PHASE 1 GEOTECHNICAL REPORT

PROPOSED SUBSIDY HOUSING PROJECT ON ERF 562 KURLAND, BITOU MUNICIPALITY, WESTERN CAPE

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Prepared by:
OUTENIQUA GEOTECHNICAL SERVICES
18 CLYDE ST
KNYSNA
6570

Prepared for:
SONQUA CONSULTING
8 ST JOHNS ST
GEORGE
6529

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0	17.5.2021	I.Paton Pr Sci Nat Pr Tech Eng	S Ngema BSc Geol	I.Paton Pr Sci Nat Pr Tech Eng
				

Authors qualifications and affiliations:

Iain Paton has a Bachelor's degree with Honours in Geology and a Master's degree in Geotechnical Engineering with over 25 years' experience in the construction, mining and energy industries. Iain Paton is a registered professional with the Engineering Council of South Africa (ECSA), the South African Council for Natural Scientific Professions (SACNSP) and is a member of the South African Institute of Engineering and Environmental Geologists (SAIEG), the Geotechnical Division of the South African Institute of Civil Engineering (SAICE) and the Institute of Municipal Engineering of South Africa (IMESA).

Declaration of independence:

The author of this report is independent professional consultant with no vested interest in the project, other than remuneration for work associated with the compilation of this report.

General limitations:

1. The investigation has been conducted in accordance with generally accepted engineering practice, and the opinions and conclusions expressed in the report are made in good faith based on the information at hand at the time of the investigation.
2. The contents of this report are valid as of the date of preparation. However, changes in the condition of the site can occur over time as a result or either natural processes or human activity. In addition, advancements in the practice of geotechnical engineering and changes in applicable practice codes may affect the validity of this report. Consequently, this report should not be relied upon after an eclipsed period of one year without a review by this firm for verification of validity. This warranty is in lieu of all other warranties, either expressed or implied.
3. Unless otherwise stated, the investigation did not include any specialist studies, including but not limited to the evaluation or assessment of any potential environmental hazards or groundwater contamination that may be present.
4. The investigation is conducted within the constraints of the budget and time and therefore limited information was available. Although the confidence in the information is reasonably high, some variation in the geotechnical conditions should be expected during and after construction. The nature and extent of variations across the site may not become evident until construction. If variations then become apparent this could affect the proposed project, and it may be necessary to re-evaluate recommendations in this report. Therefore, it is recommended that Outeniqua Geotechnical Services is retained to provide specialist geotechnical engineering services during construction in order to observe compliance with the design concepts, specifications and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction. Any significant deviation from the expected geotechnical conditions should be brought to the author's attention for further investigation.
5. The assessment and interpretation of the geotechnical information and the design of structures and services and the management of risk is the responsibility of the appointed engineer.

EXECUTIVE SUMMARY

Outeniqua Geotechnical Services was appointed by Sonqua Consulting on behalf of Bitou Municipality to undertake a Phase 1 geotechnical site investigation for a subsidy housing project on Erf 562 Kurland Township, in the Bitou Municipality, Western Cape Province. The investigation is carried out in accordance with SANS 634 - Geotechnical Investigations for Township Developments.

The site investigation involved a desk-top study of existing geotechnical data, a walk-over survey and detailed subsurface investigation on the site, including a total of 35 test pits excavated with a TLB/Backactor to a maximum depth of 2.5m. Test pits were profiled by a qualified geologist, and representative samples of various soil horizons were collected for laboratory tests. Insitu penetration tests were conducted from ground level next to each test pit.

The site is located directly adjacent to the Kurland township village, approximately 21km northeast of the central business district (CBD) of Plettenberg Bay in the Bitou Municipality. The site is easily accessible via a gravel provincial road off the N2 National Road. The climate of the area is typically temperate and wet, with a Weinert N-Value of approximately 1-2. The vegetation consists of long grass, thick indigenous Cape Fynbos bush and many medium to large alien trees. The topography consists of a very gently sloping plateau ridge running north-south, which slopes down towards natural drainage lines along the western and eastern sides of the site, which drain the site into tributaries of the Matjiesrivier and Soutrivier.

The site is underlain by sandstone and shale of the Silurian Goudini Formation (formerly Tchando) of the Table Mountain Group. The rock is typically deeply weathered and covered by a thick residual soil profile.

The general natural soil profile observed in test pits consists of a silty sand colluvium horizon, which is underlain by residual clay. No rock was encountered in the test pits. All soil horizons are potentially compressible & collapsible, and the residual clay is potentially highly active. Due to the infill nature of the site, the natural soils can be expected to be overlain in some areas by a thin layer of uncontrolled fill consisting of a soil/rubble/rubbish mix.

Site clearance will involve the removal of trees and vegetation, grubbing of stumps and roots and removal of any uncontrolled fill that may exist on parts of the site. Bulk earthworks will be required to cut access roadways and create level platforms for housing, particularly on sloping ground. The recommended structural foundation method is inverted-T beams or stiff rafts on insitu soil with a recommended maximum safe bearing pressure of 75kPa. All selected fill and road layerworks material will have to be imported, as the insitu soils are unsuitable for use in this regard.

The site is considered suitable for the proposed development of subsidy housing, but some significant geotechnical constraints have been identified which will have implications for the engineering design.

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1. Introduction and terms of reference

Outeniqua Geotechnical Services was appointed by Sonqua Consulting on behalf of Bitou Municipality to undertake a Phase 1 geotechnical site investigation for a subsidy housing project on Erf 562 Kurland Village in the Crags area of Plettenberg Bay, in the Western Cape Province (see locality map in **Figure 1**).

The physical and geotechnical nature of the site was investigated for the civil engineering design and project planning process, and the investigation was carried out in accordance with SANS 634: Geotechnical Investigations for Township Developments.

The general purpose of the investigation was to:

- Describe the location, topography and geology of the proposed site;
- Investigate and describe the soil types and expected founding conditions for new structures;
- Highlight any problem soils, slope stability or drainage issues;
- Estimate the bearing capacity, settlement and/or swell potential of the soil;
- Classify the excavations in terms of SABS 1200D;
- Determine the suitability of the site for housing purposes and make recommendations for the design of earthworks, foundations and engineering services;
- Classify the site in terms of SANS10400-H residential site designations for enrolment with the NHBRC.

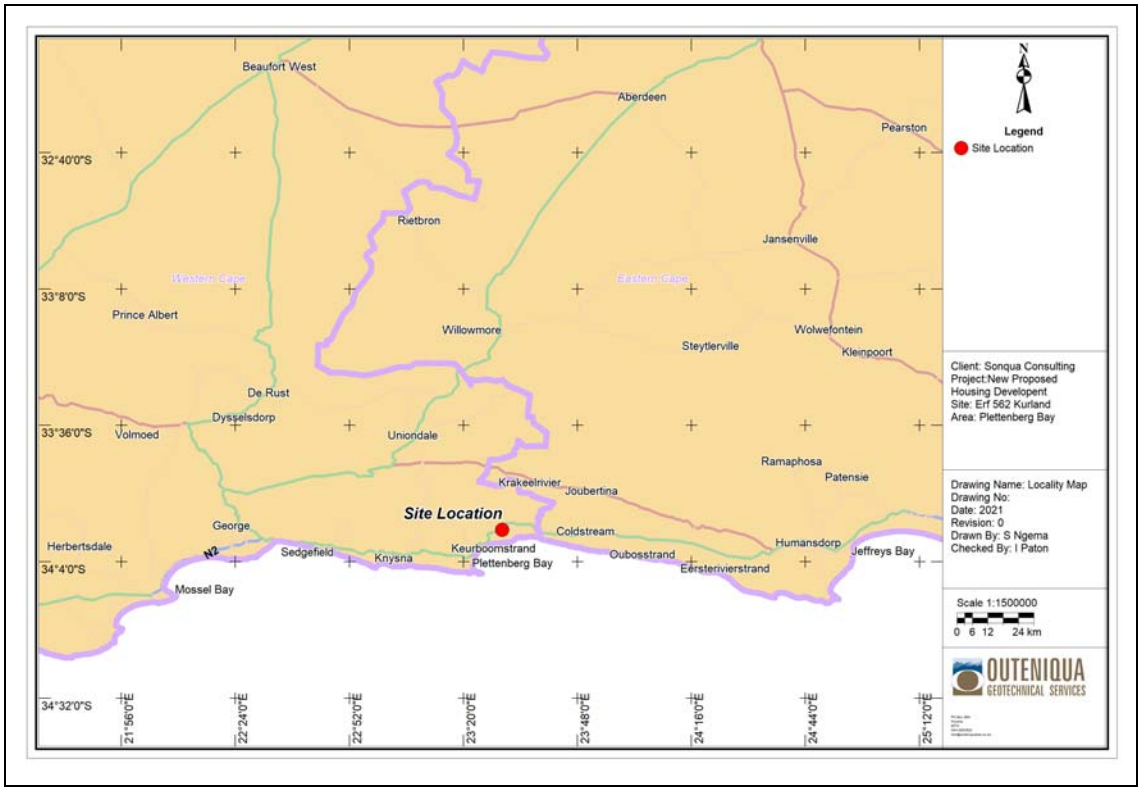


Figure 1: Locality map of site

2. Information available

The following maps and plans were available for reference purposes and may be reproduced in this report:

- Digital topo-cadastral and aerial photography data, obtained from the National Geospatial Information Department;
- 1:250 000 Geological map of the area, obtained from the Council for Geoscience;
- 1:1000000 Seismic Hazard Map of SA, obtained from the Council for Geoscience;
- Site development plan, produced by Willem de Kock Town Planners.

3. Nature of the investigation

The site investigation involved a desk-top study of existing geotechnical data, a walk over survey of the site, and a detailed subsurface investigation.

The subsurface investigation involved conducting a total of 35 test pits with a TLB/Backactor to a maximum depth of 2.5m in order to determine the geology, soil & groundwater conditions on the site. The number of test pits was determined primarily by the size of the site, in accordance with SANS 634, the expected complexity of the geology, and access across the site. The number of test positions was deemed sufficient in order to classify the soil conditions with a high degree of confidence.

Test pits were profiled by a qualified geologist, and representative samples of different soil horizons were collected for laboratory tests. Insitu DCP penetration tests were conducted next to each test pit in accordance with TMH6-ST6.

Soil samples were collected for the following tests, conducted at SANAS-Accredited labortaories, to determine the engineering characteristics of the soil:

- Foundation Indicator tests (TMH1 and ASTM) to determine gradings, Atterberg limits and potential expansiveness (tested at Outeniqua Lab in George);
- MOD/CBR/Indicator tests (TMH1) to determine the compaction/strength properties (tested at Outeniqua Lab in George);
- Swell/Consolidation tests (ASTM) to determine soil swell, collapse and compressibility characteristics (tested at Controlab in East London).
- pH & Conductivity tests to determine the soil aggressiveness to buried structures and services (tested at Controlab in East London).

The confidence in the information gained from the investigation is high as it generally concurs with expected conditions and information gained from previous site investigations in the area. Further investigations are not deemed necessary at this stage of the project.

4. Site description

The site is approximately 61Ha in extent and is easily accessed off the N2 National Road at the Kurland Village intersection, and then via existing district road DR7220 (gravel). The topography of the site is characterized by a plateau ridge, running north-south with very gently sloping terrain (1:10-1:50), which falls away steeply towards the western and eastern sides of the site, with slopes becoming progressively steeper (1:3-1:5) towards the natural drainage lines (see **Figures 2-3**). These valleys drain the site into tributaries of the Matjiesriver (west side) and Soutrivier (East side). The climate of the

Southern Cape region is typically wet, with a Weinert N-Value of approximately 1-2. The site was vacant at the time of the investigation, and the vegetation consisted mainly of long grass, indigenous fynbos shrubs and bushes, many small to large alien trees such as bluegum, wattle and blackwood (See **Figure 4**).

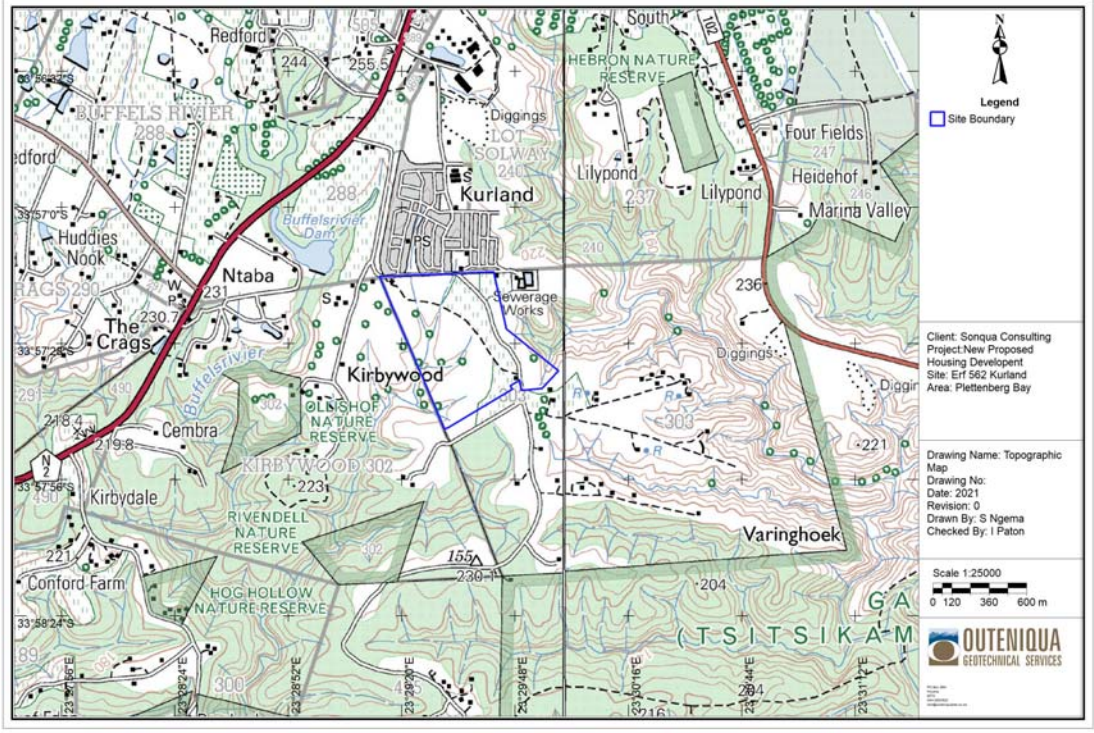


Figure 2: Topographical map of the site

Figure 3: Aerial photo of the site

Figure 4: Typical topography and vegetation cover on the site

5. Geology

According to the official geological map on a 1:250 000 scale, the site is underlain by the Goudini Formation (formerly the Tchando Formation) of the Table Mountain Group (see **Figure 5**). The Goudini Formation rocks are composed of fine to coarse grained brownish weathering sandstones and shale.

There are no major geological faults in the immediate vicinity of the site, and there is a low risk of seismic activity in the area. The geology is generally macro-stable on low to moderate slopes, and is generally suitable for urban development with no risk of dissolution (i.e. dolomitic rock or karst terrain).

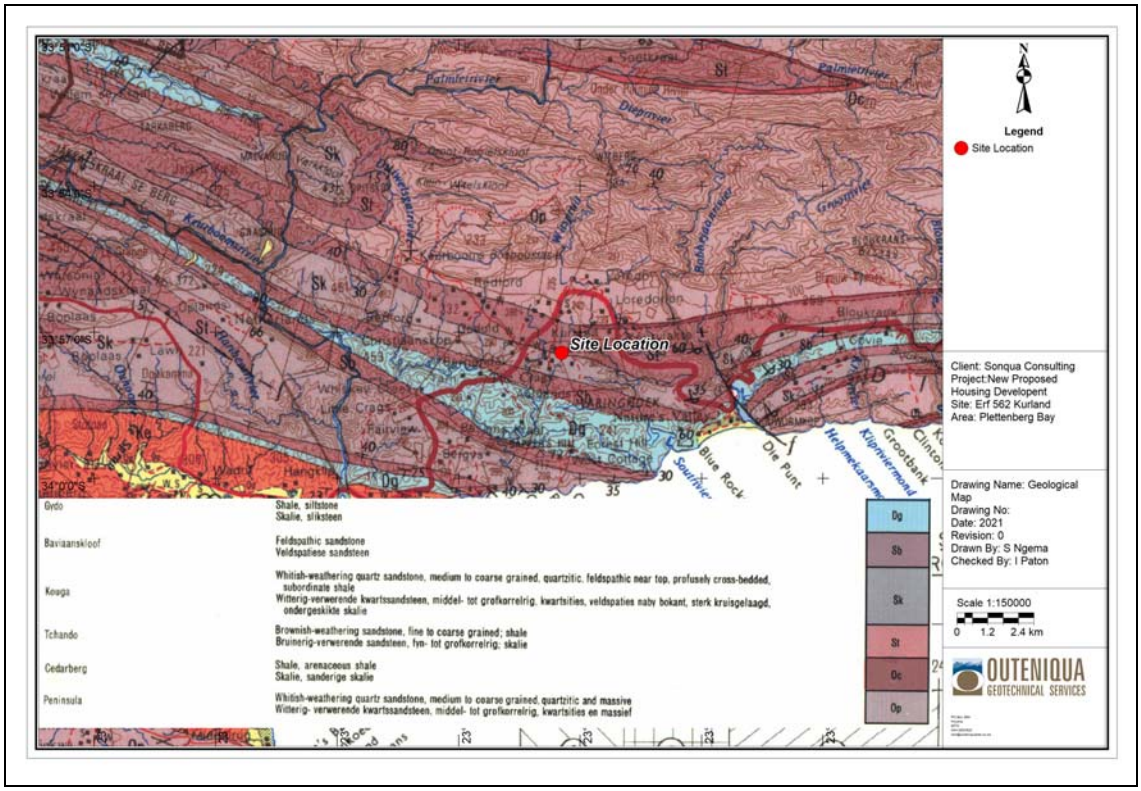


Figure 5: Geological map

6. Geotechnical Evaluation

6.1 Engineering and material characteristics

6.1.1 Topography, slopes and vegetation cover

Results of the investigation

The proposed development area of the site is located along the plateau ridge on gently to moderately sloping terrain (1:20 to 1:5) which then slopes down into the adjacent natural drainage lines (outside the proposed development area).

At the time of the investigation, the natural vegetation consisted of indigenous Fynbos and many alien species. The natural vegetation has been transformed to a large degree in some places due to human activity (i.e. historical agriculture).

Effect on the proposed development

Site clearance with require removal of thick vegetation and some large trees. Site development planning will have to take into account the topography of the site. Some bulk earthworks, including cutting and filling for house platforms and access roads with low retaining walls, may be required on sloping terrain.

6.1.2 Soil types and rock

Results of the investigation

The soil profile is dominated by residual cohesive (clay) soils formed by chemical weathering of the Goudini Formation feldspathic sandstone, which is locally overlain by a thin colluvium (topsoil) horizon consisting of silty sand (see **Figure 6**). The insitu soil

profile is fairly consistent across site, with only minor localized variation. No bedrock was encountered in any of the test pits.

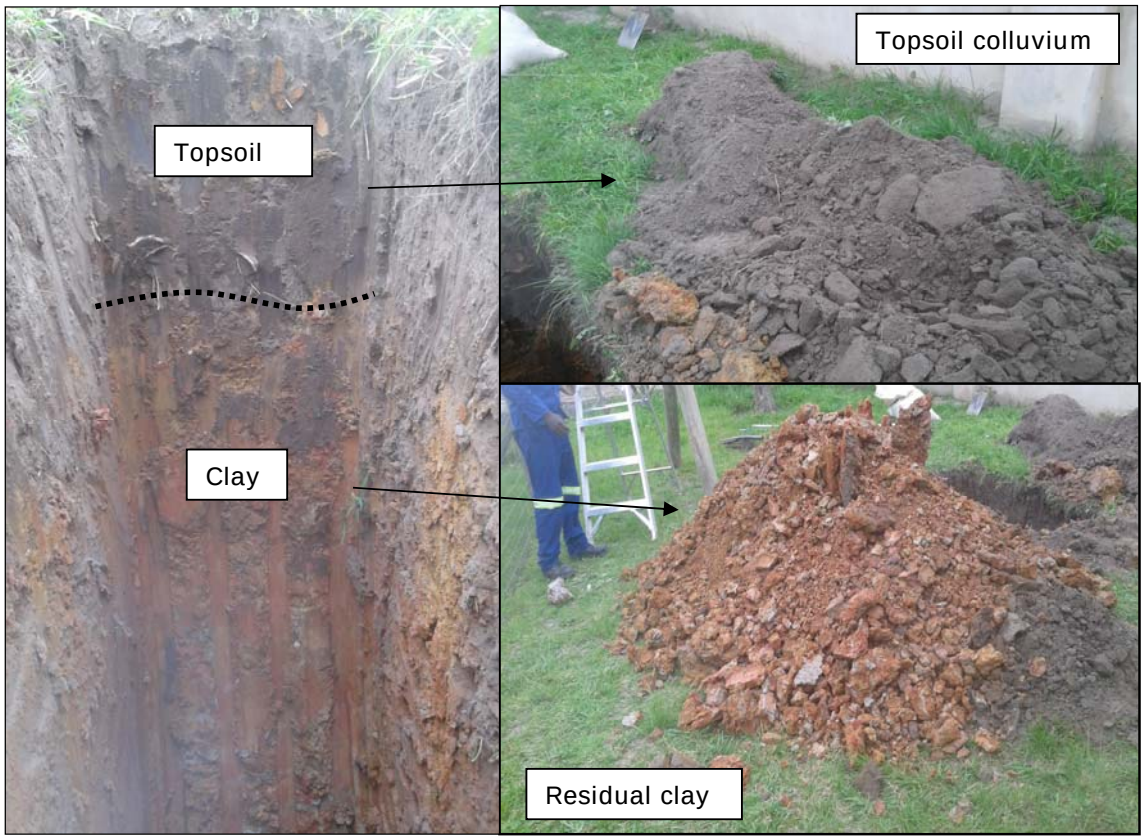


Figure 6: Typical soil profile observed in test pits

A summary of the test pit data and the thickness of the different soil horizons is tabulated in **Table 1** and **Figure 7**.

Table 1: Summary of soil horizons recorded in test pits (in mm)

Test pos. No.	*Imported (fill) soil*	*Transported soil*	*Residual soil*	*Rock*	*Total depth of test pit*	*Refusal?*
K1	-	200	100	1900	2200	No
K2	-	150	150	1700	2000	No
K3	-	600	200	1400	2200	No
K4	-	200	200	1600	2000	No
K5	-	2000	-		2000	No
K6	-	1100	-	900	2000	No
K7	-	150	150	1800	2100	No
K8	-	300	-	2000	2300	No
K9	-	300	200	1900	2400	No
K10	-	200	150	950	1300	Yes
K11	-	100	250	1650	2000	No
K12	-	200	250	1750	2200	No
K13	-	200	300	1700	2200	No
K14	-	400	150	1450	2000	No
K15	-	150	250	1800	2200	No
K16	-	200	200	1700	2100	No
K17	-	200	250	1350	1800	No
K18	-	100	200	1700	2000	No
K19	-	150	150	2000	2300	No
K20	-	300		1900	2200	No
K21	-	350	150	1600	2100	No
K22	-	400	200	1500	2100	No
K23	150	350	200	1600	2300	No
K24	-	500	-	1700	2200	No
K25	-	400	-	1850	2250	No
K26	-	880	-	1120	2000	No
K27	-	300	100	1600	2000	No
K28	400	400	150	1450	2400	No
K29	-	300	140	1860	2300	No
K30	-	420	-	1580	2000	No
K31	-	400	-	1600	2000	No
K32	-	150	150	1700	2000	No
K33	-	200	-	1800	2000	No
K34	-	200	250	1550	2000	No
K35	-	250	220	1830	2300	No

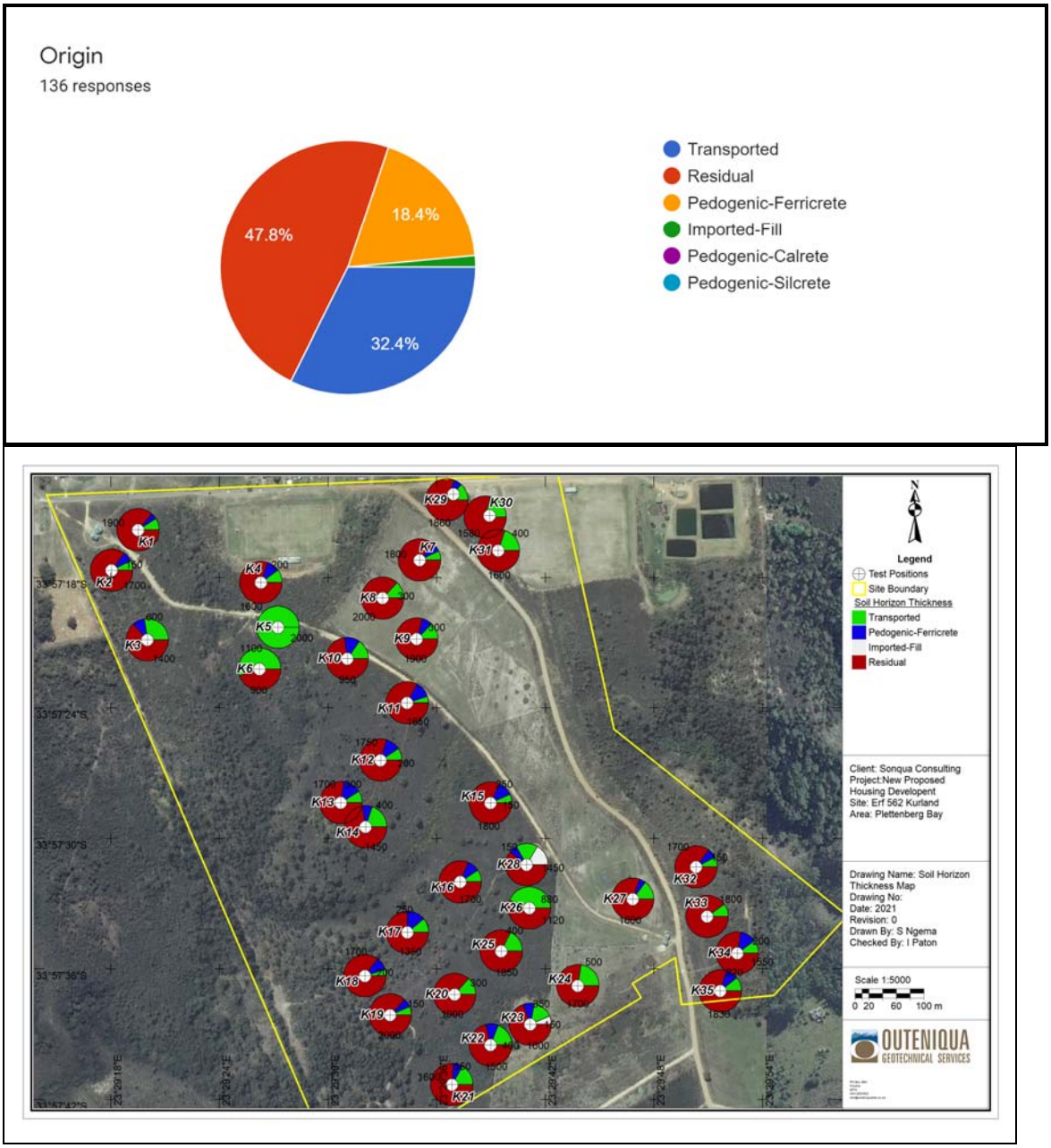


Figure 7: Origin of soil types

Effect on the proposed development

The insitu soil types are potentially problematic in terms of earthworks and foundations, mainly due to their fine-grained texture which has a significant impact on workability, moisture-sensitivity, compressibility and potential heave. Improved foundations and importation of selected fill materials will be required to overcome problematic insitu soils.

6.1.3 Grading, Atterberg limits and potential expansiveness

Results of the investigation

Representative samples of various soil horizons were collected for Foundation Indicator tests in order to determine their basic geotechnical properties, estimate potential expansivity and evaluate their suitability as founding mediums. The tests indicate that the residual soils are potentially highly expansive, with plasticity indices up to 31% (high), Liquid limits up to 71% (very high), fines contents (material passing 0.075mm) ranging from 83 to 88%, and the insitu moisture contents ranging from 19 to 27%. The tests indicate that the soils can be grouped into the following categories according to the Universal Soil Classification system:

CL – Inorganic clays of low to medium plasticity, gravelly, sandy and silty clays.
CH – Inorganic clays of high plasticity.
ML – Inorganic silts of low to medium plasticity.
MH – Inorganic silts of high plasticity.

Summarised results of the tests are shown in **Table 2** and **Figure 8**.

Table 2: Foundation Indicator test result summary

Test Pit No	Sample Depth (mm)	Atterberg Limits			Particle Analysis (%)				MC*	PE**	USC ***
		PI	LL	LS	Clay	Silt	Sand	Gravel			
K1	300-1400	22	58	11	61	16	20	3	16.3	Low	MH
K3	800-1200	27	56	13	50	27	18	5	16.9	Low	CH
K7	850-2100	29	72	14.5	48	6	42	4	25.3	Low	MH
K9	500-900	15	46	8	49	24	19	8	23.4	Low	ML
K14	550-2000	23	45	12	38	40	19	3	17.2	Medium	CL
K17	800-1800	NP	NP	0	14	46	40	0	7.9	Low	ML
K19	600-2300	25	53	12	43	31	24	2	14.7	High	CH
K24	990-2200	31	87	15	59	14	10	17	26.8	Low	MH
K33	750-2000	25	54	13	60	23	15	2	21.3	Low	CH
K35	470-1100	26	66	13	58	16	17	9	28	Low	MH

Notes: 1 Moisture content 2 Potential expansiveness (Skempton's activity chart) 3 Unified Soil Classification System

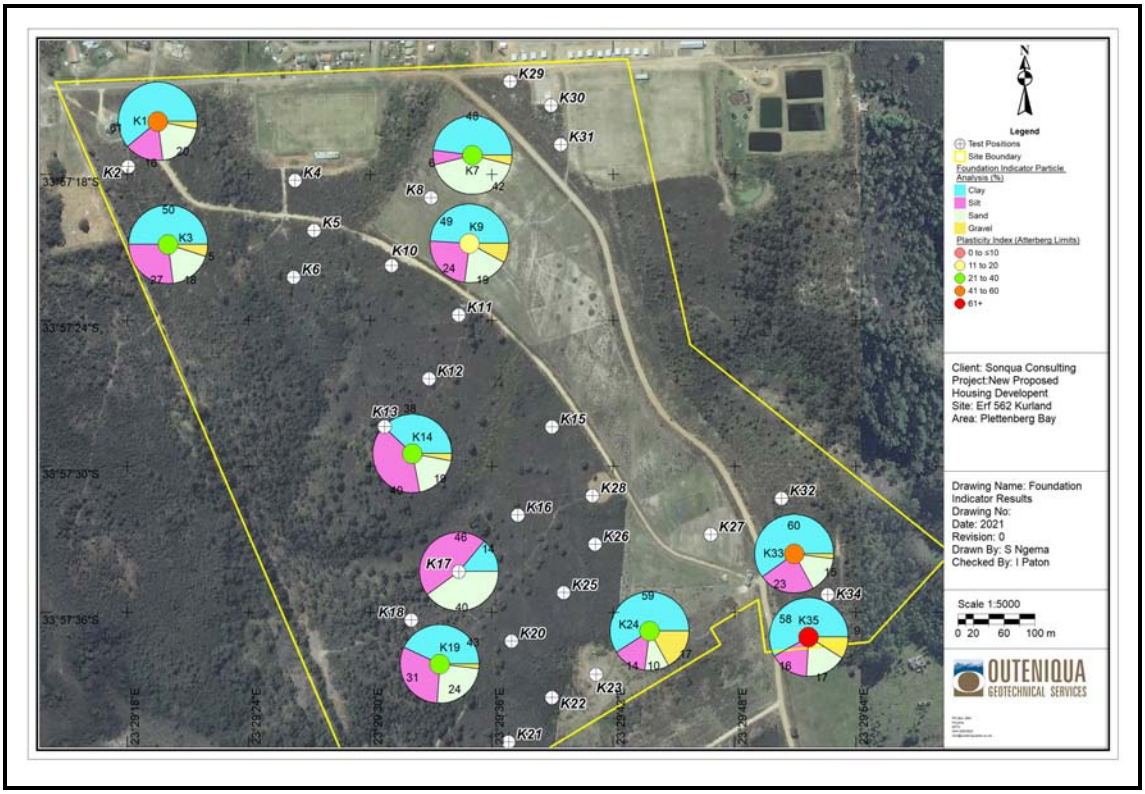


Figure 8: Spatial mapping of Atterberg limits and soil grading

Effect on the proposed development

The soils are potentially highly problematic in terms of moisture sensitivity, compressibility and/or heave which may affect earthworks, foundation design and stormwater management. Recommendations are provided in **Chapter 8**.

6.1.4 Moisture/density relationship and CBR

Results of the investigation

Representative samples of near-surface insitu soils and/or superficial fill materials were collected for Modified AASHTO density (MDD/OMC), CBR & Road Indicator tests in order to determine the moisture-density relationship, compaction and CBR properties for road subgrade and/or general filling purposes. The results of the tests are summarized in **Table 3**.

Table 3: CBR test results summary

Test Pit No	Sample Depth (mm)	CBR at					Swell (%)	PI (%)	GM	MDD/ OMC	TRH14 Class
		100 %	98%	95%	93%	90%					
K1	0-450	29	25	17	12	5	0.00	SP	0.30	1908/11.2	G10
K3	0-400	24	20	13	9	3	0.00	SP	0.23	1896/12.4	G10
K4	0-400	21	18	13	10	6	99.1	3	0.49	1958/10.5	G10

The tests indicate that the insitu topsoil is poor quality (G10) in terms of the TRH14 classification system and is classified as MH/ML under the USC system. The insitu soils

will generally be unsuitable for use as a natural filling material for compaction under floors or foundations, and may perform poorly in road subgrades.

Effect on the proposed development

Allowances should be made for importation of construction materials from commercial sources including subgrade fill, road layerworks and structural filling material. More recommendations for earthworks and roads are given in **Chapter 8**.

6.1.5 Compressibility, collapse potential and bearing capacity

Results of the investigation

Tactile and visual observations of soil types exposed in the test pits indicated that the profile is dominated by cohesive soils with firm to stiff consistency, which may become highly compressible (soft) under increased moisture conditions, specifically just below the topsoil layer, where perched water tables may develop after heavy rainfall events.

The compressibility characteristics of the insitu clay was tested in a consolidometer test apparatus. The results of these tests are pending.

Effect on the proposed development

Bearing capacity at shallow founding depths (nominal~0.6-0.7m below NGL) is generally adequate for light structures (may be shallower for raft foundations) but wetting of the clay soil (either in trenches during construction, or post-construction) may result in soft, compressible soil with attendant settlement. It would be prudent to classify all sites as S1 (potentially compressible soils with maximum total movement of 10-20mm), requiring improved foundation methods. Foundation recommendations are discussed in more detail in **Chapter 8**.

6.1.6 Swell / heave

Results of the investigation

The Foundation Indicator test results indicate several cases of medium to high potential expansiveness. Calculations done using the Van der Merwe method of swell prediction indicate potential heave of up to 48mm under extreme conditions. This method typically over-predicts the actual heave, as it doesn't take into account the present/insitu moisture content or Liquid Limit of the clay or permeability of the soil. Visual observations of the soil structure indicate that the clay has a slickensided and micro shattered structure, indicating a high potential for activity, but the insitu moisture content is presently 20-30%, which is just less than half the Liquid Limit, i.e. very near equilibrium moisture content. It is reasonable to expect a maximum level of heave somewhere between 15 and 30mm, and it would be prudent enough to assume H2 category.

Effect on the proposed development

Inverted-T beam foundations or stiff rafts are recommended throughout, in accordance with SANS 10400-H.

6.1.7 pH & Conductivity

Results of the investigation

A summary of soil chemistry test results is tabulated in **Table 4**.

Table 4: pH and conductivity test results summary

Test Position	*Depth mm*	*pH*	*Conductivity (mS/m)*
K1	300-1400	8.5	168.5
K7	850-2100	5.2	164.0
K24	990-2200	6.43	150.3
K33	750-2000	6.08	172.7
K35	470-1100	4.58	25.5

Corrosion of metallic pipe fittings and concrete reinforcement may be negatively influenced by low or high pH, and high conductivity (indicating high concentration of dissolved salts in the soils). An indication of the influence of pH and conductivity on the corrosiveness of soil is given in **Table 5**.

Table 5: Influence of pH and conductivity on the corrosiveness of soil

pH	*Conductivity (mS/m)*	*Potential Corrosiveness*
7-8	<10	Non-corrosive
5-6 or 9-10	10-20	Mildly corrosive
3-4 or 11-12	20-50	Corrosive
<3 or >12	>50	Highly corrosive

The lab results indicate potentially highly corrosive soil conditions due to acidic soil and dissolved salts, which will tend to cause corrosion of metals (i.e. rust).

Effect on the proposed development

HDPE or PVC pipe products will be suitable and buried metallic valves and fittings should be powder coated to protect against rust corrosion. Adequate rebar cover in buried concrete foundations is recommended as standard (min 40mm).

6.1.8 Soil moisture, permeability and drainage

Results of the investigation

The site is located in a temperate climatic area with a Weinert-N Climatic No. of 1-2 and typically high annual rainfall of 800-1000mm. Seasonally wet conditions and high rainfall events are common all year round. Vertical infiltration of rainwater will be restricted by clayey residual soils (silts and clays) with low permeability, so seasonal shallow groundwater seepage and/or the formation of perched water tables (mainly in or below the topsoil horizon) can be expected, particularly in winter months. No perched water tables were recorded in test pits at the time of the investigation, which was conducted in a dry weather period towards the end of summer. Saturated soil and marshy surface conditions can be expected in Terrain 2, along natural drainage lines.

During storm events, most rainfall will tend to accumulate in local depressions or run-off the site (i.e. a high percentage of stormwater run-off).

Effect on the proposed development

The design of stormwater systems must take into account the low soil permeability and site topography. Underground stormwater handling systems (piped systems) are recommended to cater for minor floods and road designs should cater for major flood events.

Groundwater is highly unlikely to have a significant effect on foundations or earthworks, but subsoil drains are recommended along roads and behind retaining structures to intercept seasonal shallow groundwater seepage.

6.1.9 Existing structures

Results of the investigation

No inhabited structures existed on the proposed development area of the site at the time of the investigation.

Effect on the proposed development

No relocation of existing informal residents or temporary structures (e.g. shacks) will be necessary, unless land invasion occurs.

6.2 Slope stability and erosion

No slope stability issues were observed on the site at the time of the investigations.

Temporary excavations are likely to be marginally stable at angles up to 45° for short periods of time (to be assessed by a Competent Person), but permanent slopes should be battered to a maximum stable angle of 26° (1:2).

Although soils are fine-grained and prone to erosion on steep slopes, the proposed development footprint of the site (See **Appendix 1**) is generally confined to areas where slopes are less than 1:4, and therefore the erodibility index is low. Erosion is unlikely to be a significant issue on the site, but contractors are required to address any potential erosion problems as they arise.

6.3 Excavation classification with respect to services

No shallow rock was encountered in any of the test holes and is not expected on this site. All excavations to 3m can be classified as “Soft”, in terms of SABS 1200D. Deeper excavations are not envisaged.

6.4 Impact of the geotechnical character of the site on subsidy housing developments

The applicable geotechnical subsidy variations are tabulated in **Table 6**.

Table 6: Site specific geotechnical subsidy variations

Geotechnical Conditions	*Category or type*	*Criteria*	*Precautionary measures*	*Applicable areas*	*Comment*
Seepage / groundwater	Category 1	Permanent or perched water tables less than 1.0m below ground surface	Subsurface drainage/improved damp-proofing measures to houses, service trenches to be dewatered during construction	All areas	Seasonal
	Category 2	Permanent or perched water tables more than 1m but less than 1.5m below ground level	Service trenches to be dewatered during construction	N/A	
Erodability of soil	Category 1	High risk (Erodability index 1-8)	Retaining walls & earthworks to reduce slopes & surface drainage	N/A	
	Category 2	Medium risk (Erodability index 9-15)	Retaining walls & earthworks to reduce slopes	N/A	
Hard excavation	Category 1	Hard rock excavation to a depth of 1.5m	Additional cost of trench and foundation excavation	N/A	
	Category 2	Boulder excavation to a depth of 1.5m	Additional cost of trench, foundation and road excavation	N/A	
Dolomite	Category 1	Risk class 1&2 (Dolomite area class D2)	Additional cost of foundations	N/A	
	Category 2	Risk class 3&4 (Dolomite area class D3)	Additional cost of foundations	N/A	
Expansive Clays	Category 1	H1	Foundation design, building procedures and precautionary measures: Modified normal	N/A	
	Category 2	H2	Foundation design, building procedures and precautionary measures: Stiffened raft	All areas	Improved foundation systems
	Category 3	H3	Foundation design, building procedures and precautionary measures: Cellular rafts/piles	N/A	
Compressible and Collapsible soils	Category 1	C1	Foundation design, building procedures and precautionary measures: Modified normal	N/A	
	Category 2	C2	Foundation design, building procedures and precautionary measures: Light or heavy raft	N/A	
Compressible soils	Category 1	S1	Foundation design, building procedures and precautionary measures: Modified normal	All areas	

Geotechnical Conditions	*Category or type*	*Criteria*	*Precautionary measures*	*Applicable areas*	*Comment*
	Category 2	S2	Foundation design, building procedures and precautionary measures: Light or heavy raft	N/A	
Mining subsidence	Category 1	Old undermining to a depth of between 90-240m below surface where stope closure has ceased	Additional cost of foundations: Compaction below footings or raft	N/A	
	Category 2	Old undermining to a depth of between 90-240m below surface where total extraction has taken place	Additional cost of foundations: additional earthworks or soil reinforcement	N/A	
Seismic activity	Category 1	Mining induced seismic activity > 100cm/s^2	Additional cost of foundations: Stiffened strip footings or raft	N/A	
	Category 2	Natural seismic activity > 100cm/s^2	Additional cost of foundations: Stiffened strip footings or raft	N/A	
Topography	Category 1	Average ground slope flatter than 1:20	Increase depth of sewer & provision of pump station		
	Category 2	Average ground slope of between 1:11 and 1:20	Terracing for houses & additional earthworks to roads & storm water control measures	Estimated from 5m contours	
	Category 3	Average ground slope of between 1:7.5 and 1:10	Terracing for houses & additional earthworks to roads & storm water control measures		
	Category 4	Average ground slope of between 1:5 and 1:7.4	Terracing for houses & additional earthworks to roads & storm water control measures		
	Category 5	Average ground slope steeper than 1:5	Terracing for houses & additional earthworks to roads & storm water control measures		
SCCCA	Southern Cape Coastal Condensation Area	Area subjected to severe condensation conditions	Plaster and paint on all external walls & 6.4mm gypsum plasterboard ceilings & 80mm thick glass fibre insulation	Yes	
Location of development site		Site more than 20km from major centres	Additional cost of transportation	Yes	George 115km

7. Site classification

The site has been mapped according to geotechnical terrains, which are explained in **Table 7,** and the mapping is illustrated in **Figure 9**.

Table 7: Site classification

Terrain Unit	*Geotechnical Constraint*	*Expected movement (mm)*	*NHBRC Site Classification*
Terrain 1	Potentially active soil	15-30	H2
	Potentially compressible soil	10-20	S1
Terrain 2	Potentially saturated soil/marshy ground		P

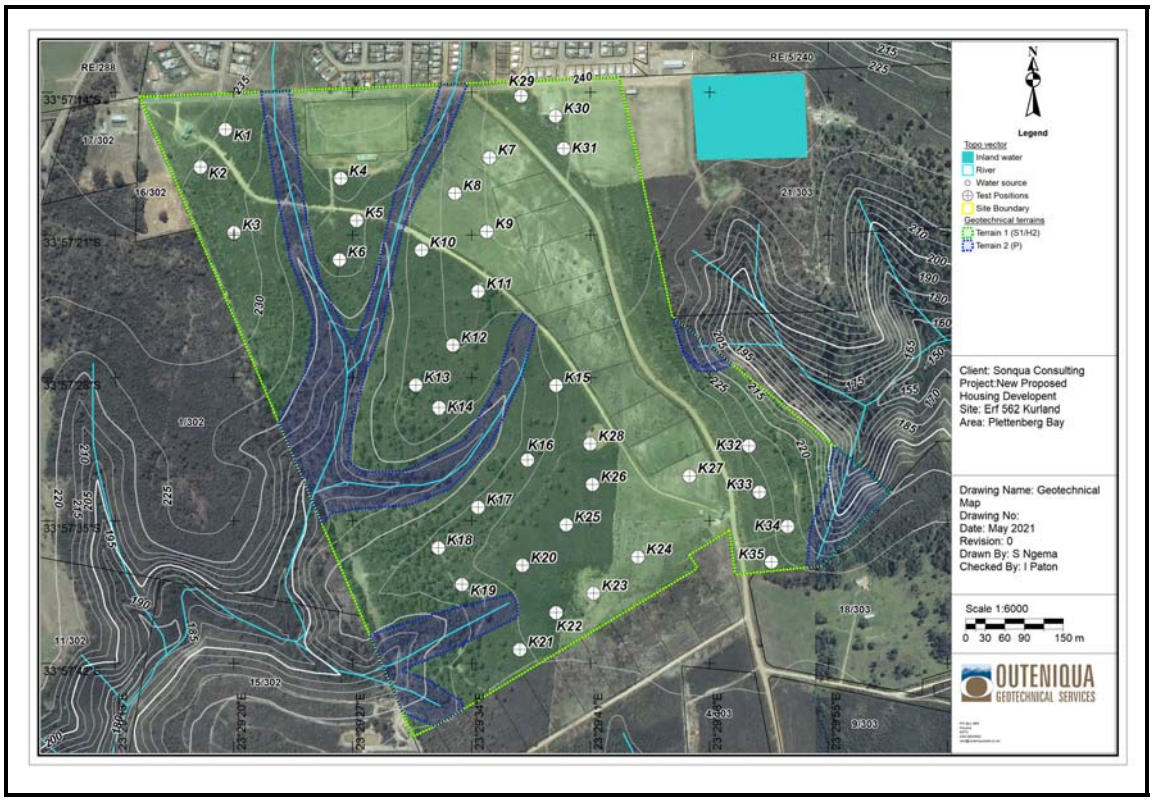


Figure 9: Geotechnical map

Recommendations for the design of earthworks and foundations in each terrain is given in **Chapter 8.1**.

