Shardesh Sewlal & Associates cc t/a

SHARDESH SEWLAL ENGINEERS

Geotechnical and Civil Engineering Consultants

Est. 2002

REPORT TITLE:	**REPORT ON THE RESULTS OF A GEOTECHNICAL INVESTIGATION CARRIED OUT AT 15 WOODHOUSE ROAD IN SCOTTSVILLE PIETERMARITZBURG FOR THE PROPOSED EXTENSIONS TO THE WOODBURN SHIPPNG CENTRE**
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PREPARED FOR:	**SHANBAR PROPERTY DEVELOPMENT** **ATT: MR ANDREW BARNES** **TEL: 033 – 344 1105** **EMAIL:** kavitha@barnesprop.co.za
PREPARED BY:	**SHARDESH SEWLAL ENGINEERS** **1 HUNTLEY PLACE** **WESTVILLE** **3629** **TEL: 031 266 7299** **MOBILE: 082 3310 780** **EMAIL:** geotech@shardesh.co.za **AUTHOR: SHARDESH SEWLAL (Pr. Sci. Nat.: 400082/00)**

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REPORT ON THE RESULTS OF A GEOTECHNICAL INVESTIGATION CARRIED OUT AT 15 WOODHOUSE ROAD IN SCOTTSVILLE PIETERMARITZBURG FOR THE PROPOSED EXTENSION TO THE WOODBURN SHOPPING CENTRE

1. INTRODUCTION AND TERMS OF REFERENCE

Shardesh Sewlal Engineers were requested by Mr. Andrew Barnes of Barnes Property Development to submit a quotation to carry out a geotechnical investigation for the proposed extension to the Woodburn Shopping Centre in Scottsville Pietermaritzburg. Shardesh Sewlal Engineers submitted a proposal and cost estimate to Barnes Property Development in an email dated 9th February 2023. The appointment to proceed with the geotechnical investigation was given by Barnes Property Development in an email dated 23rd February 2023.

The objectives of the geotechnical investigation were to:

i. Determine the soil and rock profile across the developmental area and evaluate its engineering properties and influence on the design of the foundations.
ii. Establish depth to bedrock where not exposed at the ground surface.
iii. Evaluate the workability of the site materials with regards to their excavatability and compactibility.
iv. Assess groundwater conditions.

This report presents the findings of the geotechnical investigation and discusses the results of the fieldwork geology, and subsurface conditions; and based on these findings recommendations are provided for foundations, earthwork, excavatability, and site drainage.

2. INFORMATION SUPPLIED

The following information was drawn upon for the purposes of this investigation:

- Google earth imagery of the site.
- The 1: 250 000 Geological Map of Durban issued by the Council for Geoscience.
- Site map showing the future extension plans.
- Geotechnical Report No: GEO/109/14/15 prepared by Shardesh Sewlal & Associates cc for the Woodburn Shopping Centre.

3. SITE DESCRIPTION

Locality

The Woodburn Shopping Centre is located at 15 Woodhouse Road in Scottsville Pietermaritzburg. The area proposed for the extension is situated north of the existing shopping centre and spans over the existing Woodburn Rugby Stadium.

The Woodburn Rugby Stadium is bound to the north by practice fields, to the east by residential dwellings and commercial properties, and to the west by an open space.

Vegetation and Landuse

The site for the proposed extension spans over the existing rugby field. A covered seating pavilion is located on the west side of the rugby field with grassed seating embankments located along the northern, southern and western perimeters.

Topography and Drainage

The existing ground surface has been levelled to accommodate the rugby field and external facilities. Shallow filling of the site has been previously carried out.

No natural drainage features were identified on the site itself. The Msunduzi River is located approximately 150m north west of the site.

Plate 1 below shows the locality of the site (taken from Google Earth)

Plate 1: Locality of the site.

4. FIELD WORK AND NATURE OF THE INVESTIGATION

The geotechnical investigation was carried out on 22nd February 2023 and comprised the following:

4.1. WALK-OVER SURVEY

A walk-over survey was conducted to establish and identify any surface geological features, drainage features, underground service markers and the general overview of the site and the site boundaries.

4.2. TEST PITS

Eight test pits numbered T1 to T8 were excavated using a Tractor Loader Backhoe (TLB). The test pits were profiled according to The South African Guidelines for Soil and Rock Logging.

4.3. DYNAMIC CONE PENETROMETER TESTS

A total of eight Dynamic Cone Penetrometer (DPL) tests numbered D1 to D8 were carried out adjacent the test pits. In order to facilitate an interpretation of the DPL results in respect to the consistency of the subsoils underlying the investigated area, the following table is provided. It must be however noted that it is only a guide to DCP equipment.

TABLE 1: SUBSOIL CONSISTENCY INFERRED FROM DCP RESULTS

Cohesive Soils		Non-Cohesive Soils	
DCP Blow Count Blow / 300mm	**DCP Blow Count Blow / 300mm**	**DCP Blow Count Blow / 300mm**	**DCP Blow Count Blow / 300mm**
0 – 4	Very Soft	0 – 8	Very Loose
4 – 8	Soft	8 – 18	Loose
8 – 15	Firm	18 – 54	Medium Dense
15 – 24	Stiff	54 – 90	Dense
24 – 54	Very Stiff	>90	Very Dense
>54	Hard		

The positions of the test pits and DCP tests are shown on the site plan attached in Appendix A. The test pit logs are given in Appendix B and the DPL test results are given in Appendix C.

