OUTENIQUA
GEOTECHNICAL SERVICES

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Consulting Geotechnical Engineers and Engineering Geologists
Reg. No. 1999/062743/23

GEOTECHNICAL SOIL TEST REPORT

Client: Dr Marx c/o Eco Route Environmental Consultancy
Project: Erf 1510, Sea Vista, St Francis Bay
Date of test: 21.7.2022

Geotechnical Constraint	Risk			NHBRC Classification
	Low	Medium	High	
Active clay	X			
Compressible soil			X	S2
Collapsible soil	X			
Imported/uncontrolled fill	X			
Chemically aggressive soils		X		
Saturated soils/ groundwater seepage	X			
Shallow hard rock/ difficult excavations	X			
Slope stability problems		X	X	
Flood potential	X			
Seismicity	X			
Dolomitic land	X			

Disclaimer:The above classification is provided as a guideline and is true for the specific locations that were tested and may not be true for the entire site.

Site description:

The site is located in the residential suburb of Sea Vista in St Francis Bay. The site was vacant and positioned on a coastal dune, approximately 80m south-west of the beach (see Fig1). Access to the site was gained from the road on the southern side of the stand. The terrain on the site was fairly irregular with fairly gentle access from the street level, but then dropped away steeply on the northern portion of the erf. The site naturally drains towards the north and east. At the time of the investigation, the ground conditions were generally dry and well drained and macro-stable with no signs of any drainage problems or features such as marshes, but there were some marginally stable steep slopes on the northern side.

Methods of investigation:

A total of three test pits were excavated by TLB to max depth of ~NGL-2m at the positions indicated on the attached plan. DCP test were conducted from ground level to assess soil consistency at each of the three test pits (TP1-3) as well as three additional positions (TP4-6). A soil sample of insitu material was collected from TP1 for lab tests (grading & plasticity index).

Figure 1: Photo of site, looking north and east

Figure 2: Photo of sandy soil excavated from test pit TP1

Results:

The site geology consisted of thick deposits of coastal aeolian sand which overlie sandstone bedrock of the Skurweberg Formation, which was visible in outcrops along the coast several meters below the site. The general soil profile exposed in test pits was dominated by moist, light brown or light

yellow (becoming lighter with increasing depth), poorly graded, non-plastic slightly silty fine sand of aeolian origin (see Figure 2). There was an organic-rich topsoil layer of approximately 200mm thick which covered the natural aeolian soil.

No bedrock was encountered in any of the test pits and was not expected for several tens of meters below ground level. No groundwater was encountered in any of the test holes at the time of the investigation and the site was well drained with fairly good soil permeability.

DCP tests indicated that the soil consistency was variable but potentially very loose to loose in the upper 2m with penetration rates typically exceeding 40mm/blow. The tests indicated potentially highly compressible soil, requiring adequate compaction to mitigate settlement of structures, especially on or near steep slopes.

Recommendations:

Earthworks: Some bulk earthworks were anticipated to clear, level and compact the site in preparation of construction. Terracing of the site with a retaining wall (or a series of retaining walls) may be required if a portion of the proposed structure is to be constructed below NGL (e.g. lower ground or basement levels). Earthworks can be accomplished light machinery and all excavations to a depth of at least 3m are provisionally classified as per SABS1200D as “soft”. The insitu “clean” sandy soils are fine-grained but will be generally suitable for backfilling and compaction on platforms, under floors, behind retaining walls and below foundations at the optimum moisture content. Organic matter, such as roots and humus/topsoil should be removed from the footprint of structures and stockpiled separately for landscaping purposes. Excavations may be highly unstable at angles steeper than 35° and battering or shoring of excavation sidewalls may be required. Lateral support systems may be required along site boundaries.

Foundations and floors: Single/double/triple storey masonry structures can be founded on reinforced concrete strip, pad or raft foundations. Piled foundations should only be considered for excessively heavy structures as this method is generally an uneconomical in the area due to high establishment costs of specialist contractors. Strip and pad foundations should be founded at a minimum depth of 0.8m below ground level (platform level) on well compacted insitu sands. Bearing pressures should be limited to 125-150kPa where possible, to minimise settlement. As a guideline to achieve adequate compaction to avoid settlement, the foundation trenches should be excavated to the recommended minimum founding depth, well wetted and compacted with several passes of a mechanical trench rammer (Wacker), until the DCP penetration rate is less than 20mm/blow to a depth of 1m below the foundation invert. If adequate compaction cannot be achieved with this method, the contractor should remove additional loose soil from below the founding level (e.g. over-excavate 0.3-0.5m), recompact the base of the excavation and then replace the insitu soil in compacted layers. The structural engineer can consider additional techniques such as replacing insitu soil with 3-5% cement-stabilised sand. Foundations near/above retaining walls and steep natural slopes (within 3m) will require careful consideration, possibly including special measures such as deeper foundations to prevent surcharge loading of walls or slopes. The structural engineer should inspect foundation trenches and ensure adequate testing of before casting concrete. Filling under reinforced concrete floors should be compacted at the optimum moisture content (10-12%) to 100% of maximum dry density.

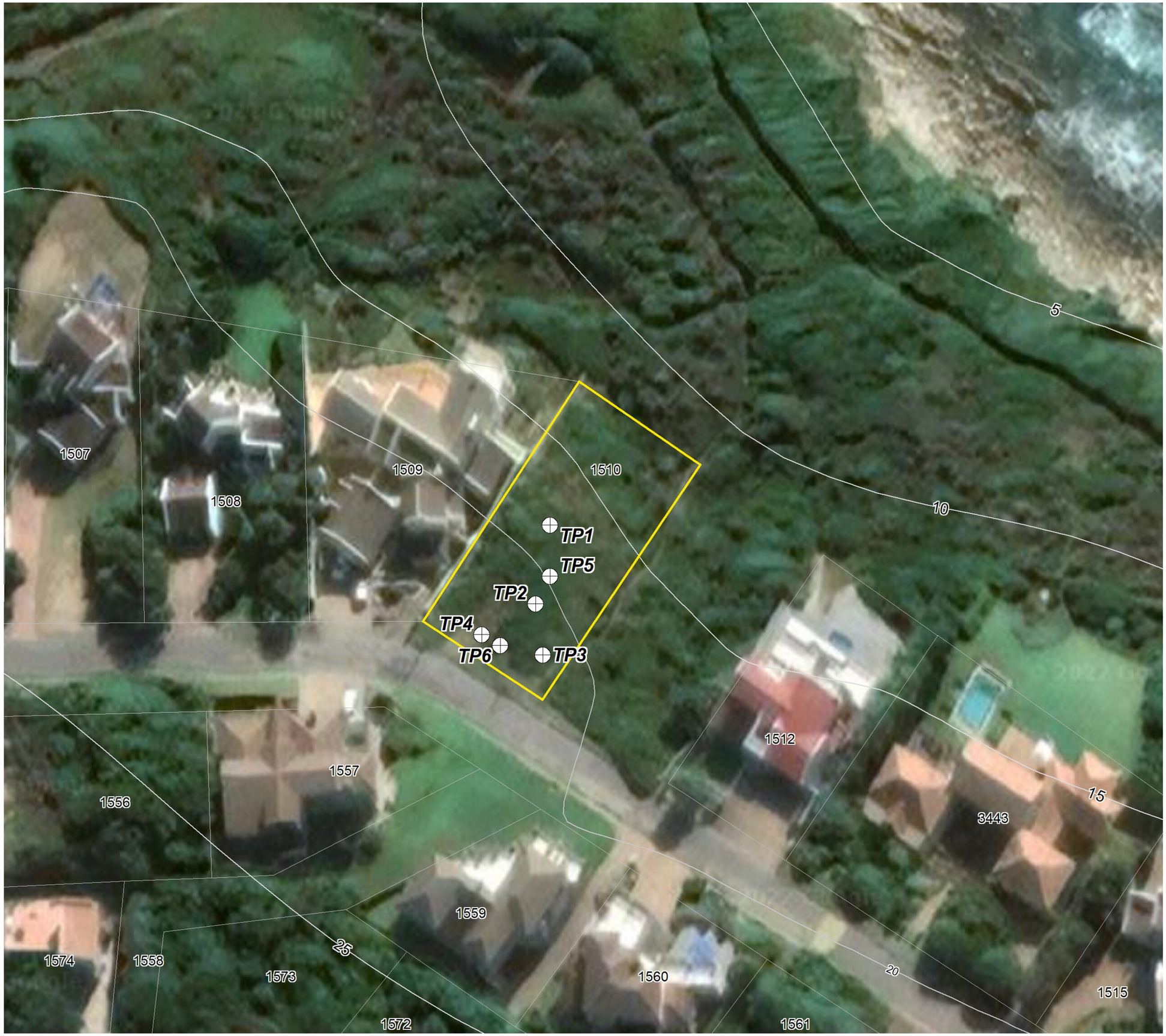
Roads: The insitu roadbed material consists of very fine sandy soil, which is loose and prone to rutting, and should be compacted to 100%MDD. Following the compaction of the roadbed, 100mm of imported SSG gravel material is recommended to support the driveway layerworks, which include 150mm of G5 subbase, compacted to 95%MDD, and cement interlocking pavers on 20mm bedding sand.

Drainage: The soil is generally moderately to highly permeable and site drainage is not envisaged to be a problem. No subsoil drains are deemed necessary, except behind retaining walls in basement structures if necessary.

Conclusions:

The site is considered suitable for the proposed development with conventional construction methods but there are some significant geotechnical constraints, mainly steep slopes and highly compressible sands, which will require consideration in the design and construction phases. Some preliminary recommendations have been provided, but all information should be verified on site during construction.

Iain Paton Pr Sci Nat Pr Tech Eng



N

Legend

- Test Positions
- Site Boundary

Project: Erf 1510
Site: Sea Vista
Area: St Francis Bay

Dwg Name: Geotechnical tests
Date: 11 August 2022
Rev no: 1
Drawn: SG

Client: Mr Marx c/o Eco Route Envirinmental Consultancy
Structural/Civil Eng:
Architect:

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Scale 1:750

0 3 6 12 18 24 30 m

Geotechnical Soil Profile

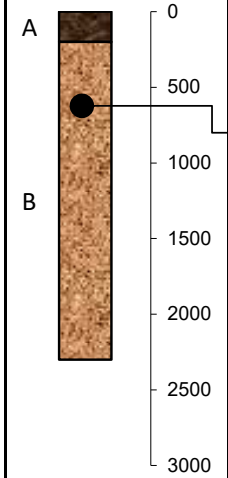
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Eco Route Environmental Consultancy
Project:	Erf 1510 Sea Vista
Area:	St Francis Bay
Date:	21.07.2022
Excavator:	TLB

TP 1

Datum: NGL | Co-ords: 25 Y0014554 X3783457

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, dark brown, very loose, intact, **SILTY SAND & ROOTS**, aeolian.

(200 to 2300) Moist, light brown, loose to medium dense towards base, intact, **SILTY SAND & ROOTS**, aeolian.

Grading & PI

Sidewalls unstable

No Water

Dynamic Cone Penetrometer (DCP)

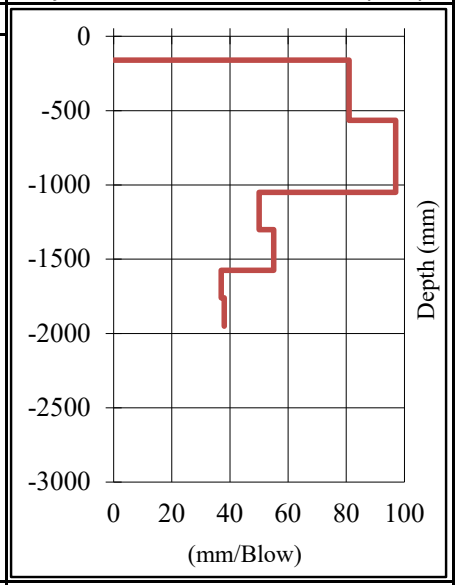
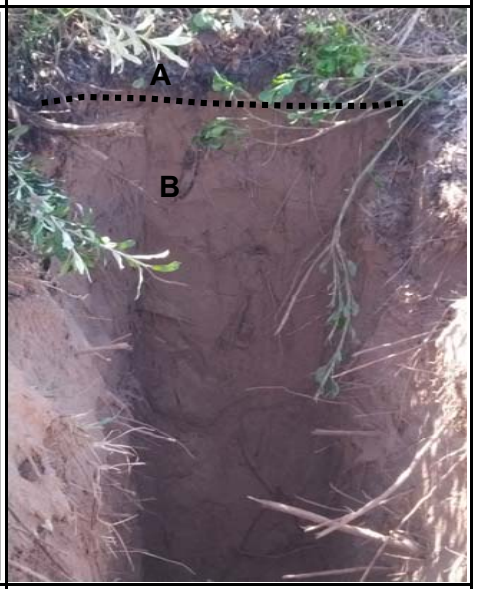


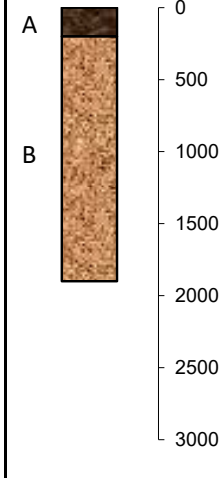
Photo of Test Pit



TP 2

Datum: NGL | Co-ords: 25 Y0014557 X3783465

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, dark brown, very loose, intact, **SILTY SAND & ROOTLETS**, aeolian.

(200 to 1900) Moist, light brown, loose to medium dense, intact, **SILTY SAND & ROOTLETS**, aeolian.

Sidewalls collapsed

No Water

Dynamic Cone Penetrometer (DCP)

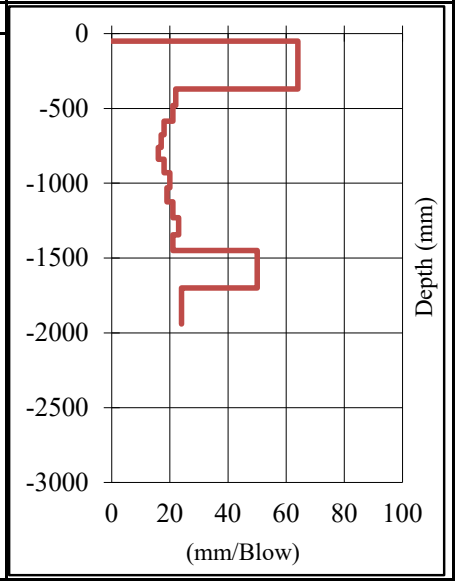
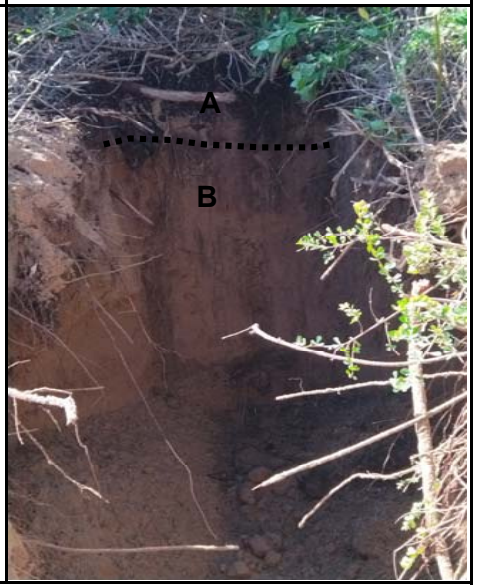


Photo of Test Pit



OUTENIQUA GEOTECHNICAL SERVICES

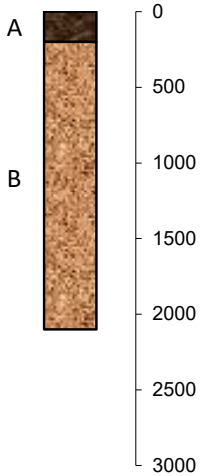
Geotechnical Soil Profile

Client:	Eco Route Environmental Consultancy
Project:	Erf 1510 Sea Vista
Area:	St Francis Bay
Date:	21.07.2022
Excavator:	TLB

TP 3

Datum: NGL | Co-ords: 25 Y0014556 X3783473

Key to symbols: ● Sample taken | Groundwater



(0 to 200) Moist, dark brown, very loose, intact, **SILTY SAND & ROOTLETS**, aeolian.

(200 to 2100) Moist, light brown, loose to medium dense at base, intact, **SILTY SAND & ROOTLETS**, aeolian.

Sidewalls colapsed

No Water

Dynamic Cone Penetrometer (DCP)

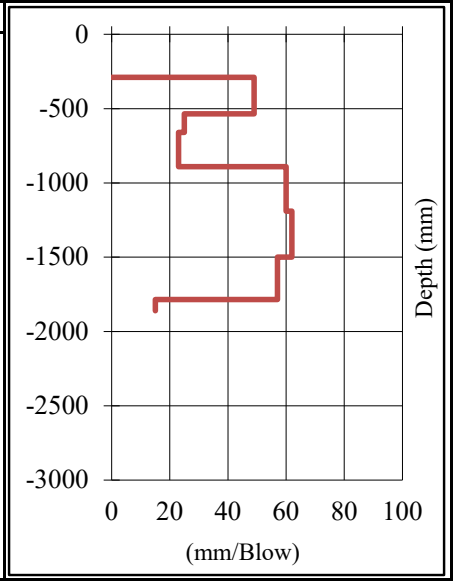


Photo of Test Pit

OUTENIQUA LAB EC cc.

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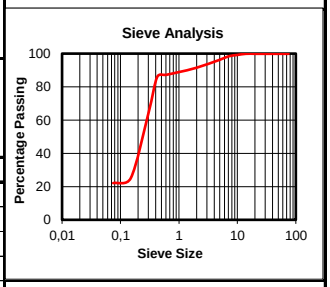
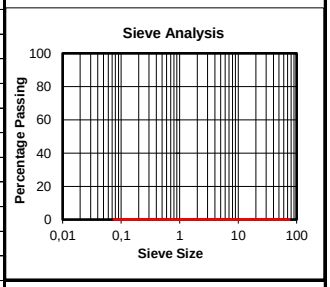
T0619

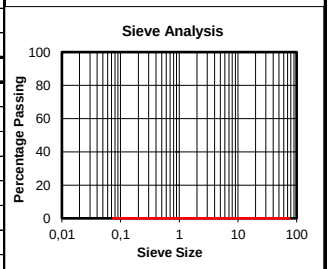
Customer :	Outeniqua Geotechinical Services cc Po Box 964 Knysna 6570	Project :	Ivan Marx - Erf 1510, Sea Vista
		Date Received :	22/07/22
		Date Reported :	04/08/22
		Req. Number :	1399/22
Attention :	I Paton - 0827827793	No. of Pages :	1/1

TEST REPORT
MATERIAL PROPERTIES OF SOILS / GRAVELS / AGGREGATES

Sample Position (SV)		TP 1								
Depth (mm)		200-2300								
Sample No		16259								
Material Description	Source	Test Pit								
	Colour	Light Brown								
	Soil Type	Silty Sand with Roots								
	Classification	Unknown								
Material Indicators - (SANS 3001 Method AG1,PR5*,GR20)										
Percentage Passing	75.0mm	100								
	63.0mm	100								
	50.0mm	100								
	37.5mm	100								
	28.0mm	100								
	20.0mm	100								
	14,0mm	100								
	10.0mm	99								
	7.1mm	98								
	5.0mm	96								
	2.0mm	92								
	1.0mm	89								
	0.600mm	87								
	0.425mm	86								
	0.300mm	64								
	0.150mm	25								
	0.075mm	22,1								
Fineness Modulus		1,5								
Moisture Content (%)										
Atterberg Limits - (SANS 3001 Method GR10)										
Liquid Limit		0								
Plasticity Index 0,425mm (%)		NP								
Plasticity Index 0,075mm (%)										
Linear Shrinkage (%)		0								
Material Strength - (SANS 3001 Method AG10,AG15*)										
ACV (%) Dry										
ACV (%) Wet										
10%FACT (kN) Dry										
10%FACT (kN) Wet										
Wet/Dry Relationship (%)										
Material Shape - (SANS 3001 Method AG2,AG3*,AG4)										
Flakiness Index (%)										
ALD - Direct Measurement (mm)										
ALD - Computation (mm)										
Material Properties - (SANS 3001 Method AG20,AG21,AG23 & TMH 1 Method B9 & SABS 0120 Section LB Part 3)*										
Relative Density (kg/m^3)										
LBD (kg/m^3)										
CBD (kg/m^3)										
Water Absorption (%)										
Compactability Factor										
Material Impurities - (SANS 5832 & SANS 5834)*										
Organic Impurities										
Soluble Deleterious (%)										
Material Classification										
AASHTO System										
Unified System										
Coefficient of Uniformity (Cu)										
Coefficient of Curvature (Cc)										
(D_{10}) (D_{30}) (D_{60})										







- **Specimens delivered to Outeniqua Lab in good order.**
- *** Non Accredited Test Methods.**

Luwayne Malgraff
Technical Signatory
For Outeniqua Lab EC cc.

1. The opinion column is an interpretation of the direct comparison between the quoted specification and the single test sample results obtained. The compliant (✓), non compliant (×) and uncertain (∗) opinion indicators are based on an approximate 95% level of confidence with reference to SAMM GUIDANCE 1, Issue 2 : 20 June 2007 Section 2.
2. The uncertain (∗) indicates that the test result is either equal to or is above / below the specified limit by a margin less than the measurement uncertainty; it is therefore not possible to state compliant (✓) or non compliant (×) based on a 95% level of confidence with reference to SAMM GUIDANCE 1, Issue 2 : 20 June 2007 Section 2.
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5. While every care is taken to ensure the correctness of all tests and reports, neither Outeniqua Lab EC cc nor its employees shall be liable in any way whatever for any error made in the execution or reporting of tests or any erroneous conclusions drawn therefrom or for any consequence thereof.

Outeniqua Geotechnical Services cc.

Geotechnical Engineering Consultants

Registration No. 1999/062743/23

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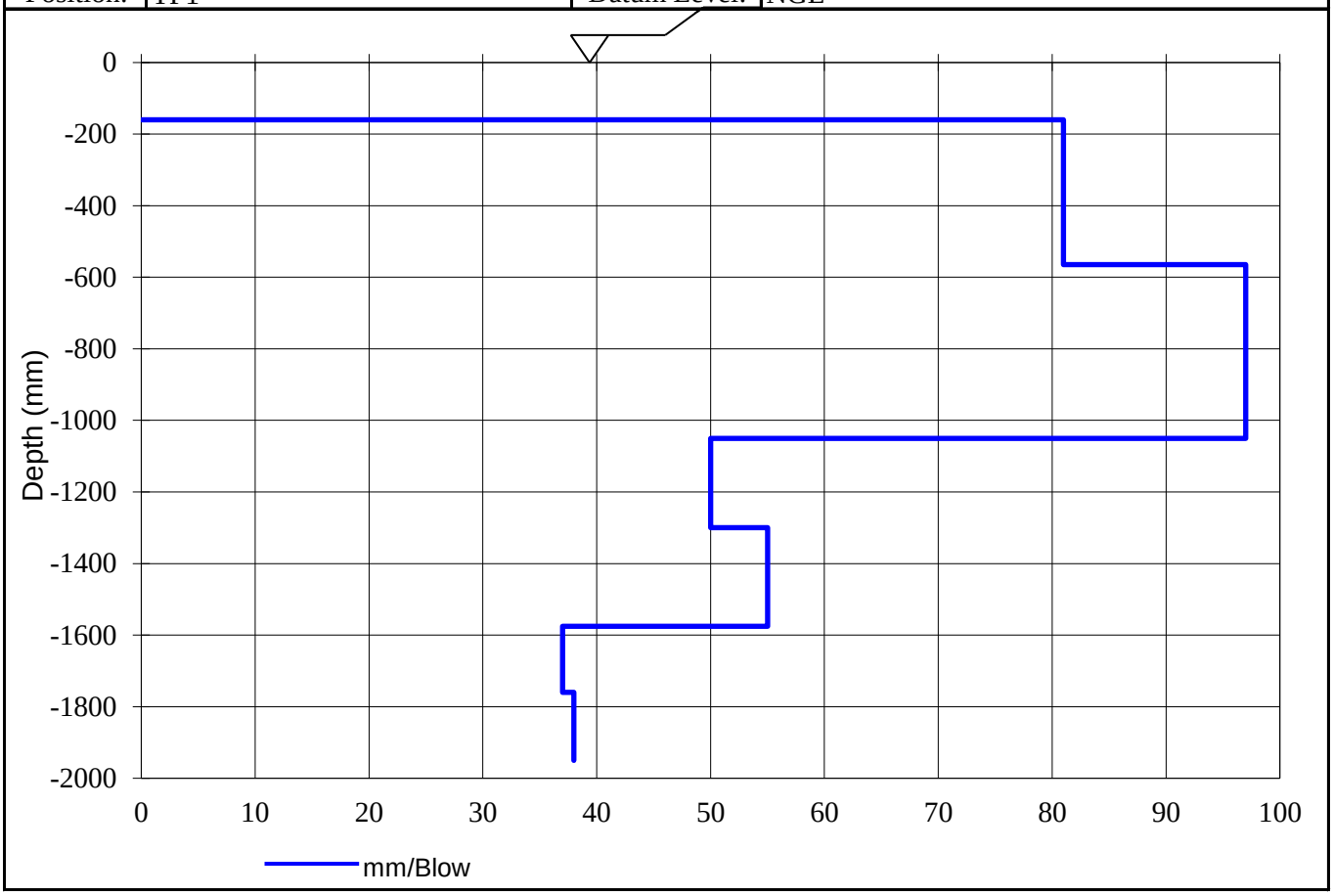
Customer :	Eco Route Environmental Consultancy Office 14 Main Road Sedgefield 6572	Project :	Erf 1510 Sea Vista St Francis Bay
		Date Received :	07.07.2022
		Date Reported :	21.07.2022
		Req. Number :	
Attention :	Samantha Teeluckdhari	No. of Pages :	1 of 6

TEST REPORT

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

Position:	TP1	Datum Level:	NGL



I Paton (Member)
For Outeniqua Geotech. Services cc.
Technical Signatory

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		Date Reported :	21.07.2022
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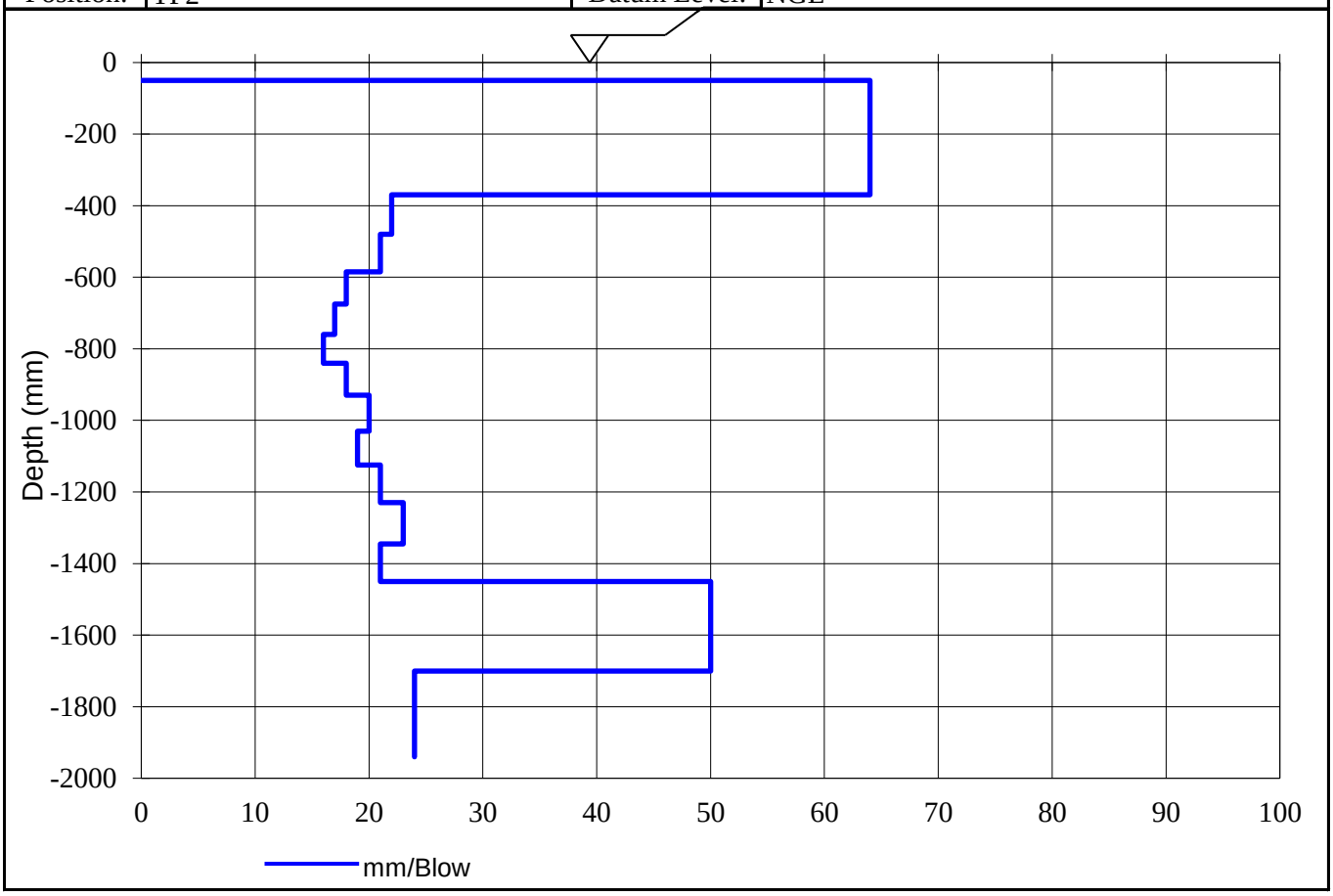
Attention :	Samantha Teeluckdhari	No. of Pages :	2 of 6

TEST REPORT

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

Position:	TP2	Datum Level:	NGL



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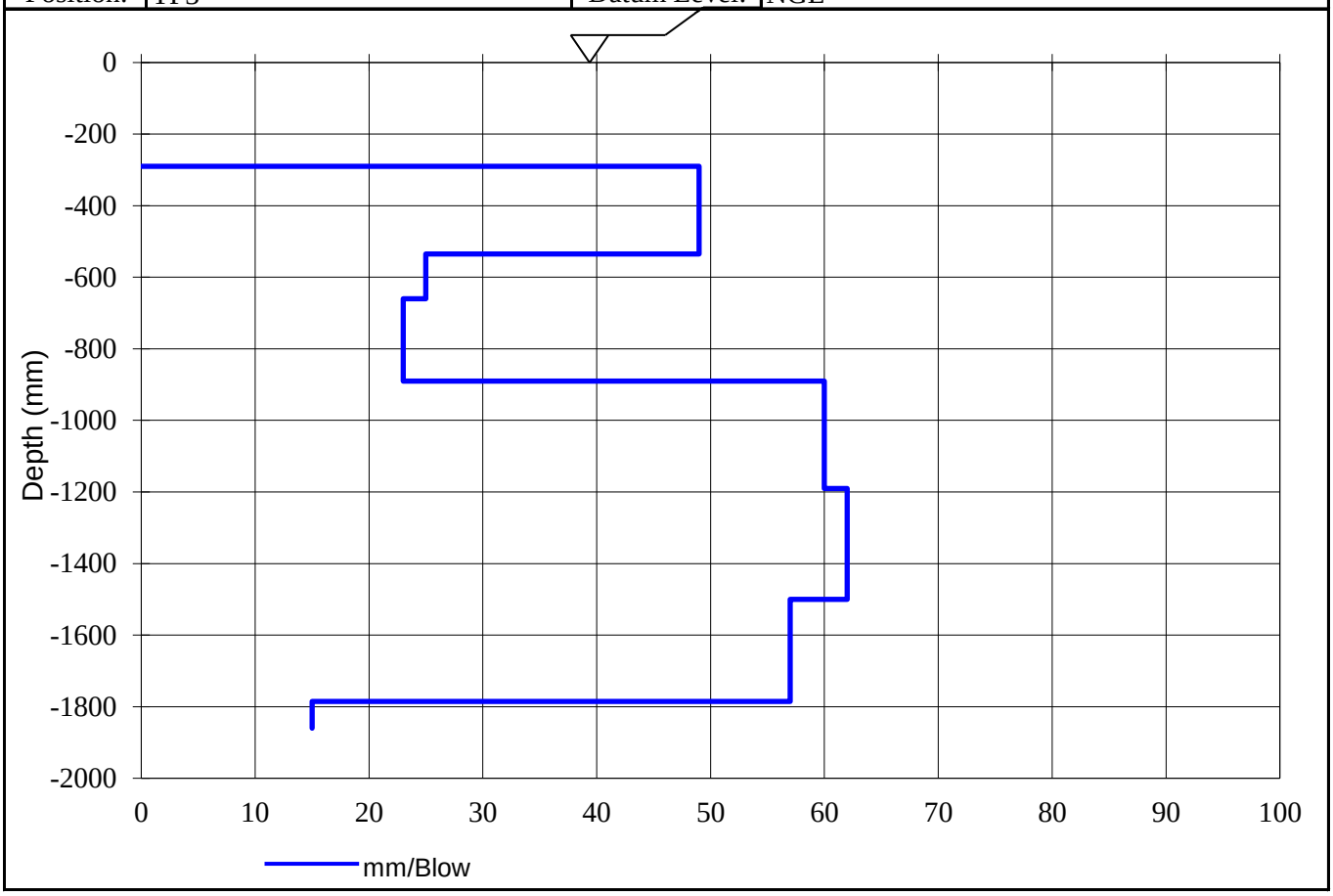
		Date Received :	07.07.2022
		Date Reported :	21.07.2022
		Req. Number :	
Attention :	Samantha Teeluckdhari	No. of Pages :	3 of 6

TEST REPORT

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

Position:	TP3	Datum Level:	NGL



I Paton (Member)
For Outeniqua Geotech. Services cc.
Technical Signatory

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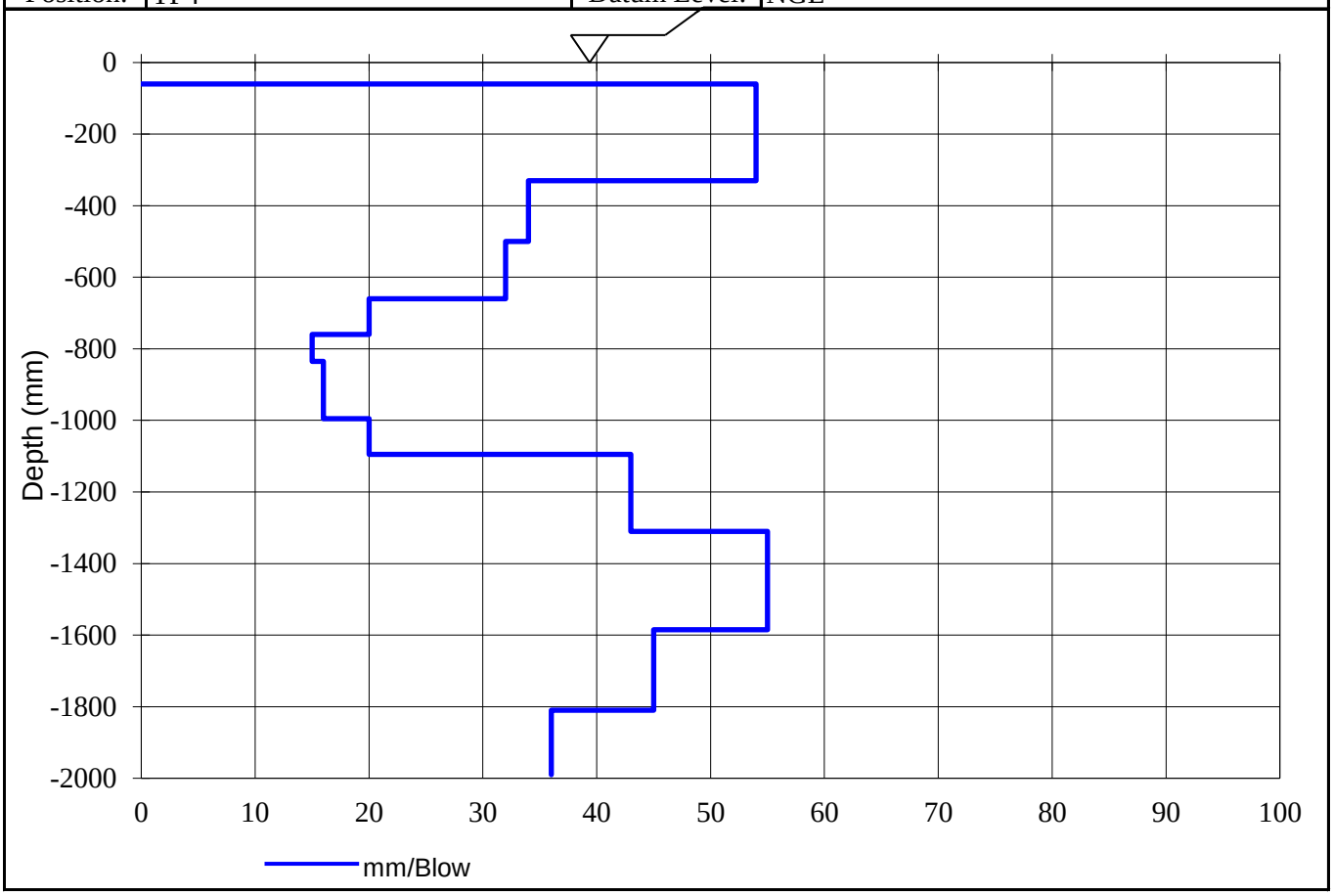
		Date Received :	07.07.2022
		Date Reported :	21.07.2022
		Req. Number :	
Attention :	Samantha Teeluckdhari	No. of Pages :	4 of 6

TEST REPORT

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

Position:	TP4	Datum Level:	NGL



I Paton (Member)
For Outeniqua Geotech. Services cc.
Technical Signatory

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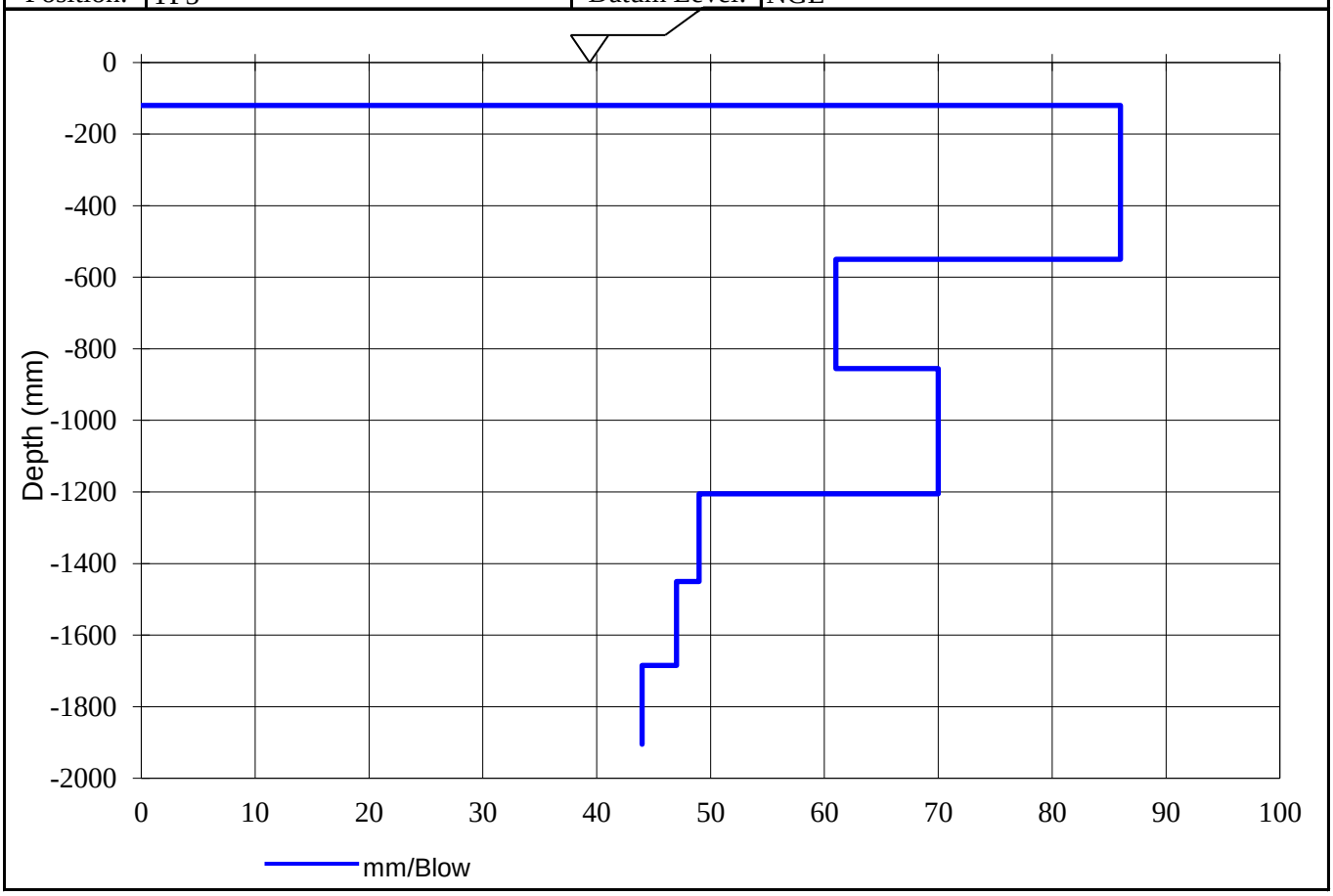
		Date Received :	07.07.2022
		Date Reported :	21.07.2022
		Req. Number :	
Attention :	Samantha Teeluckdhari	No. of Pages :	5 of 6

TEST REPORT

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

Position:	TP5	Datum Level:	NGL



I Paton (Member)
For Outeniqua Geotech. Services cc.
Technical Signatory

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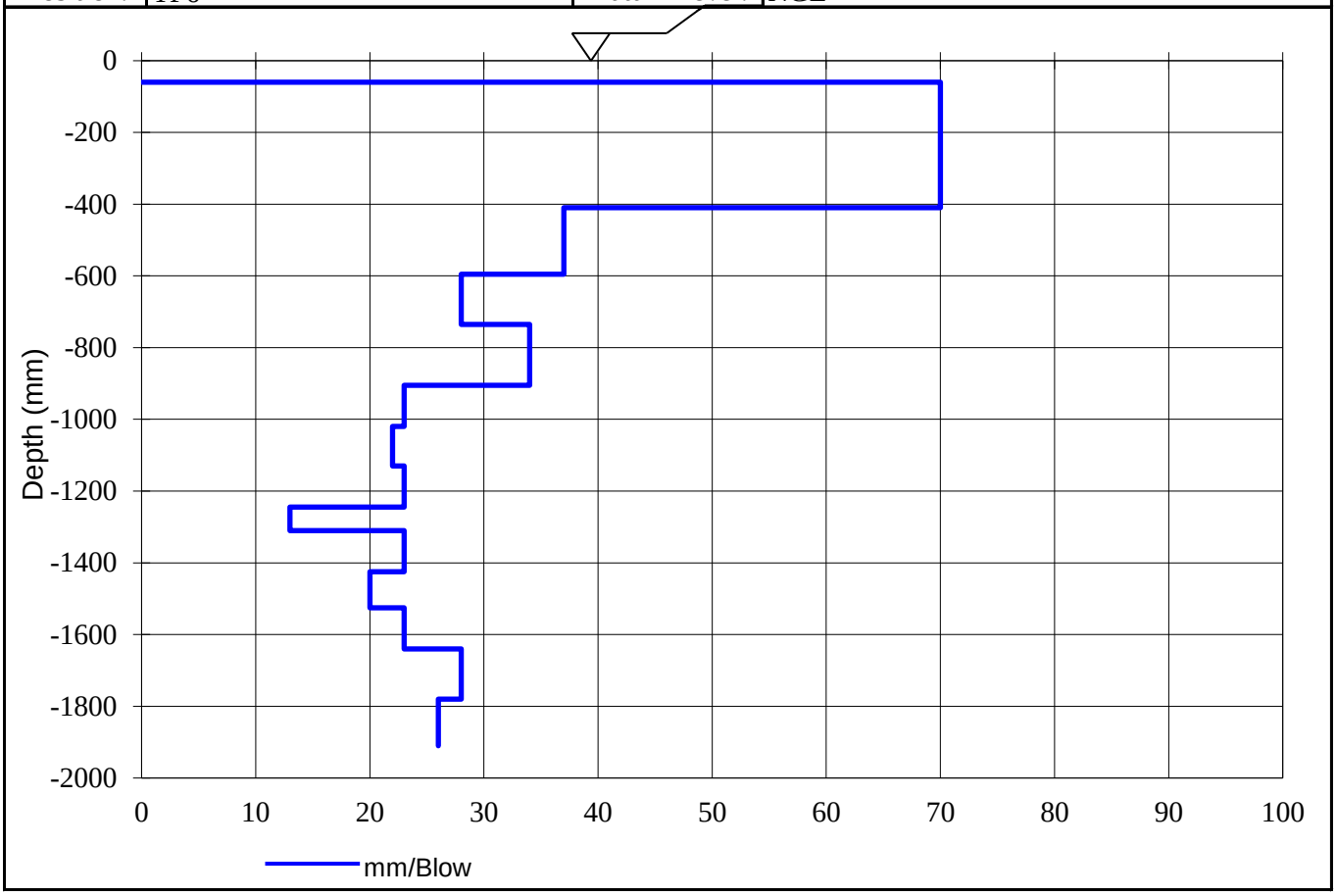
		Date Received :	07.07.2022
		Date Reported :	21.07.2022
		Req. Number :	
Attention :	Samantha Teeluckdhari	No. of Pages :	6 of 6

TEST REPORT

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

Position:	TP6	Datum Level:	NGL



I Paton (Member)
For Outeniqua Geotech. Services cc.
Technical Signatory

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