8. Foundation recommendations and solutions

8.1 Earthworks and structural foundations

Earthworks should be designed and conducted in accordance with SABS 1200D, COLTO 3300 or any site-specific specifications provided by the engineer. Foundations should be designed and constructed in accordance with the NHBRC Home Builders Manual, SANS 10400-H and/or as specified by the structural engineer.

The development layout should take into account the topography of the site and due consideration should be given to development in or directly adjacent to natural water courses (Terrain 2), where saturated soil and marshy surface conditions can be expected, requiring special engineering (e.g. for road crossings).

If any uncontrolled fill material is uncovered, such as rubble, plastic, etc., it should be completely removed from house platforms or treated as per the engineers instructions. Some bulk earthworks and possibly low retaining walls may be required to create level

platforms on sites where slopes exceed 1:10. In cut to fill operations, all organic matter should be removed from the footprint area before bulk earthworks. The insitu soils may not be suitable for use in bulk fills, unless the material is approved by the engineer and can be effectively compacted to the specified level. Platforms should be cut and rolled to achieve a minimum of 93% of the Modified AASHTO density (<30mm/blow of DCP). It is recommended that platforms are capped off with minimum 150mm G5 or G7 gravel (compacted to 95% MDD) prior to excavation of foundation trenches.

The recommended foundation system for the proposed single/double storey structures is inverted-T beams, founded at a nominal depth of 0.8m below GL on insitu soils or engineered fill with design bearing pressures limited to 75kPa. The structural engineer can consider the placement of a layer of engineered fill, such as G5 crushed rock, in trenches to improve founding conditions and to facilitate compaction. Alternative methods can include stiff raft foundations placed directly on insitu soil.

8.2 Road pavements

Access roads should be constructed in accordance with SABS 1200, COLTO, TRH4, TRH14, The Red Book or other applicable specifications and standards, or as directed by the engineer.

Test results indicate that the insitu soil is typically poor-quality material and improvement of the subgrade is recommended with lower and upper SSG layers included in the design of roads at the engineers discretion.

General preparation of the roadbed (subgrade) should include the following:

- Cut to line and level.
- Compact to 90% MDD. Recommended moisture content before rolling is optimum moisture content (OMC) minus 2%.
- Remove any incompressible or wet soil and reinstate with G9 material or as directed by the engineer.

Table 8 serves as a guideline (to be checked by the engineer) for the design of a Category C flexible pavement in a wet region with a design life of 15 years with traffic loading of less than 3×10^6 E80s over 20 years (as per TRH4).

Table 8: Road layerworks recommendations (Cat C in wet climate)

Layer	*Material*	*Thickness mm*	*Required Compaction*
Seal	HMA or Cape Seal	TBD by engineer	
Base	Imported G2/3	150	100% MDD
Subbase	Imported G5/C4	150	95% MDD
USSG	Imported G7	150	93% MDD
LSSG	Imported G7/9	150	90% MDD
OR			
Seal	n/a	n/a	n/a
Base	Interlocking cement pavers	80	n/a
Subbase	Imported G5/C4	150	95% MDD
USSG	Imported G7	150	93% MDD
LSSG	Imported G7/9	150	93% MDD

9. Storm water drainage recommendations

The design and construction of storm water drainage should be carried out in accordance with SABS 1200LE, COLTO, The Red Book or other applicable standards, or as directed by the engineer.

Minor flood events can be handled with kerb inlets and underground pipes, which discharge at suitable points into existing stormwater network or natural drainage lines, as directed by the engineer. Stormwater from major flood events can be contained within the road prism but should not overflow into adjacent erven. Well-designed access roads with sufficient level difference from the adjacent property, and adequate side drains and culverts is recommended. Subsoil drains are recommended along roads as a precaution to keep the subgrade drained.

The ponding of storm water around the exterior of houses can be avoided by shaping the ground levels around the exterior to create a fall away from the house and constructing a 1m wide a concrete apron with a 10% fall away from the house. This will also assist in minimizing erosion around the house. The finished floor level of all houses should be a minimum of 150mm above final ground level to prevent flooding.

10. Special precautionary measures

The following special measures are recommended as a precaution:

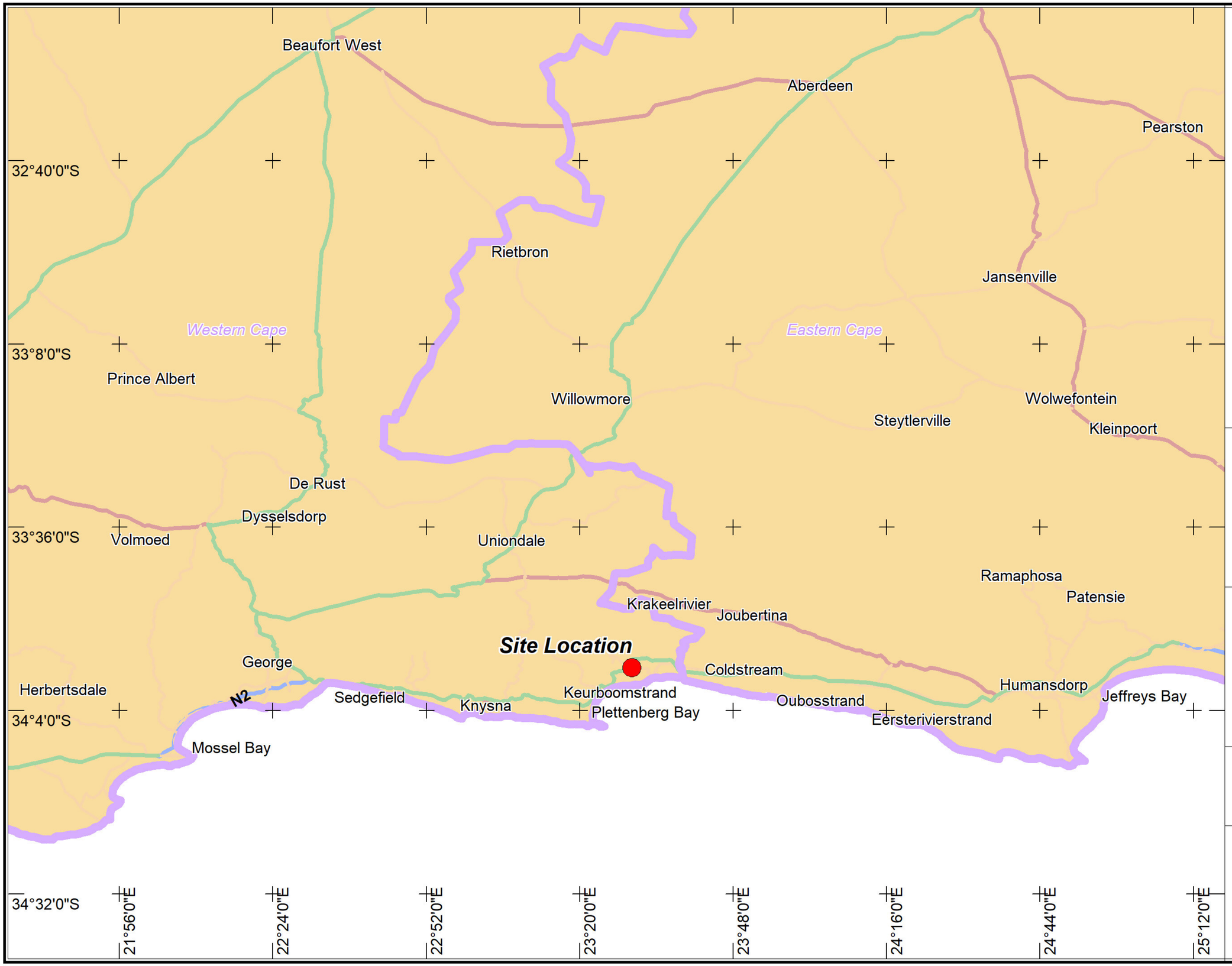
- A geotechnical specialist should be involved in earthworks and the construction of foundations to assist the engineer with quality control.
- Compaction control testing is essential during construction.

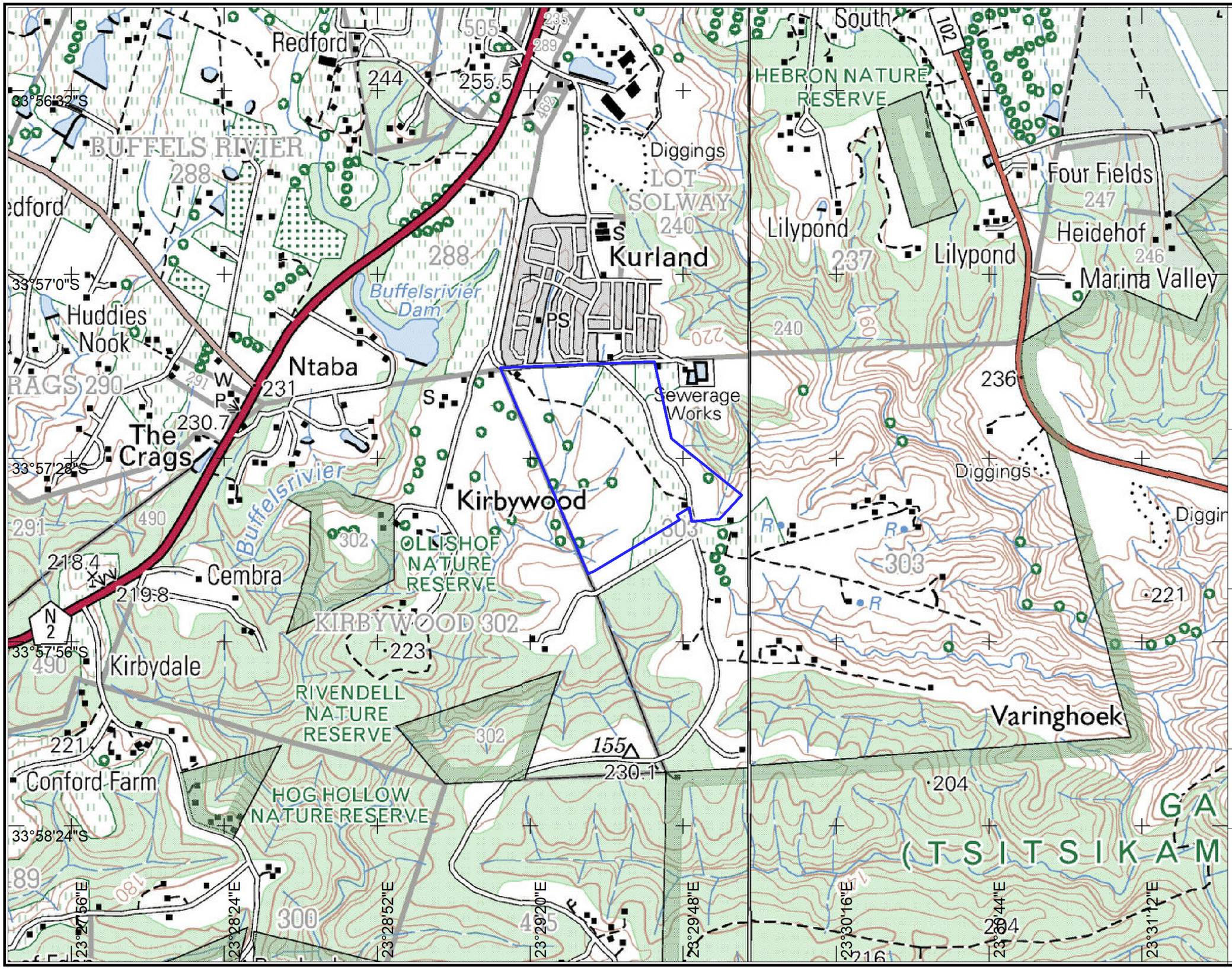
11. Conclusions

The site is potentially suitable for subsidy housing purposes, but there are some significant geotechnical constraints which may have an impact on the engineering design and subsidy variations. Some recommendations are offered for consideration by the civil and structural engineers.

Appendix 1

Maps


Beaufort West
Aberdeen
Pearston
32°40'0"S
Rietbron
Jansenville
Western Cape
Eastern Cape
33°8'0"S
Prince Albert
Willowmore
Wolwefontein
Steytlerville
Kleinpoort
De Rust
Dysselsdorp
33°36'0"S
Volmoed
Uniondale
Ramaphosa
Patensie
Krakeelrivier
Joubertina
Site Location
George
Coldstream
Herbertsdale
N2
Sedgefield
Knysna
Keurboomstrand
Plettenberg Bay
Oubosstrand
Humansdorp
Jeffreys Bay
34°4'0"S
Eersterivierstrand
Mossel Bay
34°32'0"S
21°56'0"E
22°24'0"E
22°52'0"E
23°20'0"E
23°48'0"E
24°16'0"E
24°44'0"E
25°12'0"E
N
Legend
Site Location
Client: Sonqua Consulting
Project:New Proposed Housing Developent
Site: Erf 562 Kurland
Area: Plettenberg Bay
Drawing Name: Locality Map
Drawing No:
Date: 2021
Revision: 0
Drawn By: S Ngema
Checked By: I Paton
Scale 1:1500000
0 6 12 24 km
OUTENIQUA GEOTECHNICAL SERVICES
PO Box 964
Knysna
6570
044-3820502
iain@outeniqualab.co.za



Client: Sonqua Consulting
Project:New Proposed Housing Developent
Site: Erf 562 Kurland
Area: Plettenberg Bay

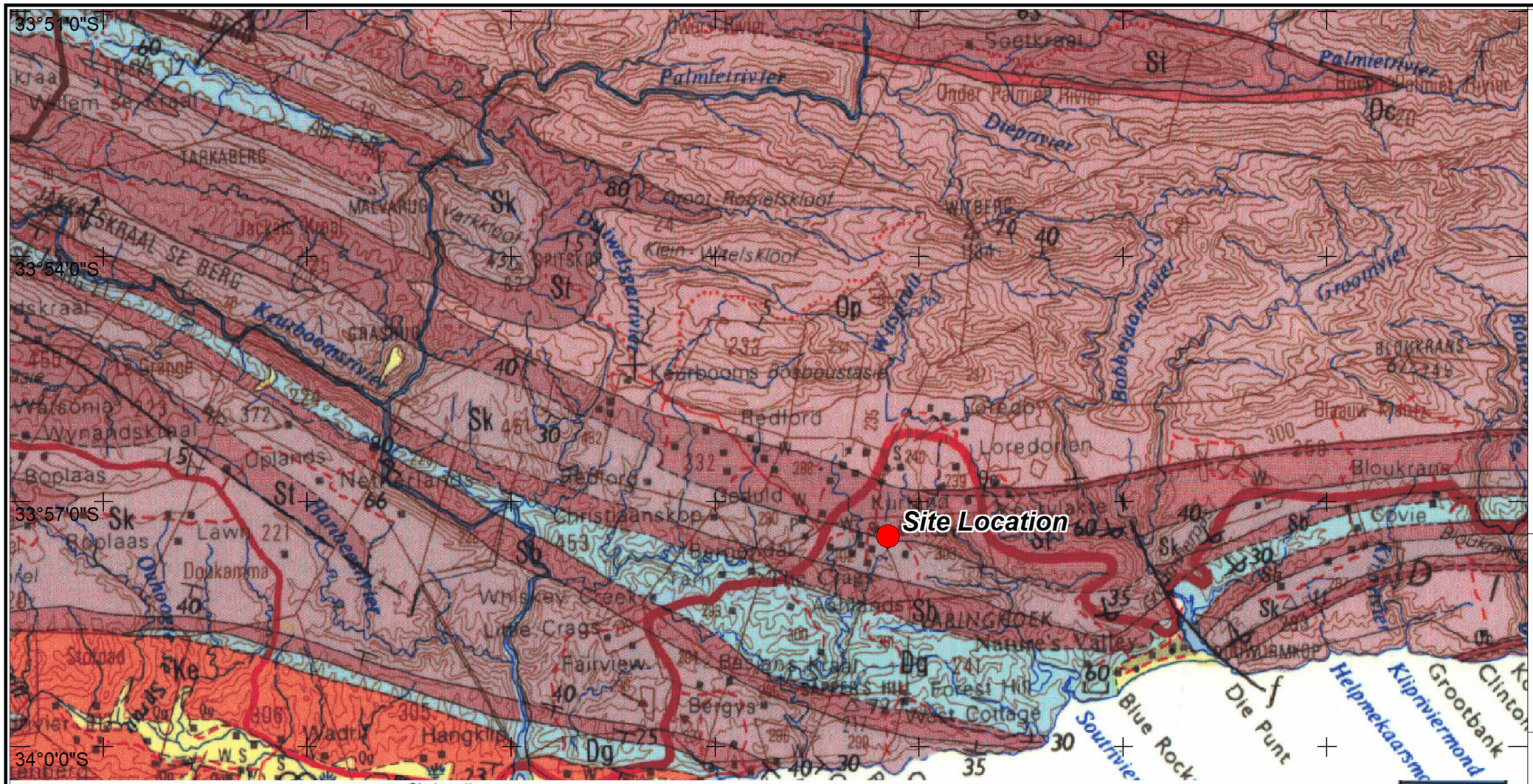
Drawing Name: Topographic Map
Drawing No:
Date: 2021
Revision: 0
Drawn By: S Ngema
Checked By: I Paton

Scale 1:25000

0 120 360 600 m

OUTENIQUA
GEOTECHNICAL SERVICES

PO Box 964
Knysna
6570
044-3820502
iain@outeniqualab.co.za



Gydo	Shale, siltstone Skalie, sliksteen	Dg
Baviaanskloof	Feldspathic sandstone Veldspatiese sandsteen	Sb
Kouga	Whitish-weathering quartz sandstone, medium to coarse grained, quartzitic, feldspathic near top, profusely cross-bedded, subordinate shale Witterig-verwerende kwartssandsteen, middel- tot grofkorrelrig, kwartsities, veldspaties naby bokant, sterk kruisgelaagd, ondergeskikte skalie	Sk
Tchando	Brownish-weathering sandstone, fine to coarse grained; shale Bruinerig-verwerende sandsteen, fyn- tot grofkorrelrig; skalie	St
Cedarberg	Shale, arenaceous shale Skalie, sanderige skalie	Oc
Peninsula	Whitish-weathering quartz sandstone, medium to coarse grained, quartzitic and massive Witterig- verwerende kwartssandsteen, middel- tot grofkorrelrig, kwartsities en massief	Op

N

Legend

Site Location

Client: Sonqua Consulting
Project:New Proposed Housing Developent
Site: Erf 562 Kurland
Area: Plettenberg Bay

Drawing Name: Geological Map
Drawing No:
Date: 2021
Revision: 0
Drawn By: S Ngema
Checked By: I Paton

Scale 1:150000

0 1.2 2.4 km

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PO Box 964
Knysna
6570
044-3820502
iain@outeniqualab.co.za

N

Legend

Topo vector

- Inland water
- River
- Water source
- Site Boundary

Client: Sonqua Consulting
Project:New Proposed Housing Developent
Site: Erf 562 Kurland
Area: Plettenberg Bay

Drawing Name: Aerial Photo Map
Drawing No:
Date: 2021
Revision: 0
Drawn By: S Ngema
Checked By: I Paton

Scale 1:10410

0 60 120 240 m

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Knysna
6570
044-3820502
iain@outeniqualab.co.za

Existing
Sewer works
21/303
BLOCK F
(+/- 3,29Ha)
BLOCK E
(+/-3,85Ha)
Road Servitude 18.89m
GP 6252/2004
BLOCK D
(+/-13,07Ha)
Servitude Pipeline & Road 735/2002
Rem/562
(Agricultur
al Project
Area)
562
BLOCK C
(+/-7,93Ha)
BLOCK D
Area to be investigated
(+/- 3,52Ha)
BLOCK B
(+/-2,65Ha)
BLOCK A
Area to be investigated
(+/- 2,1Ha)
BLOCK A
(+/- 1,87Ha)
Ptn. A
(TBC)
536
1/302
16/302
15/302
17/302
7/303
X 58 600.00
X 58 800.00
X 59 000.00
X 59 200.00
X 59 400.00
X 59 600.00
X 59 800.00
X 60 000.00
Y-46 000.00
Y-45 800.00
Y-45 600.00
Y-45 400.00
Y-45 200.00
Y-45 000.00
SCALE 1:1500


RE/288
RE/5/240
17/302
16/302
21/303
18/303
11/302
15/302
1/302
4/303
9/303
33°57'14"S
33°57'21"S
33°57'28"S
33°57'35"S
33°57'42"S
23°29'20"E
23°29'27"E
23°29'34"E
23°29'41"E
23°29'48"E
23°29'55"E
K1
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K31
K32
K33
K34
K35
N
Legend
Topo vector
Inland water
River
Water source
Test Positions
Site Boundary
Geotechnical terrains
Terrain 1 (S1/H2)
Terrain 2 (P)
Client: Sonqua Consulting
Project:New Proposed Housing Developent
Site: Erf 562 Kurland
Area: Plettenberg Bay
Drawing Name: Geotechnical Map
Drawing No:
Date: May 2021
Revision: 0
Drawn By: S Ngema
Checked By: I Paton
Scale 1:6000
0 30 60 90 150 m
OUTENIQUA GEOTECHNICAL SERVICES
PO Box 964
Knysna
6570
044-3820502
iain@outeniqualab.co.za

Appendix 2

Test pit profiles

OUTENIQUA GEOTECHNICAL SERVICES

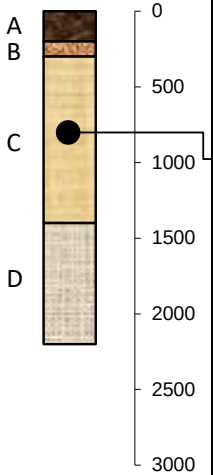
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 1

Datum: NGL | Co-ords: 23 Y-045177 X3758710

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, light grey, loose, intact, **SAND**, transported.

(200 to 300) Moist, dark grey, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(300 to 1400) Moist, dark red, dark reddish orange, stiff, fissured, micro-shattered, **SANDY SILTY CLAY**, residual.

Foundation Indicator, PH & Conductivity

(1400 to 2200) Moist, light grey, dark red, very dense, very stiff, shattered, **SLIGHTLY GRAVEL SILTY CLAYEY SAND**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

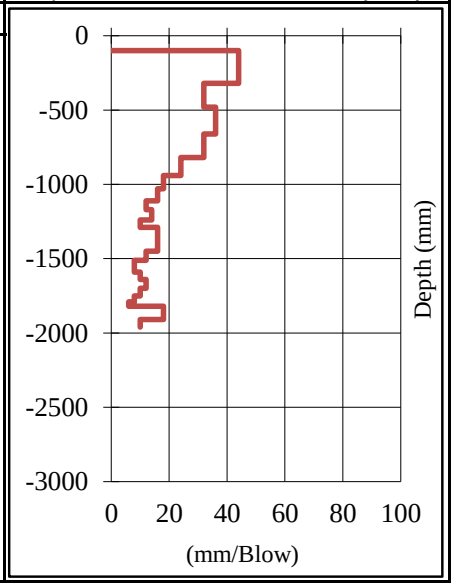
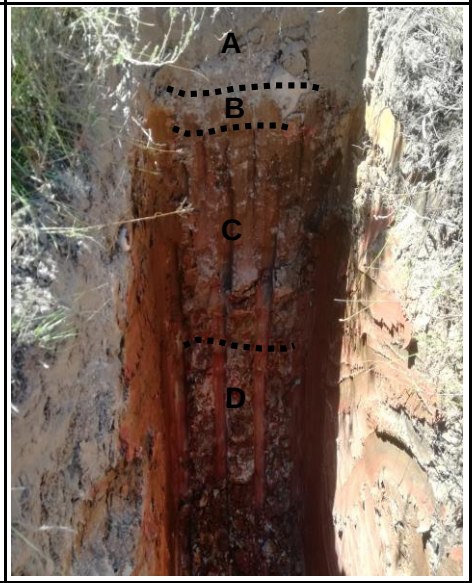


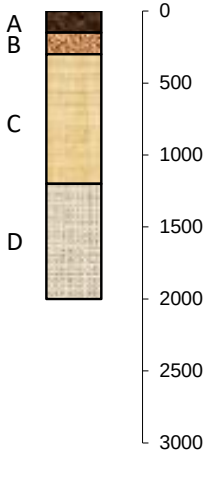
Photo of Test Pit



K 2

Datum: NGL | Co-ords: 23 Y-045140 X3758767

Key to symbols: ● Sample taken | Groundwater



(0 to 150) Moist, light grey, loose, intact, **SILTY SAND**, transported.

(150 to 300) Moist, light grey, loose, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(300 to 1200) Moist, light grey, dark red, dense, stiff, shattered, pinholed, **SANDY CLAYEY SILT**, residual.

(1200 to 2000) Moist, dark red, dark yellowish orange, stiff, fissured, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

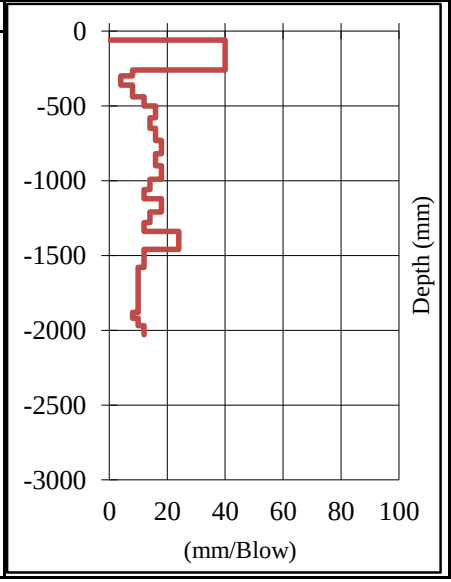
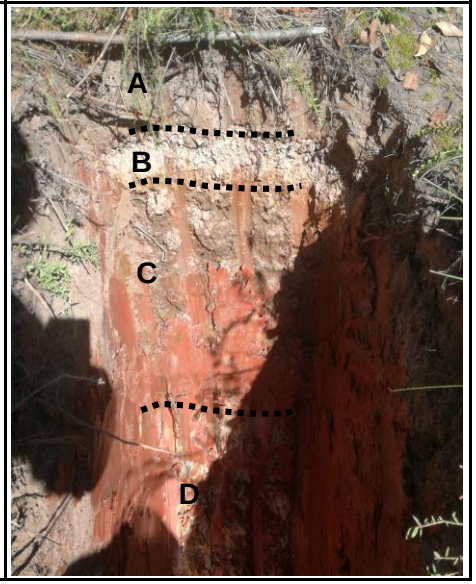


Photo of Test Pit



Geotechnical Soil Profile

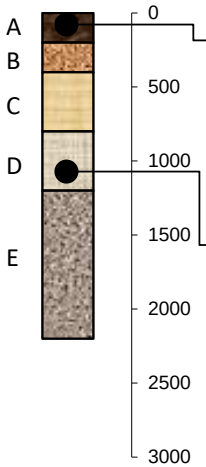
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 3

Datum: NGL | Co-ords: 23 Y-045190 X3758866

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, light grey, loose, pinholed, **SILTY SAND**, transported.

MOD/CBR/Indicator

(200 to 400) Moist, light grey, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(400 to 800) Moist, dark brown, firm, fissured, shattered, **CLAYEY SANDY SILT**, transported.

(800 to 1200) Moist, light grey, dark red, stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

Foundation Indicator

(1200 to 2200) Moist, light grey, dark red, dense, shattered, pinholed, **CLAYEY SANDY SILT WITH NODULES OF FERECRETE**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

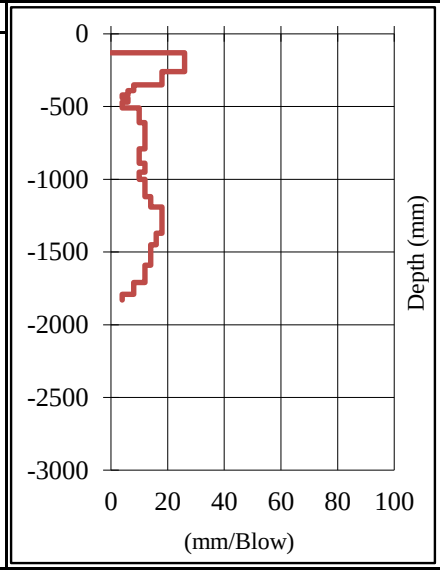
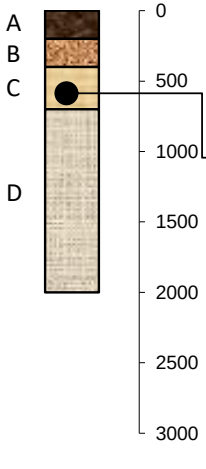


Photo of Test Pit

K 4

Datum: NGL | Co-ords: 23 Y-045351 X3758785

Key to symbols: Sample taken | Groundwater



(0 to 200) Moist, light grey, loose, pinholed, **SILTY SAND**, transported.

(200 to 400) Moist, light grey, light brown, medium dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(400 to 700) Moist, light reddish orange, dark yellow, firm, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

Collapse /Swell test

(700 to 2000) Moist, pale red, dark reddish orange, very dense, very stiff, fissured, shattered, **CLAYEY SANDY SILT WITH MINOR FE ZONES**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

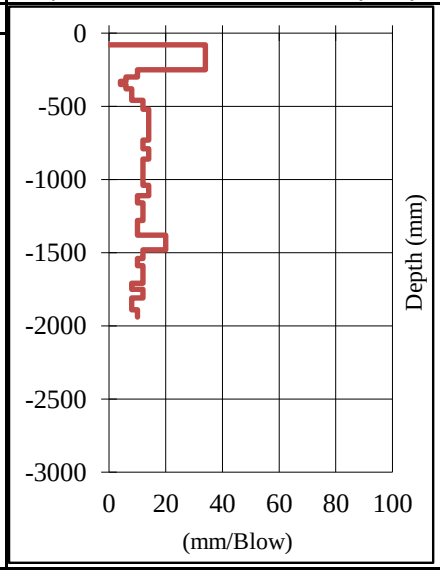


Photo of Test Pit

Geotechnical Soil Profile

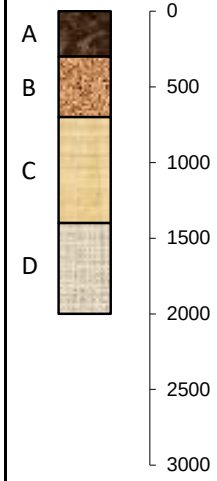
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 5

Datum: NGL | Co-ords: 23 Y-045375 X3758849

Key to symbols: ● Sample taken | Groundwater



(0 to 300) Moist, dark brown, very loose, intact, **SILTY SAND**, transported.

(300 to 700) Moist, dark brown, light yellow, medium dense, pinholed, **GRAVELLY SAND**, transported.

(700 to 1400) Moist, light reddish brown, pale red, dense, fissured, pinholed, **SLIGHTLY CLAYEY SAND**, transported.

(1400 to 2000) Very moist, dark yellowish orange, medium dense, intact, **SAND**, transported.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

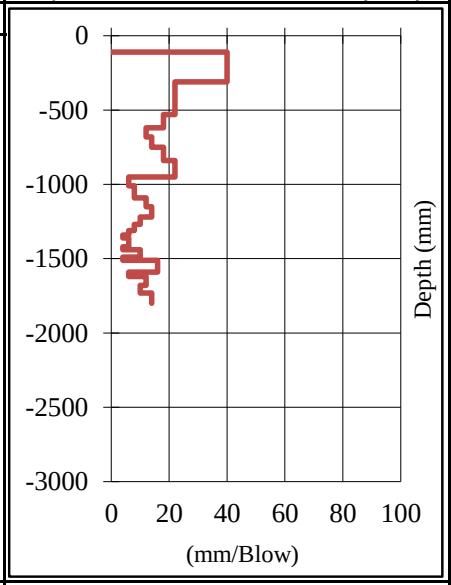
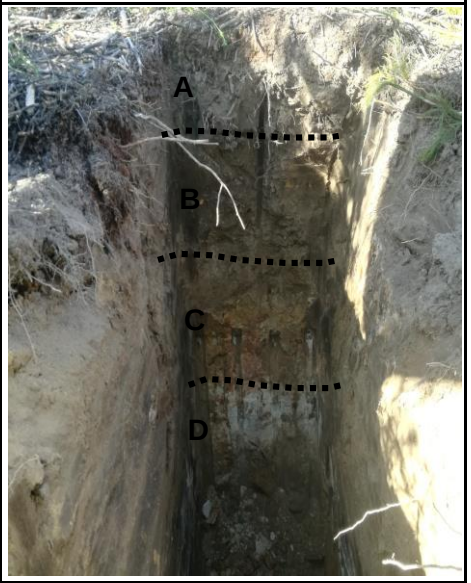


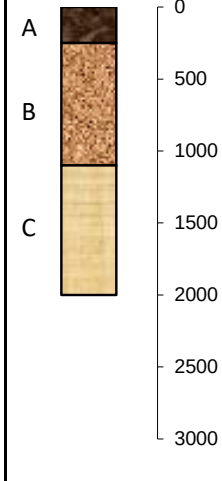
Photo of Test Pit



K 6

Datum: NGL | Co-ords: 23 Y-045349 X3758908

Key to symbols: ● Sample taken | Groundwater



(0 to 250) Moist, light grey, very loose, intact, **SILT SAND WITH ORGANIC HUMUS**, transported.

(250 to 1100) Moist, light reddish orange, medium dense, pinholed, **SLIGHTLY CLAYEY SAND**, transported.

(1100 to 2000) Moist, pale red, light yellowish orange, very dense, pinholed, **SAND**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

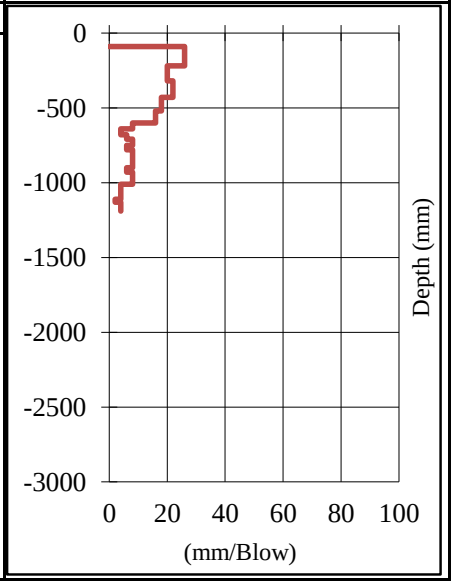
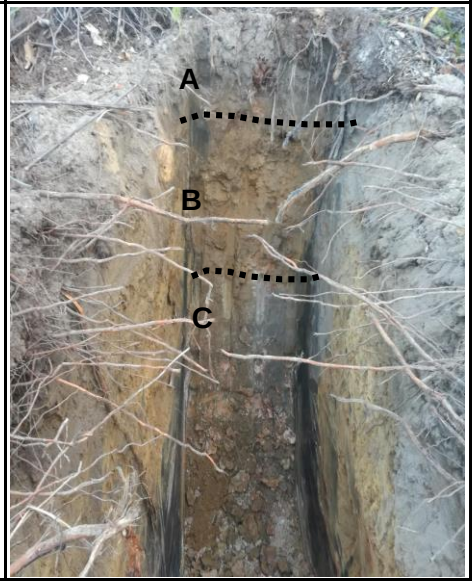


Photo of Test Pit



Geotechnical Soil Profile

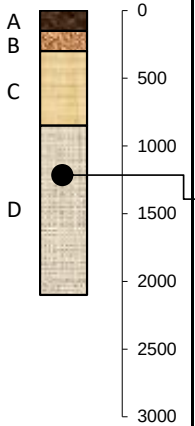
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 7

Datum: NGL | Co-ords: 23 Y-045576 X3758755

Key to symbols: ● Sample taken | Groundwater



(0 to 150) Very moist, light brown, loose, intact, **SILTY SAND**, transported.

(150 to 300) Very moist, light brown, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(300 to 850) Moist, dark yellowish orange, firm, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

(850 to 2100) Moist, light olive, dark red, stiff, micro-shattered, slickensided, **SILTY SANDY CLAY**, residual.

Foundation Indicator, PH & Conductivity, Collapse /Swell test

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

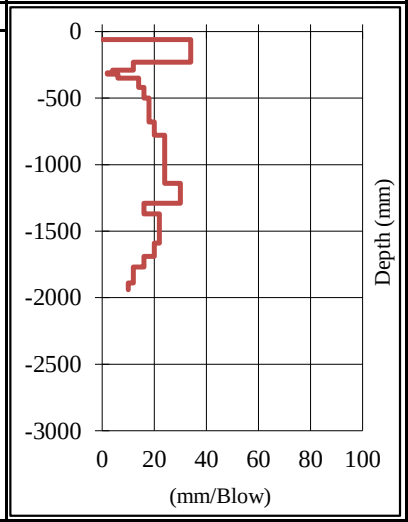
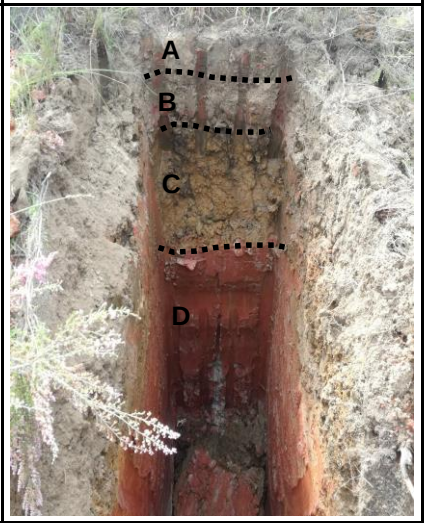


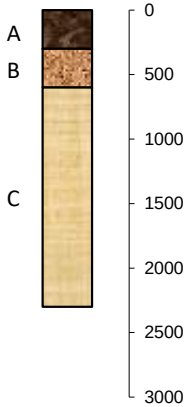
Photo of Test Pit



K 8

Datum: NGL | Co-ords: 23 Y-045524 X3758808

Key to symbols: ● Sample taken | Groundwater



(0 to 300) Moist, light grey, medium dense, pinholed, **GRAVELLY SILTY SAND**, transported.

(300 to 600) Moist, dark yellowish orange, firm, fissured, micro-shattered, slickensided, **SANDY CLAY**, residual.

(600 to 2300) Moist, light grey, dusk red, light reddish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY, WITH CRUMBLING SCATTERED FENODULES**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

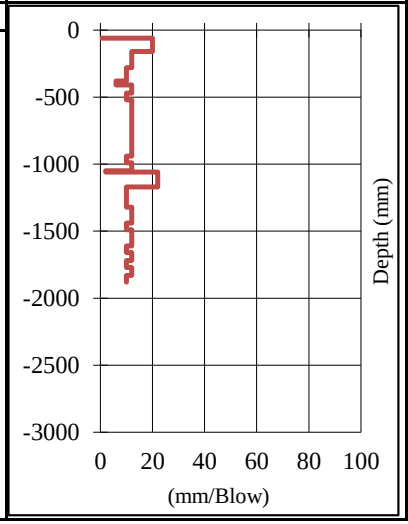


Photo of Test Pit

Geotechnical Soil Profile

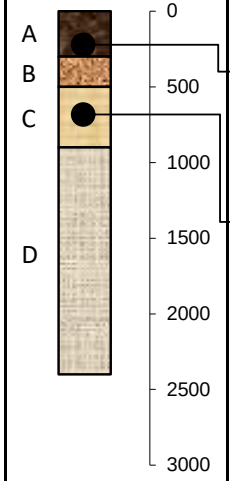
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 9

Datum: NGL | Co-ords: 23 Y-045572 X3758866

Key to symbols: ● Sample taken | Groundwater



(0 to 300) Very moist, light reddish brown, loose, intact, **SILT SAND**, transported.

MOD, CBR & Indicator

(300 to 500) Moist, light grey, dark reddish brown, medium dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(500 to 900) Moist, dark reddish orange, firm, fissured, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

Foundation Indicator

(900 to 2400) Moist, light grey, dusk red, light reddish orange, stiff, fissured, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

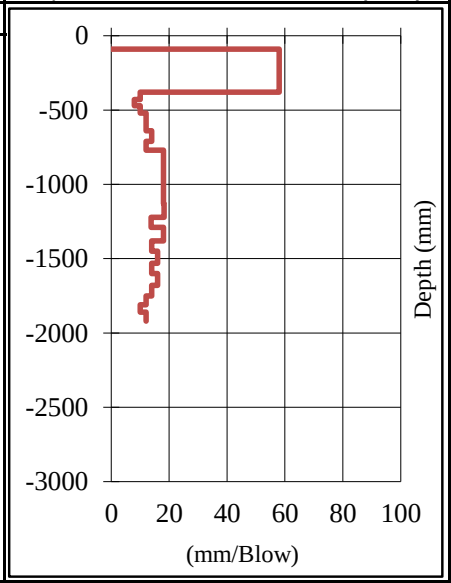
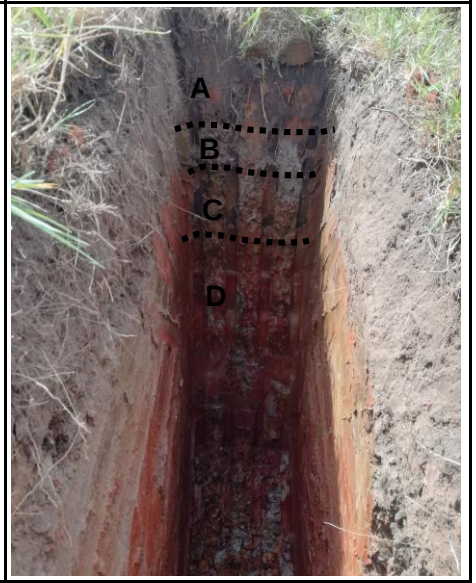


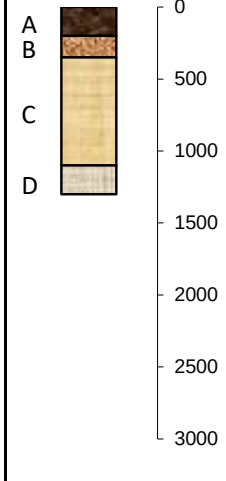
Photo of Test Pit



K 10

Datum: NGL | Co-ords: 23 Y-045473 X3758894

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, dark grey, loose, intact, **SILTY SAND**, transported.

(200 to 350) Very moist, dark reddish brown, medium dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(350 to 1100) Very moist, dark yellowish orange, dense, fissured, **SLIGHTLY CLAYEY SAND**, residual.

(1100 to 1300) Moist, light yellow, very dense, intact, **SAND/VERY SOFT ROCK SANDSTONE**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

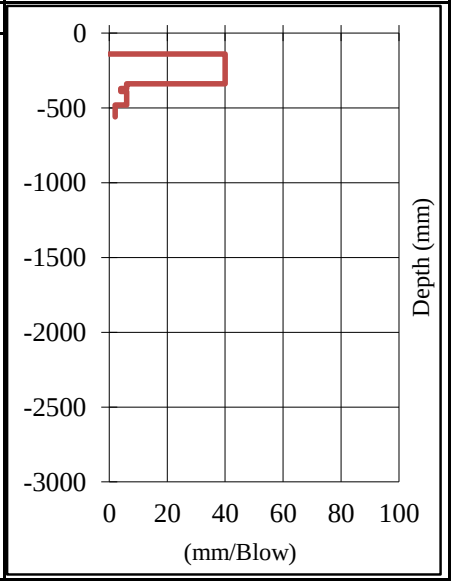
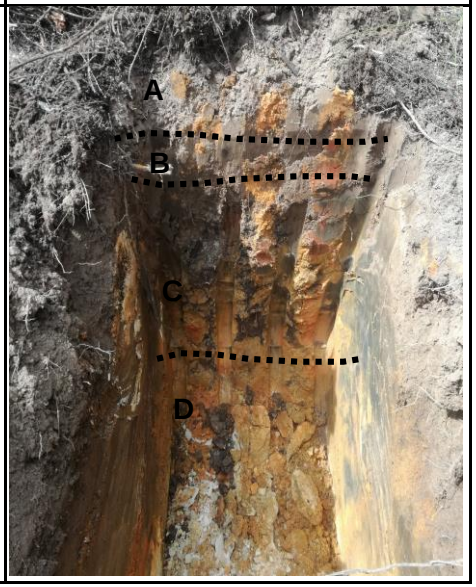


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

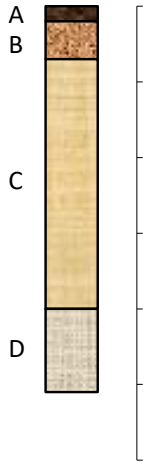
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 11

Datum: NGL | Co-ords: 23 Y-045558 X3758957

Key to symbols: ● Sample taken | Groundwater



(0 to 100) Very moist, light reddish brown, loose, intact, **SILTY SAND**, transported.

(100 to 350) Very moist, light reddish brown, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(350 to 2000) Moist, dark yellowish orange, firm, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

(2000 to 2550) Moist, light grey, dark red, stiff, fissured, micro-shattered, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

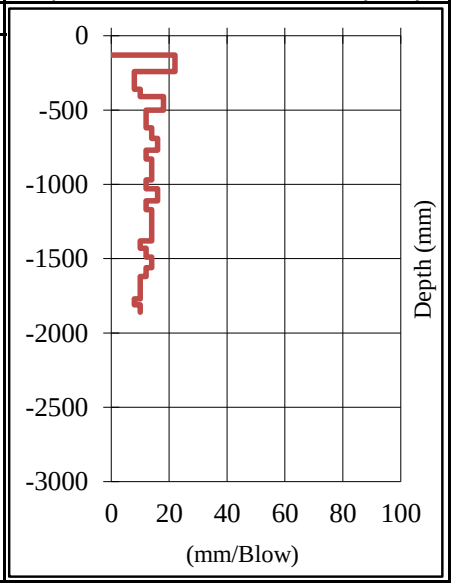
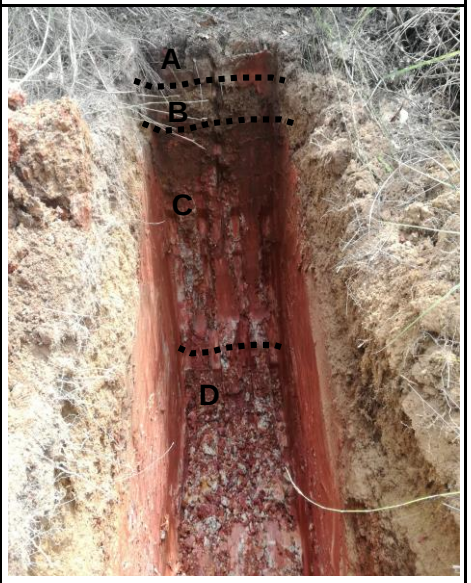


Photo of Test Pit



K 12

Datum: NGL | Co-ords: 23 Y-045520 X3759038

Key to symbols: Sample taken | Groundwater

(0 to 200) Moist, light grey, loose, intact, **SAND**, transported.