5. GENERAL GEOLOGY

According to the 1:250 000 Geological Map No. 2930 issued by the Department of Mines and Mineral Affairs, the area is underlain by ECCA Group Pietermaritzburg Formation soils and rock consisting of dark grey Shale, Siltstone and subordinate Sandstone.

6. SITE GEOLOGY

From the observations during the site investigation, the following stratigraphy underlying the site was established:

Fill

Fill material consisting of slightly moist to moist, dark grey / dark red brown / brownish grey, loose to medium dense, fine grained, SANDY SILT / CLAYEY SILT / SILTY CLAY was encountered in all of the 8 test pits excavated. The fill depth ranges between 0.380m and 1.310m in test pits 1 to 7 and extends to the full depth of test pit 8 which was excavated on the top of the southern embankment.

Alluvium

Alluvium (river or steam deposits) were intercepted below the fill in test pits 1 and 2 and below the pedogenic soils (Ferricrete) in test pit 3. The alluvium consists of moist to very moist, medium to dark grey, loose, fine grained SILT. These deposits extended to the full depth of test pits 1 and 3 and reached a depth of 1.510m in test pit 3.

Pedogenic Soils: Ferricrete

Pedogenic soils consisting of moist to very moist, dark yellow orange red brown speckled red and black, firm to stiff, fine grained, SANDY CLAY / CLAYEY SAND was encountered below the fill in test pits 3, 4, 5, 6 and 7. The Ferricrete soils reached an average depth of 1.050m in test pits 3 and 7 and extended to the full depth of test pits 4, 5 and 6.

Pietermaritzburg Formation Shale

Highly weathered, dark blue and grey stained red and black, thinly laminated, loosely jointed, highly fractured, soft to very soft rock Shale was intercepted below the Ferricrete in test pits 3 and 7. The weathered Shale was intercepted at an average depth of 1.4m.

7. GROUNDWATER

Strong groundwater seepage was recorded in the test pits. Table 2 below summarises the groundwater seepage activity.

TABLE 2: SUMMARY OF GROUNDWATER SEEPAGE DATA

Test Pit	Depth (m)	Comments
1	2.700m	Slow seepage through sidewalls
2	2.900m	Strong seepage, test hole filled with groundwater
3	1.600m	Strong seepage, test hole filled with groundwater
4	2.700m	Strong seepage, test hole filled with groundwater
5	2.700m	Strong seepage, test hole filled with groundwater
6	2.800m	Strong seepage, test hole filled with groundwater
7	-	
8	-	

8. GEOTECHNICAL ASSESSMENT

8.1. STABILITY

The site is not located within a geologically unstable area. The following geotechnical features associated with unstable ground conditions were not observed on the site:

- Slouching of the soil cover.
- Slip scars on the ground surface.
- Anomalous slope confirmations associated with lateral soil / rock movement.
- Tension cracks on existing structures.
- Rotation of any structures and poles etc. on the site.

Taking the above into consideration, the site is considered stable for the proposed development.

8.2. GEOTECHNICAL CHARACTER OF SUB-SURFACE MATERIALS

Fill

The fill material consists of SANDY SILT / CLAYEY SILT / SILTY CLAY. No evidence of any controlled compaction of the fill was recorded in the test pits. These materials exhibit a high potential to undergo consolidation settlement and do not provide ideal founding conditions.

Alluvium

The alluvial deposits comprise fine grained SILTS possessing high compressibility potential. The alluvium does not provide an ideal founding medium.

Pedogenic Soils: Ferricrete

Although the Ferricrete soils are tested to be firm to stiff, these soils possess a medium to high potential to undergo heave and shrink volumetric changes with fluctuations in soil moisture contents. Placing of foundations in these soils is not recommended as defects associated with soil heave and shrink can be expected.

Pietermaritzburg Formation Shale

The Shale bedrock encountered in test pits 3 and 7 occur as highly weathered, thinly laminated soft rock to very soft rock. The degree of weathering of the Shale is expected to decrease with increasing depth with a concomitant increase in rock strength. Very little or no clay lined joint and bedding surfaces were recorded. The Shale bedrock provides an ideal founding medium for light to moderately heavy structures.

8.3. EXCAVATABILITY

Soft excavation can be expected through the fill, alluvium and Ferricrete soils. The TLB experienced difficulty excavating through the Shale in test pit 3 and intermediate excavation can be encountered through the Shale. Heavy excavation equipment such a 22ton excavator may be required to excavate through the Shale. No boulder excavation is expected through the fill, alluvium and Ferricrete.

Shallow service trenches may be excavated using hand held tools or a Tractor Loader Backhoe.

8.4. STABILITY OF EXCAVATIONS

Severe sidewall slump / collapse was encountered in the test pits due to the strong groundwater activity. This perched water condition will render excavations unstable. Shoring of excavations by a specialist contractor will be required.

9. DEVELOPMENT RECOMMENDATIONS

9.1. EARTHWORKS

It is very important that the earthworks is planned and carried out to predetermined levels as the indiscriminate cutting and filling of the site will cause irrevocable damage. To promote the long-term stability of the site, all earthworks should be carried out to engineer's design and details; and in accordance with the guidelines provided in SABS 1200.

Some cutting of the site along the perimeter will be required. No deep filling is anticipated as majority of the site is currently level.

Table 4 below, derived from the Technical Recommendations for Highways (TRH14) summarises the material requirements for various pavement layers. The construction of the internal driveways and parking area layerworks should follow the recommendations given in the table below.

