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**GEVORKYAN
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CONSULTING EARTH SCIENTISTS

REPORT TO DAMARIS HOLDINGS (PTY) LTD ON THE RESULTS OF A GEOTECHNICAL INVESTIGATION FOR THE PROPOSED UPGRADING OF INTERNAL ROADS FOR OLIEVENHOUTSBOSCH EXT 60, GAUTENG PROVINCE

**PROJECT REF: 3837.R01
REVISION 0
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Field work:

Geomat Laboratory cc

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Table of Abbreviations

ABBREVIATION	DEFINITION
BEGL	Below natural ground level
CBR	California Bearing Ratio
DCP	Dynamic Cone Penetrometer
GEOMAT	Geomat Laboratory cc
ITS	Intensile Strength
KM	kilometre(s)
KN/M²	kiloNewtons per square metre
KPA	Kilopascals
M	metre(s)
MM	millimetre(s)
MPA	Mega Pascal
N/A	Not Applicable
NO.	number
SANS	South African National Standards
TP	Test Pit
TLB	Tractor Loader Backhoe
TRH	Technical Recommendations for Highways
UCS	Unconfined Compressive Strength

1. TERMS OF AGREEMENT AND SCOPE OF SERVICES

Geomat Laboratory cc (Geomat) was requested by Damarais Holdings Pty Ltd to carry out a materials investigation for the proposed upgrading internal roads for Olievenhoutbosch Ext 60.

The scope of the project involved the following:

- ✓ Excavation of test pits to a depth of 0.8m or shallower refusal.
- ✓ Dynamic Cone Penetrometer (DCP) tests.
- ✓ Profiling of test pits.
- ✓ Collection of soil samples for testing.
- ✓ Preparation of a material testing report.

This geotechnical report provides the results of the material investigation, and basic recommendations and comments are given regarding the use of material for the proposed layerworks.

2. CODES OF PRACTICE AND STANDARDS

The services were carried out in accordance to the current level of geotechnical standards practiced by professionals in Southern Africa.

The document referenced for use is *“Site Investigation Code of Practice, 1st Edition, South African Institution of Civil Engineering – Geotechnical Division, January, 2010”*

The nature of geotechnical engineering is such that variations in soil conditions may occur even where sites seem to be consistent. Variations from what is reported here may become evident during construction and it is thus imperative that an appropriately qualified and experienced competent person inspects all critical stages of development including, but not limited to excavations, to ensure that conditions at variance with those predicted do not occur and to undertake an interpretation of the facts supplied in this report.

It is possible that certain indications of ground stability, contamination, or groundwater levels were latent or otherwise not visible. Opinions are based on what was visible at the time the investigation was conducted.

3. REFERENCED INFORMATION

The following information was used for the project:

- i. A regional geological map titled “2528 Pretoria”, dated 1988 and prepared by the Council for Geoscience to a scale of 1:250 000; and
- ii. Low-resolution satellite imagery sourced from Google Earth (2026).

4. INVESTIGATION ACTIVITIES

The field portion of the investigation was carried out over the period of 11 to 12 March 2026 and comprised the following:

- a. Excavation of test pits; and
- b. CBR Dynamic Cone Penetrometer (DCP) testing.

4.1 Test Pitting and Profiling

Approximately 20 No. test pits were excavated at selected points along the proposed road upgrade and have been designated by prefixes TP01 to TP20 and were excavated to approximate depths in the range 1.0m to 1.4m below existing ground level (begl). (Refer to test pits for detailed information).

The test pit profiles are given in **Appendix A** at the end of this report.

The test pits were profiled in accordance to the South African Geoterminology Guidelines (Brink and bruin, 2002) and by representatives of Geomat Laboratory cc.

4.2 DCP Testing

DCP test were carried out adjacent to each test pit and elsewhere on site and a total of 25 No. DCP tests were completed. The DCP tests have been designated by prefixes DCP01 to DCP25 and extended to approximate refusal/final depths in the range 0.1m to 1.0m begl. The DCP Test results are given in **Appendix B** at the end of this report.