(200 to 450) Moist, light reddish brown, medium dense, intact, **SLIGHTLY CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(450 to 700) Moist, dark yellowish orange, firm, fissured, micro-shattered, slickensided, **SILTY CLAY**, residual.

(700 to 2200) Moist, dark red, light reddish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

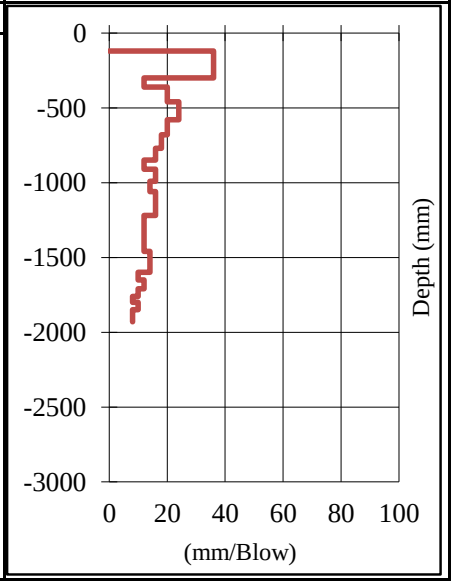
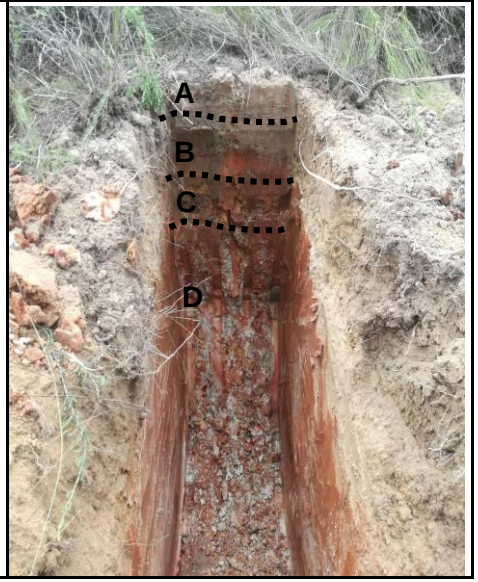


Photo of Test Pit



Geotechnical Soil Profile

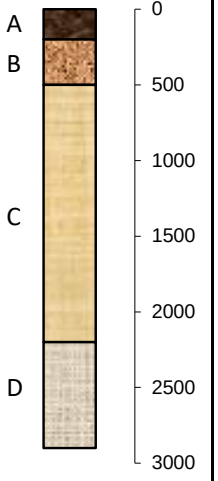
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 13

Datum: NGL | Co-ords: 23 Y-045463 X3759098

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, light reddish brown, very loose, intact, **SILTY SAND AND ORGANIC HUMUS**, transported.

(200 to 500) Very moist, dark yellowish orange, medium dense, intact, pedogenic (ferricrete)

(500 to 2200) Moist, dark yellowish orange, firm, fissured, slickensided, **SANDY SILTY CLAY**, residual

(2200 to 2900) Moist, pale red, light reddish orange, very dense, remnant cross bedding, **SAND**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

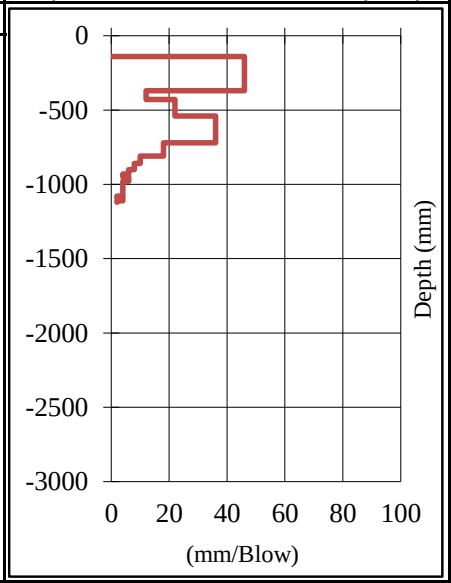
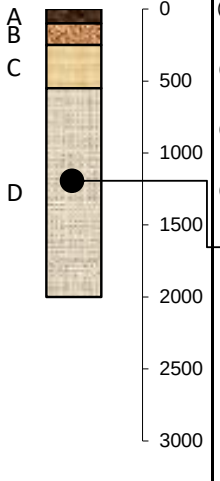


Photo of Test Pit

K 14

Datum: NGL | Co-ords: 23 Y-045498 X3759132

Key to symbols: ● Sample taken | Groundwater



(0 to 100) Moist, light reddish brown, very loose, intact, **SAND AND ORGANIC HUMUS**, transported.

(100 to 250) Moist, light yellowish orange, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(250 to 550) Moist, light yellowish orange, medium dense, fissured, **CLAYEY SILTY SAND**, transported.

(550 to 2000) Moist, light grey, dark red, stiff, fissured, slickensided, **SANDY CLAYEY SILT**, residual.

Foundation Indicator

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

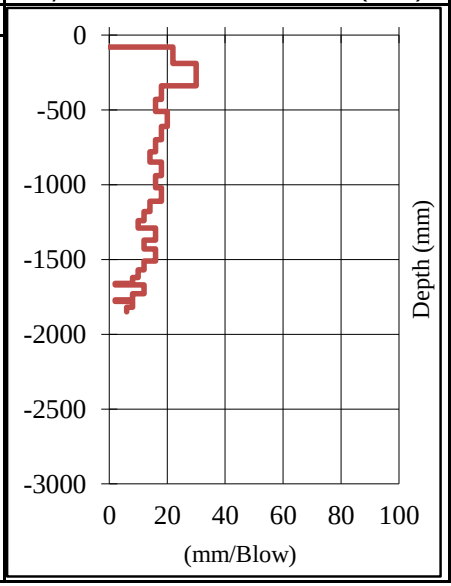
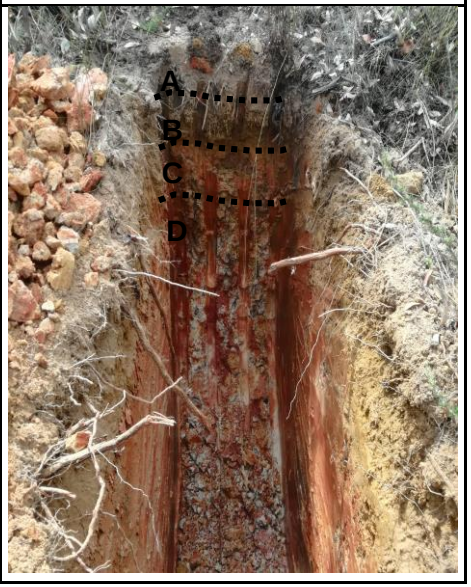


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

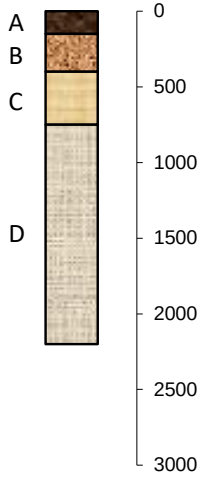
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 15

Datum: NGL | Co-ords: 23 Y-045675 X3759099

Key to symbols: ● Sample taken | Groundwater



(0 to 150) Moist, light brown, very loose, pinholed, **SILTY SAND**, transported.

(150 to 400) Moist, light reddish brown, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(400 to 750) Moist, dark yellowish orange, firm, fissured, slickensided, **SANDY SILTY CLAY**, residual.

(750 to 2200) Very Moist, light grey, dark red, very stiff, shattered, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

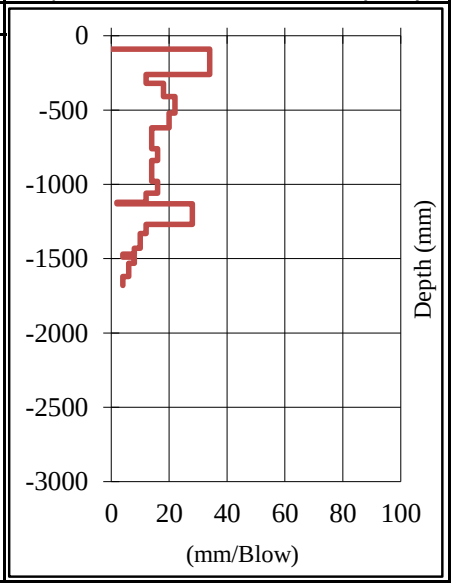
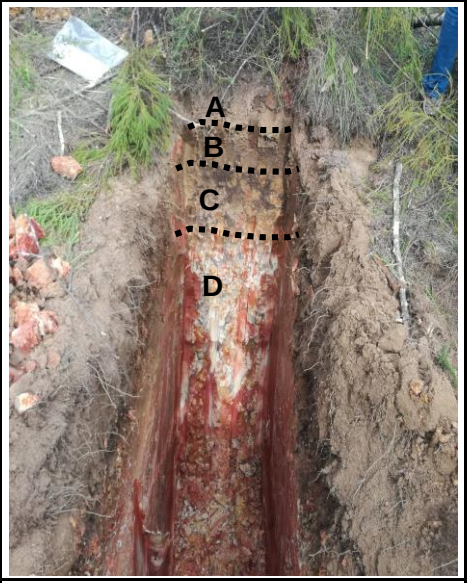


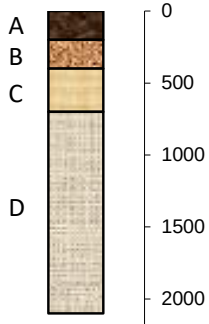
Photo of Test Pit



K 16

Datum: NGL | Co-ords: 23 Y-045632 X3759211

Key to symbols: Sample taken | Groundwater



(0 to 200) Moist, light reddish brown, very loose, intact, **SILTY SAND**, transported.

(200 to 400) Moist, light brown, light red, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(400 to 700) Moist, dark yellowish orange, firm, fissured, shattered, slickensided, **SILTY CLAY**, residual.

(700 to 2100) Moist, dark reddish brown, dark red, very stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

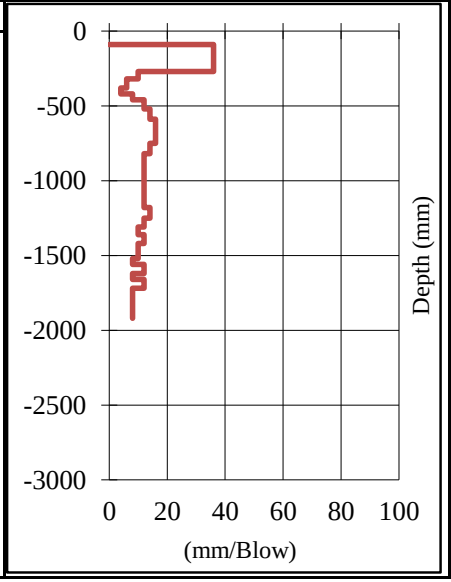
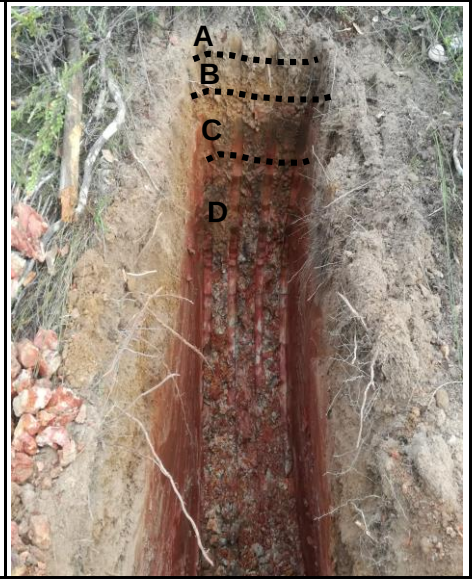


Photo of Test Pit



Geotechnical Soil Profile

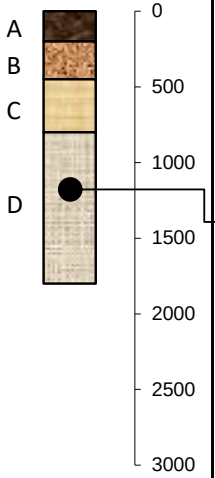
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 17

Datum: NGL | Co-ords: 23 Y-045557 X3759282

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, light brown, very loose, fissured, **SAND**, transported.

(200 to 450) Very moist, dark reddish brown, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(450 to 800) Moist, dark yellowish orange, firm, fissured, slickensided, **CLAYEY SAND**, residual.

(800 to 1800) Moist, pale red, very dense, remnant cross bedding, **SLIGHTLY SILTY SAND**, residual.

Foundation Indicator

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

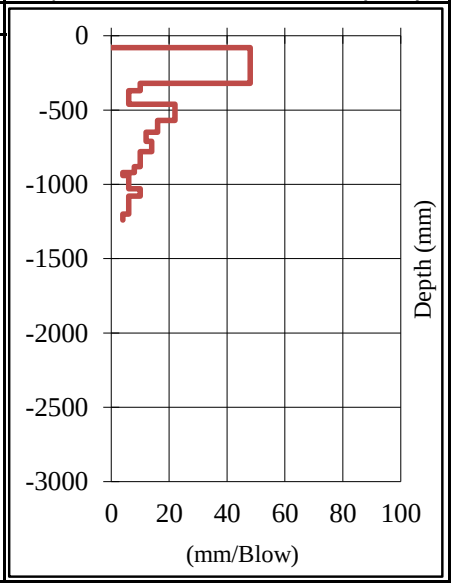
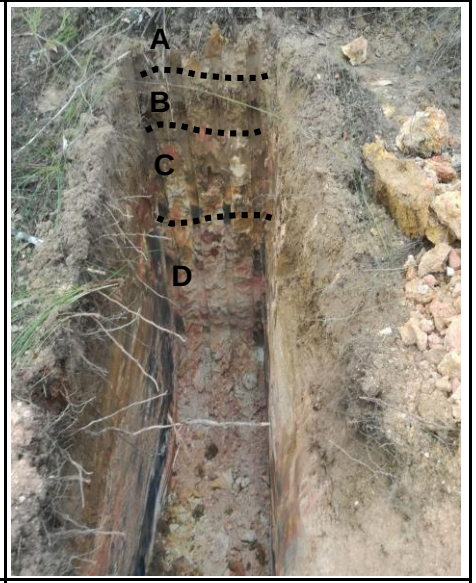


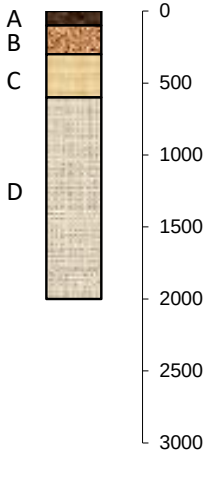
Photo of Test Pit



K 18

Datum: NGL | Co-ords: 23 Y-045496 X3759343

Key to symbols: ● Sample taken | Groundwater



(0 to 100) Moist, light reddish brown, very loose, intact, **SILTY SAND**, transported.

(100 to 300) Moist, light reddish brown, loose, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(300 to 600) Moist, dark reddish orange, firm, fissured, **SILTY SANDY CLAY**, residual.

(600 to 2000) Moist, light grey, dark red, stiff, fissured, shattered, slickensided, **SANDY SILTY CLAY WITH WEAK FE NODULE**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

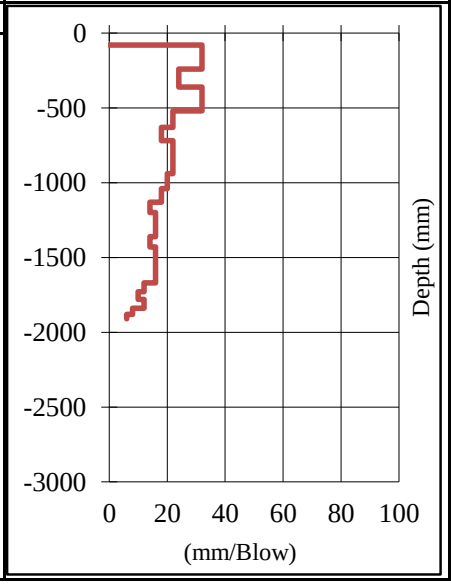
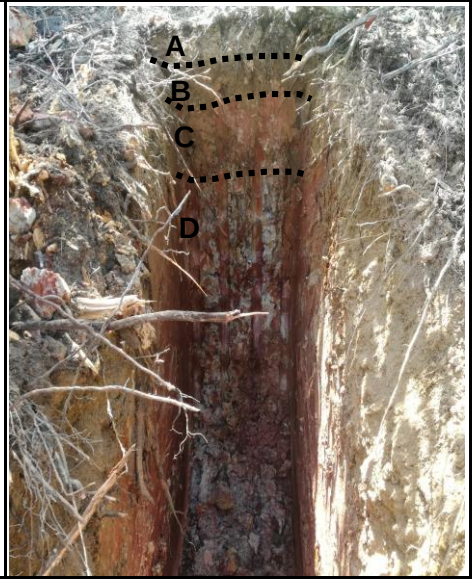


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

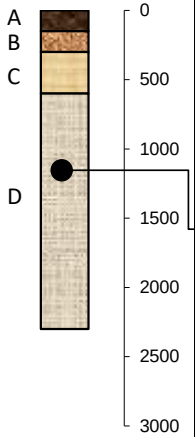
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 19

Datum: NGL | Co-ords: 23 Y-045532 X3759399

Key to symbols: ● Sample taken | Groundwater



(0 to 150) Moist, light reddish brown, very loose, intact, **SILTY SAND**, transported.

(150 to 300) Moist, very moist, dark reddish brown, dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(300 to 600) Moist, dark yellowish orange, firm, micro-shattered, slickensided, **SILTY CLAY**, residual.

(600 to 2300) Moist, light grey, dark red, dark yellowish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

Foundation Indicator, PH & Conductivity

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

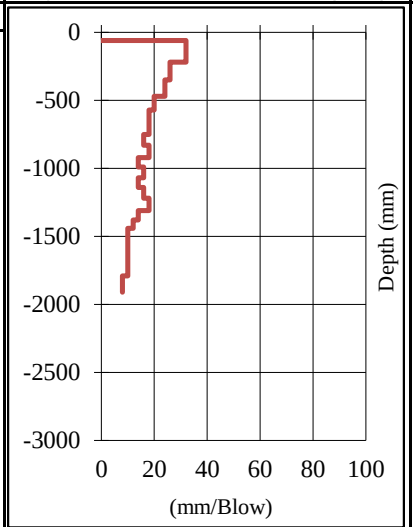
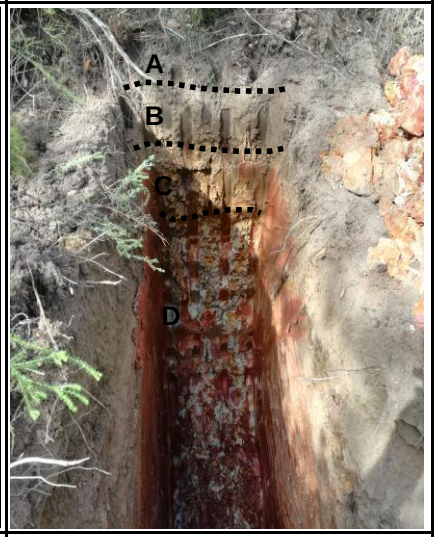


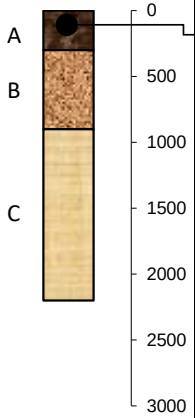
Photo of Test Pit



K 20

Datum: NGL | Co-ords: 23 Y-045623 X3759370

Key to symbols: Sample taken | Groundwater



(0 to 300) Moist, light grey, loose, intact, **SILTY SAND**, transported.

MOD/CBR/Indicator

(300 to 900) Moist, dark yellowish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual

(900 to 2200) Moist, dark red, dark reddish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

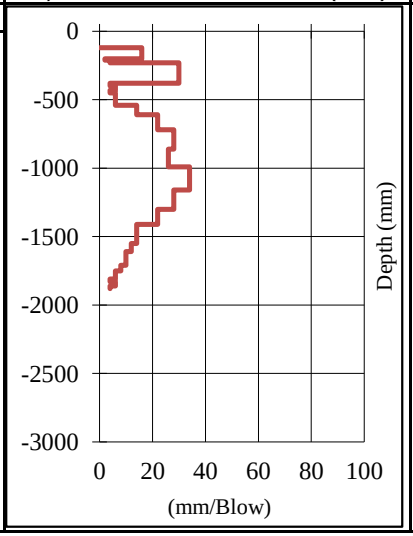


Photo of Test Pit

OUTENIQUA GEOTECHNICAL SERVICES

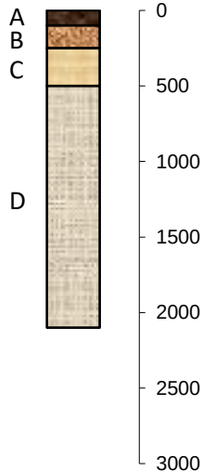
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 21

Datum: NGL | Co-ords: 23 Y-045619 X3759498

Key to symbols: ● Sample taken | Groundwater



(0 to 100) Moist, light reddish brown, loose, intact, **SILTY SAND**, transported.

(100 to 250) Moist, dark reddish brown, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(250 to 500) Moist, dark grey, dark yellowish orange, firm, shattered, slickensided, **SANDY SILTY CLAY**, transported.

(500 to 2100) Moist, light grey, dark red, stiff, fissured, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

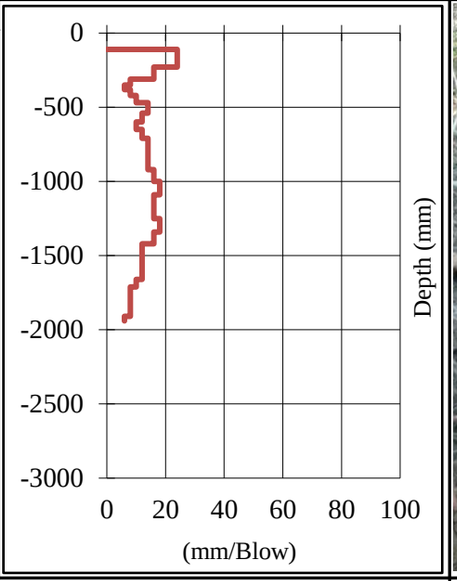
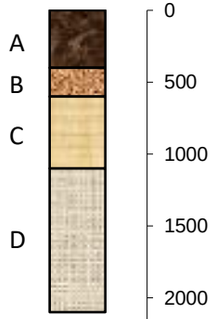


Photo of Test Pit

K 22

Datum: NGL | Co-ords: 23 Y-045674 X3759442

Key to symbols: Sample taken ● | Groundwater



(0 to 400) Moist, light grey, loose, pinholed, **SILTY SAND**, transported.

(400 to 600) Moist, dark reddish brown, medium dense, intact, **CLAYEY SANDY GRAVE**L, pedogenic (ferricrete)

(600 to 1100) Moist, dark yellowish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

(1100 to 2100) Moist, pale red, dark reddish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY WITH MINOR SCATTERED FERECRETE NODULES**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

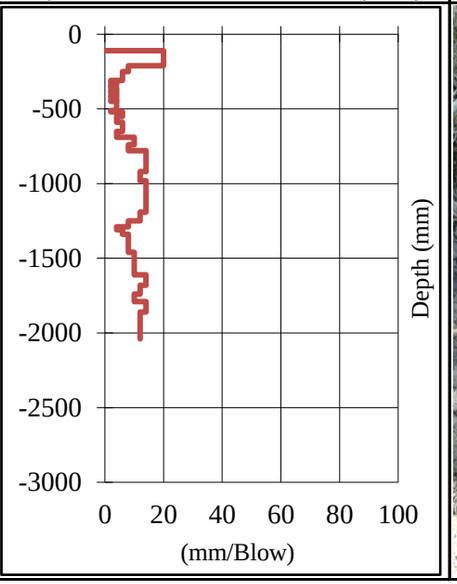
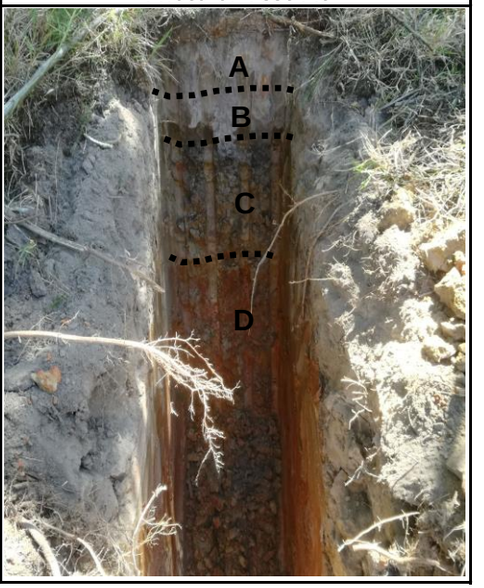


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

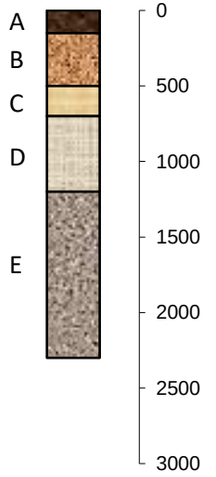
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 23

Datum: NGL | Co-ords: 23 Y-045730 X3759413

Key to symbols: ● Sample taken | ▼ Groundwater



(0 to 150)	Very moist, black, very loose, intact, **SILTY SAND WITH RUBBISH**, imported (fill)
(150 to 500)	Very moist, light brown, loose, intact, **SLIGHTLY CLAYEY SILTY SAND**, transported.
(500 to 700)	Moist, light reddish brown, dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)
(700 to 1200)	Moist, light yellowish orange, firm, micro-shattered, slickensided, **SILTY CLAY**, residual.
(1200 to 2300)	Moist, light grey, pale red, light reddish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

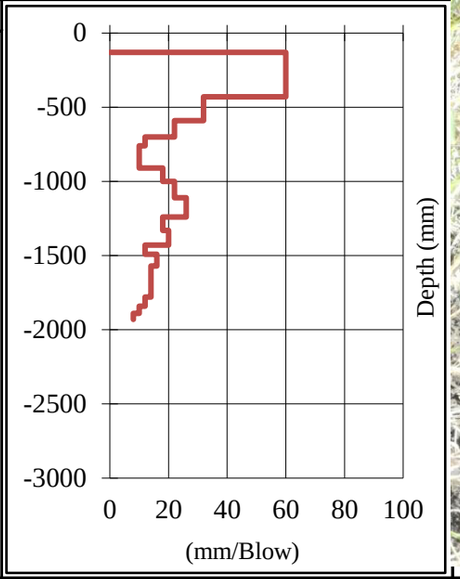
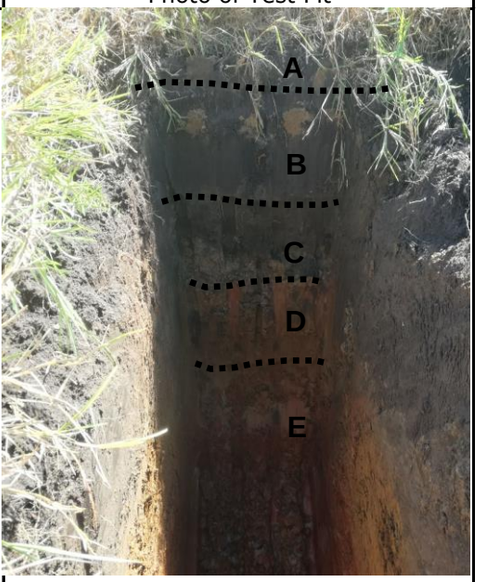


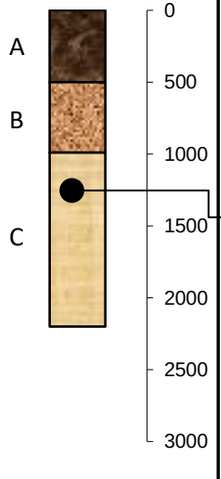
Photo of Test Pit



K 24

Datum: NGL | Co-ords: 23 Y-045798 X3759359

Key to symbols: ● Sample taken | ▼ Groundwater



(0 to 500)	Moist, light reddish brown, medium dense, pinholed, **SILTY SAND**, transported.
(500 to 990)	Moist, dark yellowish orange, firm, shattered, **SILTY CLAYEY SAND**, residual
(990 to 2200)	Moist, light grey, dark reddish orange, stiff, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

Foundation Indicator, PH & Conductivity

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

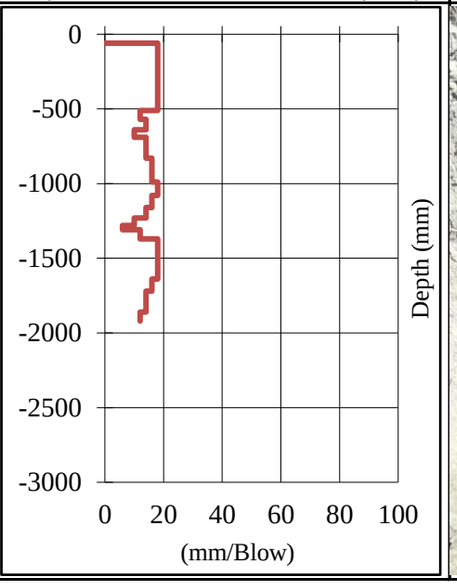
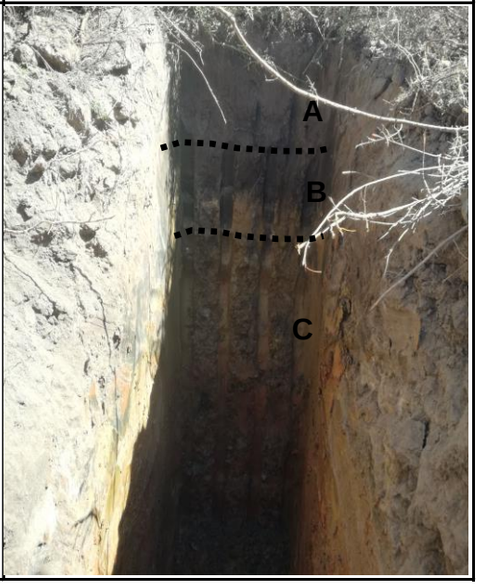


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

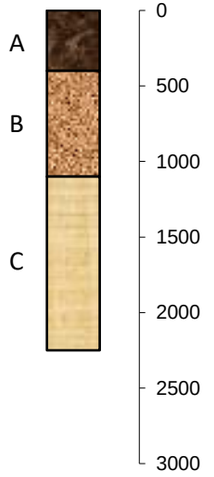
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 25

Datum: NGL | Co-ords: 23 Y-045701 X3759317

Key to symbols: ● Sample taken | Groundwater



(0 to 400) Moist, light reddish orange, loose, pinholed, **SILTY SAND**, transported.

(400 to 1100) Moist, dark yellowish orange, firm, micro-shattered, slickensided, **SILTY CLAY**, residual.

(1100 to 2250) Moist, pale green, dark reddish orange, stiff, shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

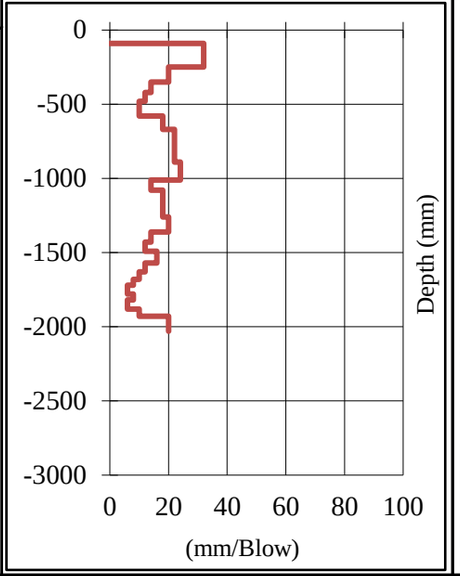
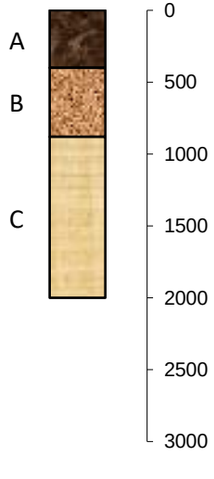


Photo of Test Pit

K 26

Datum: NGL | Co-ords: 23 Y-045748 X3759261

Key to symbols: Sample taken | Groundwater



(0 to 400) Moist, light reddish brown, medium dense, shattered, **SILTY SAND**, transported.

(400 to 880) Moist, dark yellowish orange, firm, fissured, slickensided, **GRAVELLY SILTY CLAY**, transported.

(880 to 2000) Moist, dark reddish brown, dark reddish orange, stiff, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

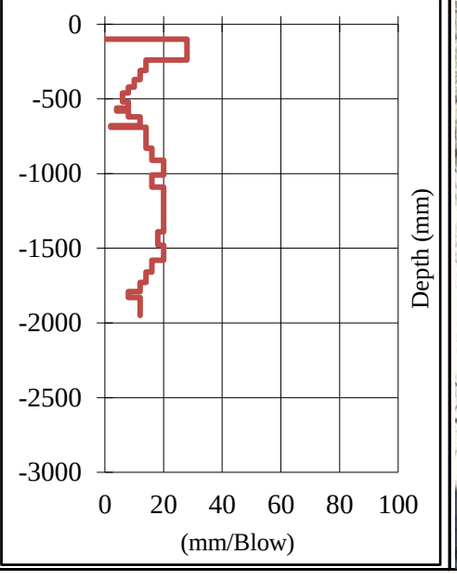
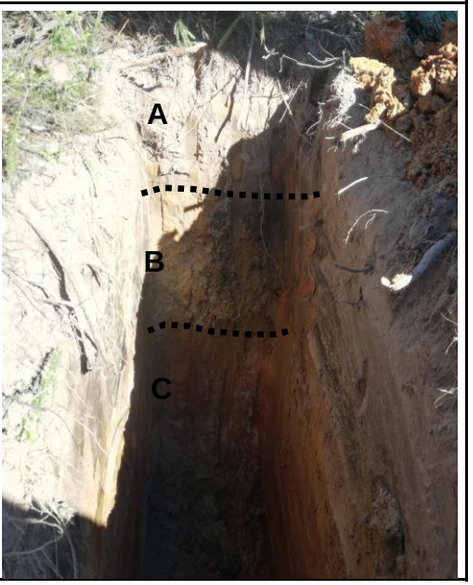


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

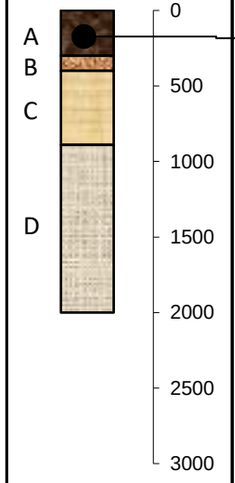
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 27

Datum: NGL | Co-ords: 23 Y-045876 X3759237

Key to symbols: ● Sample taken | Groundwater



(0 to 300) Very moist, dark grey, loose, intact, **SILTY SAND**, transported.
MOD/CBR/Indicator

(300 to 400) Very moist, dark grey, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(400 to 890) Moist, dark yellowish orange, firm, fissured, micro-shattered, slickensided, **SILTY CLAY**, residual.

(890 to 2000) Very moist, light grey, light reddish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

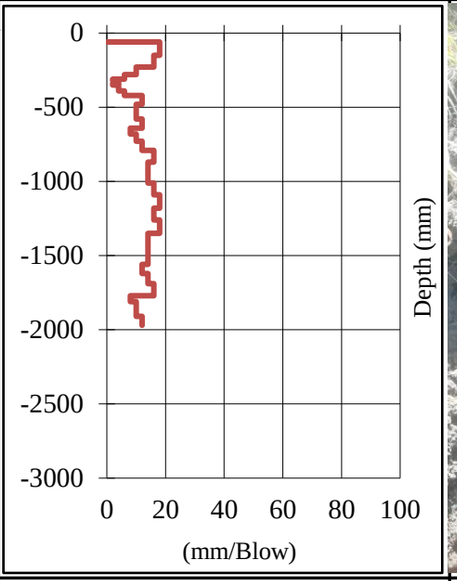
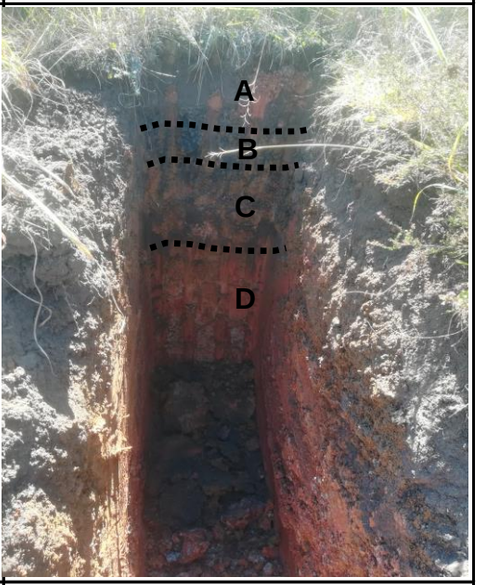


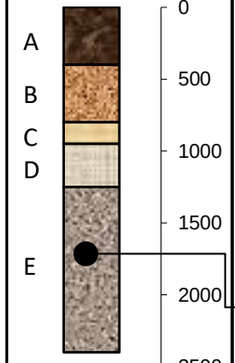
Photo of Test Pit



K 28

Datum: NGL | Co-ords: 23 Y-045726 X3759187

Key to symbols: ● Sample taken | Groundwater



(0 to 400) Slightly moist, dark reddish brown, dusk red, firm, intact, **GRAVELLY SILTY SAND CLAY**, imported (fill)

(400 to 800) Slightly moist, light brown, medium dense, pinholed, **SILTY SAND**, transported.

(800 to 950) Moist, dark reddish brown, dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(950 to 1250) Moist, dark yellowish orange, firm, shattered, slickensided, **SANDY SILTY CLAY**, residual.

(1250 to 2400) Moist, light red, light reddish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.
Collapse/Swell test

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

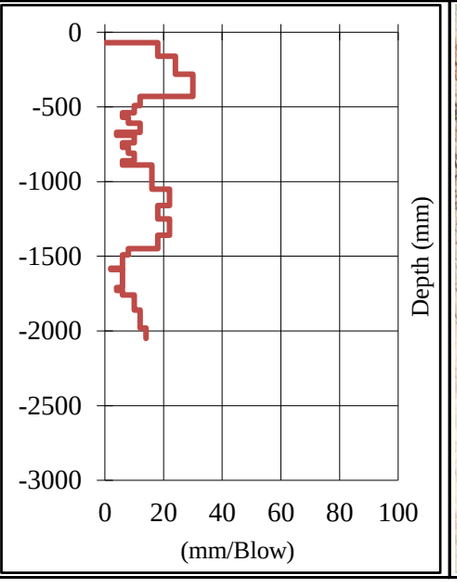
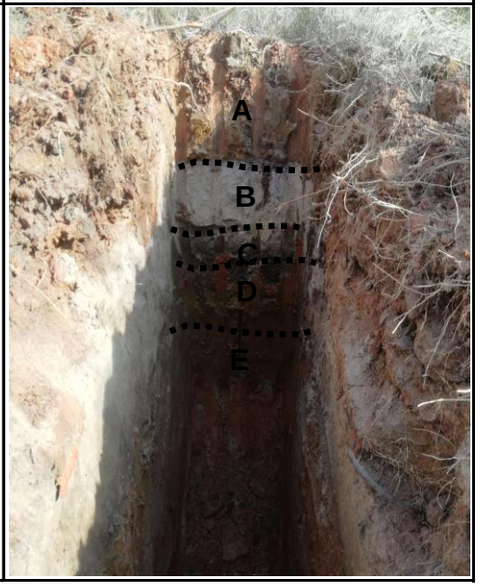


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

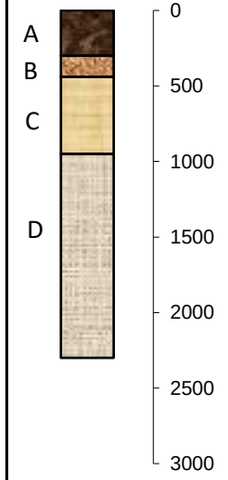
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 29

Datum: NGL | Co-ords: 23 Y-045625 X3758662

Key to symbols: ● Sample taken | Groundwater



(0 to 300) Moist, light brown, medium dense, pinholed, **SILTY SAND**, transported.

(300 to 440) Moist, light reddish brown, medium dense, intact, **CLAYEY SANDY GRAVEL**, pedogenic (ferricrete)

(440 to 950) Moist, dark yellowish orange, firm, fissured, micro-shattered, slickensided, **SILTY CLAY**, residual.

(950 to 2300) Moist, dark reddish brown, dark reddish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

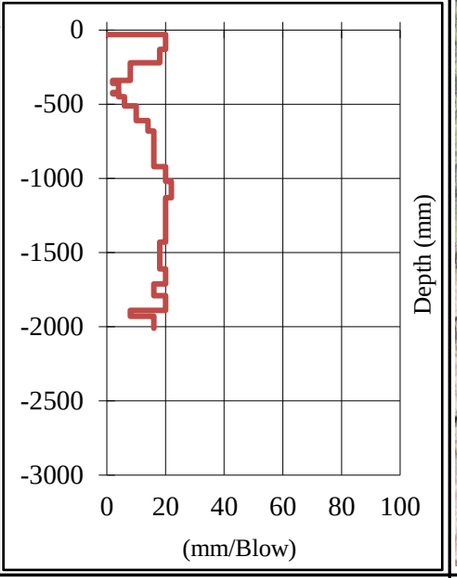
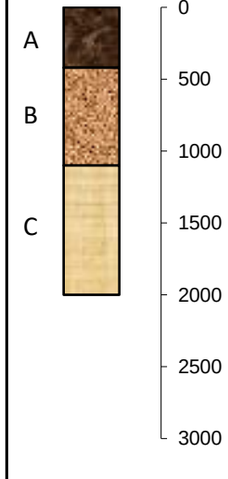


Photo of Test Pit

K 30

Datum: NGL | Co-ords: 23 Y-045676 X3758692

Key to symbols: ● Sample taken | Groundwater



(0 to 420) Slightly Moist, light grey, medium dense, pinholed, **SILTY SAND**, transported.

(420 to 1100) Moist, dark yellowish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.

(1100 to 2000) Moist, dark reddish orange, stiff, fissured, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

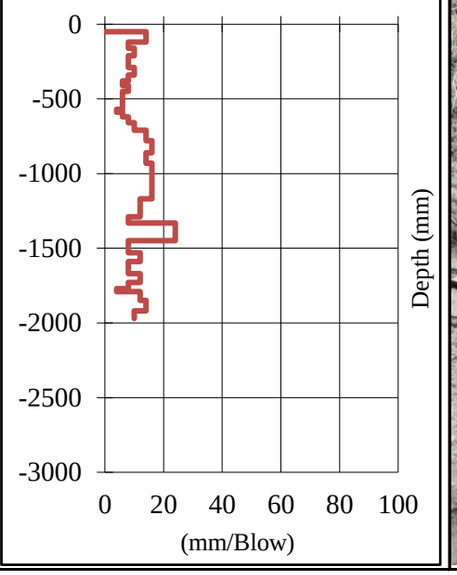


Photo of Test Pit

Geotechnical Soil Profile

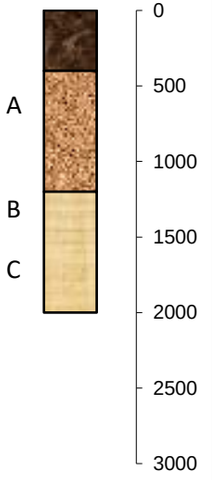
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 31

Datum: NGL | Co-ords: 23 Y-045688 X3758742

Key to symbols: Sample taken | Groundwater



(0 to 400) Moist, light grey, medium dense, pinholed, **SILTY SAND**, transported.

Moist, dark yellowish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.

(400 to 1200)

(1200 to 2000) Moist, dark brown, dark reddish orange, stiff, micro-shattered, slickensided, **SILTY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

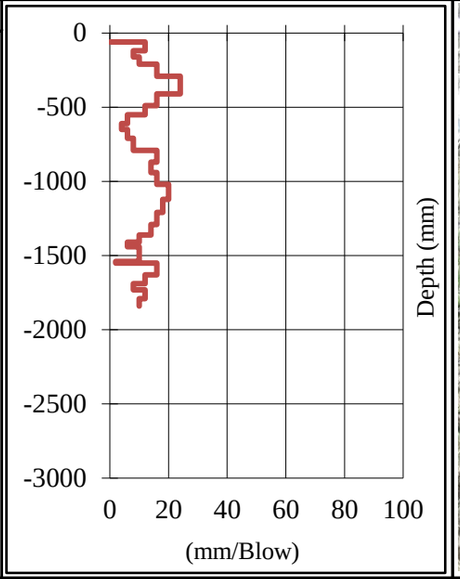
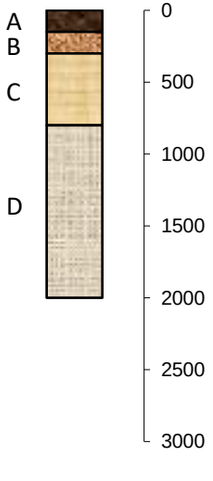


Photo of Test Pit

K 32

Datum: NGL | Co-ords: 23 Y-045966 X3759191

Key to symbols: Sample taken | Groundwater



(0 to 150) Slightly Moist, light grey, loose, intact, **SILTY SAND**, transported.

(150 to 300) Moist, dark grey, medium dense, intact, **SANDY GRAVEL**, pedogenic (ferricrete)

(300 to 800) Moist, dark yellowish orange, firm, fissured, shattered, slickensided, **SILTY CLAY**, residual.