TABLE 4: TRH14 MATERIAL CODE REQUIREMENTS FOR VARIOUS PAVEMENT LAYERS

Layer	Material Code
Sub-base	G5 and G6
Selected Layer	G6, G7, G8 and G9
Sub-grade	G8, G9 and G10

As a general rule of thumb, the highest quality material which is economically available should always be used. The fill, alluvium and pedogenic soils are considered to be of G10 quality materials and as such are unsuitable layerworks construction. Allowance should be made for importing G7 or better quality materials from an approved source.

9.2. FOUNDATION RECOMMENDATIONS

Ideally, foundation loads should be taken down to the insitu Shale bedrock, but the depth to the bedrock varies between 2.1m to greater than 5.0m. Deep foundations are required and piled foundations are considered to provide the most feasible founding solution. Piles would require to be drilled to virtual refusal in the weathered Shale bedrock to achieve a good end bearing resistance. A detailed pile investigation is required to be carried out to determine the diameter and length of piles required. The design of the piles must take into account that the pile shaft will fill with water and/or tend to collapse when the pile auger is withdrawn. It is important to note that the final depth to bedrock across the entire site was not established in this investigation and will need to be confirmed during the pile investigation. Pile integrity testing is to be carried out by an independent accredited authority.

9.3. SURFACE DRAINAGE

One of the most important factors in the promotion of a stable site is the control and removal of both surface and groundwater from the property. It is important that the design of the storm water management system allows for the effective collection and disposal of accumulated surface water in a responsible manner.

Both during and after construction, the building platform should be well graded to permit water to readily drain away from the platform, and to prevent ponding of water anywhere on the surface. Stormwater may be collected in manholes and disposed into the Municipal stormwater disposal system. Attenuation of the stormwater will be required before disposing into the Municipal stormwater system.

The use of soakpits to dispose stormwater will prove problematic due to the perched groundwater condition.

10. CONCLUSIONS

This report presents the results of a geotechnical investigation carried out for the proposed extensions to the Woodburn Shopping Centre in Scottsville Pietermaritzburg.

i. Based on the geotechnical investigation, the proposed extensions are considered feasible provided the guidelines given in this reported are followed.

ii. The site is underlain by blue grey stained red and black, highly weathered, thinly laminated, loosely jointed weathered, highly fractured, very soft rock to soft rock Shale. The depth the weathered Shale varies across the development area.

iii. Alluvium was encountered to the full depth of the test pits along the north western perimeter of the site. The alluvium comprises fine grained, highly compressible SILT.

iv. Pedogenic soils consisting of moist to very moist, dark yellow orange brown speckled red and black, firm to stiff SANDY CLAY/CLAYE SAND was intercepted in the test pits along the eastern boundary. These soils are observed to possess at least medium potential to undergo heave and shrink changes with seasonal fluctuations in soil moisture contents.

v. Shallow fill material overlies the site and comprises grey, loose, SILTY CLAY/CLAYEY SILT. No evidence of any controlled compaction of the fill was observed in the test holes.

vi. The test holes fill with groundwater indicating the presence of a perched water condition.

vii. Moderate to severe sidewall slump was recorded in the test pits due to the perched water condition.

viii. Piled foundations are recommended for supporting the proposed extensions. The piles will require to be drilled to virtual refusal into the Shale bedrock. The depth to bedrock will need to be confirmed during the pile investigation.

ix. Stormwater may be disposed into the Municipal stormwater lines. The use of soakpits on site will be problematic due to the perched groundwater condition.

Finally, the ground conditions described in this report refer specifically to those encountered in the inspection pits. It is possible that conditions at variance to those described in this report can be encountered elsewhere on site. It is recommended that Shardesh Sewlal Engineers undertake periodic inspections during the construction operations to confirm appropriate founding conditions and materials suitability.

COMPILED AND SIGNED BY:

SHARDESH SEWLAL
(PR. SCI. NAT 400082/00)

APPENDIX A

PLAN SHOWING THE APPROXIMATE POSITIONS OF THE TEST PITS AND DYNAMIC CONE PENETROMETER (DPL) TESTS

T: Test Pits

D: DPL Tests

	SHARDESH SEWLAL ENGINEERS 1 Huntley Place, Westville, 3629 T: 031 - 266 7299 M:082 3310 780 E: geotech@shardesh.co.za	**PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE** **LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG**	**DRAWING: SITE PLAN SHOWING POSITIONS OF TEST PITS & DPL TESTS** **SCALE: N.T.S**	**DRAWN BY: S. KALPEE** **CHECKED: S. SEWLAL**

APPENDIX B

PROFILES OF TEST PITS

SHARDESH SEWLAL ENGINEERS	PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 1

SAMPLE	DEPTH (m)	DESCRIPTION (MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)
	0.600	*Slightly moist to moist, dark red brown-grey, loose, fine grained, CLAYEY SILT: IMPORTED*
	2.930	*Moist to very moist, medium to dark grey, loose, fine grained, SILT: ALLUVIUM*

Notes:

- Refusal: No refusal encountered.
- Groundwater: Strong water seepage at 2.700m.
- Bedrock: No bedrock encountered.
- Sidewall Collapse: Sidewall collapse was observed at 2.490m.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS	PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 2

SAMPLE	DEPTH (m)	DESCRIPTION (MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)
	1.310	*Slightly moist to moist, dark red brown-grey, loose, fine grained, slightly CLAYEY SILT: IMPORTED*
	3.280	*Moist to very moist, grey, loose, fine grained, SILT: ALLUVIUM*

Notes:

- Refusal: No refusal encountered.
- Groundwater: Strong water seepage at 2.900m.
- Bedrock: No bedrock encountered.
- Sidewall Collapse: Sidewall collapse was observed at 2.500m.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS	PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 3

