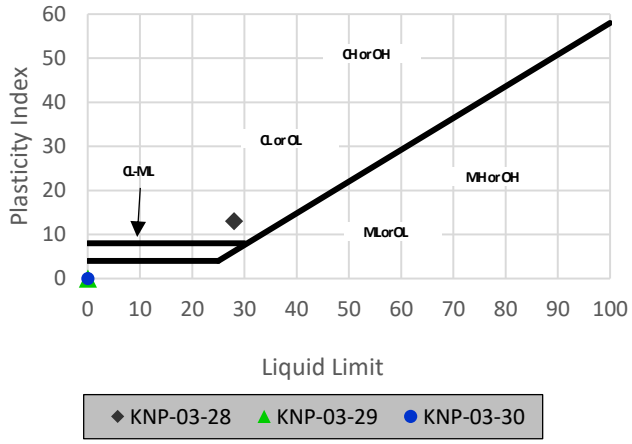
FOUNDATION INDICATOR



Potential Expansiveness



Casagrande Plasticity Chart



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FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP28/1	TP29/1	TP30/2	Sample	TP28/1	TP29/1	TP30/2
Depth (m)	0.3 - 3.4	0.6 - 0.9	1.1 - 1.7	Depth (m)	0.3 - 3.4	0.6 - 0.9	1.1 - 1.7
Lab No	KNP-03-32	KNP-03-33	KNP-03-35	Lab No	KNP-03-32	KNP-03-33	KNP-03-35
53.0	**100**	**100**	**100**	Liquid Limit (%)	**29**	**-**	**25**
37.5	**100**	**100**	**100**	Plastic Limit (%)	**19**	**-**	**14**
26.5	**100**	**100**	**100**	Plasticity Index (%)	**10**	**NP**	**11**
19.0	**100**	**100**	**100**	Linear Shrinkage (%)	**5.0**	**0.0**	**5.5**
13.2	**100**	**100**	**100**	PI of whole sample	**7**	**-**	**7**
9.5	**100**	**100**	**100**				
6.7	**100**	**100**	**100**	% Gravel	**4**	**1**	**2**
4.75	**100**	**100**	**100**	% Sand	**74**	**89**	**70**
2.00	**96**	**99**	**98**	% Silt	**18**	**7**	**13**
1.00	**87**	**90**	**88**	% Clay	**4**	**3**	**15**
0.425	**70**	**57**	**65**	Activity	**2.5**	**0.0**	**0.7**
0.250	**59**	**39**	**54**				
0.150	**49**	**27**	**45**	% Soil Mortar	**96**	**99**	**98**
0.075	**32**	**12**	**33**				
0.060	**22**	**10**	**28**	Grading Modulus	**1.02**	**1.32**	**1.04**
0.050	**19**	**9**	**27**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**14**	**6**	**24**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**11**	**5**	**21**				
0.006	**7**	**4**	**17**	Unified (ASTM D2487)	**SC**	**SW-SM**	**SC**
0.002	**4**	**3**	**15**	AASHTO (M145-91)	**A - 2 - 4**	**A - 2 - 4**	**A - 2 - 6**

Remarks: *: Assumed
N / T: Not Tested

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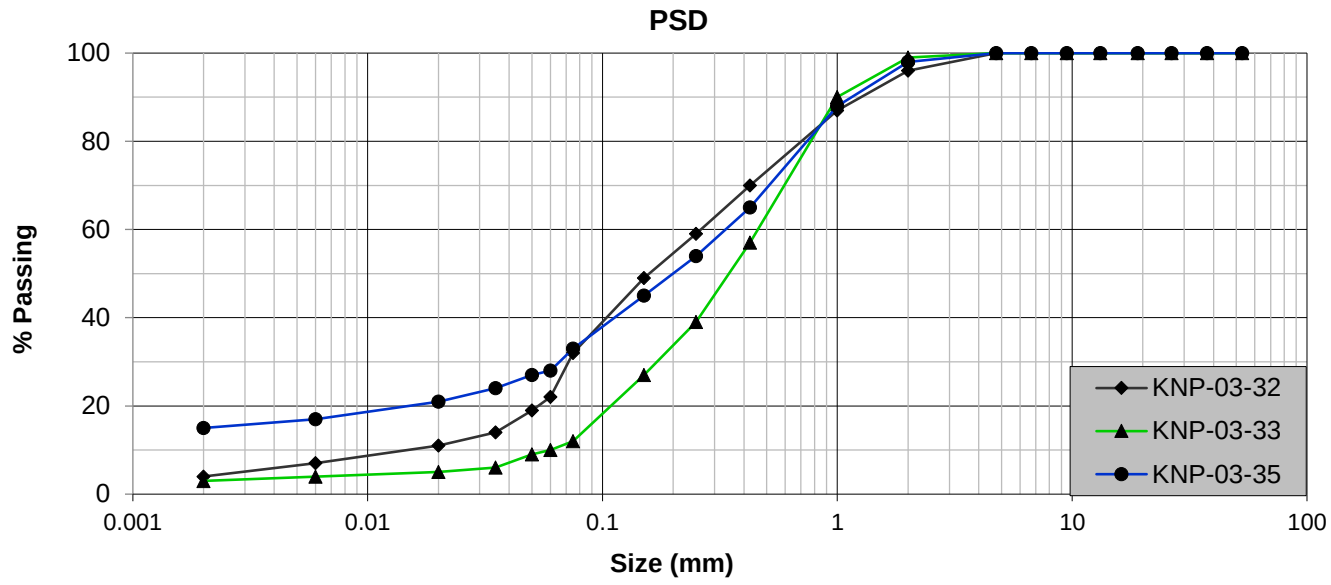
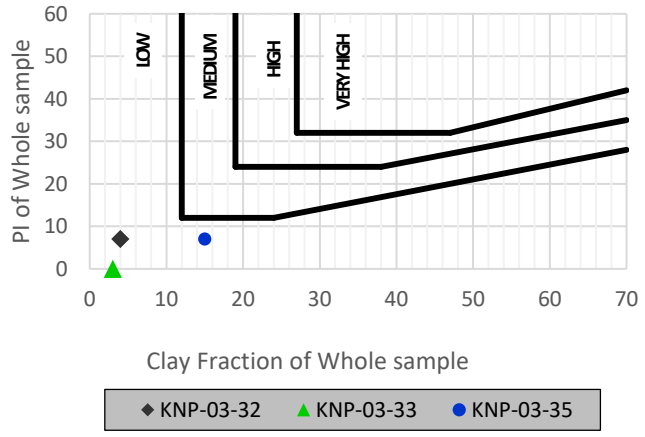
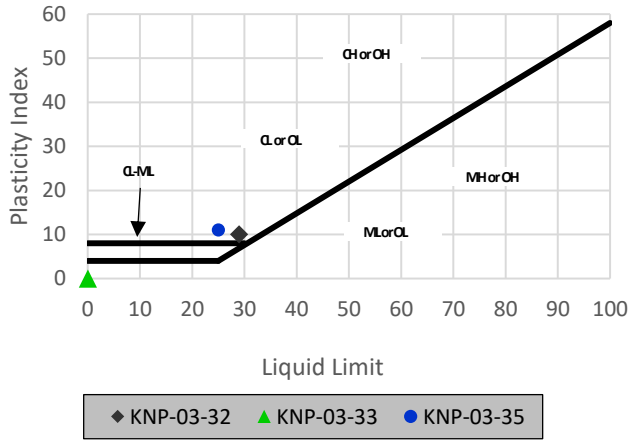


Potential Expansiveness



Casagrande Plasticity Chart



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FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP31/1	TP39/1	TP40/1	Sample	TP31/1	TP39/1	TP40/1
Depth (m)	0.5 - 0.85	0 - 1.6	0.8 - 2.3	Depth (m)	0.5 - 0.85	0 - 1.6	0.8 - 2.3
Lab No	KNP-03-36	KNP-03-37	KNP-03-38	Lab No	KNP-03-36	KNP-03-37	KNP-03-38
53.0	**100**	**100**	**100**	Liquid Limit (%)	**17**	**-**	**22**
37.5	**100**	**100**	**100**	Plastic Limit (%)	**13**	**-**	**13**
26.5	**100**	**100**	**100**	Plasticity Index (%)	**4**	**SP**	**9**
19.0	**100**	**100**	**100**	Linear Shrinkage (%)	**1.5**	**1.0**	**4.0**
13.2	**100**	**100**	**99**	PI of whole sample	**2**	**-**	**5**
9.5	**100**	**100**	**99**				
6.7	**100**	**100**	**99**	% Gravel	**3**	**2**	**10**
4.75	**100**	**100**	**98**	% Sand	**81**	**87**	**72**
2.00	**97**	**98**	**90**	% Silt	**10**	**8**	**10**
1.00	**86**	**87**	**79**	% Clay	**6**	**3**	**8**
0.425	**60**	**60**	**58**	Activity	**0.7**	**0.0**	**1.1**
0.250	**44**	**42**	**41**				
0.150	**33**	**30**	**32**	% Soil Mortar	**97**	**98**	**90**
0.075	**19**	**18**	**21**				
0.060	**16**	**11**	**18**	Grading Modulus	**1.24**	**1.24**	**1.31**
0.050	**14**	**10**	**17**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**11**	**7**	**15**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**9**	**6**	**13**				
0.006	**7**	**4**	**10**	Unified (ASTM D2487)	**SC-SM**	**SM**	**SC**
0.002	**6**	**3**	**8**	AASHTO (M145-91)	**A - 2 - 4**	**A - 2 - 4**	**A - 2 - 4**

Remarks: *: Assumed
N / T: Not Tested

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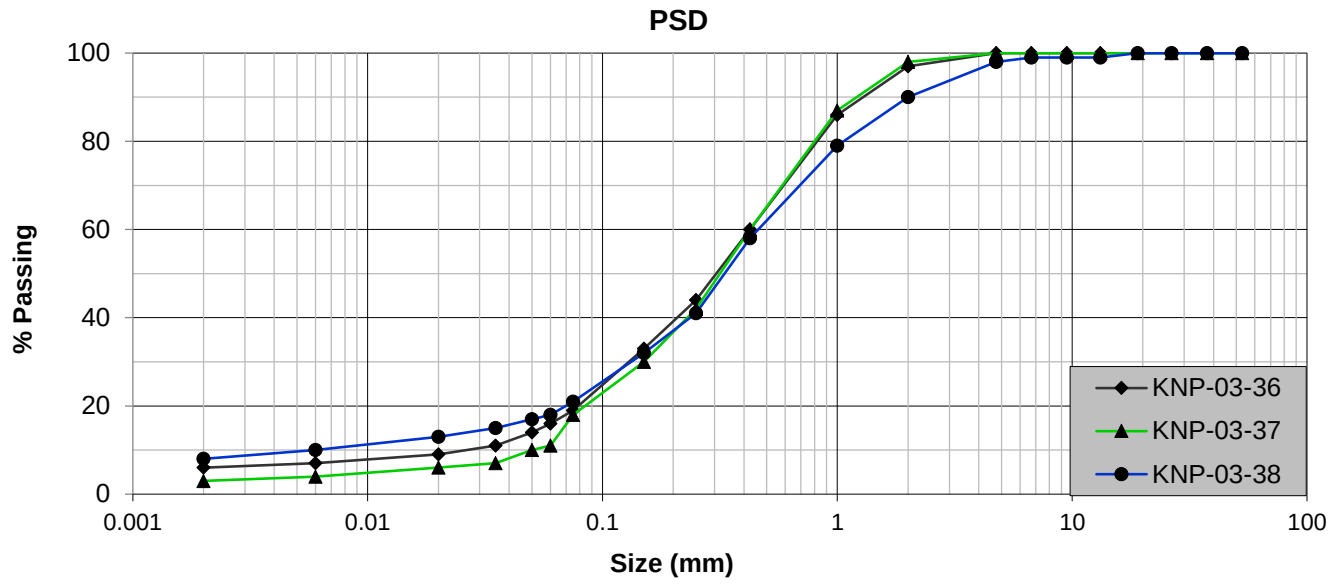
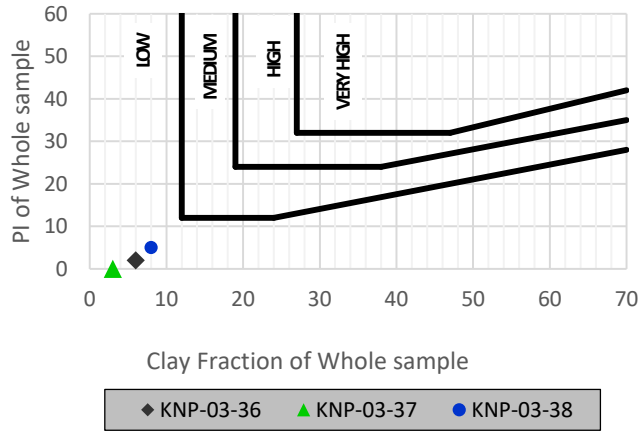
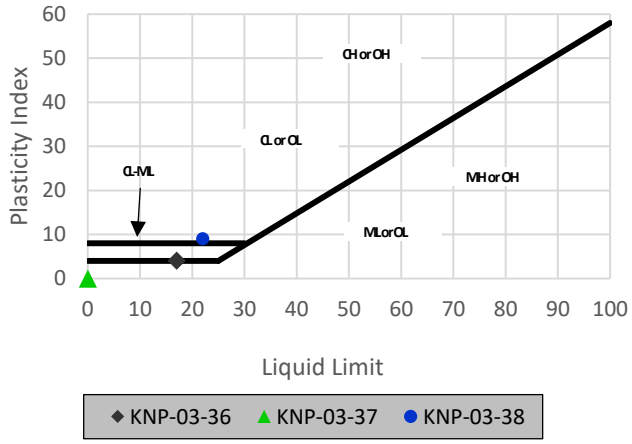


Potential Expansiveness



Casagrande Plasticity Chart



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Gerrie | 082 309 4448 | gerrie@stlab.co.za
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Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Job Number: KNP-03
Date: 2019-07-17
Method: SANS 3001 GR1, GR3, GR10 GR12 & BS 1377 (where applicable)

FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP40/2	TP45/1	TP47/1	Sample	TP40/2	TP45/1	TP47/1
Depth (m)	0 - 0.8	0 - 1.1	0.7 - 1.4	Depth (m)	0 - 0.8	0 - 1.1	0.7 - 1.4
Lab No	KNP-03-39	KNP-03-40	KNP-03-41	Lab No	KNP-03-39	KNP-03-40	KNP-03-41
53.0	**100**	**100**	**100**	Liquid Limit (%)	**-**	**31**	**30**
37.5	**100**	**96**	**100**	Plastic Limit (%)	**-**	**13**	**16**
26.5	**100**	**91**	**100**	Plasticity Index (%)	**NP**	**18**	**14**
19.0	**100**	**86**	**100**	Linear Shrinkage (%)	**0.0**	**8.5**	**6.5**
13.2	**100**	**77**	**100**	PI of whole sample	**-**	**8**	**9**
9.5	**100**	**73**	**100**				
6.7	**100**	**67**	**99**	% Gravel	**2**	**44**	**4**
4.75	**100**	**63**	**99**	% Sand	**89**	**35**	**64**
2.00	**98**	**56**	**96**	% Silt	**6**	**14**	**10**
1.00	**86**	**52**	**87**	% Clay	**3**	**7**	**22**
0.425	**58**	**45**	**66**	Activity	**0.0**	**2.6**	**0.6**
0.250	**41**	**40**	**54**				
0.150	**28**	**35**	**46**	% Soil Mortar	**98**	**56**	**96**
0.075	**14**	**28**	**37**				
0.060	**9**	**21**	**32**	Grading Modulus	**1.30**	**1.71**	**1.01**
0.050	**8**	**19**	**31**	Moisture Content (%)	**N / T**	**N / T**	**N / T**
0.035	**6**	**16**	**28**	Relative Density (SG)*	**2.65**	**2.65**	**2.65**
0.020	**5**	**14**	**26**				
0.006	**4**	**9**	**23**	Unified (ASTM D2487)	**SM**	**GC**	**SC**
0.002	**3**	**7**	**22**	AASHTO (M145-91)	**A - 2 - 4**	**A - 2 - 6**	**A - 6**

Remarks: *: Assumed
N / T: Not Tested

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Quality | Excellence | On Time

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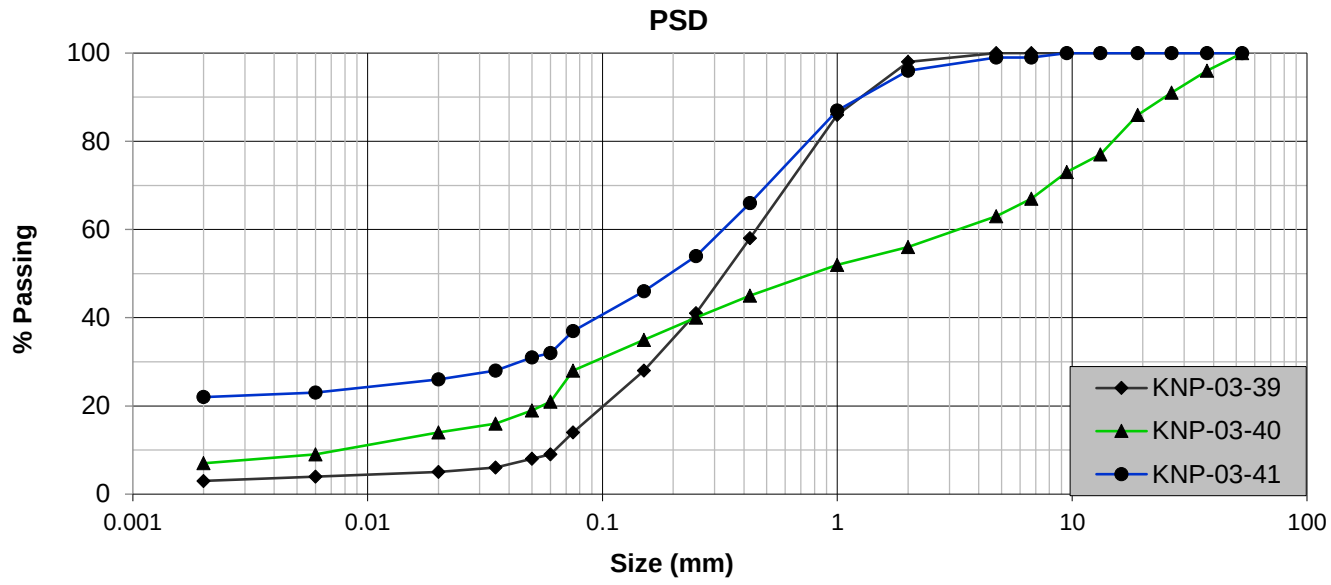
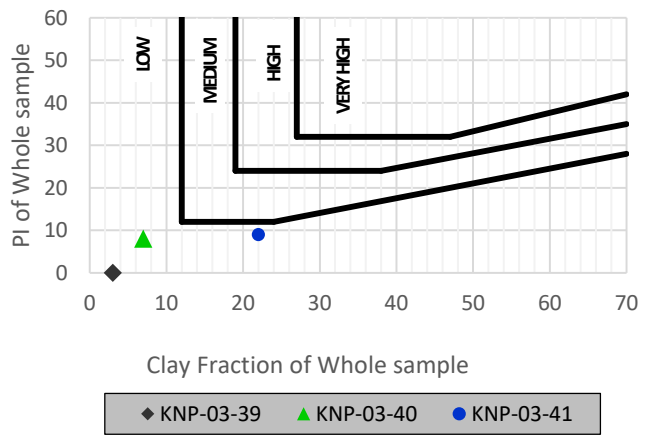
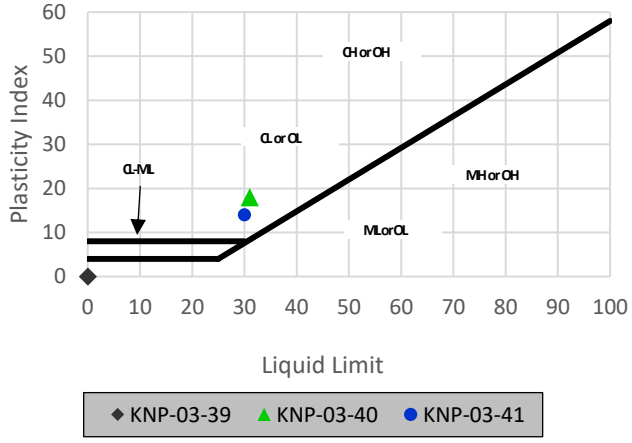
FOUNDATION INDICATOR