(800 to 2000) Moist, light grey, dark red, shattered, **SANDY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

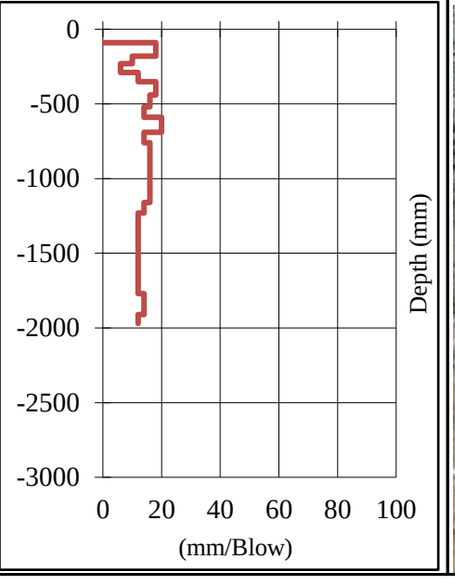
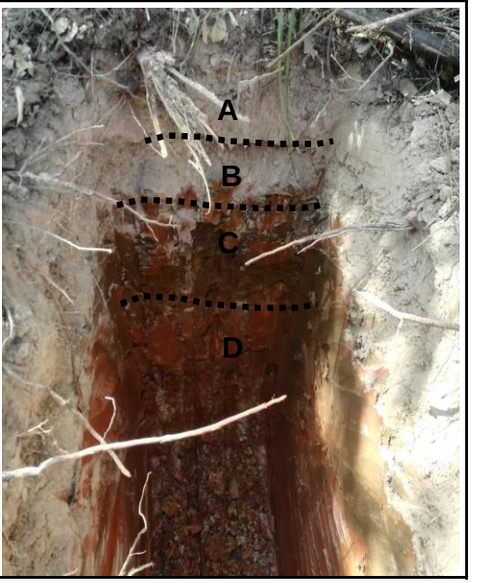


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

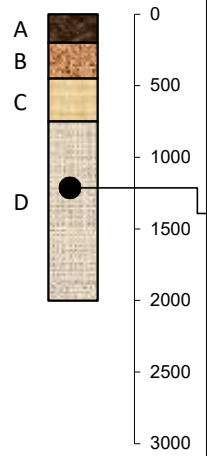
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 33

Datum: NGL | Co-ords: 23 Y-045982 X3759262

Key to symbols: ● Sample taken | ▼ Groundwater



(0 to 200) Slightly moist, light grey, loose, pinholed, **SILTY SAND**, transported.

(200 to 450) Moist, light reddish brown, medium dense, intact, **SANDY GRAVEL**, residual.

(450 to 750) Moist, dark yellowish orange, stiff, shattered, slickensided, **SILTY CLAY**, residual.

(750 to 2000) Moist, dark reddish brown, light reddish orange, stiff, shattered, slickensided, **SANDY CLAY**, residual.

PH & Conductivity, Collapse / Swell test

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

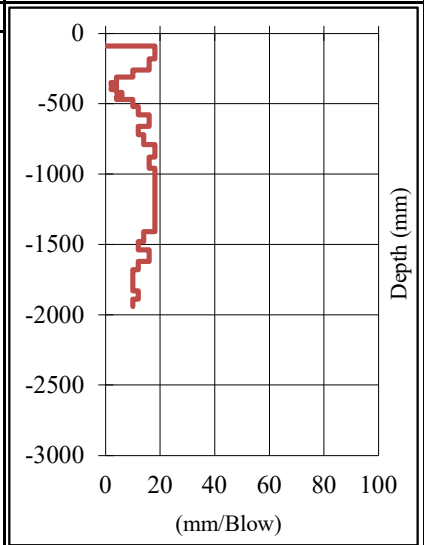
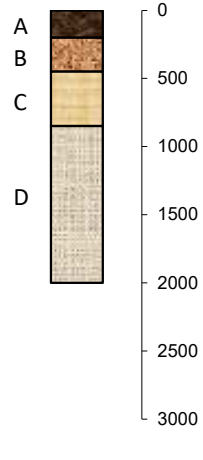


Photo of Test Pit

K 34

Datum: NGL | Co-ords: 23 Y-046024 X3759314

Key to symbols: Sample taken | Groundwater



(0 to 200) Moist, light grey, loose, pinholed, **SILTY SAND**, transported.

(200 to 450) Moist, dark reddish brown, dense, intact, **CLAYEY SILTY SAND**, pedogenic (ferricrete)

(450 to 850) Moist, dark reddish orange, dark yellowish orange, firm, fissured, slickensided, **SILTY CLAY**, residual.

(850 to 2000) Moist, light grey, dark reddish brown, stiff, fissured, shattered, slickensided, **SANDY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

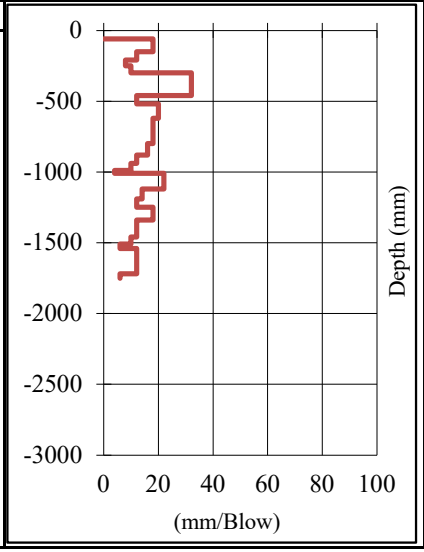
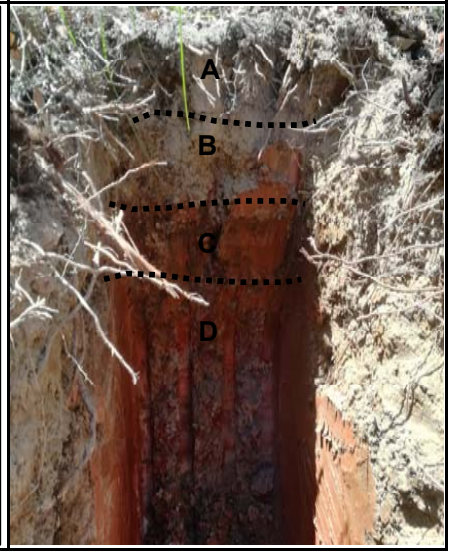


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

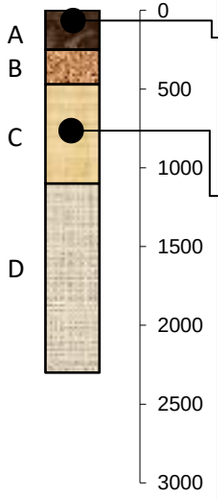
Geotechnical Soil Profile

Client:	Sonqua Consulting
Project:	Erf 562 Housing Project Kurland
Area:	Plettenberg Bay
Date:	23.03.2021
Excavator:	TLB

K 35

Datum: NGL | Co-ords: 23 Y-046000 X3759367

Key to symbols: ● Sample taken | ▼ Groundwater



(0 to 250) Moist, light grey, loose, fissured, **SILTY SAND**, transported.

MOD/CBR/Indicator

(250 to 470) Moist, light reddish brown, dense, intact, **CLAYEY GRAVELLY SAND**, pedogenic (ferricrete)

(470 to 1100) Moist, dark yellowish orange, stiff, micro-shattered, slickensided, **SANDY SILTY CLAY**, residual.

Foundation Indicator, PH & Conductivity

(1100 to 2300) Moist, pale red, light reddish orange, stiff, shattered, slickensided, **SANDY CLAY**, residual.

TP Stopped
No Water

Dynamic Cone Penetrometer (DCP)

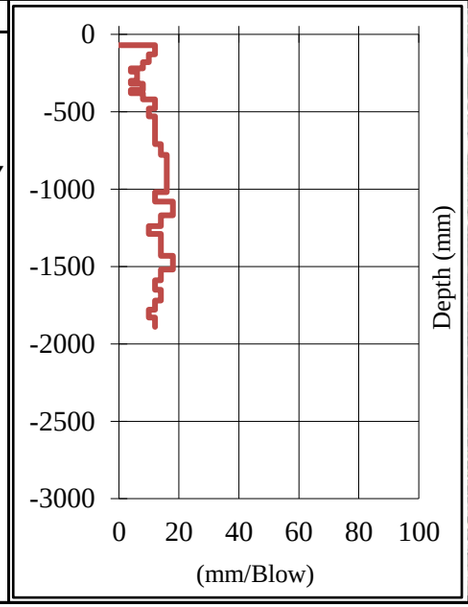
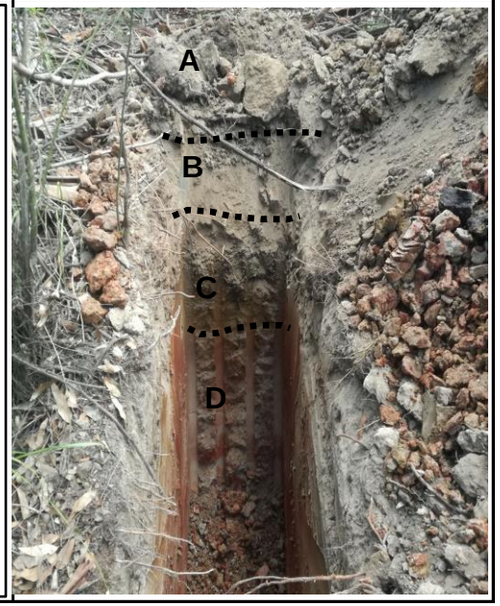


Photo of Test Pit



Appendix 3

Lab test data

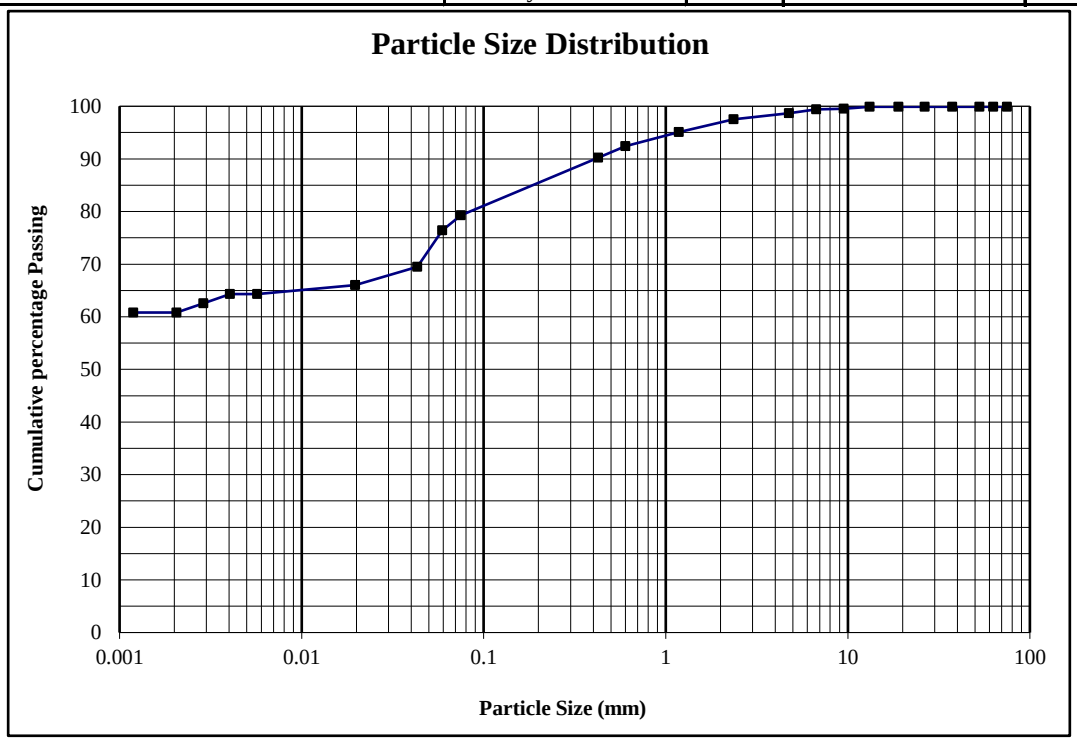
OUTENIQUA LAB (Pty) Ltd
Materials Testing Laboratory
Registration No. 95/07742/07
6 Mirrorball Street, George : PO Box 3186, George Industria, 6536
Tel: 044 8743274 : Fax: 044 8745779 : e-mail: llewelyn@outeniqualab.co.za

Customer :	Outeniqua Geotechnical Services	Project :	Erf 562 - Housing Project - Kurland - Plettenberg Bay
	P O Box 964	Date Received :	30/03/21
	Knysna	Date Reported :	14/04/21
	6570	Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	1/9

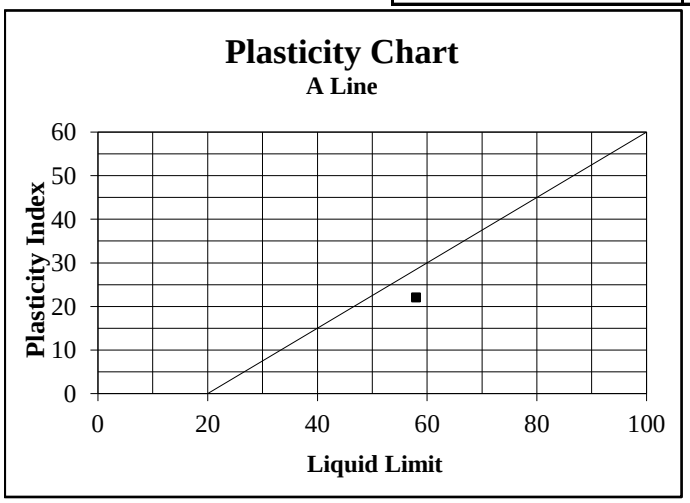
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

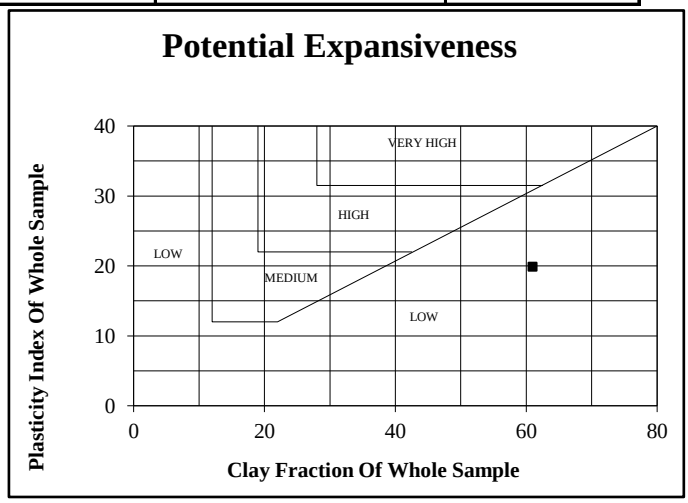
Material Description:	Dark Reddish to Dark Reddish Orange Silty Sandy Clay	Sample Number:	81168		
Position:	K1 - Layer 3	Liquid Limit	58	Linear Shrinkage	11
Depth:	300-1400	Plasticity Index	22	Insitu M/C%	16.3

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	99
4.75	99
2.36	98
1.18	95
0.600	92
0.425	90
0.075	79
0.0591	76
0.0432	69
0.0197	66
0.0057	64
0.0040	64
0.0029	63
0.0021	61
0.0012	61



% Clay	61	% Silt	16	% Sand	20	% Gravel	3
Unified Soil Classification		MH		PRA Soil Classification		A-7-5	





Notes:

- **Specimens delivered to Outeniqua Lab in good order.**

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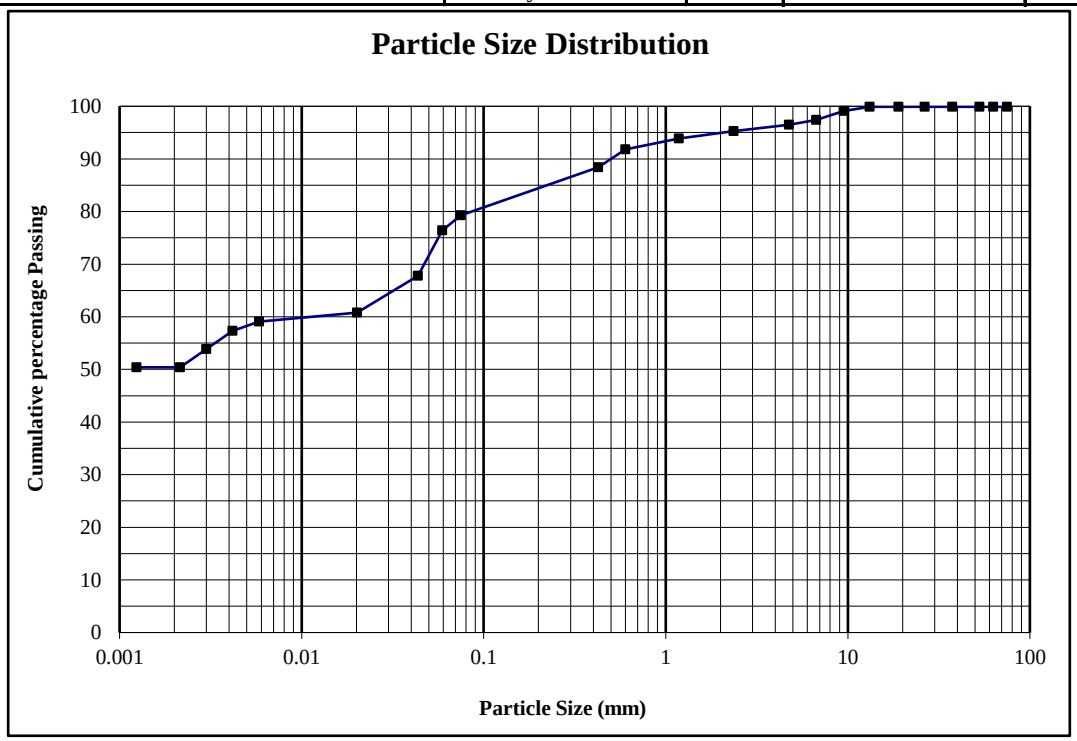
	P O Box 964	Date Received :	30/03/21
	Knysna	Date Reported :	14/04/21
	6570	Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	2/9

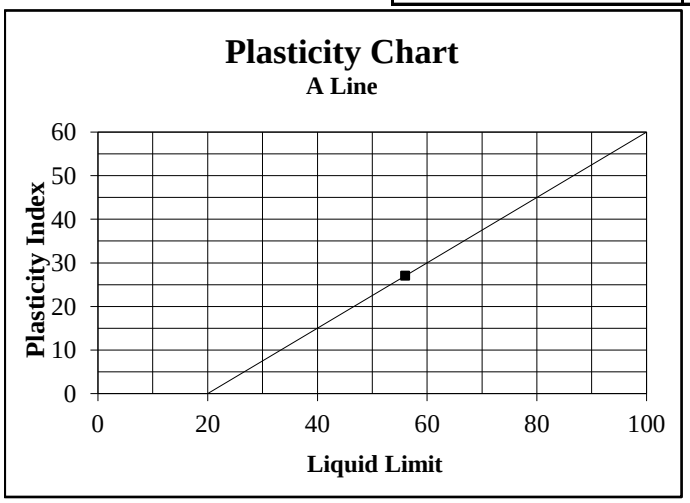
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

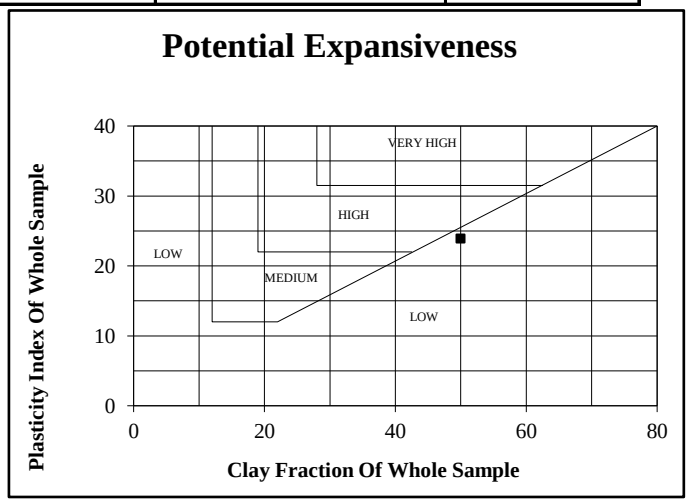
Material Description:	Light Grey to Light Reddish Sandy Silty Clay	Sample Number:	81170		
Position:	K3 - Layer 4	Liquid Limit	56	Linear Shrinkage	13
Depth:	800-1200	Plasticity Index	27	Insitu M/C%	15.9

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	99
6.7	97
4.75	97
2.36	95
1.18	94
0.600	92
0.425	88
0.075	79
0.0591	76
0.0436	68
0.0202	61
0.0059	59
0.0042	57
0.0030	54
0.0021	50
0.0012	50



% Clay	50	% Silt	27	% Sand	18	% Gravel	5
Unified Soil Classification		CH		PRA Soil Classification		A-7-6	





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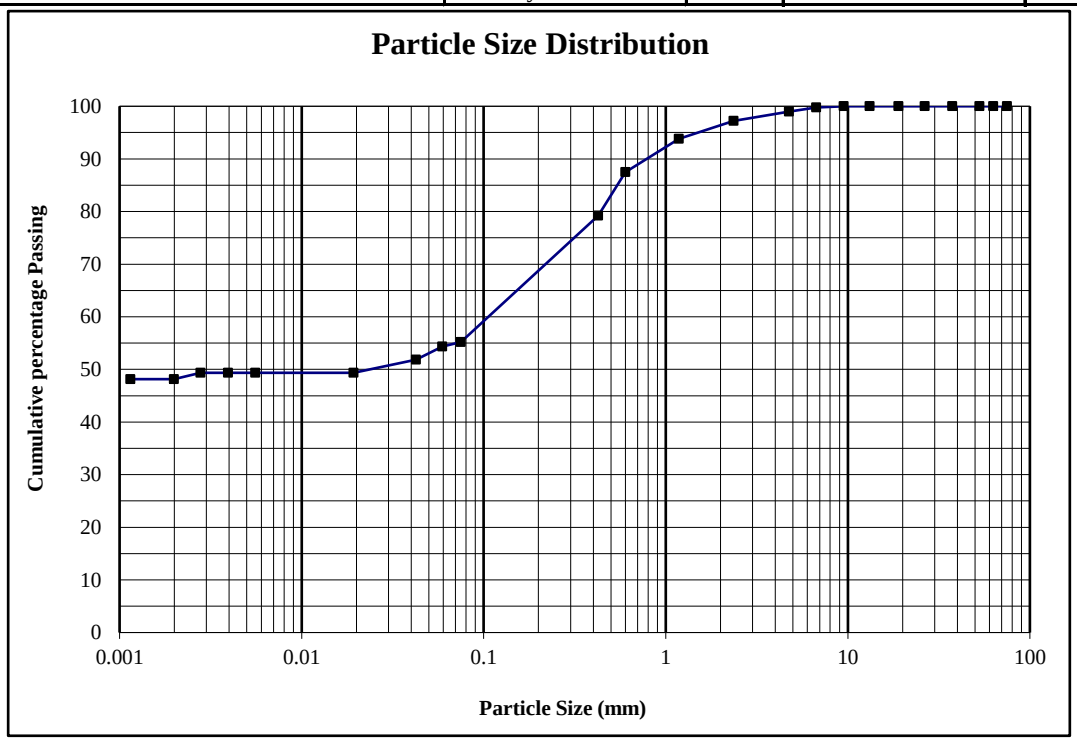
	Knysna	Date Reported :	14/04/21
	6570	Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	3/9

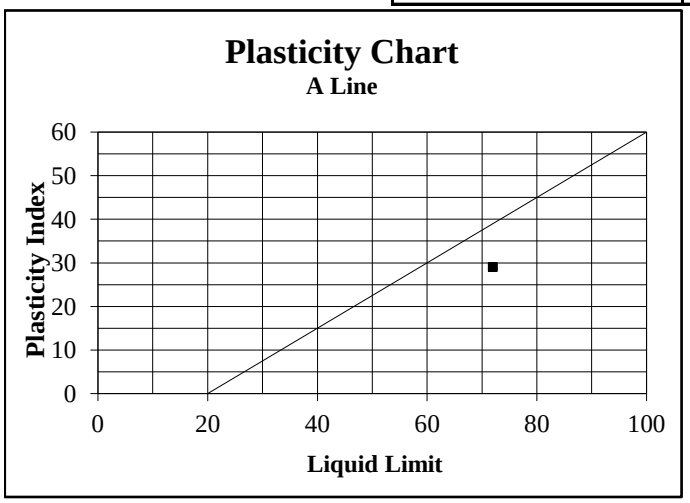
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

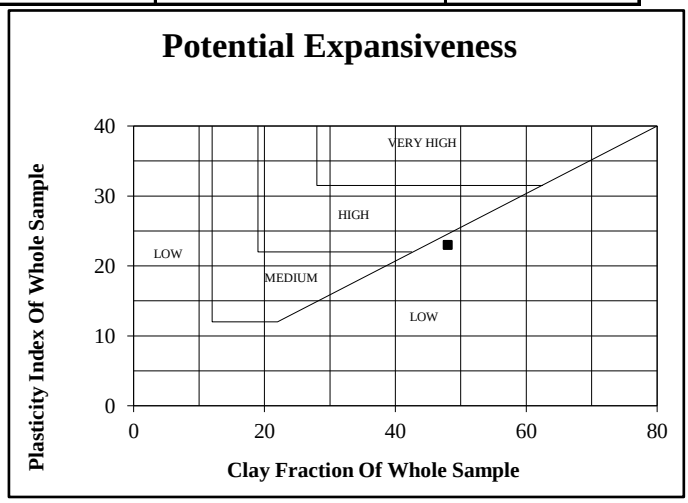
Material Description:	Light Olive to Dark Reddish Sandy Clay	Sample Number:	81173		
Position:	K7 - Layer 4	Liquid Limit	72	Linear Shrinkage	14.5
Depth:	850-2100	Plasticity Index	29	Insitu M/C%	25.2

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	100
4.75	99
2.36	97
1.18	94
0.600	88
0.425	79
0.075	55
0.0591	54
0.0425	52
0.0193	49
0.0056	49
0.0039	49
0.0028	49
0.0020	48
0.0011	48



% Clay	48	% Silt	6	% Sand	42	% Gravel	4
Unified Soil Classification	MH			PRA Soil Classification		A-7-5	





Notes:

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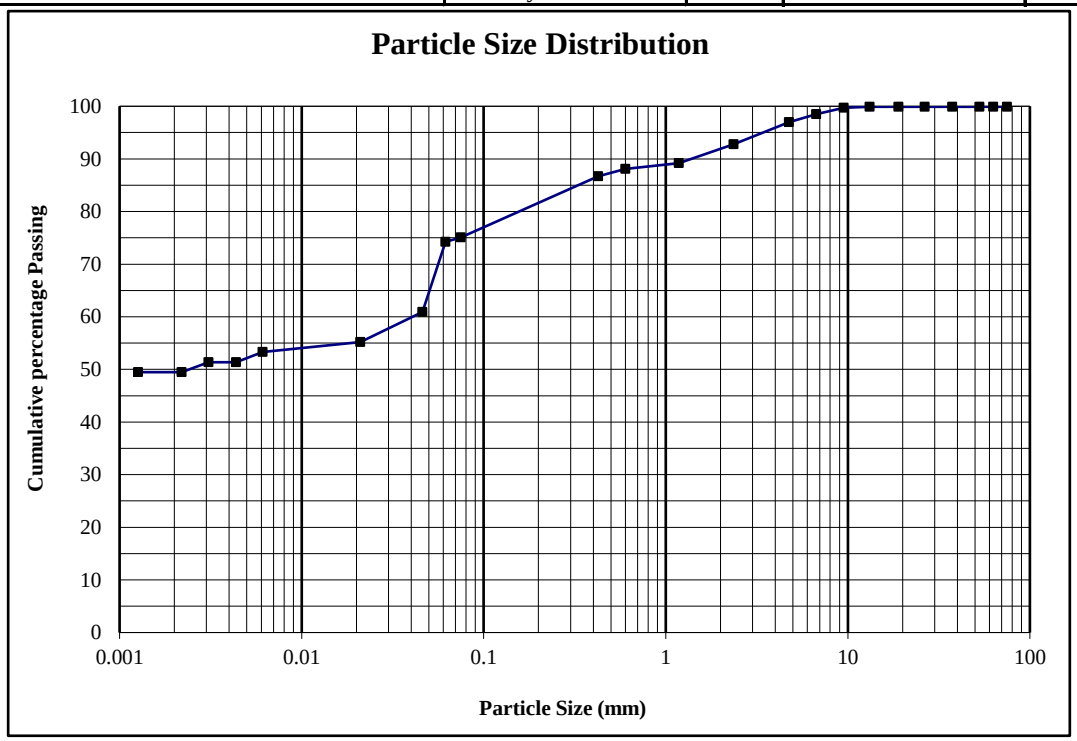
Customer :	Outeniqua Geotechnical Services	Project :	Erf 562 - Housing Project - Kurland - Plettenberg Bay
	P O Box 964	Date Received :	30/03/21
	Knysna	Date Reported :	14/04/21
	6570	Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	4/9

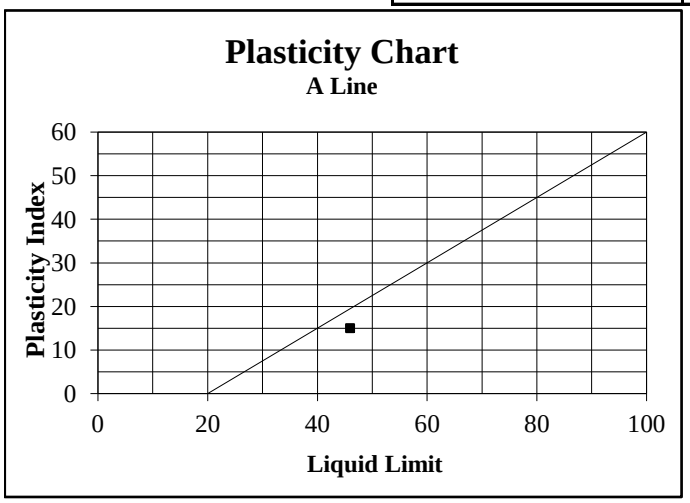
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

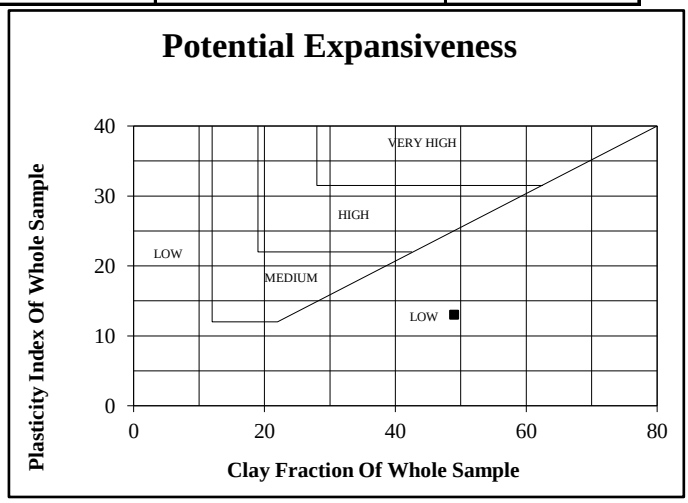
Material Description:	Dark Reddish Orange Sandy Silty Clay	Sample Number:	81175		
Position:	K9 - Layer 3	Liquid Limit	46	Linear Shrinkage	8
Depth:	500-900	Plasticity Index	15	Insitu M/C%	23.4

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	99
4.75	97
2.36	93
1.18	89
0.600	88
0.425	87
0.075	75
0.0617	74
0.0462	61
0.0210	55
0.0061	53
0.0044	51
0.0031	51
0.0022	49
0.0013	49



% Clay	49	% Silt	24	% Sand	19	% Gravel	8
Unified Soil Classification		ML		PRA Soil Classification		A-7-5	





Notes:

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For Outeniqua Lab (Pty) Ltd.

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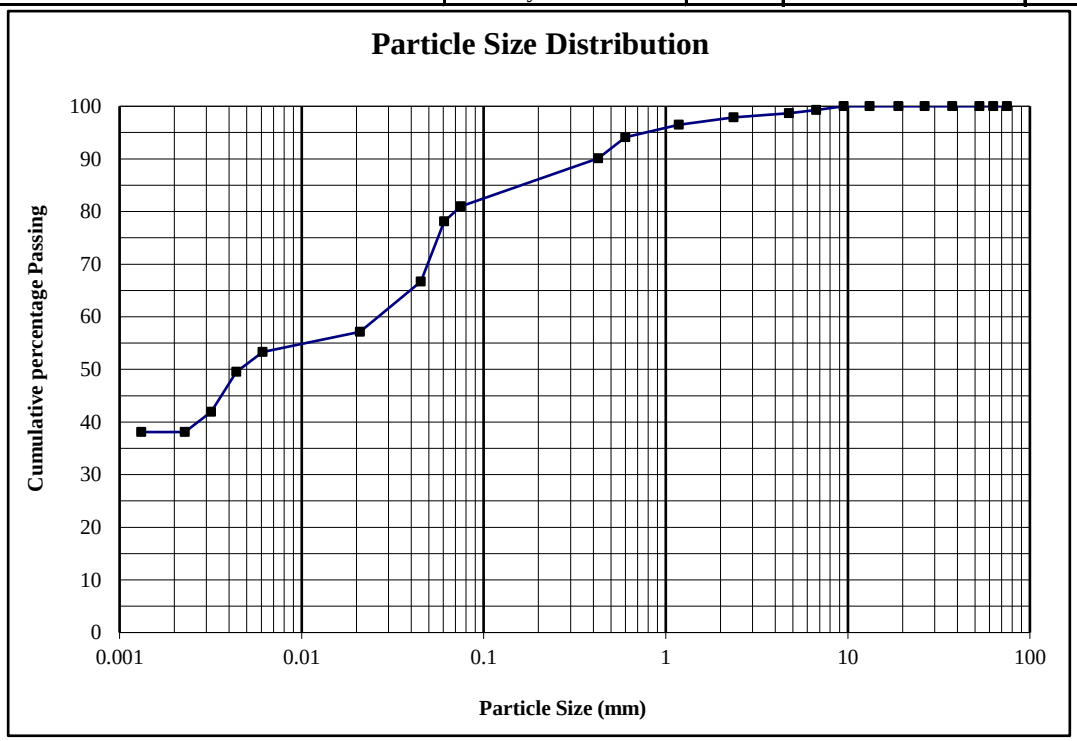
Materials Testing Laboratory
Registration No. 95/07742/07
6 Mirrorball Street, George : PO Box 3186, George Industria, 6536
Tel: 044 8743274 : Fax: 044 8745779 : e-mail: llewelyn@outeniqualab.co.za

Customer :	Outeniqua Geotechnical Services	Project :	Erf 562 - Housing Project - Kurland - Plettenberg Bay
	P O Box 964	Date Received :	30/03/21
	Knysna	Date Reported :	14/04/21
	6570	Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	5/9

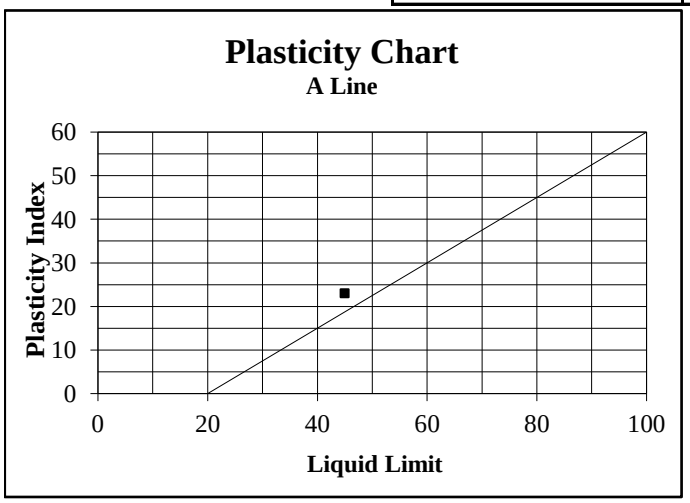
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

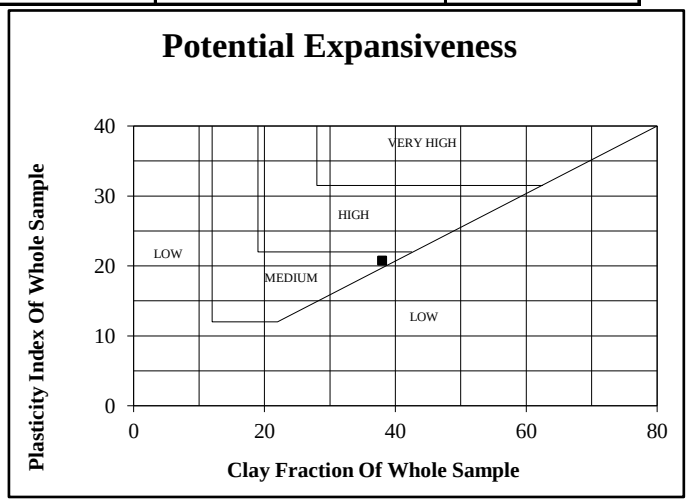
Material Description:	Light Grey to Dark Reddish Sandy Clayey Silt	Sample Number:	81176		
Position:	K14 - Layer 4	Liquid Limit	45	Linear Shrinkage	12
Depth:	550-2000	Plasticity Index	23	Insitu M/C%	17.2

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	99
4.75	99
2.36	98
1.18	97
0.600	94
0.425	90
0.075	81
0.0607	78
0.0451	67
0.0209	57
0.0061	53
0.0044	50
0.0032	42
0.0023	38
0.0013	38



% Clay	38	% Silt	40	% Sand	19	% Gravel	3
Unified Soil Classification		CL		PRA Soil Classification		A-7-6	





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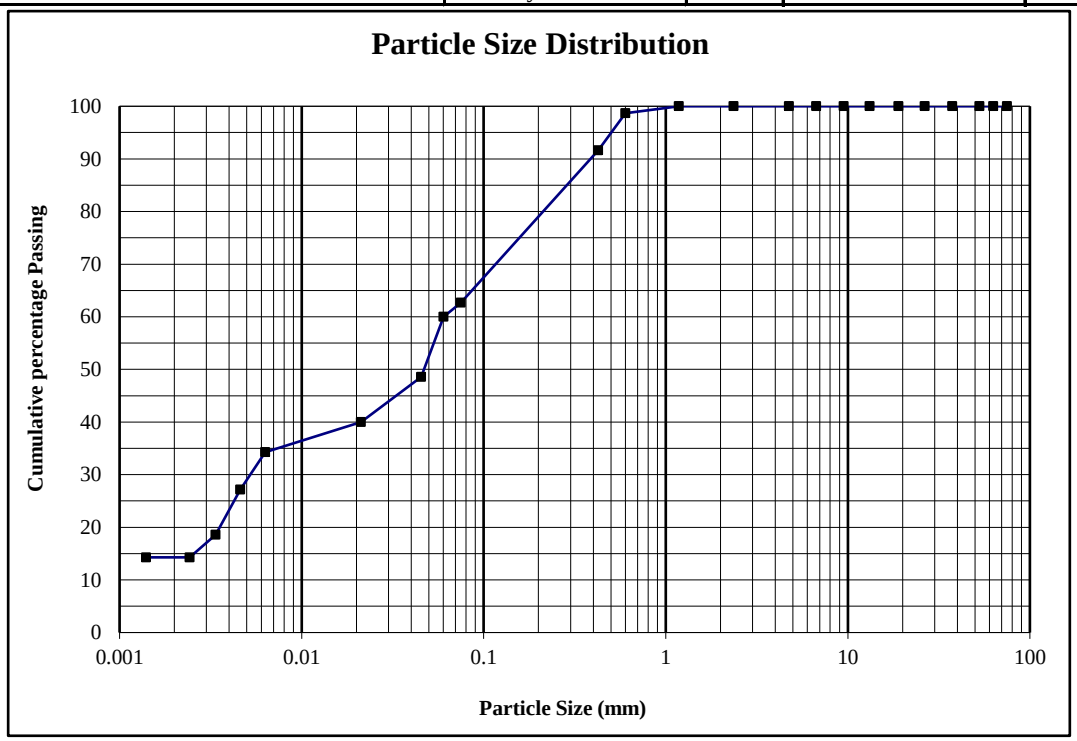
	PO Box 964	Date Received :	20/04/21
	Knysna	Date Reported :	03/05/21
	6570	Req. Number :	1246/21
Attention :	Iain Paton	No. of Pages :	1

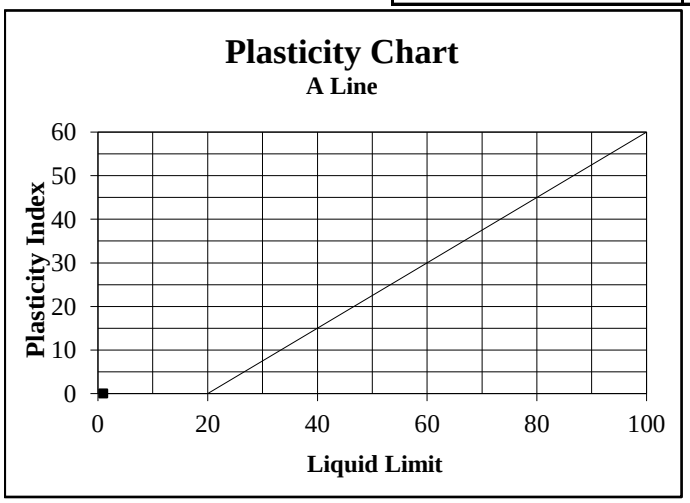
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

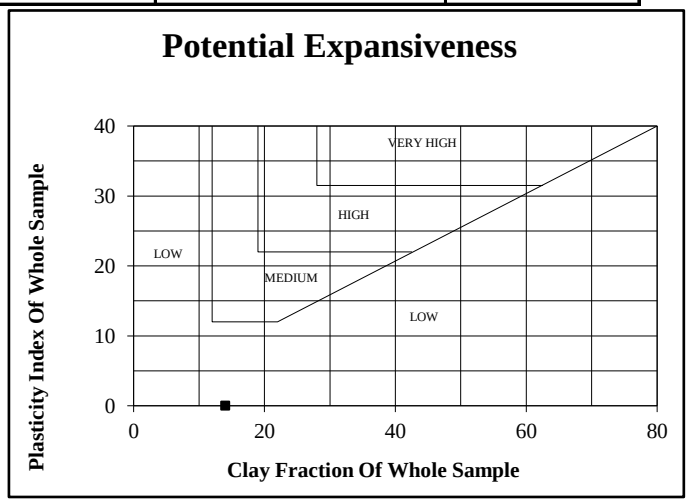
Material Description:	Pale Red Clayey Sandy Silt	Sample Number:	81248		
Position:	K17 - Layer 4	Liquid Limit	NP	Linear Shrinkage	0
Depth:	800-1400	Plasticity Index	NP	Insitu M/C%	7.9

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	100
4.75	100
2.36	100
1.18	100
0.600	99
0.425	92
0.075	63
0.0601	60
0.0453	49
0.0212	40
0.0063	34
0.0046	27
0.0034	19
0.0024	14
0.0014	14



% Clay	14	% Silt	46	% Sand	40	% Gravel	0
Unified Soil Classification	ML			PRA Soil Classification	A-4		





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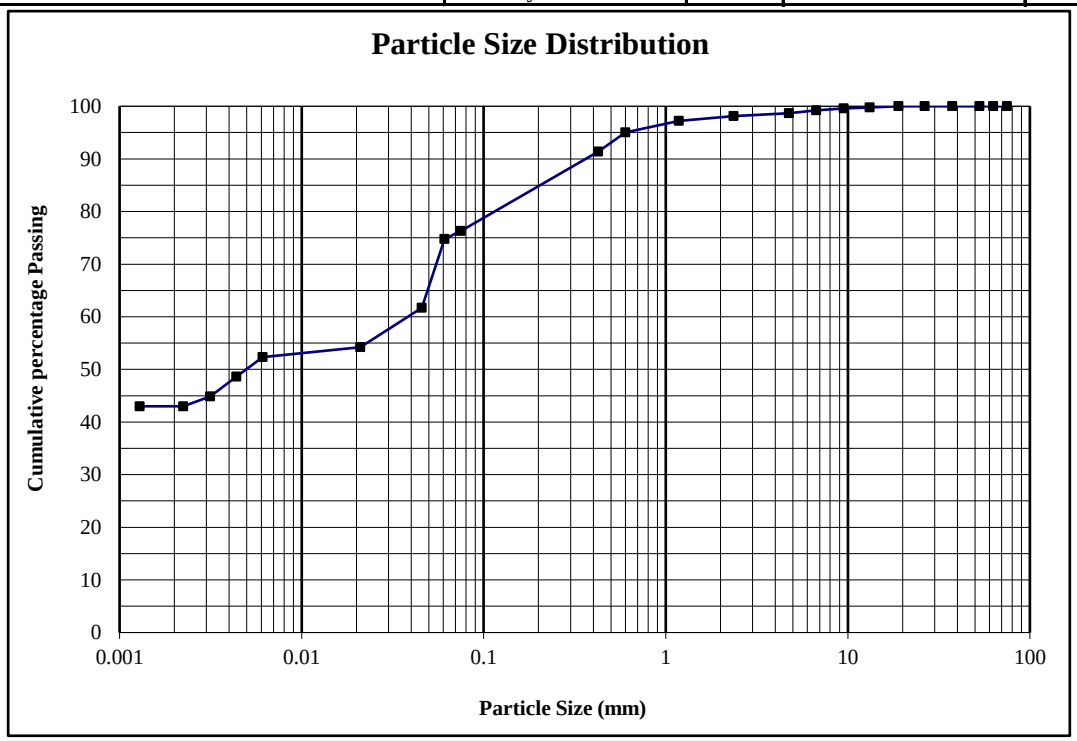
Attention :	Iain Paton	No. of Pages :	6/9

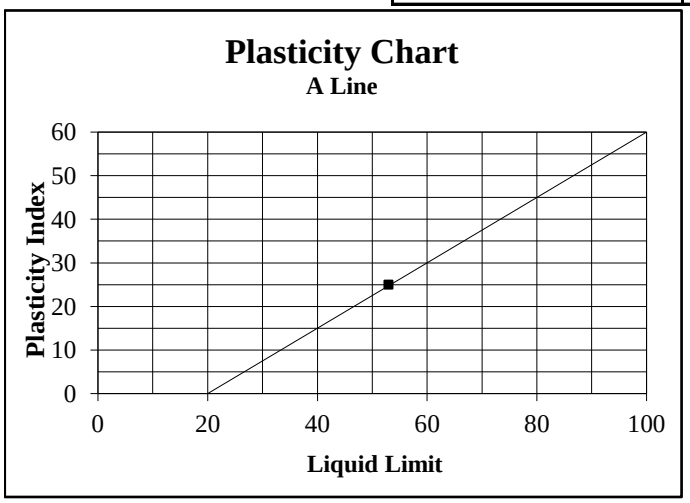
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

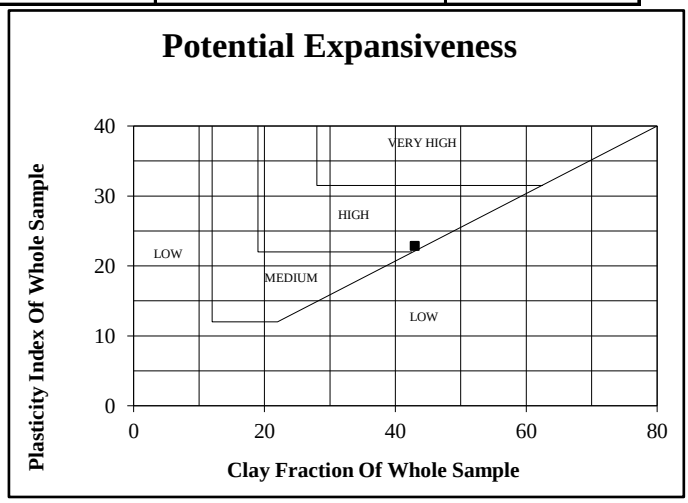
Material Description:	Light Grey to Dark Reddish to Dark Yellowish Orange Sandy Silty Clay	Sample Number:	81178		
Position:	K19 - Layer 4	Liquid Limit	53	Linear Shrinkage	12
Depth:	600-2300	Plasticity Index	25	Insitu M/C%	14.7

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	99
4.75	99
2.36	98
1.18	97
0.600	95
0.425	91
0.075	76
0.0610	75
0.0458	62
0.0210	54
0.0061	52
0.0044	49
0.0032	45
0.0022	43
0.0013	43



% Clay	43	% Silt	31	% Sand	24	% Gravel	2
Unified Soil Classification		CH		PRA Soil Classification		A-7-6	





Notes:

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For Outeniqua Lab (Pty) Ltd.