SAMPLE	DEPTH (m)	DESCRIPTION (MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)
	0.380	*Slightly moist, dark grey, loose, fine grained, slightly SANDY SILT: IMPORTED*
	0.790	*Moist, pale red brown speckled white and black, fine grained, CLAYEY SAND: FERRICRETE*
	1.510	*Very moist, dark grey, loose, fine grained, SILT: ALLUVIUM*
	2.300	*Highly weathered, dark blue stained red, thinly bedded, loosely jointed, soft to very soft rock SHALE (PIETERMARITZBURG FORMATION)*

Notes:

- Refusal: TLB experienced difficulty excavating through the highly weathered Shale. Test pit terminated at 2.300m.
- Groundwater: Test pit filled with groundwater at 1.600m
- Bedrock: Highly weathered Shale bedrock encountered at 1.510m.
- Sidewall Collapse: No sidewall collapse.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS	PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 4	
SAMPLE	**DEPTH (m)**	**DESCRIPTION** **(MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)**
	0.380	*Slightly moist, grey-dark red, medium dense, fine grained, CLAYEY SILT: IMPORTED containing crushed stone aggregate*
	2.930	*Moist to very moist, dark yellow orangey brown speckled red and black, firm, SANDY CLAY: FERRICRETE*

Notes:

- Refusal: No refusal
- Groundwater: Test pit filled with groundwater at 2.700m. Unable to record the weathered Shale below the Ferricrete.
- Bedrock: Highly weathered Shale underlies the Ferricrete.
- Sidewall Collapse: Sidewall collapse at 2.00m.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS		PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 5
SAMPLE	**DEPTH (m)**	**DESCRIPTION** **(MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)**
	0.380	*Slightly moist, grey-dark red, medium dense, fine grained, CLAYEY SILT: IMPORTED containing crushed stone aggregate*
	3.200	*Moist to very moist, yellow orange brown speckled red and black, stiff, SANDY CLAY: FERRICRETE*

Notes:

- Refusal: No refusal
- Groundwater: Test pit filled with groundwater at 2.700m.
- Bedrock: No bedrock encountered.
- Sidewall Collapse: Sidewall collapse at 2.700m.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS	PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 6	
SAMPLE	**DEPTH (m)**	**DESCRIPTION** **(MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)**
	0.410	*Slightly moist, greyish brown, medium dense, fine grained, slightly SANDY CLAYEY SILT: IMPORTED*
	3.200	*Moist to very moist, dark red yellow orange brown speckled red and black, stiff, SANDY CLAY: FERRICRETE*

Notes:

- Refusal: No refusal
- Groundwater: Test pit filled with groundwater at 2.800m.
- Bedrock: No bedrock encountered.
- Sidewall Collapse: Sidewall collapse at 2.700m.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS	PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 7

SAMPLE	DEPTH (m)	DESCRIPTION (MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)
	0.400	*Slightly moist, greyish brown, medium dense, fine grained, slightly SANDY CLAYEY SILT: IMPORTED*
	1.300	*Moist to very moist, dark red yellow orange brown speckled red and black, stiff, SANDY CLAY: FERRICRETE*
	2.300	*Highly weathered, grey stained black and red, thinly bedded, loosely jointed, soft to very soft rock SHALE (PIETERMARITZBURG FORMATION)*

Notes:

- Refusal: No refusal. Test pit terminated at 2.300m due to sewer pipe encountered in the test pit at 2.100m
- Groundwater: No groundwater seepage encountered.
- Bedrock: Highly weathered Shale bedrock encountered at 1.300m.
- Sidewall Collapse: No sidewall collapse.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

SHARDESH SEWLAL ENGINEERS		PROJECT: EXTENSIONS TO WOODBURN SHOPPING CENTRE LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE PIETERMARITZBURG DATE: 22 FEBRUARY 2023 TEST PIT NO. 8
SAMPLE	**DEPTH (m)**	**DESCRIPTION** **(MOISTURE / COLOUR / CONSISTENCY / STRUCTURE / SOIL TYPE / ORIGIN / STRAT. UNIT)**
	3.300	*Slightly moist, dark grey and red brown, loose, CLAYEY SILT-SANDY SILT: IMPORTED containing pieces of concrete, plastic, steel rods Shale fragments*

Notes:

- Refusal: No refusal.
- Groundwater: No groundwater seepage encountered.
- Bedrock: No bedrock encountered
- Sidewall Collapse: No sidewall collapse.
- Samples: Nil.