5. DESCRIPTION OF THE STUDY AREA

The sites are located within Olievenhoutbosch Extension 60 and approximately 7km north of Midrand Town. The latitude and longitude of the site 25.91314 S and 28.11816 E. The current condition of the road is gravel and is proposed for asphalt upgrade. The area is dominated by residential developments with minimal vegetation.

The locality of the site is shown in Figure 1, with the general layout of the site with field test positions given in Figure 2.

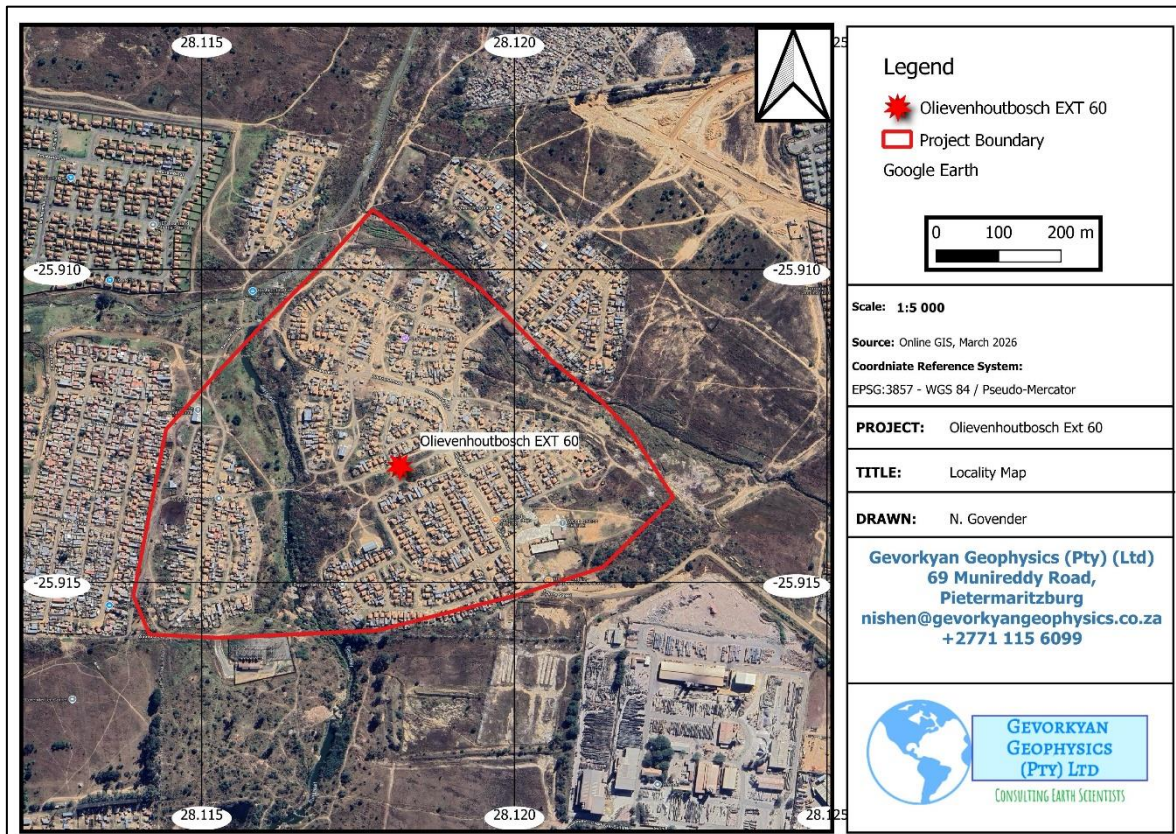


Figure 1: Locality of the site

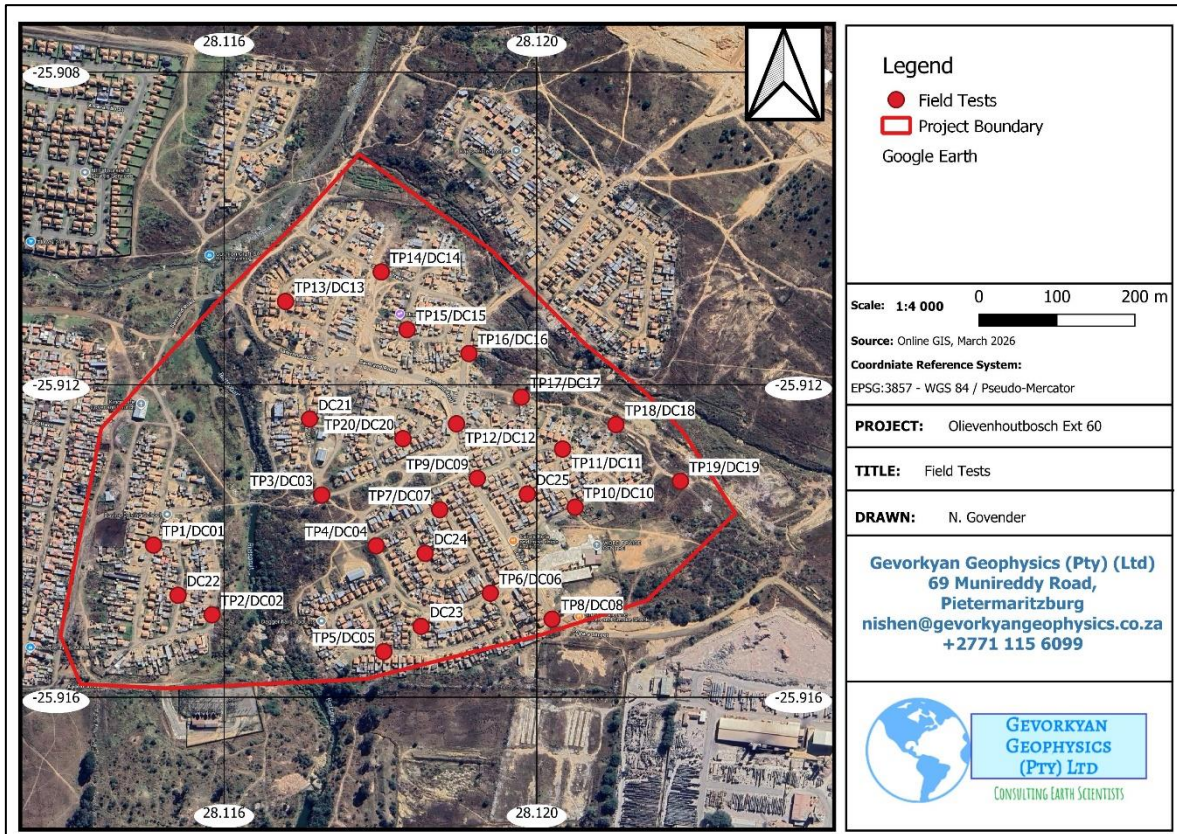


Figure 2: Field Test Positions

6. GENERAL GEOLOGY AND INFERRED SUBGRADE CONDITIONS ALONG THE PROPOSED ROAD ALIGNMENT

According to the Geological Map Sheet “2528 Pretoria” as shown in Figure 3, the site is underlain by Halfway House suite granite-gneiss and can be regarded as non-dolomitic.