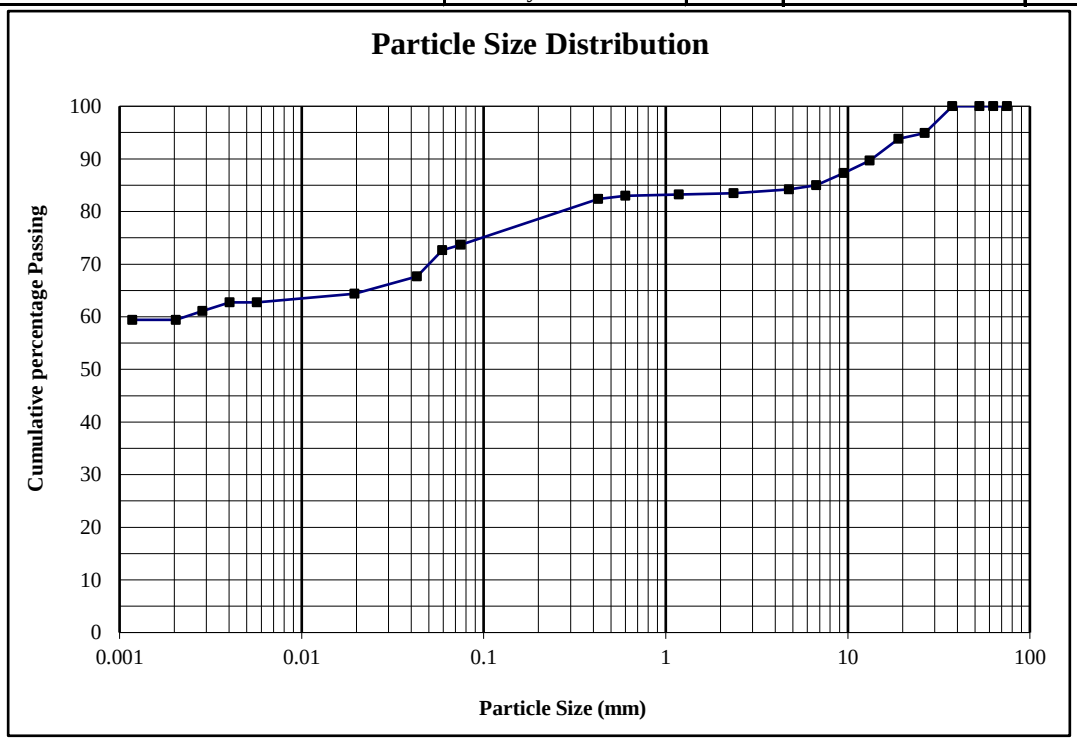
OUTENIQUA LAB (Pty) Ltd
Materials Testing Laboratory
Registration No. 95/07742/07
6 Mirrorball Street, George : PO Box 3186, George Industria, 6536
Tel: 044 8743274 : Fax: 044 8745779 : e-mail: llewelyn@outeniqualab.co.za

Customer :	Outeniqua Geotechnical Services	Project :	Erf 562 - Housing Project - Kurland - Plettenberg Bay
	P O Box 964	Date Received :	30/03/21
	Knysna	Date Reported :	14/04/21
	6570	Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	7/9

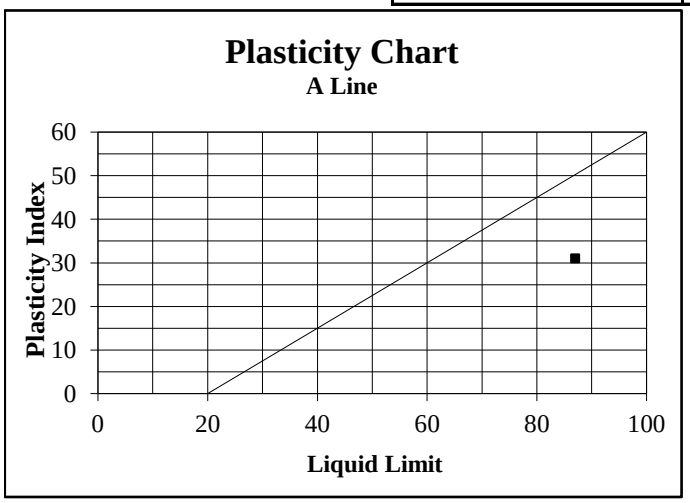
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

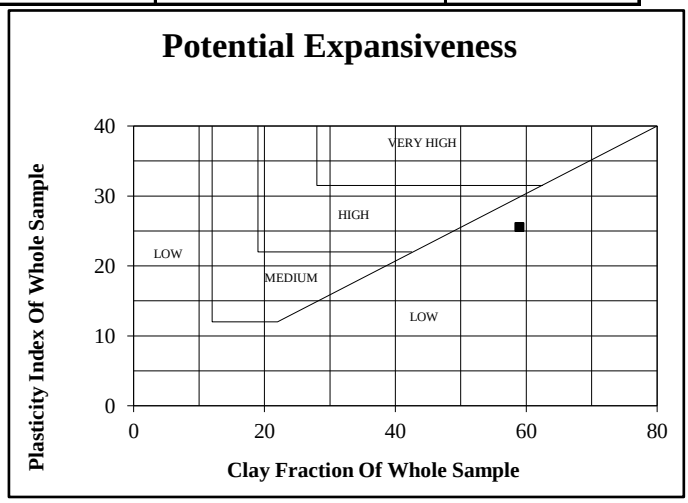
Material Description:	Light Grey to Dark Reddish Orange Sandy Silty Clay	Sample Number:	81180		
Position:	K24 - Layer 3	Liquid Limit	87	Linear Shrinkage	15
Depth:	990-2200	Plasticity Index	31	Insitu M/C%	26.8

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	95
19.0	94
13.2	90
9.5	87
6.7	85
4.75	84
2.36	84
1.18	83
0.600	83
0.425	82
0.075	74
0.0591	73
0.0429	68
0.0195	64
0.0057	63
0.0040	63
0.0029	61
0.0020	59
0.0012	59



% Clay	59	% Silt	14	% Sand	10	% Gravel	17
Unified Soil Classification	MH			PRA Soil Classification		A-7-5	





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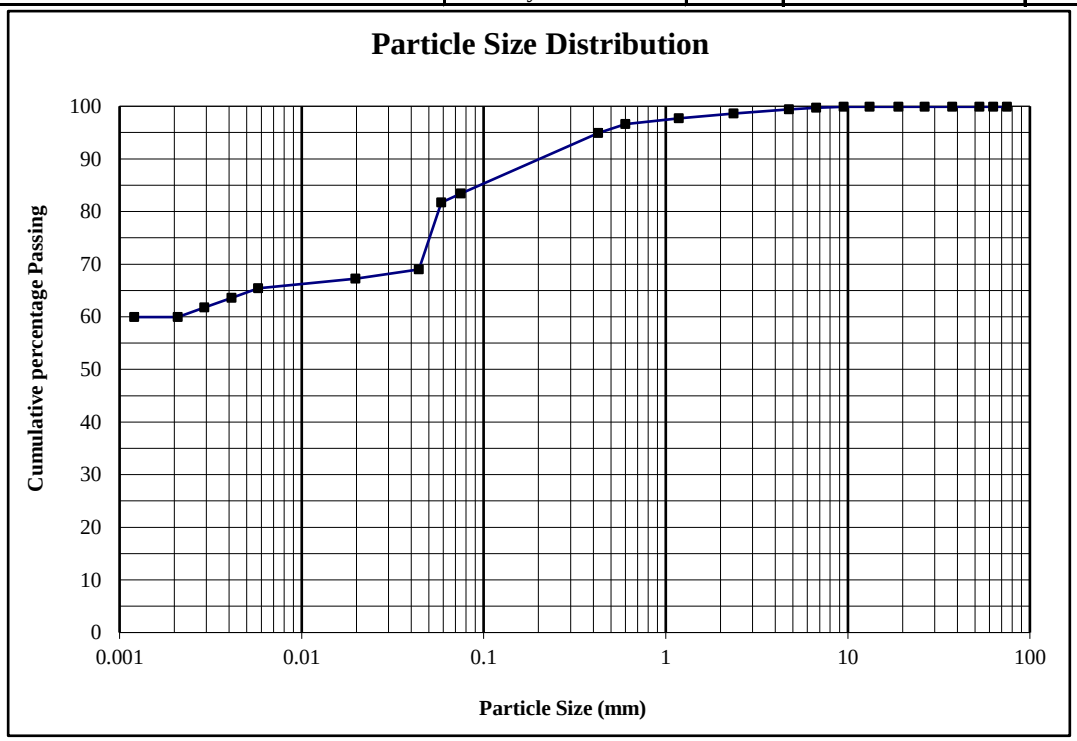
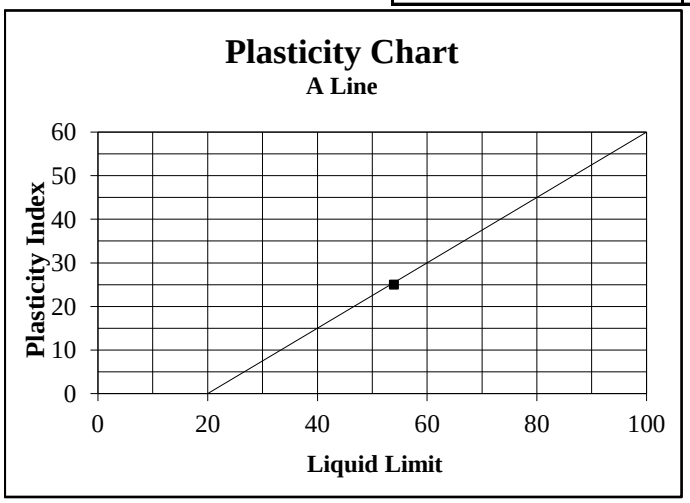
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

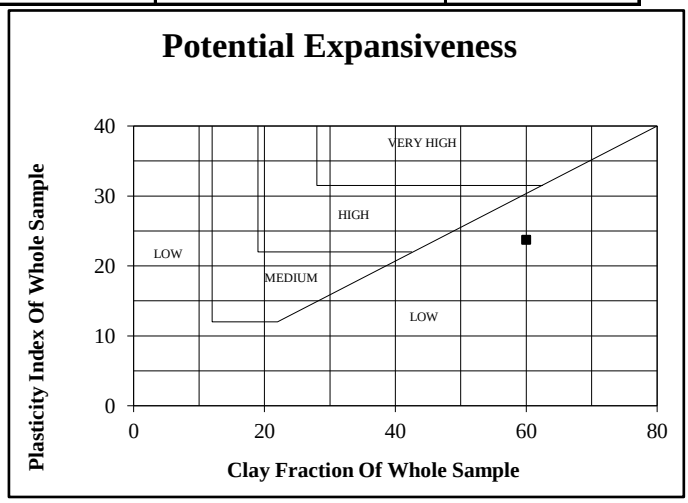
Material Description:	Dark Reddish Brown to Light Reddish Orange Sandy Silty Clay	Sample Number:	81182		
Position:	K33 - Layer 4	Liquid Limit	54	Linear Shrinkage	13
Depth:	750-2000	Plasticity Index	25	Insitu M/C%	23.1

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	100
9.5	100
6.7	100
4.75	99
2.36	99
1.18	98
0.600	97
0.425	95
0.075	83
0.0585	82
0.0440	69
0.0198	67
0.0058	65
0.0041	64
0.0029	62
0.0021	60
0.0012	60



% Clay	60	% Silt	23	% Sand	15	% Gravel	2
Unified Soil Classification	CH			PRA Soil Classification		A-7-6	





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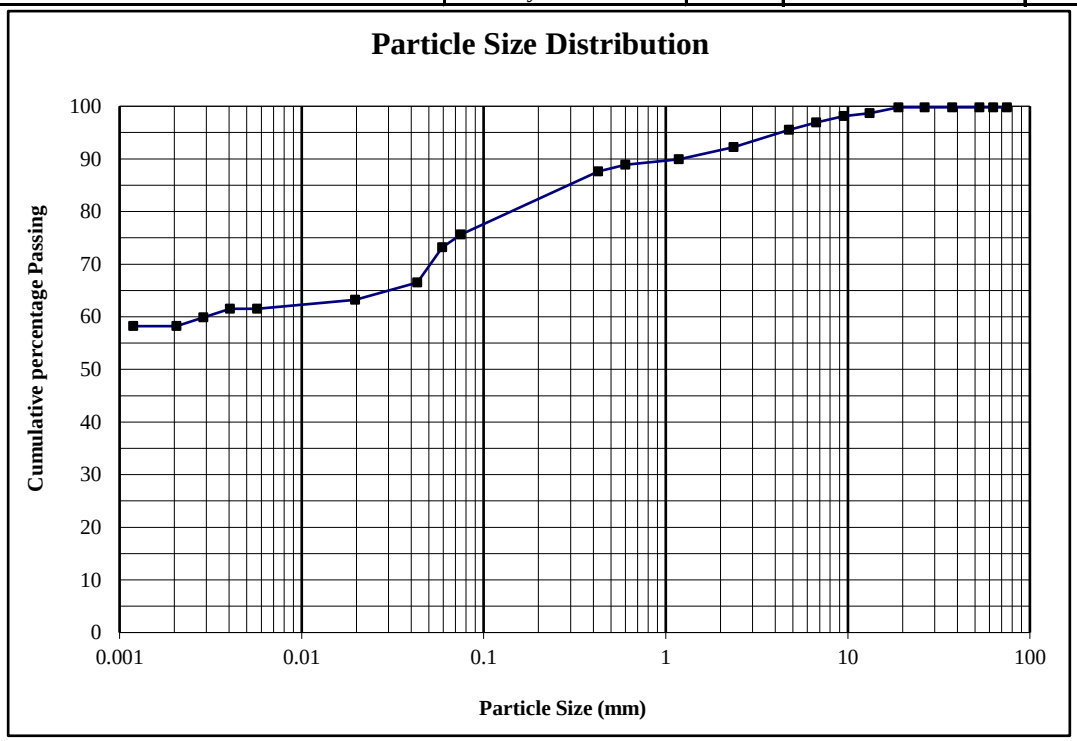
Attention :	Iain Paton	No. of Pages :	9/9

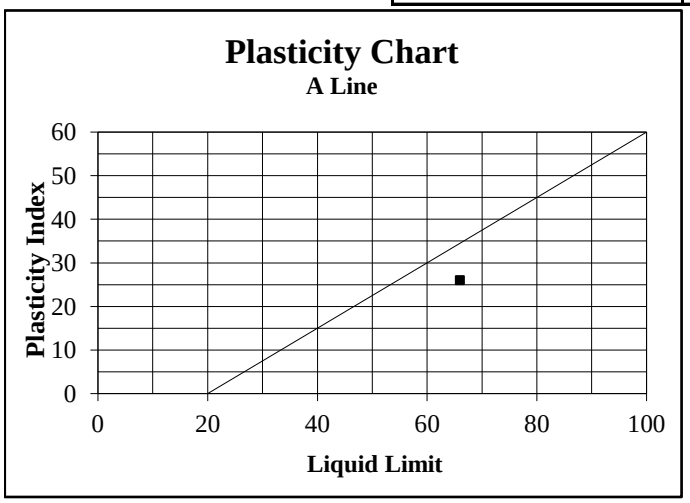
TEST REPORT
FOUNDATION INDICATOR - (TMH 1 Method A1(a),A2,A3,A4,A5) & (ASTM Method D422)

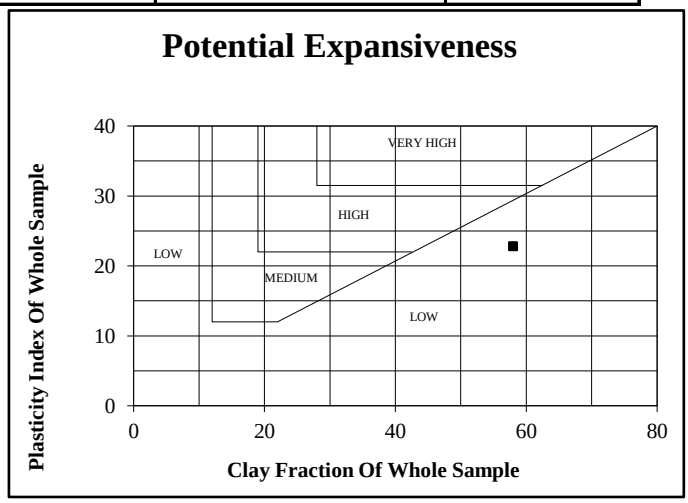
Material Description:	Dark Yellowish Orange Silty Sandy Clay	Sample Number:	81184		
Position:	K35 - Layer 3	Liquid Limit	66	Linear Shrinkage	13
Depth:	470-1100	Plasticity Index	26	Insitu M/C%	28

Sieve Size(mm)	% Passing
75.0	100
63.0	100
53.0	100
37.5	100
26.5	100
19.0	100
13.2	99
9.5	98
6.7	97
4.75	96
2.36	92
1.18	90
0.600	89
0.425	88
0.075	76
0.0591	73
0.0432	67
0.0197	63
0.0057	62
0.0040	62
0.0029	60
0.0021	58
0.0012	58



% Clay	58	% Silt	16	% Sand	17	% Gravel	9
Unified Soil Classification		MH		PRA Soil Classification		A-7-5	





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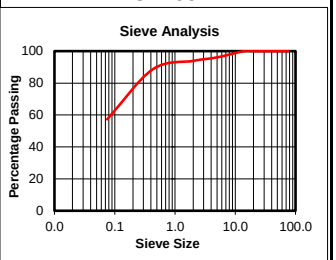
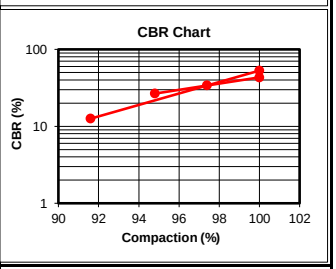
		Date Reported :	14/04/21
		Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	1/5

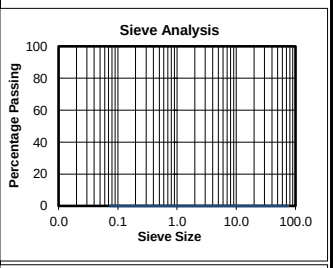
TEST REPORT
CALIFORNIA BEARING RATIO

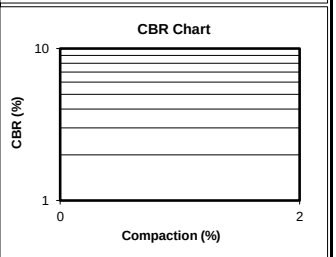
Sample Position (SV)		K3 - Layer 1	COLTO: Not Classified				
Depth (mm)		0-200					
Sample No		**81169**					
Materials Description	Source	In-situ					
	Colour	Light Grey					
	Soil Type	Silty Sand					
	Classification	Existing					
Material Indicators - (SANS 3001 Method GR1)							
Percentage Passing	75 mm	100		Opinion			
	63 mm	100					
	50 mm	100					
	37,5 mm	100					
	28 mm	100					
	20 mm	100					
	14 mm	100					
	5 mm	96					
	2 mm	94					
	0,425 mm	89					
	0,075 mm	57.3					
Material Indicators - (SANS 3001 Method PR5)							
Grading Modulus		0.60					
Coarse Sand Soil-Mortar (%)		6					
Atterberg Limits - (SANS 3001 Method GR10)							
Liquid Limit (%)		Undetermined					
Plasticity Index (%)		NP					
Linear Shrinkage (%)		NP					
Material Strength - (SANS 3001 Method GR30,GR40 - SCALPED)							
MDD	Max Dry Density (kg/m^3)	2004					
	Optimum Moisture Content (%)	9.1					
	Mould Moisture Content (%)	9.1					
A	Relative Compaction (%)	100.0					
	Swell (%)	0.0					
B	Relative Compaction (%)	94.8					
	Swell (%)	0.0					
C	Relative Compaction (%)	91.6					
	Swell (%)	0.0					
CBR	@100% Max Dry Density	53					
	@98% Max Dry Density	38					
	@95% Max Dry Density	23					
	@93% Max Dry Density	16					
	@90% Max Dry Density	10					
Material Condition							
Insitu Moisture Content (%)							
Soil Classification Achieved By The Material							
COLTO:		Not Classified					
AASHTO System		A-4					
Unified System		MH					

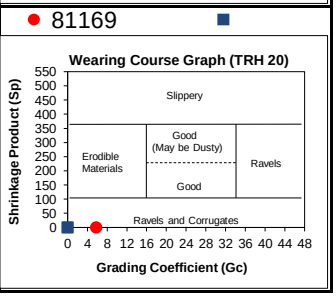
81169











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Ruaan Lesch
Technical Signatory
For Outeniqua Lab (Pty) Ltd.

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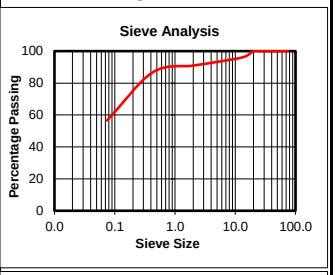
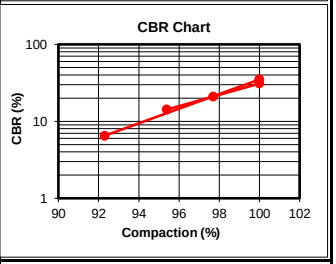
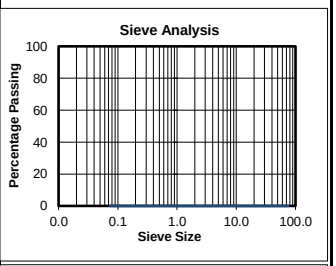
TEST REPORT
CALIFORNIA BEARING RATIO

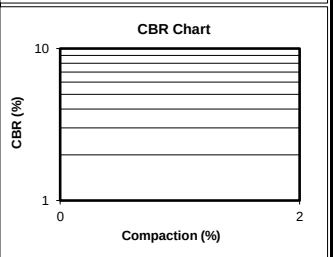
Sample Position (SV)		K9 - Layer 1	COLTO: Not Classified				
Depth (mm)		0-300					
Sample No		**81174**					
Materials Description	Source	In-situ					
	Colour	Light Reddish Brown					
	Soil Type	Silty Sand					
	Classification	Existing					
Material Indicators - (SANS 3001 Method GR1)							
Percentage Passing	75 mm	100		Opinion			
	63 mm	100					
	50 mm	100					
	37,5 mm	100					
	28 mm	100					
	20 mm	100					
	14 mm	96					
	5 mm	93					
	2 mm	91					
	0,425 mm	87					
	0,075 mm	56.6					
Material Indicators - (SANS 3001 Method PR5)							
Grading Modulus		0.66					
Coarse Sand Soil-Mortar (%)		5					
Atterberg Limits - (SANS 3001 Method GR10)							
Liquid Limit (%)		17					
Plasticity Index (%)		4					
Linear Shrinkage (%)		2.0					
Material Strength - (SANS 3001 Method GR30,GR40 - SCALPED)							
MDD	Max Dry Density (kg/m^3)	1978					
	Optimum Moisture Content (%)	9.9					
	Mould Moisture Content (%)	10.1					
A	Relative Compaction (%)	100.0					
	Swell (%)	0.0					
B	Relative Compaction (%)	95.4					
	Swell (%)	0.0					
C	Relative Compaction (%)	92.3					
	Swell (%)	0.1					
CBR	@100% Max Dry Density	35					
	@98% Max Dry Density	22					
	@95% Max Dry Density	12					
	@93% Max Dry Density	8					
	@90% Max Dry Density	4					
Material Condition							
Insitu Moisture Content (%)							
Soil Classification Achieved By The Material							
COLTO:		Not Classified					
AASHTO System		A-4					
Unified System		CL-ML					

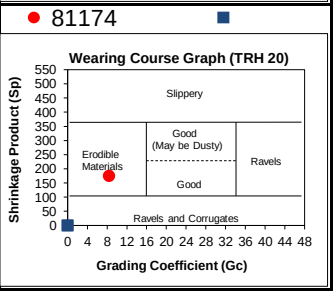
81174











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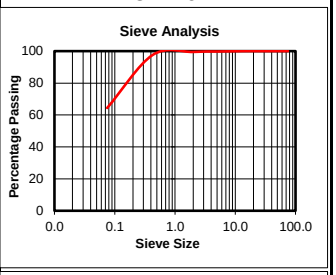
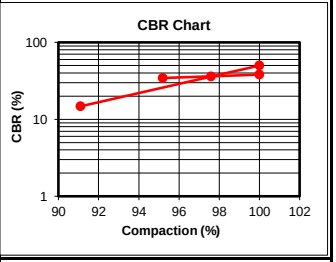
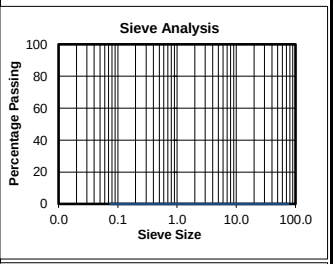
TEST REPORT
CALIFORNIA BEARING RATIO

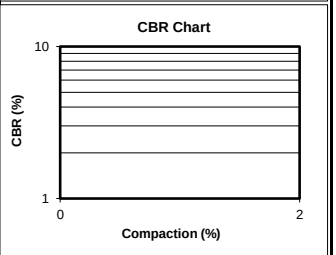
Sample Position (SV)		K20 - Layer 1	COLTO: Not Classified				
Depth (mm)		0-300					
Sample No		**81179**					
Materials Description	Source	In-situ					
	Colour	Light Grey					
	Soil Type	Silty Sand					
	Classification	Existing					
Material Indicators - (SANS 3001 Method GR1)							
Percentage Passing	75 mm	100		Opinion			
	63 mm	100					
	50 mm	100					
	37,5 mm	100					
	28 mm	100					
	20 mm	100					
	14 mm	100					
	5 mm	100					
	2 mm	99					
	0,425 mm	98					
	0,075 mm	64.4					
Material Indicators - (SANS 3001 Method PR5)							
Grading Modulus		0.39					
Coarse Sand Soil-Mortar (%)		2					
Atterberg Limits - (SANS 3001 Method GR10)							
Liquid Limit (%)		Undetermined					
Plasticity Index (%)		SP					
Linear Shrinkage (%)		NP					
Material Strength - (SANS 3001 Method GR30,GR40 - SCALPED)							
MDD	Max Dry Density (kg/m^3)	2009					
	Optimum Moisture Content (%)	9.0					
	Mould Moisture Content (%)	9.2					
A	Relative Compaction (%)	100.0					
	Swell (%)	0.0					
B	Relative Compaction (%)	95.2					
	Swell (%)	0.0					
C	Relative Compaction (%)	91.1					
	Swell (%)	0.0					
CBR	@100% Max Dry Density	50					
	@98% Max Dry Density	38					
	@95% Max Dry Density	25					
	@93% Max Dry Density	19					
	@90% Max Dry Density	13					
Material Condition							
Insitu Moisture Content (%)							
Soil Classification Achieved By The Material							
COLTO:		Not Classified					
AASHTO System		A-4					
Unified System		MH					

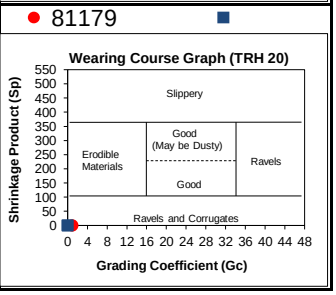
81179











- **Specimens delivered to Outeniqua Lab in good order.**

Ruaan Lesch
Technical Signatory
For Outeniqua Lab (Pty) Ltd.

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OUTENIQUA LAB (Pty) Ltd.

Registration No. 95/07742/07

Materials Testing Laboratory

6 Mirrorball Street, George : PO Box 3186, George Industria, 6536

Tel: 044 8743274 : Fax: 044 8745779 : e-mail: llewelyn@outeniqualab.co.za

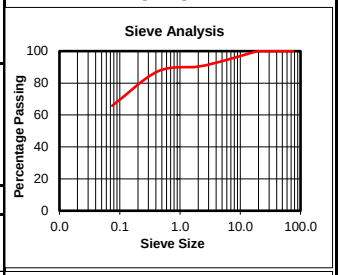
T0347

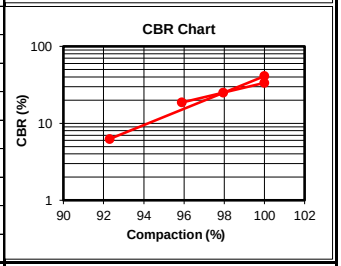
Customer :	Outeniqua Geotechnical Services P O Box 964 Knysna 6570	Project :	Erf 562 - Housing Project - Kurland - Plettenberg Bay
		Date Received :	30/03/21
		Date Reported :	14/04/21
		Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	4/5

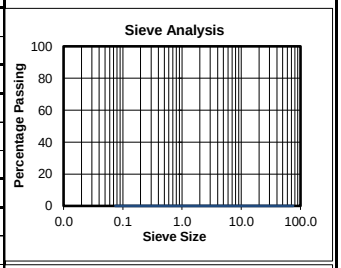
TEST REPORT
CALIFORNIA BEARING RATIO

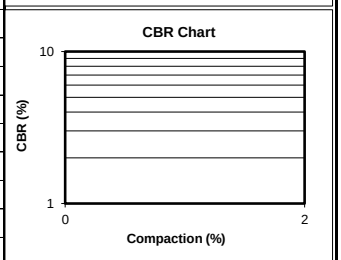
Sample Position (SV)		K27 - Layer 1	COLTO: Not Classified				
Depth (mm)		0-300					
Sample No		**81181**					
Materials Description	Source	In-situ					
	Colour	Dark Grey					
	Soil Type	Silty Sand					
	Classification	Existing					
Material Indicators - (SANS 3001 Method GR1)							
Percentage Passing	75 mm	100		Opinion			
	63 mm	100					
	50 mm	100					
	37,5 mm	100					
	28 mm	100					
	20 mm	100					
	14 mm	99					
	5 mm	94					
	2 mm	90					
	0,425 mm	87					
	0,075 mm	65.8					
Material Indicators - (SANS 3001 Method PR5)							
Grading Modulus		0.57					
Coarse Sand Soil-Mortar (%)		3					
Atterberg Limits - (SANS 3001 Method GR10)							
Liquid Limit (%)		17					
Plasticity Index (%)		3					
Linear Shrinkage (%)		1.5					
Material Strength - (SANS 3001 Method GR30,GR40 - SCALPED)							
MDD	Max Dry Density (kg/m^3)	2084					
	Optimum Moisture Content (%)	9.4					
	Mould Moisture Content (%)	9.2					
A	Relative Compaction (%)	100.0					
	Swell (%)	0.2					
B	Relative Compaction (%)	95.9					
	Swell (%)	0.3					
C	Relative Compaction (%)	92.3					
	Swell (%)	0.7					
CBR	@100% Max Dry Density	41					
	@98% Max Dry Density	25					
	@95% Max Dry Density	12					
	@93% Max Dry Density	7					
	@90% Max Dry Density	4					
Material Condition							
Insitu Moisture Content (%)							
Soil Classification Achieved By The Material							
COLTO:		Not Classified					
AASHTO System		A-4					
Unified System		ML					

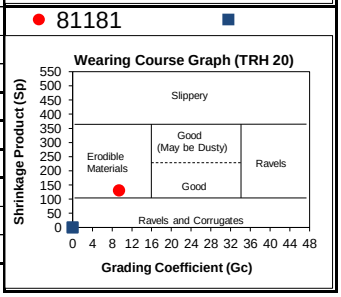
81181











- **Specimens delivered to Outeniqua Lab in good order.**

Ruaan Lesch
Technical Signatory
For Outeniqua Lab (Pty) Ltd.

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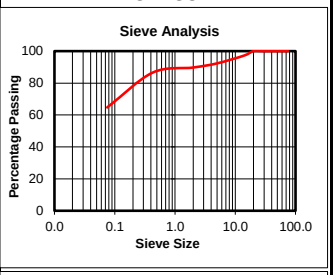
Tel: 044 8743274 : Fax: 044 8745779 : e-mail: llewelyn@outeniqualab.co.za

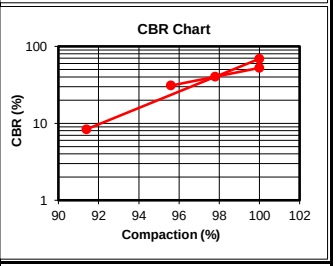
Customer :	Outeniqua Geotechnical Services P O Box 964 Knysna 6570	Project :	Erf 562 - Housing Project - Kurland - Plettenberg Bay
		Date Received :	30/03/21
		Date Reported :	14/04/21
		Req. Number :	1020/21
Attention :	Iain Paton	No. of Pages :	5/5

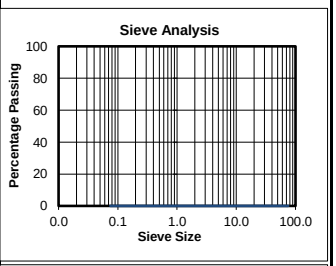
TEST REPORT
CALIFORNIA BEARING RATIO

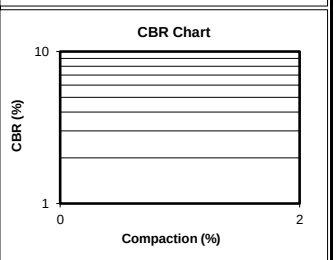
Sample Position (SV)		K35 - Layer 1	COLTO: Not Classified				
Depth (mm)		0-250					
Sample No		**81183**					
Materials Description	Source	In-situ					
	Colour	Light Grey					
	Soil Type	Silty Sand					
	Classification	Existing					
Material Indicators - (SANS 3001 Method GR1)							
Percentage Passing	75 mm	100		Opinion			
	63 mm	100					
	50 mm	100					
	37,5 mm	100					
	28 mm	100					
	20 mm	100					
	14 mm	97					
	5 mm	92					
	2 mm	90					
	0,425 mm	87					
	0,075 mm	64.7					
Material Indicators - (SANS 3001 Method PR5)							
Grading Modulus		0.59					
Coarse Sand Soil-Mortar (%)		4					
Atterberg Limits - (SANS 3001 Method GR10)							
Liquid Limit (%)		17					
Plasticity Index (%)		2					
Linear Shrinkage (%)		1.0					
Material Strength - (SANS 3001 Method GR30,GR40 - SCALPED)							
MDD	Max Dry Density (kg/m^3)	2045					
	Optimum Moisture Content (%)	8.5					
	Mould Moisture Content (%)	8.5					
A	Relative Compaction (%)	100.0					
	Swell (%)	0.1					
B	Relative Compaction (%)	95.6					
	Swell (%)	0.3					
C	Relative Compaction (%)	91.4					
	Swell (%)	0.3					
CBR	@100% Max Dry Density	69					
	@98% Max Dry Density	42					
	@95% Max Dry Density	20					
	@93% Max Dry Density	12					
	@90% Max Dry Density	6					
Material Condition							
Insitu Moisture Content (%)							
Soil Classification Achieved By The Material							
COLTO:		Not Classified					
AASHTO System		A-4					
Unified System		ML					

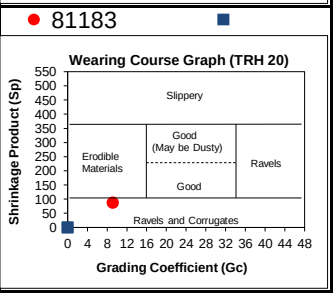
81183











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Labco Southern Africa (Pty) Ltd
Email: Jacobus@labco.co.za ■ www.labco.co.za
Phone: +27 (0)21 905 0515 ■ +27 (0)21 905 0498
15 Warrior Crescent, Blackheath ■ PO Box 6627, Kraaifontein North, 7572

sanas T0293

Client	:	Outeniqua Lab	**Client Reference**	:	
Address	:	PO Box 3186	**Order No.**	:	OUT64E/Req1020/21
	:	George			
	:	6536			
Attention	:	Carla Damon	**Date Received**	:	16 04 2021
Facsimile	:	n/a	**Date Tested**	:	16/04/2021 - 19/04/2021
E-mail	:	carla@outeniqualab.co.za	**Date Reported**	:	20/04/2021
Project	:	pH & Conductivity Test			
Project No.	:	C-883	**Report Status**	:	Final Report
			Page	:	1 of 6

Herewith please find the test report(s) pertaining to the above project. All tests were conducted in accordance with prescribed test method(s). Information herein consists of the following:

Test(s) conducted / Item(s) measured	Qty.	Test Method(s)	Authorized By**	Page(s)
Conductivity	5.000	TMH1 A21T	S de Vlam	2-6
pH	5.000	TMA1 A20	S de Vlam	2-6

Any test results contained in this report and marked with * in the table above are "not SANAS accredited" and are not included in the schedule of accreditation for this laboratory.

Any information contained in this test report pertain only to the areas and/or samples tested. Documents may only be reproduced or published in their full context. • Any information gained by the laboratory prior, during or after test process will be treated as confidential and will not be reproduced or disclosed to any person or organization, unless required by law.

All interpretations, Interpolations, Opinions and/or Classifications contained in this report falls outside our scope of accreditation.

The following parameters, where applicable, were excluded from the classification procedure: Chemical modifications, Additional fines, Fractured Faces, Soluble Salts, pH, Conductivity, Coarse Sand Ratio, Durability (COLTO: G4-G9).

The following parameters, where applicable, were assumed: Rock types were assumed to be of an Arenaceous nature with Siliceous cementing material.

Unless otherwise requested or stated, all samples will be discarded after a period of 3 months.

Deviations in Test Methods:

**All results are authorized by technical signatories.

Technical Signatory.