Excavation Method: ***TLB***

Profiled By: ***S. Sewlal***

Captured By: ***S. Kalpee***

APPENDIX C

DYNAMIC CONE PENETROMETER (DPL) TEST RESULTS

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

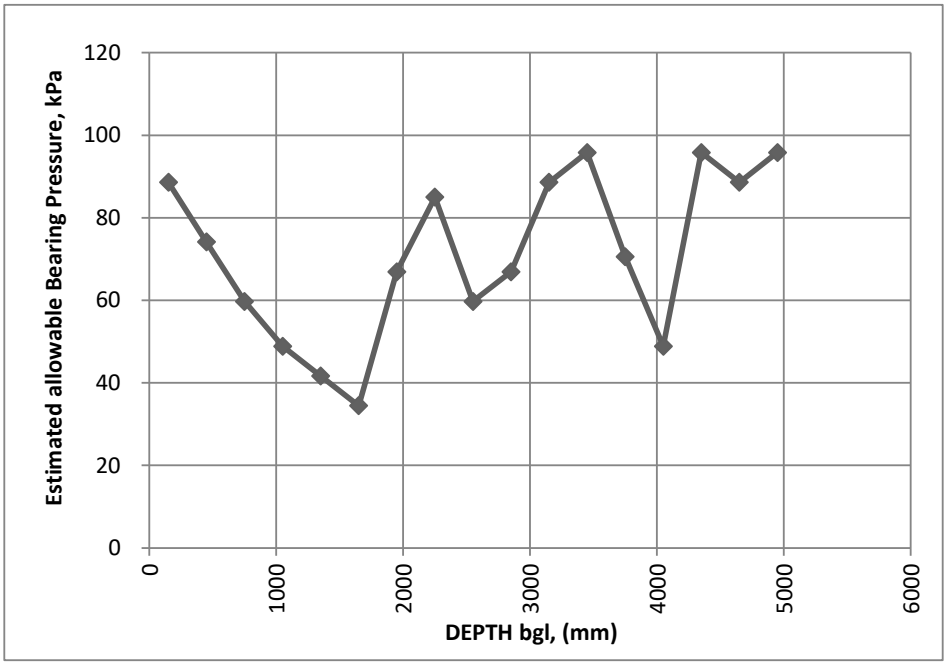
DPL NO: 1

DATE: 22 FEBRUARY 2023

DPL NO: 1

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	19	150	16	7	13	89
2	300	600	450	15	450	20	6	9	74
3	600	900	750	11	750	27	4	6	60
4	900	1200	1050	8	1050	38	3	4	49
5	1200	1500	1350	6	1350	50	2	3	42
6	1500	1800	1650	4	1650	75	2	2	34
7	1800	2100	1950	13	1950	23	5	8	67
8	2100	2400	2250	18	2250	17	7	12	85
9	2400	2700	2550	11	2550	27	4	6	60
10	2700	3000	2850	13	2850	23	5	8	67
11	3000	3300	3150	19	3150	16	7	13	89
12	3300	3600	3450	21	3450	14	8	14	96
13	3600	3900	3750	14	3750	21	5	8	71
14	3900	4200	4050	8	4050	38	3	4	49
15	4200	4500	4350	21	4350	14	8	14	96
16	4500	4800	4650	19	4650	16	7	13	89
17	4800	5100	4950	21	4950	14	8	14	96

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

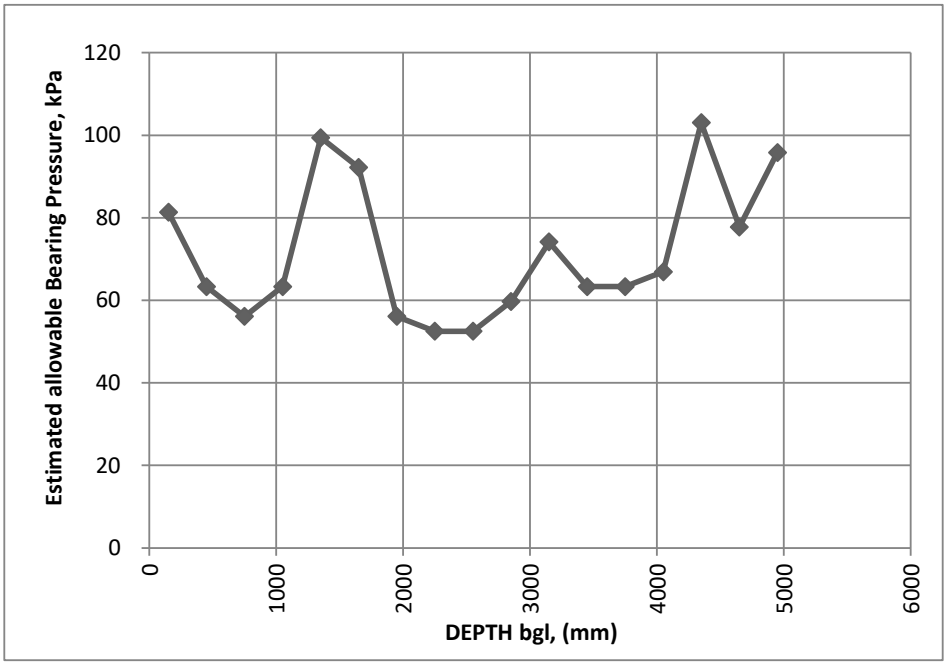
DPL NO: 2

DATE: 22 FEBRUARY 2023

DPL NO: 2

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa
1	0	300	150	17	150	18	6	11	81
2	300	600	450	12	450	25	5	7	63
3	600	900	750	10	750	30	4	5	56
4	900	1200	1050	12	1050	25	5	7	63
5	1200	1500	1350	22	1350	14	8	15	99
6	1500	1800	1650	20	1650	15	8	13	92
7	1800	2100	1950	10	1950	30	4	5	56
8	2100	2400	2250	9	2250	33	3	5	52
9	2400	2700	2550	9	2550	33	3	5	52
10	2700	3000	2850	11	2850	27	4	6	60
11	3000	3300	3150	15	3150	20	6	9	74
12	3300	3600	3450	12	3450	25	5	7	63
13	3600	3900	3750	12	3750	25	5	7	63
14	3900	4200	4050	13	4050	23	5	8	67
15	4200	4500	4350	23	4350	13	9	16	103
16	4500	4800	4650	16	4650	19	6	10	78
17	4800	5100	4950	21	4950	14	8	14	96

