OUTENIQUA
GEOTECHNICAL SERVICES

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

GEOTECHNICAL SOIL TEST REPORT

Client: Mr Sean Holmes
Project: Erf 301, Wilderness
Date of test: 13.09.2024

Geotechnical Constraint	Risk			NHBRC Classification
	Low	Medium	High	
Active clay	X			H
Compressible soil	X			
Collapsible soil	X			C
Controlled/uncontrolled fill	X			
Chemically aggressive soils	X			
Saturated soils/ groundwater seepage		X		
Shallow hard rock/ difficult excavations		X		R
Slope stability problems		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 for the proposed residential development, consisting of a main residence and 4 smaller dwelling units, was located on ~4ha of vacant land approximately within 2km east of the central business area of Wilderness. Access to the site was gained on foot only from Whites Road along the northern boundary. At the time of investigation, the vegetation cover on the site was very thick, and consisted of indigenous forest and coastal thicket. The natural topography of the site was steeply sloping to the south with an average gradient of 1V:2.5H (~21°). See Figure 1-4.

There were natural drainage lines along the western and eastern boundaries of the site. No other drainage features or surface water bodies such as streams, marshes or dams were noted. The surface conditions were generally dry and stable with no signs of any slope stability problems.

The climate of the area was described as subtropical oceanic, with very mild winters and warm summers and an annual precipitation of 600-900mm (i.e. a wet climate with chemical decomposition as the dominant mode of weathering). Heavy rainfall events exceeding 100mm in a 24hour period were not uncommon in the area.

Figure 1: Oblique aerial view of the site (proposed development area circled in yellow and proposed access point and driveway)

Figure 2: View of the northern boundary of the site entrance along Whites Road

Figure 3: Viewing deck at the proposed main residence site, looking south

Figure 4: View of the site looking west from the viewing platform

Geology & soil profile:

The geological map of the area indicated that the site was underlain by granite rock of the George Pluton.

The profile excavated in test pits correlated with the local geology of the area. TP1 and TP2 consisted of silty sand of colluvial origin to an average depth of 1m below ground level, underlain by a thin residual clayey sand horizon, which quickly transitions into very soft granite rock (See Figure 5a). At TP3 and TP4 shallow, hard rock was encountered at a depth of 0.4m below ground level, overlain by similar colluvial silty sand (see Figure 5b).

Figure 5a: Typical profile at TP1 & TP2

Fig 5b: Typical profile at TP3 & TP4

Test results:

Lab tests conducted on the residual clayey sand indicated a medium PI (17) but low clay content (17%) thus resulting in an overall low potential expansiveness.

DCP tests conducted from natural ground level only penetrated to a maximum depth of 1.15m before refusing on very dense residual soil and/or shallow rock. See Figure 6 below. The tests confirmed the visual observations in test pits of very good founding conditions at shallow depth.

Overall assessment:

The investigation data indicates that the underlying geology and geotechnical conditions are generally favourable and suitable for a “low-impact” type residential development, where the development footprint takes into account the natural slope and bulk excavations are minimised accordingly. The proposed main dwelling (refer TP1 & 2) is underlain by very soft rock at a depth of about 1.2m which is ideal for normally loaded strip/pad foundations and a minor to moderate amount of cut to fill (to be mitigated where possible). The proposed pod units (refer TP3 & 4) are underlain by very shallow rock (may vary slightly) which is ideal for low-impact light structures on shallow pads and columns with minimal cut to fill. The natural slope stability was deemed to be OK under such development if structures are properly founded and earthworks are properly managed.

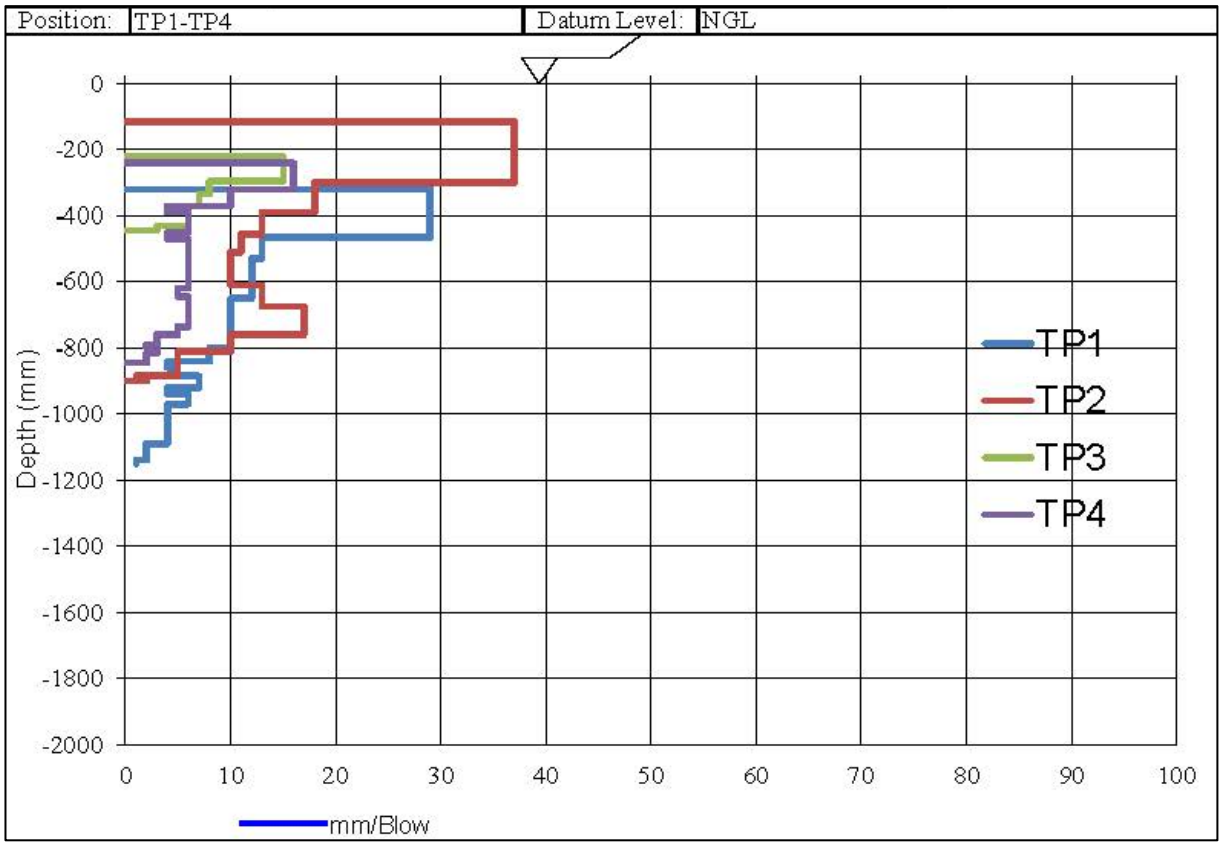


Figure 6: Combined DCP data

Recommendations:

Earthworks: Selective and minimal bush clearing, and removal/disturbance of organic topsoil is recommended to preserve the natural state of the site during construction. In a similar vein, the construction of the proposed access road onto the site should be carefully planned and managed to minimise earthworks and retaining walls by following the contours as far as possible. Excavations may be hampered by shallow bedrock in areas and thus should be mitigated as far as possible to reduce costs. Gravelly soil and fractured/broken rock material (max size 100mm) obtained from excavations may be used as bulk fill material if the required level of compaction can be achieved. Organic matter should be removed from potential fill material. Load-bearing fill material on roads, platforms and under surface beds should be compacted at optimum moisture content to min 95%MDD (<20mm/blow of DCP). Compaction should be properly tested.

Foundations: In order to minimise the impact of development on the site, it is recommended that structures are designed as light-weight structures with suspended floors, supported on posts and pads. Pad foundations should be supported on very dense residual soil or preferably bedrock at an estimated average depth of 0.9m below NGL with an allowable safe bearing pressure of 150kPa. Depth of excavations may vary to ensure all foundations are well founded to avoid any stability issues. Masonry/concrete structures with surface beds and strip footings will typically involve more earthworks and retaining walls. All excavations and foundations should be checked by the engineer.

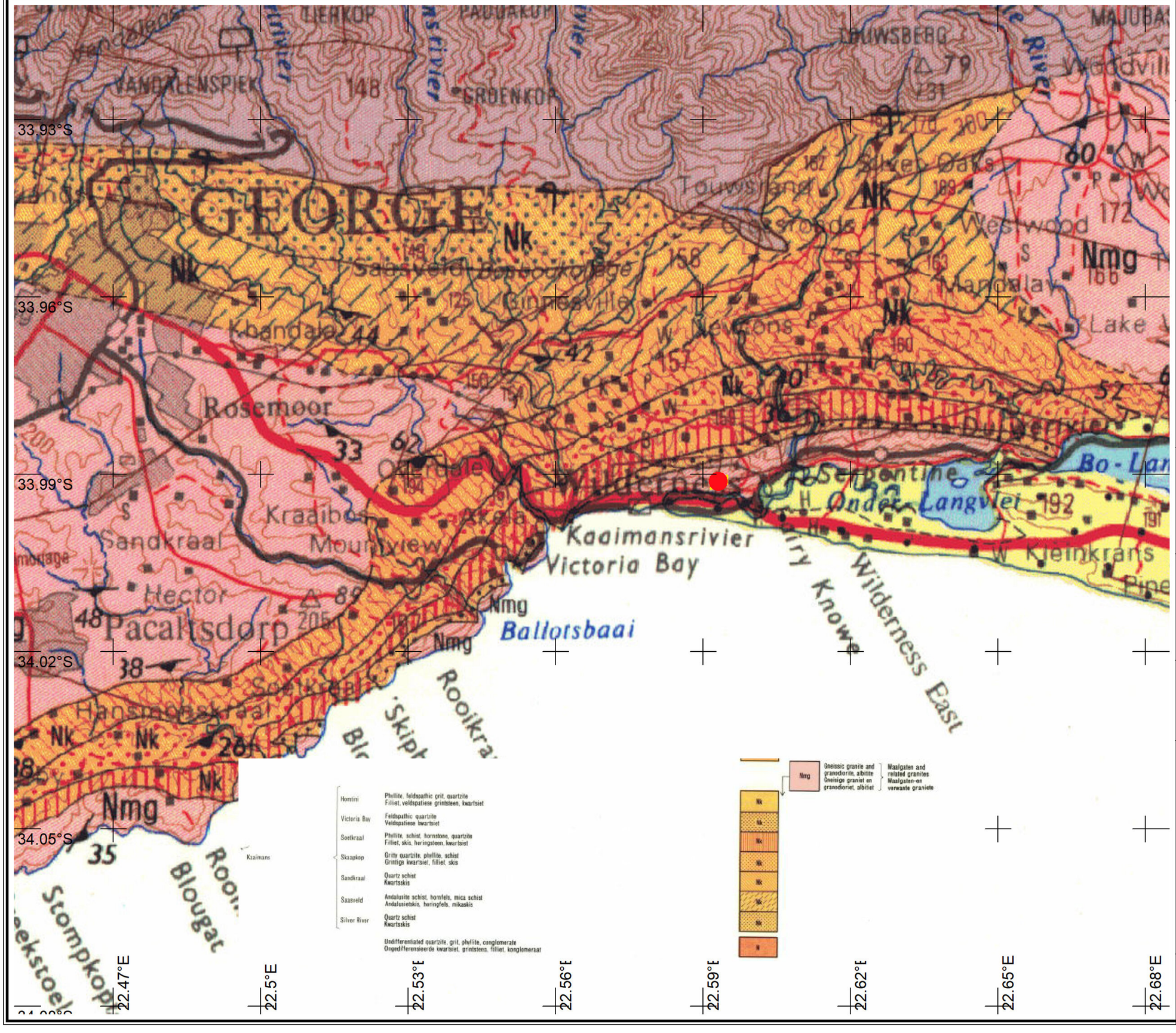
Access road/driveway: The steep site gradient and shallow bedrock may hamper road building, however, where the access road/driveway is planned for the site (as indicated in Figure 1), consideration should be given to minimise its length and width, and avoid a steep decline by following the natural contours as far as possible. The insitu organic-rich topsoil was considered poor quality roadbed material with a tendency to rut, particularly in wet conditions and should be entirely removed along any planned access roads and replaced with suitable gravel fill material (e.g. from cut or imported). It is recommended that allowance is made for importation of some gravel material to supplement material obtained from site. Recommended paved driveway layerworks include 150mm subbase (compacted to 95%MDD) and concrete slabs or interlocking pavers.

Drainage: The permeability of the soil is generally low due to stiff/dense fine grained soils and shallow bedrock. The fine grained sandy topsoil was also considered prone to erosion, especially on denuded slopes. An effective stormwater management system was highly recommended to ensure that water does not collect next to structures where it can seep into foundations or discharge in an uncontrolled manner onto the slopes below. The use of low-impact type structures, with minimal bulk excavations and post-and-pad type foundations, will help to mitigate erosion. Rain water harvesting from roofs is recommended to minimise run-off from site.

Conclusions:

The investigation indicated that the site was suitable for residential development but there were some geotechnical constraints which require some consideration in the engineering design and during construction.

Iain Paton Pr Sci Nat Pr Tech Eng



N

Legend

- Erf Boundary
- Site Location

Project: New Residential Units
Site: Erf 301
Area: Wilderness

Dwg Name: Geological Map
Date: September 2024
Rev no: 1
Drawn: IP

Client: Sean Holmes
Structural Eng:
Civil Eng:

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Scale 1:100000

0 0.6 1.8 3 km

N

Legend

Contours
Contours
5
20
100
500
Erf Boundary
Test positions
Geotechnical Terrains
Shallow Hard Rock @NGL-0.4m
Soft Rock Approx @NGL-1.3m

Project: New Residential Units
Site: Erf 301
Area: Wilderness

Dwg Name: Geotechnical Map
Date: September 2024
Rev no: 1
Drawn: IP

Client: Sean Holmes
Structural Eng:
Civil Eng:

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Scale 1:1500

0 6 24 36 48 60 m

OUTENIQUA GEOTECHNICAL SERVICES

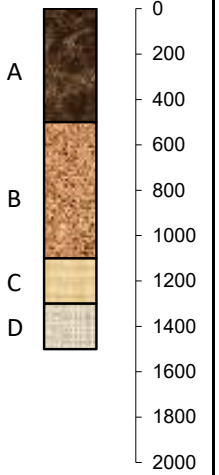
Geotechnical Soil Profile

Client:	Sean Holmes
Project:	Erf 301 Whites Road
Area:	Wilderness
Date:	13.09.2024
Excavator:	By Hand

TP 1

Datum: NGL | Co-ords: S33.99108 E22.59339

Key to symbols: ● Sample taken | Groundwater



(0 to 500)	Moist, dark brown, loose, pinholed, **silty SAND**, colluvial (contained abundant organics).
(500 to 1100)	Moist, dark red brown, loose, pinholed, **silty SAND**, colluvial.
(1100 to 1300)	Moist, dark yellow orange, very stiff, laminated, **clayey SAND**, residual.
(1300 to 1500)	Dark yellow orange, completely weathered, fine to medium grained, highly fractured, very soft rock, **GRANITE**.

Sidewalls stable
TP Refused
No Water

Dynamic Cone Penetrometer (DCP)

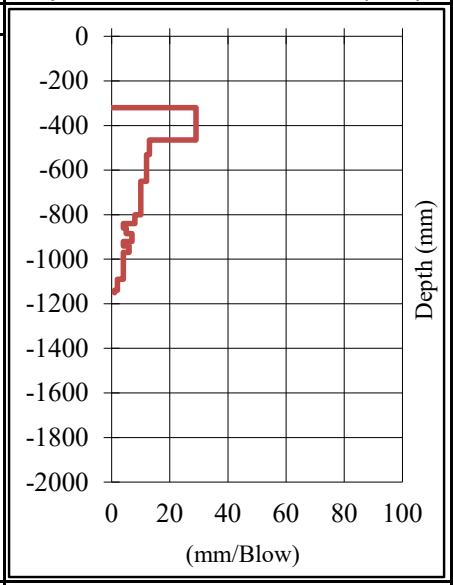
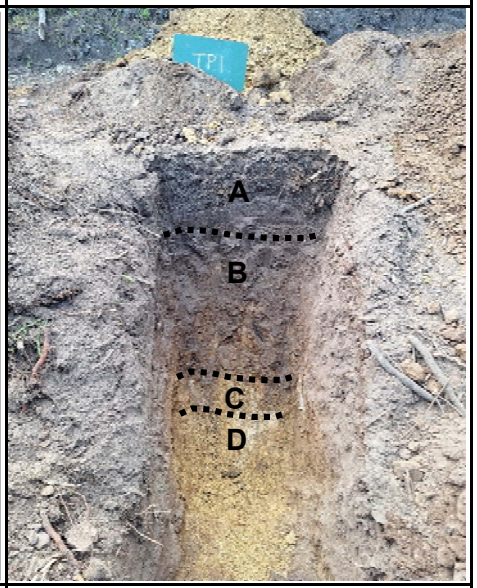


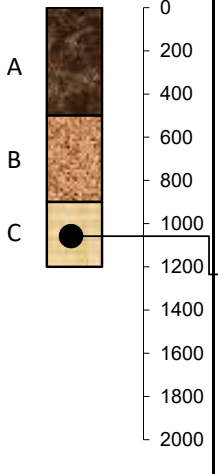
Photo of Test Pit



TP 2

Datum: NGL | Co-ords: S33.99105 E22.59324

Key to symbols: ● Sample taken | Groundwater



(0 to 500)	Moist, dark brown, loose, pinholed, **silty SAND**, colluvial (contained abundant organics).
(500 to 900)	Moist, dark red brown, loose, pinholed, **silty SAND**, colluvial.
(900 to 1200)	Moist, dark yellow orange, very stiff, laminated, **clayey SAND**, residual (transitioning into very soft rock).

Foundation Indicator

Sidewalls stable
TP Refused
No Water

Dynamic Cone Penetrometer (DCP)

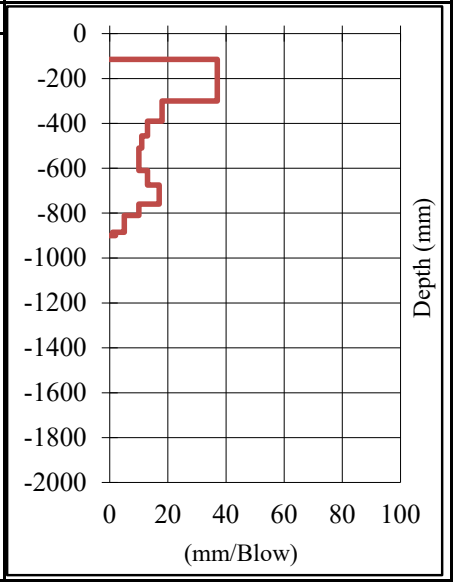


Photo of Test Pit

Geotechnical Soil Profile

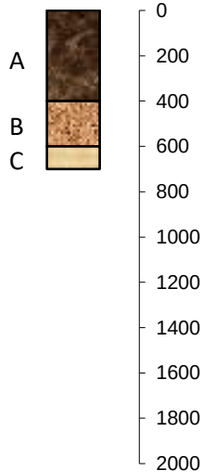
OUTENIQUA GEOTECHNICAL SERVICES

Client:	Sean Holmes
Project:	Erf 301 Whites Road
Area:	Wilderness
Date:	13.09.2024
Excavator:	By Hand

TP 3

Datum: NGL | Co-ords: S33.99107 E22.59306

Key to symbols: ● Sample taken | Groundwater



(0 to 400) Moist, dark brown, loose, pinholed, **silty SAND**, colluvial (contained abundant organics).

(400 to 600) Dark yellow orange, highly weathered, fine to medium grained, highly fractured, soft rock, **GRANITE**.

(600 to 700) Dark yellow orange, moderately weathered, fine to medium grained, slightly fractured, hard rock, **GRANITE**.

Sidewalls stable
TP Refused
No Water

Dynamic Cone Penetrometer (DCP)

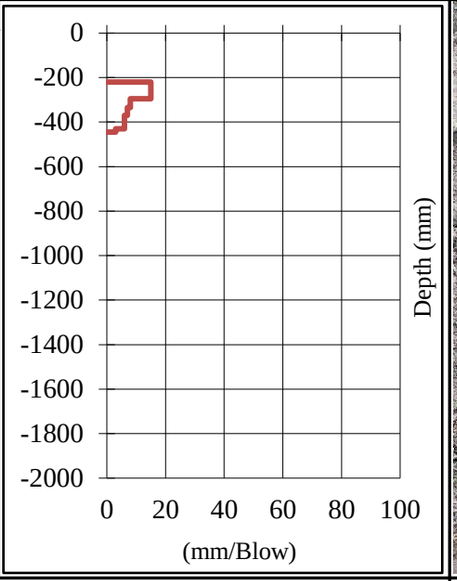
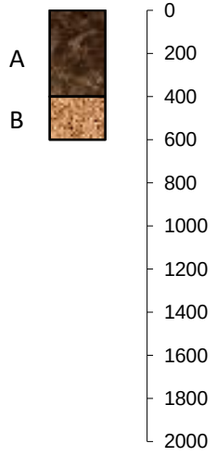


Photo of Test Pit

TP 4

Datum: NGL | Co-ords: S33.99107 E22.59265

Key to symbols: ● Sample taken | Groundwater



(0 to 400) Moist, dark brown, loose, pinholed, **silty SAND**, colluvial (contained abundant organics).

(400 to 600) Dark yellow orange, moderately weathered, fine grained, moderately fractured, medium hard to hard, **GRANITE**.

Sidewalls stable
TP Refused
No Water

Dynamic Cone Penetrometer (DCP)

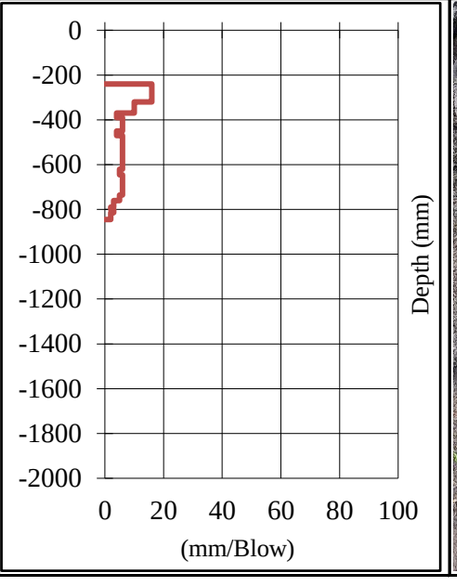


Photo of Test Pit

OUTENIQUA LAB (Pty) Ltd.

Registration No. 95/07742/07

Materials Testing Laboratory

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sanas Testing Laboratory

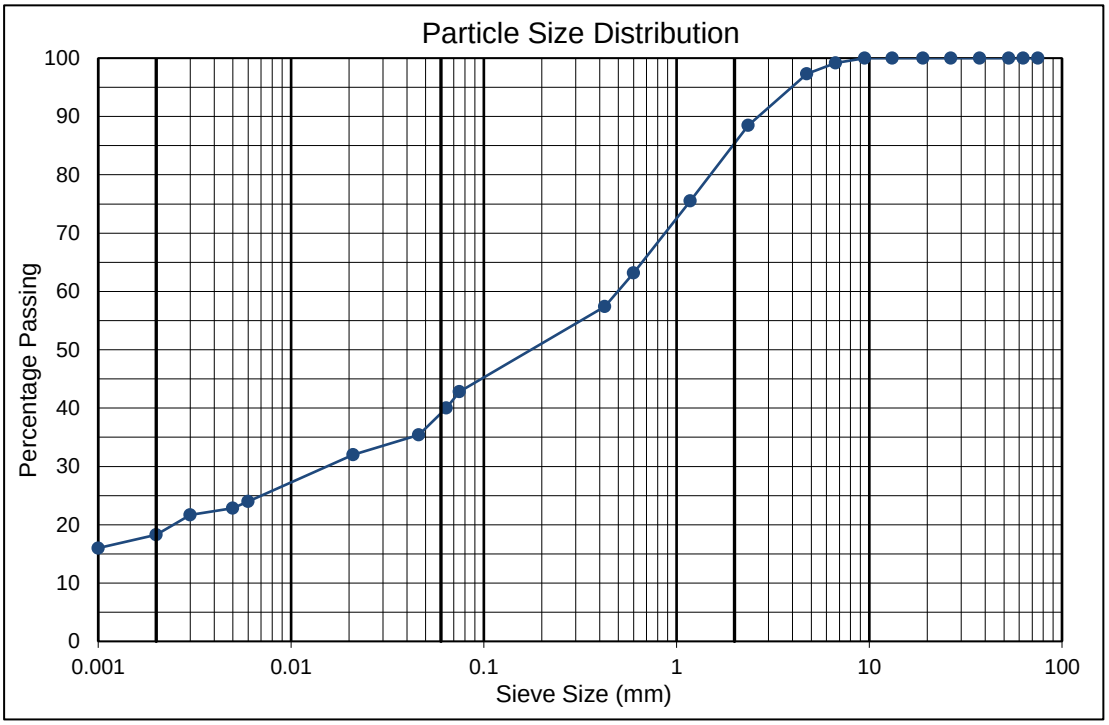
Customer :	Outeniqua Geotechnical Services P O Box 964 Knysna 6570	Project :	Erf 301 - White Road - Wilderness
		Date Received :	17/09/24
		Date Reported :	26/09/24
		Req. Number :	3926/24
Attention :	Iain Paton	No. of Pages :	1 of 1

TEST REPORT

FOUNDATION INDICATOR - (ASTM Method D422)

Sample Position (SV)		TP 2
Depth (mm):		900 - 1200
Sample No.:		89434
Materials Description	Source	In-Situ
	Colour	Light Yellow Orange
	Soil Type	Clayey Sand
	Classification	Trail Pit

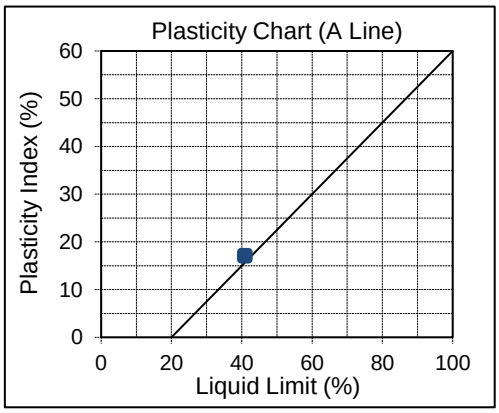
Percentage Passing	
75.0mm	100
63.0mm	100
53.0mm	100
37.5mm	100
26.5mm	100
19mm	100
13.2mm	100
9.5mm	100
6.7mm	99
4.75mm	97
2.36mm	89
1.18mm	76
0.6mm	63
0.425mm	57
0.075mm	43
0.064mm	40
0.046mm	35
0.021mm	32
0.006mm	24
0.005mm	23
0.003mm	22
0.002mm	18
0.001mm	16

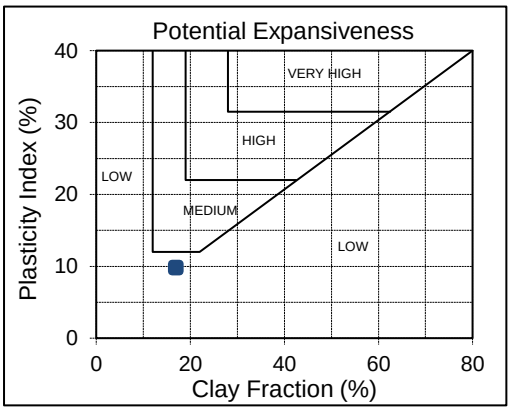


Liquid Limit (%)	41
Plasticity Index (%)	17
Linear Shrinkage (%)	9
Moisture Content (%)	12.9

% Clay	17
% Silt	22
% Sand	46
% Gravel	15

Unified Soil Classification	SC
AASHTO Soil Classification	A-7-6





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

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

Outeniqua Geotechnical Services cc.

Geotechnical Engineering Consultants

Registration No. 1999/062743/23

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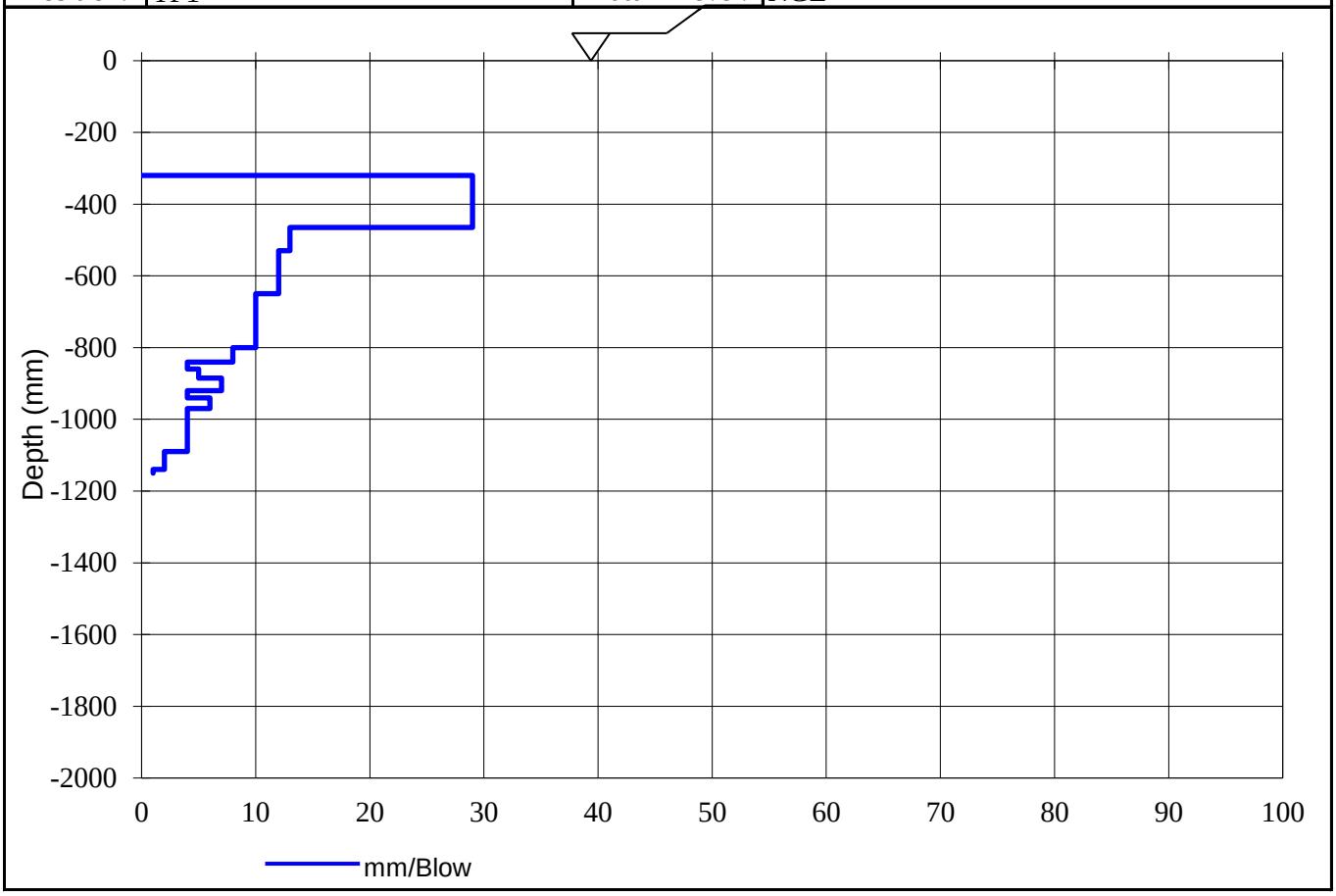
Customer :	Sean Holmes 473 10th Ave Wilderness 6540	Project :	Erf 301 Whites Road Wilderness
		Date Received :	22.08.2024
		Date Reported :	13.09.2024
		Req. Number :	
Attention :	Sean Holmes	No. of Pages :	1 of 4

TEST REPORT

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

Position:	TP1	Datum Level:	NGL



I Paton (Member)
For Outeniqua Geotech. Services cc.
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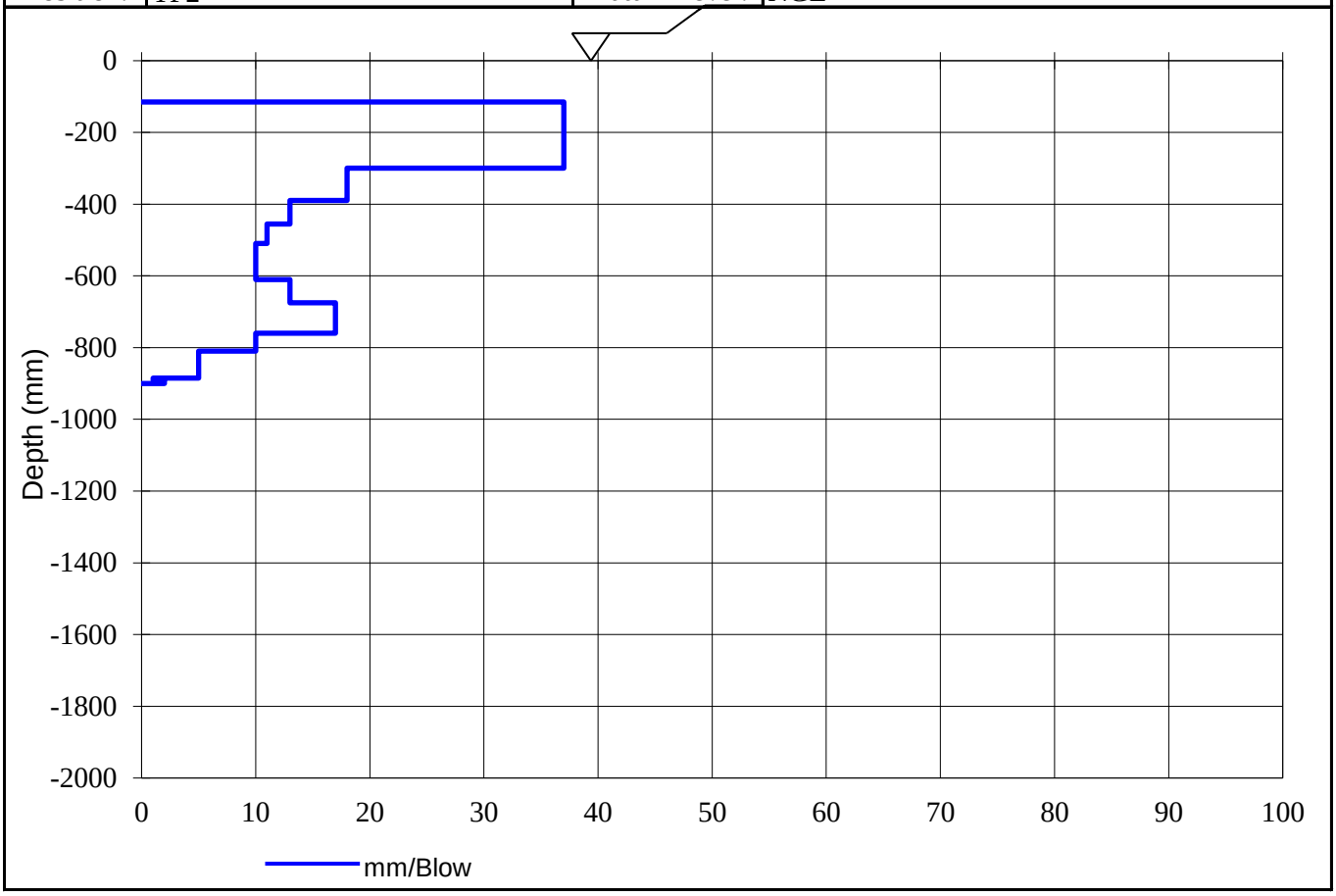
Attention :	Sean Holmes	No. of Pages :	2 of 4

TEST REPORT

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

Position:	TP2	Datum Level:	NGL



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		Date Received :	22.08.2024
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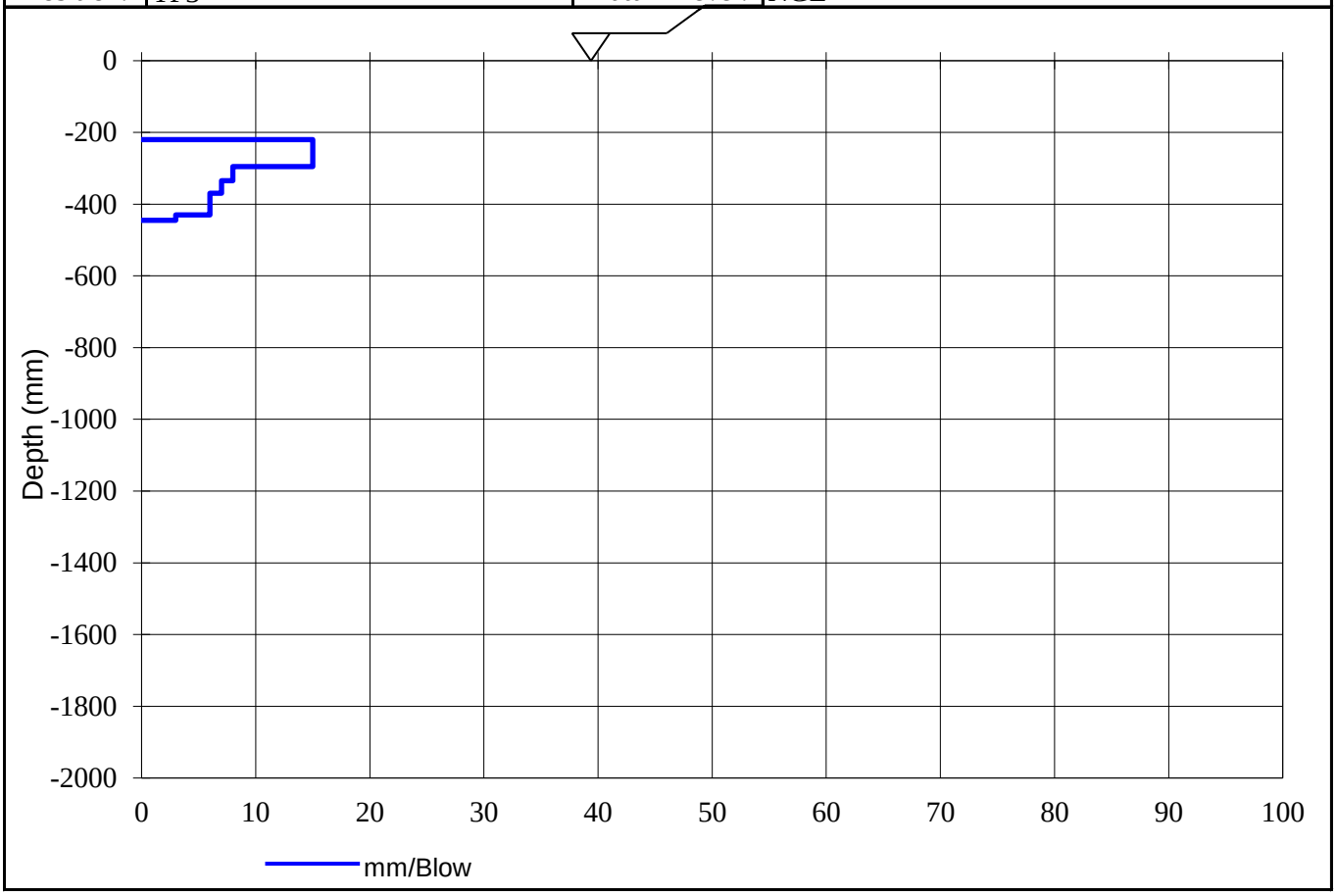
		Req. Number :	
Attention :	Sean Holmes	No. of Pages :	3 of 4

TEST REPORT

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

Position:	TP3	Datum Level:	NGL



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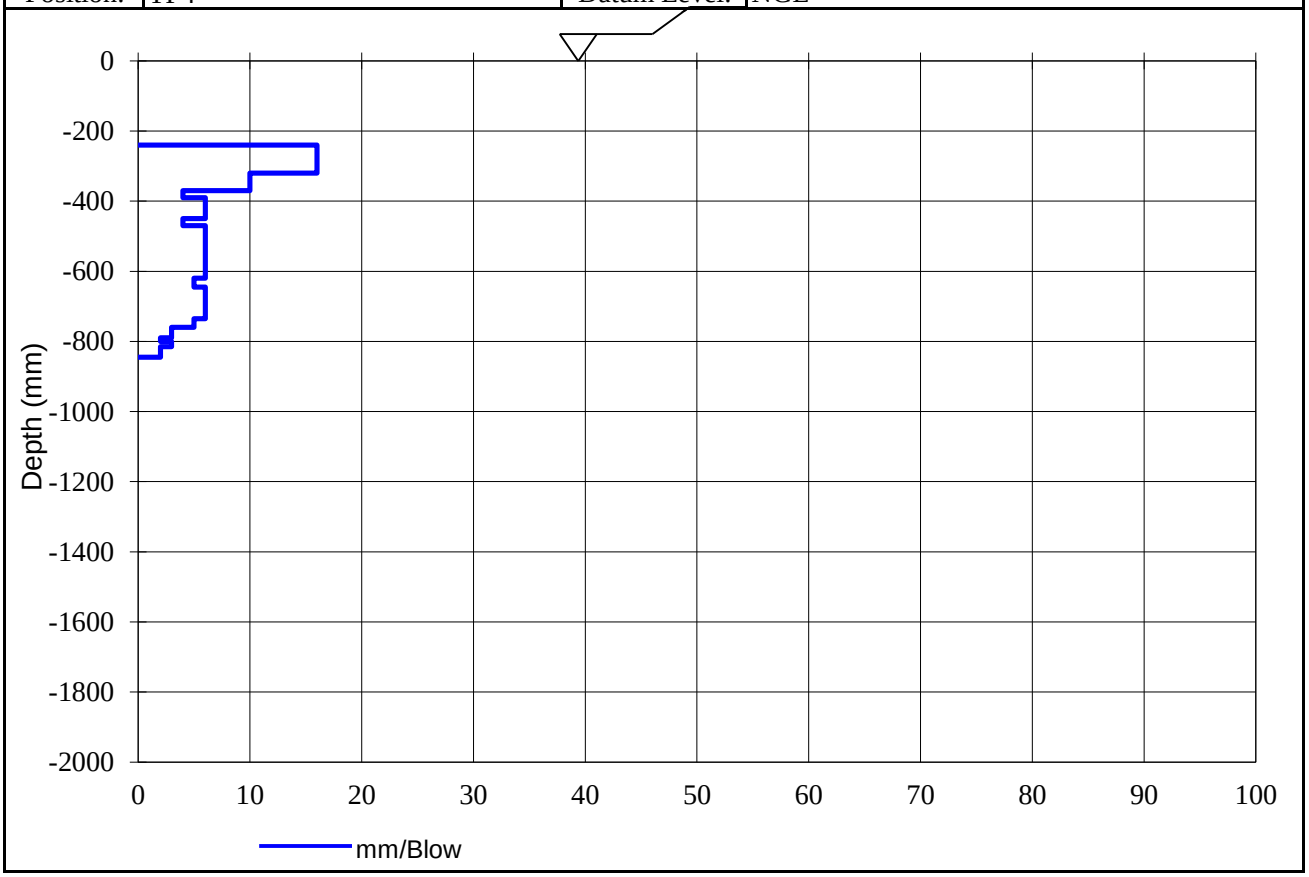
		Date Received :	22.08.2024
		Date Reported :	13.09.2024
		Req. Number :	
Attention :	Sean Holmes	No. of Pages :	4 of 4

TEST REPORT

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

Position: TP4 Datum Level: NGL



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		Date Received :	22.08.2024
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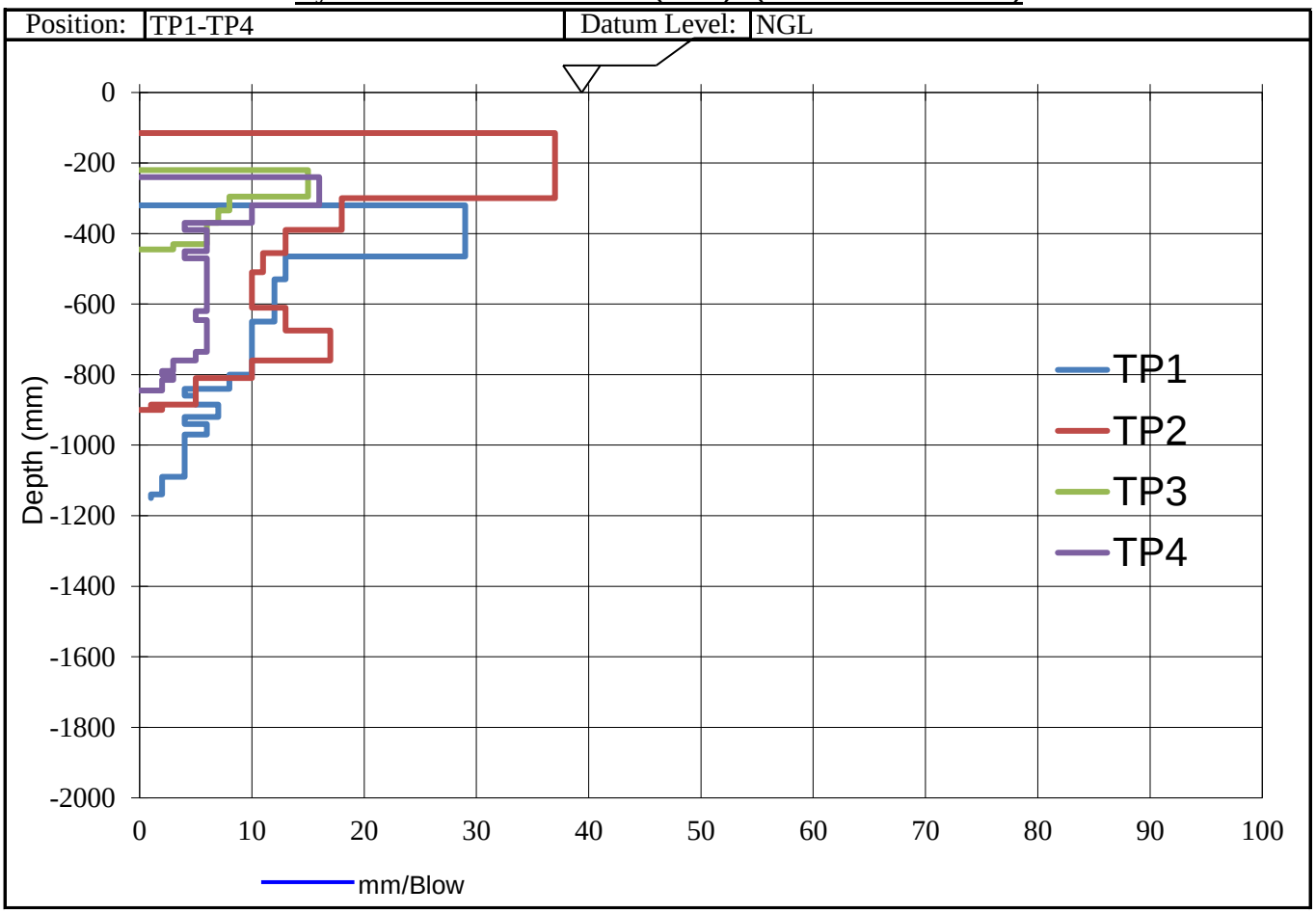
		Req. Number :	
Attention :	Sean Holmes	No. of Pages :	

TEST REPORT

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

Position:	TP1-TP4	Datum Level:	NGL



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