Labco Southern Africa (Pty) Ltd
sanas T0293
Email: Jacobus@labco.co.za ■ www.labco.co.za
Phone: +27 (0)21 905 0515 ■ +27 (0)21 905 0498
15 Warrior Crescent, Blackheath ■ PO Box 6627, Kraaifontein North. 7572

Client	:	Outeniqua Lab	Date Received:	16 04 2021
Project	:	pH & Conductivity Test	Date Reported:	20/04/2021
Project No	:	C-883	Page No. :	2 of 6

AGGREGATE TEST REPORT

Laboratory Number		1
Field Number		K1
Client Reference		81168
Depth (mm)		300-1400
Position		Layer 3
Coordinates	X	
	Y	
Description		Dark reddish to dark reddish orange - Sandy Silty Clay
Additional Information		
Calcrete/Crushed		
Stabilizing Agent		

% Passing			mm		Finess Modulus						
			mm		Clay Content			%			
			mm		Organic Impurities			Ref.			
			mm		Flakiness Index	Total		%			
			mm								
			mm								
			mm		Average Least Dimension	Manual		mm			
			mm			Machine					
			mm			Computation					
			mm		Aggregate Crushing Value	Dry		%			
			mm			Wet					
			mm			Eth. Glycol					
			mm		10% Fines Aggregate Crushing Test (FACT)	Dry		kN			
			mm			Wet					
			mm			Eth. Glycol					
			mm			Wet/Dry Ratio		%			
			mm		Bulk Density	Loose		kg/m³			
			mm			Compacted					
			mm		Water Absorption			%			
Sand Equivalent, Se											
pH		TMH1 A20		8.5	Bulk Particle Density			kg/m³			
Relative Density of Soils						Aggregate					
Durability Mill Index											
Moisture Content			%		Apparent Particle Density			kg/m³			
Compactibility Factor											
Conductivity		TMH1 A21T	mS/m	168.5							
Total Water Soluble	Salts		%			Adjusted					
	Sulphates					Relative					
Soluble	Salts		%		LA Abrasion	1000 Revs		%			
	Sulphates					500 Revs					
Soundness	Fine		%		Riedel & Weber						
	Coarse				Akali Silica Reaction			%			
	Fractions		No.		Drying Shrinkage			%			
Methylene Blue Absorption					Wetting Expansion			%			
Soluble Deleterious Impurities			%		Fractured Faces			%			
Chloride Content			%		Coarse Sand Ratio			%			
Low Density Material			%		Shape: Voids			%			
Presence of Sugar					Shell Content			%			
Mill Abrasion					Durability	Ballast					
Treton Value					Eth. Glycol Durability on _ Stone	Concrete					
Vialit Adhesion @	5°C		%			Crushed					
	25°C		%			Seal					

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Phone: +27 (0)21 905 0515 ■ +27 (0)21 905 0498
15 Warrior Crescent, Blackheath ■ PO Box 6627, Kraaifontein North. 7572
sanas TO293

Client	:	Outeniqua Lab	Date Received:	16 04 2021
Project	:	pH & Conductivity Test	Date Reported:	20/04/2021
Project No	:	C-883	Page No. :	3 of 6

AGGREGATE TEST REPORT

Laboratory Number		2
Field Number		K7
Client Reference		81173
Depth (mm)		850-2100
Position		Layer 4
Coordinates	X	
	Y	
Description		Light olive to Dark reddish - Silty clay
Additional Information		
Calcrete/Crushed		
Stabilizing Agent		

% Passing			mm		Finess Modulus				
			mm		Clay Content			%	
			mm		Organic Impurities			Ref.	
			mm		Flakiness Index	Total		%	
			mm						
			mm						
			mm		Average Least Dimension	Manual		mm	
			mm			Machine			
			mm			Computation			
			mm		Aggregate Crushing Value	Dry		%	
			mm			Wet			
			mm			Eth. Glycol			
			mm		10% Fines Aggregate Crushing Test (FACT)	Dry		kN	
			mm			Wet			
			mm			Eth. Glycol			
			mm			Wet/Dry Ratio		%	
			mm		Bulk Density	Loose		kg/m³	
			mm			Compacted			
			mm		Water Absorption			%	
Sand Equivalent, Se									
pH		TMH1 A20		5.2	Bulk Particle Density			kg/m³	
Relative Density of Soils						Aggregate			
Durability Mill Index									
Moisture Content			%		Apparent Particle Density			kg/m³	
Compactibility Factor									
Conductivity		TMH1 A21T	mS/m	164.0					
Total Water Soluble	Salts		%			Adjusted			
	Sulphates					Relative			
Soluble	Salts		%		LA Abrasion	1000 Revs		%	
	Sulphates					500 Revs			
Soundness	Fine		%		Riedel & Weber				
	Coarse				Akali Silica Reaction			%	
	Fractions		No.		Drying Shrinkage			%	
Methylene Blue Absorption					Wetting Expansion			%	
Soluble Deleterious Impurities			%		Fractured Faces			%	
Chloride Content			%		Coarse Sand Ratio			%	
Low Density Material			%		Shape: Voids			%	
Presence of Sugar					Shell Content			%	
Mill Abrasion					Durability	Ballast			
Treton Value					Eth. Glycol Durability on _ Stone	Concrete			
Vialit Adhesion @	5°C		%			Crushed			
	25°C		%			Seal			

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sanas TC293

Client	:	Outeniqua Lab	Date Received:	16 04 2021
Project	:	pH & Conductivity Test	Date Reported:	20/04/2021
Project No	:	C-883	Page No. :	4 of 6

AGGREGATE TEST REPORT

Laboratory Number		3
Field Number		K24
Client Reference		81180
Depth (mm)		990-2200
Position		Layer 3
Coordinates	X	
	Y	
Description		Light grey to Dark reddish orange - Sandy Silty clay
Additional Information		
Calcrete/Crushed		
Stabilizing Agent		

% Passing			mm		Finess Modulus				
			mm		Clay Content			%	
			mm		Organic Impurities			Ref.	
			mm		Flakiness Index	Total		%	
			mm						
			mm						
			mm		Average Least Dimension	Manual		mm	
			mm			Machine			
			mm			Computation			
			mm		Aggregate Crushing Value	Dry		%	
			mm			Wet			
			mm			Eth. Glycol			
			mm		10% Fines Aggregate Crushing Test (FACT)	Dry		kN	
			mm			Wet			
			mm			Eth. Glycol			
			mm			Wet/Dry Ratio		%	
			mm		Bulk Density	Loose		kg/m³	
			mm			Compacted			
			mm		Water Absorption			%	
Sand Equivalent, Se									
pH		TMH1 A20		6.43					
Relative Density of Soils					Bulk Particle Density			kg/m³	
Durability Mill Index						Aggregate			
Moisture Content			%		Apparent Particle Density			kg/m³	
Compactibility Factor									
Conductivity		TMH1 A21T	mS/m	150.3					
Total Water Soluble	Salts		%			Adjusted			
	Sulphates					Relative			
Soluble	Salts		%		LA Abrasion	1000 Revs		%	
	Sulphates					500 Revs			
Soundness	Fine		%		Riedel & Weber				
	Coarse				Akali Silica Reaction			%	
	Fractions		No.		Drying Shrinkage			%	
Methylene Blue Absorption					Wetting Expansion			%	
Soluble Deleterious Impurities			%		Fractured Faces			%	
Chloride Content			%		Coarse Sand Ratio			%	
Low Density Material			%		Shape: Voids			%	
Presence of Sugar					Shell Content			%	
Mill Abrasion					Durability	Ballast			
Treton Value					Eth. Glycol Durability on _ Stone	Concrete			
Vialit Adhesion @	5°C		%			Crushed			
	25°C		%			Seal			

Labco Southern Africa (Pty) Ltd
Email: Jacobus@labco.co.za ■ www.labco.co.za
Phone: +27 (0)21 905 0515 ✉ +27 (0)21 905 0498
15 Warrior Crescent, Blackheath ■ PO Box 6627, Kraaifontein North. 7572

sanas T0293

Client	:	Outeniqua Lab	Date Received:	16 04 2021
Project	:	pH & Conductivity Test	Date Reported:	20/04/2021
Project No	:	C-883	Page No. :	5 of 6

AGGREGATE TEST REPORT

Laboratory Number		4
Field Number		K33
Client Reference		81182
Depth (mm)		750-2000
Position		Layer 4
Coordinates	X	
	Y	
Description		Dark reddish brown to light reddish orange - Sandy Clay
Additional Information		
Calcrete/Crushed		
Stabilizing Agent		

% Passing			mm		Finess Modulus				
			mm		Clay Content			%	
			mm		Organic Impurities			Ref.	
			mm		Flakiness Index	Total		%	
			mm						
			mm						
			mm		Average Least Dimension	Manual		mm	
			mm			Machine			
			mm			Computation			
			mm		Aggregate Crushing Value	Dry		%	
			mm			Wet			
			mm			Eth. Glycol			
			mm		10% Fines Aggregate Crushing Test (FACT)	Dry		kN	
			mm			Wet			
			mm			Eth. Glycol			
			mm			Wet/Dry Ratio		%	
			mm		Bulk Density	Loose		kg/m^3	
			mm			Compacted			
			mm		Water Absorption			%	
Sand Equivalent, Se									
pH		TMH1 A20		6.08	Bulk Particle Density			kg/m^3	
Relative Density of Soils						Aggregate			
Durability Mill Index					Apparent Particle Density			kg/m^3	
Moisture Content			%						
Compactibility Factor									
Conductivity		TMH1 A21T	mS/m	172.7		Adjusted			
Total Water Soluble	Salts		%			Relative			
	Sulphates				LA Abrasion	1000 Revs		%	
Soluble	Salts		%			500 Revs			
	Sulphates				Riedel & Weber				
Soundness	Fine		%		Akali Silica Reaction			%	
	Coarse				Drying Shrinkage			%	
	Fractions		No.		Wetting Expansion			%	
Methylene Blue Absorption					Fractured Faces			%	
Soluble Deleterious Impurities			%		Coarse Sand Ratio			%	
Chloride Content			%		Shape: Voids			%	
Low Density Material			%		Shell Content			%	
Presence of Sugar					Durability	Ballast			
Mill Abrasion					Eth. Glycol Durability on _ Stone	Concrete			
Treton Value						Crushed			
Vialit Adhesion @	5°C		%			Seal			
	25°C		%						

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15 Warrior Crescent, Blackheath ■ PO Box 6627, Kraaifontein North. 7572
sanas T0293

Client	:	Outeniqua Lab	Date Received:	16 04 2021
Project	:	pH & Conductivity Test	Date Reported:	20/04/2021
Project No	:	C-883	Page No. :	6 of 6

AGGREGATE TEST REPORT

Laboratory Number		5
Field Number		K35
Client Reference		81184
Depth (mm)		470-1100
Position		Layer 3
Coordinates	X	
	Y	
Description		Dark yellowish orange - Sandy silty clay
Additional Information		
Calcrete/Crushed		
Stabilizing Agent		

% Passing			mm		Finess Modulus				
			mm		Clay Content			%	
			mm		Organic Impurities			Ref.	
			mm		Flakiness Index	Total		%	
			mm						
			mm						
			mm		Average Least Dimension	Manual		mm	
			mm			Machine			
			mm			Computation			
			mm		Aggregate Crushing Value	Dry		%	
			mm			Wet			
			mm			Eth. Glycol			
			mm		10% Fines Aggregate Crushing Test (FACT)	Dry		kN	
			mm			Wet			
			mm			Eth. Glycol			
			mm			Wet/Dry Ratio		%	
			mm		Bulk Density	Loose		kg/m³	
			mm			Compacted			
			mm		Water Absorption			%	
Sand Equivalent, Se									
pH		TMH1 A20		4.58	Bulk Particle Density			kg/m³	
Relative Density of Soils						Aggregate			
Durability Mill Index					Apparent Particle Density			kg/m³	
Moisture Content			%						
Compactibility Factor									
Conductivity		TMH1 A21T	mS/m	25.5		Adjusted			
Total Water Soluble	Salts		%			Relative			
	Sulphates				LA Abrasion	1000 Revs		%	
Soluble	Salts		%			500 Revs			
	Sulphates				Riedel & Weber				
Soundness	Fine		%		Akali Silica Reaction			%	
	Coarse				Drying Shrinkage			%	
	Fractions		No.		Wetting Expansion			%	
Methylene Blue Absorption					Fractured Faces			%	
Soluble Deleterious Impurities			%		Coarse Sand Ratio			%	
Chloride Content			%		Shape: Voids			%	
Low Density Material			%		Shell Content			%	
Presence of Sugar					Durability	Ballast			
Mill Abrasion					Eth. Glycol Durability on _ Stone	Concrete			
Treton Value						Crushed			
Vialit Adhesion @	5°C		%			Seal			
	25°C		%						

Appendix 4

DCP test data

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Registration No. 1999/062743/23

18 Clyde Street, Knysna : PO Box 964, Knysna, 6570

Tel: 044 3820502 : Fax: 044 3820503 : e-mail: iain@outeniqualab.co.za

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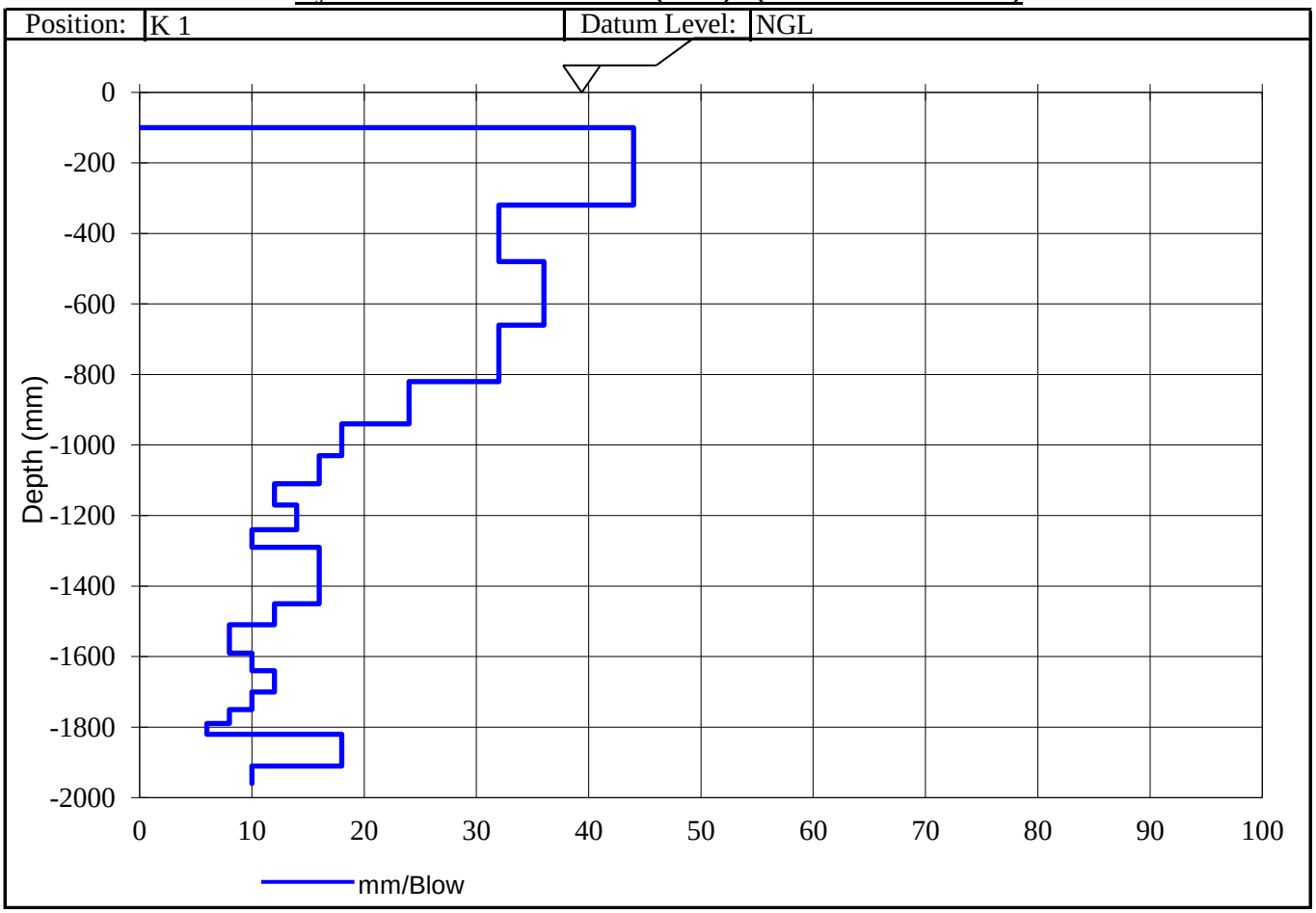
		Req. Number :	
Attention :	Theo Adams	No. of Pages :	1 of 35

TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 1 Datum Level: NGL



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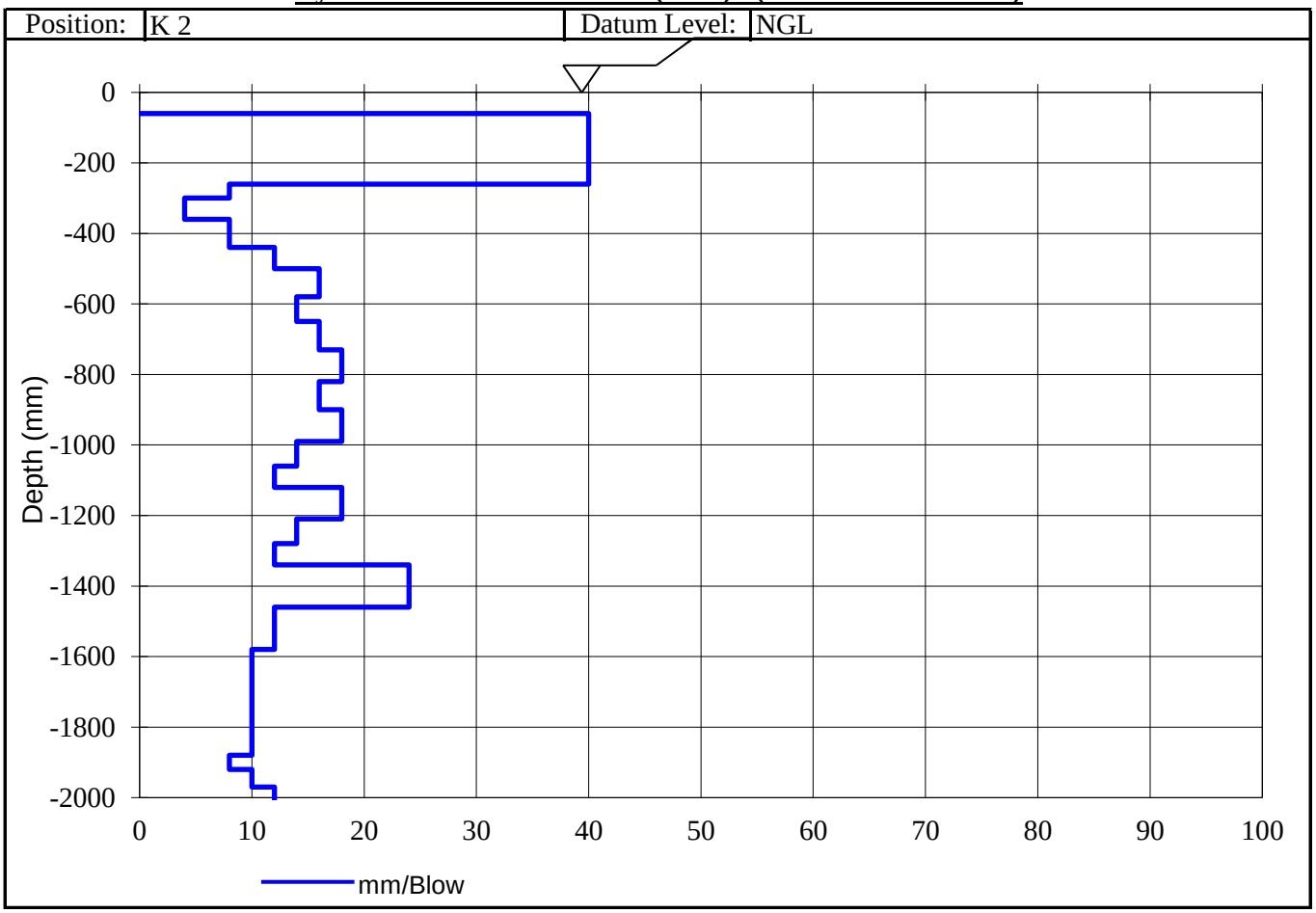
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 2 Datum Level: NGL



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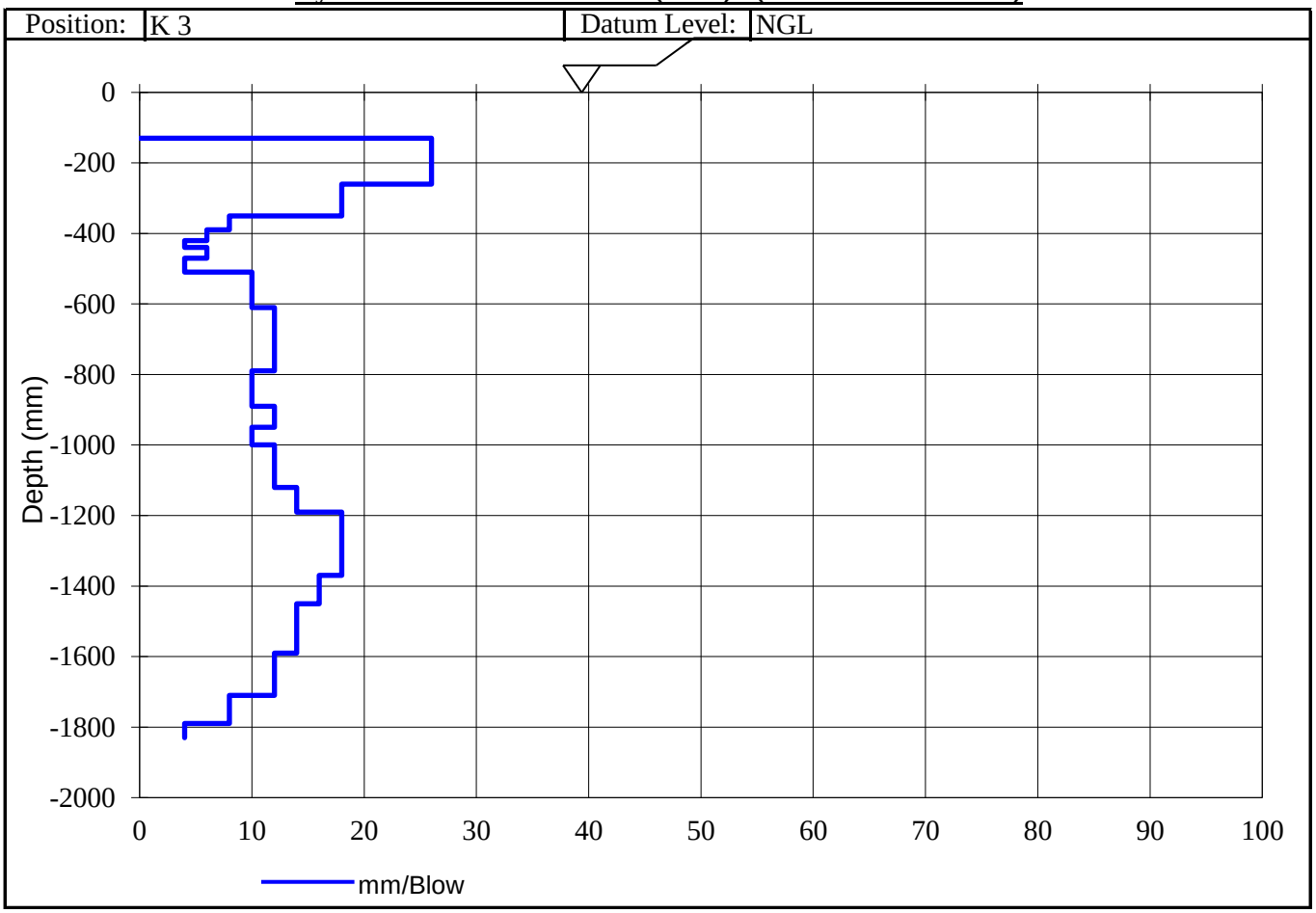
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 3 Datum Level: NGL



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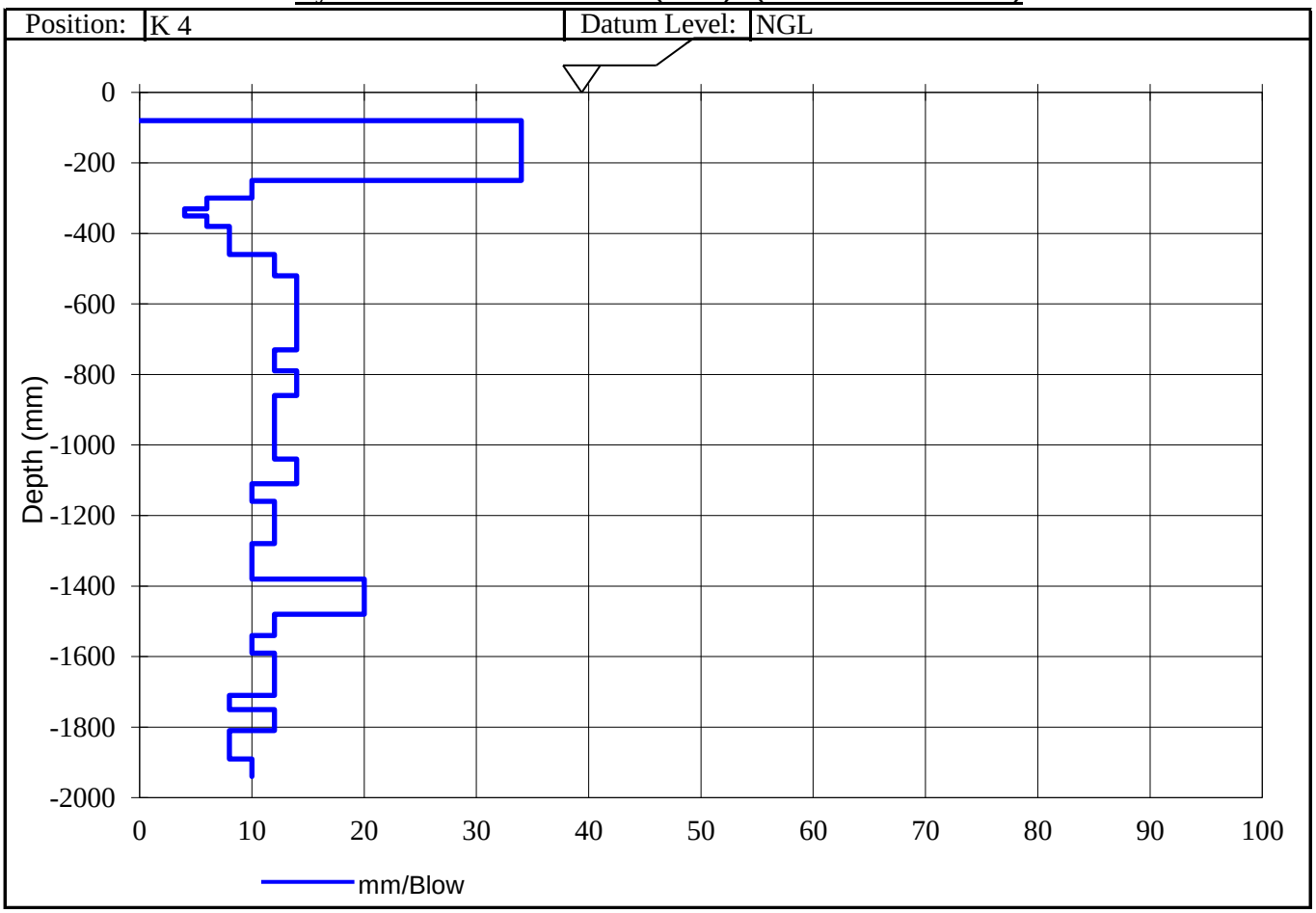
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 4 Datum Level: NGL



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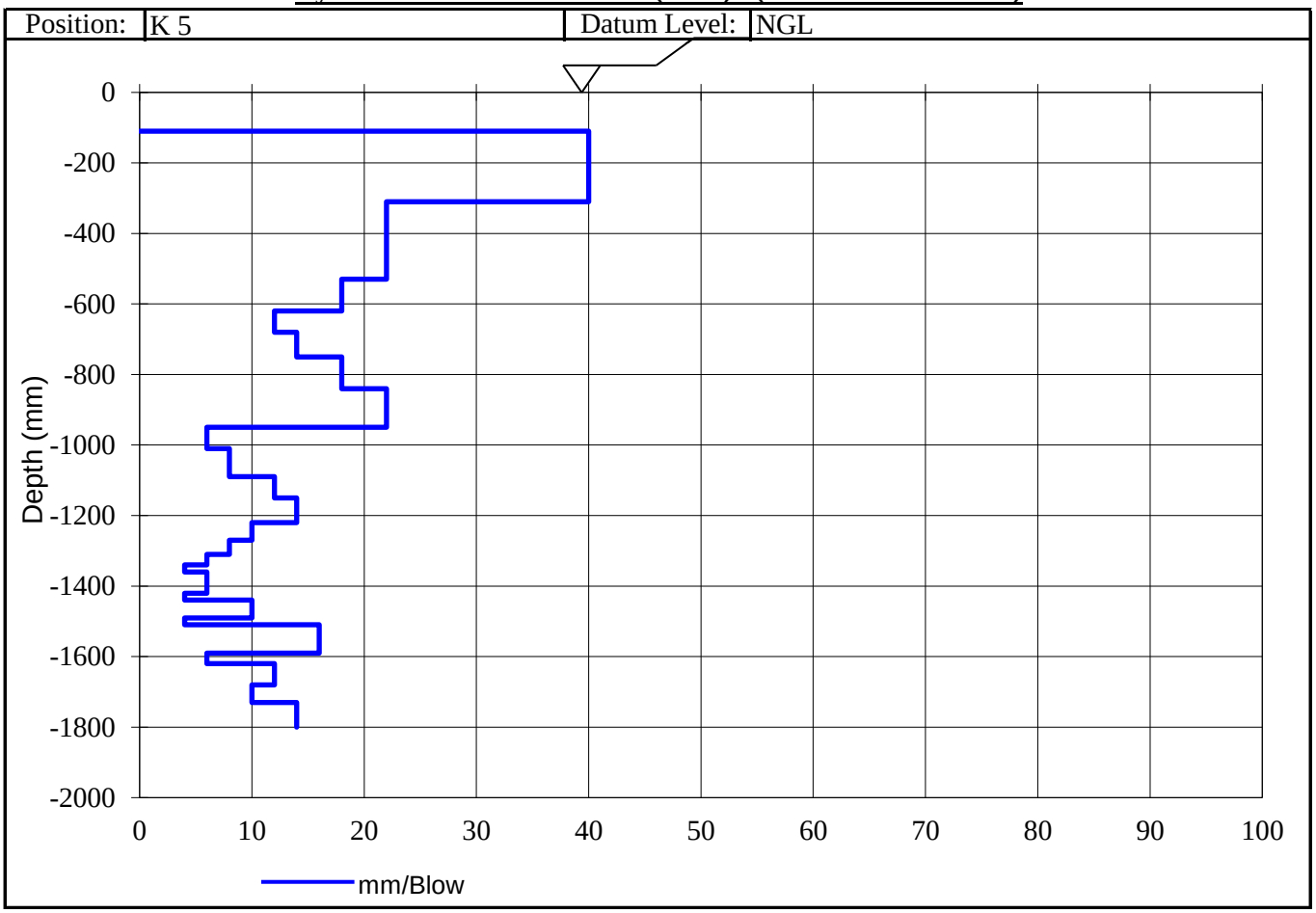
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 5 Datum Level: NGL



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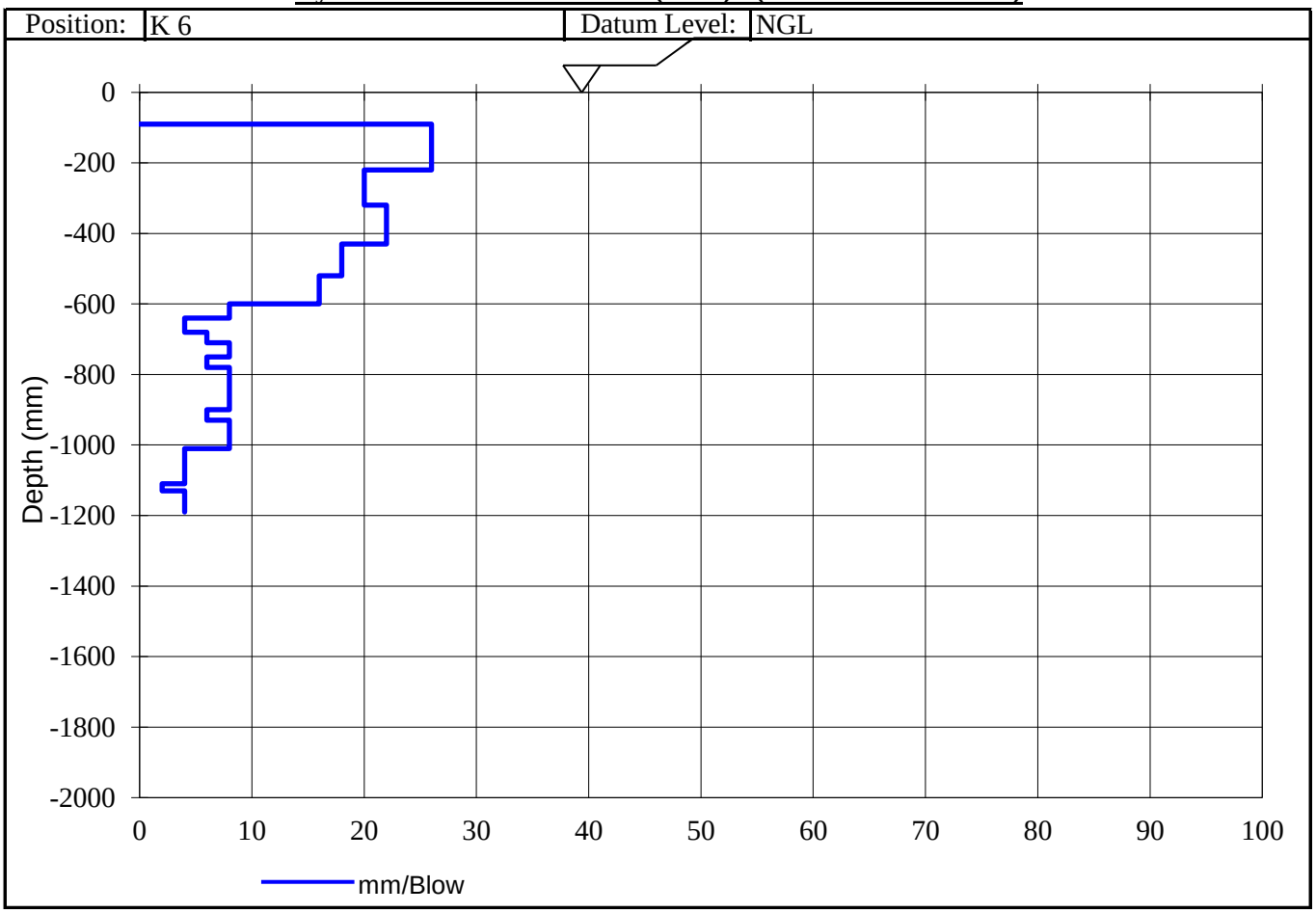
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 6 Datum Level: NGL



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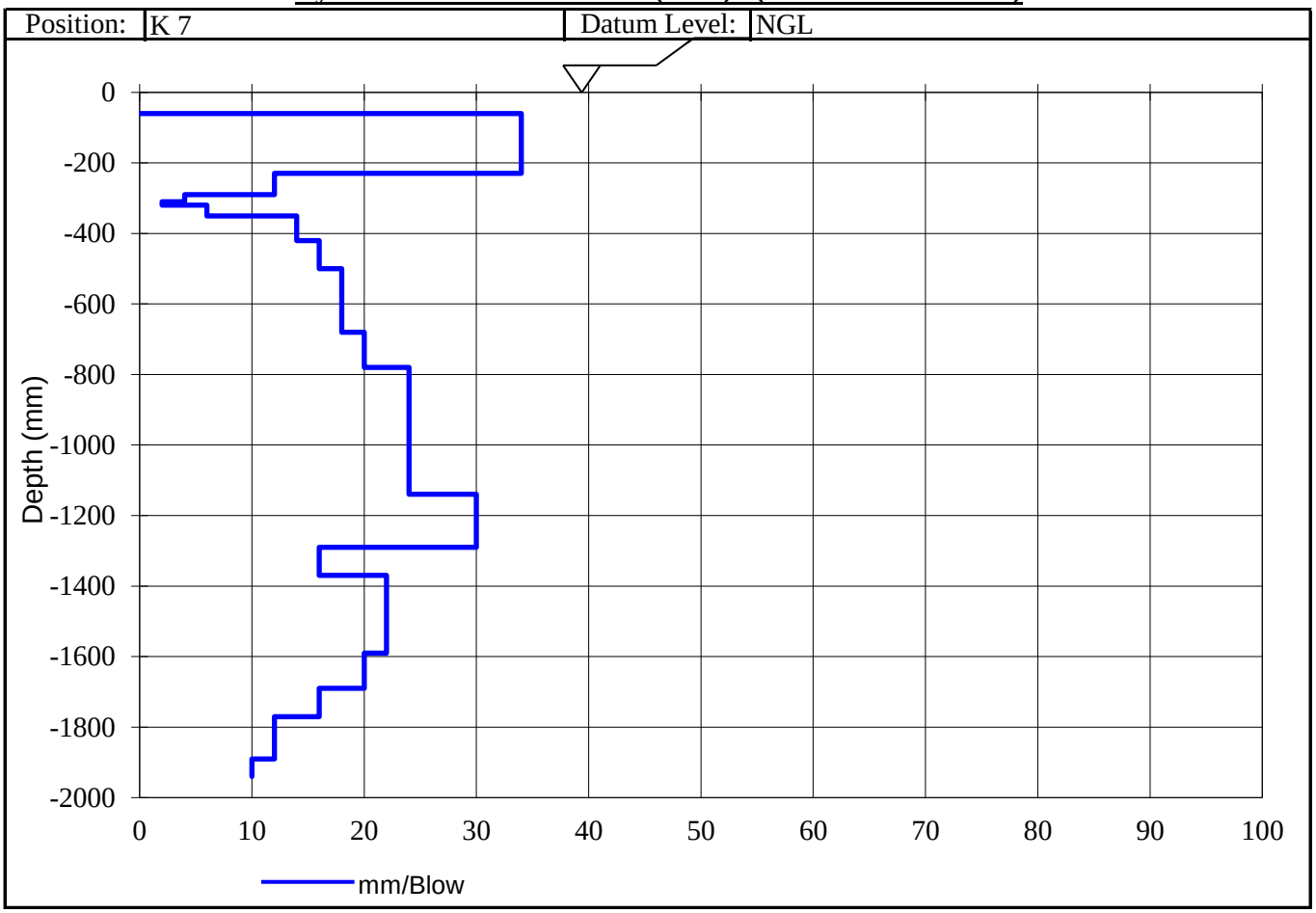
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 7 Datum Level: NGL



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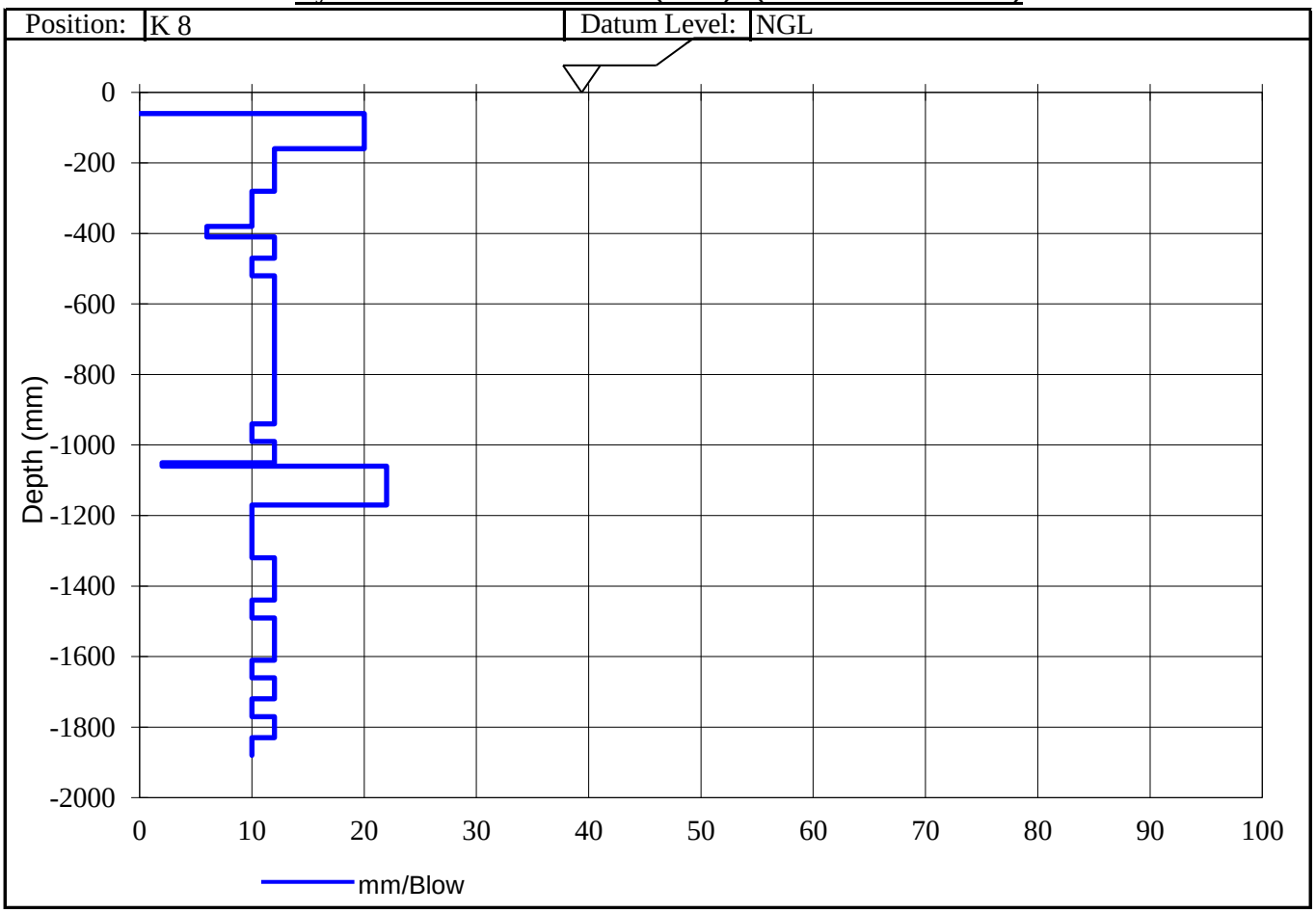
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 8 Datum Level: NGL



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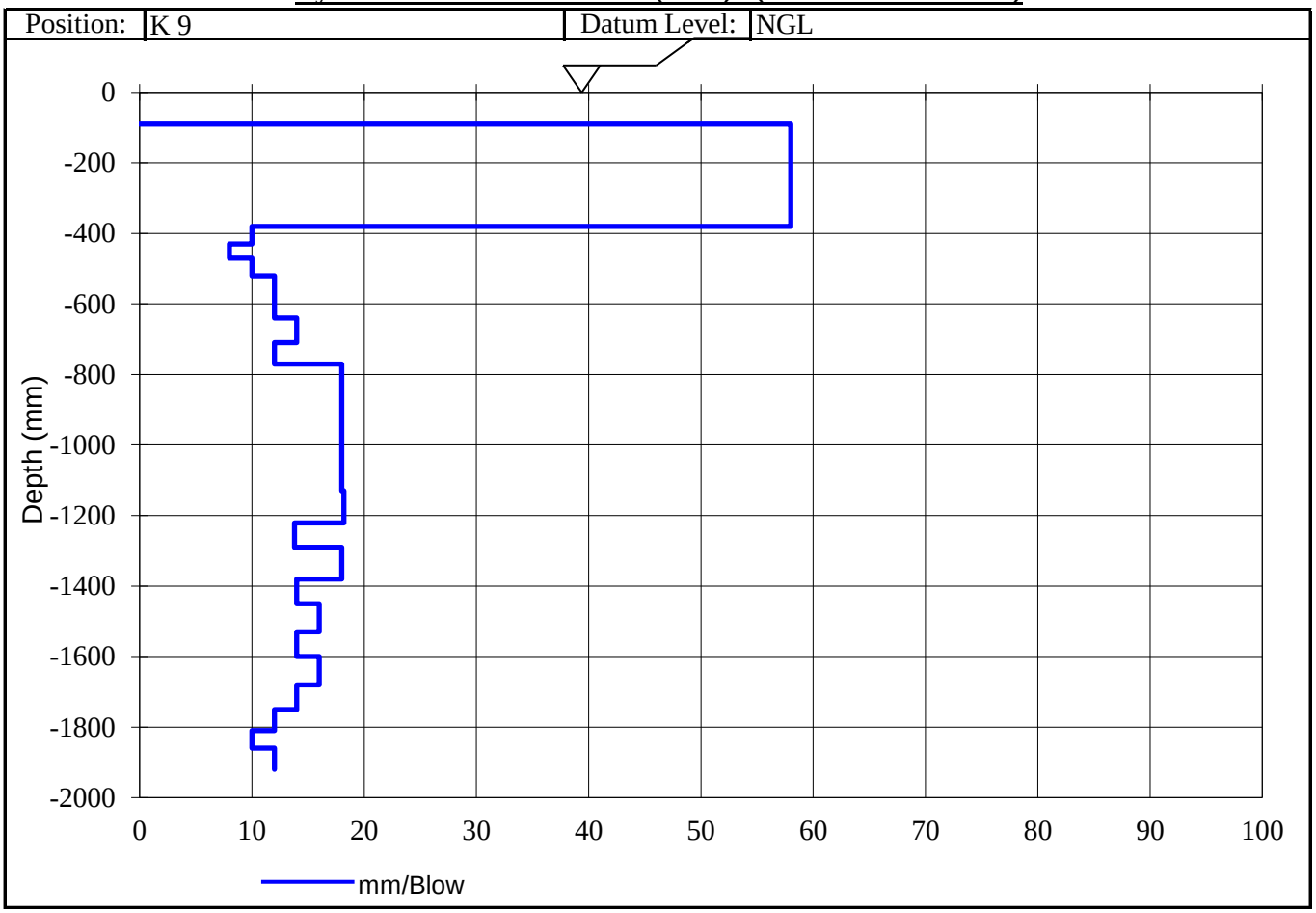
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 9 Datum Level: NGL



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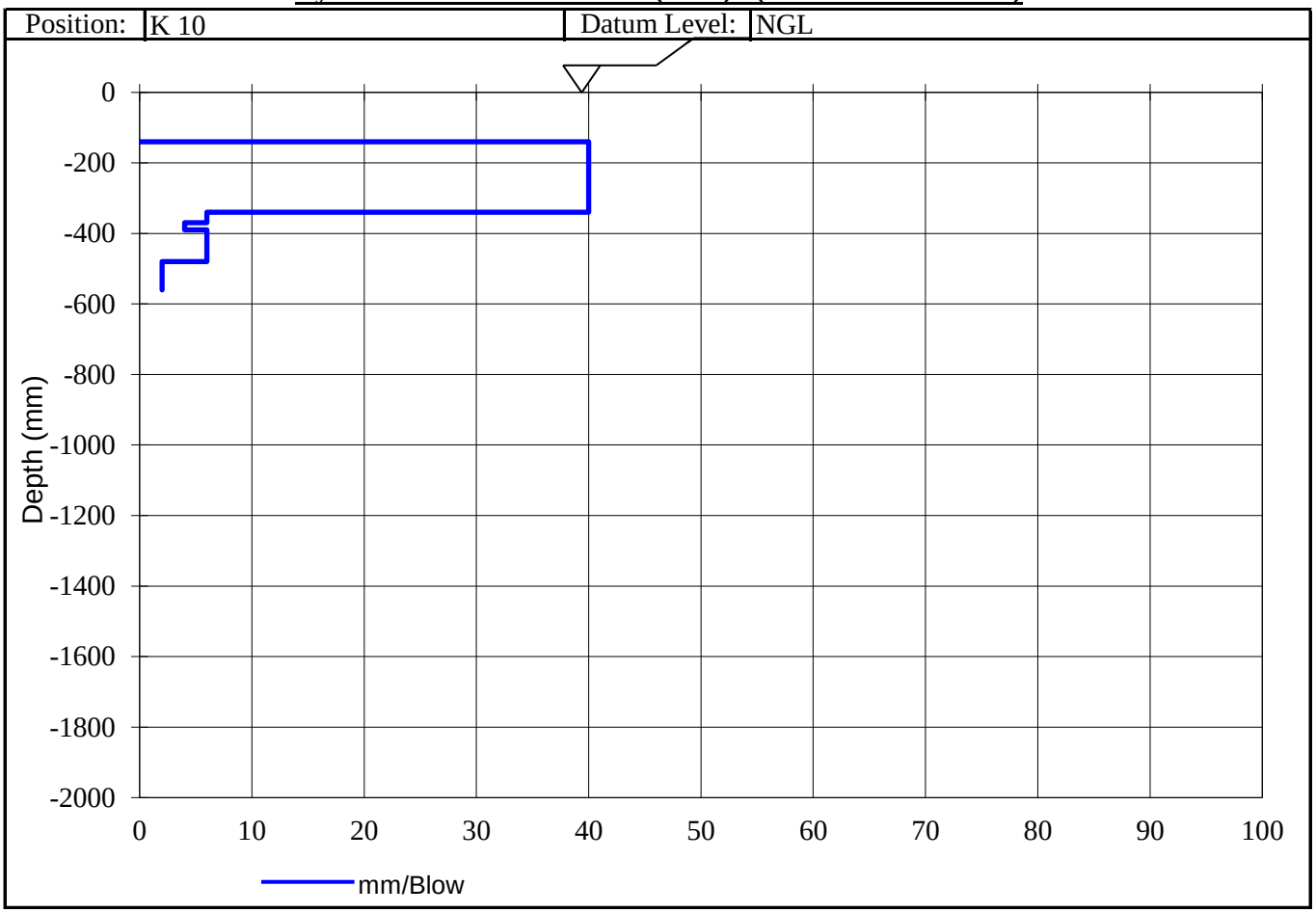
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 10 Datum Level: NGL



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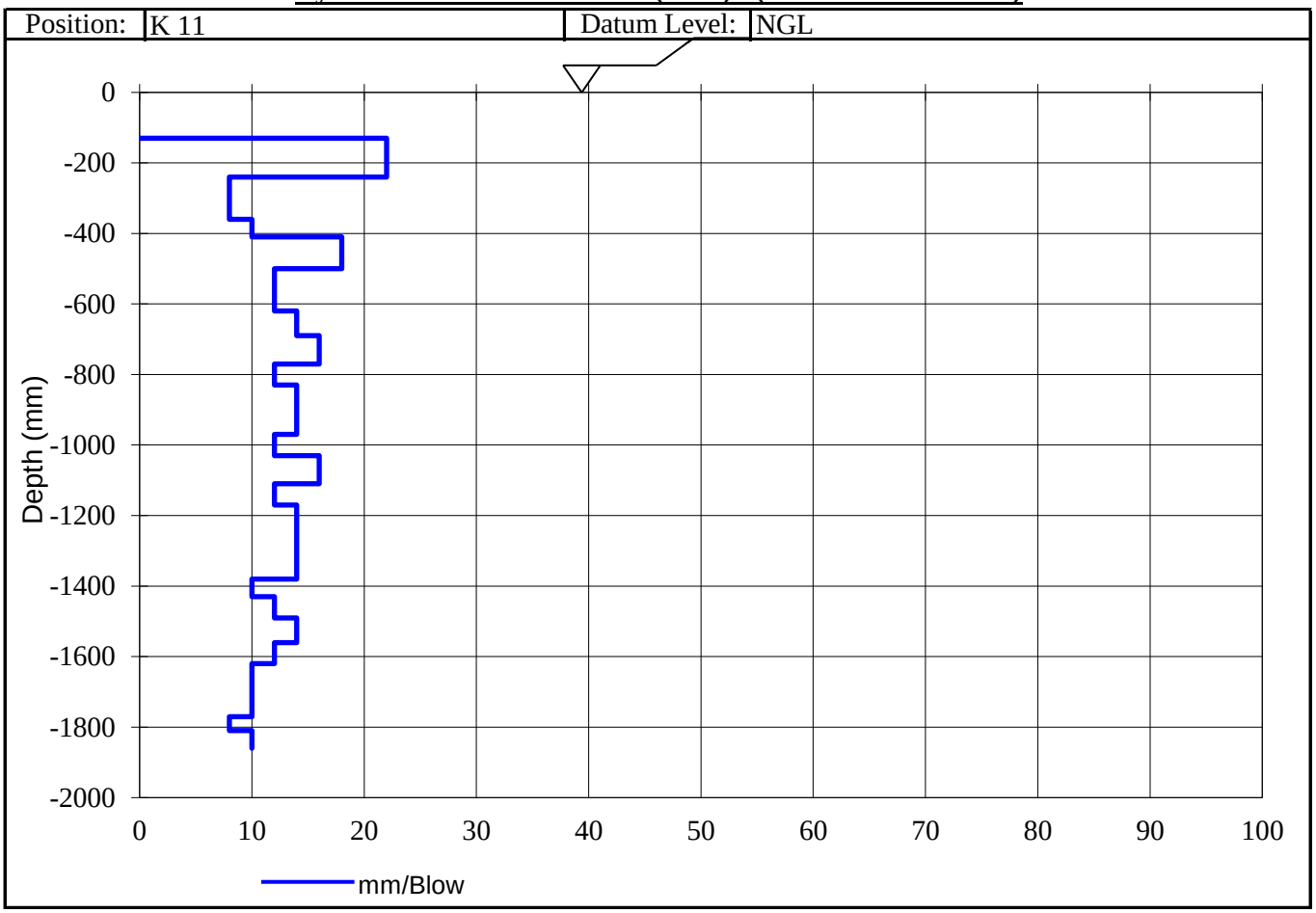
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 11 Datum Level: NGL