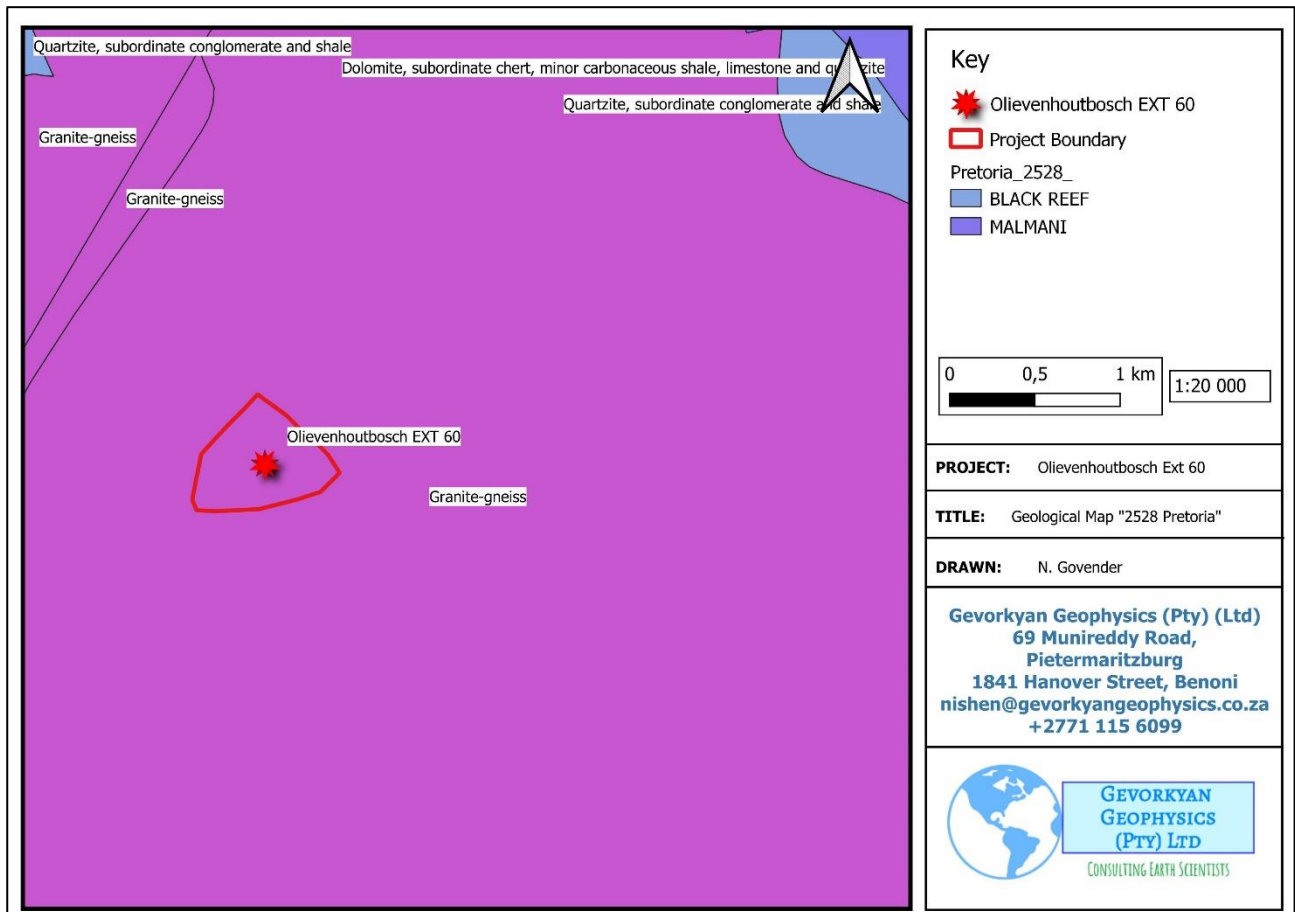


Figure 3: Geological Map "2528 Pretoria"

6.1 Geology and Subgrade

The positions investigated generally encountered fill and residual granite with an isolated area comprising dolerite.

Table 1 provides summarised information of the subsoil profile for the site.

Table 1: Summary of Subsurface Profiles and Material Classifications

Test Pit No. (DC No.)	Depth (m begl)	Description	Material Quality	CBR % (based on DCPs)
TP01 (DC01)	0-0.5 0.5-1.0	Silty SAND – Colluvium. Clayey GRAVEL – Ferricrete. Water seepage at 1.0m	TBC	12-42 6-10
TP02 (DC02)	0-0.3 0.3-1.0	Silty SAND – Fill. Sandy GRAVEL – Ferricrete.	TBC	Ref -
TP03 (DC03)	0-0.3 0.3-1.1	Sandy GRAVEL – Residual Granite. Sandy GRAVEL – Residual Granite.	TBC	29-53 12-18
TP04 (DC04)	0-0.15 0.15-1.1	Sandy GRAVEL – Residual Granite. Sandy GRAVEL – Residual Granite.	TBC	22-53 14-29
TP05 (DC05)	0-0.4 0.4-1.2	Gravelly SAND – Fill. Sandy GRAVEL – Residual Granite.	TBC	25-70 12-25