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Job Number: KNP-03
Date: 2019-07-17
Method: SANS 3001 GR1, GR3, GR10 GR12 & BS 1377 (where applicable)

FOUNDATION INDICATOR

Grading & Hydrometer Analysis (Particle Size (mm) & % Passing)				Atterberg Limits & Classification			
Sample	TP48/1			Sample	TP48/1		
Depth (m)	2.2 - 2.6			Depth (m)	2.2 - 2.6		
Lab No	KNP-03-42			Lab No	KNP-03-42		
53.0	**100**			Liquid Limit (%)	**54**		
37.5	**93**			Plastic Limit (%)	**23**		
26.5	**89**			Plasticity Index (%)	**31**		
19.0	**86**			Linear Shrinkage (%)	**20.5**		
13.2	**76**			PI of whole sample	**10**		
9.5	**67**						
6.7	**58**			% Gravel	**60**		
4.75	**50**			% Sand	**26**		
2.00	**40**			% Silt	**7**		
1.00	**36**			% Clay	**7**		
0.425	**32**			Activity	**4.4**		
0.250	**27**						
0.150	**23**			% Soil Mortar	**40**		
0.075	**19**						
0.060	**14**			Grading Modulus	**2.09**		
0.050	**13**			Moisture Content (%)	**N / T**		
0.035	**11**			Relative Density (SG)*	**2.65**		
0.020	**9**						
0.006	**8**			Unified (ASTM D2487)	**GC**		
0.002	**7**			AASHTO (M145-91)	**A - 2 - 7**		

Remarks: *: Assumed
N / T: Not Tested

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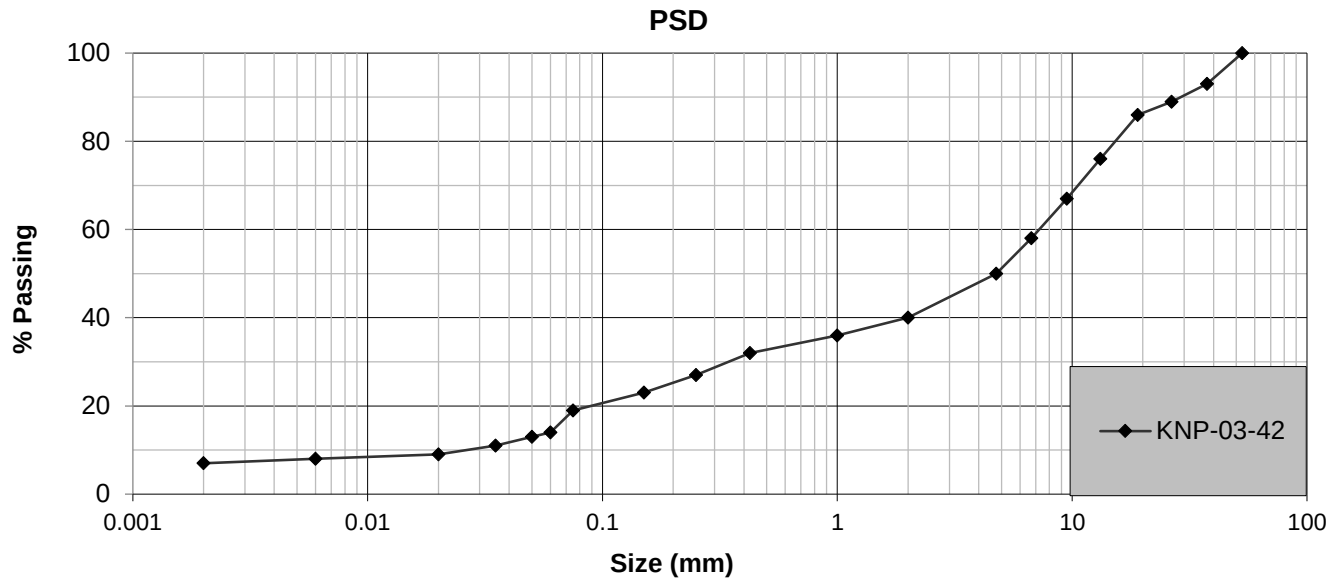
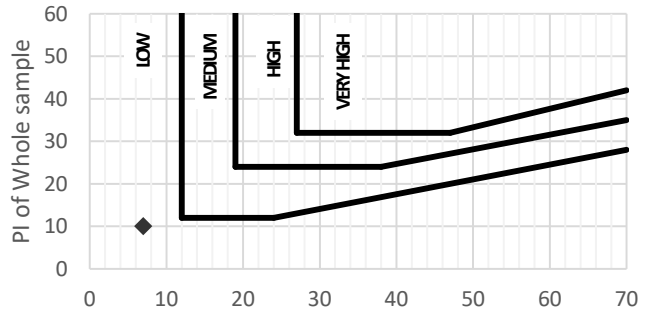
Job Number: KNP-03
Date: 2019-07-17
Method: SANS 3001 GR1, GR3, GR10 GR12 & BS 1377 (where applicable)

FOUNDATION INDICATOR

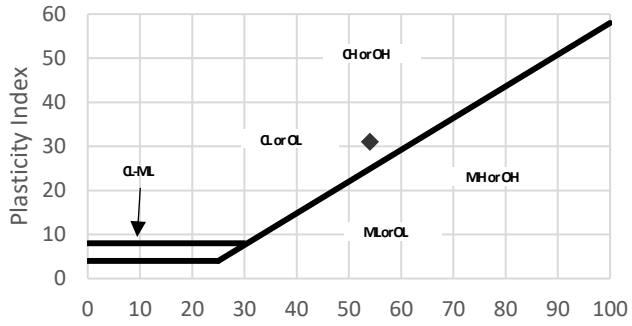


Potential Expansiveness



◆ KNP-03-42

Casagrande Plasticity Chart



◆ KNP-03-42

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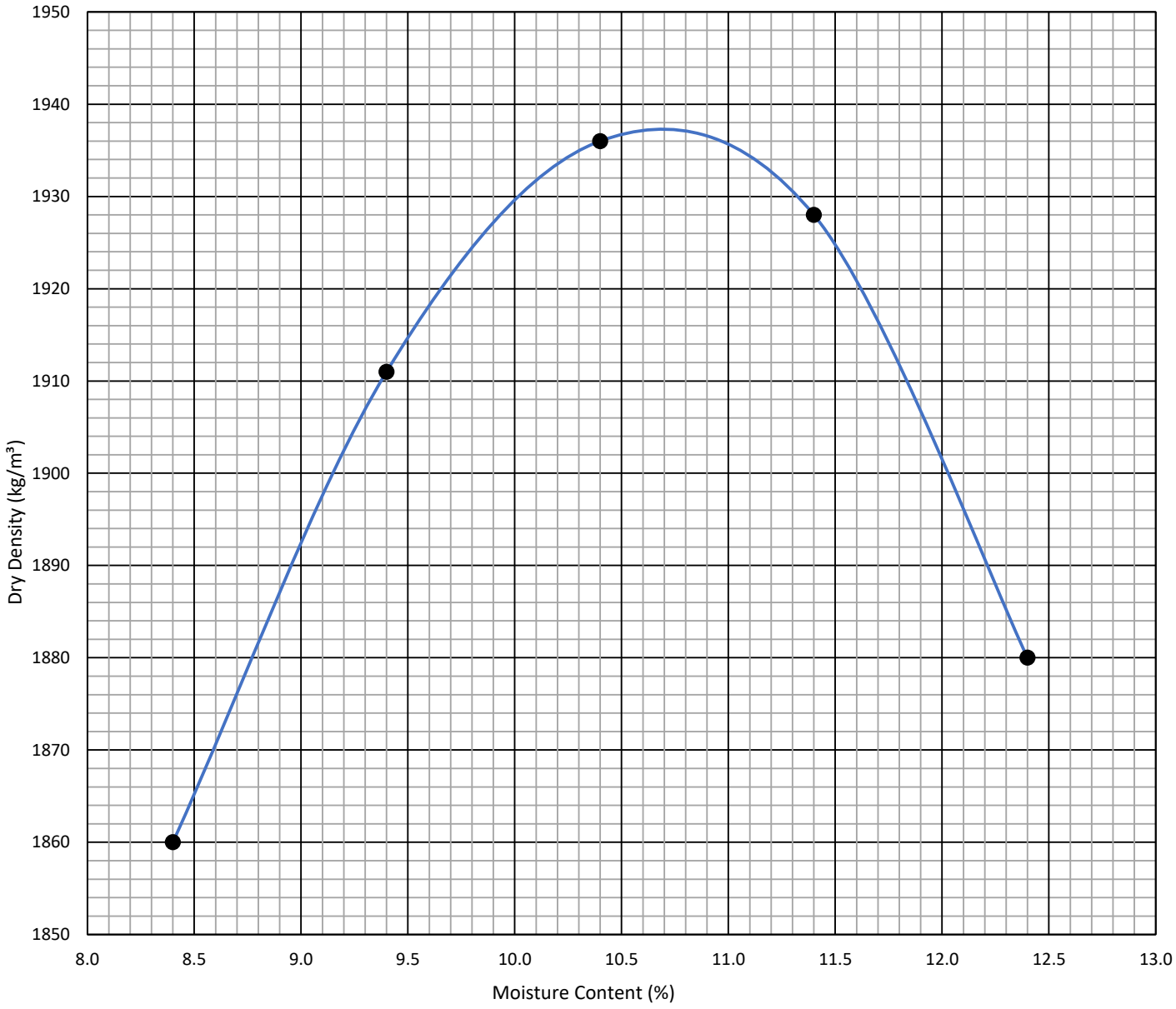
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-15
Sample:	TP1/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 2.2	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **1942** kg/m³ Optimum Moisture Content: **10.7** %

Moisture Content (%):	8.4	9.4	10.4	11.4	12.4			
Dry Density (kg/m³)	1860	1911	1936	1928	1880			



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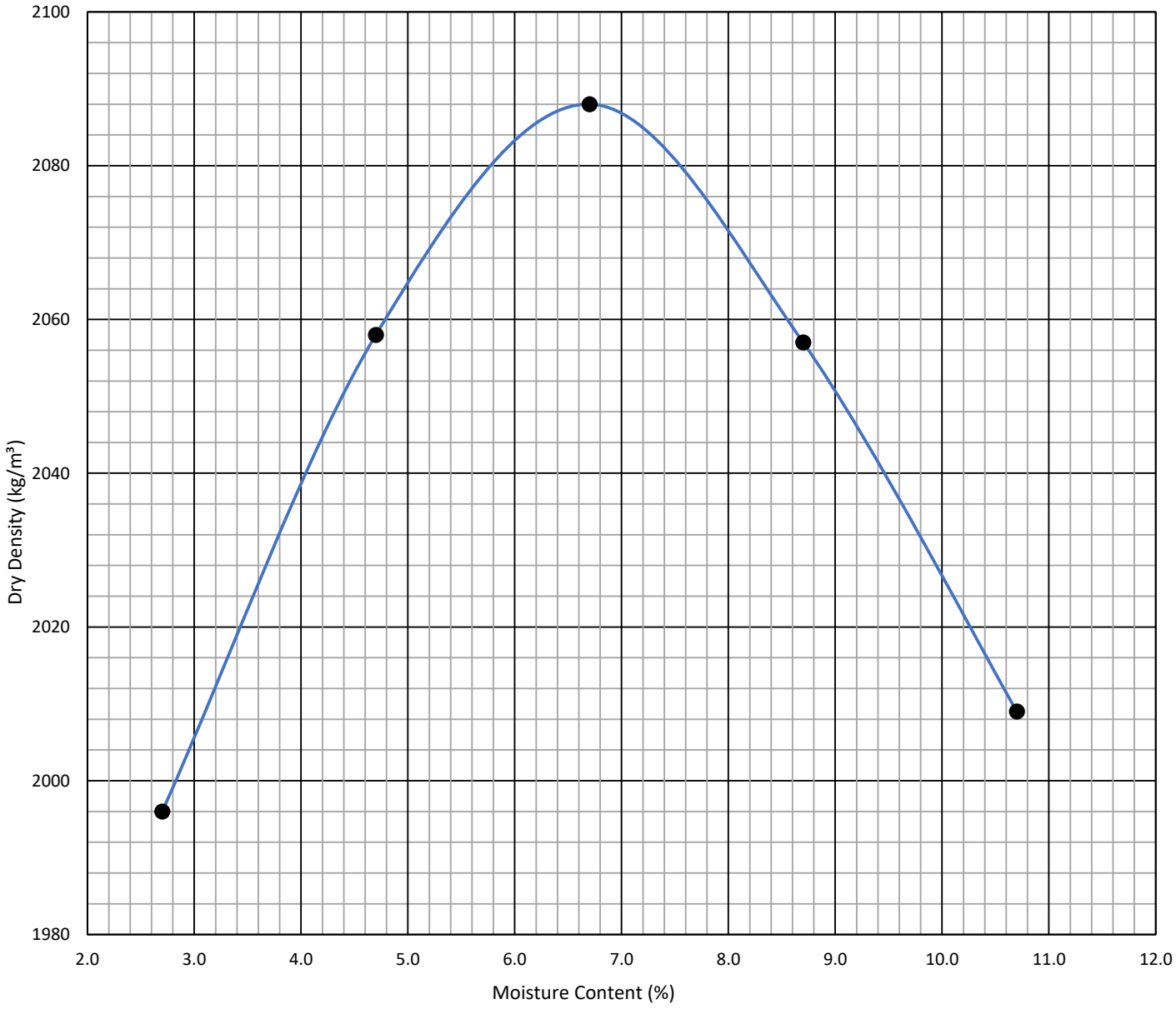
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-18
Sample:	TP7/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 2.3	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2088** kg/m³ Optimum Moisture Content: **6.7** %

Moisture Content (%):	2.7	4.7	6.7	8.7	10.7			
Dry Density (kg/m³)	1996	2058	2088	2057	2009			



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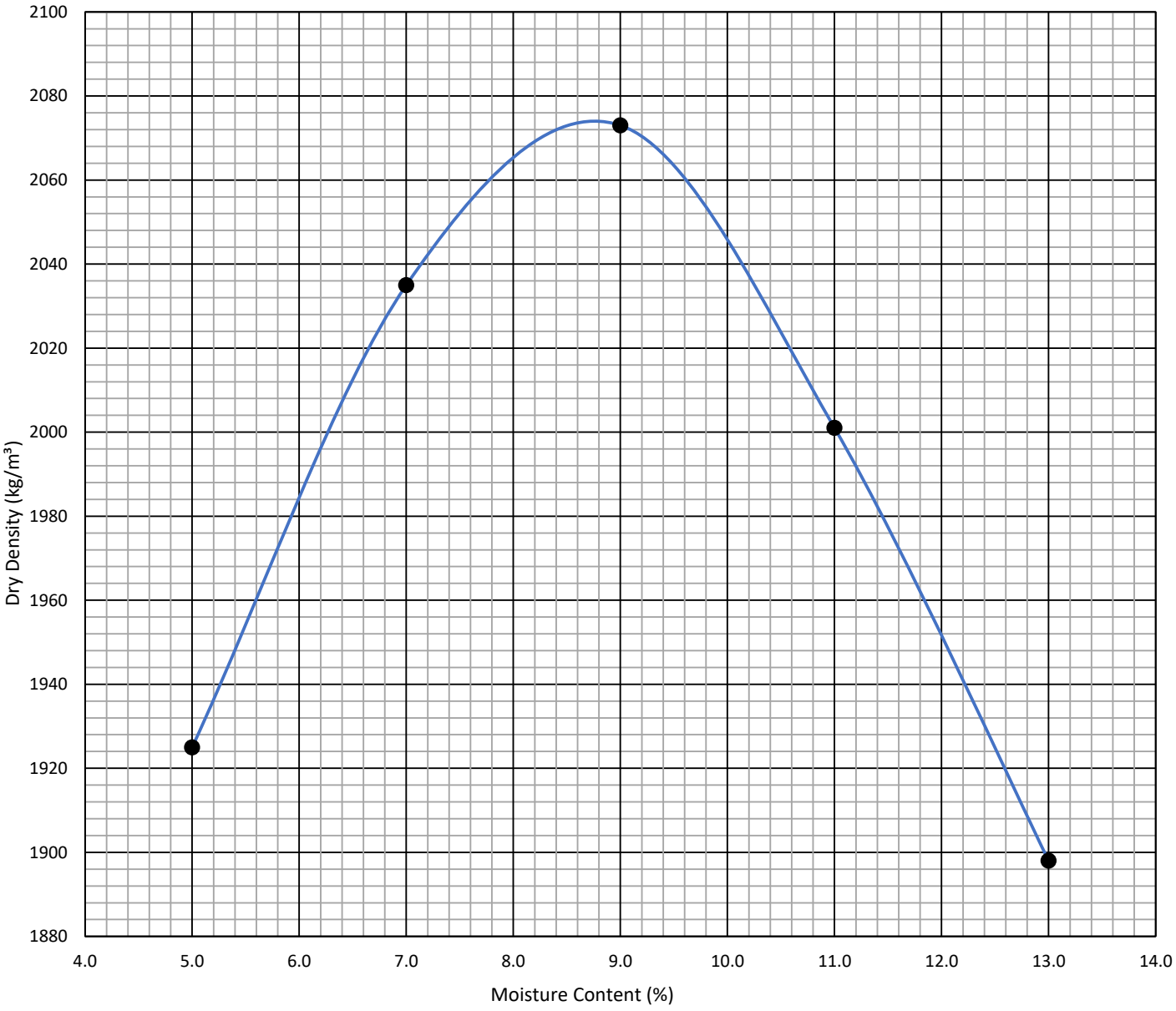
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-20
Sample:	TP9/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 0.8	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2080** kg/m³ Optimum Moisture Content: **8.8** %

Moisture Content (%):	5.0	7.0	9.0	11.0	13.0			
Dry Density (kg/m³)	1925	2035	2073	2001	1898			