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

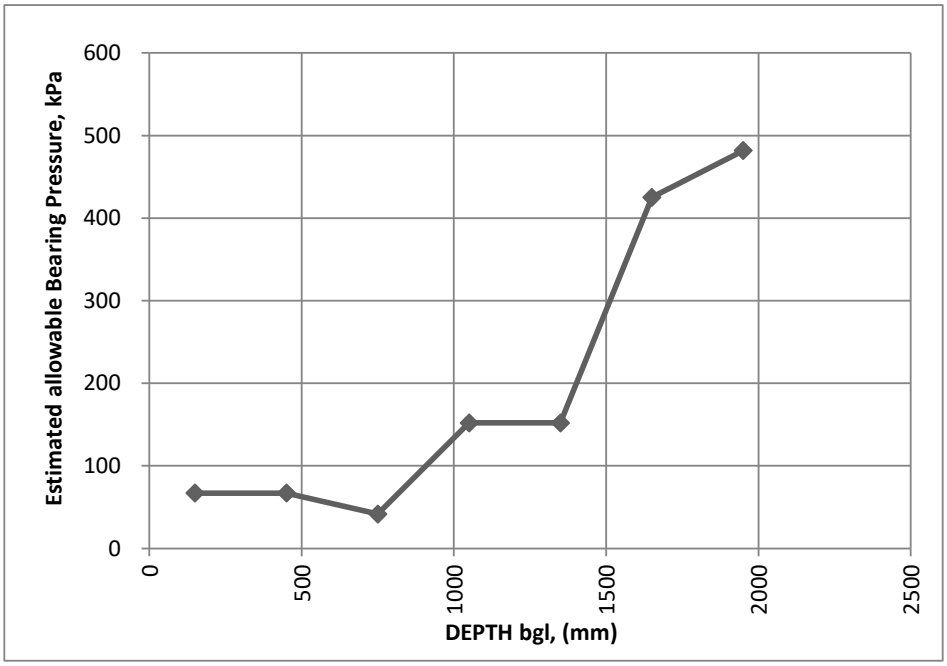
DPL NO: 3

DATE: 22 FEBRUARY 2023

DPL NO: 3

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa	
1	0	300	150	13	150	23	5	8	67	
2	300	600	450	13	450	23	5	8	67	
3	600	900	750	6	750	50	2	3	42	
4	900	1200	1050	28	1050	11	11	21	152	
5	1200	1500	1350	28	1350	11	11	21	152	
6	1500	1800	1650	86	1650	3	33	90	425	
7	1800	2100	1950	98	1950	3	37	107	482	**REFUSAL**

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

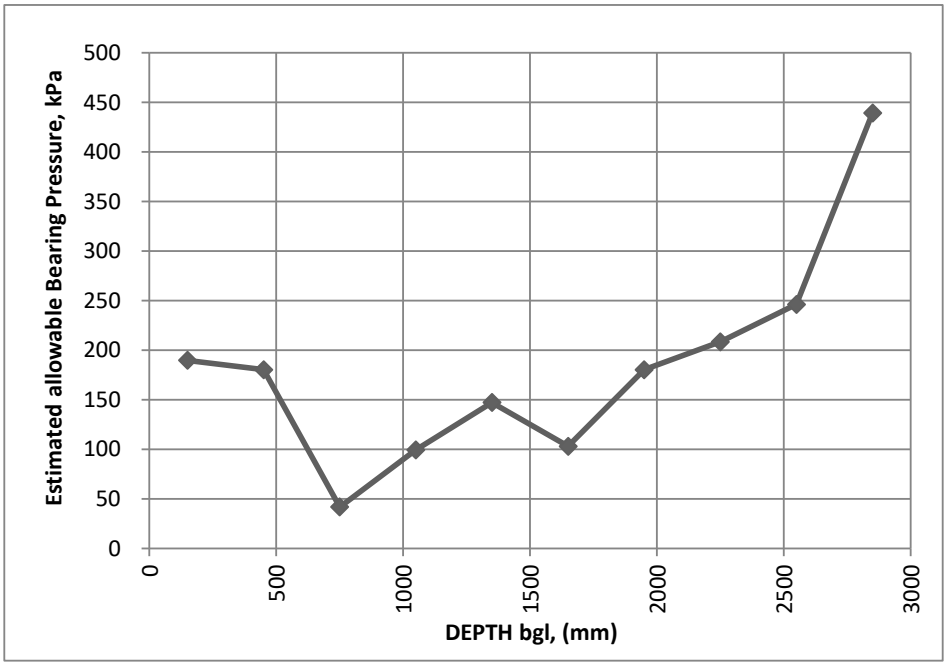
DPL NO: 4

DATE: 22 FEBRUARY 2023

DPL NO: 4

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL

Applied Factor : 1,0 times Terzaghi's value

Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa	
1	0	300	150	36	150	8	14	29	190	
2	300	600	450	34	450	9	13	27	180	
3	600	900	750	6	750	50	2	3	42	
4	900	1200	1050	22	1050	14	8	15	99	
5	1200	1500	1350	27	1350	11	10	20	147	
6	1500	1800	1650	23	1650	13	9	16	103	
7	1800	2100	1950	34	1950	9	13	27	180	
8	2100	2400	2250	40	2250	8	15	33	208	
9	2400	2700	2550	48	2550	6	18	42	246	
10	2700	3000	2850	89	2850	3	34	95	439	**REFUSAL**