Test Pit No. (DC No.)	Depth (m begl)	Description	Material Quality	CBR % (based on DCPs)
TP06 (DC06)	0-0.4 0.4-1.1	Gravelly SAND – Fill. Sandy GRAVEL – Residual Granite.	TBC	25-102 18-35
TP07 (DC07)	0-0.4 0.4-1.1	Sandy GRAVEL with boulders – Fill. Sandy GRAVEL – Residual Granite.	TBC	35-50 18-35
TP08 (DC08)	0-0.4 0.4-1.0 1.0-1.2	Sandy GRAVEL – Residual Granite. Sandy GRAVEL – Residual Granite. Sandy GRAVEL – Residual Granite.	TBC	25-71 14-25 N/A
TP09 (DC09)	0-0.3 0.3-0.7 0.7-1.4	Gravelly SAND – Fill. Sandy GRAVEL – Residual Dolerite. Sandy GRAVEL with rock Fragments – Dolerite	TBC	53-102 Ref
TP10 (DC10)	0-0.3 0.3-1.2	Gravelly SAND – Ferricrete. Sandy GRAVEL – Residual Granite.	TBC	29-53 18-35
TP11 (DC11)	0-0.3 0.3-0.8 0.8-1.3	Gravelly SAND – Fill. Gravelly SAND – Ferricrete. Gravelly SAND – Residual Granite.	TBC	25-42 18-29 14-18
TP12 (DC12)	0-0.7 0.7-1.0	Gravelly SAND – Fill. Gravelly SAND – Residual Granite.	TBC	18-71 14-20
TP13 (DC13)	0-0.3 0.3-0.7 0.7-1.2	Silty SAND – Fill. Gravelly SAND – Ferricrete. Gravelly SAND – Ferricrete.	TBC	29-53 20-29 18-25
TP14 (DC14)	0-0.5 0.5-1.3	Silty SAND with boulders – Fill. Gravelly SAND – Residual Granite.	TBC	25-42 14-22
TP15 (DC15)	0-0.2 0.2-0.6 0.6-1.1	Silty SAND – Fill. Gravelly SAND – Residual Granite. Sandy GRAVEL – Residual Granite.	TBC	35-102 22-25 9-22
TP16 (DC16)	0-0.3 0.3-0.5 0.5-1.1	Silty SAND – Fill. Gravelly SAND – Residual Granite. Gravelly SAND – Residual Granite.	TBC	Ref.
TP17 (DC17)	0-0.15 0.15-1.1	Sandy GRAVEL – Fill. Gravelly SAND – Residual Granite.	TBC	42-71 9-42
TP18 (DC18)	0-0.4 0.4-1.0 1.0-1.3	Gravelly SAND – Fill. Sandy GRAVEL – Residual Granite. GRAVEL – Granite.	TBC	29-53 29-35 Ref
TP19 (DC19)	0-0.3 0.3-0.8 0.8-1.2	Gravelly SAND – Fill. Sandy GRAVEL – Residual Granite. Sandy GRAVEL – Residual Granite.	TBC	35-42 14-25 16-18
TP20 (DC20)	0-0.4 0.4-1.0	Silty SAND – Fill. Sandy GRAVEL – Residual Granite.	TBC	29-35 10-25

N/A – Not Applicable due to no testing done

TBC – To be Confirmed when results available

Ref – Refusal

Photographs of subsurface profiles observed in the inspection pits are given in Photographs 1 to 6.



Photograph 1: View of TP02



Photograph 2: View of TP04



Photograph 3: View of TP09



Photograph 4: View of TP12



Photograph 5: View of TP16



Photograph 6: View of TP20

7. GROUNDWATER

Groundwater was only encountered in TP01 at a depth of 1.0m begl.

It must be noted that groundwater activity is, however, generally expected across the entire site on an intermittent / periodic basis and is also likely to fluctuate as a result of seasonal rainfall patterns.