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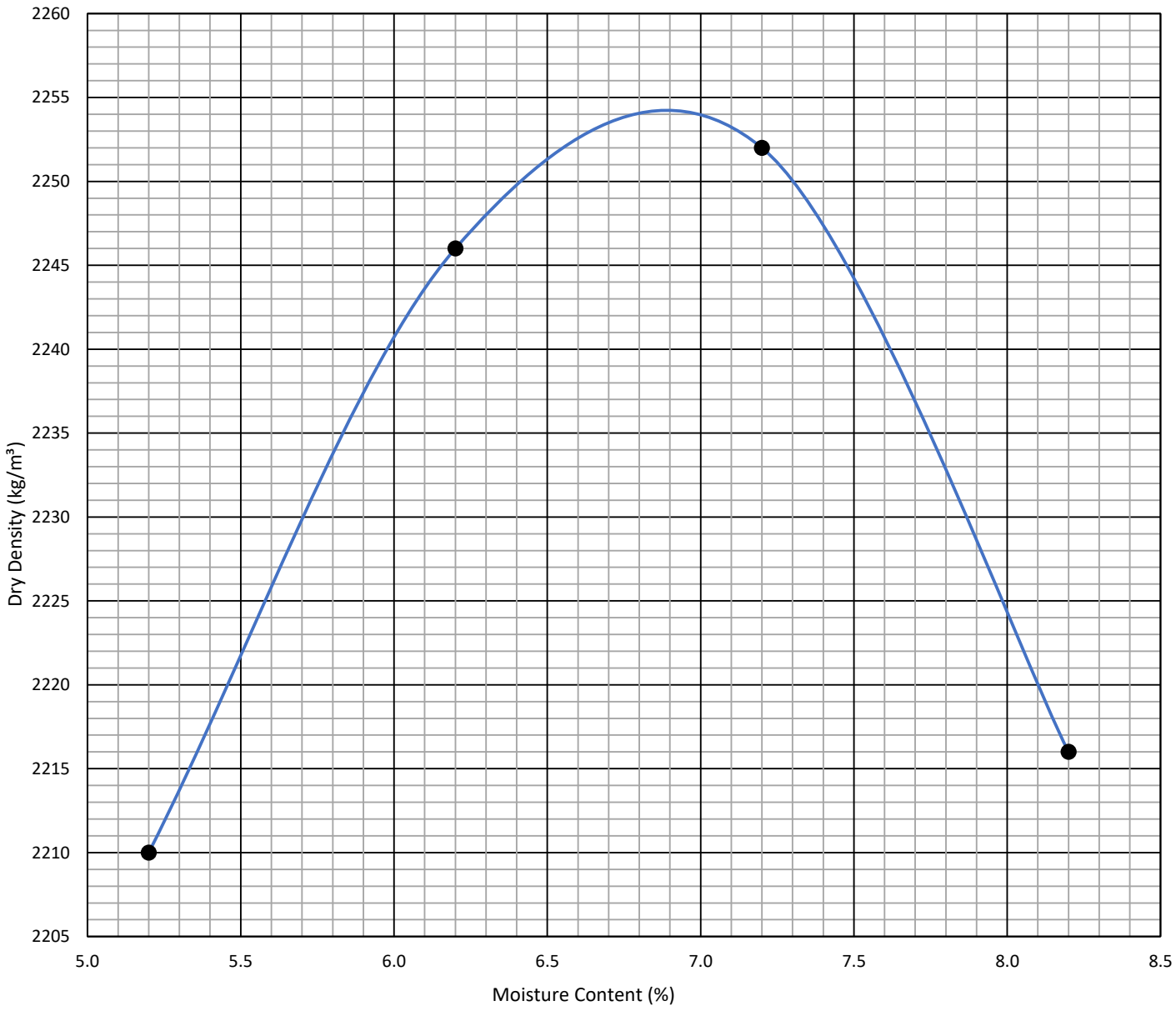
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-22
Sample:	TP14/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 0.5	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2258** kg/m³ Optimum Moisture Content: **6.9** %

Moisture Content (%):	5.2	6.2	7.2	8.2				
Dry Density (kg/m³)	2210	2246	2252	2216				



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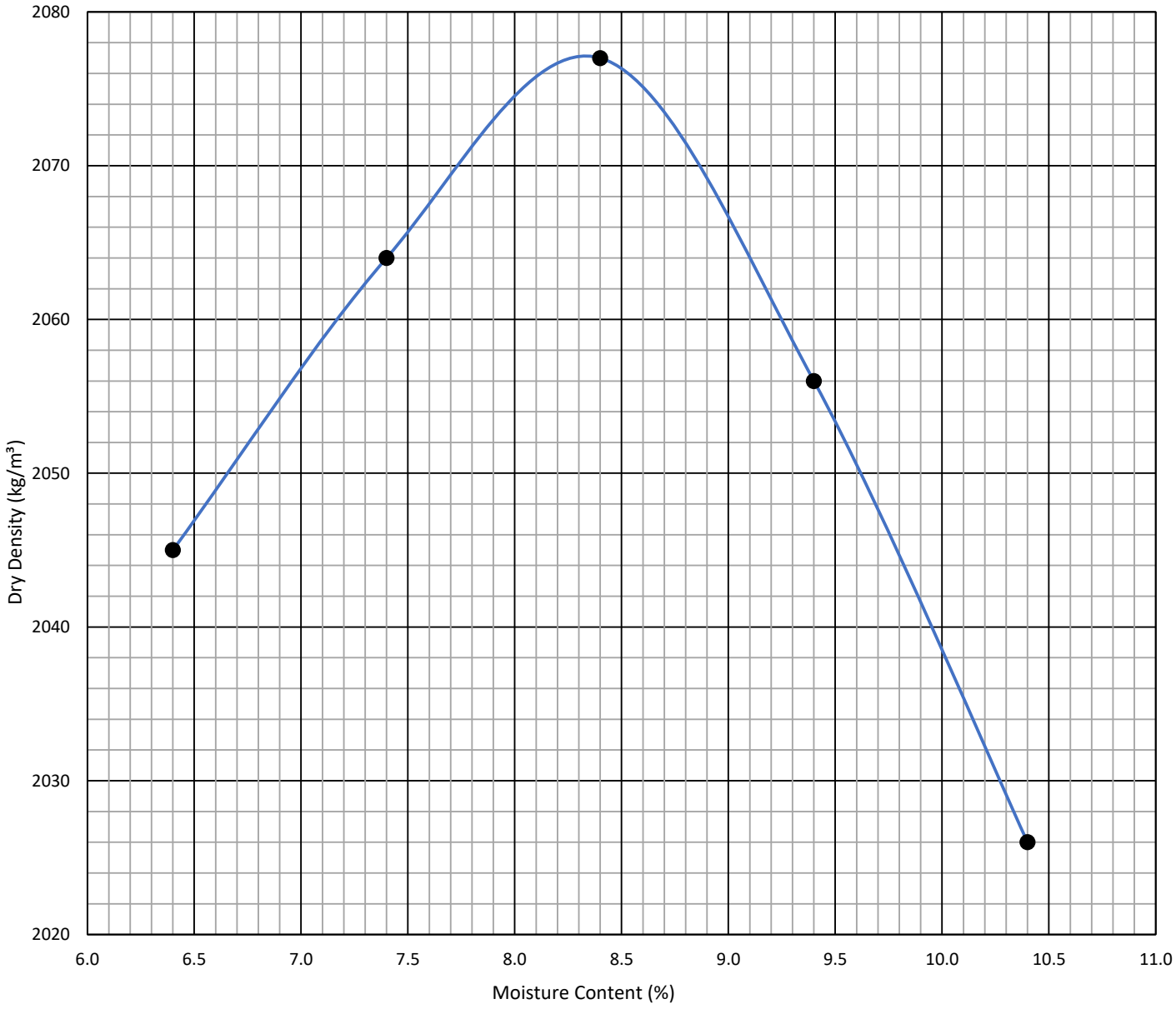
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-24
Sample:	TP17/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 1.2	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2080** kg/m³ Optimum Moisture Content: **8.3** %

Moisture Content (%):	6.4	7.4	8.4	9.4	10.4			
Dry Density (kg/m³)	2045	2064	2077	2056	2026			



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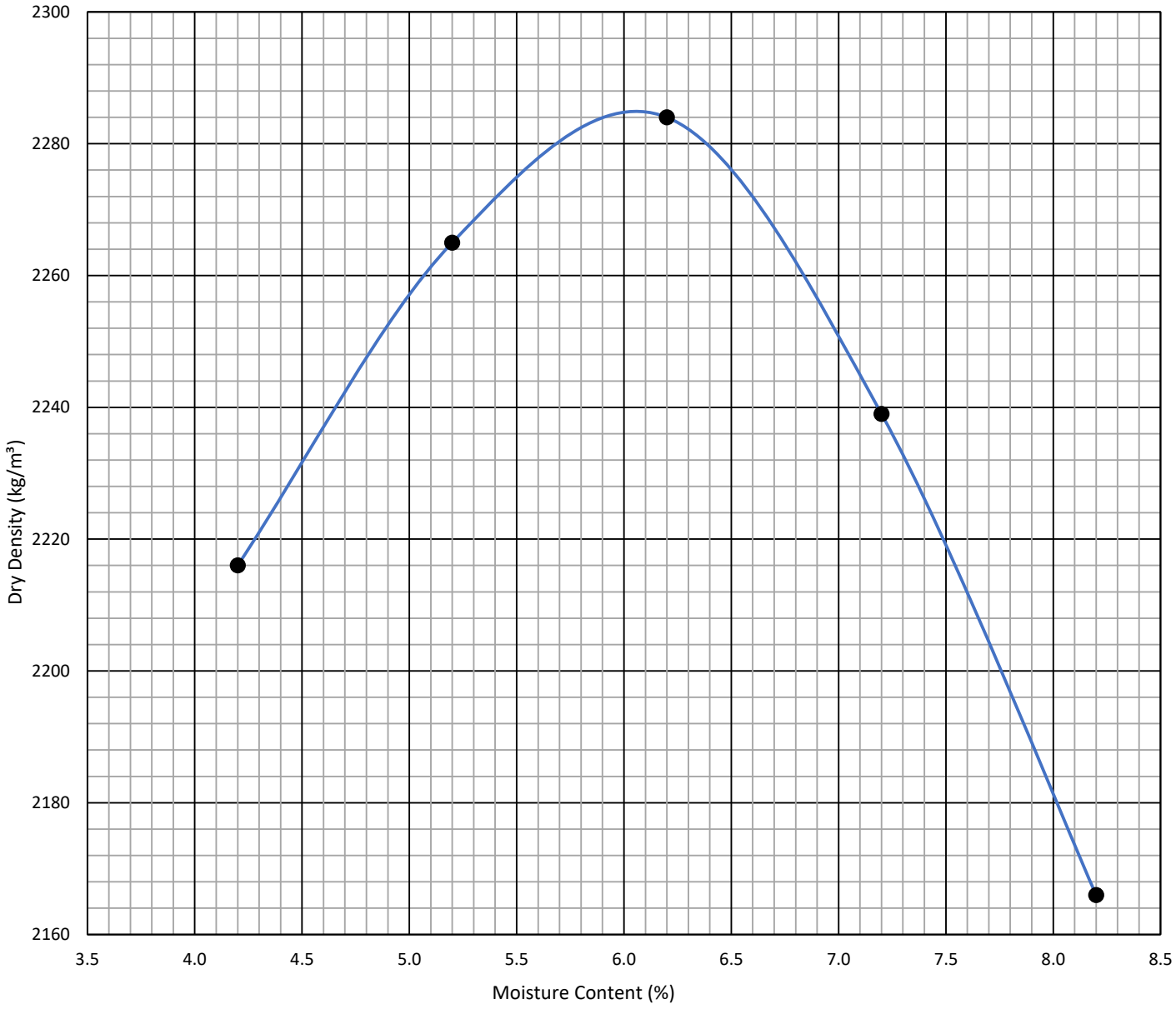
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-29
Sample:	TP22/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 0.6	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2293** kg/m³ Optimum Moisture Content: **6.1** %

Moisture Content (%):	4.2	5.2	6.2	7.2	8.2			
Dry Density (kg/m³)	2216	2265	2284	2239	2166			



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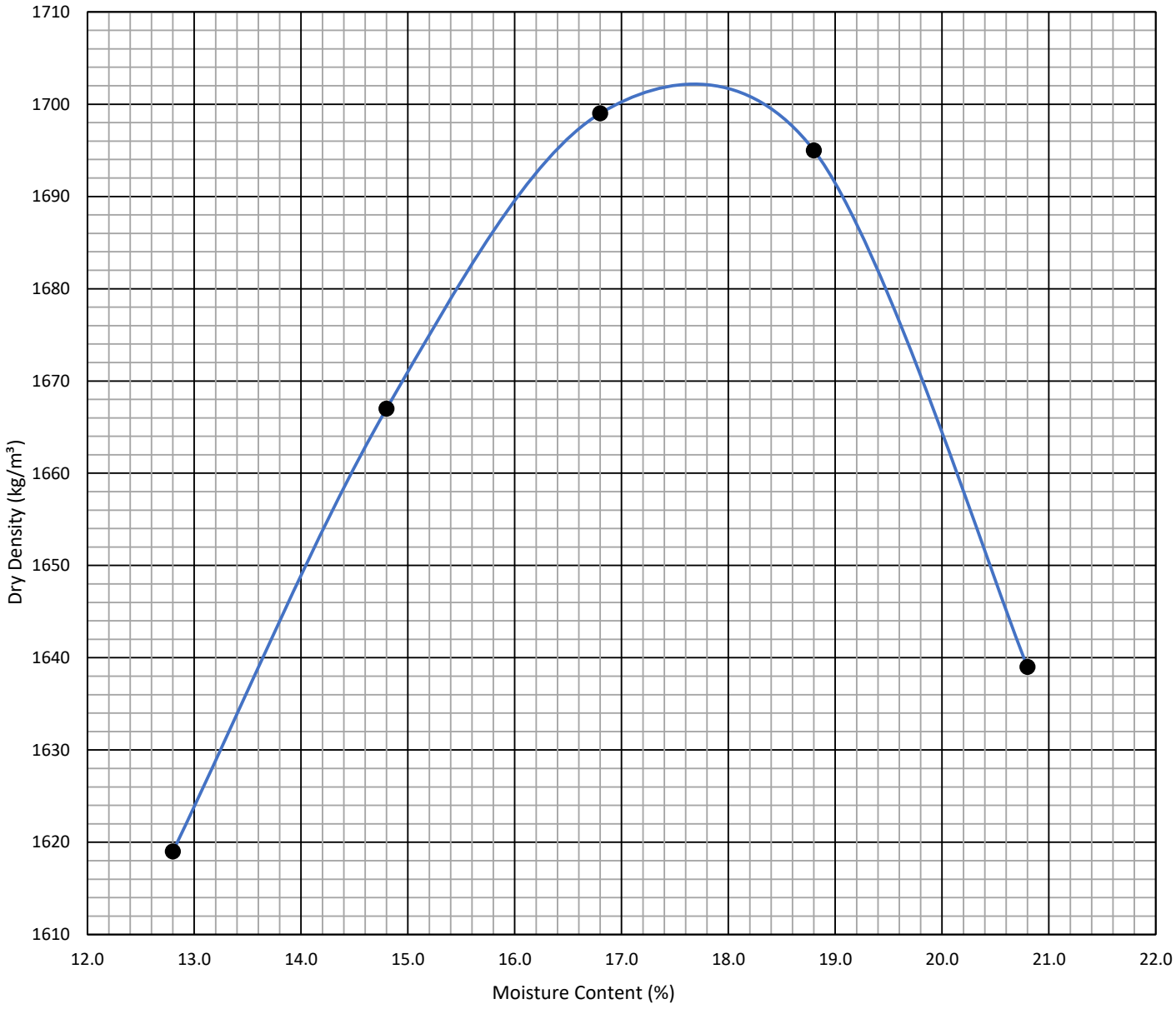
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-32
Sample:	TP28/2	**Method:**	SANS 3001 GR30
Depth: (m)	0.3 - 3.4	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **1708** kg/m³ Optimum Moisture Content: **17.6** %

Moisture Content (%):	12.8	14.8	16.8	18.8	20.8			
Dry Density (kg/m³)	1619	1667	1699	1695	1639			



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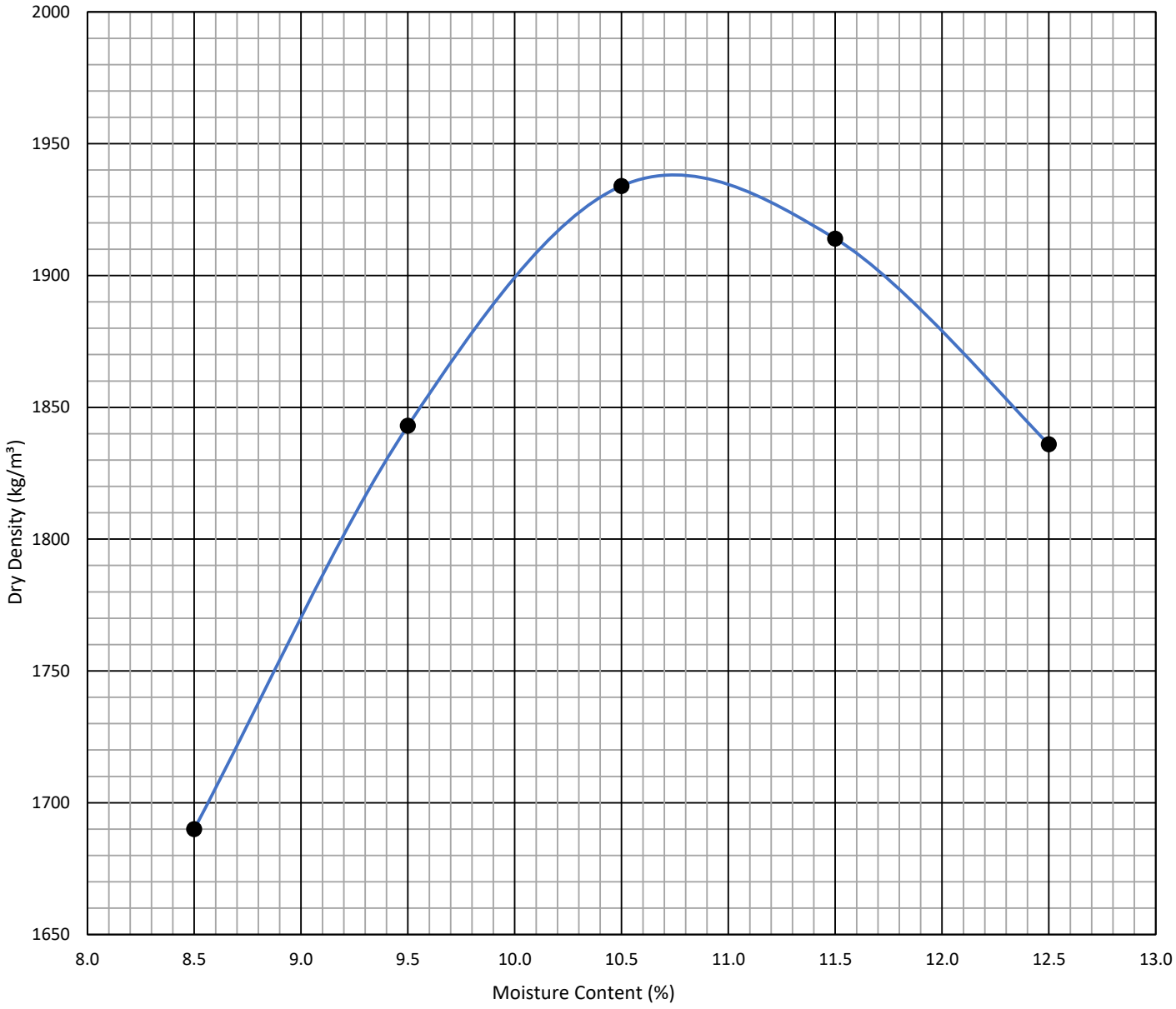
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-35
Sample:	TP30/2	**Method:**	SANS 3001 GR30
Depth: (m)	1.1 - 1.7	**Date:**	20-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **1939** kg/m³ Optimum Moisture Content: **10.7** %

Moisture Content (%):	8.5	9.5	10.5	11.5	12.5			
Dry Density (kg/m³)	1690	1843	1934	1914	1836			