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

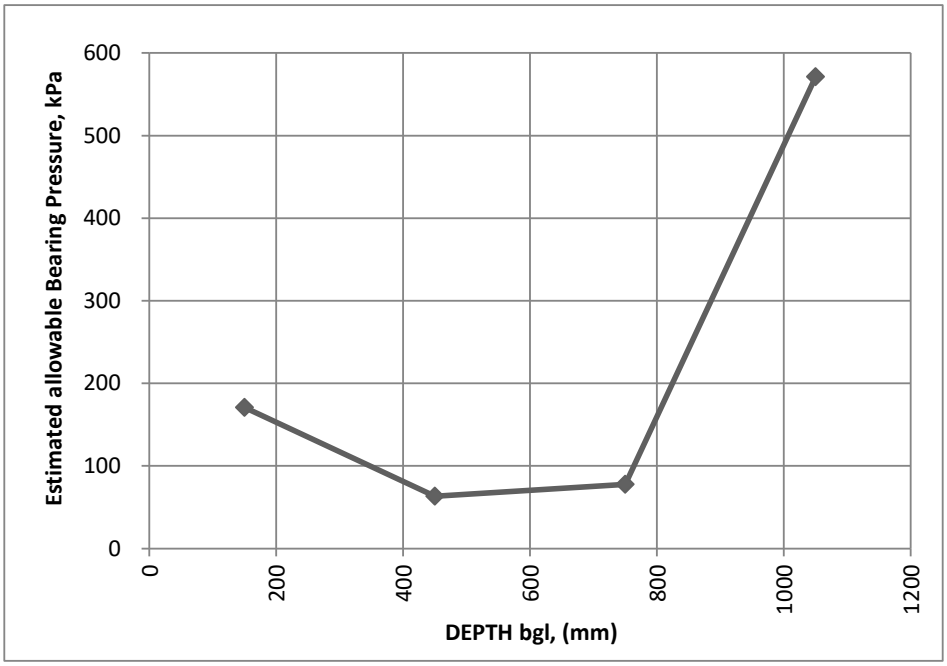
DPL NO: 5

DATE: 22 FEBRUARY 2023

DPL NO: 5

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa	
1	0	300	150	32	150	9	12	25	171	
2	300	600	450	12	450	25	5	7	63	
3	600	900	750	16	750	19	6	10	78	
4	900	1200	1050	117	1050	3	44	110	571	**V. DENSE**

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

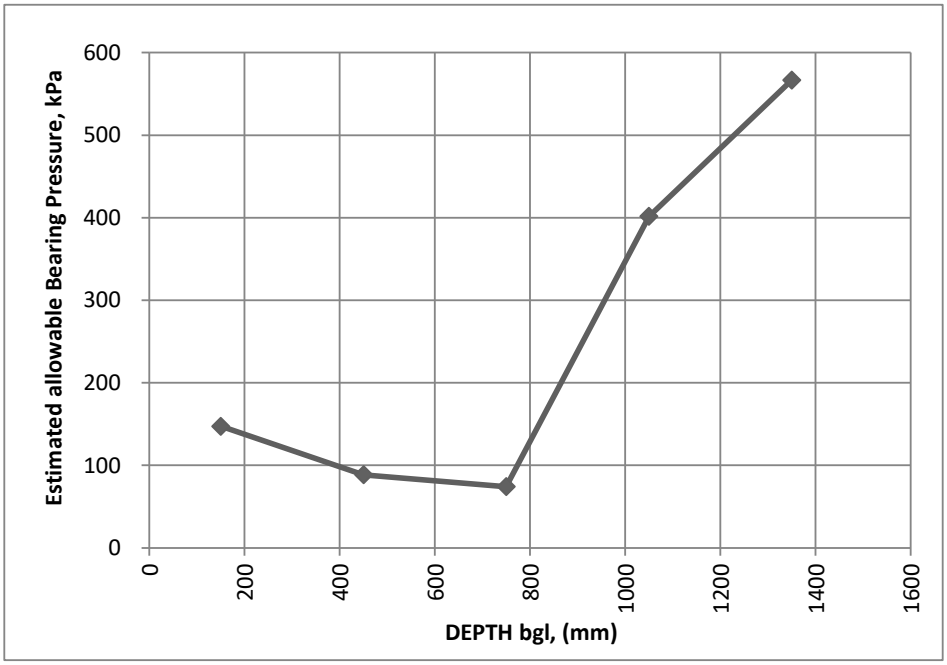
DPL NO: 6

DATE: 22 FEBRUARY 2023

DPL NO: 6

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa	
1	0	300	150	27	150	11	10	20	147	
2	300	600	450	19	450	16	7	13	89	
3	600	900	750	15	750	20	6	9	74	
4	900	1200	1050	81	1050	4	31	84	402	
5	1200	1500	1350	116	1350	3	44	110	567	**V. DENSE**