There is also a concern for groundwater close to drainage channels / streams / rivers and this will need to be accommodated for in the construction budget.

It is therefore recommended that the appropriate measures be implemented to counteract the potential groundwater activity on site, i.e. subsurface drainage.

8. SOIL LABORATORY RESULTS

To evaluate the engineering properties and the suitability of the in-situ soils and bedrock for construction use, the following laboratory tests were conducted on soil and rock samples retrieved from the site:

- i) Grading Analysis, Atterberg Limits;
- ii) Modified AASHTO;
- iii) California Bearing Ratio and
- iv) Moisture Content

The results of the laboratory tests are given in Appendix C and summarized in Table 2.

Table 2: Summary of Results of Grading Analysis, Atterberg Limit Determinations, and Material Classifications for materials from Road D379

TO BE UPDATED WHEN AVAILABLE								
LL	-	Liquid Limit	OMC	-	Optimum Moisture Content	PI	-	Plasticity Index
MDD	-	Maximum Dry Density	LS	-	Linear Shrinkage	G6	-	Classification in Terms of COLTO
ITS	-	Intensile Strength						

9. DISCUSSION

9.1 Proposed Development

The current state of the road is gravel and will be upgraded to black top (asphalt surfaced). The final design of the road was unknown at the time of preparation of the report.

9.2 Trechability/Excavatability along the Proposed Route

The excavations have been assessed based on SANS 1200 (Latest version). Based on the results of the field investigation, it is inferred that the subsurface classifies as soft excavation down to the final depths of the field tests (TP and DCP results refers).

In such instances, it is considered that the material may be easily excavated by a tractor loader backhoe (TLB).

It is also possible that intermediate to hard excavations may be encountered at a shallower depths along the proposed route. Therefore, a contingency amount is recommended in the construction budget for intermediate to hard excavations at shallower depths.

9.3 Classification of Material and Recommended Usage

To be upgraded when laboratory results are available.

9.4 Drainage

A critically important factor in the stable development of the site is the control and removal of both surface and groundwater from the site. Drainage measures should be designed in such a way as to prevent ponding of, or high concentrations of, stormwater or groundwater anywhere on site, both during and after the development.

On all road curves, the outer shoulder should be lined with upright kerbs to deflect water run-off back into the road stormwater system. Experience with the erodible

soils indicates that unlined dish (half round) drains adjacent to the roads are virtually ineffective and will soon give way to the formation of large and deep dongas (erosion gully). Subsequent damage of road prism can be expected.

The need for subsoil drainage will have to be assessed on site during construction in consultation with the geotechnical professional.

9.5 Foundations for the Proposed Culvert

No culverts were indicated to the team on site. Should these be proposed, the geotechnical professional will need to be consulted for suitable foundation recommendations.

9.6 Quality Assurance Testing during Construction

Regular process control and acceptance control testing must be carried out during road construction. It is recommended that once the roadbed (formation) has been prepared that a series of samples be taken for CBR testing and stabilised tests (if required) at the required intervals of the current legislation.

These results should then be discussed with the geotechnical professional.

All aspects of the project should be done in accordance with the South African Pavement Engineering Manual, Chapters 1 to 14, which was developed by the South African National Roads Agency Soc Ltd.

Alternatively, the design engineer may use other standards that are accepted in South Africa for Road Designs.

10. DOLOMITE STATUS AND RISK

The results of the geotechnical investigation have identified that the site is not underlain by dolomite and is considered as dolomite free (Figure 4 refers).