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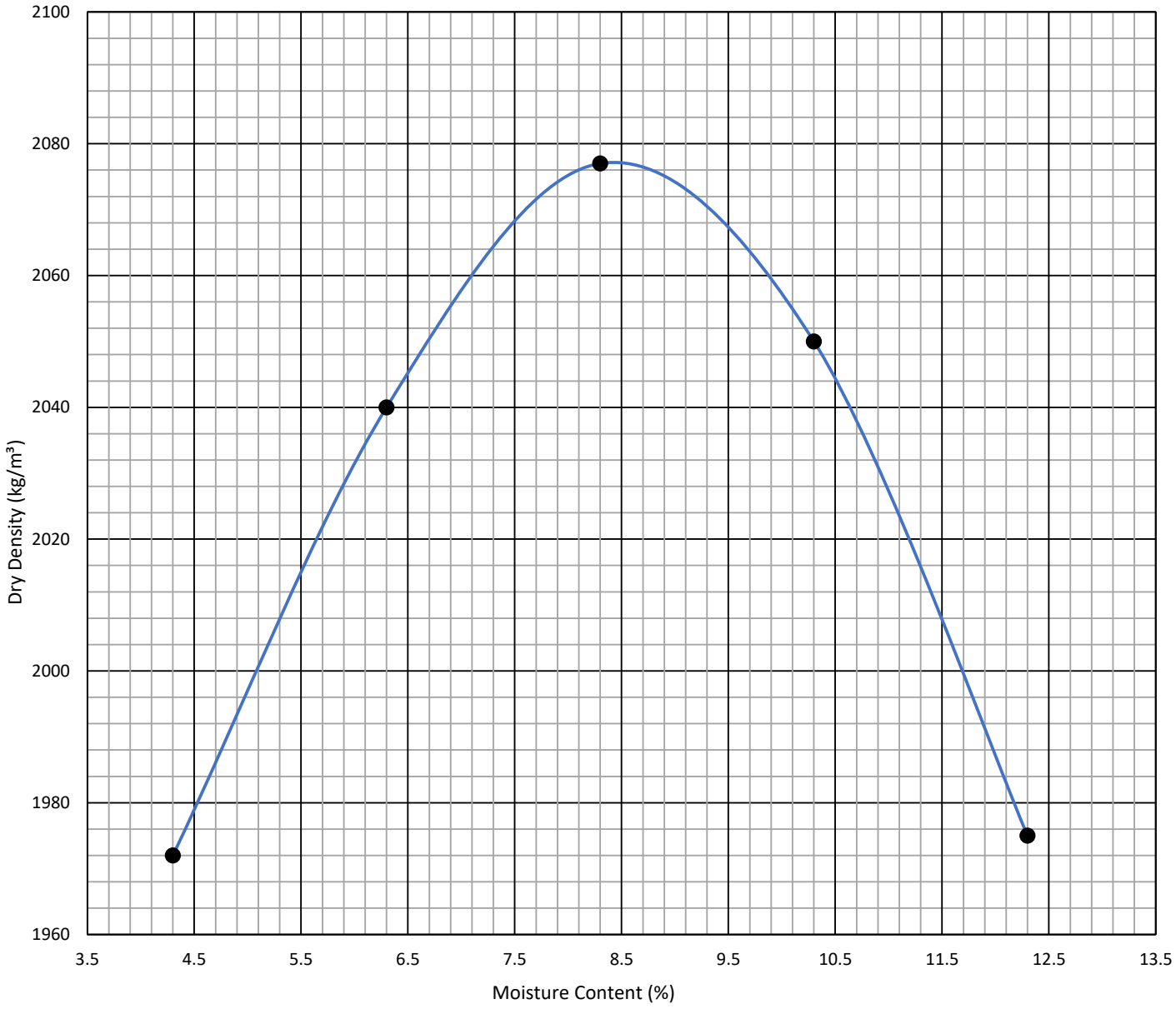
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-37
Sample:	TP39/1	**Method:**	SANS 3001 GR30
Depth: (m)	0 - 1.6	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2086** kg/m³ Optimum Moisture Content: **8.4** %

Moisture Content (%):	4.3	6.3	8.3	10.3	12.3			
Dry Density (kg/m³)	1972	2040	2077	2050	1975			



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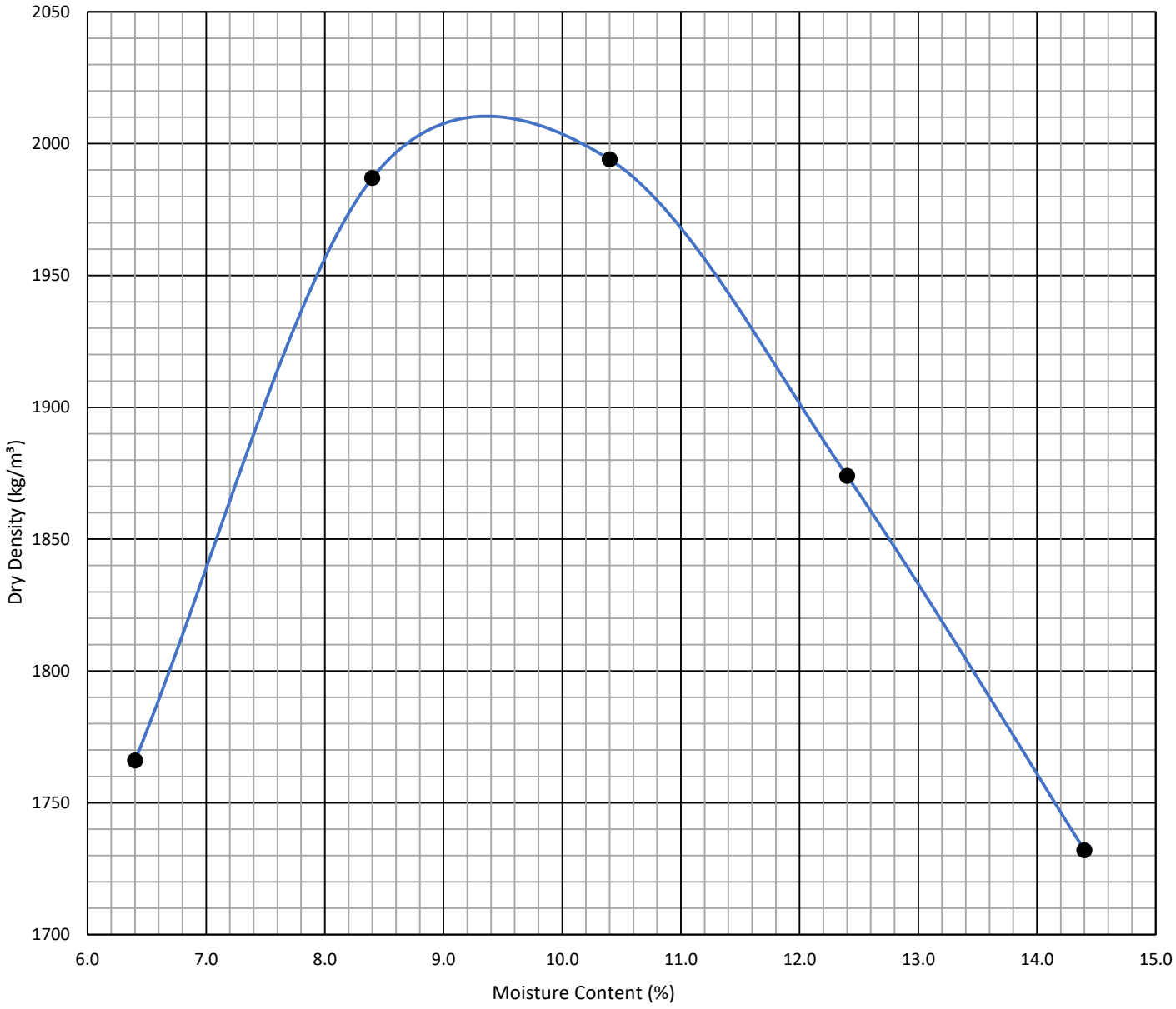
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-38
Sample:	TP40/1	**Method:**	SANS 3001 GR30
Depth: (m)	0.8 - 2.3	**Date:**	13-May-19

MDD & OMC DETERMINATION (Std. Proctor)

Maximum Dry Density: **2012** kg/m³ Optimum Moisture Content: **9.4** %

Moisture Content (%):	6.4	8.4	10.4	12.4	14.4			
Dry Density (kg/m³)	1766	1987	1994	1874	1732			



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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-20
Sample:	TP9/1	**Date:**	18/07/2019
Depth: (m)	0 - 0.8		

CONSOLIDATED DRAINED TRIAXIAL TEST

General Test Data	
Type of Test:	Saturated, Consolidated Drained with Volume Change Measurements
Type of Sample:	Remoulded to 95% of MDD (Proctor) Value - 2080kg/m³ at 8.8%
Side Drains:	No
Drainage:	To One End
Comments:	-

Initial Specimen Details				
		Specimen 1	**Specimen 2**	**Specimen 3**
Diameter	mm	50.0	50.0	50.0
Length	mm	100.2	100.6	100.2
Volume	cm³	196.8	197.4	196.7
Moisture Content	%	9.8	9.7	9.6
Dry Density	g/cm³	1.953	1.949	1.957
Void Ratio	-	0.397	0.400	0.394
Degree of Saturation	%	67.1	66.1	66.7
Particle Density (SG)	-	2.728 - Determined		

End of Saturation Phase				
Method:		Increments of Cell- and Backpressure		
		Specimen 1	**Specimen 2**	**Specimen 3**
Cell Pressure	kPa	400	250	200
Back Pressure	kPa	390	240	190
B Value	-	0.98	0.98	0.98

Consolidation Phase				
		Specimen 1	**Specimen 2**	**Specimen 3**
Cell Pressure	kPa	540	590	890
Back Pressure	kPa	390	240	190
Pore Pressure (Initial)	kPa	529.6	576.2	875.6
Pore Pressure (Final)	kPa	388.9	238.1	190.6
Effective Stress	kPa	150.0	350.0	700.0
Volumetric Strain	%	0.9	1.3	1.9

End of Shear Phase				
Failure Criterion:		Maximum Deviator Stress		
Rate of Strain		0.5 %/hour		
		Specimen 1	**Specimen 2**	**Specimen 3**
Corrected Deviator Stress	kPa	470.7	831.1	1710.6
at Axial Strain	%	2.3	14.9	13.1
Principal Stresses $\sigma 1'$	kPa	621	1181	2411
Principal Stresses $\sigma 3'$	kPa	150	350	700

Final Specimen Details				
Moisture Content	%	12.2	12.5	11.0
Dry Density	g/cm³	1.971	1.974	1.995
Void Ratio	-	0.384	0.382	0.368

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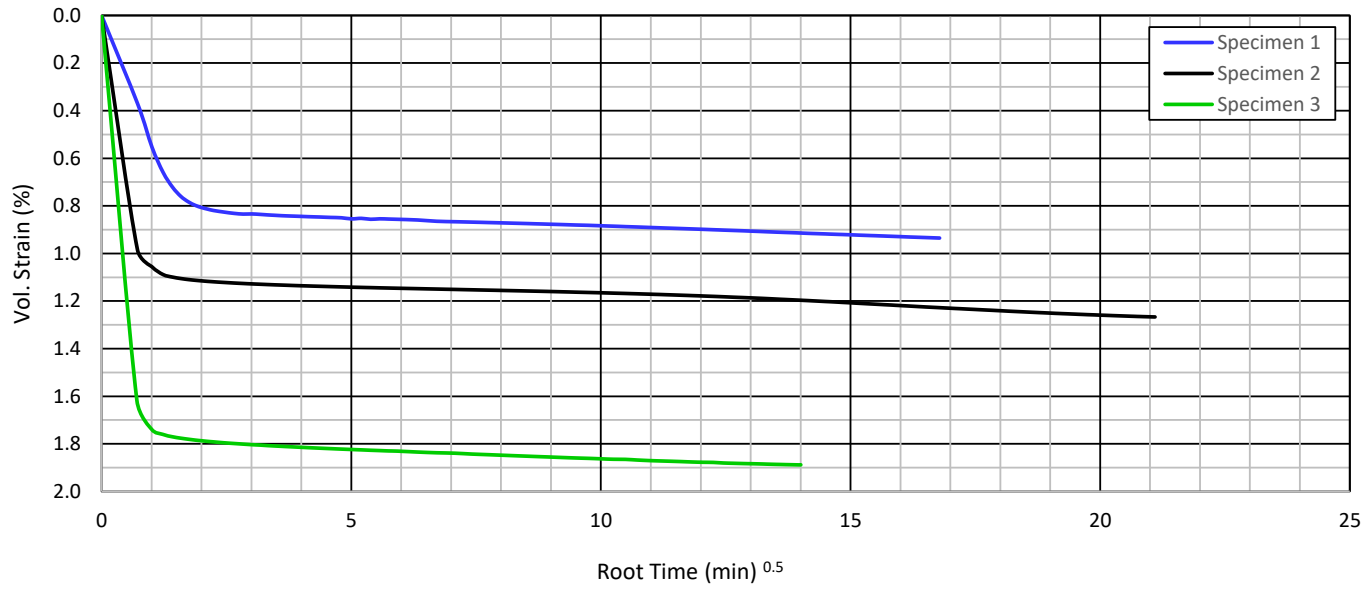
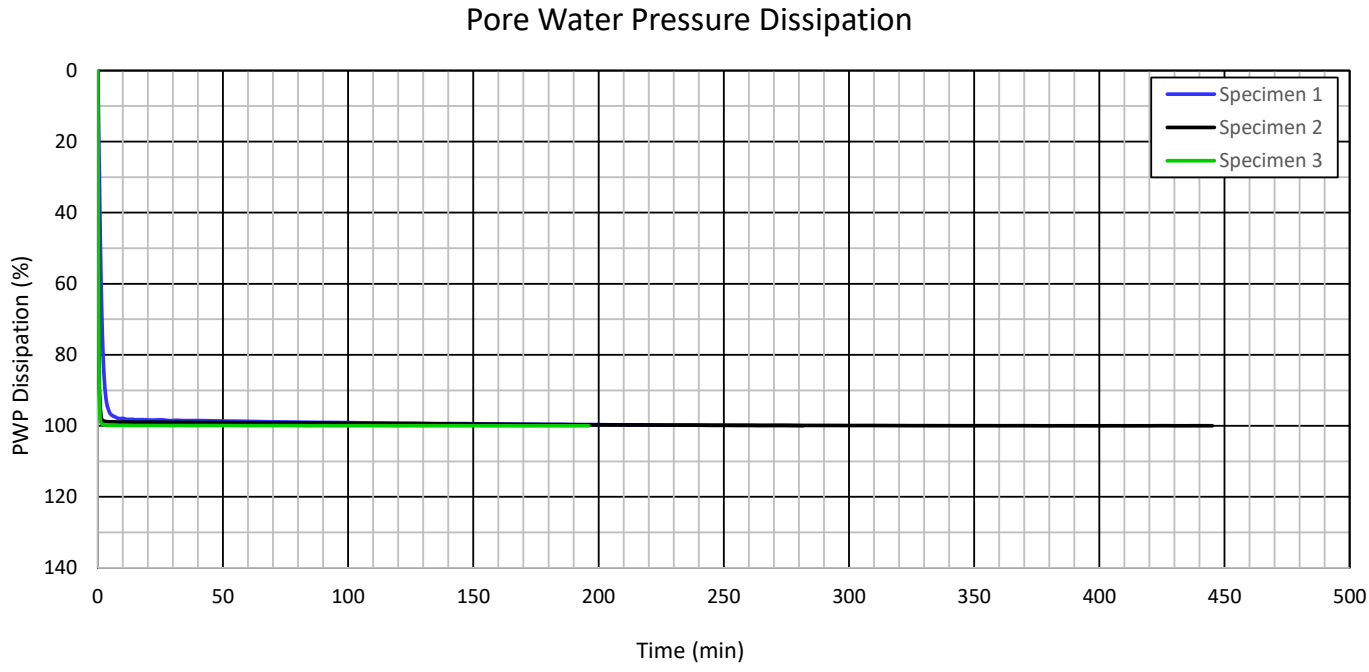
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-20
Sample:	TP9/1	**Date:**	18/07/2019
Depth: (m)	0 - 0.8		

CONSOLIDATED DRAINED TRIAXIAL TEST





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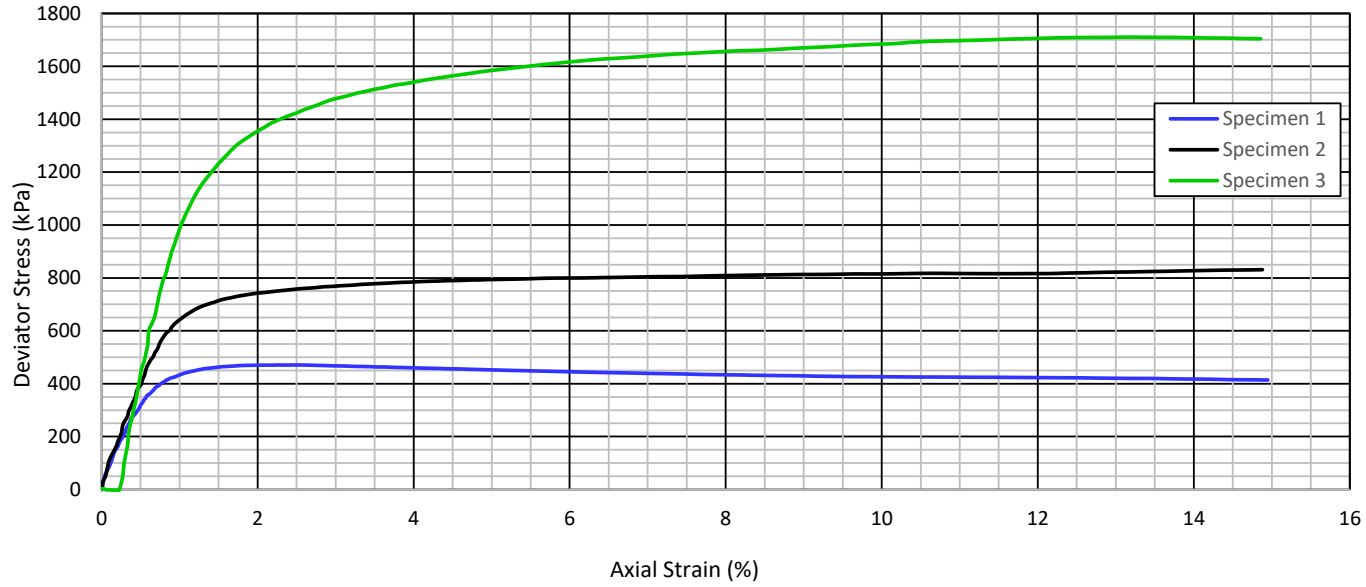
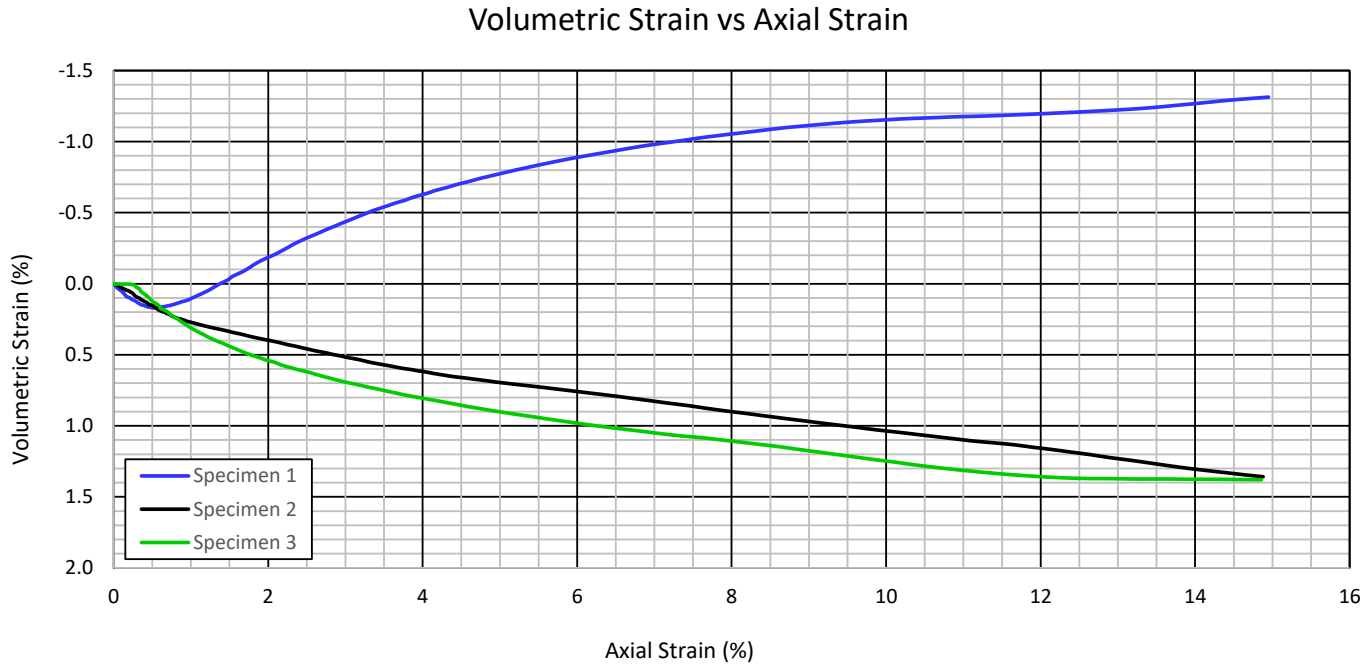
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-20
Sample:	TP9/1	**Date:**	18/07/2019
Depth: (m)	0 - 0.8		