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

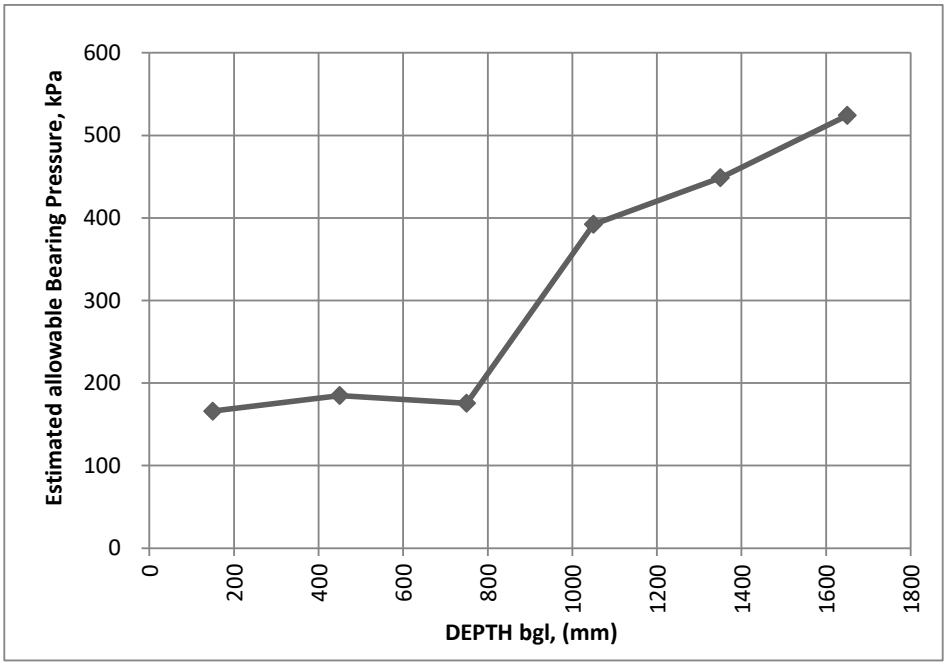
DPL NO: 7

DATE: 22 FEBRUARY 2023

DPL NO: 7

Elevation: **m**
Coord. (S): **° ' " S**
Coord. (E): **° ' " E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa	
1	0	300	150	31	150	10	12	24	166	
2	300	600	450	35	450	9	13	28	185	
3	600	900	750	33	750	9	13	26	175	
4	900	1200	1050	79	1050	4	30	81	392	
5	1200	1500	1350	91	1350	3	35	97	449	
6	1500	1800	1650	107	1650	3	41	110	524	**REFUSAL**

SHARDESH SEWLAL
ENGINEERS

PROJECT: EXTENSION TO WOODBURN SHOPPING CENTRE

LOCATION: 15 WOODHOUSE ROAD, SCOTTSVILLE

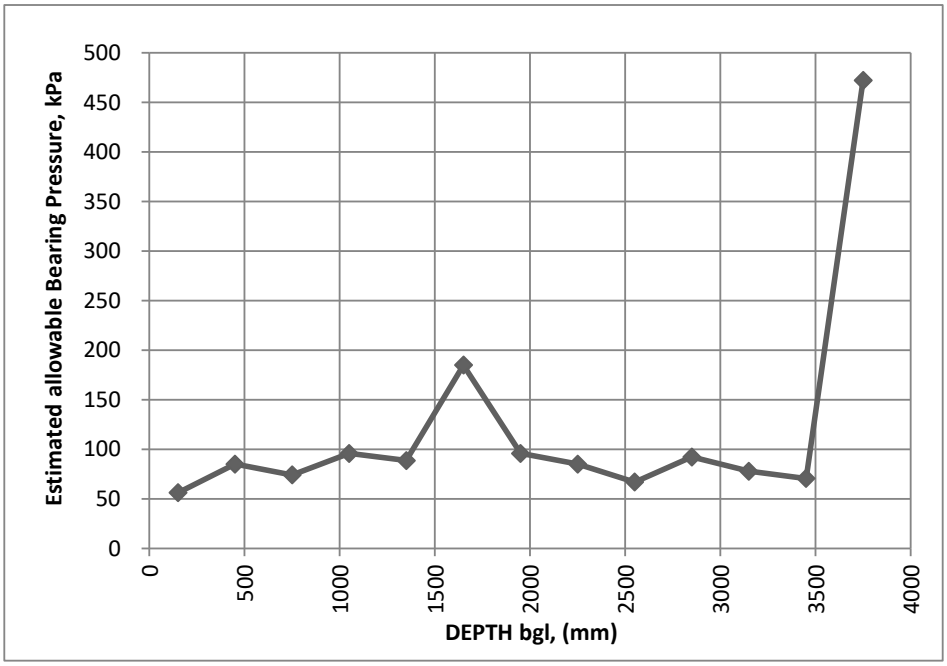
DPL NO: 8

DATE: 22 FEBRUARY 2023

DPL NO: 8

Elevation: **m**
Coord. (S): **° ′ ″ S**
Coord. (E): **° ′ ″ E**

DYNAMIC CONE PENETROMETER TEST RESULTS



Non - Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
< 5	132-210	Very Dense
5 - 10	78-132	Dense
10 - 30	25-78	Med Dense
30 - 75	10 25	Loose
75 -100	<10	Very Loose

Cohesive		
Penetration Guide		
SPT mm/blow	DCP DN	Consistency
5	13	V. Soft
10	26	Soft
15	66	Firm
50	132	Stiff
80	211	V. Stiff

NOTE: A minimum of 4 readings is required!

Depth of hole in which DCP was taken : _____ mm below NGL
Applied Factor : 1,0 times Terzaghi's value
Remarks :

Reading No.	Layer From	Layer To	Average Layer Depth	DCP DN Blows / 300mm	Level Below NGL mm	DCP penetration mm/blow	Equiv. SPT N Value	Approx In-situ CBR	Approx EASBP kPa	
1	0	300	150	10	150	30	4	5	56	
2	300	600	450	18	450	17	7	12	85	
3	600	900	750	15	750	20	6	9	74	
4	900	1200	1050	21	1050	14	8	14	96	
5	1200	1500	1350	19	1350	16	7	13	89	
6	1500	1800	1650	35	1650	9	13	28	185	
7	1800	2100	1950	21	1950	14	8	14	96	
8	2100	2400	2250	18	2250	17	7	12	85	
9	2400	2700	2550	13	2550	23	5	8	67	
10	2700	3000	2850	20	2850	15	8	13	92	
11	3000	3300	3150	16	3150	19	6	10	78	
12	3300	3600	3450	14	3450	21	5	8	71	
13	3600	3900	3750	96	3750	3	36	105	472	**REFUSAL**