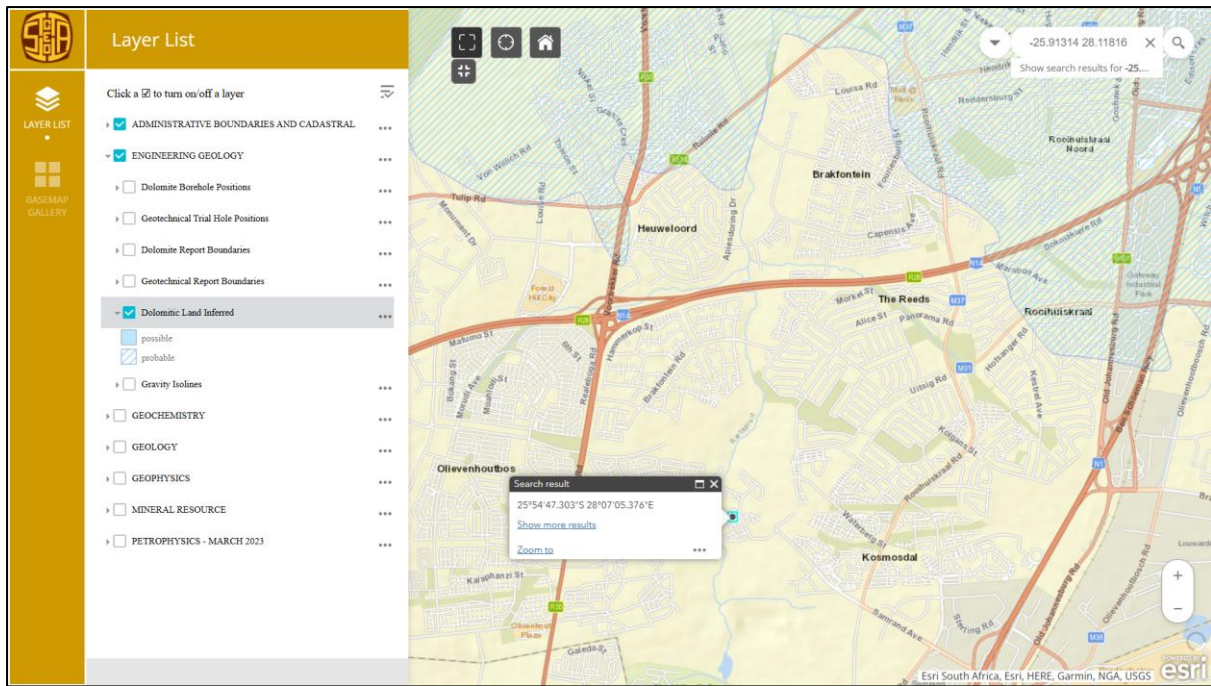


Figure 4: Dolomite Map from Council for Geosciences

11. CONCLUDING REMARKS

- i. The ground conditions identified along the proposed route are inferred based on actual field test positions and are likely to variate.
- ii. The subsurface profile comprises mainly fill, ferricrete, residual granite, weathered granite rock and isolated areas of dolerite intrusions.
- iii. There is evidence of groundwater activity in the area and precautionary measures is recommended and should be budgeted in the construction bill.
- iv. Trenchability and excavatability along the proposed route are provided in Section 9.2. In general, soft excavations are possible down to final depths of the test pits.
- v. This report is issued in Draft Format as the Laboratory results are currently not available.

The ground conditions given in this report refer specifically to the field tests carried out on site. It is therefore, quite possible that conditions at variance with those given in this report may be encountered elsewhere on site during construction.

It is therefore important that Geomat Laboratory cc or a geotechnical practitioner be appointed to carry out periodic inspections during construction.

To this end, it is important that regular process control and acceptance control testing be carried out during road construction. Any change from the anticipated ground conditions could then be taken into account to avoid unnecessary expense.

12. REFERENCES

1. Brink, A., & Bruin, R. (2002). Guidelines for Soil and Rock Logging in South Africa. Proceedings of the Geoterminology Workshop. South Africa: Association of Engineering Geologists, South African Institute of Civil Engineering and South African Institute for Engineering and Environmental Geologists.
2. Committee of State Road Authorities. (1985). THR14: Guidelines for Road Construction Materials. South Africa: Department of Transport.
3. Committee of Land Transport Officials (COLTO). (2010). Standard Specifications for Road and Bridge Works for State Road Authorities.
4. Committee of Transport Officials (COTO). (2020) (DS). Standard Specifications for Road and Bridge Works for South African Road Authorities. Chapter 4.
5. South African Bureau of Standards. (1990). Standard Specification for Civil Engineering Construction, D: Earthworks. South Africa: South African Bureau of Standards.