CONSOLIDATED DRAINED TRIAXIAL TEST





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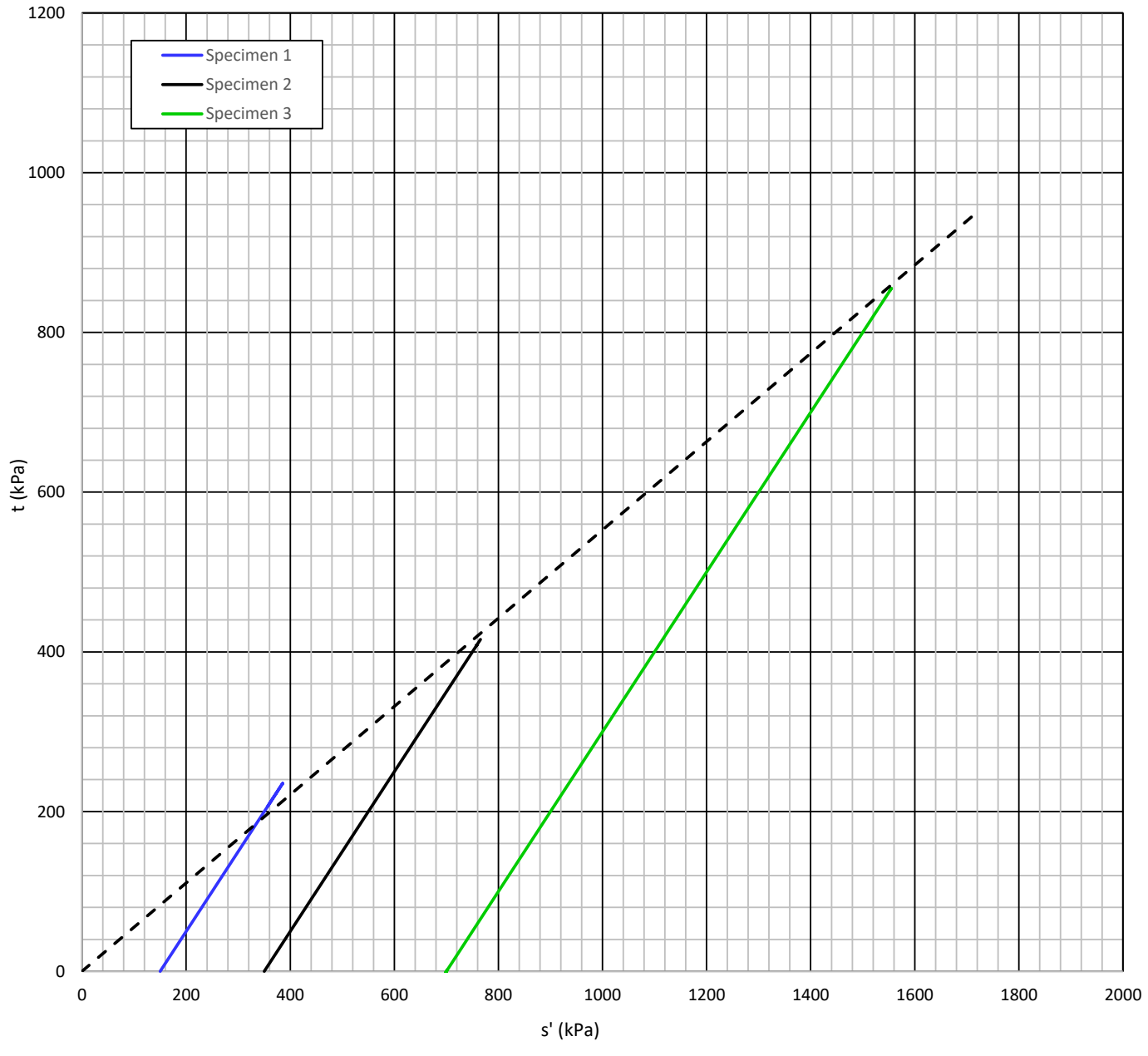
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-20
Sample:	TP9/1	**Date:**	18/07/2019
Depth: (m)	0 - 0.8		

CONSOLIDATED DRAINED TRIAXIAL TEST

ϕ'	Deg.	**34**
c'	kPa	**0**



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Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP17/1
Depth: (m) 0 - 1.2

Job Number: KNP-03
Lab Number: KNP-03-24
Date: 18/07/2019

CONSOLIDATED DRAINED TRIAXIAL TEST

General Test Data	
Type of Test:	Saturated, Consolidated Drained with Volume Change Measurements
Type of Sample:	Remoulded to 95% of MDD (Proctor) Value - 2080kg/m³ at 8.3%
Side Drains:	No
Drainage:	To One End
Comments:	-

Initial Specimen Details				
		Specimen 1	Specimen 2	Specimen 3
Diameter	mm	50.0	50.0	50.0
Length	mm	100.6	100.3	100.3
Volume	cm³	197.4	197.0	196.9
Moisture Content	%	8.6	9.0	8.4
Dry Density	g/cm³	1.958	1.956	1.969
Void Ratio	-	0.371	0.373	0.364
Degree of Saturation	%	62.3	64.9	61.9
Particle Density (SG)	-	2.685 - Determined		

End of Saturation Phase				
Method:		Increments of Cell- and Backpressure		
		Specimen 1	Specimen 2	Specimen 3
Cell Pressure	kPa	200	200	200
Back Pressure	kPa	190	190	190
B Value	-	0.98	0.98	0.99

Consolidation Phase				
		Specimen 1	Specimen 2	Specimen 3
Cell Pressure	kPa	340	540	890
Back Pressure	kPa	190	190	190
Pore Pressure (Initial)	kPa	327.7	525.9	875.0
Pore Pressure (Final)	kPa	190.6	190.2	189.3
Effective Stress	kPa	150.0	350.0	700.0
Volumetric Strain	%	0.9	1.9	1.8

End of Shear Phase				
Failure Criterion:		Maximum Deviator Stress		
Rate of Strain		0.5 %/hour		
		Specimen 1	Specimen 2	Specimen 3
Corrected Deviator Stress	kPa	455.4	828.1	1746.5
at Axial Strain	%	1.6	13.2	13.9
Principal Stresses σ1'	kPa	605	1178	2446
Principal Stresses σ3'	kPa	150	350	700

Final Specimen Details				
Moisture Content	%	13.1	12.7	12.1
Dry Density	g/cm³	1.976	1.995	2.005
Void Ratio	-	0.359	0.346	0.339

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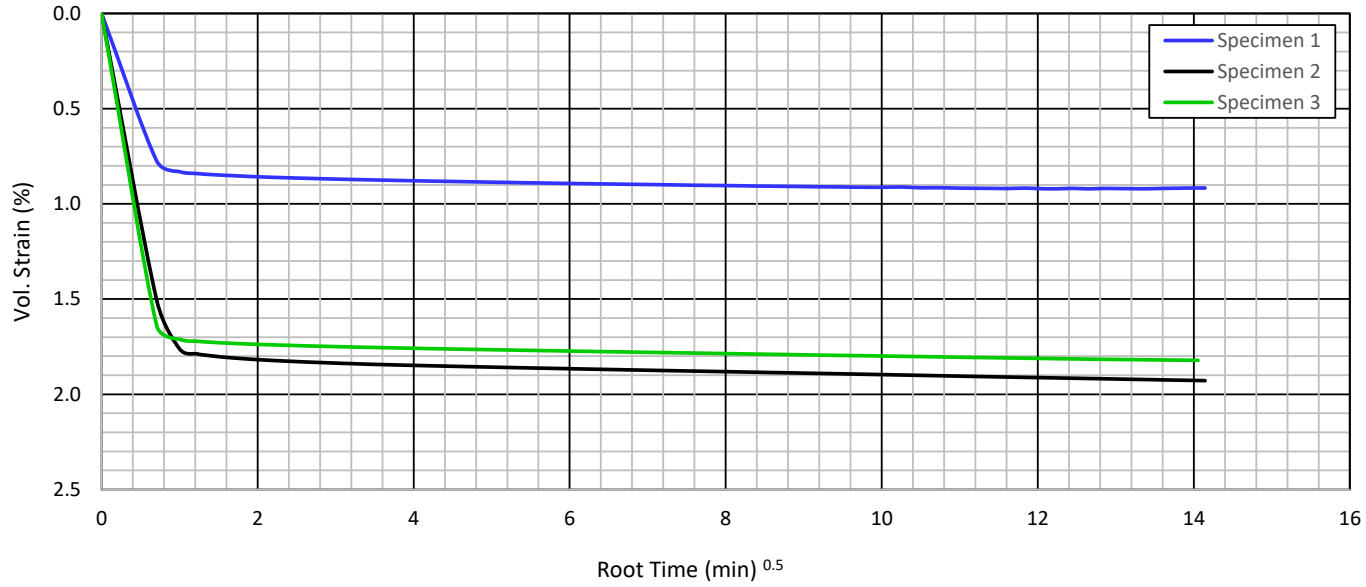
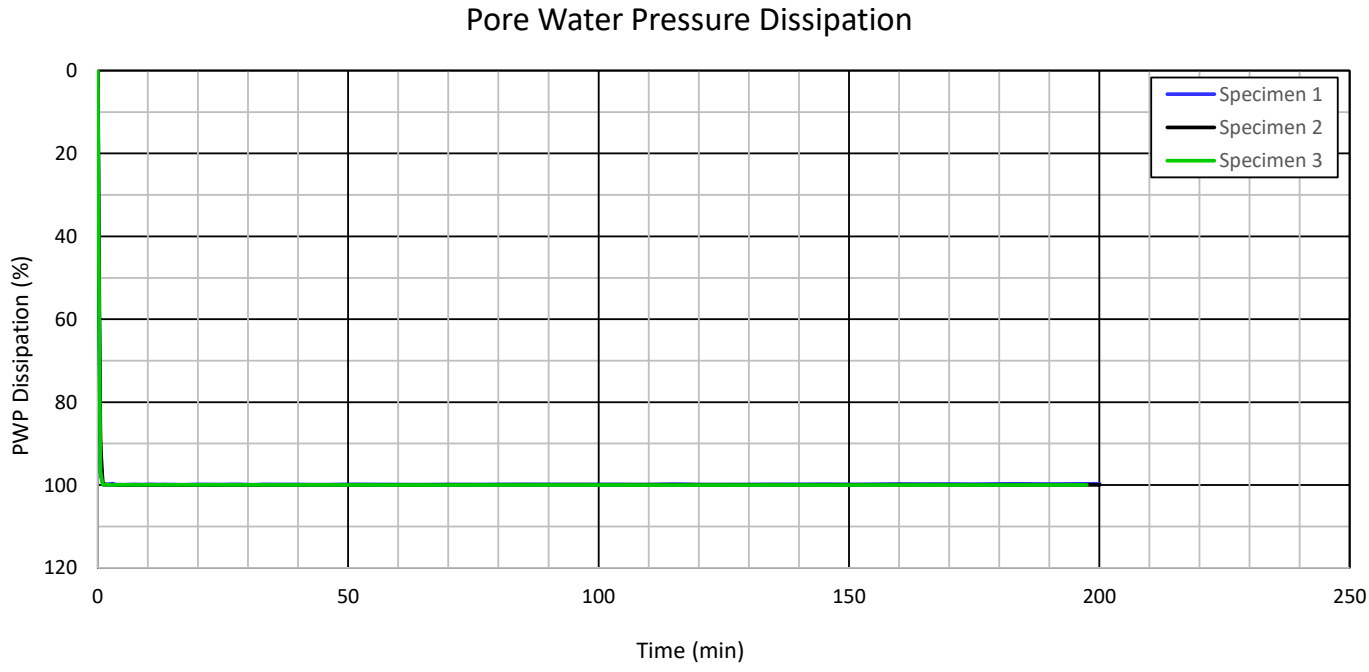
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-24
Sample:	TP17/1	**Date:**	18/07/2019
Depth: (m)	0 - 1.2		

CONSOLIDATED DRAINED TRIAXIAL TEST





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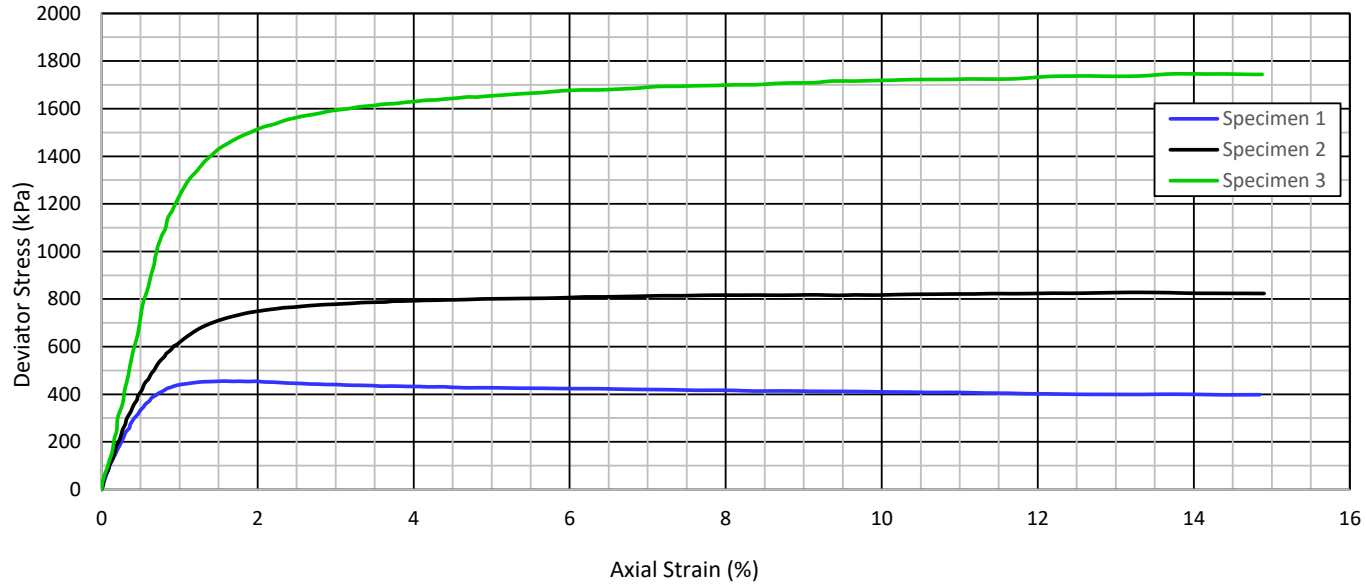
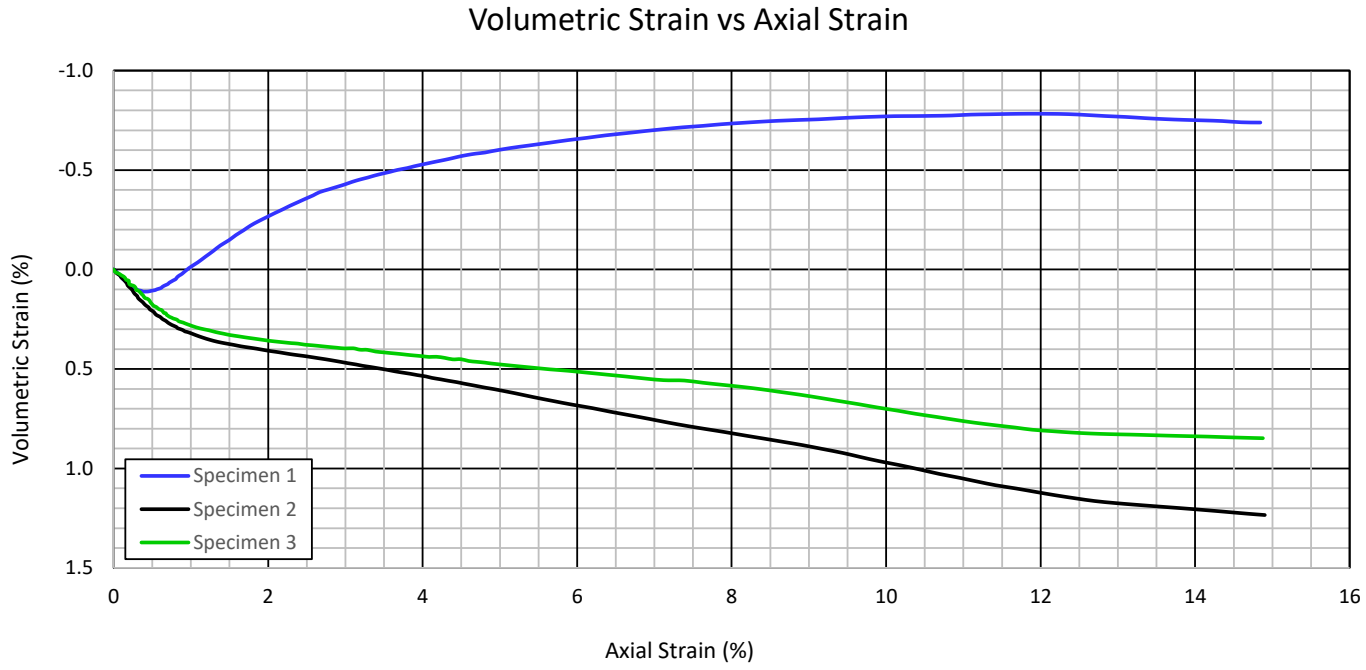
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-24
Sample:	TP17/1	**Date:**	18/07/2019
Depth: (m)	0 - 1.2		