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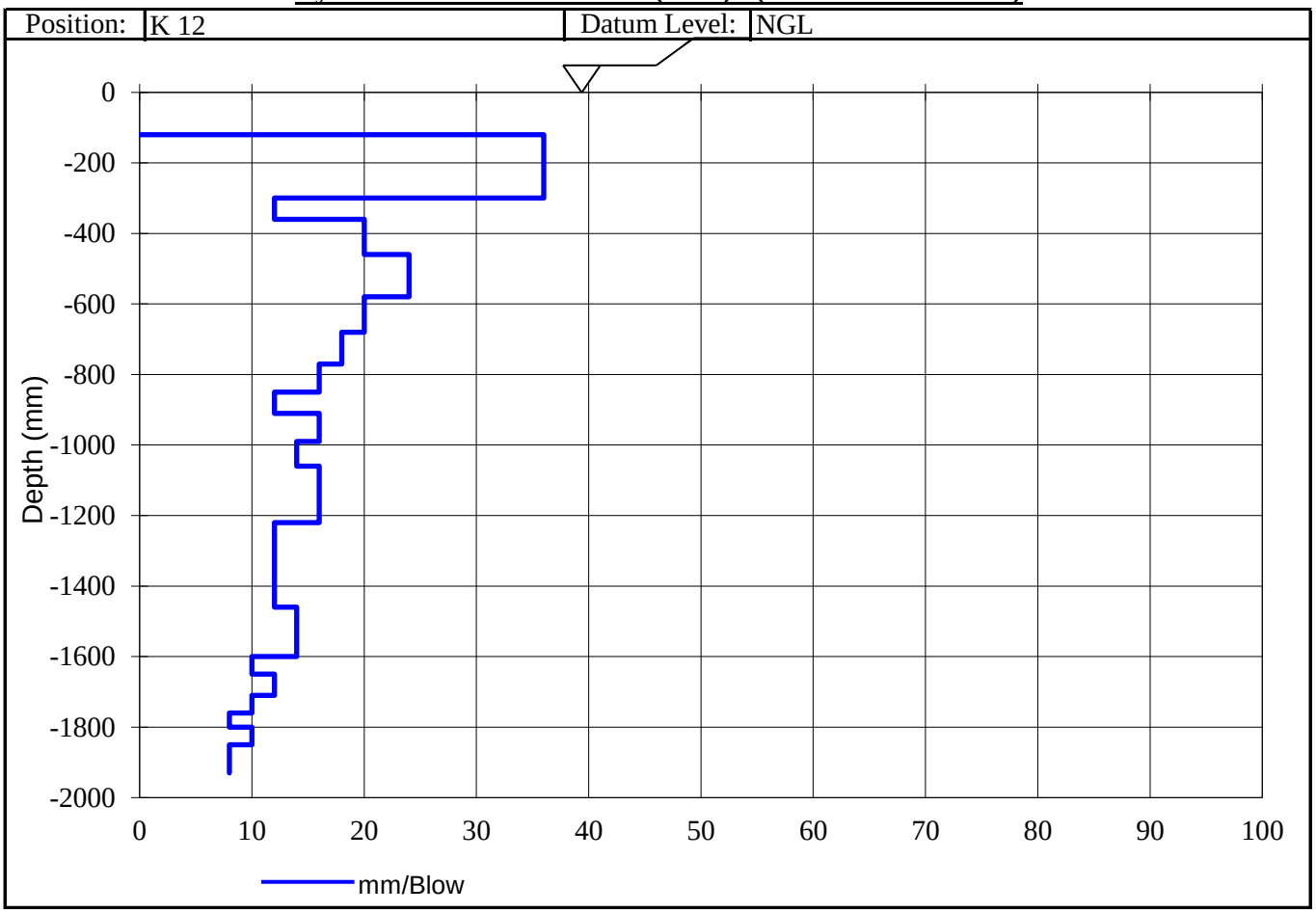
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 12 Datum Level: NGL



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Tel: 044 3820502 : Fax: 044 3820503 : e-mail: iain@outeniqualab.co.za

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		Date Received :	01.03.2021
		Date Reported :	23.03.2021
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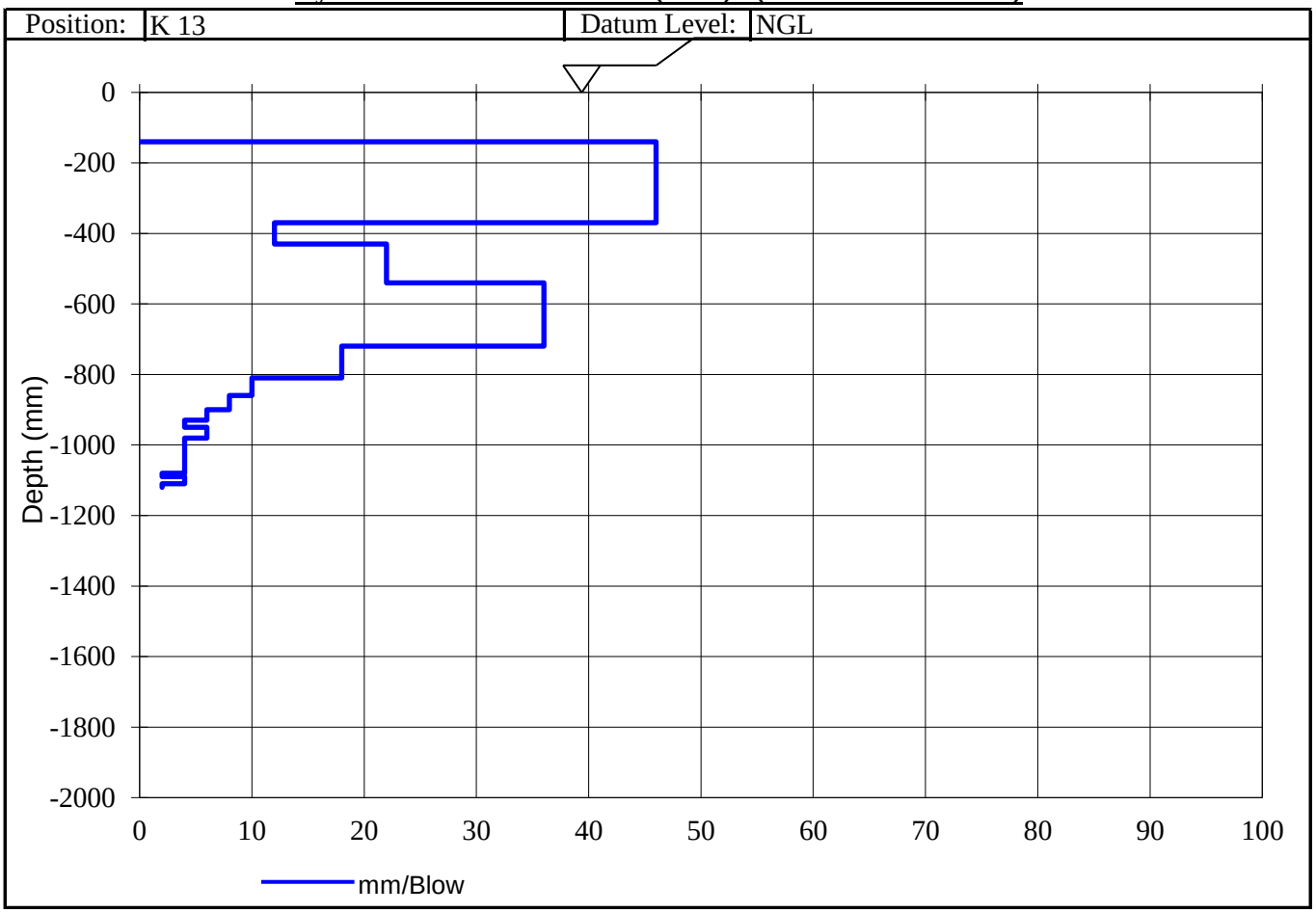
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 13 Datum Level: NGL



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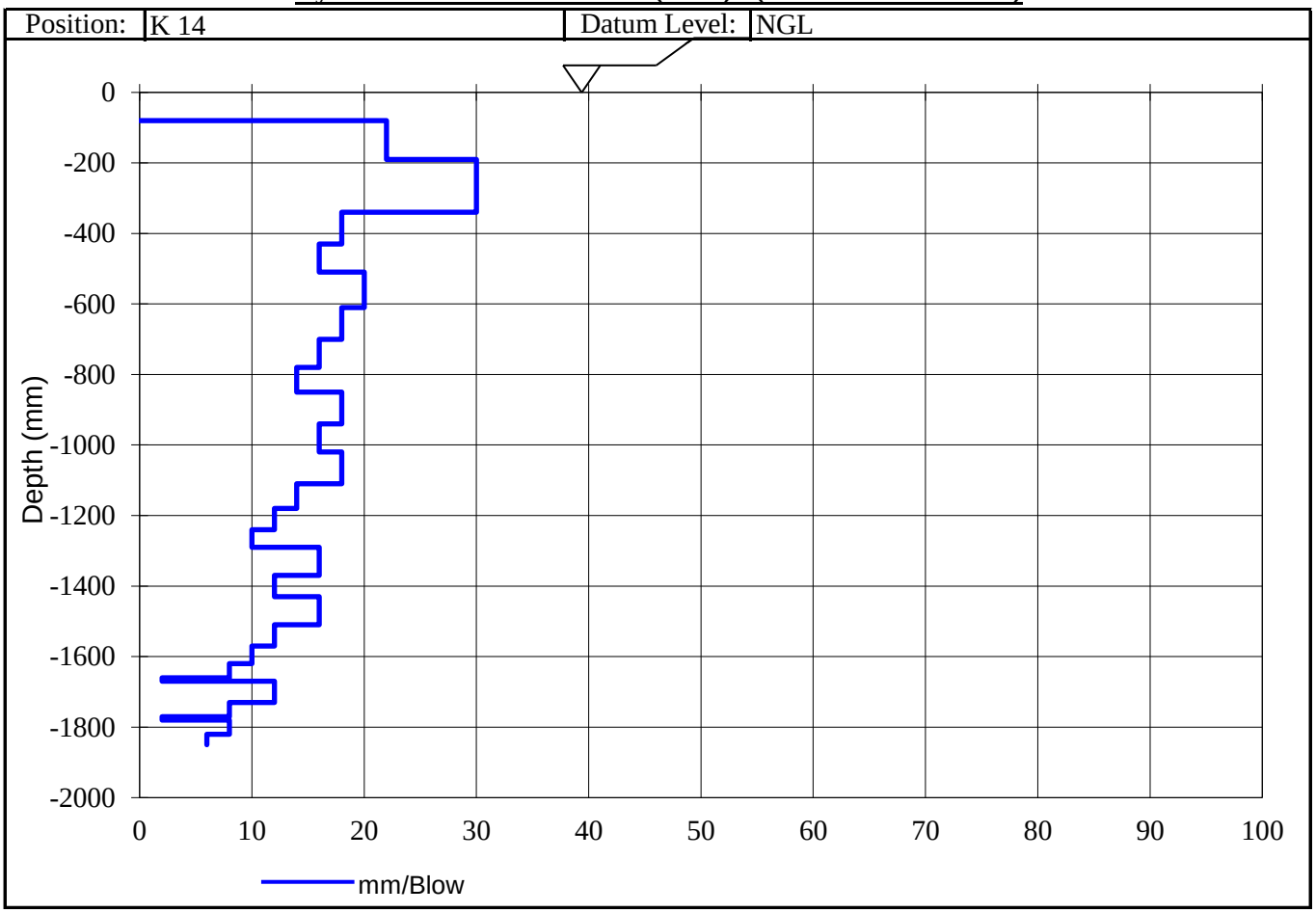
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 14 Datum Level: NGL



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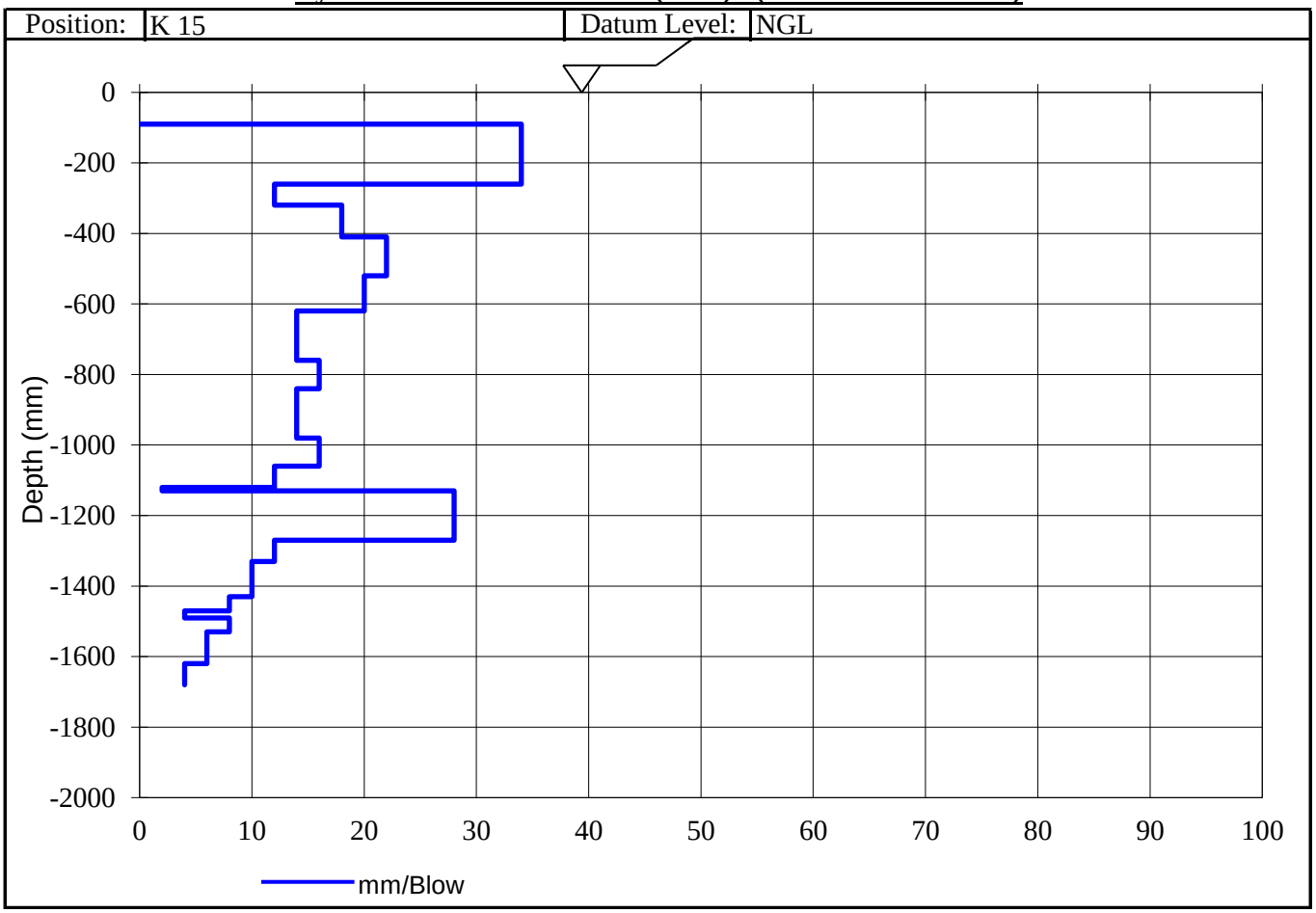
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 15 Datum Level: NGL



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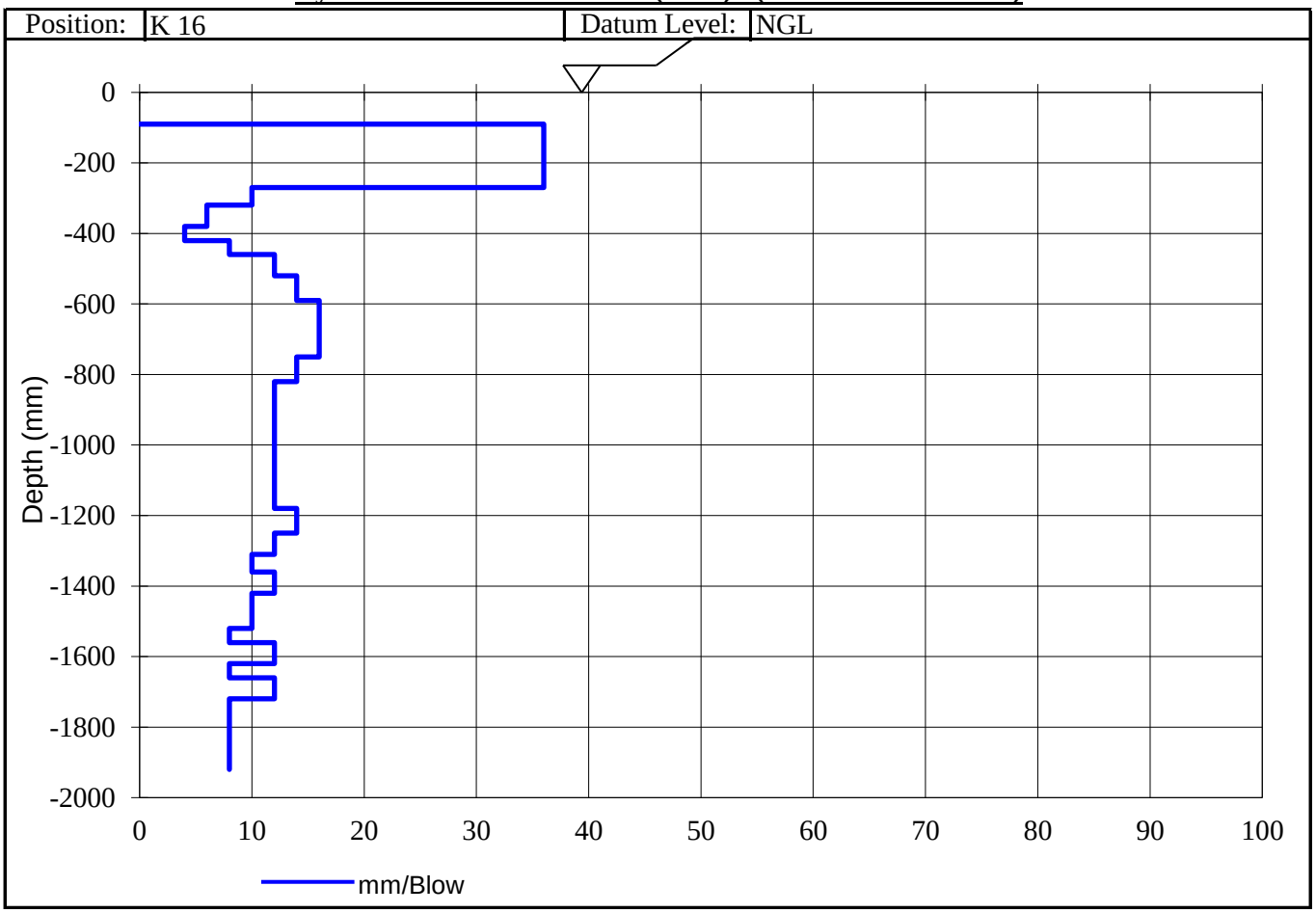
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 16 Datum Level: NGL



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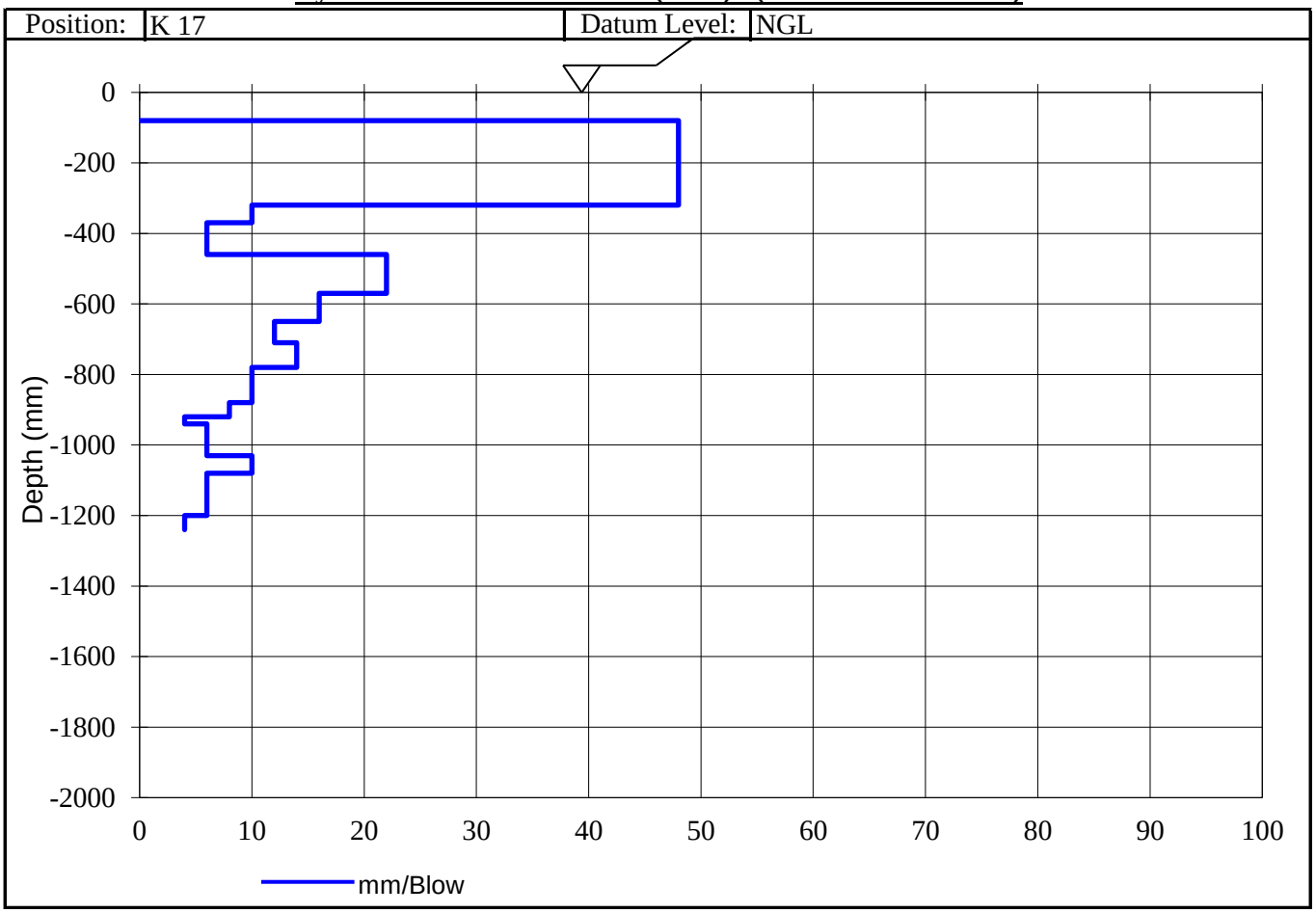
Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 17 Datum Level: NGL



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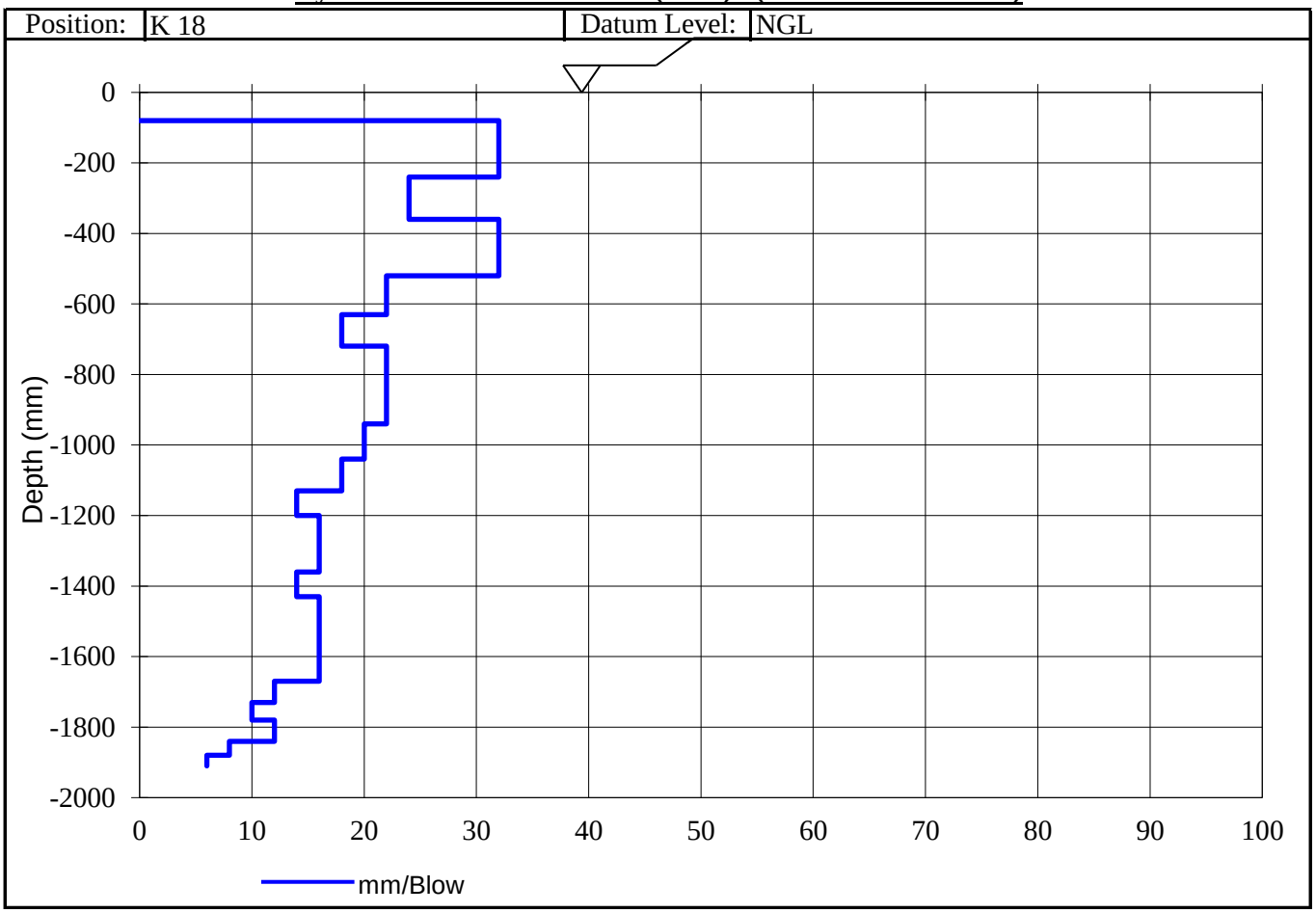
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 18 Datum Level: NGL



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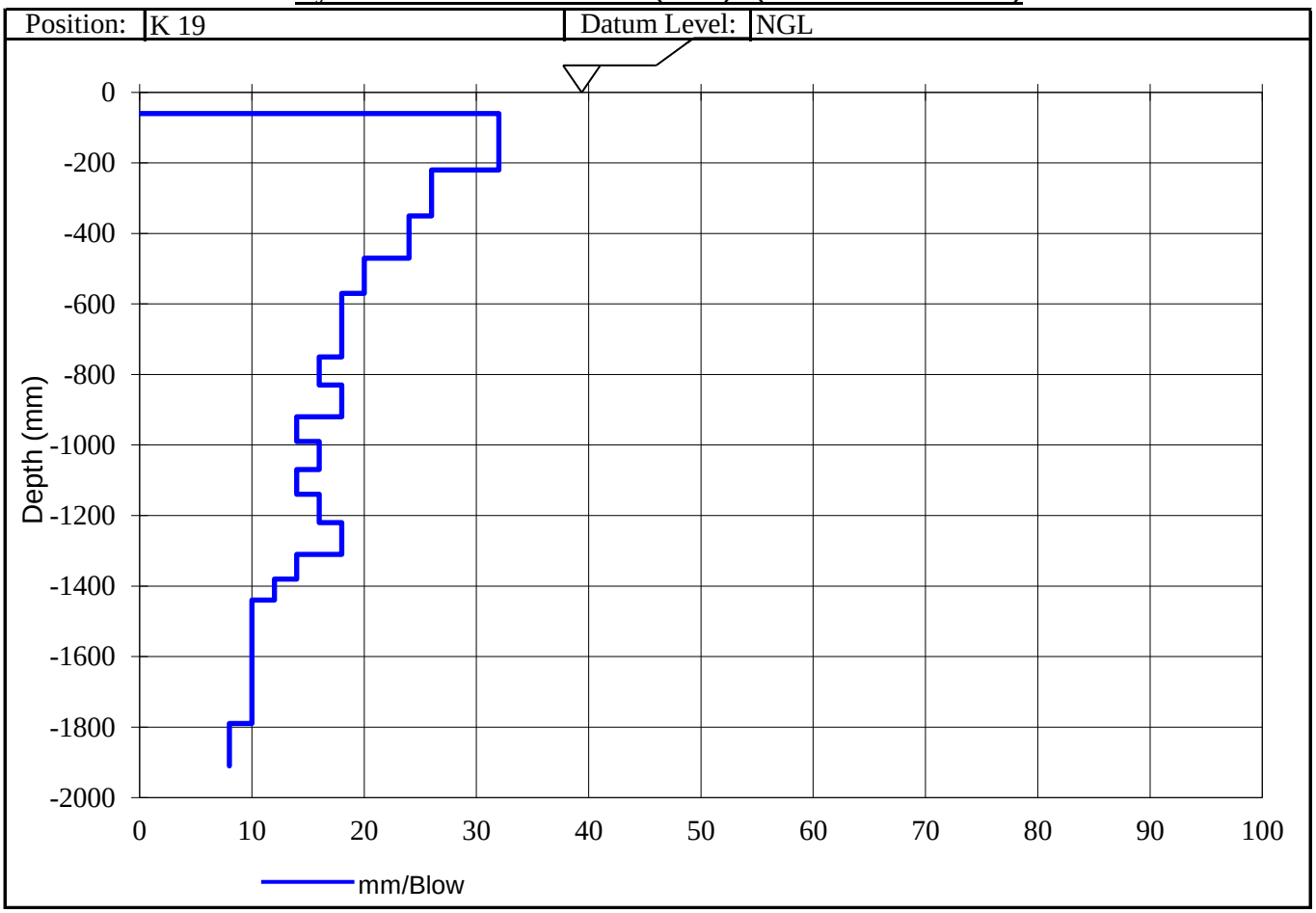
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 19 Datum Level: NGL



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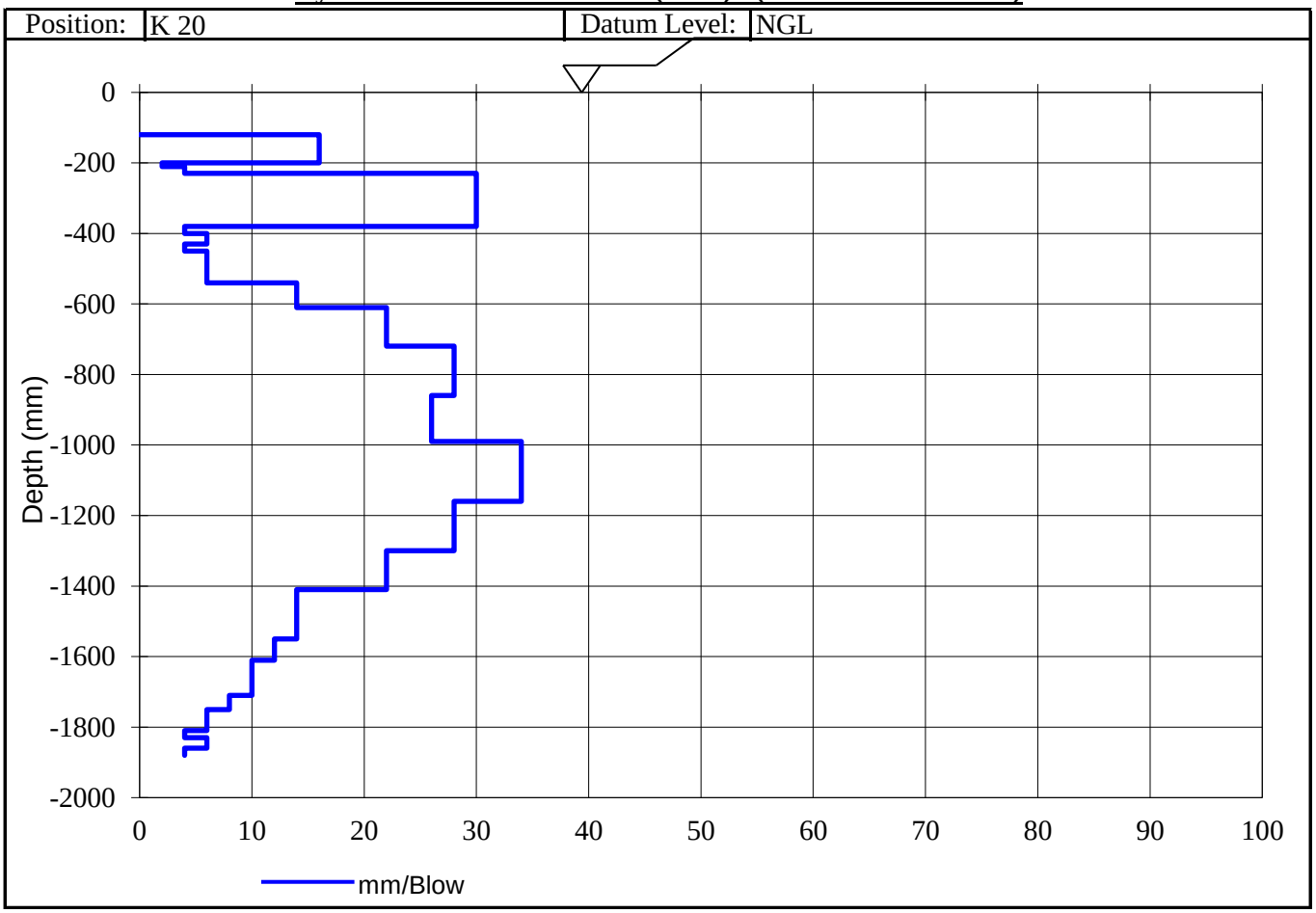
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 20 Datum Level: NGL



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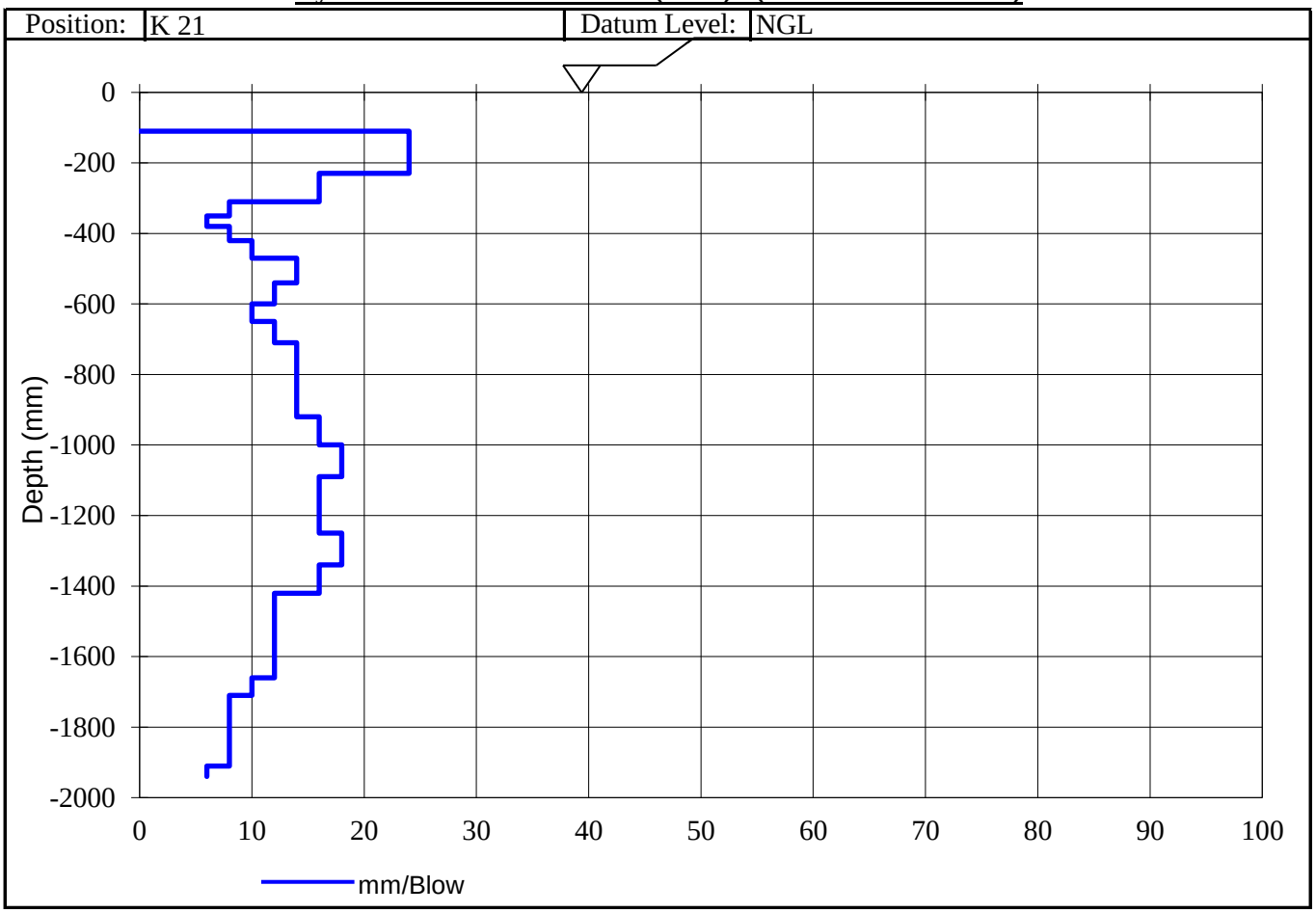
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 21 Datum Level: NGL



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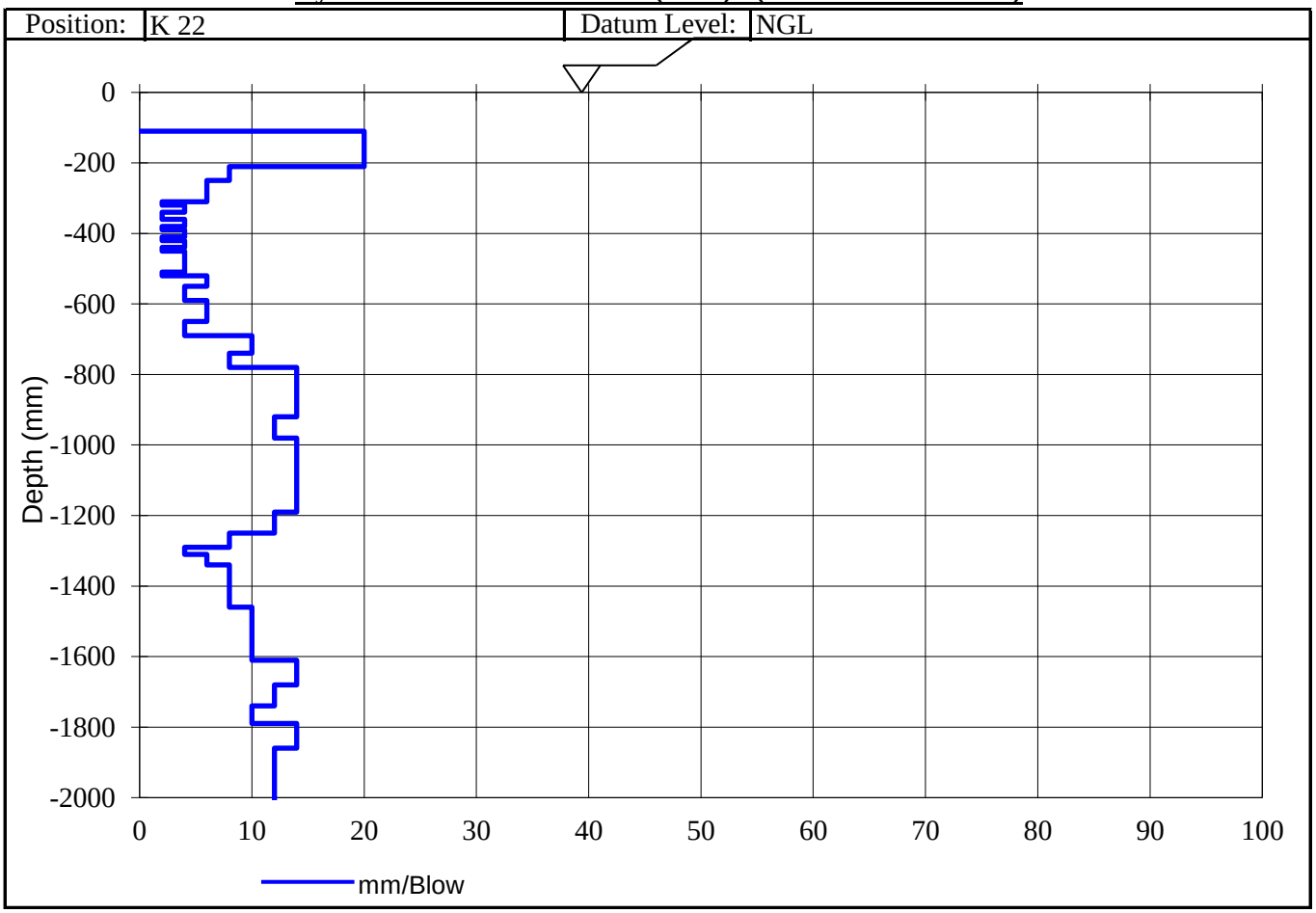
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 22 Datum Level: NGL



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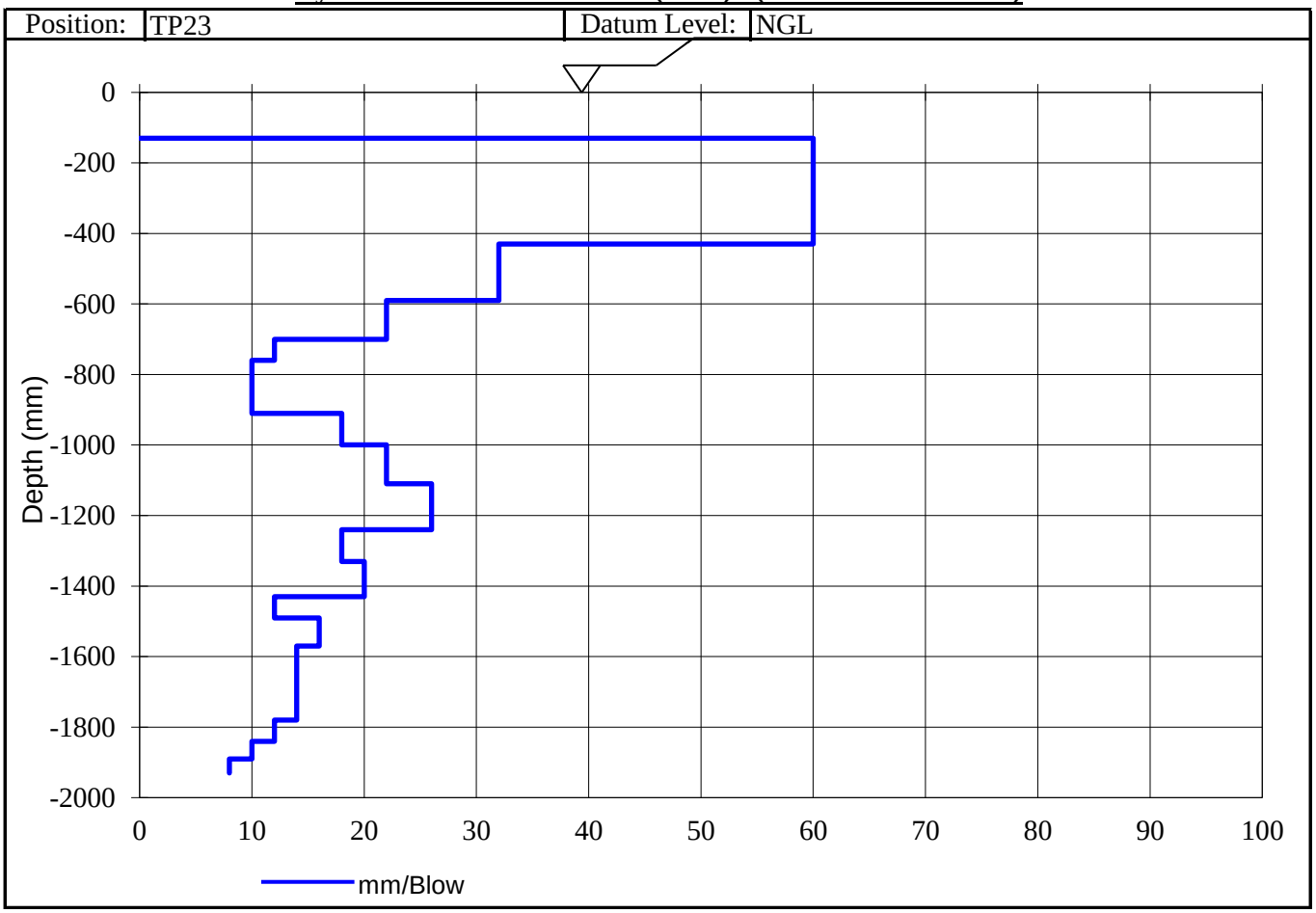
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: TP23 Datum Level: NGL



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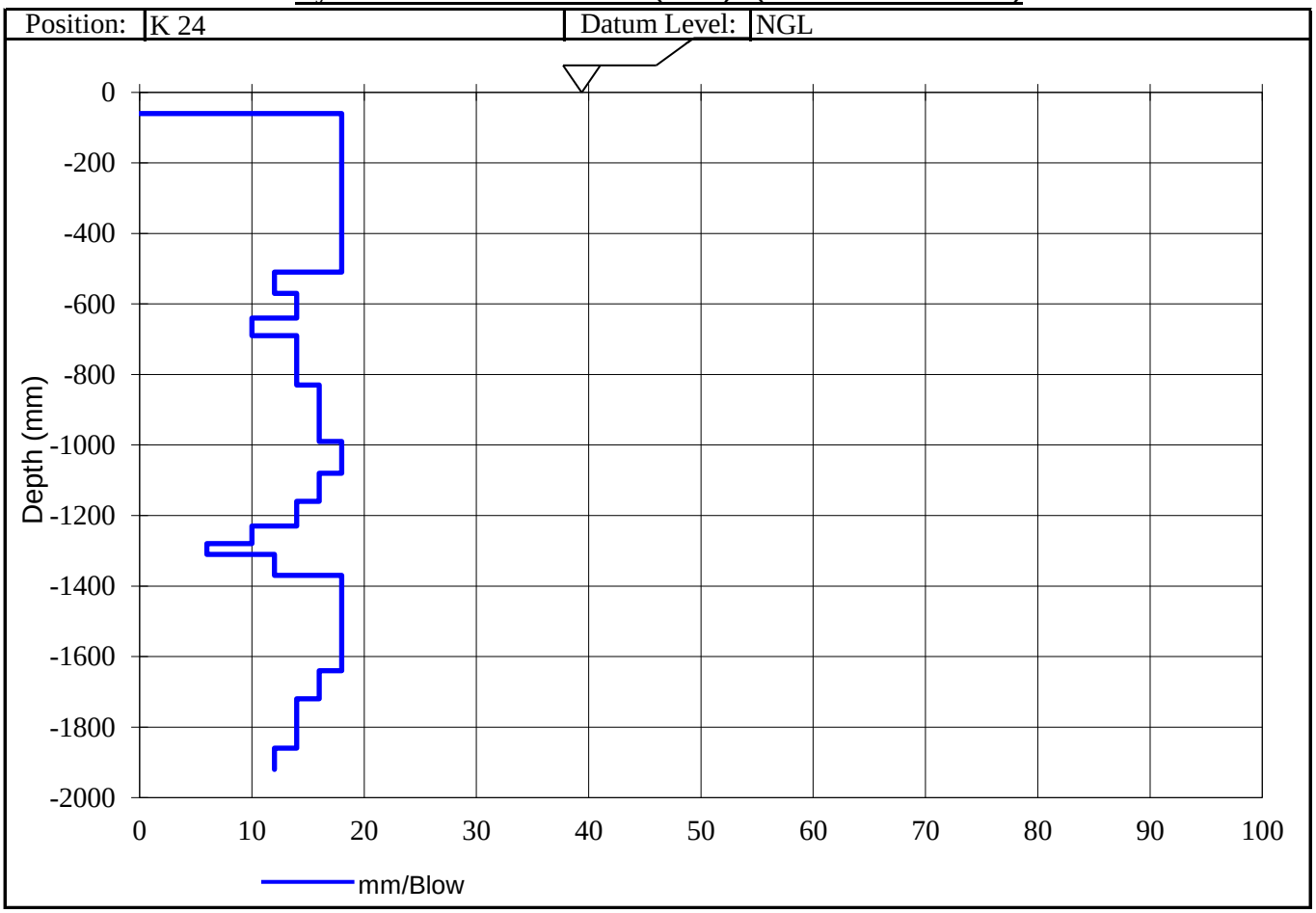
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 24 Datum Level: NGL



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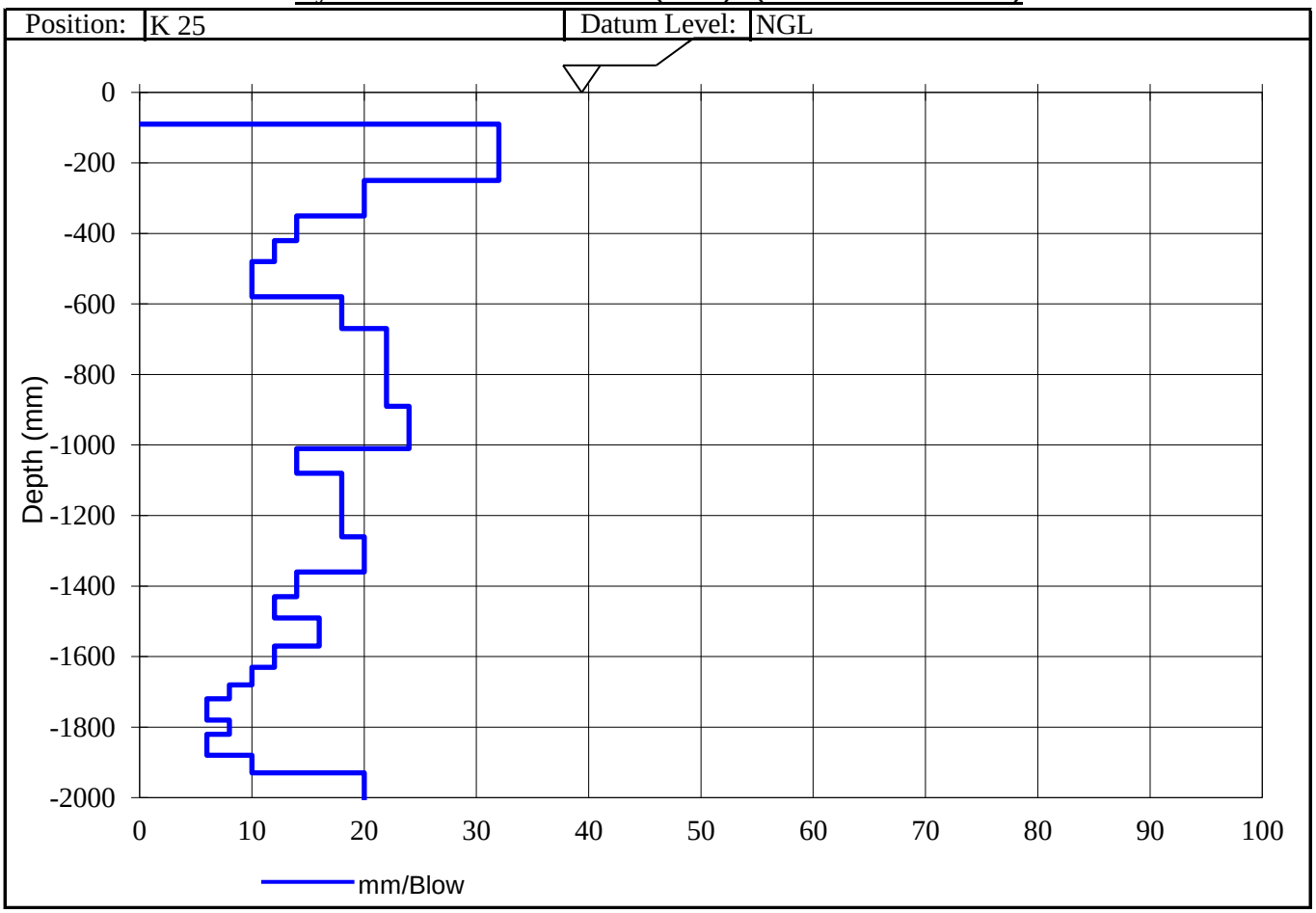
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 25 Datum Level: NGL



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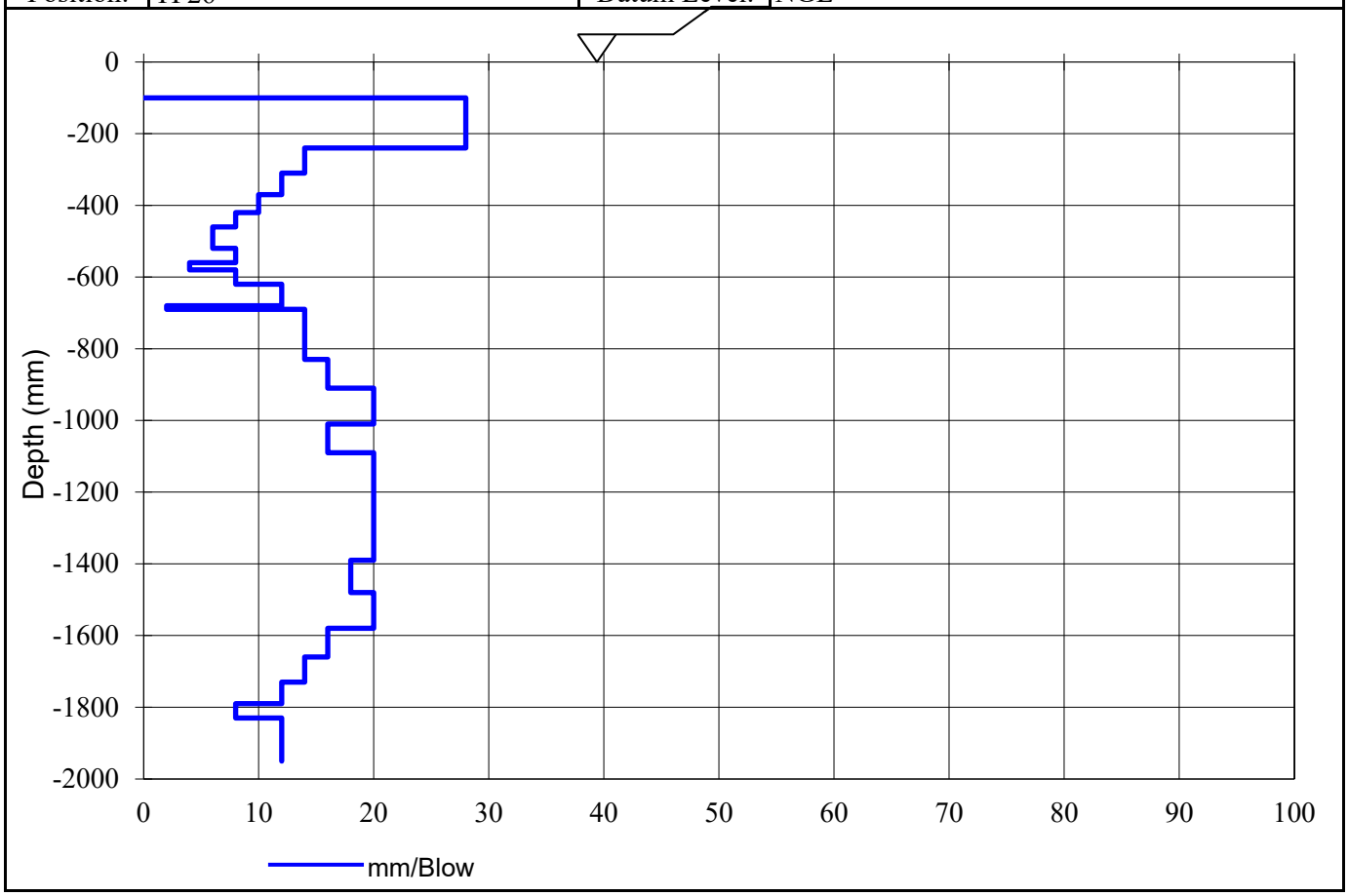
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position:	TP26	Datum Level:	NGL



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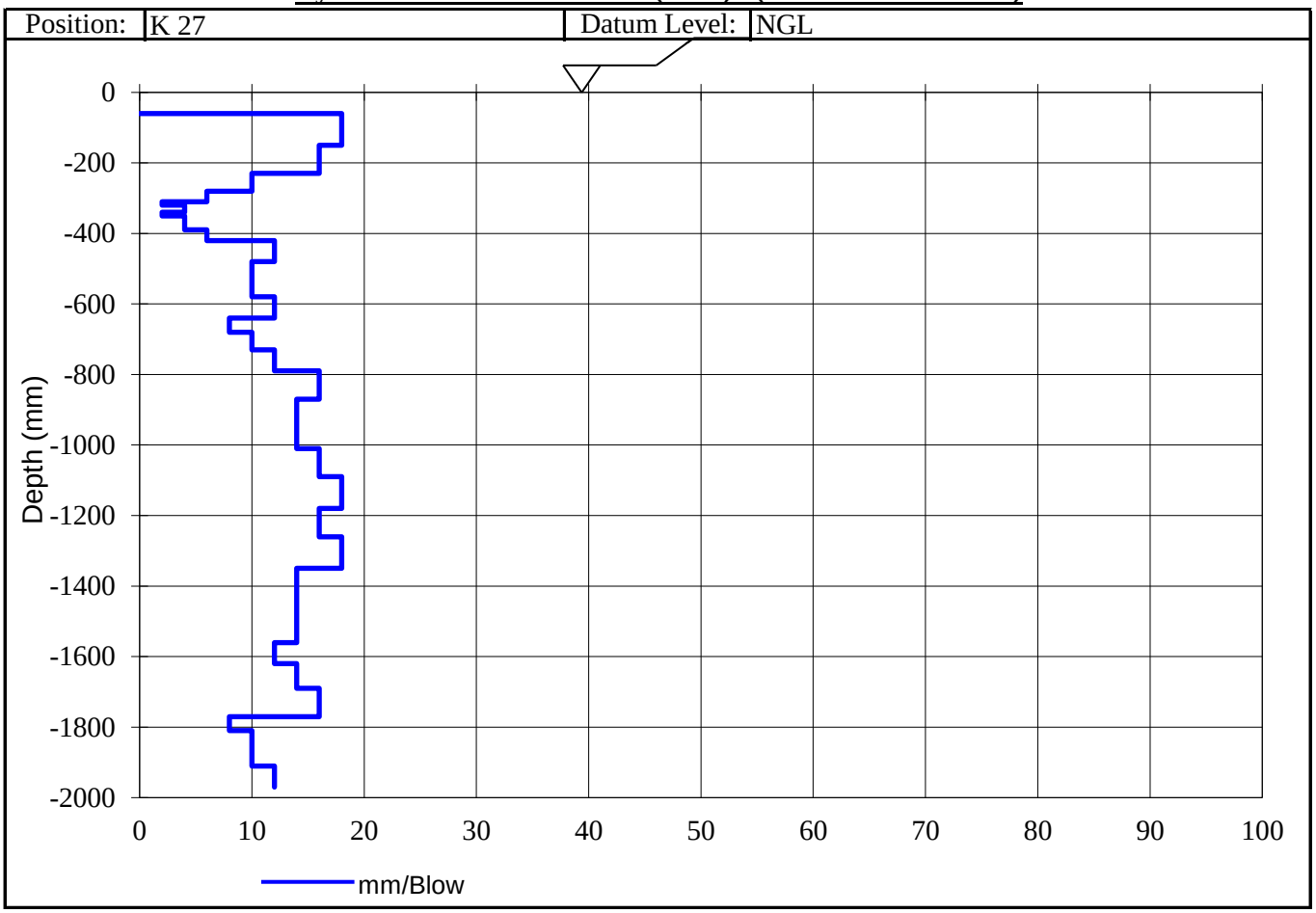
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 27 Datum Level: NGL



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Registration No. 1999/062743/23

18 Clyde Street, Knysna : PO Box 964, Knysna, 6570

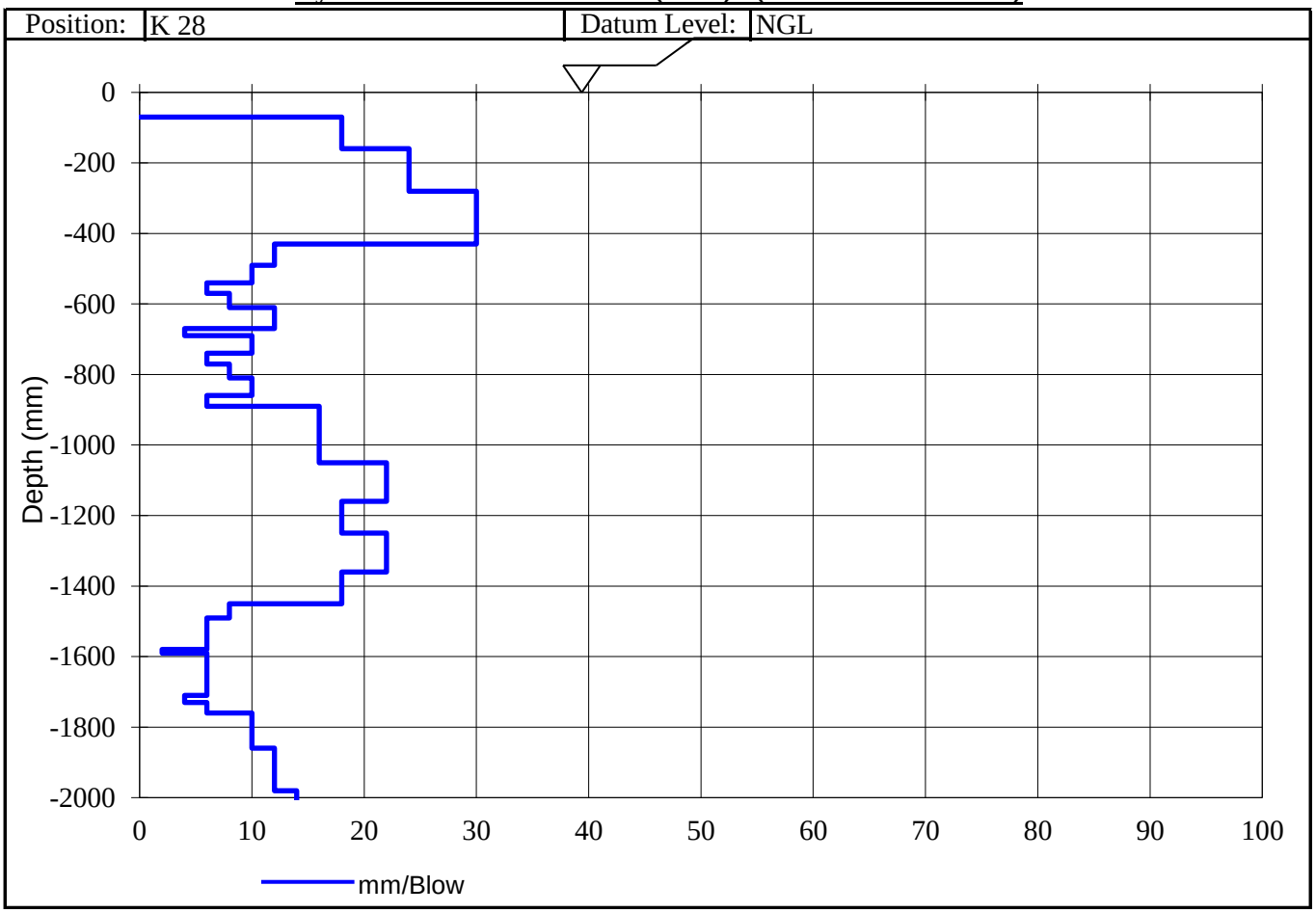
Tel: 044 3820502 : Fax: 044 3820503 : e-mail: iain@outeniqualab.co.za

Customer :	Sonqua Consulting 8 St John Street George 6529	Project :	Erf 562 Housing Project Kurland Plettenberg Bay
		Date Received :	01.03.2021
		Date Reported :	23.03.2021
		Req. Number :	
Attention :	Theo Adams	No. of Pages :	28 of 35

TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 28 Datum Level: NGL



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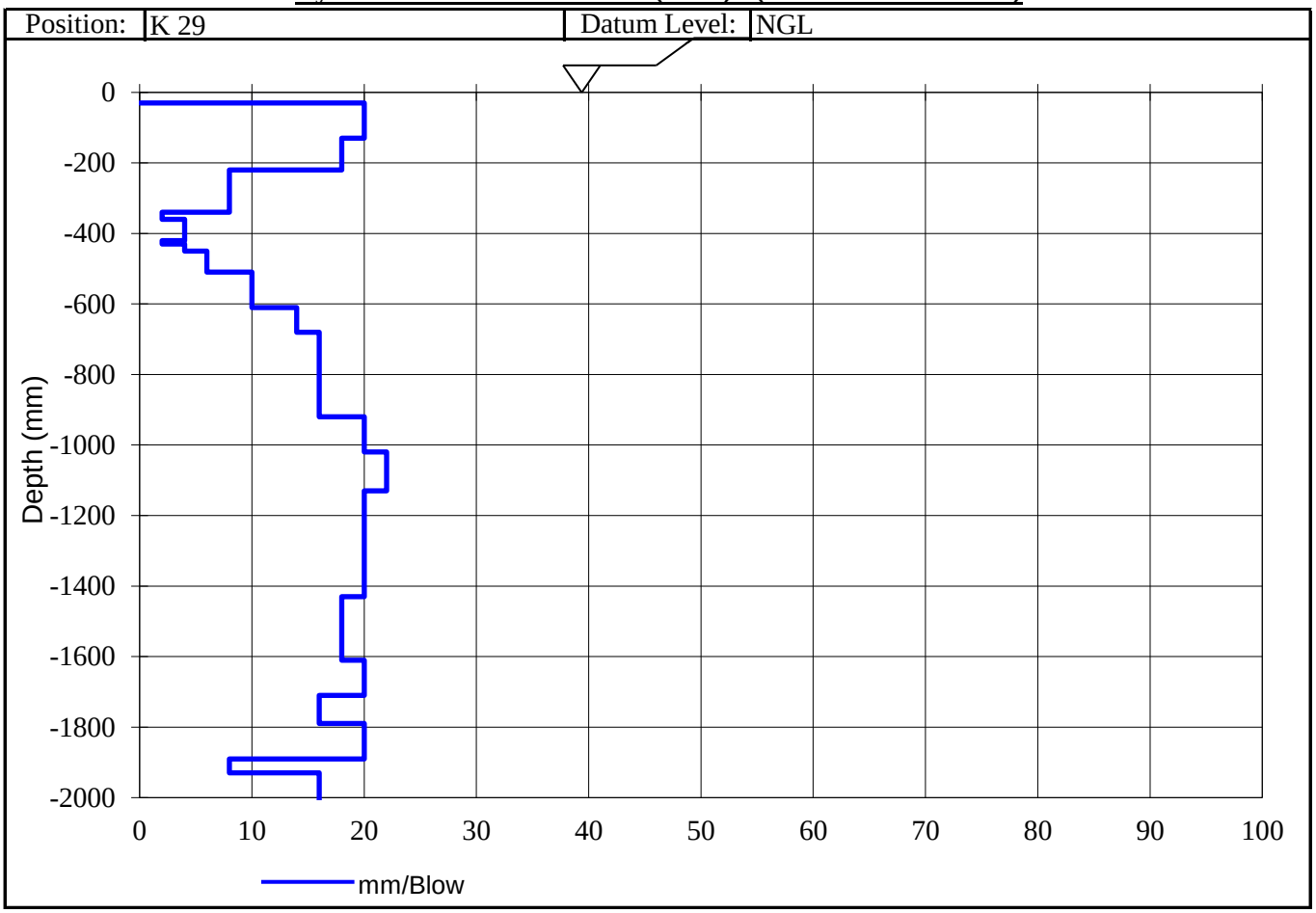
Attention :	Theo Adams	No. of Pages :	29 of 35

TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 29 Datum Level: NGL



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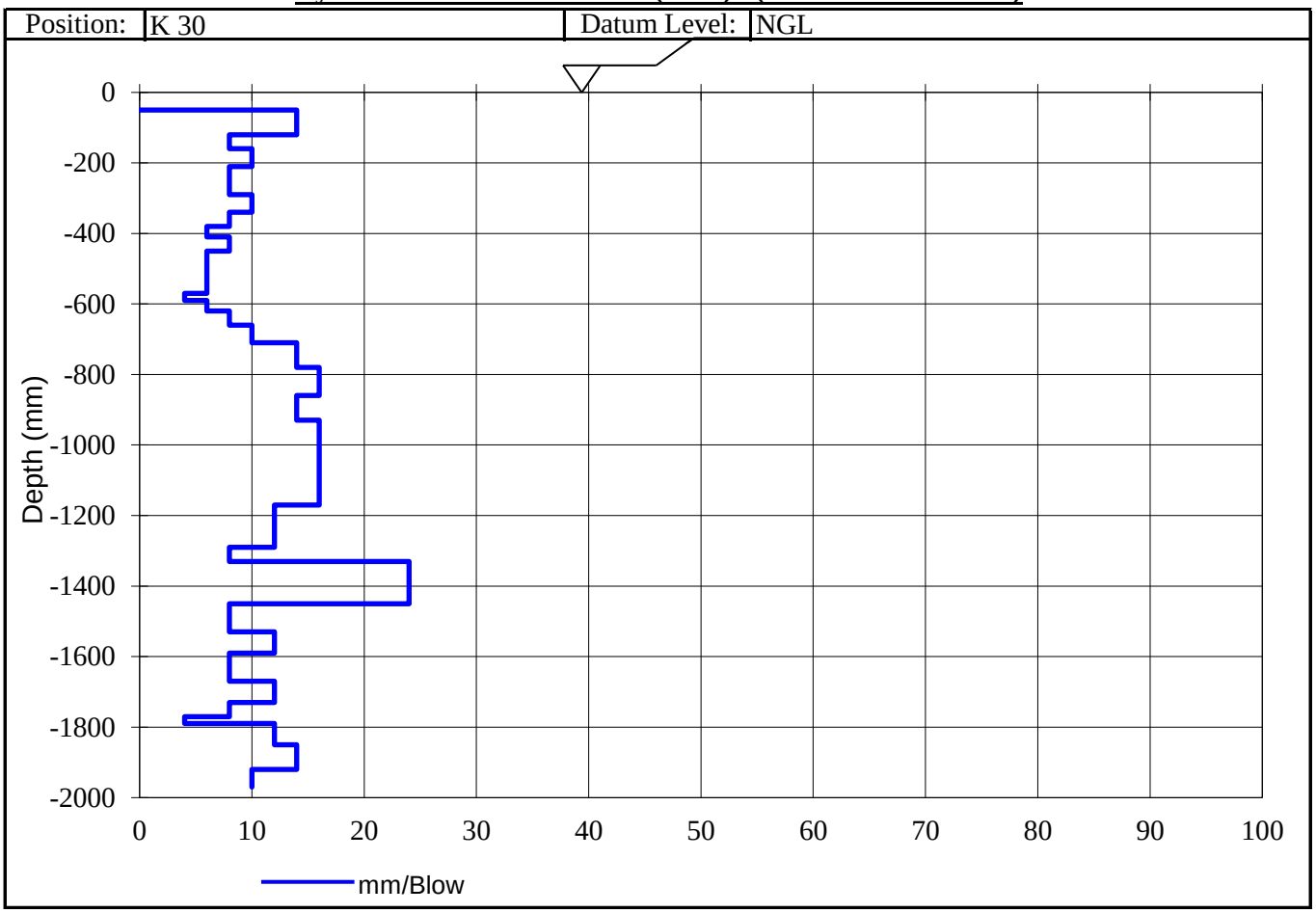
Attention :	Theo Adams	No. of Pages :	30 of 35

TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 30 Datum Level: NGL



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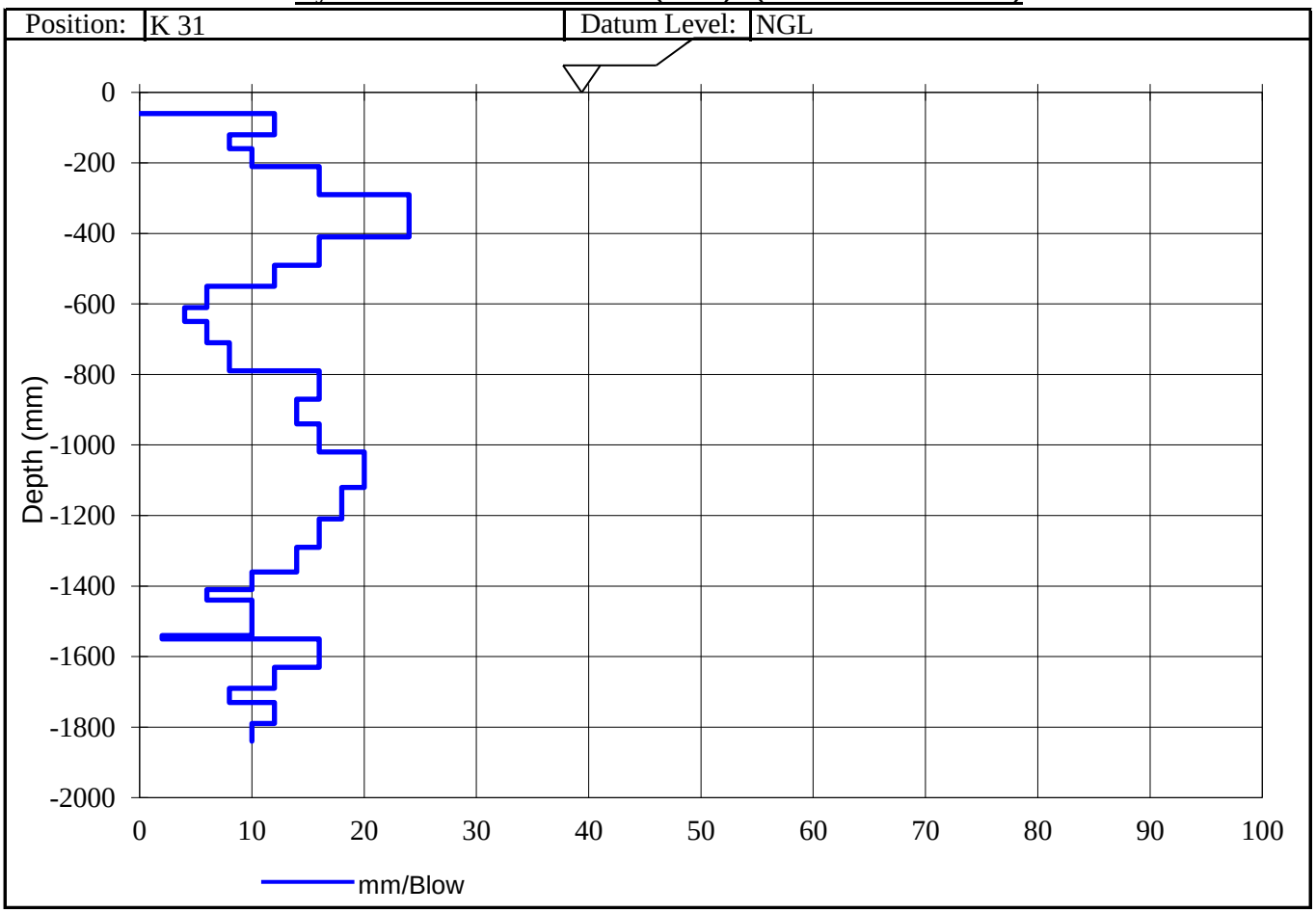
Attention :	Theo Adams	No. of Pages :	31 of 35

TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 31 Datum Level: NGL



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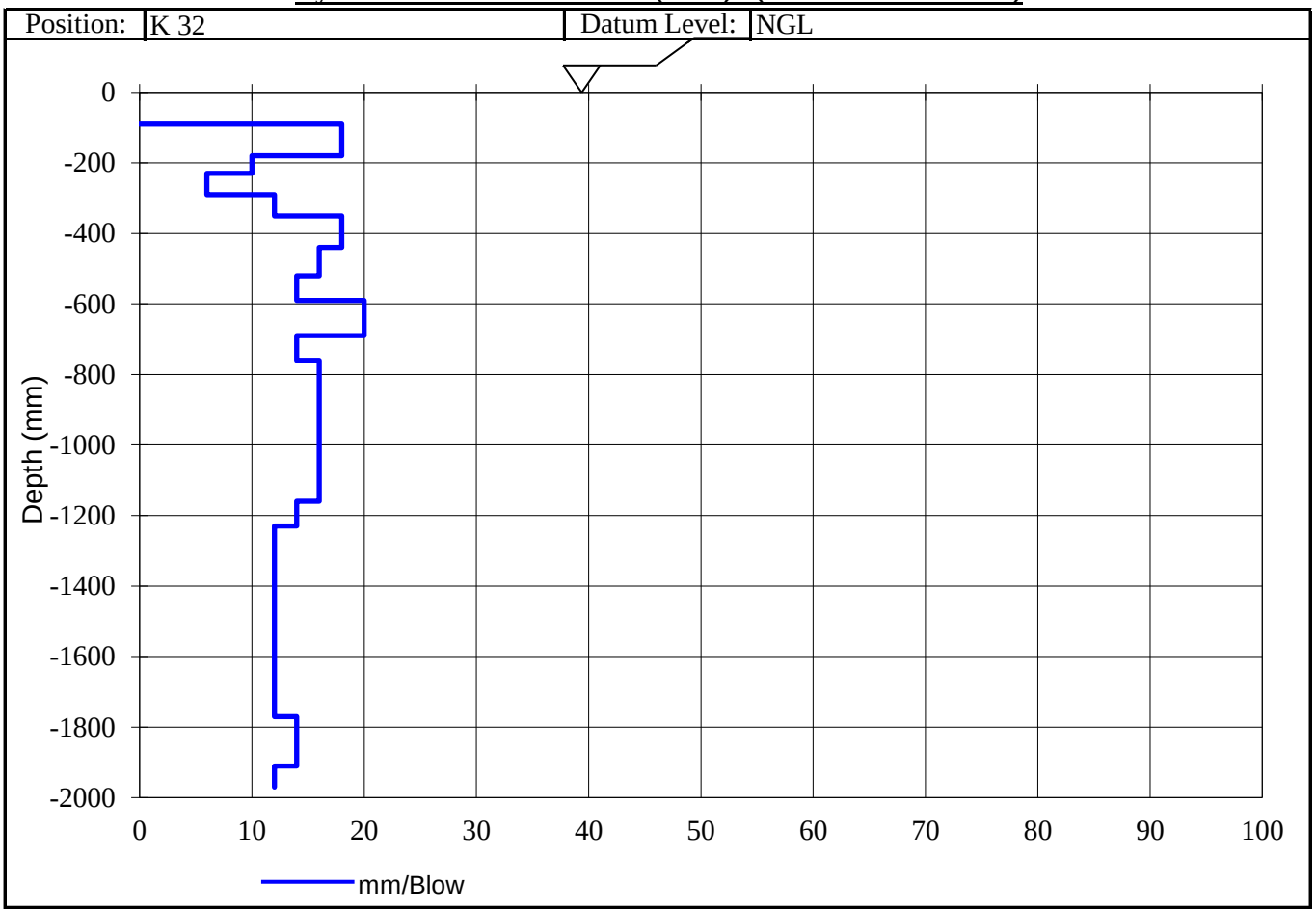
Attention :	Theo Adams	No. of Pages :	32 of 35

TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 32 Datum Level: NGL



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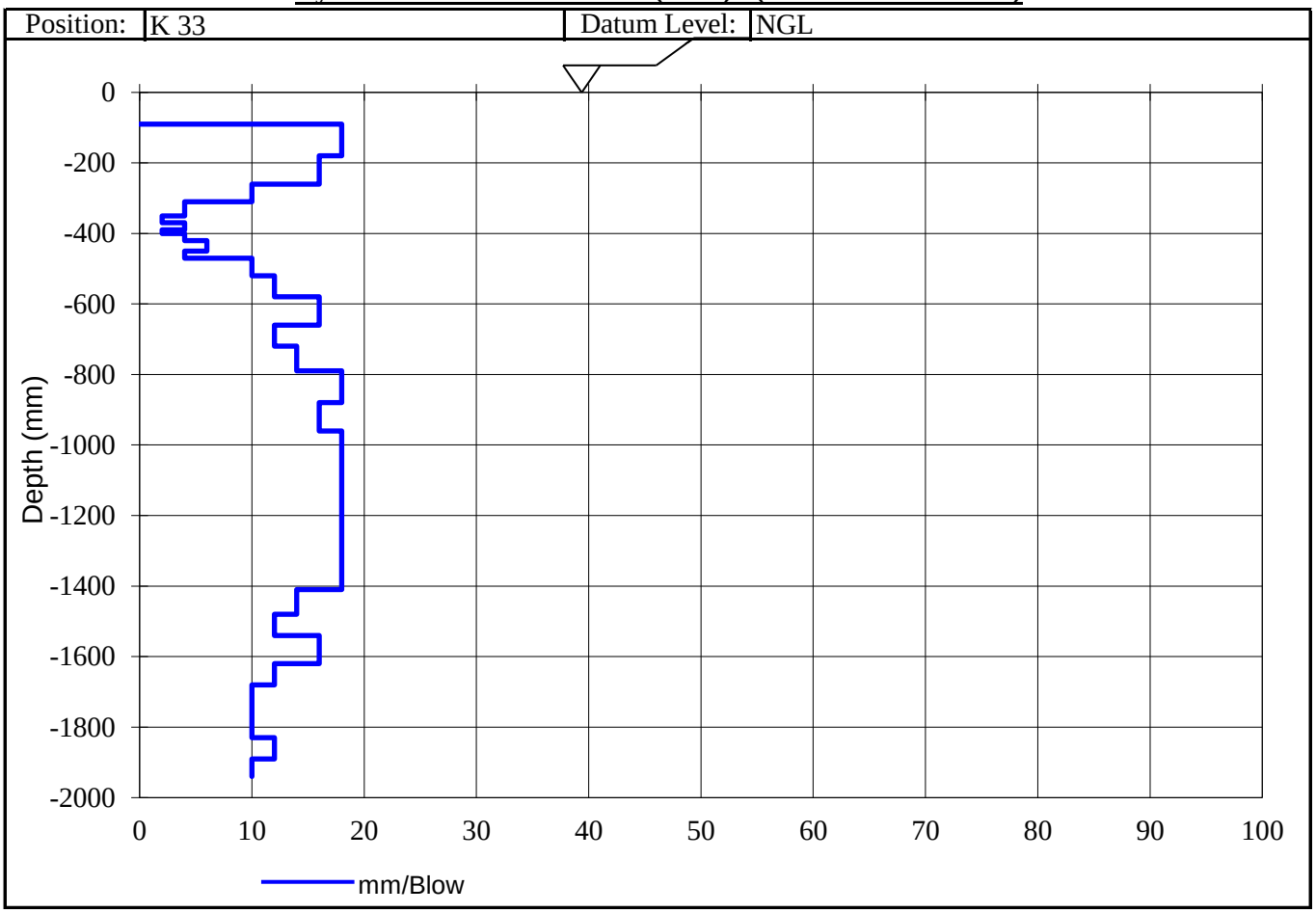
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 33 Datum Level: NGL



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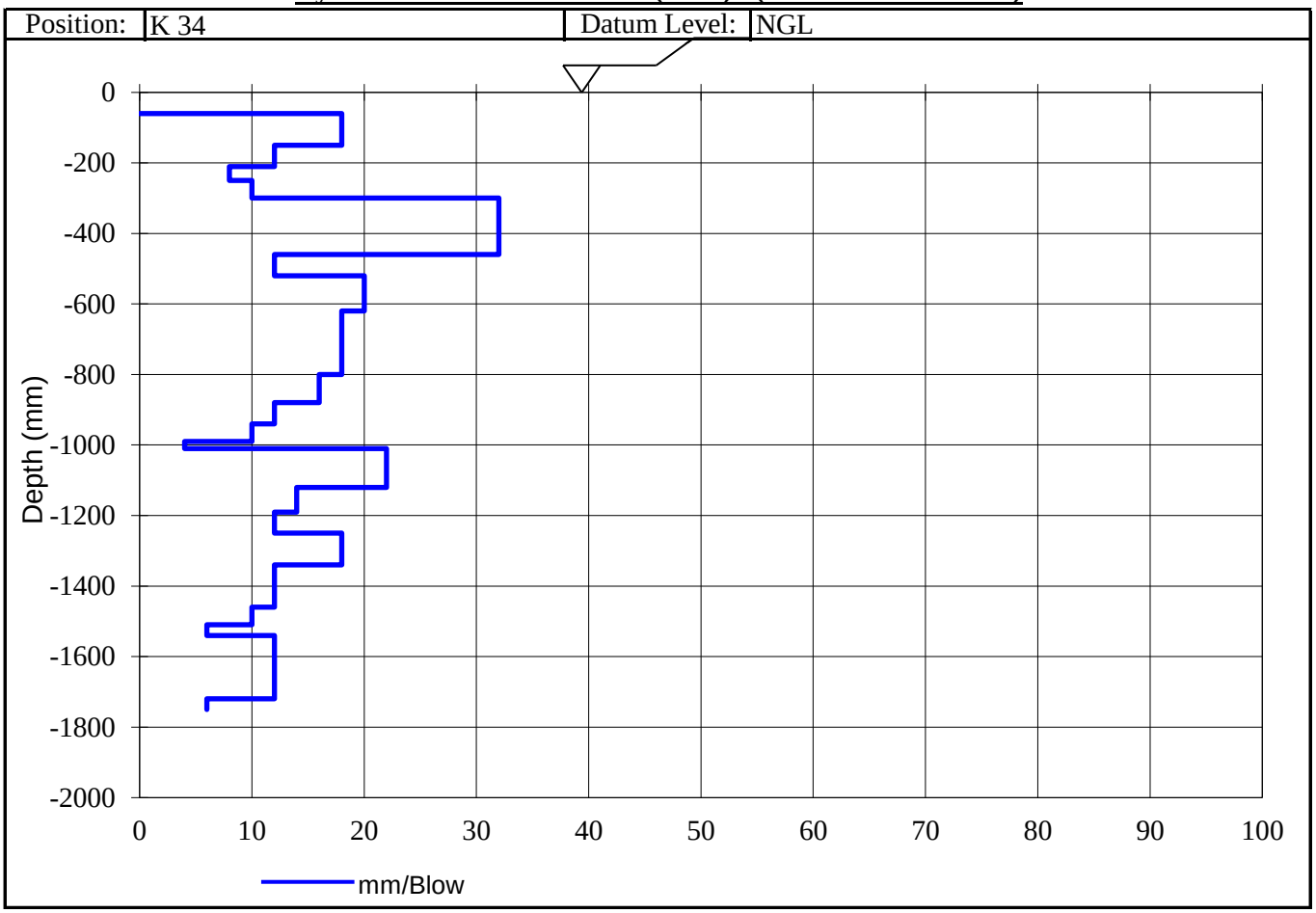
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 34 Datum Level: NGL



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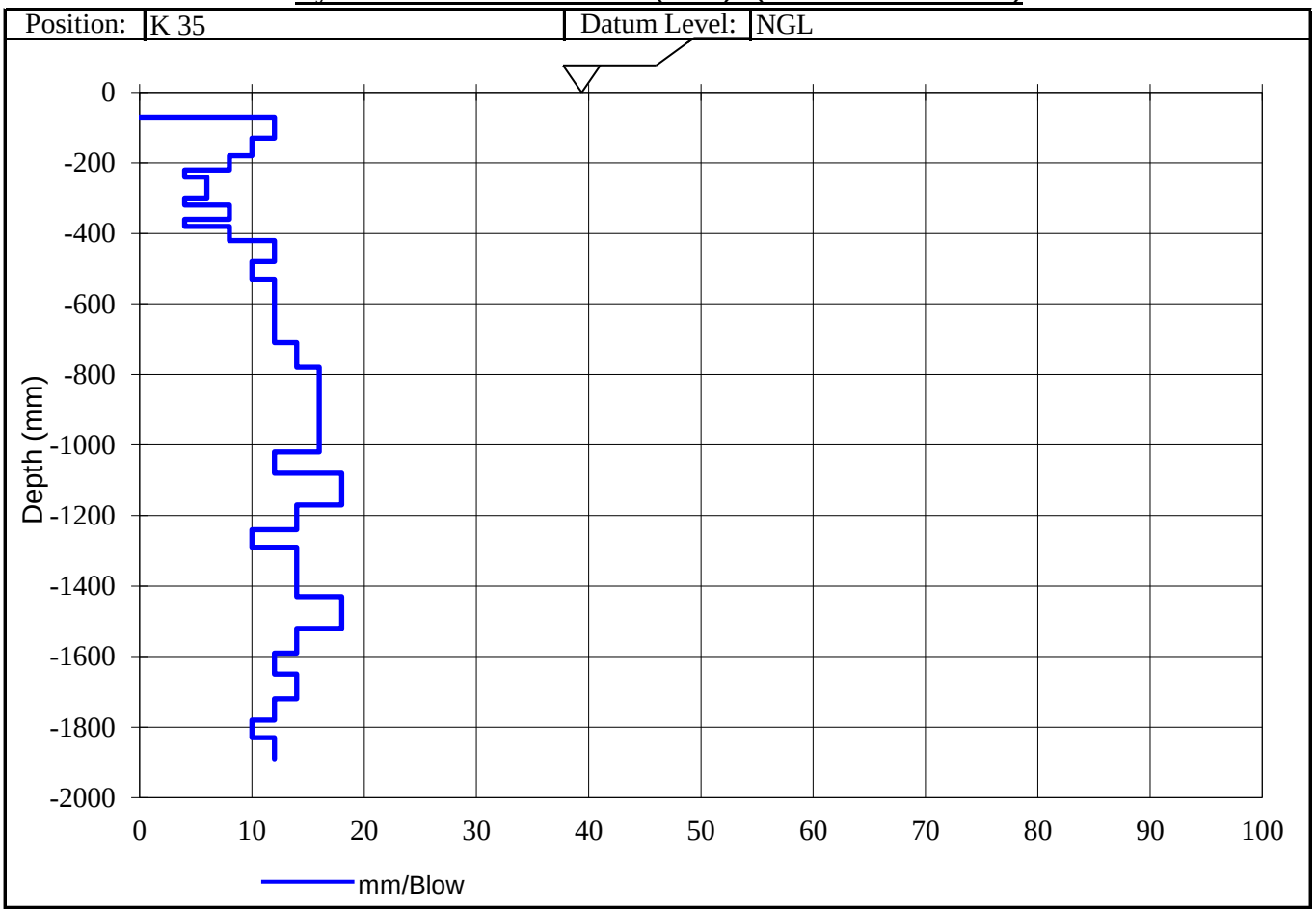
TEST REPORT

Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)

Position: K 35 Datum Level: NGL



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