

GEOTECHNICAL SOIL TEST REPORT

Client: Mr Beveridge c/o Dave Visser Consulting Engineers

Project: Rem of Ptn 57 Brakkloof 443, Plettenberg Bay

Date of test: 20.09.2024

| Geotechnical Constraint | Risk | | | NHBC Classification |
|---|------|--------|------|-----------------------|
| | Low | Medium | High | |
| Active clay | X | | | |
| Compressible soil | | | X | S2 |
| Collapsible soil | X | | | |
| Controlled/uncontrolled fill | | | X | P (uncontrolled fill) |
| Chemically aggressive soils | | X | | |
| Saturated soils/ groundwater seepage | X | | | |
| Shallow hard rock/ difficult excavations | X | | | |
| 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 new dwelling was located on the eastern part of the Remainder of Portion 57 of Brakkloof 443, approximately 4km south of the central business district (CBD) of Plettenberg Bay. At the time of investigation, the site was vacant and the previously existing house had been demolished. Access to the site was easily gained from the internal paved driveway leading off Robberg Bay Road (gravel road only accessible from the south/Robberg Road).

The natural topography of the site was generally characterised as a coastal dune ridge, sloping to the west and east. Robberg beach was located less than 100m to the east of the site. There were no significant natural drainage features or surface water bodies on the site such as streams, marshes or dams, but the ground surface was fairly irregular with several depressions and small hillocks, typical of a dune field. The proposed site for the new house was a fairly level existing platform where

the previous house was built (See Figure 1-2). The surface conditions were moist due to recent rain and loose/sandy but generally stable with no signs of any severe 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 and existing platform area, looking southwest



Figure 2: View of the site, looking east towards Robberg Beach

Geology & soil profile:

The geological map of the area indicated that the site was underlain by thick deposits of unconsolidated dune sands overlying sedimentary rocks of the Robberg formation at unknown depth.

The profile excavated in test pits correlated with the local geology of the area. The natural soil profiles were dominated by fine aeolian (dune) sand (see Figure 3). Uncontrolled fill from the previous house and its demolition were encountered in some of the test pits, consisting of a mixture of rubble, sand and remnant foundation structures (See Figure 4). The underlying bedrock was not exposed on surface or in test pits and was not expected within a depth of at least 10m.

No groundwater or perched water tables were observed in test pits.



Figure 3: Typical fine grained aeolian sand encountered in test pits



Figure 4: Rubble and remnant foundation structures encountered in some pits

Test results:

The lab results indicated that the insitu soil was dominated by non-plastic, silty fine sand with negligible clay content and zero heave potential. The soil type was classified according to the Unified Soil Classification as SM (sand with >12% fines) and was deemed suitable for use as a general filling material (probably G8 quality).

handheld penetration tests (DCP) conducted through the upper 4m of the profile indicated that the upper 1.5m was very loose, but consistently improving below 2m to medium dense state (see attached results). The following approximated shear strength parameters were derived from DCP tests:

- 0-1500mm: loose, $\phi'=28^\circ$, $c'=0\text{kPa}$, high compressibility.
- 1500-2500mm: medium dense, $\phi'=32^\circ$, $c'=0\text{kPa}$, moderate compressibility.
- 2500-4000mm: dense, $\phi'=34^\circ$, $c'=0\text{kPa}$, low compressibility.

In general, the tests indicated a highly compressible soil within the influence zone of normal shallow foundations, thus requiring modified or improved foundation systems.

DPSH tests conducted from present ground level to a depth of 8m indicated a similar profile as follows:

- **DPSH1:** Very loose upper 1m (<10 blows/300mm), improving to a medium dense state (10-20 blows/300mm) to a depth of 3.5m and then dense below this depth (>20 blows/300mm).
- **DPSH2:** The test indicated a very dense upper 2.5m possibly due to obstruction from buried old concrete foundations, underlain by a generally medium dense layer to 7.5m and becoming very dense beyond this depth.
- **DPSH3:** The test indicated a variable consistency (medium to dense) in the upper 4.5m, but consistently dense below this depth.

The general interpretation of the tests was as follows:

0-4.5m: Medium dense, SPT N=10-20, $\phi'=32-34^\circ$, $c'=0\text{kPa}$

4.5-7.5m: Dense, SPT N=20-40, $\phi'=34-36^\circ$, $c'=0\text{kPa}$

7.5-8m: Very dense, SPT N=40-50, $\phi'=36-38^\circ$, $c'=0\text{kPa}$

No refusal was reached within the maximum test depth of 8.1m at any of the test positions.

Recommendations:

Earthworks: Significant earthworks were expected to remove old remnant foundation structures and establish the various proposed platform levels. All excavations were provisionally classified as "soft" in accordance with SANS1200D and thus excavatable with a TLB or preferably tracked excavator, as some buried foundations may be difficult to excavate with a TLB.

All vegetation and existing uncontrolled fill should be completely stripped from the footprint of the proposed structures and stockpiled for later use or removed to spoil as directed by the engineer. The insut sandy soil could be re-used for bulk fill material on platforms, behind retaining walls and under floors and foundations, provided that any unsuitable rubble, steel rebar, etc is selected out and the required level of compaction is achieved (recommend 95-98% MDD (<25mm/blow of DCP) for load-bearing fill). All soils obtained from excavations on site should first be stockpiled for approval by the engineer before reuse as fill material. Allowance should also be made for importation of some higher quality material (such as G5) for upper layerworks under surface bed floors and under heavily loaded spread foundations, where necessary. Compaction should be properly tested. Deep excavations may be highly unstable at angles greater than 45° and shoring or battering of slopes is recommended in excavations >1m.

Foundations: Single/double storey masonry structures can be founded on reinforced spread foundations (strips/pads), placed on recompacted insitu soil (i.e. a soil raft). Bearing pressure should be limited to 150kPa. Higher loads may require deep foundations (e.g. piles) or stabilisation of the insitu soil below foundations. The thickness of compacted soil below shallow foundations should be at least 1.5x width of the footing and should be tested with a DCP. The recommended method is to over excavate the trench, wet and compact the base of the excavation and then replace the excavated soil back into the trench in compacted layers not exceeding 0.3m if using a 2t roller or 0.15m for 1t roller or trench compactor. Sand should be well wetted to achieve compaction. The engineer should also inspect excavations to confirm suitable conditions. An RC raft foundation is also a suitable system on an engineered soil raft. Some articulation joints are recommended in large structures to accommodate differential settlement. Furthermore, it is recommended that the eastern edge of the structure is supported on piled foundations to protect against possible future coastal erosion. The recommended pile type is bored or driven piles embedded at least 6-8m below ground level. No water table is expected at this depth.

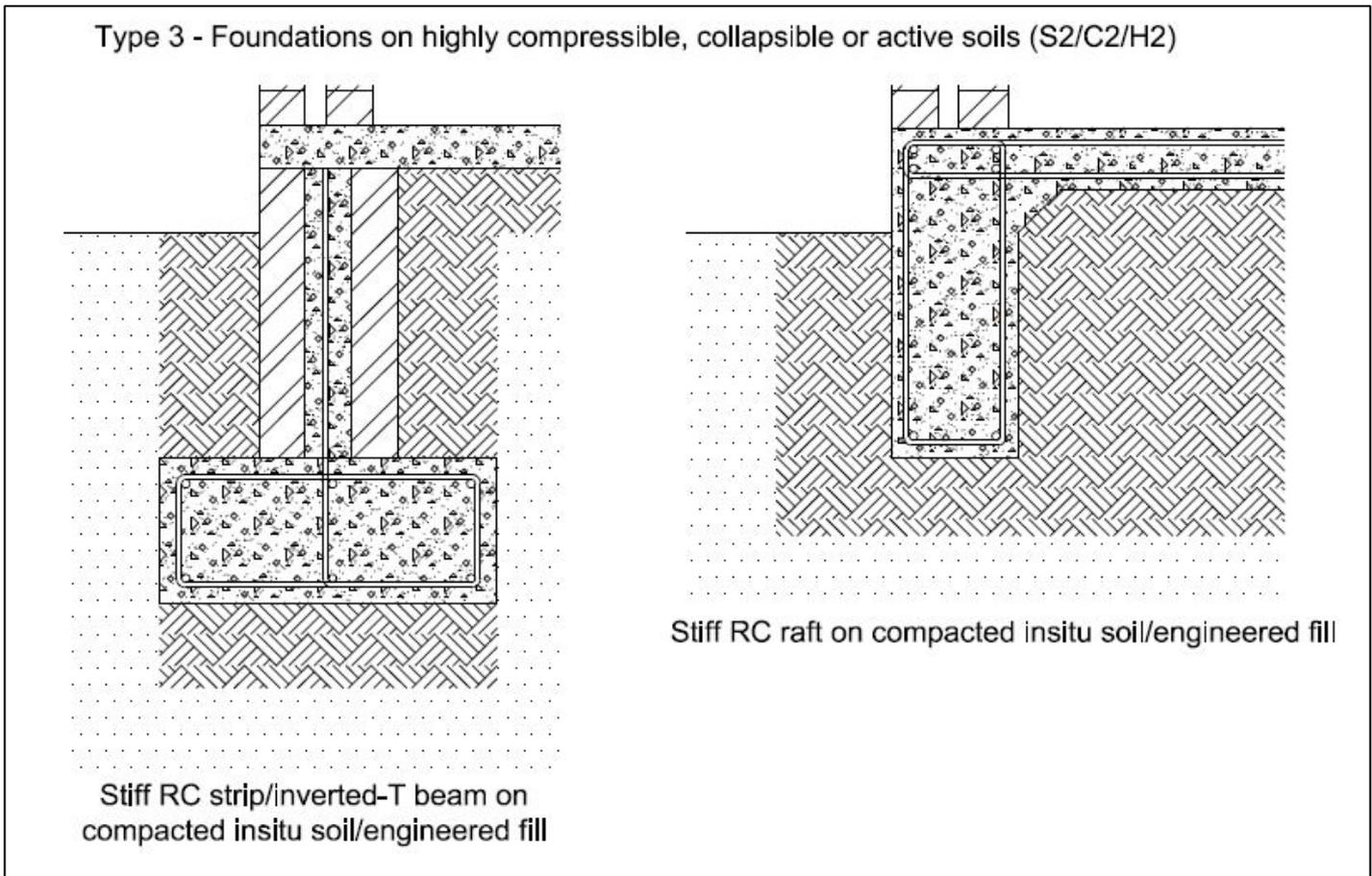


Figure 5: Recommended shallow foundation types

Roads: The insitu soil was generally marginal quality sandy subgrade material (~G8/9) and the recommended minimum layerworks include 150-200mm of imported G5 subbase, compacted to 95%MDD, and conventional concrete pavers or concrete slabs.

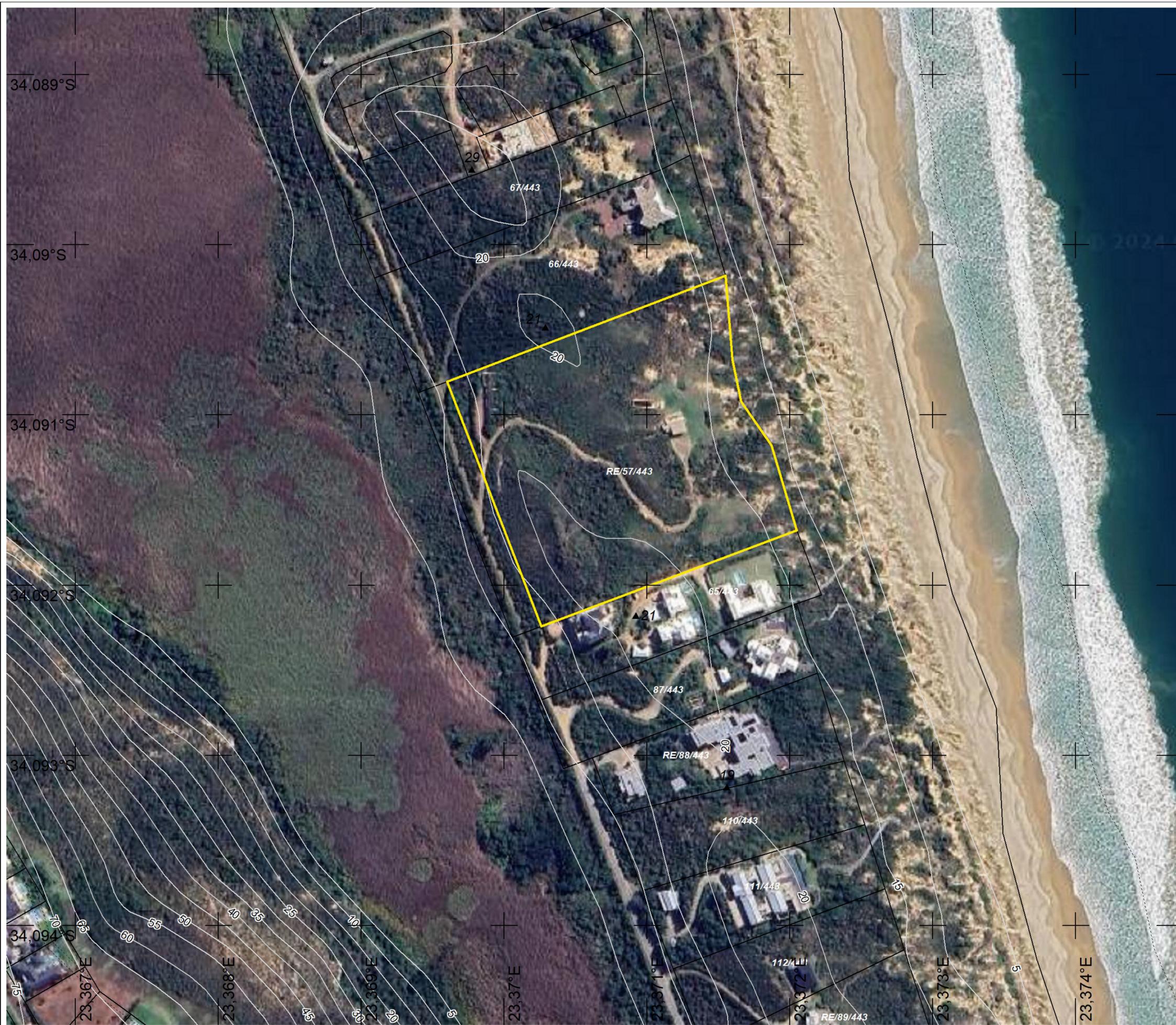
Drainage: The soil was generally permeable but fine grained and may drain slowly in heavy downpours. The soil is also potentially highly erodible under the action of concentrated stormwater, so an effective stormwater management system is highly recommended to collect and discharge stormwater in a controlled manner away from structures. Preventative measures, such as good landscaping, will also mitigate the effect of stormwater on structures.

Conclusions:

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

A handwritten signature in black ink, appearing to read 'Iain Paton', written in a cursive style.

Iain Paton Pr Sci Nat Pr Tech Eng



Legend

 Site Boundary

Project: House Beveridge
 Site: Rem Ptn 57 of 443 Brakkloof
 Area: Plettenberg Bay

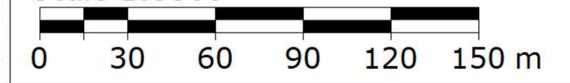
Dwg Name: Aerial map
 Date: Sept 2024
 Rev no: 1
 Drawn: IP

Client: Beveridge
 Structural Eng: Dave Visser
 Architect: SOATA



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Scale 1:3500





Legend

- Site Boundary
- Test Holes
- DPSH Positions

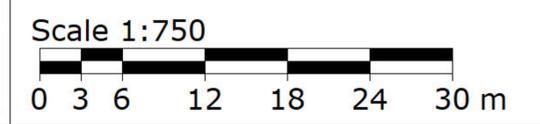
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 Site: Rem Ptn 57 of 443 Brakkloof
 Area: Plettenberg Bay

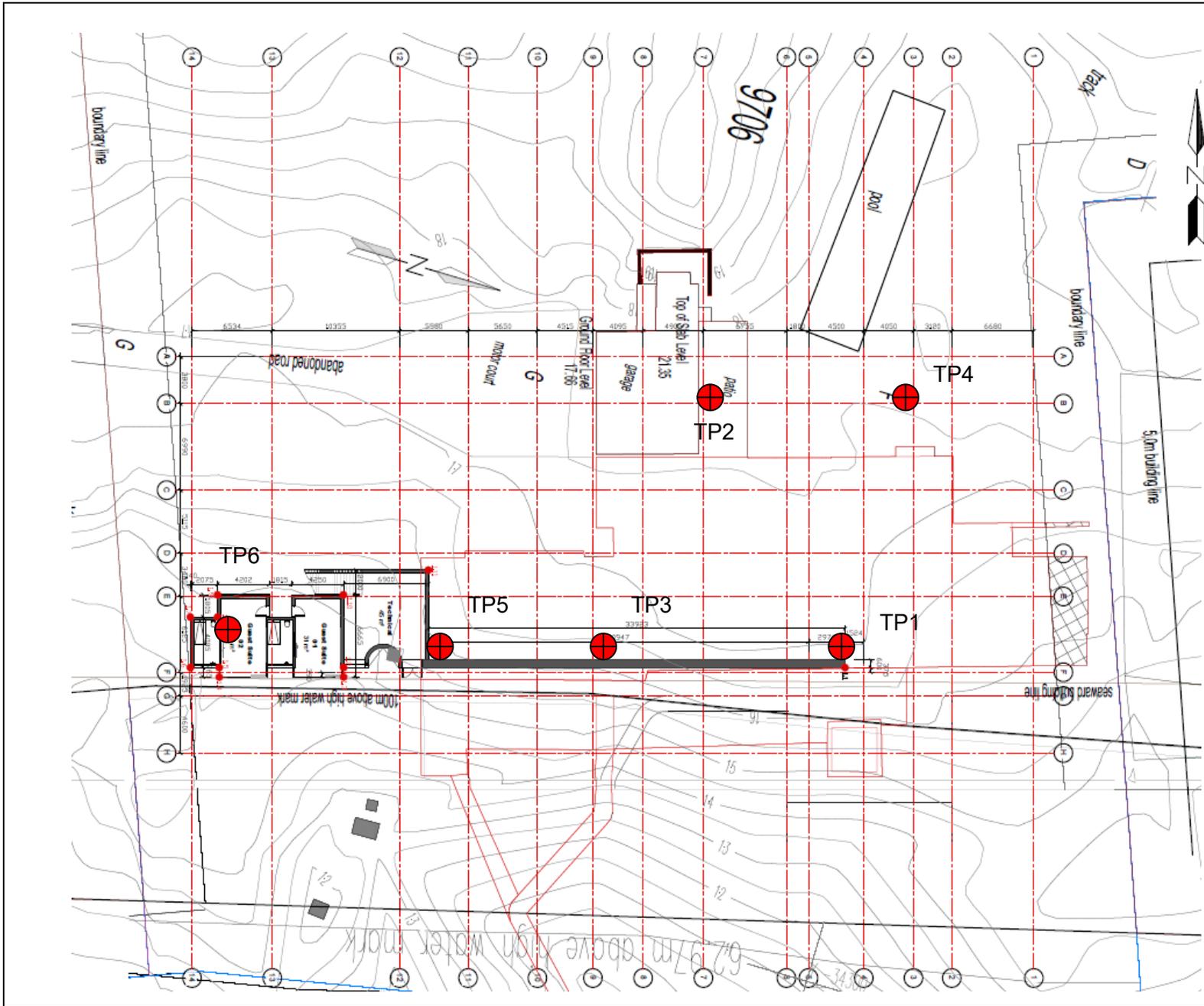
Dwg Name: Geotechnical tests
 Date: Sept 2024
 Rev no: 1
 Drawn: IP

Client: Beveridge
 Structural Eng: Dave Visser
 Architect: SOATA



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CLIENT:
Beveridge

PROJECT:
Ptn 57 Brakkloof 443
Plettenberg Bay

TITLE:
Figure 1: Site plan
showing test positions

REVISION No.:
0

DATE:
20.9.2024

SCALE:





OUTENIQUA GEOTECHNICAL SERVICES

Geotechnical Soil Profile

| | |
|------------|----------------------------------|
| Client: | Dave Visser Consulting Engineers |
| Project: | Rem Portion 57 of Brakkloof 443 |
| Area: | Plettenberg Bay |
| Date: | 20.09.2024 |
| Excavator: | TLB |

| | | Datum: NGL | Co-ords: S34.09085 E23.37139 | Dynamic Cone Penetrometer (DCP) | Photo of Test Pit |
|--|---|--|------------------------------|---------------------------------|-------------------|
| | TP 1 | Key to symbols: ● Sample taken | ☒ Groundwater | | |
| | (0 to 1000) Moist, light brown, loose, structureless, slightly silty fine SAND , imported (old concrete foundations). (1000 to 2000) Moist, light yellow, medium dense, structureless, fine SAND , aeolian. | Sidewalls highly unstable TP Stopped No Water | | | |
| | TP 2 | Key to symbols: ● Sample taken | ☒ Groundwater | | |
| | (0 to 1000) Moist, light brown, loose, structureless, slightly silty fine SAND , imported (old concrete foundations). (1000 to 1500) Moist, dark brown, medium dense, structureless, silty fine SAND , aeolian. (1500 to 2500) Moist, light yellow, medium dense, structureless, fine SAND , aeolian. Foundation Indicator | Sidewalls highly unstable TP Stopped No Water | | | |



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Geotechnical Soil Profile

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| Area: | Plettenberg Bay |
| Date: | 20.09.2024 |
| Excavator: | TLB |

| | | | | | |
|---|--|--------------------------------|--|---------------------------------|-------------------|
| A | TP 3 | Datum: NGL | Co-ords: S34.09106 E23.37138 | Dynamic Cone Penetrometer (DCP) | Photo of Test Pit |
| | (0 to 2400) | Key to symbols: ● Sample taken | ▼ Groundwater | | |
| 0 500 1000 1500 2000 2500 3000 3500 4000 | Moist, light yellow, medium dense, structureless, slightly silty fine SAND , imported FILL. | | <p style="text-align: center;">Depth (mm)</p> <p style="text-align: center;">(mm/Blow)</p> | | |
| <p style="text-align: center;">Sidewalls highly unstable TP Stopped No Water</p> | | | | | |

| | | | | | |
|---|--|---|--|---------------------------------|-------------------|
| A B C | TP 4 | Datum: NGL | Co-ords: S34.09085 E23.37118 | Dynamic Cone Penetrometer (DCP) | Photo of Test Pit |
| | (0 to 350) (350 to 1100) (1100 to 2100) | Key to symbols: ● Sample taken | ▼ Groundwater | | |
| 0 500 1000 1500 2000 2500 3000 3500 4000 | Very moist, light yellow, loose, structureless, fine SAND , imported. | | <p style="text-align: center;">Depth (mm)</p> <p style="text-align: center;">(mm/Blow)</p> | | |
| | | Moist, dark brown, loose, structureless, silty fine SAND , aeolian. | | | |
| | | Moist, light yellow, medium dense, structureless, fine SAND , aeolian. | | | |
| <p style="text-align: center;">Sidewalls highly unstable TP Stopped No Water</p> | | | | | |



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GEOTECHNICAL SERVICES

Geotechnical Soil Profile

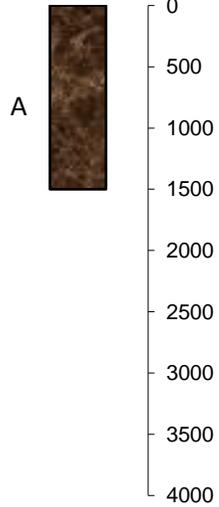
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| Area: | Plettenberg Bay |
| Date: | 20.09.2024 |
| Excavator: | TLB |

TP 5

| | | | |
|-----------------|----------------|----------|---------------------|
| Datum: | NGL | Co-ords: | S34.09113 E23.37143 |
| Key to symbols: | ● Sample taken | 📍 | Groundwater |

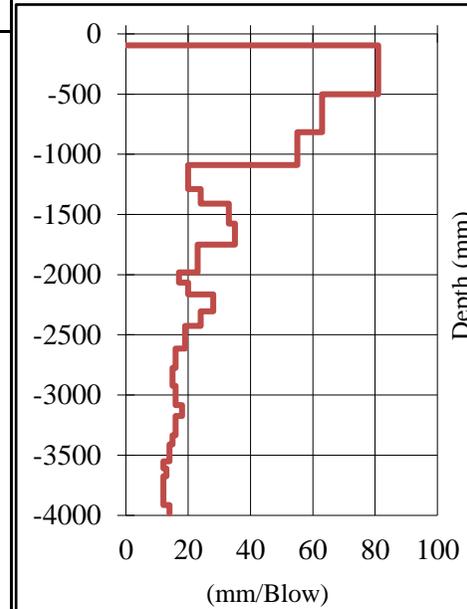
Dynamic Cone Penetrometer (DCP)

Photo of Test Pit



(0 to 1500) Moist, dark brown & light yellow, very loose to medium dense, structureless, **slightly silty fine SAND**, imported (old concrete foundations).

Sidewalls highly unstable
TP refused on old foundations @NGL-1.5m
No Water





OUTENIQUA LAB (Pty) Ltd.

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Materials Testing Laboratory

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Jan-22



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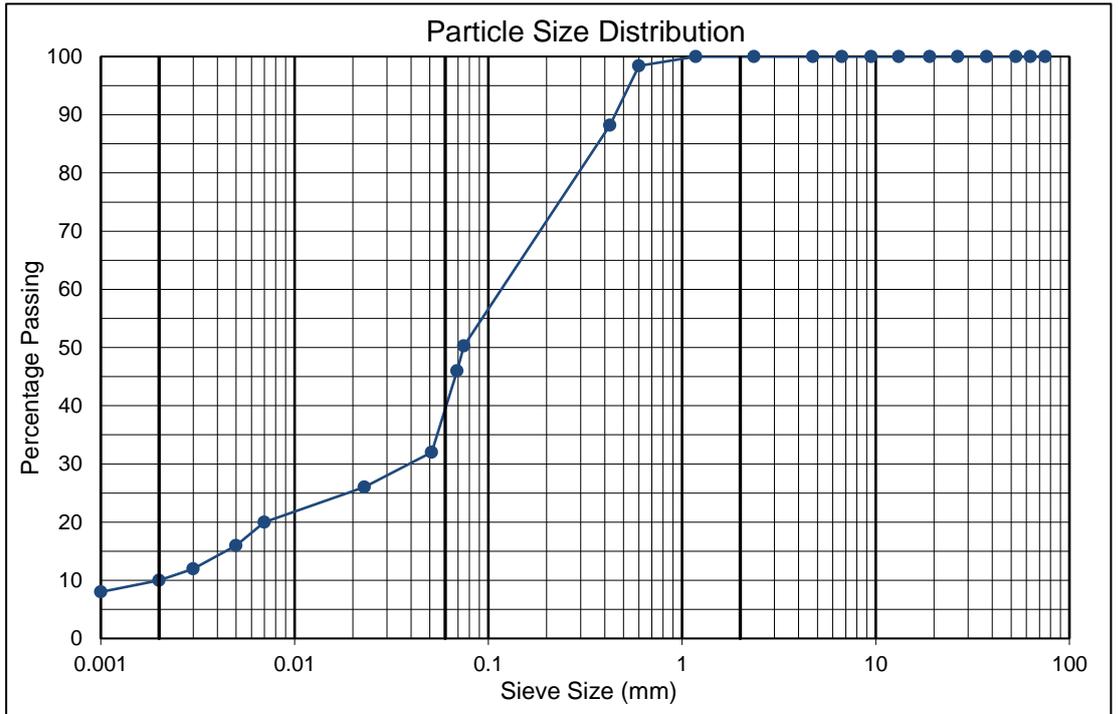
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| | 6570 | Req. Number : | 3968/24 |
| | Iain Paton | No. of Pages : | 1 of 1 |

TEST REPORT

FOUNDATION INDICATOR - (ASTM Method D422)

| | |
|-----------------------|----------------|
| Sample Position (SV) | TP 2 |
| Depth (mm): | 1500 - 2500 |
| Sample No.: | 89477 |
| Materials Description | Source |
| | Colour |
| | Soil Type |
| | Classification |
| | In-Situ |
| | Light Yellow |
| | Silty Sand |
| | Trail Pit |

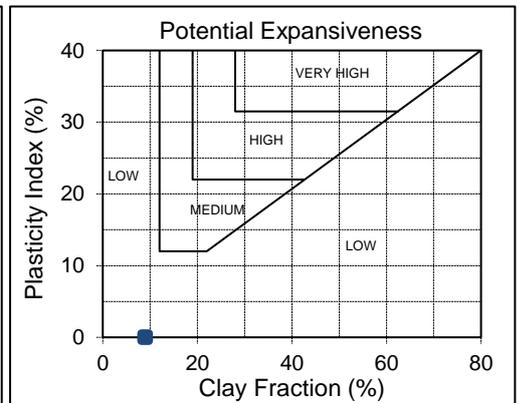
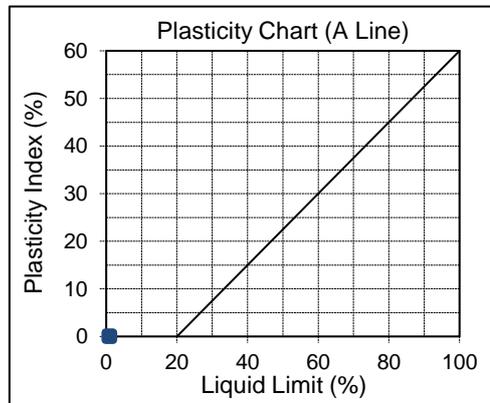
| | |
|---------|-----|
| 75.0mm | 100 |
| 63.0mm | 100 |
| 53.0mm | 100 |
| 37.5mm | 100 |
| 26.5mm | 100 |
| 19mm | 100 |
| 13.2mm | 100 |
| 9.5mm | 100 |
| 6.7mm | 100 |
| 4.75mm | 100 |
| 2.36mm | 100 |
| 1.18mm | 100 |
| 0.6mm | 98 |
| 0.425mm | 88 |
| 0.075mm | 50 |
| 0.069mm | 46 |
| 0.051mm | 32 |
| 0.023mm | 26 |
| 0.007mm | 20 |
| 0.005mm | 16 |
| 0.003mm | 12 |
| 0.002mm | 10 |
| 0.001mm | 8 |



| | |
|----------------------|-----|
| Liquid Limit (%) | NP |
| Plasticity Index (%) | NP |
| Linear Shrinkage (%) | NP |
| Moisture Content (%) | 6.7 |

| | |
|----------|----|
| % Clay | 9 |
| % Silt | 30 |
| % Sand | 61 |
| % Gravel | 0 |

| | |
|-----------------------------|-----|
| Unified Soil Classification | SM |
| AASHTO Soil Classification | A-4 |



• Specimen delivered to Outeniqua Lab in good order.

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

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Outeniqua Geotechnical Services cc.

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Dec-14

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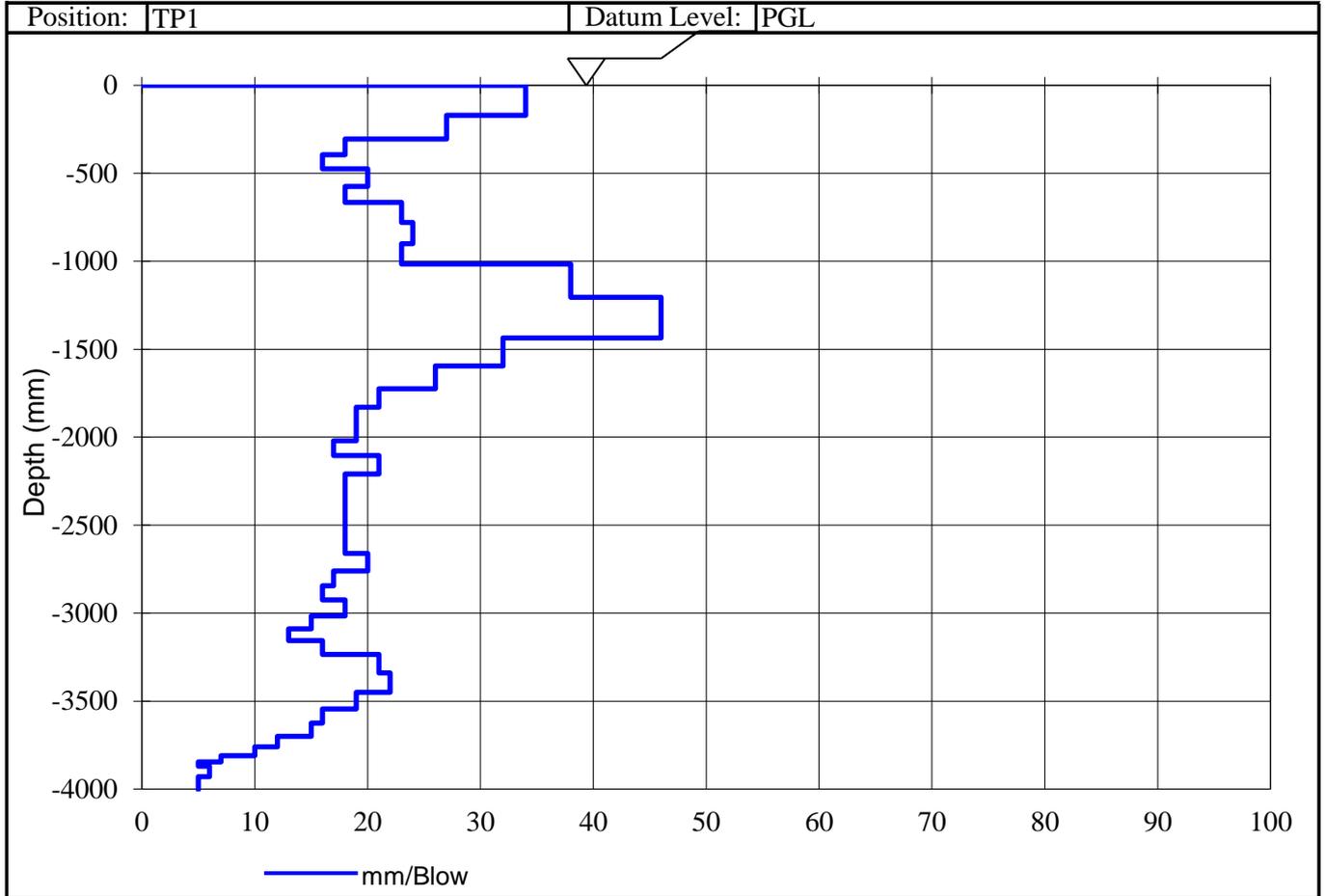
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| | Plettenberg Bay | Date Reported : | 20.09.2024 |
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TEST REPORT

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



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

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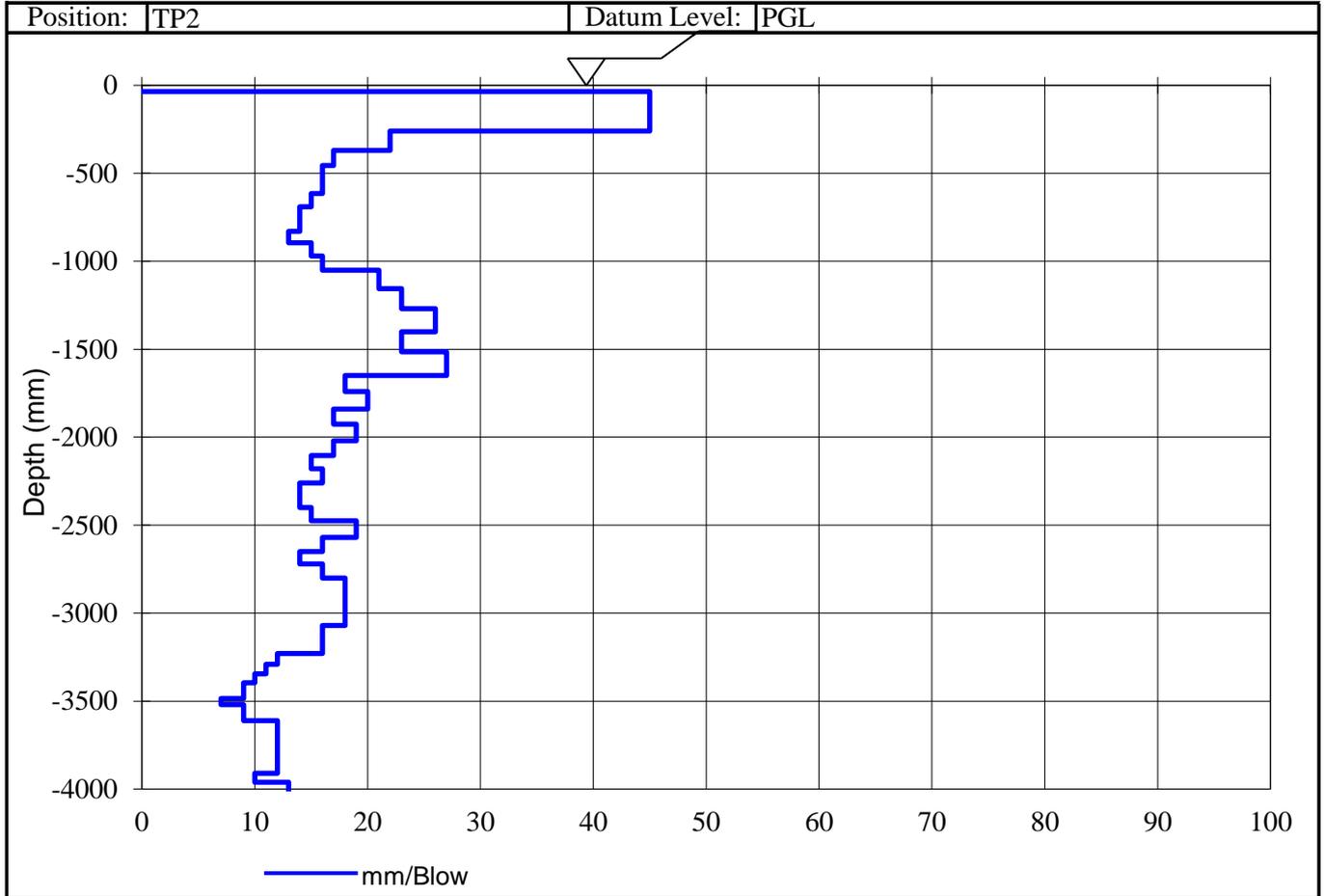
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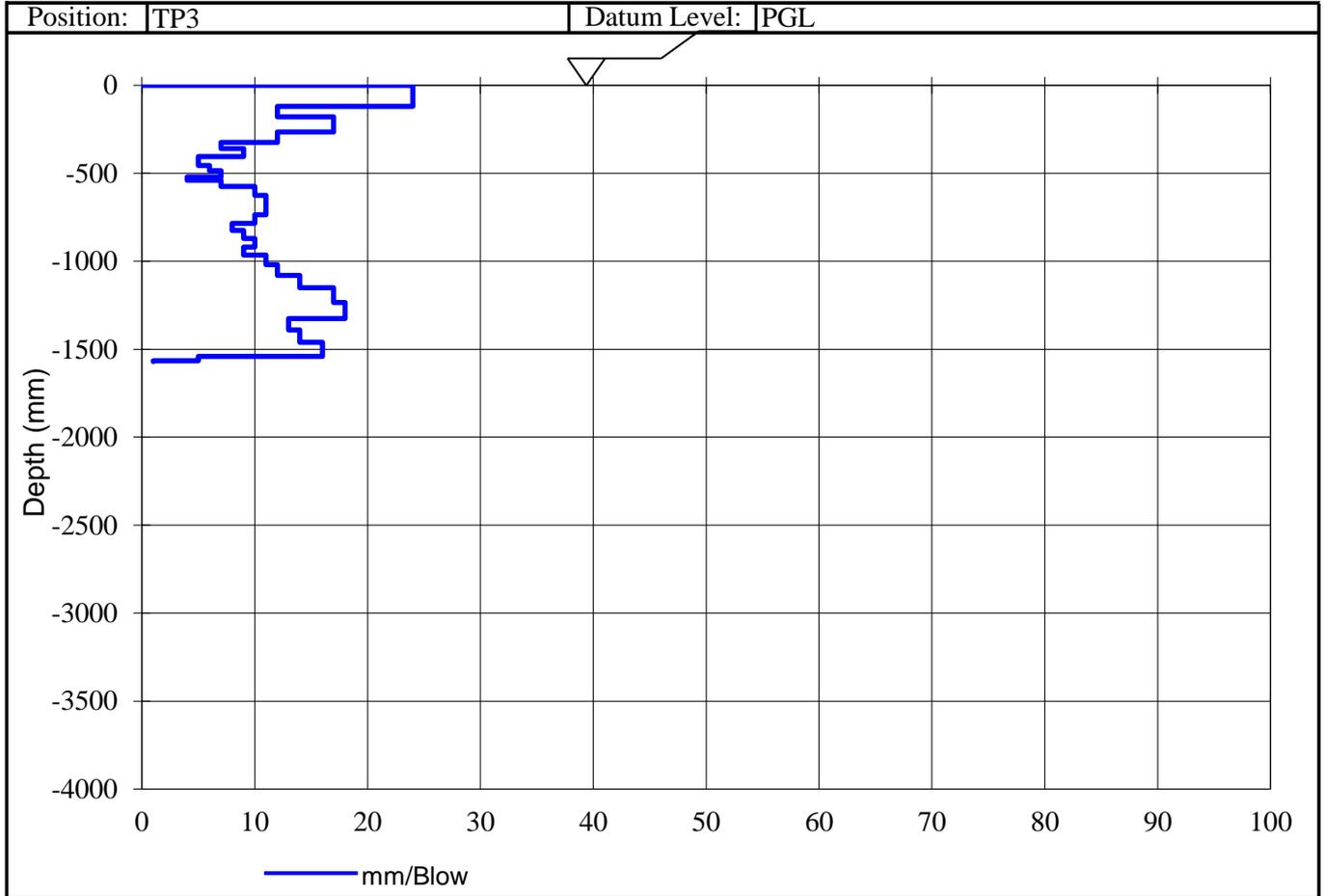
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Dynamic Cone Penetrometer (DCP) - (TMH 6 Method ST6)



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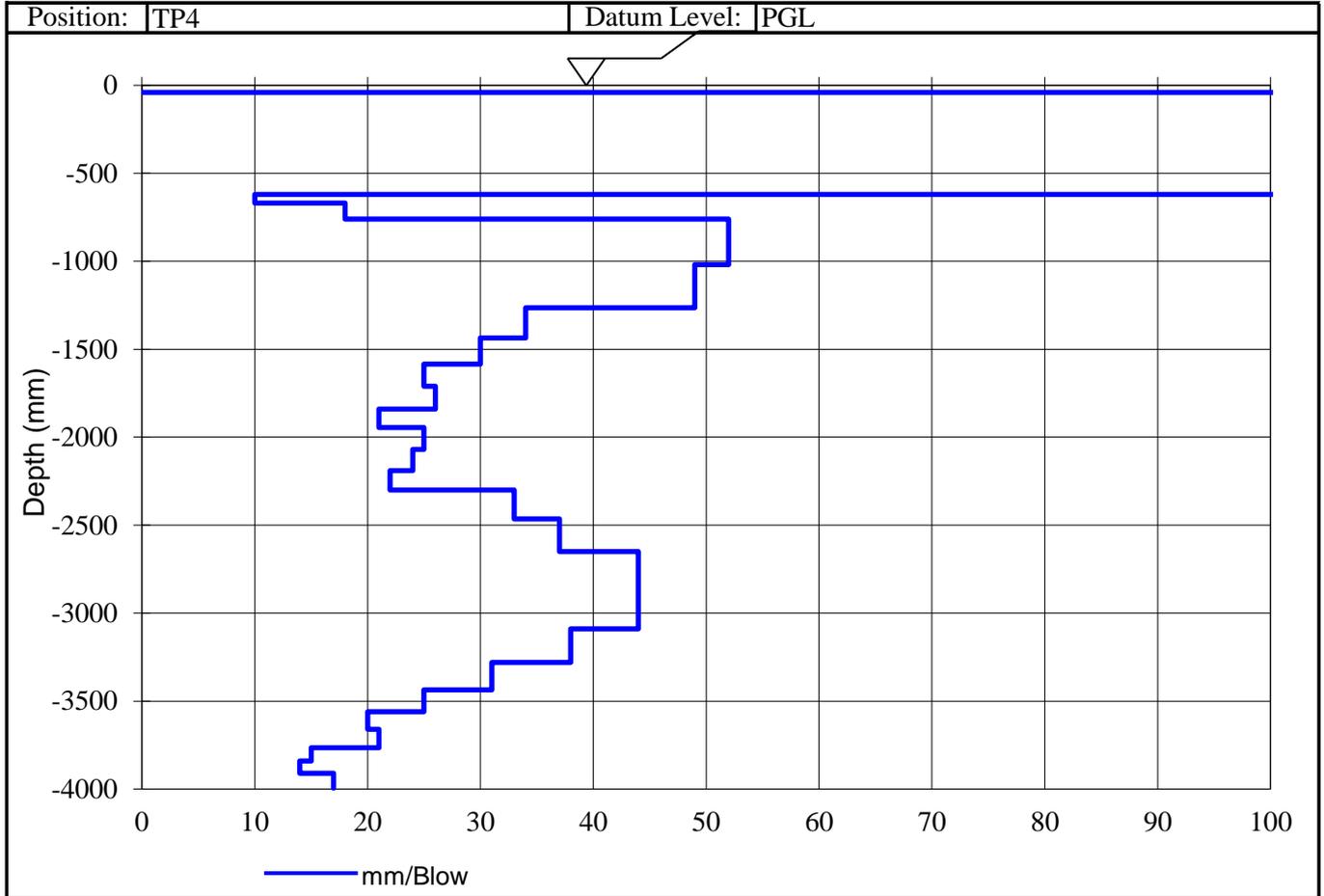
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TEST REPORT

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



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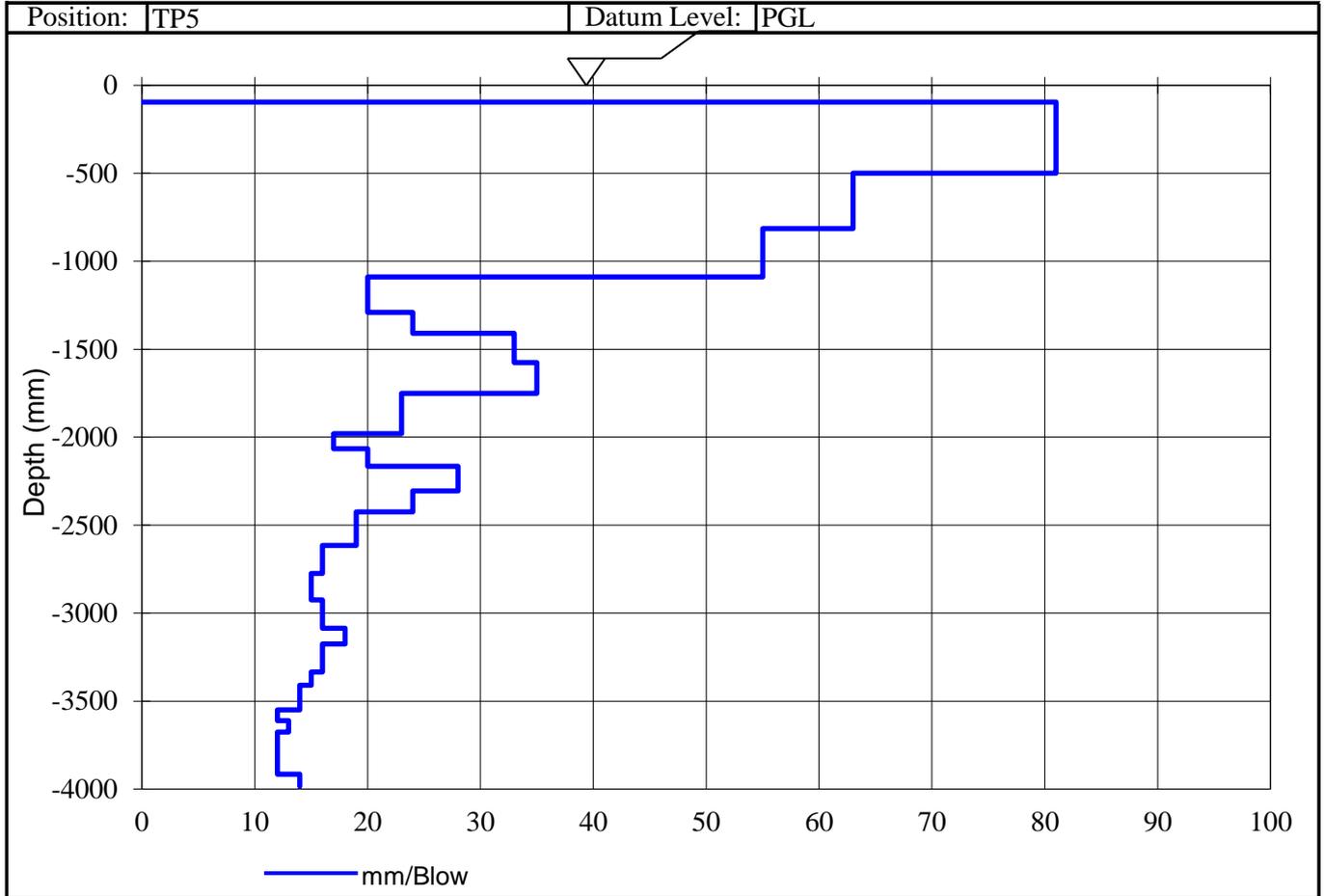
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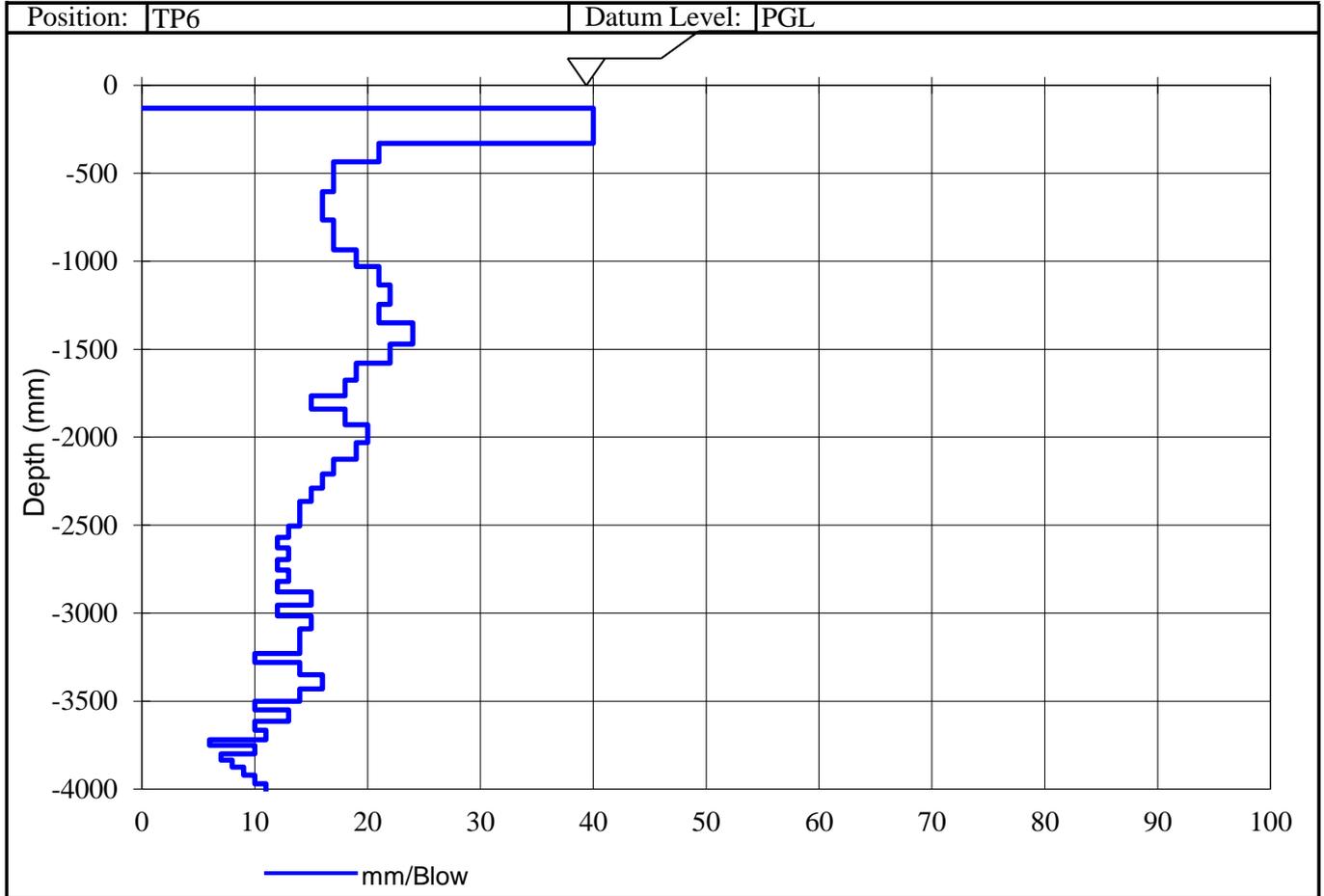
18 Clyde Street, Knysna : PO Box 964, Knysna, 6570

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

| | | | |
|-------------|--|-----------------|---|
| Customer : | Dave Visser Consulting Engineers Noel Centre Main St Plettenberg Bay 6600 | Project : | Rem Portion 57 of Brakkloof 443 Plettenberg Bay |
| | | Date Received : | 13.09.2024 |
| | | Date Reported : | 20.09.2024 |
| | | Req. Number : | |
| Attention : | Dave Visser | No. of Pages : | 6 of 6 |

TEST REPORT

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



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

1. This report (with attachments) is the correct record of all measurements made, and may not be reproduced other than with full written approval from the Members of Outeniqua Geotechnical Services cc.
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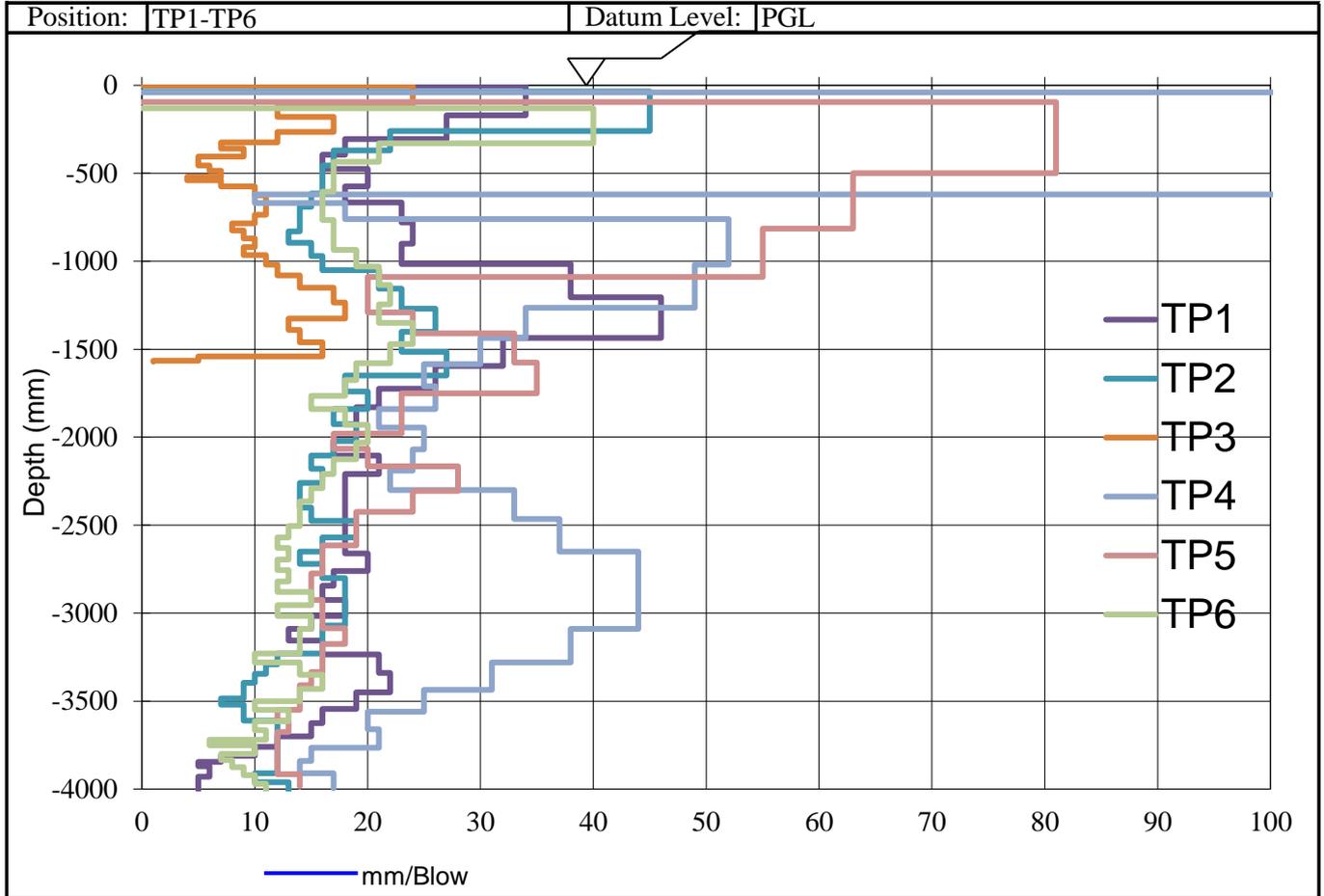
18 Clyde Street, Knysna : PO Box 964, Knysna, 6570

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| Attention : | Dave Visser | No. of Pages : | |

TEST REPORT

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



I Paton (Member)
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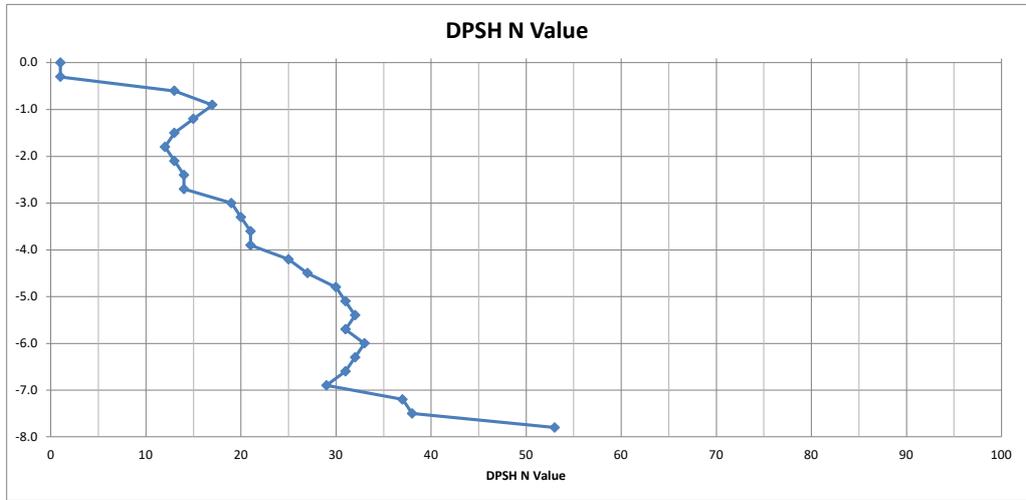
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PENETROMETER TEST RESULTS

DYNAMIC PROBE SUPER HEAVY (DPSH)

| Depth m | DN* Blows/0.3m |
|------------|-------------------|
| 0.0 | 0 |
| -0.3 | 1 |
| -0.6 | 1 |
| -0.9 | 13 |
| -1.2 | 17 |
| -1.5 | 15 |
| -1.8 | 13 |
| -2.1 | 12 |
| -2.4 | 13 |
| -2.7 | 14 |
| -3.0 | 14 |
| -3.3 | 19 |
| -3.6 | 20 |
| -3.9 | 21 |
| -4.2 | 21 |
| -4.5 | 25 |
| -4.8 | 27 |
| -5.1 | 30 |
| -5.4 | 31 |
| -5.7 | 32 |
| -6.0 | 31 |
| -6.3 | 33 |
| -6.6 | 32 |
| -6.9 | 31 |
| -7.2 | 29 |
| -7.5 | 37 |
| -7.8 | 38 |
| -8.1 | 53 |

| | |
|------------------|--|
| Project | Rem Portion 57 of Brakkloof 443 |
| Client | Beveridge c/o Dave Visser Consulting Engineers |
| Test date | 10.10.2024 |
| Position | DPSH1 (TP1) |



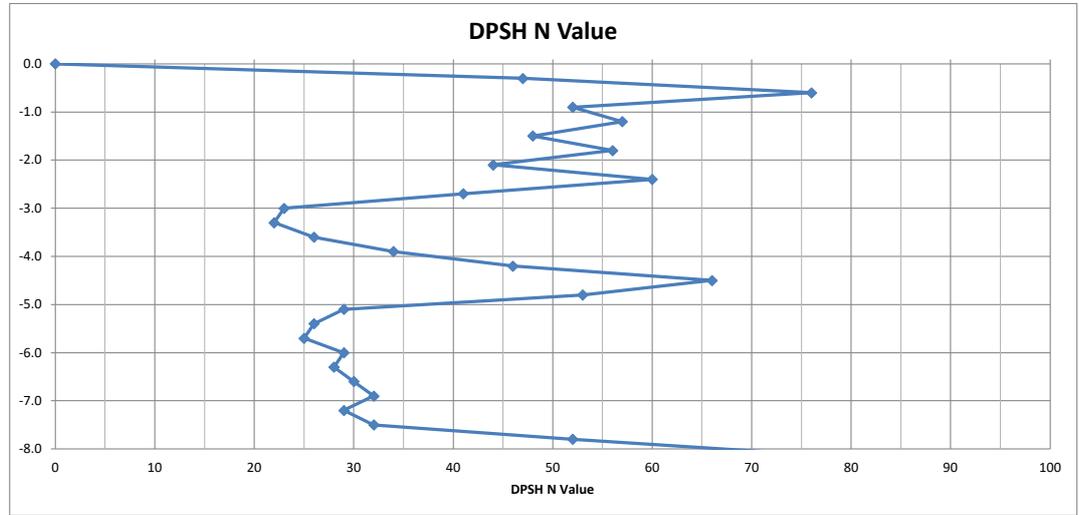
*Uncorrected blow count

PENETROMETER TEST RESULTS

DYNAMIC PROBE SUPER HEAVY (DPSH)

| Depth | DN* |
|-------|------------|
| m | Blows/0.3m |
| 0.0 | 0 |
| -0.3 | 47 |
| -0.6 | 76 |
| -0.9 | 52 |
| -1.2 | 57 |
| -1.5 | 48 |
| -1.8 | 56 |
| -2.1 | 44 |
| -2.4 | 60 |
| -2.7 | 41 |
| -3.0 | 23 |
| -3.3 | 22 |
| -3.6 | 26 |
| -3.9 | 34 |
| -4.2 | 46 |
| -4.5 | 66 |
| -4.8 | 53 |
| -5.1 | 29 |
| -5.4 | 26 |
| -5.7 | 25 |
| -6.0 | 29 |
| -6.3 | 28 |
| -6.6 | 30 |
| -6.9 | 32 |
| -7.2 | 29 |
| -7.5 | 32 |
| -7.8 | 52 |
| -8.1 | 75 |

| | |
|------------------|--|
| Project | Rem Portion 57 of Brakkloof 443 |
| Client | Beveridge c/o Dave Visser Consulting Engineers |
| Test date | 10.10.2024 |
| Position | DPSH2 (TP3) |



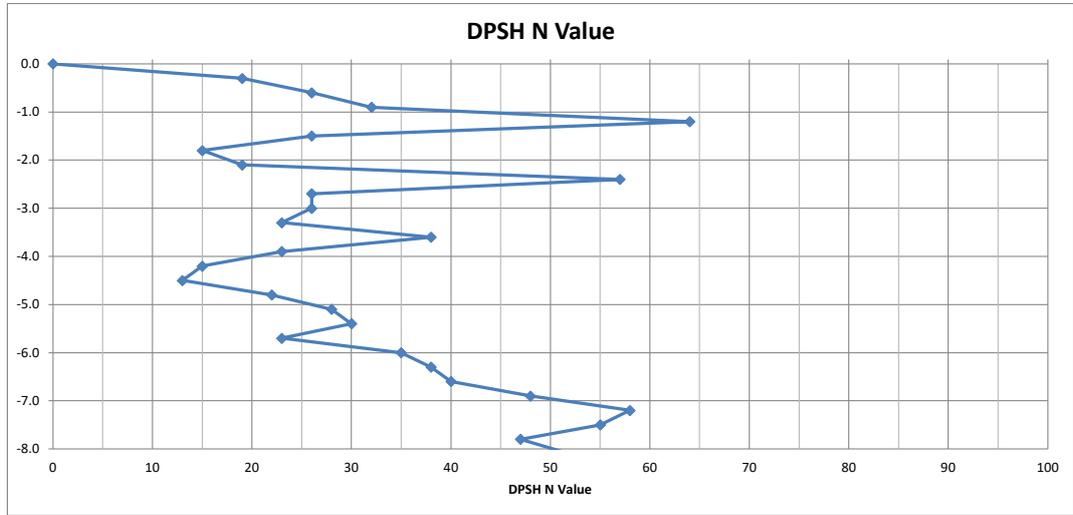
* Uncorrected blow count

PENETROMETER TEST RESULTS

DYNAMIC PROBE SUPER HEAVY (DPSH)

| Depth | DN* |
|-------|------------|
| m | Blows/0.3m |
| 0.0 | 0 |
| -0.3 | 19 |
| -0.6 | 26 |
| -0.9 | 32 |
| -1.2 | 64 |
| -1.5 | 26 |
| -1.8 | 15 |
| -2.1 | 19 |
| -2.4 | 57 |
| -2.7 | 26 |
| -3.0 | 26 |
| -3.3 | 23 |
| -3.6 | 38 |
| -3.9 | 23 |
| -4.2 | 15 |
| -4.5 | 13 |
| -4.8 | 22 |
| -5.1 | 28 |
| -5.4 | 30 |
| -5.7 | 23 |
| -6.0 | 35 |
| -6.3 | 38 |
| -6.6 | 40 |
| -6.9 | 48 |
| -7.2 | 58 |
| -7.5 | 55 |
| -7.8 | 47 |
| -8.1 | 52 |

| | |
|------------------|--|
| Project | Rem Portion 57 of Brakkloof 443 |
| Client | Beveridge c/o Dave Visser Consulting Engineers |
| Test date | 10.10.2024 |
| Position | DPSH3 (TP5) |



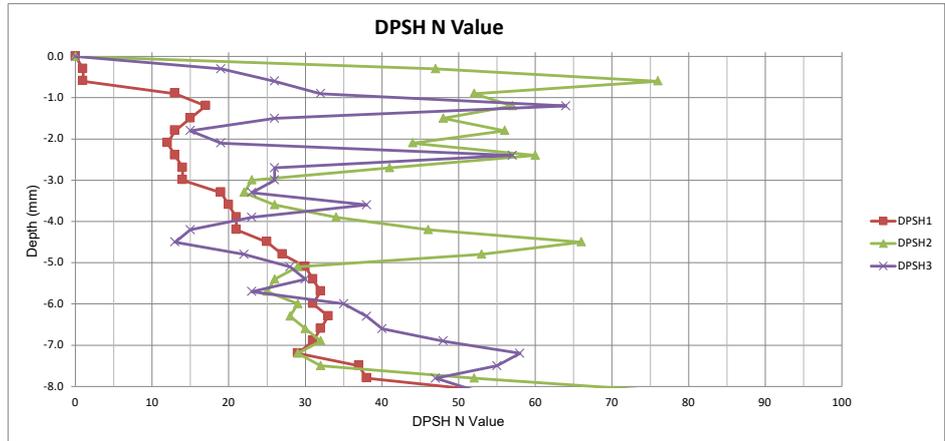
*Uncorrected blow count

PENETROMETER TEST RESULTS

DYNAMIC PROBE SUPER HEAVY (DPSH)

| Depth | DPSH 1 (TP1) | DPSH 2 (TP3) | DPSH 3 (TP5) |
|---------|--------------|--------------|--------------|
| m | DN* | DN* | DN* |
| 0.0 | 0 | 0 | 0 |
| -0.3 | 1 | 47 | 19 |
| -0.6 | 1 | 76 | 26 |
| -0.9 | 13 | 52 | 32 |
| -1.2 | 17 | 57 | 64 |
| -1.5 | 15 | 48 | 26 |
| -1.8 | 13 | 56 | 15 |
| -2.1 | 12 | 44 | 19 |
| -2.4 | 13 | 60 | 57 |
| -2.7 | 14 | 41 | 26 |
| -3.0 | 14 | 23 | 26 |
| -3.3 | 19 | 22 | 23 |
| -3.6 | 20 | 26 | 38 |
| -3.9 | 21 | 34 | 23 |
| -4.2 | 21 | 46 | 15 |
| -4.5 | 25 | 66 | 13 |
| -4.8 | 27 | 53 | 22 |
| -5.1 | 30 | 29 | 28 |
| -5.4 | 31 | 26 | 30 |
| -5.7 | 32 | 25 | 23 |
| -6.0 | 31 | 29 | 35 |
| -6.3 | 33 | 28 | 38 |
| -6.6 | 32 | 30 | 40 |
| -6.9 | 31 | 32 | 48 |
| -7.2 | 29 | 29 | 58 |
| -7.5 | 37 | 32 | 55 |
| -7.8 | 38 | 52 | 47 |
| -8.1 | 53 | 75 | 52 |
| Refusal | | | |

| | |
|------------------|--|
| Project | Rem Portion 57 of Brakklouf 443 |
| Client | Beveridge c/o Dave Visser Consulting Engineers |
| Test date | 10.10.2024 |
| Position | DPSH1-3 |



*Uncorrected blow count