CONSOLIDATED DRAINED TRIAXIAL TEST





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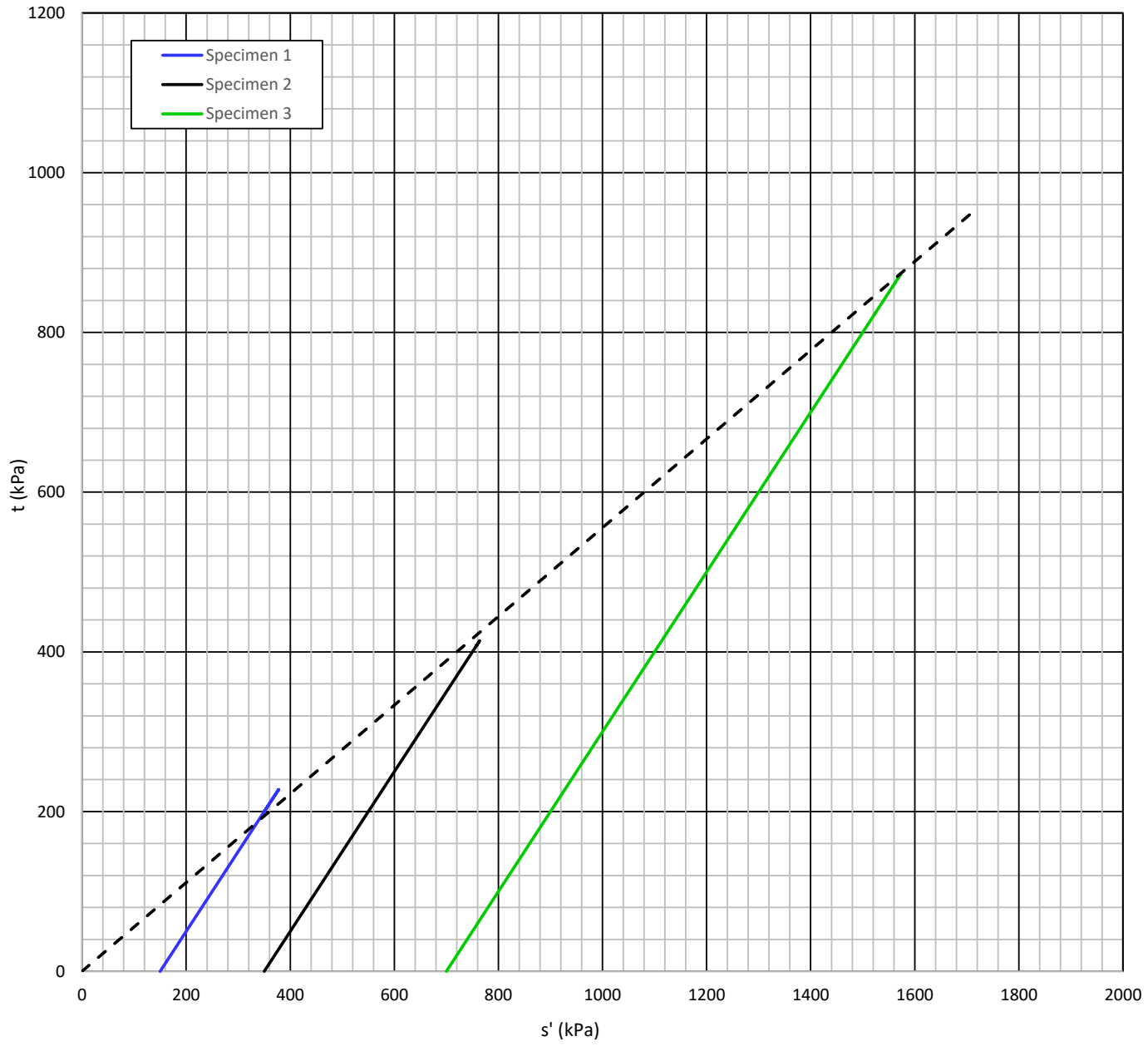
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-24
Sample:	TP17/1	**Date:**	18/07/2019
Depth: (m)	0 - 1.2		

CONSOLIDATED DRAINED TRIAXIAL TEST

ϕ'	Deg.	**34**
c'	kPa	**0**



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Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP40/1
Depth: (m) 0.8 - 2.3

Job Number: KNP-03
Lab Number: KNP-03-38
Date: 18/07/2019

CONSOLIDATED DRAINED TRIAXIAL TEST

General Test Data	
Type of Test:	Saturated, Consolidated Drained with Volume Change Measurements
Type of Sample:	Remoulded to 95% of MDD (Proctor) Value - 2012kg/m³ at 9.4%
Side Drains:	No
Drainage:	To One End
Comments:	-

Initial Specimen Details				
		Specimen 1	**Specimen 2**	**Specimen 3**
Diameter	mm	50.0	50.0	50.0
Length	mm	100.0	100.2	100.4
Volume	cm³	196.4	196.8	197.1
Moisture Content	%	10.2	10.3	9.9
Dry Density	g/cm³	1.896	1.891	1.895
Void Ratio	-	0.423	0.427	0.424
Degree of Saturation	%	64.9	65.2	63.0
Particle Density (SG)	-	2.699 - Determined		

End of Saturation Phase				
Method:		Increments of Cell- and Backpressure		
		Specimen 1	**Specimen 2**	**Specimen 3**
Cell Pressure	kPa	300	300	250
Back Pressure	kPa	290	290	240
B Value	-	0.96	0.98	0.99

Consolidation Phase				
		Specimen 1	**Specimen 2**	**Specimen 3**
Cell Pressure	kPa	440	640	940
Back Pressure	kPa	290	290	240
Pore Pressure (Initial)	kPa	426.2	626.7	925.5
Pore Pressure (Final)	kPa	289.8	288.2	241.4
Effective Stress	kPa	150.0	350.0	700.0
Volumetric Strain	%	1.5	3.9	5.7

End of Shear Phase				
Failure Criterion:		Maximum Deviator Stress		
Rate of Strain		T1: 0.07, T2: 0.03 & T3: 0.02%/hour		
		Specimen 1	**Specimen 2**	**Specimen 3**
Corrected Deviator Stress	kPa	365.7	761.7	1516.2
at Axial Strain	%	11.9	14.2	14.9
Principal Stresses σ1'	kPa	516	1112	2216
Principal Stresses σ3'	kPa	150	350	700

Final Specimen Details				
Moisture Content	%	11.5	10.5	9.5
Dry Density	g/cm³	1.925	1.968	2.010
Void Ratio	-	0.402	0.371	0.343

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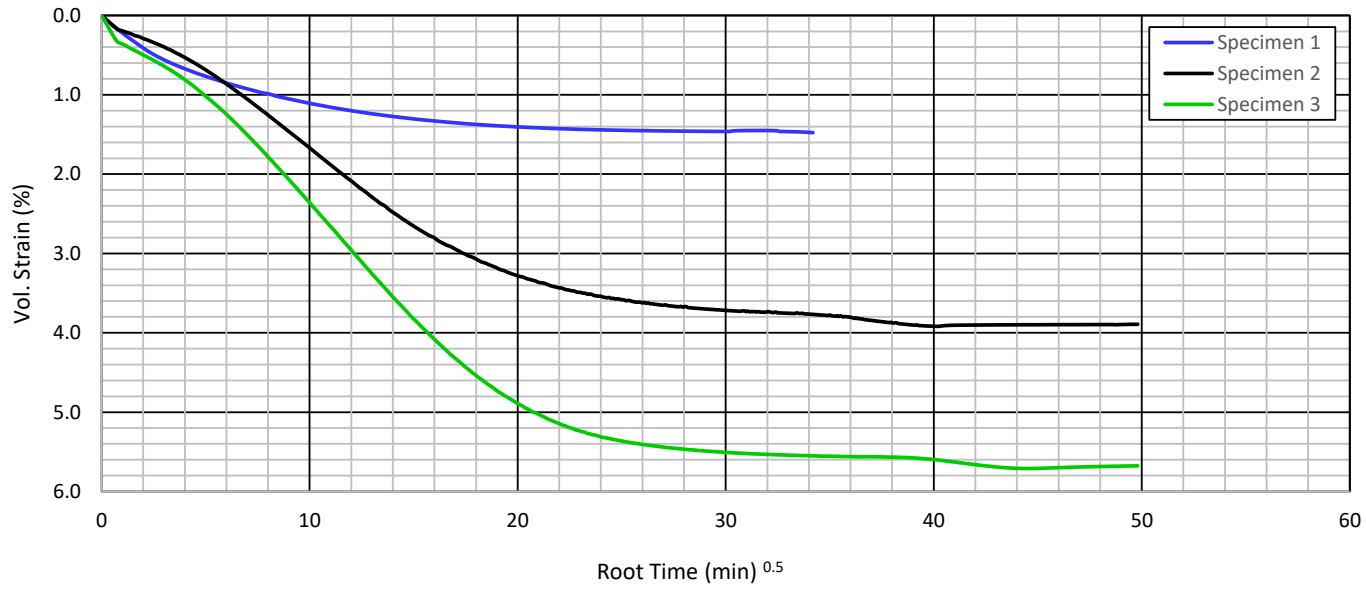
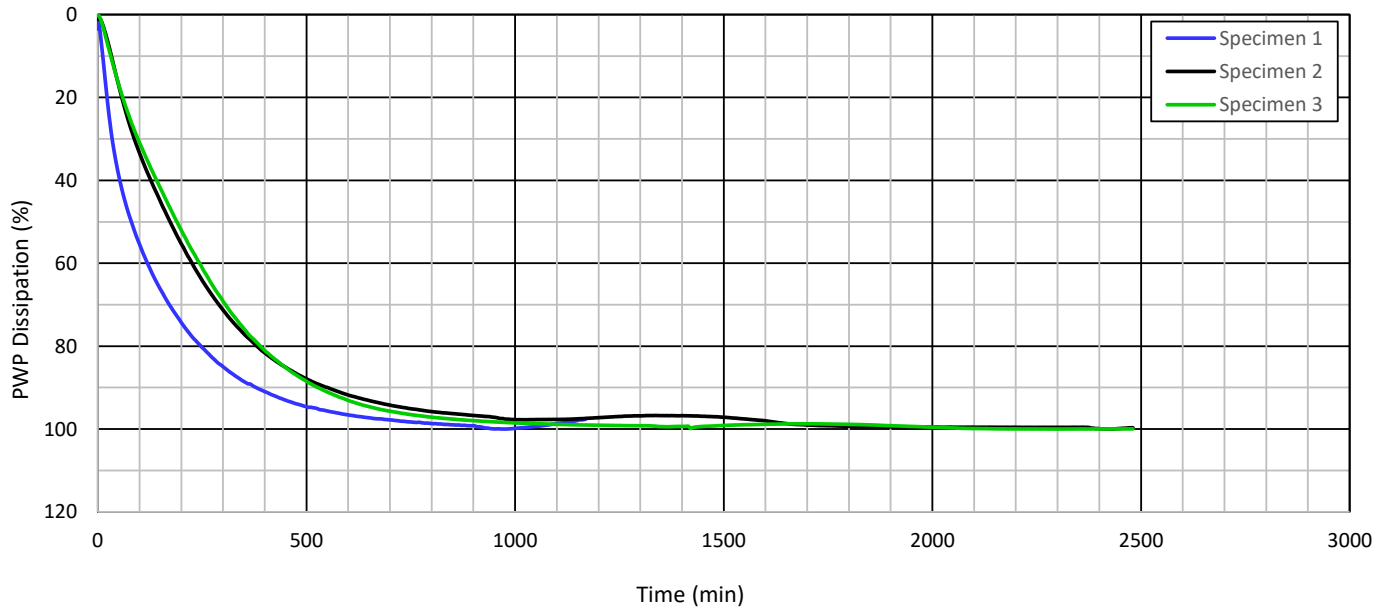
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-38
Sample:	TP40/1	**Date:**	18/07/2019
Depth: (m)	0.8 - 2.3		

CONSOLIDATED DRAINED TRIAXIAL TEST

Consolidation



Pore Water Pressure Dissipation



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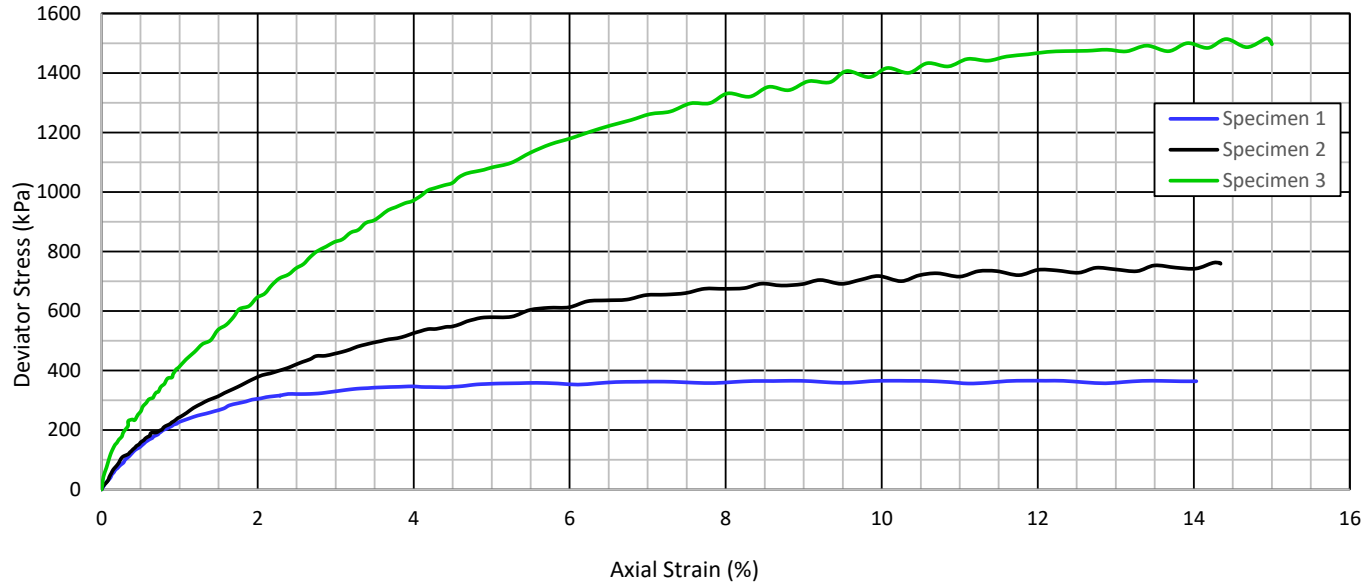
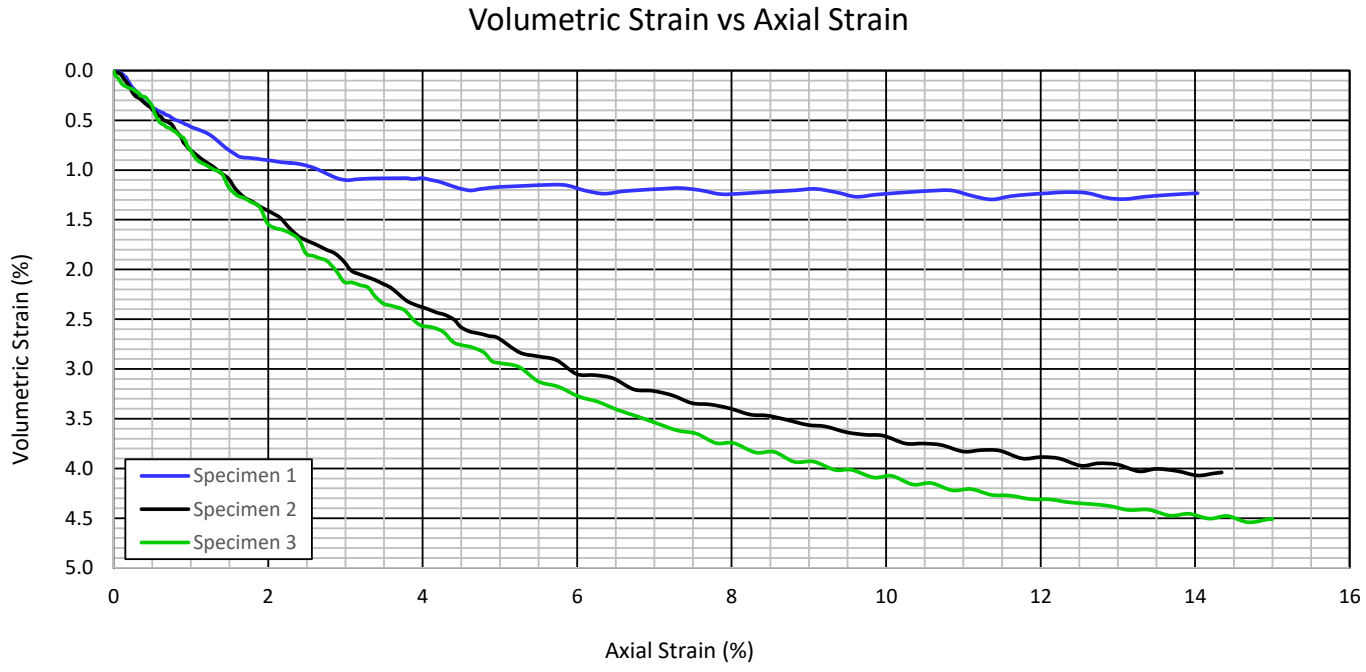
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-38
Sample:	TP40/1	**Date:**	18/07/2019
Depth: (m)	0.8 - 2.3		

CONSOLIDATED DRAINED TRIAXIAL TEST





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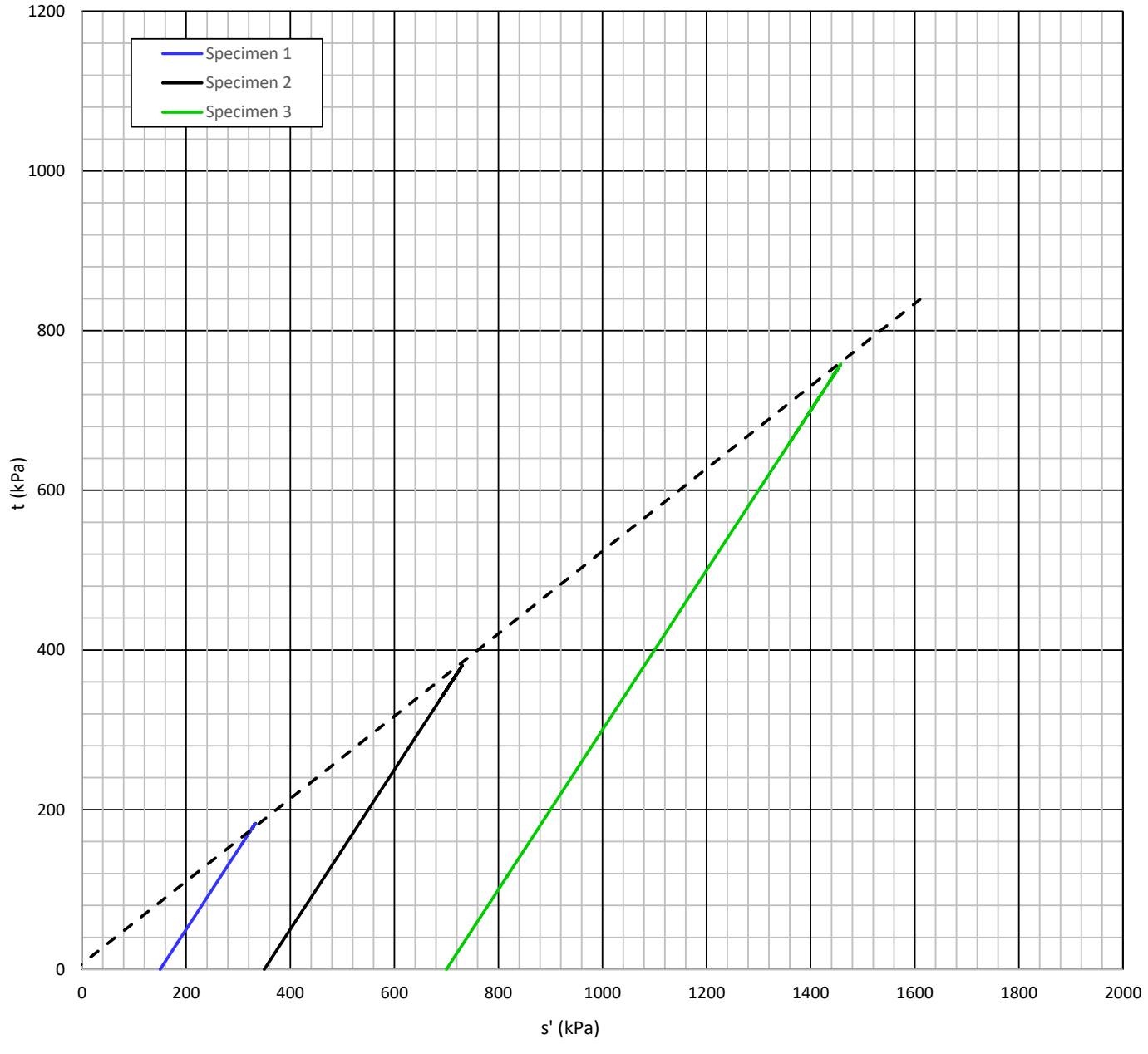
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-38
Sample:	TP40/1	**Date:**	18/07/2019
Depth: (m)	0.8 - 2.3		

CONSOLIDATED DRAINED TRIAXIAL TEST

ϕ'	Deg.	**31**
c'	kPa	**8**



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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-18
Sample:	TP7/1	**Date:**	18-Jul-19
Depth: (m)	0 - 2.3		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	2.088
OMC:	%	6.7

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	92.3
Area	mm²	2026.8
Volume	cm³	187.1
Moisture Content	%	6.5
Dry Density	g/cm³	1.969
Void Ratio	-	0.346
Degree of Saturation	%	50.1
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	2.7	5.9
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	2.33E-06	2.18E-06
Average	m/s	**2.25E-06**		

Run 2				
Elapsed Time	min	0	2.9	6.2
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	2.18E-06	2.07E-06
Average	m/s	**2.12E-06**		

Selected k_T	**m/s**	**2.12E-06**

Temp. Corrected k_{T20}	**m/s**	**1.88E-06**

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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-20
Sample:	TP9/1	**Date:**	18-Jul-19
Depth: (m)	0 - 0.8		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	2.080
OMC:	%	8.8

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	90.8
Area	mm²	2026.8
Volume	cm³	184.0
Moisture Content	%	8.0
Dry Density	g/cm³	1.952
Void Ratio	-	0.358
Degree of Saturation	%	59.4
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	24.0	52.0
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	2.57E-07	2.42E-07
Average	m/s	**2.50E-07**		

Run 2				
Elapsed Time	min	0	26.4	59.0
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	2.34E-07	2.08E-07
Average	m/s	**2.21E-07**		

Selected k_T	**m/s**	**2.21E-07**

Temp. Corrected k_{T20}	**m/s**	**1.95E-07**

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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-22
Sample:	TP14/1	**Date:**	18-Jul-19
Depth: (m)	0 - 0.5		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	2.258
OMC:	%	6.9

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	90.9
Area	mm²	2026.8
Volume	cm³	184.2
Moisture Content	%	7.4
Dry Density	g/cm³	2.156
Void Ratio	-	0.229
Degree of Saturation	%	85.6
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	14.6	33.1
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	4.24E-07	3.67E-07
Average	m/s	**3.96E-07**		

Run 2				
Elapsed Time	min	0	16.7	37.0
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	3.70E-07	3.35E-07
Average	m/s	**3.52E-07**		

Selected k_T	**m/s**	**3.52E-07**

Temp. Corrected k_{T20}	**m/s**	**3.11E-07**

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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-29
Sample:	TP22/1	**Date:**	18-Jul-19
Depth: (m)	0 - 0.6		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	2.293
OMC:	%	6.1

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	91.1
Area	mm²	2026.8
Volume	cm³	184.6
Moisture Content	%	6.8
Dry Density	g/cm³	2.041
Void Ratio	-	0.299
Degree of Saturation	%	60.8
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	67.5	228.0
Height Above Outlet	mm	1610.2	1410.2	1290.2
Height Ratio	mm	-	1.14	1.09
k_T	m/s	-	2.34E-08	6.60E-09
Average	m/s	**1.50E-08**		

Run 2				
Elapsed Time	min			
Height Above Outlet	mm			
Height Ratio	mm			
k_T	m/s			
Average	m/s			

Selected k_T	**m/s**	**1.50E-08**

Temp. Corrected k_{T20}	**m/s**	**1.33E-08**

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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-32
Sample:	TP28/2	**Date:**	18-Jul-19
Depth: (m)	0.3 - 3.4		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	1.708
OMC:	%	17.6

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	90.3
Area	mm²	2026.8
Volume	cm³	183.1
Moisture Content	%	18.9
Dry Density	g/cm³	1.619
Void Ratio	-	0.637
Degree of Saturation	%	78.5
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	383.4	1344.8
Height Above Outlet	mm	1610.2	1570.2	1330.2
Height Ratio	mm	-	1.03	1.18
k_T	m/s	-	8.82E-10	2.32E-09
Average	m/s	**1.60E-09**		

Run 2				
Elapsed Time	min	0	380.5	1801.0
Height Above Outlet	mm	1610.2	1570.2	1320.2
Height Ratio	mm	-	1.03	1.19
k_T	m/s	-	8.89E-10	1.64E-09
Average	m/s	**1.27E-09**		

Selected k_T	**m/s**	**1.27E-09**

Temp. Corrected k_{T20}	**m/s**	**1.12E-09**

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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-35
Sample:	TP30/2	**Date:**	18-Jul-19
Depth: (m)	1.1 - 1.7		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	1.939
OMC:	%	10.7

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	90.5
Area	mm²	2026.8
Volume	cm³	183.4
Moisture Content	%	9.7
Dry Density	g/cm³	1.850
Void Ratio	-	0.433
Degree of Saturation	%	59.6
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	2880.0	4320.0
Height Above Outlet	mm	1610.2	1410.2	1290.2
Height Ratio	mm	-	1.14	1.09
k_T	m/s	-	2.76E-10	3.70E-10
Average	m/s	**3.23E-10**		

Run 2				
Elapsed Time	min			
Height Above Outlet	mm			
Height Ratio	mm			
k_T	m/s			
Average	m/s			

Selected k_T	**m/s**	**3.23E-10**

Temp. Corrected k_{T20}	**m/s**	**2.85E-10**

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Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-37
Sample:	TP39/1	**Date:**	18-Jul-19
Depth: (m)	0 - 1.6		

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	2.086
OMC:	%	8.4

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	91.6
Area	mm²	2026.8
Volume	cm³	185.7
Moisture Content	%	8.6
Dry Density	g/cm³	1.977
Void Ratio	-	0.340
Degree of Saturation	%	66.8
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	25.8	61.5
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	2.42E-07	1.91E-07
Average	m/s	**2.17E-07**		

Run 2				
Elapsed Time	min	0	31.7	74.9
Height Above Outlet	mm	1610.2	1360.2	1130.2
Height Ratio	mm	-	1.18	1.20
k_T	m/s	-	1.97E-07	1.58E-07
Average	m/s	**1.77E-07**		

Selected k_T	**m/s**	**1.77E-07**

Temp. Corrected k_{T20}	**m/s**	**1.57E-07**

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Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP40/1
Depth: (m) 0.8 - 2.3

Job Number: KNP-03
Lab Number: KNP-03-38
Date: 18-Jul-19

FALLING HEAD PERMEABILITY TEST

General Test Data		
Type of Sample:	-	Remoulded to 95% of MDD (Proctor)
MDD (Proctor):	g/cm³	2.012
OMC:	%	9.4

Initial Specimen Details		
Diameter	mm	50.8
Length	mm	89.9
Area	mm²	2026.8
Volume	cm³	182.3
Moisture Content	%	9.2
Dry Density	g/cm³	1.900
Void Ratio	-	0.394
Degree of Saturation	%	61.7
Particle Density (SG)	-	2.65 - Assumed

Permeability Details				
Run 1				
Elapsed Time	min	0	498.6	1442.6
Height Above Outlet	mm	1610.2	1520.2	1310.2
Height Ratio	mm	-	1.06	1.16
k_T	m/s	-	6.86E-10	9.37E-10
Average	m/s	**8.12E-10**		

Run 2				
Elapsed Time	min	0	329.0	1387.2
Height Above Outlet	mm	1610.2	1520.2	1260.2
Height Ratio	mm	-	1.06	1.21
k_T	m/s	-	1.04E-09	1.05E-09
Average	m/s	**1.05E-09**		

Selected k_T	**m/s**	**8.12E-10**

Temp. Corrected k_{T20}	**m/s**	**7.17E-10**

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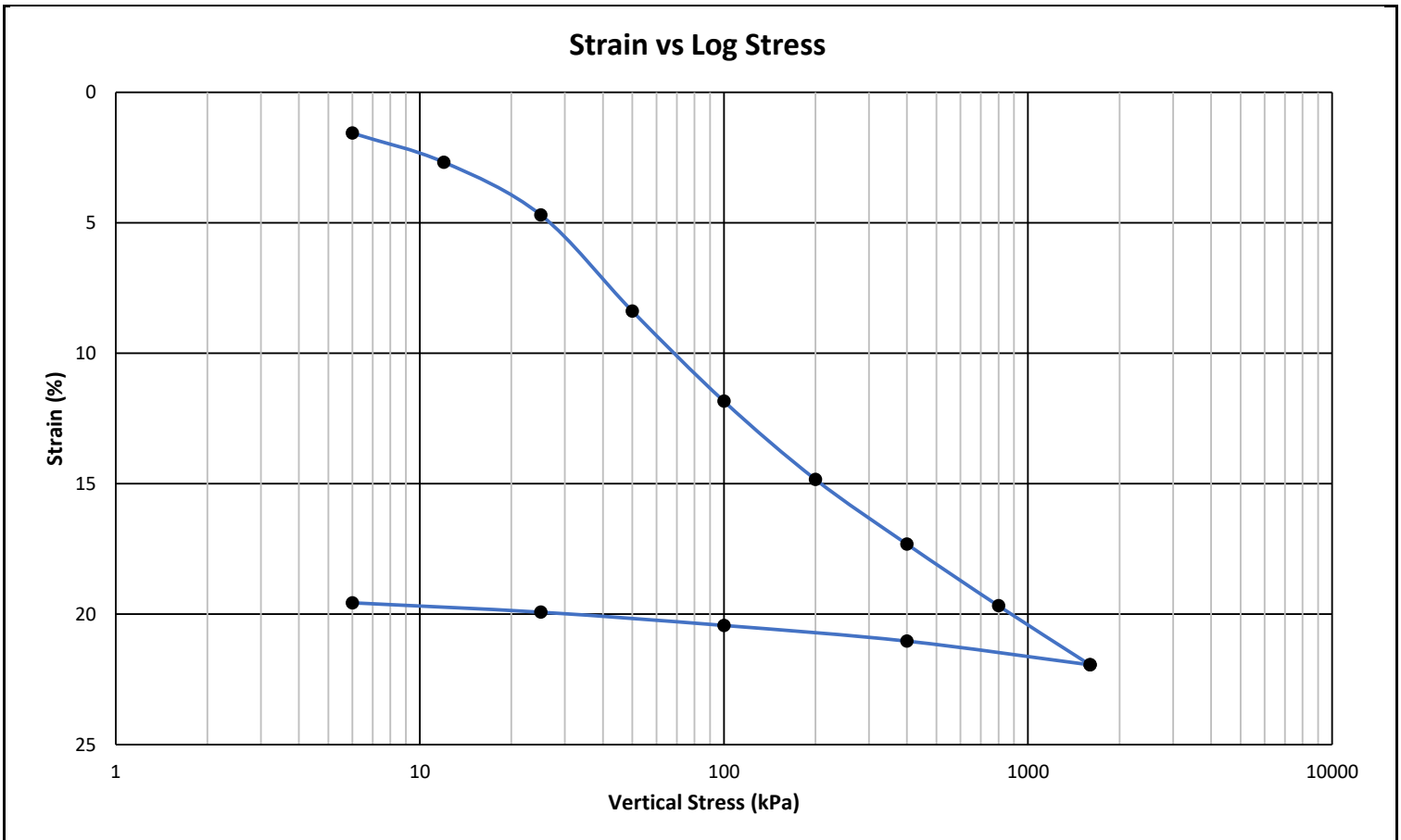
Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP2/1
Depth: (m) 0.6 - 0.9

Job Number: KNP-03
Lab Number: KNP-03-17
Method: BS 1377 Part 5
Date: 18/07/2019

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Info		Unit	Initial	Test Remarks:
Test Specimen Height		mm	25.4	Undisturbed
Moisture Content	Initial	%	5.2	
	Final	%	14.6	
Dry Density		kg/m³	1556	
Void Ratio		-	0.719	
Degree of Saturation		%	19.3	
Relative Density (SG)		-	2.675	Determined

Vertical Stress Applied:	kPa	6	12	25	50	100	200	400	800	1600	400	100	25	6
Load applied for:	Hrs	12	12	12	12	12	12	12	12	12	3	3	3	3
Height after increment	mm	25.00	24.72	24.21	23.27	22.39	21.63	21.00	20.40	19.83	20.06	20.21	20.34	20.43
Total Strain	%	1.56	2.68	4.70	8.39	11.84	14.84	17.32	19.68	21.94	21.03	20.43	19.93	19.56
Void Ratio	-	0.692	0.673	0.638	0.574	0.515	0.464	0.421	0.380	0.342	0.357	0.367	0.376	0.382
Mv (1/Mpa)	-	-	1.888	1.600	1.547	0.753	0.340	0.146	0.071	0.035	0.010	0.025	0.085	0.237



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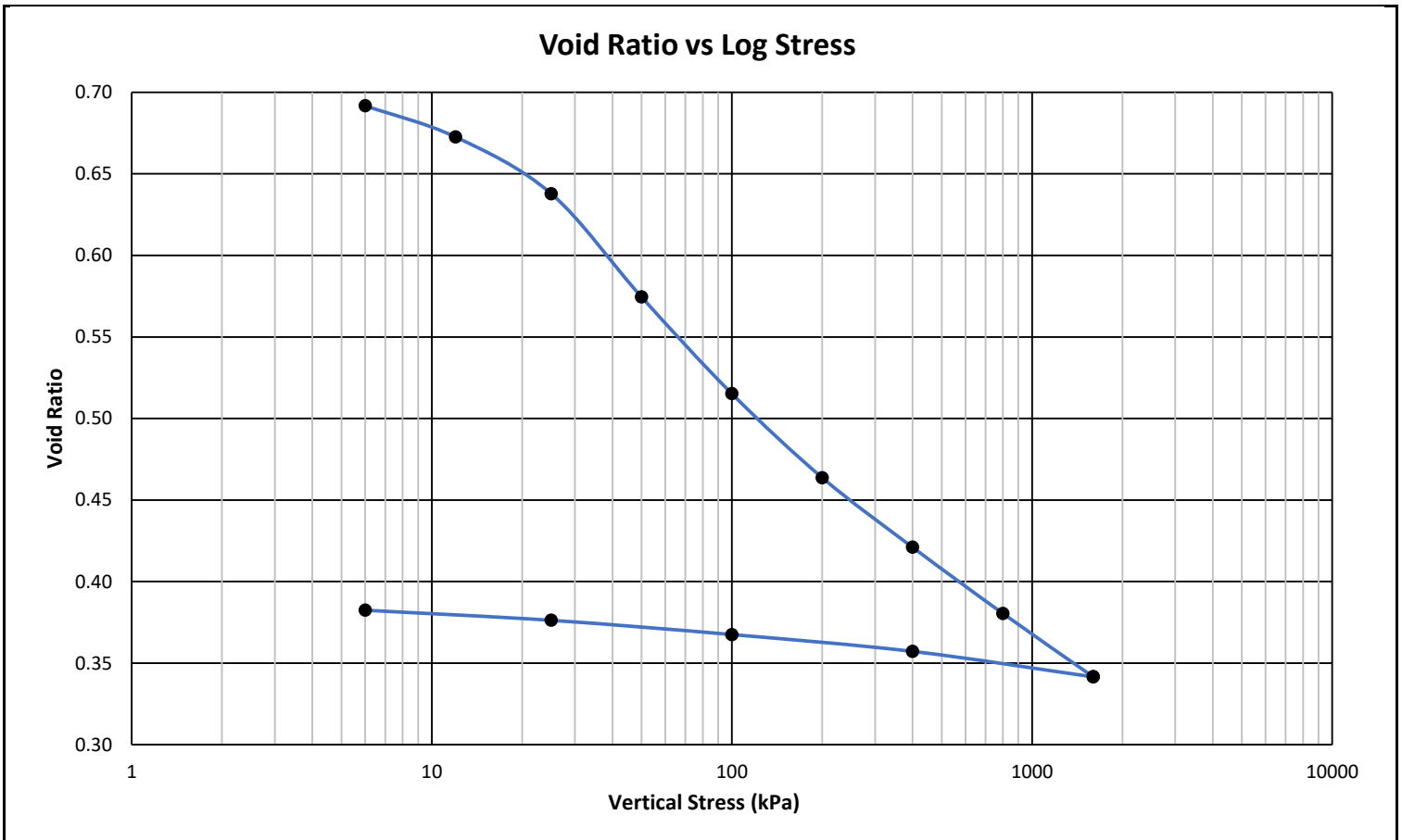
Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP2/1
Depth: (m) 0.6 - 0.9

Job Number: KNP-03
Lab Number: KNP-03-17
Method: BS 1377 Part 5
Date: 18/07/2019

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Info		Unit	Initial	Test Remarks:
Test Specimen Height		mm	25.4	Undisturbed
Moisture Content	Initial	%	5.2	
	Final	%	14.6	
Dry Density		kg/m³	1556	
Void Ratio		-	0.719	
Degree of Saturation		%	19.3	
Relative Density (SG)		-	2.675	Determined

Vertical Stress Applied:	kPa	6	12	25	50	100	200	400	800	1600	400	100	25	6
Load applied for:	Hrs	12	12	12	12	12	12	12	12	12	3	3	3	3
Height after increment	mm	25.00	24.72	24.21	23.27	22.39	21.63	21.00	20.40	19.83	20.06	20.21	20.34	20.43
Total Strain	%	1.56	2.68	4.70	8.39	11.84	14.84	17.32	19.68	21.94	21.03	20.43	19.93	19.56
Void Ratio	-	0.692	0.673	0.638	0.574	0.515	0.464	0.421	0.380	0.342	0.357	0.367	0.376	0.382
Mv (1/Mpa)	-	-	1.888	1.600	1.547	0.753	0.340	0.146	0.071	0.035	0.010	0.025	0.085	0.237



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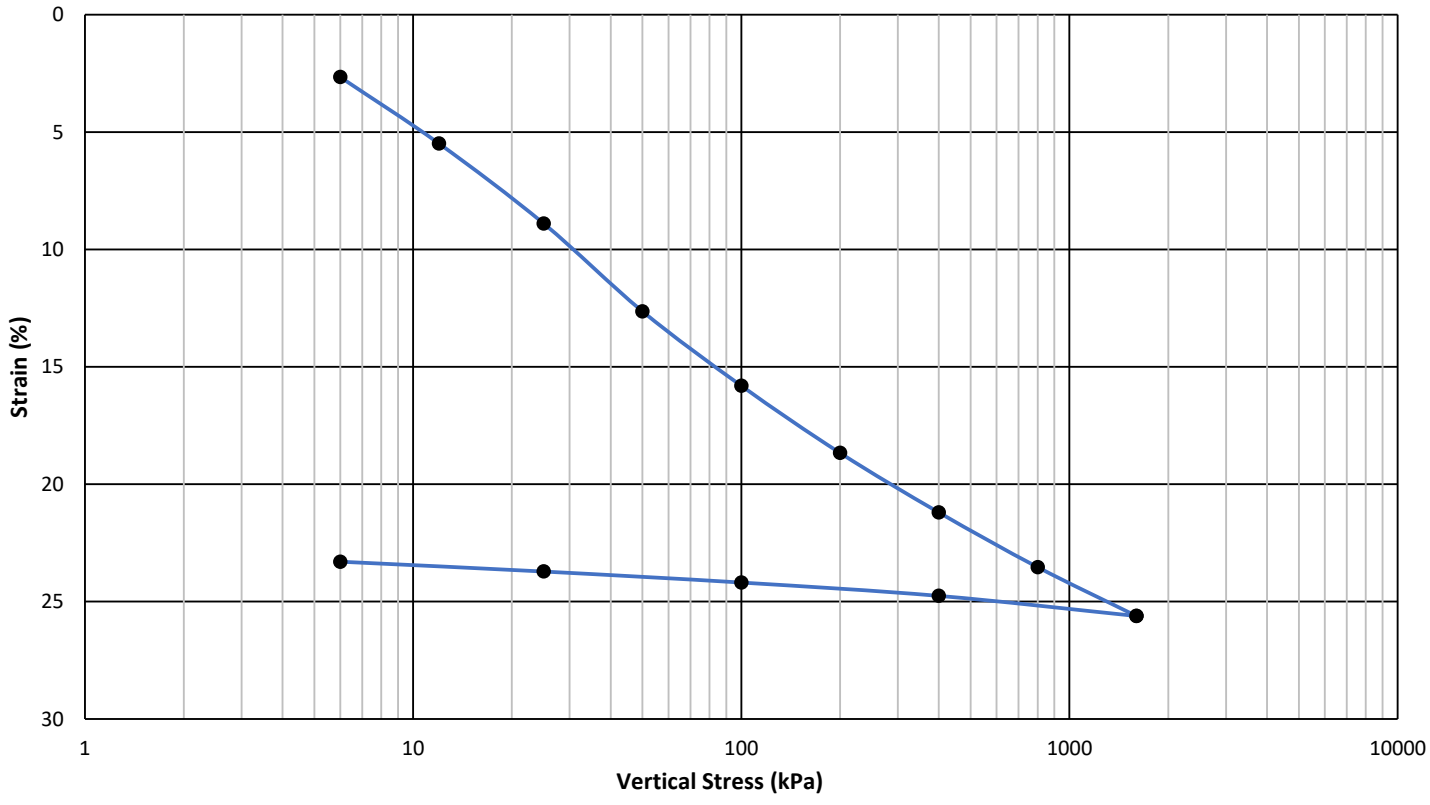
Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP31/1
Depth: (m) 0.5 - 0.85

Job Number: KNP-03
Lab Number: KNP-03-36
Method: BS 1377 Part 5
Date: 18/07/2019

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Info		Unit	Initial	Test Remarks:
Test Specimen Height		mm	25.4	Undisturbed
Moisture Content	Initial	%	3.6	
	Final	%	11.3	
Dry Density		kg/m³	1462	
Void Ratio		-	0.839	
Degree of Saturation		%	11.4	
Relative Density (SG)		-	2.688	Determined

Vertical Stress Applied:	kPa	6	12	25	50	100	200	400	800	1600	400	100	25	6
Load applied for:	Hrs	12	12	12	12	12	12	12	12	12	3	3	3	3
Height after increment	mm	24.72	24.00	23.14	22.19	21.39	20.66	20.01	19.42	18.89	19.11	19.26	19.38	19.48
Total Strain	%	2.66	5.49	8.90	12.64	15.81	18.67	21.20	23.53	25.61	24.76	24.19	23.72	23.30
Void Ratio	-	0.790	0.738	0.675	0.606	0.548	0.495	0.449	0.406	0.368	0.383	0.394	0.403	0.410
Mv (1/Mpa)	-	-	4.848	2.770	1.642	0.725	0.340	0.156	0.074	0.034	0.010	0.025	0.083	0.290



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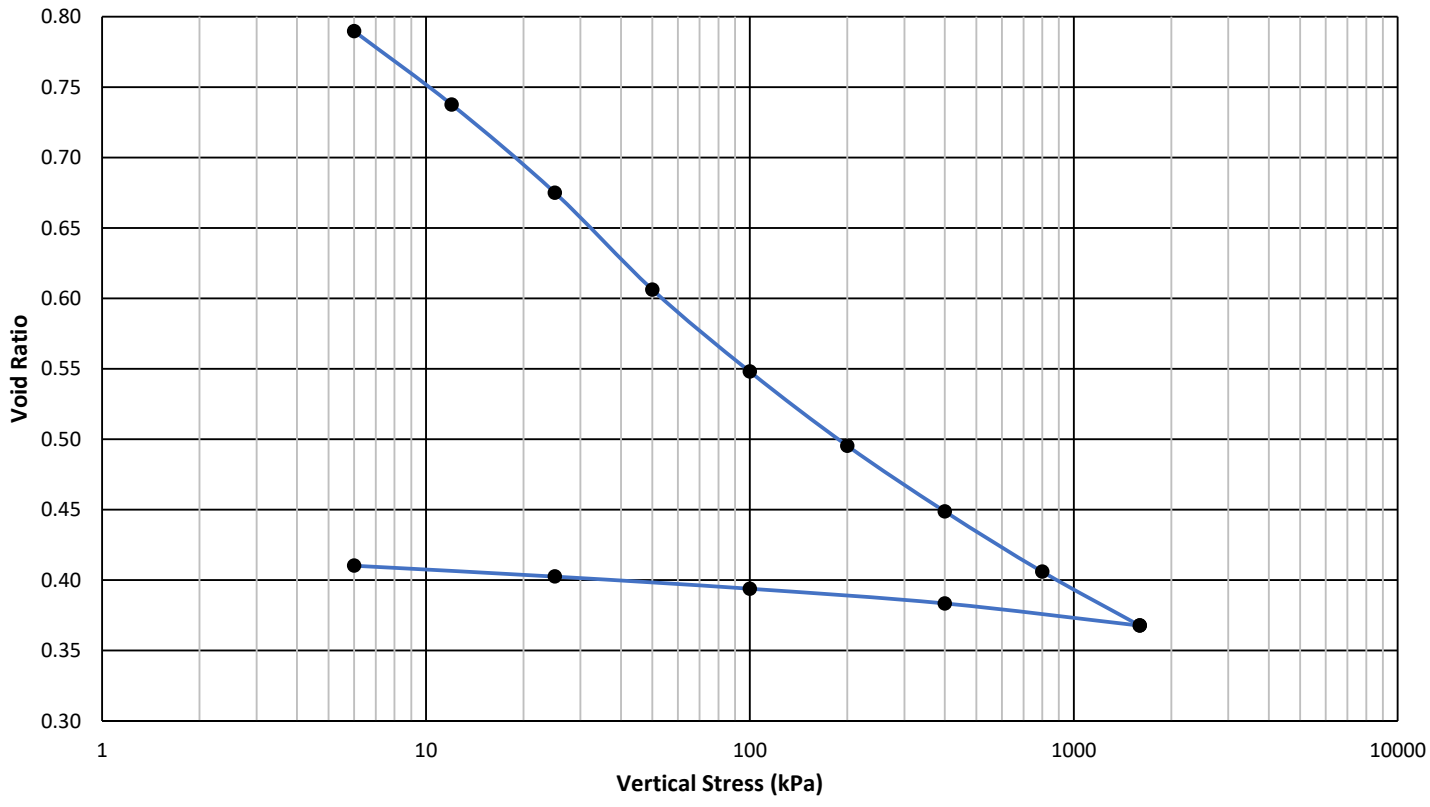
Client Name: Knight Piesold
Project Name: 301-00825/01: Matimba Ash Dump
Sample: TP31/1
Depth: (m) 0.5 - 0.85

Job Number: KNP-03
Lab Number: KNP-03-36
Method: BS 1377 Part 5
Date: 18/07/2019

ONE DIMENSIONAL CONSOLIDATION TEST

Sample Info		Unit	Initial	Test Remarks:
Test Specimen Height		mm	25.4	Undisturbed
Moisture Content	Initial	%	3.6	
	Final	%	11.3	
Dry Density		kg/m³	1462	
Void Ratio		-	0.839	
Degree of Saturation		%	11.4	
Relative Density (SG)		-	2.688	Determined

Vertical Stress Applied:	kPa	6	12	25	50	100	200	400	800	1600	400	100	25	6
Load applied for:	Hrs	12	12	12	12	12	12	12	12	12	3	3	3	3
Height after increment	mm	24.72	24.00	23.14	22.19	21.39	20.66	20.01	19.42	18.89	19.11	19.26	19.38	19.48
Total Strain	%	2.66	5.49	8.90	12.64	15.81	18.67	21.20	23.53	25.61	24.76	24.19	23.72	23.30
Void Ratio	-	0.790	0.738	0.675	0.606	0.548	0.495	0.449	0.406	0.368	0.383	0.394	0.403	0.410
Mv (1/Mpa)	-	-	4.848	2.770	1.642	0.725	0.340	0.156	0.074	0.034	0.010	0.025	0.083	0.290



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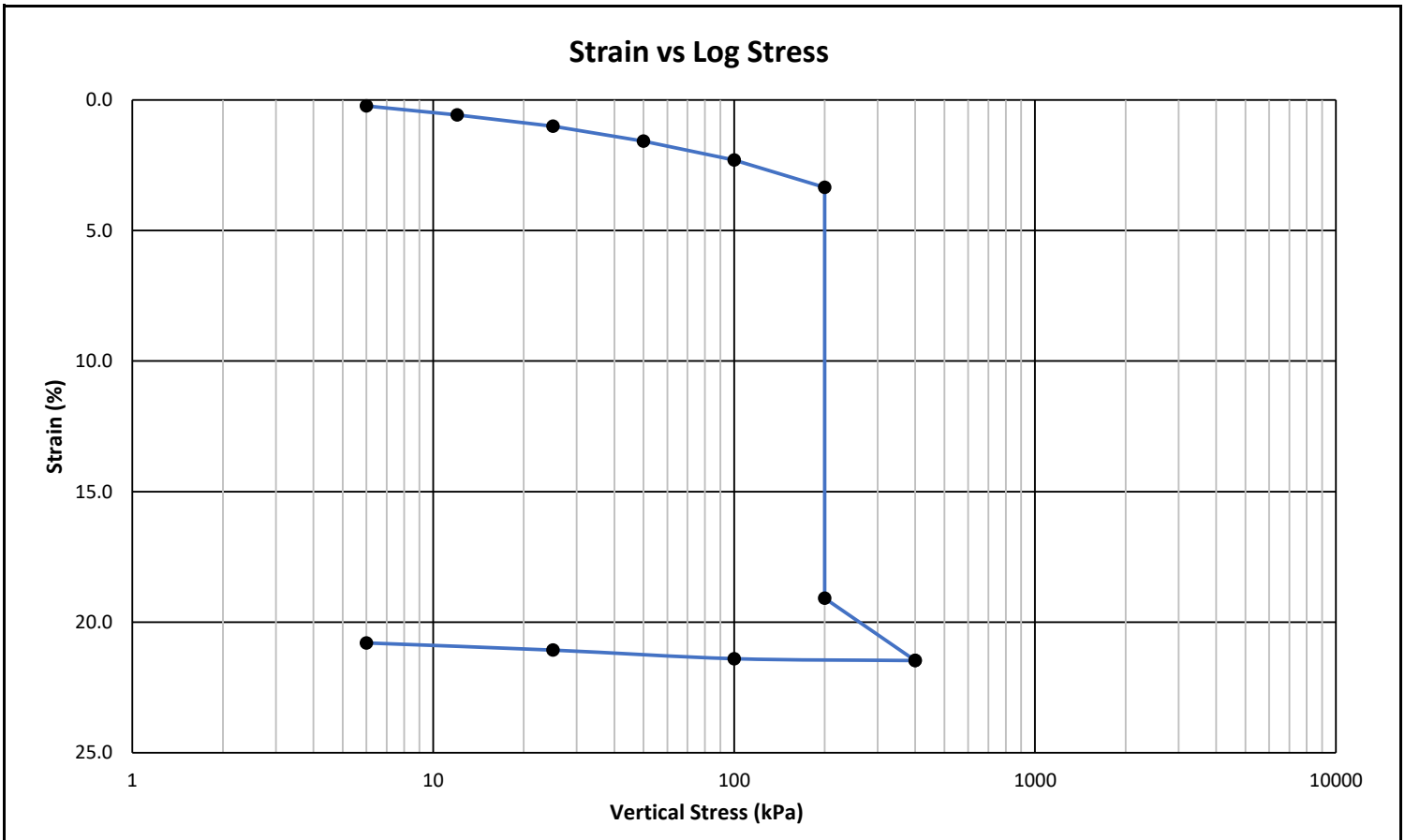
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-33
Sample:	TP29/1	**Method:**	BS 1377 Part 5
Depth: (m)	0.6 - 0.9	**Date:**	18-Jul-19

ONE DIMENSIONAL COLLAPSE POTENTIAL TEST

Sample Info		Unit	Initial	Test Remarks:
Test Specimen Height		mm	25.4	**Collapse Potential:** 15.73 %
Moisture Content	Initial	%	4.3	
	Final	%	13.1	
Dry Density		kg/m³	1445	
Void Ratio		-	0.834	
Degree of Saturation		%	13.7	
Relative Density (SG)		-	2.650	Assumed

Vertical Stress Applied:	kPa	6	12	25	50	100	200	200	400	100	25	6		
Load applied for:	Hrs	1	1	1	1	1	1	24	1	1	1	1		
Height after increment	mm	25.34	25.25	25.15	25.00	24.82	24.55	20.55	19.95	19.97	20.05	20.12		
Total Strain	%	0.23	0.57	1.00	1.57	2.30	3.35	19.08	21.47	21.40	21.07	20.79		
Void Ratio	-	0.830	0.824	0.816	0.806	0.792	0.773	0.484	0.441	0.442	0.448	0.453		
Mv (1/Mpa)	-	-	0.576	0.332	0.231	0.147	0.107	-	0.147	0.003	0.056	0.184		



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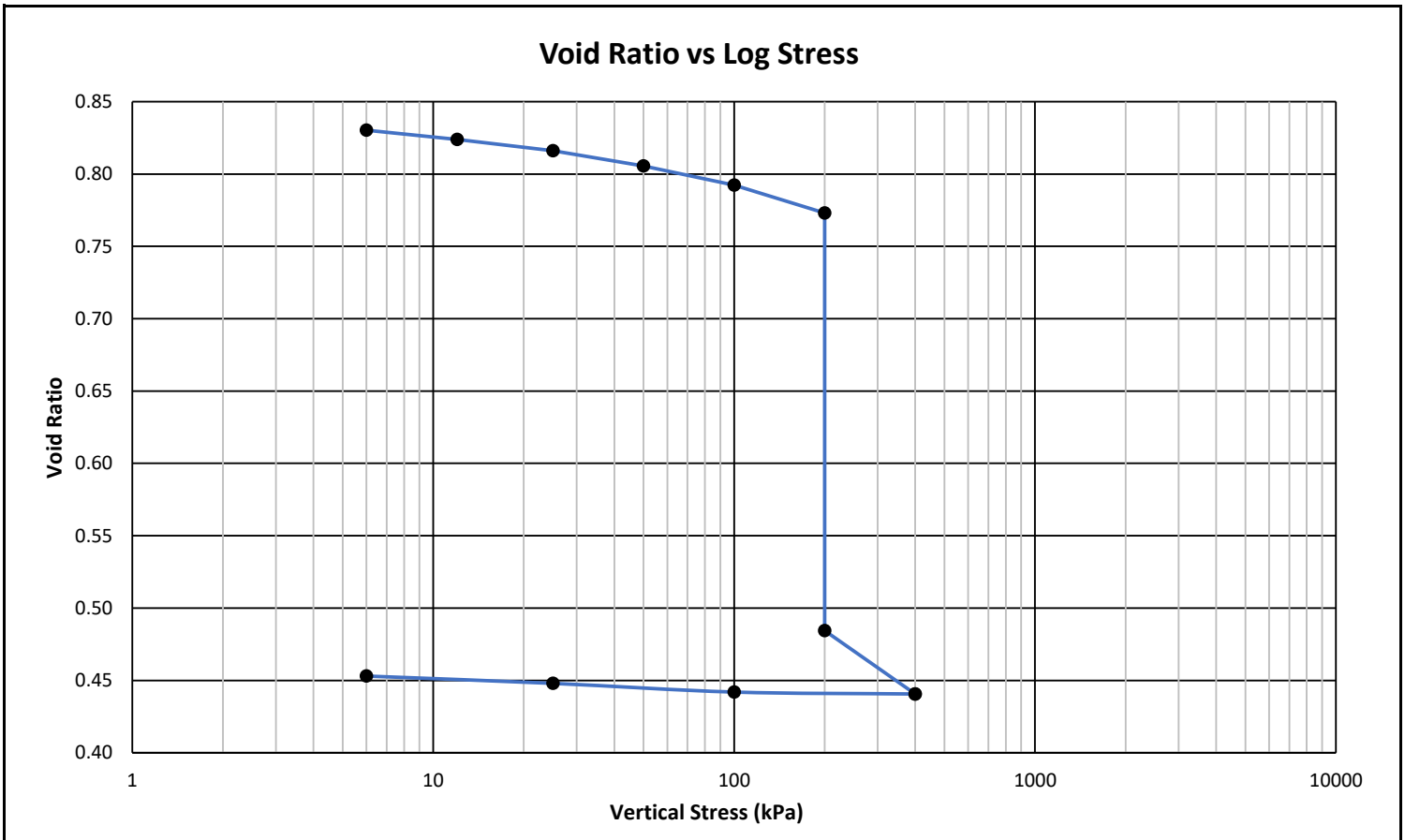
Client Name:	Knight Piesold	**Job Number:**	KNP-03
Project Name:	301-00825/01: Matimba Ash Dump	**Lab Number:**	KNP-03-33
Sample:	TP29/1	**Method:**	BS 1377 Part 5
Depth: (m)	0.6 - 0.9	**Date:**	18-Jul-19

ONE DIMENSIONAL COLLAPSE POTENTIAL TEST

Sample Info		Unit	Initial	Test Remarks:
Test Specimen Height		mm	25.4	**Collapse Potential:** 15.73 %
Moisture Content	Initial	%	4.3	
	Final	%	13.1	
Dry Density		kg/m³	1445	
Void Ratio		-	0.834	
Degree of Saturation		%	13.7	
Relative Density (SG)		-	2.650	Assumed

Vertical Stress Applied:	kPa	6	12	25	50	100	200	200	400	100	25	6		
Load applied for:	Hrs	1	1	1	1	1	1	24	1	1	1	1		
Height after increment	mm	25.34	25.25	25.15	25.00	24.82	24.55	20.55	19.95	19.97	20.05	20.12		
Total Strain	%	0.23	0.57	1.00	1.57	2.30	3.35	19.08	21.47	21.40	21.07	20.79		
Void Ratio	-	0.830	0.824	0.816	0.806	0.792	0.773	0.484	0.441	0.442	0.448	0.453		
Mv (1/Mpa)	-	-	0.576	0.332	0.231	0.147	0.107	-	0.147	0.003	0.056	0.184		



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Test Method(s) : SANS 3001-AG1 / AG2 / AG4 / AG5 / AG10 / AG14 / AG15 / AG20 / AG21 / AG22 SANS202 / 850 / 5833 / 5837 / 5839 / 5840 / 5846 / 5849 / 5850 / 5856 / 6243 / 5832 / TMH1 A20 / A21 (if applicable)

Sheet reference: R-STL-005

Client: Knight Piesold | Project Name: Matimba Ash Dump | Job Reference no: KNP-03

Source: - | Project No: 301-00825/01 | Date: 18.07.2019

Lab no	Client ref no	Sieve Analysis (% Passing) per Sieve Size (mm)														Organic Content (LOI) (%)
		37.5	28	20	14	10	7.1	5	2	1	0.600	0.300	0.150	0.075	FM	
15	TP1/1 - 0 - 2.2m															2.00
18	TP7/1 - 0 - 2.3m															2.98
20	TP9/1 - 0 - 0.8m															1.20
22	TP14/1 - 0 - 0.5m															0.80
24	TP17/1 - 0 - 1.2m															2.60
26	TP18/1 - 0 - 1.1m															2.40
29	TP22/1 - 0 - 0.6m															3.80
34	TP30/1 - 0 - 1.1m															0.60
37	TP39/1 - 0 - 1.6m															2.21
40	TP45/1 - 0 - 1.1m															9.80

Remarks: