Lanseria International Airport
Proposed Expansion Project
Southern Precinct

GEOTECHNICAL INVESTIGATION REPORT

REPORT NO: GGE/23031/3

April 2025

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BGL -	Below ground level
BH -	Borehole (& No)
CBR -	California Bearing Ratio (soil test)
CBRW -	Concrete Block Retaining Wall alternatively, CBR wall, also CRBW used interchangeably by others
CIR -	Landpac's Continuous Impact Response Verification plot
C4 / G6 / G9..-	Material Classification (per TRH14, rather than COLTO / COTO)
DC -	Dynamic Compaction
DCP -	Dynamic Cone Penetrometer
DPSH -	Dynamic Probe Super Heavy
DR -	Dynamic Replacement
FEA -	Finite Element Analysis
FIND -	Foundation Indicator (soil test) = Sieve analysis, Atterberg Limits, Hydrometer & Moisture Content
FOS -	Factor of Safety
GM -	Grading modulus
NGL -	Natural ground level
NMC -	Natural Moisture Content (%)
MDD -	Maximum Dry Density (generally using Mod AASHTO compactive effort as the benchmark)
MSE -	Mechanically Stabilised Earth
MSEW -	Mechanically Stabilised Earth Wall
OMC -	Optimum Moisture Content (%) (at Mod AASHTO compactive effort)
PI -	Plasticity Index
RCCW -	Reinforced Concrete Cantilever Wall
RIC -	Rapid Impact Compaction
SDP -	Site Development Plan
T/C -	Taxiway Charlie
TH -	Large Diameter Trial Hole - usually drilled to refusal by means of a piling rig
TP -	Test Pit (& No) - usually excavated to refusal / maximum reach of a TLB
TLB -	Tractor Loader Backhoe
TRH14 -	Technical Recommendations for Highways
TMH -	Technical Methods for Highways
UCS -	Unconfined Compressive Strength

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Project Title	**Geotechnical Investigation for the Proposed Expansion Project of the Southern Precinct at Lanseria International Airport for Growthpoint Properties**		
Client	**EDS Engineering Design Services**	For Attention	Mr Pedri de Lange
Project Number	GGE/23031/3	Date	1 April 2025

1. Introduction and Terms of Reference

Geoid Geotechnical Engineers (GGE) have been appointed by Mr Pedri de Lange on behalf of EDS Engineering Design Services (Pty) Ltd, to carry out a geotechnical investigation for the proposed Southern Precinct of the Lanseria International Airport expansion project.

The approved cost proposal GGE/P23047/R2 of 29th November 2023 and subsequent email correspondence from EDS on 29th November 2023 have reference.

This investigation was carried out according to the *Guidelines for Urban Engineering Geological Investigations,* as published by the *South African Institute of Engineering Geologists* and South African Institution of Civil Engineers.

2. Scope of Work

The scope of work covered in this appointment comprised the following components:

(a) GIS modelling of regional topographic and geological setting for contextual site classification purposes (see Figures 1-2 - Appendix A)

(b) Consolidation of all existing information from prior investigations in the area, so as to provide an optimised fieldwork distribution (see Figure 3, Appendix A) and reuse of any useful information from this work

(c) Near surface investigative fieldwork, comprising in situ profiling of a grid of test pits covering the footprint of the proposed development (see Figure 3, Appendix A and Appendix C1)

(d) Supplementary probing of the ground profile by means of DCP techniques, typically from ground level adjacent to test pits, which are provided as material strength overlays on the test pit profiles (see Appendix C1)

(e) Deep investigative fieldwork, comprising in situ profiling of an infill grid of large diameter trial holes covering the footprint of the proposed deep cutting in the south-western sector of the site (see Figure 3 and Appendix C4)

(f) DPSH probing of the elevated embankment to the east of the southern taxiway (see Figure 3 and Appendix D)

(g) Soil laboratory testing for foundation and materials assessment (Appendix E)

(h) Data synthesis and analysis

(i) Formal geotechnical report, comprising factual and interpretive components

3. Investigation Objectives

The objectives of this project were limited to the following:

(a) to determine the general nature, distribution and engineering properties of the near surface soils and underlying rocks across the footprint of the proposed development;

(b) to provide a geotechnical classification of the site according to the guidelines referred to above;

(c) to give general foundation recommendations for the anticipated structures;

(d) to classify the excavation characteristics for buried services, deep foundations and lateral support installation;

(e) to appraise any groundwater conditions which may impact on any foundations / excavations;

(f) to assess the slope stability of the project site;

(g) to comment provisionally on the properties of available soils for reuse;

(h) to assess the compressibility characteristics of the existing elevated fill;

(i) to comment on any other geotechnical issues warranting attention.

4. Background Information

The findings of the following historical geotechnical reports have been synthesised and included in this investigation:

(a) Geoid Geotechnical Engineers (Pty) Ltd (January 2020)***, Geotechnical Investigation Report for Portion 32 and Remainder of Portion 1 Botesdal 529-JQ***, Report No: GGE/19040 for EDS Africa Consulting.

(b) Geostrategies Consulting Engineers (August 2007), ***Geotechnical Investigation for Holding 1, Sunrella Agricultural Holdings***, Job No: 07257, for Carlisle & Associates.

(c) Blue Rock Consulting (March 2007), ***Report on the Geotechnical Investigation for Township Development on Portion 80, Bultfontein 533-IQ***, Report No 2006-0050/1 for Western Ocean Trading 3 (Pty) Ltd.

5. Setting

The project site for the Southern Precinct straddles several contiguous properties within, and immediately bordering, the present airport, including the following (see Figure 3, Appendix A):

(a) **Lanseria Airport X1**
- (i) Remainder of Portion 6 of the farm Botesdal 529-JQ
- (ii) Portion 24 of the farm Botesdal 529-JQ
- (iii) Portion 23 of the farm Botesdal 529-JQ

(b) **Adjacent Plot Lands**
- (i) Portion 32 of the farm Botesdal 529-JQ
- (ii) Portion 1 of the farm Botesdal 529-JQ
- (iii) Remainder of Portion 1of the farm Botesdal 529-JQ
- (iv) Portion 80 of the farm Bultfontein 533-JQ - denoted Lanseria X12
- (v) Holding 1 Sunrella A/H
- (vi) Holding 5 Sunrella A/H
- (vii) Holding 6 Sunrella A/H

6. Site Description

The southern precinct - with a combined area of approximately 45ha - comprises the vacant land surrounding Taxiway Charlie (T/C), south of the fire station / control tower and present hangar development through to the main perimeter fence of the airport, with the addition of several undeveloped, contiguous neighbouring plots which have been recently acquired for inclusion (see Figures 1, 3 - Appendix A).

City of Johannesburg mapping - based on the 2015 LIDAR survey - provides 2m contour details from which the site can be seen to be dipping north-eastwards from the high point in the south-western corner, and south-eastwards from the north-eastern corner towards the low-lying drainage line passing through a neighbouring property (Portion 77/533-JQ).

The average natural slope in the future cut zone appears to be approximately 1:25 (4% or 2.3°), which is locally interrupted in the vicinity of the taxiway, by an existing low cut and fill terrace, hosting the taxiway itself. The adjacent plot lands are similarly sloped, all dipping towards the drainage line which exits the property near the Permit Office of the south entrance.

At the time of the investigation, the vegetation on the site consisted predominantly of veld grass, with subordinate areas of vlei grasses - indicative of near-surface groundwater - largely defined by Zone 3 (Figure 4, Appendix A), which indicate two separate drainage lines converging on Portion 77.

An overall depiction of the present state of the site is shown in the image sequence below:

Image 1: North view from beyond the southern tip of Taxiway Charlie

Image 2: South view of Taxiway Charlie from the north

Image 3: North-east view from the elevated south-west extremity of the site

Image 4: Overgrown attenuation pond, east of Taxiway Charlie

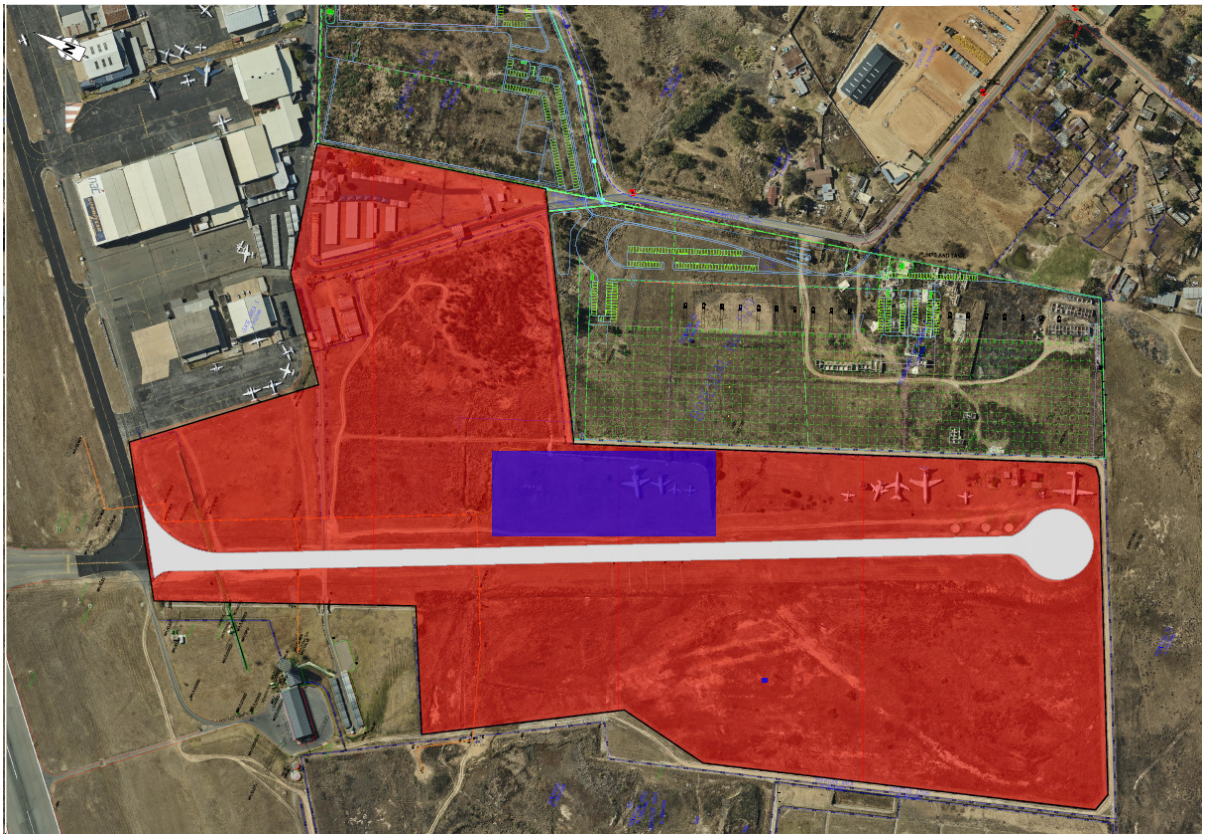
Image 5: Typical bush found on Portion 80/533-JQ (Extension 12)

Image 6: Typical grassland on Holding 5, with the drainage line in the background defined by reeds

Image 7: Shallow groundwater dominating the western half of Holding 6

7. Proposed Development

At this stage, no conceptual plans have been provided for consideration, other than that depicted below. Discussions with the property developer suggest that this could be a protracted development, undertaken over perhaps a decade or two, with the plans developing as the needs arise.



It is understood that the findings of the geotechnical investigation will - wisely - be incorporated into the overall master plan for the airport, and used to optimise the development of the site, taking cognizance of geotechnical constraints imposed by the available ground.

The development will, reportedly, consist of warehouse facilities, aircraft hangars and offices with parking areas, yards for truck movements and aprons and taxiways for large aircraft up to ICAO Code E aircraft (typically B777 or similar). The development will also include fire tanks and civil engineering services such as water, sewer and stormwater reticulation. Required bearing capacity for warehouse and hangar structures is typically 250kPa.

In essence, the development goal is the optimisation of level access to Taxiway Charlie, which is presently formed in partial cut / fill roughly along a north-south contour in the sloping ground. To achieve this, a significant cut - reportedly as much as 11m - is envisaged for the south-western sector to drop this to taxiway level. In contrast, this would necessitate raising the ground to the east by as much as 15m above the low-point, if a single terrace level were to be used, without drainage slopes being applied, which appears unlikely. The partial fill terrace shown in the image above would, however, more than halve this required fill height at the midpoint position to a more tolerable ~7.5m.

In practice, it may be onerous to construct a single level terrace, of such large dimensions, in a balanced cut and fill on this sloping site. Considerations of material quality and reusability, together with the drainage challenges of the overall site may necessitate a series of lesser terraces to minimise the bulk earthworks costs, provided these can be accommodated in the overall scheme.

8. Nature of the Investigation

This investigation is based on a desk study to collate and synthesize all existing information, followed by a phased fieldwork programme comprising the profiling of shallow test pits, large diameter trial holes, DPSH and DCP probing, supplemented with soils laboratory testing, all in accordance with industry norms.

8.1 Test Pit Profiling

The primary fieldwork component of this investigation comprised the in situ, visual and tactile profiling of 45 test pits (TP01-TP51, with exclusions) by a registered professional geotechnical engineer, using industry-standard methodology. [1]

The data set includes eight test pits (TP01-TP08) from an earlier phase of work completed by ourselves on Portion 32 and Re/Portion 1 in January 2020 [2] (Figure 3, Appendix A), which is supplemented by a further eight test pit provided by Blue Rock in 2007 on Portion 80 / 533-JQ (Appendix C2), and nine additional test pits on Holding 1 by Geostrategies in 2007 (Appendix C3).

The test pits were pre-planned on a triangulated grid maintained from our prior investigation of Portion 32 and Re/Portion 1, the result of which is near-optimal coverage of the site at a reasonable resolution so as to expose the range of geotechnical conditions present on this site.

Test positions were set out using a hand-held Garmin GPS - typically accurate to ~2m - following prior agreement and tailoring of the positions on site in consultation with the Lanseria authorities so as to avoid damaging any buried services.

Test pits were excavated between 6th-15th February 2024, by a Cat 428.F TLB supplied by HireAll Lanseria, to the limit of reach (approximately 2.5m-3.0m) or refusal on competent soil/rock quality material.

Profile plots - which graphically represent the soil profile in the test pits - are presented in Appendix C1.

1 Brink, ABA, and Bruin, RMH (2002) ***Guidelines for Soil and Rock Logging in South Africa***, Proceedings, Geoterminology Workshop organized by AEG, SAICE, and SAIEG, 1990.

2 Geoid Geotechnical Engineers (Pty) Ltd (January 2020), ***Geotechnical Investigation Report for Portion 32 and Remainder of Portion 1 Botesdal 529-JQ***, Report No: GGE/19040 for EDS Africa Consulting.

8.2 Trial Hole Profiling

In view of the need for a large excavation in the south-western sector of the site, a supplementary deep investigation was undertaken using a production piling rig to assess the nature of the soils and rock in this future cut-zone.

In the absence of any existing geotechnical information in this portion of the site, the trial hole investigation provided general coverage of this future cut, on a coarse triangulated grid supplemented with infill test pits, the positions of which are depicted on Figure 3 (Appendix A).

The investigation comprised the drilling of six large (750mm) diameter trial holes, on the 14th February 2024 using a Casagrande B125 piling rig, provided by *Makarios Geotechnical Dynamics.*

Trial holes were drilled to proven refusal of the auger flight fitted with tungsten rock tips, on what is typically rated *medium hard rock.*

These trial holes were formally profiled in situ to refusal depth by a registered professional geotechnical engineer, using industry-standard methodology.

Profile plots - which provide a graphical representation of the soil/rock profile encountered in the trail holes - are presented in Appendix C4.

These trial holes provide a high-level overview of the nature and quality of soil and rock mass in the future cut zone so as to inform the *conceptual design* of this excavation in this sector.

This includes information on the range and quality of the material for reuse in earth fill terraces, and high level information on appropriate lateral support techniques for the cut slope.

This investigation will, however, need to be supplemented with rotary core boreholes specifically along the alignment of the future lateral support / retaining wall in order to provide detailed design-level soil and rock parameters for the purposes of anchorage design.

8.3 DCP Probing

A set of supplementary dynamic cone penetration (DCP) tests were performed from ground surface to nominally 2m depth or prior refusal where this was not possible, at all of the GGE test pit positions shown on Figure 3 (Appendix A).

These DCP probes provide:

(i) an *indicative in situ soil consistency* from the crest of the test pits to a maximum depth of 2m below the probing surface;

(ii) an in situ CBR[3] of the soils, which is, importantly, highly dependent on the in situ moisture regime at the time of the test;

(iii) a preliminary in situ field assessment of the engineering properties of the soil horizons penetrated;

(iv) the rational basis upon which to *infer the soil profile* where this may not be physically observed, in the absence of any test pits being accessible (as in the case of TP20 located in the shallow groundwater Zone 3 - Figure 4, Appendix A).

These probe traces are presented graphically as a *Design Equivalent Material Class*, based on penetration rate ranges specified in the South African Pavement Engineering Manual[4], and overlaid on the soil profiles in Appendix C1.

3 **California Bearing Ratio (CBR)** - a penetration test for the evaluation of the mechanical strength of road subgrades, or as a measure of the load-bearing capacity of soils used for building roads, which can also be used for measuring the load-bearing capacity of unimproved airstrips or for soils under paved airstrips. The harder the surface, the higher the CBR rating. Characteristically a CBR of 3 equates to tilled farmland comprising poor-quality fines-dominant soils, while high quality compacted crushed rock aggregate has a CBR of 100.

4 South African National Roads Agency Ltd (January 2013): ***South African Pavement Engineering Manual Revision 1.0, Chapter 9: Materials Utilisation and Design, Section 15.4 Determining the Material Class, Table 32 - DCP Criteria for Granular Materials.***

8.4 DPSH Probing

Given the uncertainty in the quality, compaction density and thickness of the constituent materials used in the existing fill terrace east of Taxiway Charlie, a triangulated grid of dynamic probe super-heavy (DPSH) soundings were undertaken to cover the anticipated extent of the terrace, visible from satellite imagery.

Unlike the cone penetration driven by an 8kg DCP hammer - typically limited to 1m-2m depth - the DPSH probing depth is substantially less affected by soil friction on the drill string, in view of the 63.5kg hammer falling through a drop height of 760mm. As such, the DPSH test closely approximates the parameters of the *standard penetration test* (SPT).

Unlike the SPT at depth, however, the shear stress on the drill string do still add increasingly significant penetration resistance, providing a potentially exaggeration of the soil consistency and bearing capacity.

To overcome this limitation, research published by MacRobert et al [5] provides an approximate SPT : DPSH resistance correlation - shown below - which is being increasingly adopted by the geotechnical profession in RSA as a reasonable estimate of an *equivalent SPT.*

$$Equivalent\ SPT\ N = \frac{N_{30SB}}{0{,}02 \times N_{30SB} + 0{,}8}$$

The *Equivalent SPT* corrects for the potential exaggeration of the actual soil stiffness in higher density materials and at depth, where the effect of rod friction can markedly skew the soil stiffness.

The DPSH probing data are presented graphically in our Appendix D as an N_{30SB} plot with an overlay of the *equivalent SPT N* values, using the MacRobert equation.

In the present application, the DPSH probe traces provide a *preliminary appraisal* of the soil consistency (stiffness or resistance to penetration), and a *qualitative illustration of the efficacy of compaction* on any fill terraces employed. It is intended that this be used as an *index test* to inform the need for piling or further ground improvement through dynamic compaction, where a poorly compacted fill terrace of substantial thickness is present.

Moreover, the DPSH approximately simulates the resistance which would develop on a driven pile, providing a very useful *preliminary assessment* of the upper limit at which a driven pile might terminate, but does not purport to provide detailed pile design information. These findings should be confirmed / otherwise by formal rotary core drilling / large diameter trial holes for detailed pile design purposes, should this be required.

For a *relatively shallow, cohesionless* profile, rod friction would be comparatively minor, and a penetration resistance in the order of *30 blows per 300mm* would be required for a well-compacted fill terrace (blue reference line in the DPSH plots of Appendix D) - for settlements to be in a tolerable range. The base of the fill would normally be inferred from a steady increase in soil density followed by refusal on very soft rock at depth.

[5] MacRobert, CJ (2017) ***Interpreting DPSH Penetration Values in Sand Soils*** in Journal of the South African Institution of Civil Engineering ISSN 1021-2019 Vol 59 No 3, September 2017, Pages 11–15, Paper 1551

8.5 Laboratory Testing

Selected soil samples retrieved at the time of profiling were submitted for laboratory testing focussed on both a foundation and materials engineering analysis.

The tests undertaken include the following:

(i) Grading and Atterberg Limit tests to determine the basic engineering properties of the in situ soils for classification purposes.

(ii) Natural moisture content tests to determine the in situ moisture regime.

(iii) Collapse potential test, soaked at 200kPa, to model the combined effect of foundation loading and ingress moisture, to provide a collapse index for site classification purposes.

(iv) One-dimensional consolidometer (oedometer) tests to assess the stress-strain behaviour from which to predict the free swell potential as well as the settlement characteristics of the soils, and provide allowable bearing pressures for the foundations.

(v) Double-oedometer tests to assess the *comparable* stress-strain behaviour under both natural and soaked conditions, modelling the settlement characteristics of the soils, and demonstrating the relative effect of soil saturation under load; also providing allowable bearing pressures for the foundations.

(vi) Moisture-density tests at Mod-AASHTO compactive effort and California Bearing Ratio (CBR) tests to determine the compaction characteristics and classification of the in situ materials for the purpose of both road pavement and earth terrace / soil mattress design.

(vii) Shear box tests on intact soil block samples to estimate the shear strength parameters **C'** and **ϕ'** for the purposes of designing the anchors for the anticipated deep cutting in the south-western sector.

(viii) Basic chemistry tests (pH and conductivity) for the purposes of determining the aggressiveness of the soils towards buried concrete and steel.

(ix) No durability tests have been included at this stage, as these are only appropriate for the aggregates which will be imported from commercial sources for the subbase and base courses of the pavement layerworks.

Copies of these laboratory tests are included in Appendix E and a summary thereof which is presented in Table 1 (Appendix B).

The current set of tests excludes the shear box results and supplementary oedometers from the deep cuttings, which experienced sample preparation difficulties due to the high material densities. These are still currently in progress and will be presented as an addendum to this report on receipt.

9. Geology and Soil Profile

9.1 Regional Geology

Available regional geological mapping [6] shows the project site to be principally underlain by **granite** (migmatites, banded gneisses, mafic and ultra-mafic xenoliths, homogeneous and porphyritic grano-diorite phases with prominent pegmatite veining) of the Halfway House Granite formation (Johannesburg-Pretoria granite inlier [7]) of the Basement Complex - see Figure 2 (Appendix A).

The regional geological mapping shows that this granitic mass hosts a prominent, north-south oriented, mafic (**diabase**) intrusion passing directly through the project site, near-parallel with the taxiway. Intrusions of this nature are typically mapped off aerial photographs on the basis of visible rock outcrop, which is very common in these intrusive rocks. At the scale of the mapping, the position of the intrusion may be somewhat imprecise, necessitating more detailed investigation to establish its lateral extent (see Figure 2, Appendix A).

In addition to this, a similarly oriented north-south **shear zone** / **fault line** is shown to bisect Portion 80 (Extension12), manifesting in the form of heavy quartz veins exposed as rock outcrop, also sufficiently visible from aerial photographs for mapping purposes (see Figure 2, Appendix A).

9.2 Local Soil Profile

On the basis of our in situ profiling, the following characteristic soil profiles were identified, which form the basis for the geotechnical zonation presented below, and depicted in Figure 4 (Appendix A). In some of the zones, the natural profile is modified as a result of prior cut/fill operations and surface drainage interventions:

9.2.1 Hillwash / Colluvium Overlying Residual Granite

(i) **Hillwash**

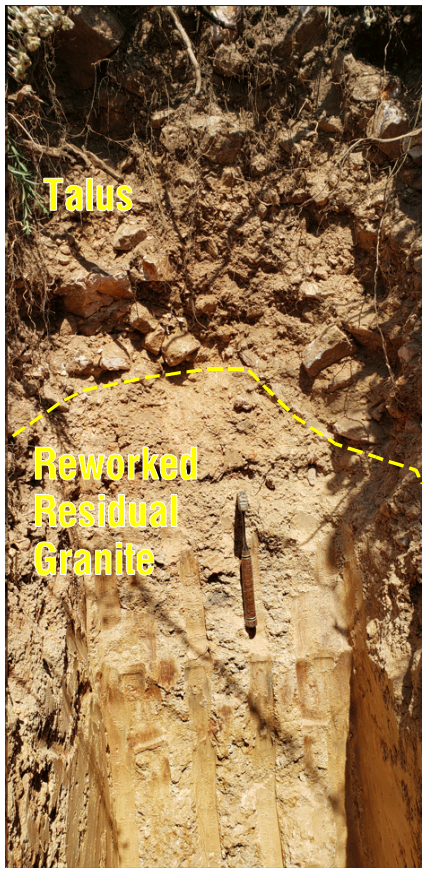
Slightly moist to moist, greyish-brown, loose through medium dense, porous, slightly clayey silty sand with scattered gravel and fine roots.

(ii) **Ferruginous Pebble Marker (locally Talus)**

Slightly moist to moist, light brown through pale grey blotched mustard-orange, red and black, generally loose through medium dense, porous, variably cemented, clayey through silty sand with variable concentrations of fine and medium sub-rounded quartz gravel and cobbles and ferricrete nodules.

In the lower-lying Portion 80 - in the general vicinity of the afore-mentioned fault line - the pebble marker contains a substantially larger coarse fraction, where it is typically termed a *talus* (as depicted in the image adjacent).

In this low lying area of oversized talus, the ferricrete tends to be conspicuously absent.



6 Department of Mines (1973), **1:50,000 Geological Series, *2527DD Broederstroom,*** Geological Survey.

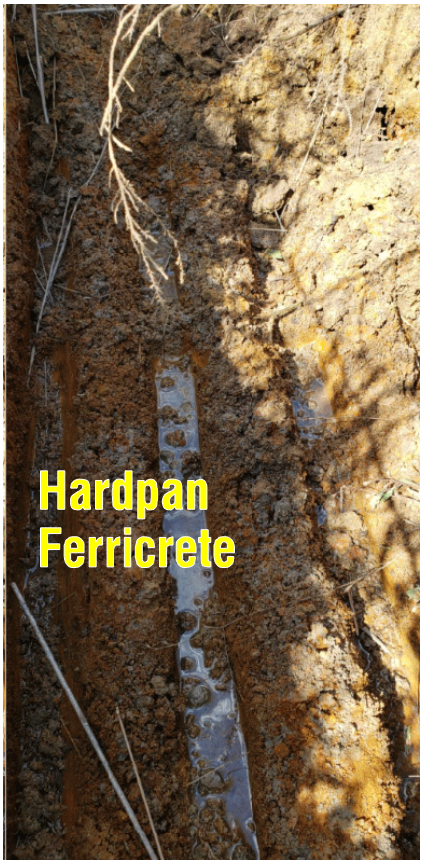
7 An ***inlier*** is an area of older rocks surrounded by younger rocks. Conversely an ***outlier*** is an area of younger rock completely surrounded by older rocks

(iii) **Hardpan Ferricrete**

Significant banks of hardpan ferricrete were encountered throughout much of the site, typically in the general vicinity of either the diabase intrusion or the vlei area (depicted on Figure 4, Appendix A).

The ferricrete has typically cemented the granular pebble marker into a very competent mass of near-rock quality material, which proved extremely difficult to penetrate by TLB and all forms of probing, although providing little resistance to the high powered piling auger.

The ferricrete appears to straddle both the base of the transported soils as well as the upper residual soils, making the transition relatively indistinct.



(iv) **Altered Reworked Residual Granite**

The dominant residual profile of this general area is of granitic origin, but shows signs of alteration by the nearby diabase intrusion - and sporadically includes diabase stringers within the granitic mass - which tends to degrade the overall quality of the soils.

This horizon typically occurs as a slightly moist through moist, dull orange mottled and blotched pale grey, black and pale yellow, medium dense, partially intact and relict-structured, porous, clayey sand through sandy silt with loose leached runnels and sporadic clay lenses.

(v) **Altered Residual Granite**

Below the reworked zone, the soils occur as slightly moist through moist, mustard-red and khaki mottled pale yellow and black, firm, intact and relict-structured, sandy silt with clay lenses.

(vi) **Residual Granite**

In contrast, the residual granite generally occurs as a slightly moist through moist, orange speckled red pale yellow, medium dense through dense, intact and relict-structured, silty sand.

9.2.2 Gullywash Overlying Residual Diabase

(i) **Imported Fill**

Significant areas affected by the gullywash soils - which are typically associated with shallow groundwater conditions - have been reclaimed by substantial deposits of loosely tipped granitic fill directly over these soils without their prior removal.

This fill is typically of granitic origin, occurring in the form of moist to very moist, brownish-orange mottled / blotched pale yellow and orange, medium dense through loose to medium dense, generally poorly compacted, slightly clayey, silty coarse sand with scattered through abundant gravels and rock fragments.

These soils may well have been harvested from the cutting for the present taxiway and placed in a relatively uncontrolled state, really for the purposes of elevating the ground for - and around - the taxiway.

(ii) **Gullywash**

It is not uncommon for this horizon to emerge at signficant depth, in the order of 3m below surface in the areas dominated by thick fill.

The soil horizon was observed to vary from a very moist, dark grey, loose, cohesionless sand through a grey mottled mustard-orange and pale grey, soft to firm, slickensided, silty clay.

The gullywash appears to be commonly associated with an underlying residual diabase profile, but cannot be assumed to be universally the case.

(iii) **Ferruginous Gullywash**

Slightly moist through very moist, grey through mustard-orange, mottled yellowish-brown, black and pale grey, soft through stiff, locally slickensided, sandy through silty clay with trace ferricrete becoming prolific with depth.

(iv) **Hardpan Ferricrete**

Very moist, reddish-orange, very dense, well cemented, gravelly clayey through silty sand is frequently present beneath the gullywash, but not universally so.

(v) **Ferruginous Reworked Residual Diabase**

Where exposed, this takes the form of a very moist, mustard-orange through light grey mottled reddish-orange, stained black, soft, sandy clay through firm, fissured clayey silt, reducing to silt with depth.

9.3 Rock Profile

The following three classes of rock were encountered in the investigation:

9.3.1 Granite

Granite is the dominant rock type in this general area, likely to be the dominant material emanating from the 11m deep cut in the south-western sector. From the investigation, it is evident that the rockhead in this zone arises from around 1.5m-2m below NGL in the form of a highly weathered, very soft rock. The weathering front of the granitic rock appears to be relatively modest, with *excavatable softer rock limited to the upper 4m of the profile*, below which the rock becomes considerably harder and more intact.

Intact, highly weathered, soft rock granite

Pulverised soft and medium hard rock granite on the auger flight

Significantly less weathered, medium hard rock granite

9.3.2 Diabase

Diabase is the subordinate rock type on this site, limited to the intrusion which passes nominally north-south through the site, roughly parallel withe the runway. Being a finer-grained, mafic rock, the weathering front is significantly deeper than the granite host rock, with the excavatable rockhead extending to nearly double the depth of the granite. The rock is fairly susceptible to the formation of *spheroidal boulders* - both at surface and below ground - where the latter can be problematic.

9.3.3 Quartz Veining

Quartz veins manifesting as rock outcrop are associated with a small fault line passing through Extension 12, outside of the anticipated cut zone and unlikely to be present or affecting the future cut. Although relatively hard, the veins are jointed and of limited size, making excavation possible without ground engaging tools.

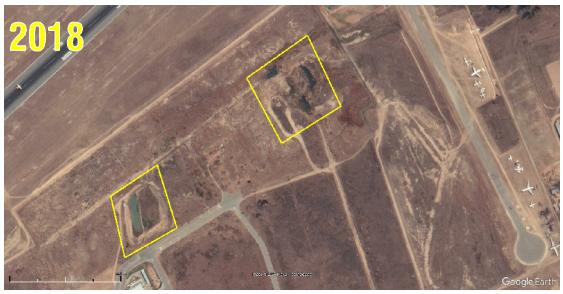
9.4 Groundwater

Significant portions of this site are negatively impacted by shallow groundwater, which evidently perches on a well developed hardpan ferricrete horizon, or is hosted well above this level within porous gullywash deposits. The underlying bedrock also encounters groundwater, albeit of a disconnected origin, which typically emanates from the rock joints at greater depths.

The groundwater is most prevalent in a lower-lying basin south of the fire station / control tower where concentrated stormwater is discharged from the neighbouring property via a series of conduits as shown in the images below. This appears to persist beneath the taxiway into the adjacent low-lying ground which was, reportedly, previously used as an attenuation facility, although this is no longer easily discernable.

A secondary drainage line - evidently of natural origin - emanates from Portions 32 and 72 of the neighbouring farm, Bultfontein 533-JQ, south of T/C, which impacts on significant portions of Holdings 5 and 6, as well as Re/1/529-JQ. This, together with the outflow from the fire station depression, appear to converge and discharge onto the adjacent stand (Portion 77/533-JQ) south-east of the permit office.

Whether these are a natural phenomenon, or artificially-induced, is beyond the scope of our expertise, but it is very apparent from the GoogleEarth ® satellite imagery that this situation has been exacerbated following the development of the business park to the west of T/C from around 2008, which has greatly reduced the natural attenuation capacity of the virgin ground and increased the runoff entering the airport environs.



This evidently prompted the construction of several attenuation ponds which are visible in the satellite photographs of 03/2013 and 03/2015 (not shown). These ponds appear to reach a areal peak in 2018, following which the easternmost cluster suddenly disappears, or was removed, in 04/2021, as depicted in the images adjacent.

10. Geotechnical Assessment of the Project Site

10.1 General Discussion

The geotechnical assessment which follows represents a *professional interpretation of the factual information* collated from our current and previous investigations, supplemented with several earlier investigations by different firms, using similar techniques and terminologies.

These comments are intended to guide the overall master plan for the development of this site, including preliminary design and costing of appropriate solutions for bulk excavations, cut slopes, ground improvements, earth fill using available materials usage and indicative founding of future industrial structures, the details of which are presently unknown. These are subject to consideration of the site development plan and/or bulk excavation levels which were yet to be finalised at the time of this report being drafted.

It is considered sound engineering practice for the investigating Geotechnical Specialist to be included in the project team so as to have further input - and be given opportunity to review final development plans and design details in regard to all the ground-related issues covered in this report - in order to verify the appropriateness of decision-making on the construction methodology and specifications, and to provide important continuity from investigation / initial interpretation phase through to detailed design and construction.

The following issues of importance should be borne in mind in carrying forward the detailed design process in respect of foundations and earthworks:

(i) given the appropriately wide grid spacing used for this general investigation, the soil profiles presented in this report provide an initial guide (or characteristic) to the generally expected ground conditions;

(ii) within the relatively coarse grid, it is completely normal for ground profile variations to be present between points of inspection;

(iii) as such, notable changes should, in fact, be anticipated - particularly across geological interfaces, such as are present on this site - which will give rise to the need for *informed geotechnical judgment* in applying the design recommendations;

(iv) these investigation findings should, therefore, be verified by the geotechnical specialist once the site is opened up for construction, or where significantly-modified earthworks and construction are proposed, in order that ground variances are properly interpreted and construction recommendations appropriately revised where necessary.

10.2 Basis for Geotechnical Assessment

(i) **Test Pit Profiling (Appendix C1-C3)**
In situ assessment of the nature and basic engineering behaviour of the shallow soil & rock profile.

(ii) **Trial Hole Profiling (Appendix C4)**
In situ assessment of the nature and basic engineering behaviour of the deep soil & rock profile.

(iii) **DCP Probing (Appendix C1 overlays)**
Assessment of the in situ CBR and equivalent material class of the upper 1m-2m of the profile.

(iv) **DPSH Probing (Appendix D)**
Assessment of the thickness and compaction of fill terraces and the depth to a suitable founding horizon.

(v) **Laboratory Testing (Appendix E)**
Verification of the visual - tactile assessment and provision of soil strength parameters for design purposes.

10.3 Geotechnical Classification

The geotechnical classification provides a first-order appraisal of the project site from a ground engineering perspective, which illustrates the impact of the ground on a characteristic light masonry structure. The classification and geotechnical data appraisal are, subsequently, expounded to guide the optimal development of the site for the intended usage - assumed to be industrial warehouse-type structures and/or aircraft hangars.

On the basis of our field profiling, we are of the opinion that the project site is characterised by **six geotechnical zones** - provisionally zoned as presented on Figure 4 (Appendix A) - with each assigned a geotechnical designation based on the characteristic profile (an explanation of which is presented in Appendix F).

In addition to exposing diabase in several of the test pits and trial holes - which confirms the accuracy of the regional geological mapping - it is evident that the predominantly *granitic profile* of the project site has been *significantly altered by this diabase intrusion*. The effect of the intrusion is to degrade the otherwise high quality residual granitic material to a comparatively poor quality net result in the general vicinity of the intrusion.

Whether for natural or artificial reasons, the drainage lines which have developed - as discussed in Section 9.4 - are characterised by gullywash deposits overlying a variable residual profile which is, in places, highly ferruginous, frequently to hardpan quality. The natural site is further altered by both cut and fill operations, principally associated with the construction of Taxiway Charlie.

10.3.1 Zone 1: 2 [C1-C2 / H-H1 / locally P (uncontrolled fill)]

The soil profile on this zone - which comprises the eastern and western peripheries of the site - is characterised by highly compressible / potentially highly collapsible hillwash soils and localised loose fill deposits of variable thickness, blanketing compressible residual granite, which tend towards being slightly expansive in close proximity to the diabase.

Given the historic agricultural nature of much of the site - particularly the area outside of the airport grounds - localised deposits of uncontrolled fill will be present which would negatively influence founding of structures and support of pavements.

10.3.2 Zone 2: 2 [C1-C2 / H1-H2 / locally P (uncontrolled fill)]

This zone - which comprises the *inferred areal extent* of the *diabase intrusion,* including the peripheral areas of highly altered residual granite which are degraded by the diabase - tends to be *slightly to moderately expansive,* but also blanketed by *potentially highly collapsible* hillwash soils of variable thickness. The extensive evidence of ferricrete in this zone will tend to mitigate the activity of the soils, rendering these more inert than would normally be the case. The diabasic soils also become progressively inert with depth.

As with Zone1, much of the zone outside of the airport grounds is susceptible to localised deposits of fill, given its historic agricultural nature, which would negatively influence founding of structures and support of pavements.

10.3.3 Zone 3: 3 [S2 / H1-H2 / locally P (uncontrolled fill) / W (shallow groundwater)]

This zone comprises the low-lying depressions either side of the taxiway, including the two drainage lines which converge south-east of the permit office exhibiting shallow groundwater. These are typically characterised by bands of gullywash which range from loose, compressible, cohesionless sands to moderately expansive clays. This zone, to a large extent, appears to be underlain by residual diabase, which is similarly potentially moderately active in the reworked zone, although this is frequently capped by competent hardpan ferricrete which masks the nature of the residual soils.

In the most severe shallow groundwater areas, drainage is largely impeded, rendering this zone untrafficable and unable to be developed without prior canalisation of the stormwater and the removal and replacement of the problematic gullywash soils which are unsuitable for founding / pavement layerworks or in situ improvement.

10.3.4 Zone 4: 3 [P (uncontrolled fill)]

This zone comprises a large berm of predominantly loose, gap-graded residual granite which has been dumped within the low-lying basin of Zone 3, and is now colonised by invasive trees with large roots.

The zone is delineated using georeferenced satellite imagery dating back to 09/2010, at which time this material first became apparent.

Although of a reasonable quality, these fill materials are presently in a loose and voided state, without any evidence of compaction, rendering this area *completely unsuitable to structural development until such time as the zone is improved,* either by conventional layerworks rehabilitation or in situ densification employing some form of deep dynamic compaction.

10.3.5 Zone 5: 2-3 [P (Variable Fill Terrace)]

This zone comprises much of the periphery of T/C south of the fire station, previously falling within Zone 3, but now elevated well above the natural ground level to support the taxiway and the adjacent aircraft graveyard platforms. Although there are two apparent platforms for the aircraft graveyard, only the northern of the two is actually constructed in fill, with the southern platform largely formed at grade in the virgin soil profile.

From the test pits it is evident that the profile comprises a reasonable quality, selected (nominally G7) granular fill, primarily of residual granite origin. In situ profiling, supplemented with DCP and DPSH probing (see Appendix D) show this fill to be better compacted in the upper reaches near ground level, with a tendency for the stiffness to deteriorate with depth, particularly near the interface with the underlying gullywash soils, where little to no compaction is evident.

As mentioned previously, a penetration resistance in the order of *30 blows per 300mm* would be expected for a well-compacted fill terrace for settlements to be kept in a tolerable range. As this fill terrace generally falls even well below this benchmark, it is considered *susceptible to future consolidation and differential settlement under load*. In situ densification of this zone is considered a necessary precursor to development.

DPSH probing through the terrace shows this to be as much as 5m thick at DPSH2, but tapering in either direction beyond this possible low-point.

10.3.6 Zone 6: 2 [P (Variable Depth Cut Terrace)]

Zone 6, which comprises approximately the southern half of T/C, is the reciprocal operation of Zone 5 - i.e. a tapered cutting, possibly as much as 3m deep at the southern extremity of the taxiway - likely to be the primary source of the material used in Zone 5. Here, much of the natural soil profile has been removed through to the soft rock granite (or diabase) rockhead, which is locally exposed in the deepest part of the cutting near TP31.

Somewhat unexpectedly, test pits in the graveyard platform east of the turning circle of T/C, exposed a *natural profile where not in cut,* albeit hosting a very competent hardpan ferricrete horizon. This ferricrete could be mistaken for the rockline at the base of a cutting, which is not the case.

10.4 Excavation Assessment

The excavation assessment of the soil/rock profile - in terms of *SANS 1200D - Earthworks* specification - is presented in detail in Table 2 (Appendix B) and summarised in Table 3 below:

Table 3: Excavation Assessment

Class	SANS1200D Definition	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Soft	Generally possible by hand or conventional light earth-moving equipment (**TLB**)	Consistently limited to the hillwash soils, and intermittently also the underlying profile where ferricrete is poorly developed and/or nodular, rather than massive.	Generally limited to the upper transported soil horizons including the hillwash and very moist gullywash soils only.	Much of the upper 2m in this zone is soft and compressible gullywash, frequently not even trafficable, except in the attenuation pond area, where the layer is much thinner.	The bulk of the profile observed in this zone through to around 2.5m depth occurs as soft excavation, being loosely tipped fill of granitic origin, possibly derived from a shallow cutting.	The bulk of the profile observed in this zone occurs as soft excavation, being lightly compacted granitic fill and transported soils, demonstrated in the DPSH probing to be 4m-5m thick.	With much of the upper soil profile having been scalped in this cutting, the soft excavation in this zone is very limited, tapering from zero to a maximum of around 1.5m BGL.
Intermediate	Necessitates the use of heavier plant (**tracked excavator**) and/or pneumatic ground-engaging-tools for economic excavation	Accounts for the bulk of the upper 2m-4m of the profile, including the generally well ferruginised very dense pebble marker and underlying reworked and residual granite through to medium hard rock consistency.	Includes the stiff gullywash and dry altered reworked granite / diabase clays which contain a high concentration of competent ferricrete, as well as the residual profile through to medium hard rock.	Competent hardpan ferricrete commonly underlies the gullywash, in the depth range 0.6m-2.0m BGL in this zone to the east of T/C and within the broad extent of both of the drainage lines shown.	Although not proven, it is assumed that competent ferricrete will underlie this fill, consistent with the findings of Zone 3 east of T/C.	Similarly not proven, in view of the thicker controlled fill in this zone other than by DPSH probing, which suggests this only arises around 4m-5m below surface	Expected from ground surface in the deepest part of the cutting from which much of the natural profile has been removed - particularly at the southern extremity of T/C. Possibly limited to the upper 1m-2m in this zone.
Hard	Requiring **drill-and-blast** operations	Was not proven in the test pits, and considered unlikely within a cut depth of less than 2m-3m below NGL. Proven in the trial holes from ~4m below surface and may comprise a significant proportion of the material to be excavated from this deep cutting.	Was not proven in the test pits, and considered unlikely within a cut depth of less than 2m-3m below NGL. Proven in the trial holes from ~7m below surface and likely to be the subordinate material from the deep cutting.	Not proven in this zone in view of the unstable holes / hardpan ferricrete, but unlikely to be encountered or needing removal as this occurs in a fill zone of the site, which is likely to be elevated, rather than cut.	Not proven in this zone in view of the thick fill deposits, but unlikely to be encountered or needing removal as this occurs in a fill zone of the site.	Not proven in this zone in view of the thick fill deposits, but unlikely to be encountered or needing removal as this occurs in a fill zone of the site.	Likely to emerge superficially near-surface - in view of prior scalping. May already be locally present at ground surface in the deepest part of this cutting.
Boulder Class A	All material that, in the opinion of the Engineer, **can be removed** by any means **other than explosives**, including dump-rock and boulders not exceeding 0.5m^3 in volume	No boulders were present in the granitic material of this zone, other than quartz veins in the shear zone. With this being an igneous rock, boulder excavation should not be ignored, but appropriately allowed for.	A pocket of both Class A and Class B boulders were encountered at TP28, some buried in the fill, with others sporadically dotted above NGL, consistent with the geological intrusion. Allow for fair volume of boulders.	No boulder horizon of either class was encountered in this zone, the base of which appears to be largely capped by competent hardpan ferricrete, obviating the need for deeper excavation.	Granitic rock fragments classifying as small boulder-sized particles were found in the fill material of this zone, but considered sufficiently small to not hinder RIC / dynamic compaction.	Granitic rock fragments classifying as small boulder-sized particles were found in the fill material of this zone, but considered sufficiently small to not hinder RIC / dynamic compaction.	There is a high risk of near-surface Boulder Class A and B being present in this zone where the cutting intersects Zone 2, in particular.

Boulder Class B	Rock occurring in bulk or in bands or ledges, the practicable excavation of which, in the opinion of the Engineer, will **necessitate the use of explosives**, as well as **boulders exceeding 0.5m³** in volume (whether or not blasting is required for their removal) and which will necessitate the use of heavier plant (tracked excavator) and/or fragmentation prior to transport	Since granite is prone to the formation of corestones in the soil:rock transition zone, a suitable provision should be allowed for Class B boulder excavation in the deep cutting envisaged for this zone west of T/C. Where present, these boulders can be of significant size, necessitating fragmentation through blasting / chemical splitting.	Since diabase intrusions are generally mapped on the basis of boulder outcrop visible on aerial photography, it is likely that there is a significant amount of boulder material in this zone which is presently masked by the long veld grass, which must be accounted for. Boulder size may be significant, presenting a challenge for both excavation and disposal, potentially necessitating prior fragmentation.	No boulder horizon of either class was encountered in this zone.	Granitic rock fragments classifying as small boulder-sized particles were found in the fill material of this zone, but considered sufficiently small to not hinder RIC / dynamic compaction.	Granitic rock fragments classifying as small boulder-sized particles were found in the fill material of this zone, but considered sufficiently small to not hinder RIC / dynamic compaction	There is a high risk of near-surface Boulder Class A and B being present in this zone where the cutting intersects the Zone 2, in particular.

10.5 Groundwater

Outside of Zone 3, groundwater appears to be largely absent from the near-surface soil profile, other than at depth, where this emanates from the rock joints. All modest to deep cuttings envisaged for Zone 1 and 2, west of the T/C are, however, likely to intercept groundwater, which is expected to increase in strength and volume with depth, potentially emanating from depths as shallow as 0.8m below NGL.

Zone 3, however, presents a significant challenge for the development of this site, as there is extensive near-surface groundwater collecting in these relatively poor quality, impervious, unconsolidated, clayey gullywash soils, which are presently in a vulnerable, compressible state. West of the T/C and south of the fire station, the ground is physically wet, rendering this zone untrafficable and essentially uncompactable.

This groundwater appears to be largely artificially induced through runoff emanating from the adjacent properties - particularly recently following the development of the industrial park to the west, which has exacerbated the negative situation and reduced any natural infiltration opportunity.

The satellite imagery records suggest that some of the attenuation dams on the adjacent industrial site have either been abandoned or become dysfunctional, which may have increased of stormwater runoff directly into Zone 3 in recent time, aggravating the situation.

It is understood that a shallow attenuation basin had previously been constructed in Zone 3 east of T/C, but appears to have fallen into a state of disrepair, or become non-functional in recent time, with limited drainage opportunity from the corresponding basin west of T/C, which now retains shallow groundwater.

As such, shallow groundwater conditions should be expected throughout Zone 3, necessitating engineering interventions to render this zone suitable for development.

10.6 Material Properties

The materials assessment provided in Table 4 below categorises and summarises the specific test data reported in Table 1 (Appendix B), and is based on a combination of visual-tactile profiling, DCP probing and a suite of laboratory results:

Table 4: Provisional Materials Assessment

Horizon	TRH14	Earthworks Quality	Recommended Application
Gullywash	G10-sub-G10	Very poor	Typically clayey and saturated, rendering compaction extremely difficult, if not impossible. Unsuitable for reuse in engineering applications. Cut to spoil and do not include in earthworks.
Hillwash	G7	Fair	Harvest and blend with stockpiled materials for engineered fill terraces. Impact roll all areas in the fill zone to remove collapse potential / compressibility.
Talus / Pebble Marker	G5-G7	Good to fair	Good quality granular material, but may be significantly oversized in the lower reaches, necessitating prior **crushing** to render this suitable for subbase applications. Possibly be worthwhile selectively harvesting and stockpiling for **subbase** applications.
Ferruginous Pebble Marker / Ferricrete	G4-G7	Very good to fair	**Subbase** through mid-specification selected subgrade applications, suitable for road pavement layerworks and earth platforms, provided this is carefully selected and stockpiled from the cut zone. As hardpan ferricrete degrades on reworking, this is best left intact in the in situ state in the fill zones, insofar possible, and retained as a foundation base for subsequent pavement layerworks or bulk earthworks.
Reworked Residual Granite	G7-G10	Fair to very poor	Highly variable but generally found to be low quality, and largely unsuitable for engineering applications, as this may not respond well to compaction when the PI exceeds ~12. Ideally cut to spoil, rather than include in the earthworks, as these soils may deteriorate the overall material quality. Alternatively, investigate the use of **lime stabilisation** to reduce the PI and improve compactability. Impact roll in fill areas to remove collapse potential / compressibility vulnerability.
Residual Granite	G5-G10	Good to very poor	Fair quality granular material with banks of soft rock which will improve overall quality with depth of excavation through to the competent rockhead. Quality of material degrades significantly towards the diabase intrusion necessitating **careful selection** to avoid contamination.
Weathered Granite Bedrock	G4-G9	Very good to poor	Generally pulverises to a good quality granular material with potential for good compaction potential. Below the interface with medium hard rock, however, the material will break out with difficulty in large rock fragments, which are likely to be significantly oversized, necessitating screening and crushing prior to layerworks applications. Quality of material, similarly, degrades significantly towards the diabase intrusion, necessitating **careful selection** to avoid contamination.
Reworked Residual Diabase	G9-sub-G10	Very Poor	**Poor quality clayey material, unsuitable for engineering applications**. This material must be carefully identified as it will contaminate and **substantially degrade the better quality residual granite if carelessly blended**. Cut to spoil wherever encountered, or redeploy in non-loaded earthworks applications which are not settlement sensitive, or where compaction densities are not formally measured.
Residual Diabase	G9-G10	Poor to very poor	No improvement noted with depth in this very poor quality of this material through to the rockhead. Laboratory test results demonstrate that even when harvested from around 3.5m depth, the fines from this material are very poor, rendering this unsuitable for engineered fill terraces. This material must be carefully identified as it will contaminate and **substantially degrade the better quality residual granite if carelessly blended**. Cut to spoil wherever encountered, or redeploy in non-loaded earthworks applications which are not settlement sensitive, or where compaction densities are not formally measured.
Weathered Diabase Bedrock	Not measured, but possibly G7-G8 at best	Fair	Likely to occur at double the depth of the granite rockhead due to deeper weathering (i.e. around 7m below NGL), which is still probable from the deep cutting envisaged. This rock will **likely pulverise** much easier than the granite and produce a **net silt quality soil**, which is **greatly inferior** to the sandy granite. This is likely to **contaminate a crushed granitic material** earmarked for subbase applications, and must be avoided. Ideally separate from the granite rock and used in non-critical earthworks applications where good compaction is not required / compaction densities are not formally measured.

10.7 Soil Chemistry

The basic soil chemistry for the soils arising on this site - determined from a combination of pH, TDS, Conductivity / Resistivity tests - is presented in Table 5 below. These results are consistent with the general pattern for soils within a granitic environment, yielding the following indicative results:

Table 5: Basic Soil Chemistry Assessment

Soil	pH	Resistivity (Ω)	Comment
Gullywash	6.6	5,319	Slightly acidic + mildly corrosive
Hillwash	6.3	4,975	Moderately acidic + corrosive
Pebble Marker	6.5	5,714	Slightly acidic + mildly corrosive
Ferricrete	6.5	5,102	Slightly acidic + mildly corrosive
Reworked Residual Granite	6.3	4,051	Moderately acidic + corrosive / very corrosive
Fill (Residual Granite)	7.5	4,405	Slightly alkaline + corrosive
Transported + Residual Granite	5.7	4,545	Moderately acidic + corrosive
Residual Granite	5.9	4,505	Moderately acidic + corrosive
Residual Granite + Granite Rock	7.2	4,854	Slightly alkaline + corrosive
Reworked Residual Diabase	6.1-6.8	3,984 - 5,917	Moderately acidic + very corrosive

As is apparent, from Table 5, the soils present on this site are generally **mildly to moderately acidic**, except where rock quality material is included. In combination with the **moderate to low resistivity** readings - virtually across the board - all soils on this site should be assumed to be **corrosive** and destructive to any ferrous and/or concrete in ground, necessitating adequate / supplementary cathodic protection and / or sacrificial cover over steel reinforcement to maintain long-term serviceability.

10.8 Soil Horizon Compressibility

A combination of oedometer and moisture-density tests have been performed on each of the characteristic soil horizons in order to quote their in situ dry density (DD) as a percentage of maximum dry density (MDD) at Modified AASHTO compactive effort. These results, summarised in Table 6 below, provide a first appraisal of the compressibility and material deficit between the in situ state and a final compacted state, post compaction:

Table 6: Indicative Material Deficit Following Compaction

Soil	DD (kg/m^3)	MDD (kg/m^3)	% MDD	Target %MDD	Nominal Layer Thickness (m)	Nominal Compaction Deficit (m)
Gullywash	1,439	2,102	68%	93%	1.2	0.3
Reworked Residual Diabase	1,583	1,970	80%	93%	0.8	0.1
Nominal Deficit (Diabase)					**2.0**	**0.4**
Hillwash	1,486	2,202	67%	93%	0.8	0.2
Pebble Marker / Talus / Ferricrete	1,650	2,208	75%	93%	0.4	0.1
Reworked Residual Granite	1,530	2,050	75%	93%	0.6	0.1
Residual Granite	1,434	2,143	67%	93%	0.2	0.1
Nominal Deficit (Granite)					**2.0**	**0.4**

On the basis of the available dataset - in expectation of the upper 2m of the profile being compacted as a prerequisite to either future layerworks or *at grade* development - the data indicate that a material deficit in the order of 0.4m should be anticipated, irrespective of the characteristic profile, apart from any grubbing losses.

10.9 General Foundation Assessment

In view of the assessment above, we recommend that structures in this environment be founded using one of the following solutions presented in Table 7 to either *mitigate* or *accommodate* the impact of the prevailing ground conditions. The selection of an appropriate solution will require consideration of the potential settlement, top-structure stiffness and movement-sensitivity in each instance, as well as environmental issues inclusive of potential disturbances to neighbouring developments from compaction vibrations, noise, space for stockpiling excavated materials etc.

Table 7: General Foundation Suitability by Zone

Foundation Solution		Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6
Normal (Strip footing / slab on the ground)		✗	✗	✗	✗	✗	✗
Structural Solutions	Modified Normal (Reinforced Strip Footing)	⛌	✗	✗	✗	✗	✓
	Stiffened Strip Footings / Ground Beams or Cellular Raft	✓	✓	✗	✗	⛌	⛌
	Deep Strip Foundations	✓	⛌	✗	✗	✗	✓
	Pad and Piers / stub columns with Ground-beams	✓	✓	✗	✗	✗	✗
	Piles with Ground-beams	✓	✓	✗	✗	✓	✗
Geotechnical Solutions	Compaction of Soil Below Individual Footings	✗	✗	✗	✗	✗	✓
	Engineered Soil Raft / Soil Mattress	✓	✓	✓	⛌	⛌	✓
	Impact Rolling (1m-2m compaction)	✓	⛌	✗	✗	⛌	✓
	Rapid Impact Compaction (4m deep compaction)	✓	✓	⛌	✓	✓	✓
	Stone Columns	⛌	⛌	✓	✓	✓	✗
	Dynamic Compaction	✗	✗	✗	✓	✓	✗

KEY	
✓	Recommended or well suited foundation solution.
✓	Appropriate but not an optimal solution as it may be more than is necessary in this zone. **OR** There may be some vulnerability to its application on this site. Necessitates further investigation to determine if a viable solution.
⛌	Workable but considered sub-optimal or overly expensive / complicated for this zone. Necessitates further investigation to determine if a viable solution.
✗	Foundation solution is either not appropriate for this geotechnical site class or not recommended given the observed conditions.

11. Component Assessment and Recommendations

11.1 Bulk Earthworks

(i) The future development will consist of warehouse facilities, aircraft hangars and offices with parking areas, yards for truck movements and aprons and taxiways for large aircraft up to ICAO Code E aircraft (typically B777 or similar), and include fire tanks and civil engineering services such as water, sewer and stormwater reticulation.

(ii) In essence, the goal of the development - as understood by ourselves - is evidently the optimisation of *single level access to Taxiway Charlie.*

(iii) Although not strictly level, the taxiway is cut into the slope and presently formed in a partial cut / fill roughly parallel with the 1358masl contour.

(iv) To achieve this goal, a significant wedge-shaped cut - reportedly as much as 11m - is envisaged for the south-western sector to lower this ground to taxiway level.

(v) In contrast, this would necessitate raising the natural ground level east of T/C by as much as 15m above the lowest-point, if a single terrace level were to be used for the full property, without drainage slopes being applied.

(vi) In practice, it may be extremely onerous to construct a single level cut-to-fill terrace, of such large dimensions, in a balanced cut-and-fill operation on this site, as ground contours indicate that there is likely to be a *material deficit on the fill side of the site,* even if a single deep cut terrace were to be employed on the west.

(vii) Moreover, the material deficit is likely to be significantly exacerbated by the large north-south oriented diabase intrusion which bisects the site (see Zone 2, Figure 4, Appendix A), as the quality of this diabase material - as well as the residual granite on the periphery thereof - is likely to be considerably poorer than the unaffected granitic host rock.

(viii) From an excavatability perspective, it is evident that *soft excavation* will be limited to the upper 1.5m-2.0m of the side slope west of T/C, followed by *intermediate excavation* to nominally 3.5m-4.0m below surface (i.e. UCS < 10MPa), both of which are possible using conventional tracked excavators, with only sporadic need for rock breaking using hydraulic hammers.

(ix) From below 4m - in the granitic Zone 1 - excavation classifies as *hard*, necessitating drill-and-blast techniques for the economic removal of the bedrock, for which the UCS is likely to be > 25MPa. In contrast, *intermediate excavation* appears to extend to approximately 7m below surface in the diabase of Zone 2, whereafter *hard* and *boulder excavation* should be anticipated.

(x) The excavatability of the hard rock will be heavily influenced by the natural jointing, which remains uncertain, as this is not identifiable in the trial holes, which appropriately terminate on the interface with *medium hard rock.*

(xi) Supplementary rotary core boreholes will be necessary to provide structural information on the intact rock mass, should this be required for the design of rock slopes.

(xii) If it is possible, in the master plan, for two, or a series of smaller cut terraces to be formed to the west of T/C, this would significantly reduce both the bulk earthworks and lateral support costs, which are likely to be very onerous for the scheme as currently proposed.

11.2 Cut Slope Stability

(i) In the absence of confirmatory laboratory testing, provision should be made for all cut slopes in the *soil portion of the profile, rated as soft excavation* to be battered to nominally 1V:2.5H (~22°) to maintain lateral stability and facilitate serviceable revegetation.

(ii) Once penetrating the intact, very soft rockhead, rated as *intermediate excavation,* cut slopes can provisionally be increased to 2V:1H (~63°) - subject to verification of the rock jointing in rotary core boreholes - these being considered stable, but too steep for revegetation, to the extent that these will remain bare and unsightly, and susceptible to weathering and ravelling with time.

(iii) Where battered slopes cannot be tolerated for the sake of space optimisation, robust retaining walls or lateral support measures will be required, which can facilitate vertical cuts being employed.

(iv) Any vertical cut of significant height - which would be necessary to maximise the working floor area - is, however, inherently unstable, obviating the opportunity for a *bottom-up* retaining wall solution - such as a reinforced concrete cantilever wall - to be constructed, necessitating a *top-down* lateral support solution to be installed either before or during excavation.

(v) Suitable top-down lateral support solutions could include diaphragm walls, shotcreted soil nail / ground anchors and rock bolts, or various forms of soldier piles, tailored to the profile arising.

(vi) As *hard excavation* conditions arise from roughly 1/3 of the potential slope height, piled lateral support solutions - other than using very expensive percussion bored installation - will be inappropriate.

(vii) The most appropriate solutions would comprise a combination of *soil nails* in the *soft* and *intermediate excavation* portions of the profile, followed by *ground / rock anchors* and *rock bolts* once *hard excavation* conditions are encountered.

(viii) For the design of the latter of these solutions, a better understanding on the jointing of the rock mass will be necessary, which can be achieved by means of design-level rotary core boreholes, specifically drilled on the alignment of the future wall.

11.3 Fill Slope Stability

(i) Unlike cut slopes which employ a top-down approach, fill slopes have unrestricted access to place the retaining structure in the requisite position, allowing for a suitable founding medium to be selected, bearing pressures to be determined and the ground to be suitably improved to the requisite standard.

(ii) Fill retaining structures can take the form of low to medium height reinforced concrete cantilever walls.

(iii) Beyond a height of, say, 5m-6m, an RCCW solution is likely to become uneconomical, necessitating alternative internally reinforced soil solutions, using either a system of extensible geotextile reinforcement for segmental block walls, or rigid steel reinforcement for mechanically stabilised earth walls (MSEW), such as Reinforced Earth ®.

(iv) The former of these, in our experience, are limited to around 8m-9m height in a single slope constructed at ~75° without the need for laterally displaced benches. Where space is a premium, vertically sided MSE walls become an attractive substitute, facilitating much higher walls with a lower risk of settlement, as may be required on this site, albeit at greater expense than the CBRW.

(v) Once the optimal position of the future retaining wall has been decided upon, a design-level geotechnical investigation should be undertaken to assess the compressibility and shear strength parameters of the supporting foundation soils, including the settlement and global stability risks, which should advise on any ground improvements necessary to produce a satisfactory result.

11.4 Cut / Fill Transition

The inferred interface between the cut and fill can be assumed from Figure 4 (Appendix A). This interface represents one of the higher vulnerabilities to foundation, pavements and hardstands / surface beds, since on the cut side of the interface, relatively unyielding conditions prevail, while highly compressible / potentially collapsible transported soil vulnerabilities exist on the fill side, which deteriorate eastwards.

Where present - as can be inferred from the DCP and DPSH probing - a very competent hardpan ferricrete horizon mitigates much of this risk, and provides a shallow founding horizon for light industrial structures as well as a very good surface against which to compact the overlying transported soils, if this is carefully retained. Where no ferricrete is present, a high vulnerability remains, necessitating deep in situ compaction or deeper foundations.

11.5 Material Reuse

(i) Considerations of material quality and reusability, together with the need to deal with the drainage challenges of the site may necessitate a series of lesser terraces be employed to minimise the bulk earthworks costs.

(ii) To a large extent, other than the uncontrolled fill and the very poor quality gullywash soils, the ***transported soils*** throughout the site are generally of at least G7 selected subgrade quality, suitable for reuse.

(iii) Within Zone 3, the essentially untrafficable and wet **gullywash** soils are highly compressible under present moisture regime, but potentially moderately expansive in the event of desiccation and very poor quality materials overall. These materials are unsuitable for reuse and should be cut to spoil and disposed, or used in completely non-critical, non-loaded areas where excessive ground movement is non-problematic.

(iv) Where the **colluvial pebble marker** is present, particularly in combination with ferricrete, these materials are high grade, suitable for subbase (G5/G6) applications, provided that these can be selectively harvested and stockpiled. Where talus particle size is excessive, however, prior crushing to the requisite grade will be required.

(v) Where present in hardpan layers in the *fill side* of the site, the **ferricrete** is already in an optimal state of density, and is best left undisturbed in situ and rather used as the pioneer layer for subsequent layerworks, as this is likely to degrade on handling.

(vi) Laboratory test results show that the **reworked and residual diabase** soils, which weather to fine-grained and potentially expansive silts and clays, are *very poor quality* materials, unsuitable for reuse in engineered fills, except in settlement insensitive bulk fill applications, where no future structures are proposed.

(vii) The same limitations apply to all **residual granitic soils in close proximity to Zone 2**, which are of a very poor quality, and will tend to contaminate the overall quality of engineered fill, to the extent that these should, rather, be separated and disposed of, where found to contain a high fines content.

(viii) Where present in the fill zone, these soils are best left undisturbed to take advantage of both their natural in situ density and any positive cementation offered by the ferricrete. In the cut zone, however, the materials show poor reuse opportunity and should either be discarded or used in settlement insensitive fill applications, which will not be subject to structural loading.

(ix) Despite the reasonable grading modulus of the **altered residual granite** soils - which would normally satisfy G7 standards - moisture-density compaction tests show a *very poor response to compaction,* returning sub-G10 quality results, rendering these materials unsuitable for high quality fill terrace construction, unless these can be adequately improved through lime stabilisation.

(x) Where sufficiently far from the diabase so as to be unimpacted - such as Extension 12 - these **residual granitic soils** are found to improve in quality, generally meeting at least G7 standards, rendering these suitable for reuse in selected layerworks and fills of modest loading requirements. Delineation of the transition points will only be possible once large excavations are opened for inspection.

(xi) **Residual granite** from Zone 1, again sufficiently far from the diabase intrusion, shows potential to meet *subbase standards* (G4-G6), although these deteriorate rapidly towards the diabase of Zone 2.

(xii) Notwithstanding the above, a substantial volume of residual granite is likely to be recovered from the deep cutting which provides a fair to good quality fill, likely to be in the order of a G6-G7 material suitable for reuse in the proposed fill terraces.

(xiii) The quality of the granite is likely to improve with depth, potentially producing a net G4-G5 material, well suited to MSE wall construction, but may necessitate some screening and/or crushing as a perquisite to use.

(xiv) Unlike the granitic rock, which breaks down to a net sandy soil, the diabasic rock appears to pulverise to a very low grade silty soil, provisionally rendering this unsuitable for reuse, unless demonstrated otherwise.

11.6 Fill Terrace Settlement

Internal settlement of the fill terraces will be a function of foundation preparation prior to placement of the fill - where virgin conditions allow - as well as the quality of the materials used for compaction.

(i) Where a monolithic G5 fill is used, compacted to 95% MDD, foundation contact pressures up to 250kPa can generally be used without risk of settlements exceeding 20mm. This is likely to be the requisite material quality for the serviceable functionality of a vertical MSE wall.

(ii) For a net G6 compacted to 95% MDD, foundation contact pressures should be reduced to 200kPa to limit settlements to 20mm.

(iii) For a net G7 compacted to 93% MDD - considered to be the minimum quality which should be used for engineered fill terraces and geosynthetically reinforced CBRWS - foundation contact pressures should be further reduced to 150kPa to limit settlements to 20mm. Too low a material quality places the internal geosynthetic reinforcement at risk of performance failure, and should not be contemplated.

In areas of pre-existing fill terraces, DPSH probing demonstrates that this deteriorates with depth, inducing a settlement vulnerability within Zones 4 and 5, which will require densification through the use of an appropriate form of deep impact / dynamic compaction, failing which structures will need to be piled with suspending floors to overcome the risk of differential settlement.

Given the high compressibility and collapse potential of the transported soils and upper residual horizon, particularly in Zone 1 east of T/C, impact rolling and/or deep rapid impact compaction will be a prerequisite for either at grade developments or the construction of elevated fill terraces, to deal with the global stability and settlement risks of retained earth walls and terraces.

Assuming that the foundation soils for the fill terrace are impact compacted to 2m depth - particularly if the higher-quality transported soils are retained - this is likely to produce an equivalent G7 foundation, suitable for loads in the order of 150kPa. For a fill up to 7.5m high, utilising a G5 material compacted to 95% MDD, bearing pressures will be nominally 150kPa, falling within the tolerable elastic range. For lesser quality materials, bearing pressures will actually reduce. Provided the engineered fill is compacted to the requisite specification, settlement is likely to be elastic and immediate, with minimal concern for long term settlement, provided that appropriate soil drainage is provided for both the fill and the foundation zone to dissipate pore water pressure.

11.7 Surface Beds

All surface beds should be formally designed to satisfy the loading requirements of the anticipated traffic. In general, this will require a consistent mattress of G5 material, no less than 450mm thick for general warehousing applications and 600mm thick for aircraft hangars, all compacted to 95% Mod AASHTO density to prevent cracking induced by differential support. This will, moreover, require careful attention to the compaction of the supporting fill layers, particularly in the fill zone of the site, which are vulnerable to settlement.

It is likely that this class of material can be produced on site through crushing of the rock excavated from the deep cutting, obviating the need for this to be imported from commercial sources, provided that the material is stockpiled for strategic use in the optimal location and not contaminated by the diabase materials.

11.8 Hard Stands

Hard stands should be formally designed for the anticipated vehicle loading, assuming the risk of relatively weak underlying subgrade, unless care is exercised in harvesting the hillwash/gullywash and retaining the cemented pebble maker for reuse. Where this is not achieved, the prevailing subgrade should be treated as no better than G10 quality, and provision made for sufficient pavement layerworks to be imported, as required.

As with surface beds, these are likely to necessitate a subbase no less than 450mm thick for general warehousing applications and 600mm thick for heavy aircraft, all compacted to 95% Mod AASHTO density to prevent concrete panel failure beneath concentrated wheel loads.

11.9 Drainage

Installation of cut-off drains will be required against the face and toe of all cuttings, and near the face of all fill retaining walls to dissipate potential pore pressures which are extremely adverse to earth structure serviceability.

No surface or ground water should be allowed to saturate the foundation zone of the earth wall or terrace, to the extent that appropriate soil drains must be installed as a prerequisite to wall / earth terrace construction, particularly in areas close to the natural drainage lines of Zone 3, where there is a risk of underflow.

These subsoil drains should be installed around the full perimeter and sufficiently offset from the footprint of any elevated earth terraces to preclude soil saturation, which could lead to excessive settlement or bearing capacity / slope stability problems.

In order to render Zone 3 suitable for development, the attenuation structures upslope of the zone will need to be reinstated to capture and temporarily store the runoff, reduce its energy. Following this, the stormwater should ideally be channelled or piped through Zone 3, allowing for the problematic clays to be replaced - *in their entirety* through to the ferricrete / dense residual soil horizon - with imported fill of a similar quality and density used for the fill platforms, to render this zone suitable for development.

Some form of further attenuation will, then, be required downslope of the platforms to control the runoff from the warehouse and paved terraces, which will be greatly increased due to the loss of infiltration capacity - prior to exiting from the site. This should, again, not be placed within close proximity to any elevated fills or structural foundations, as these will tend to be compromised in the process.

11.10 General Foundation Recommendations

On the basis of our observations to date, and given the need for bulk earthworks for future terracing, we would recommend the following alternative founding methodologies:

11.10.1 Cut zone

(i) pad foundations bearing on proven rockhead (contact pressure up to 500kPa)
(ii) pad foundations bearing on dense inert residual granite below the zone of reworking (250kPa)
(iii) pad foundations bearing on dense / stiff residual diabase below the zone of reworking (150kPa)
(iv) pad foundations bearing directly on proven very dense ferricrete > 0.5m thick (250kPa)

11.10.2 Fill zone

(i) earthworks to be preferably constructed with either G5/G6 material only
(ii) shallow pad / strip foundations placed as high up in the fill as is practicable
(iii) bearing pressures of 250kPa for G5 quality fill compacted to 95% MDD
(iv) bearing pressures of 200kPa for G6 quality fill compacted to 95% MDD
(v) bearing pressures of 150kPa for G7 quality fill compacted to 93% MDD

11.11 Foundation preparation for Earthworks

11.11.1 Cut Zone

(i) trim loose material to surface of dense residual soil
(ii) dress bedrock with 150mm of residual soil to avoid direct rock contact, compacted to 95% MDD

11.11.2 Transition from Cut to Fill

(i) box cut to surface of ferricrete / dense residual soil horizon and replace with imported fill of at least G5 quality, compacted in 150mm-300mm layers to 95% MDD
(ii) bearing pressures limited to 250kPa
(iii) *alternatively,* impact roll or RIC densify the in situ soil to an equivalent G7 standard (CBR>15)
(iv) bearing pressures limited to 150kPa

11.11.3 General Fill Zone

(i) strip upper 150mm - 200mm of organic rich material
(ii) impact roll / dynamically compact the entire footprint of the fill platform with a 5m clear margin beyond the extremity of the fill to at least medium dense consistency equivalent to a DPSH N_{30sb}>30 or DCP N <15mm per blow - which satisfies nominally equivalent G7 standard (CBR>15) to 2m depth
(iii) subsequent bulk fill to be preferably constructed with either G5/G6 material only
(iv) shallow pad / strip foundations to be placed as high up in the fill possible
(v) foundation bearing pressures in fill of 250kPa for G5 quality fill compacted to 95% MDD
(vi) foundation bearing pressures in fill of 200kPa for G6 quality fill compacted to 95% MDD

11.11.4 Retaining Wall Alignment

(i) strip upper 150mm - 200mm of organic rich material
(ii) apply RIC or impact rolling to stiffen the influence zone of the future wall + 2.5m clear buffer
(iii) produce a medium dense consistency equivalent to a DPSH N_{30sb}>30 or DCP N <15mm per blow - which satisfies nominally equivalent G7 standards to be proven to at least 2m below anticipated bottom of concrete
(iv) where this cannot be achieved in the natural profile - across the poor geotechnical zones - a preparatory box cut will be required to replace no less than 2m deep x 3m buffer around the footprint of the future foundation for the wall, in order to insert G5/G6 quality fill compacted to 95% MDD, as plinth for the concrete foundation, to provide adequate lateral load distribution through the soil, mitigate differential stress and address global stability challenges

12. General Recommendations

(a) Unless fully rehabilitated in the bulk earthworks operations, the exploratory hole positions could potentially impact on the integrity of future foundations / hard stand areas. Where this is the case, loosely backfilled holes need to be formally rehabilitated so that the proposed structure(s) are not compromised.

(b) Given the complexity of this site, with structures likely to straddle even multiple zones, it is recommended that the Geotechnical Specialist be appointed to interact with the professional team to provide ongoing support for the duration of this project to further investigate, delineate transition zones, provide costings, undertake preliminary designs and procurement advice, finalise the designs, and inspect / monitor the ground improvement / foundation works for compliance with the project recommendations and specifications on all in-ground works.

Periodic inspection of the works during construction will provide for confirmation of the recommendations given in this report, and for any significant changes from the anticipated conditions to be taken into account timeously, so as to avoid unnecessary expense due to construction errors.

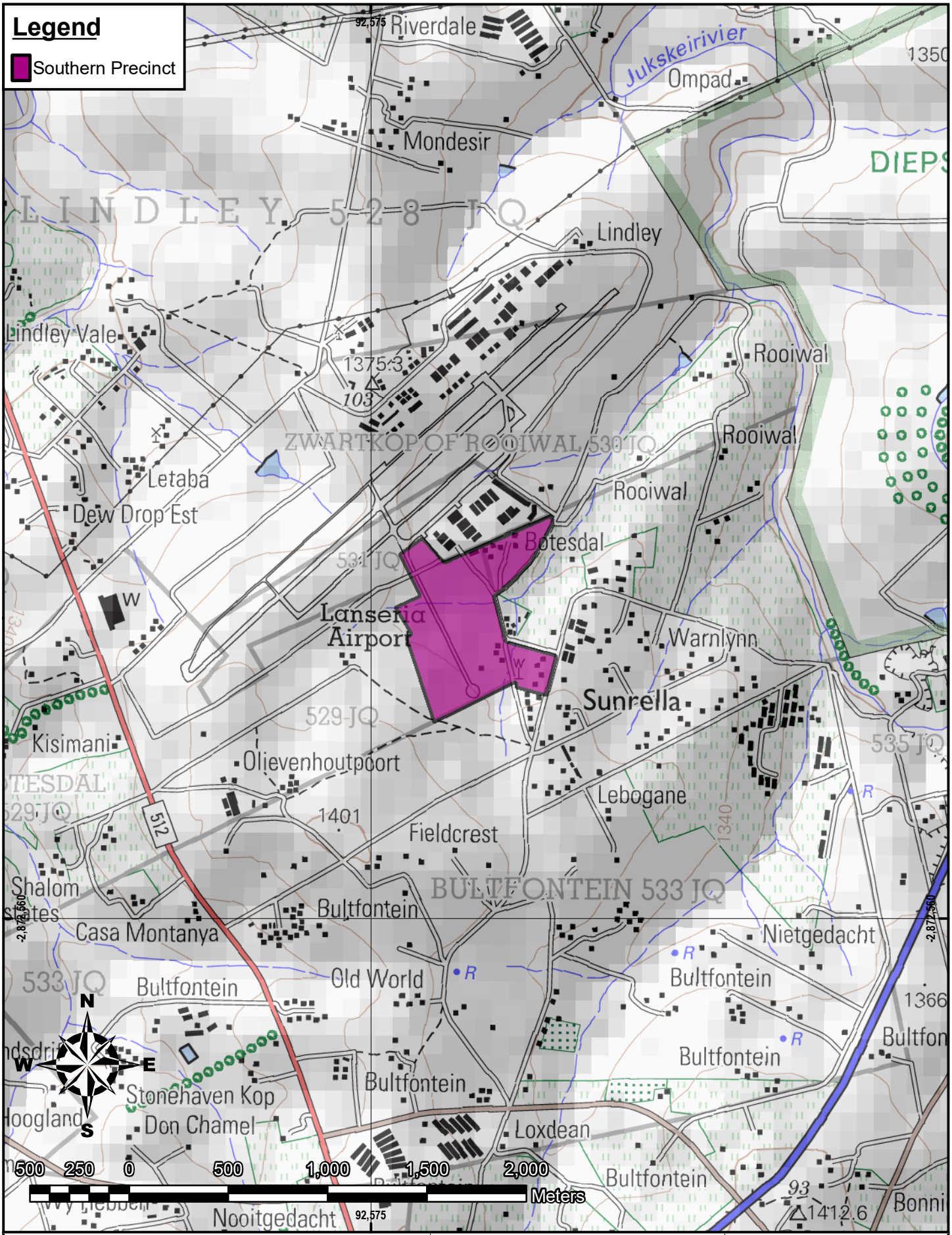
(c) Additional design-level investigative work necessary to optimize foundation works / ground improvement / deep cuts with lateral support and high fills with retaining walls are expected to include:

- Detailed rotary core drilling on the proposed alignment of the future cut slope to establish the geotechnical parameters necessary for the lateral support.
- Supplementary investigation, by means of test pits, DCP and DPSH probing along proposed alignment of all future fill retaining walls, to establish the design-level geotechnical parameters affecting global stability, settlement, bearing pressure and overall shear strength.
- Undertaking the slope stability analyses for both the cut and fill slopes, CBRWs or MSEWs.
- Modelling of the bulk earthworks to optimise the platform design.
- Professional input, by the Geotechnical Specialist, for the design of lateral support, shoring and battering of the proposed cut, including the design of subsoil drainage.
- Professional design input, by the Geotechnical Specialist, for the earth fill terraces / earth mattresses / soil raft / ground improvements and deep foundation solutions, including performance criteria and detailed design considerations.
- Rigorous testing of the materials emanating from the bulk cut to verify the quality of the materials as well as the compaction parameters for reuse in the fills, particularly where there is a risk of condemning large volumes of material which might otherwise be reusable.
- Inspection of bulk fill earthworks, excavations and foundation trenches to verify the allowable bearing pressures and compliance with the Code of Practice and the engineer's design requirements.

CS MORGAN Pr Eng | Director
Geoid Geotechnical Engineers

APPENDIX A

Figures



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TITLE:
Lanseria Airport: Southern Precinct Regional Topographic Setting

CLIENT:
EDS Engineering Design Services

PROJECT NUMBER:	GGE/23031
DRAWING NUMBER:	Figure 1
REVISION:	0
DATE:	20/02/2024
ENGINEER:	CS Morgan
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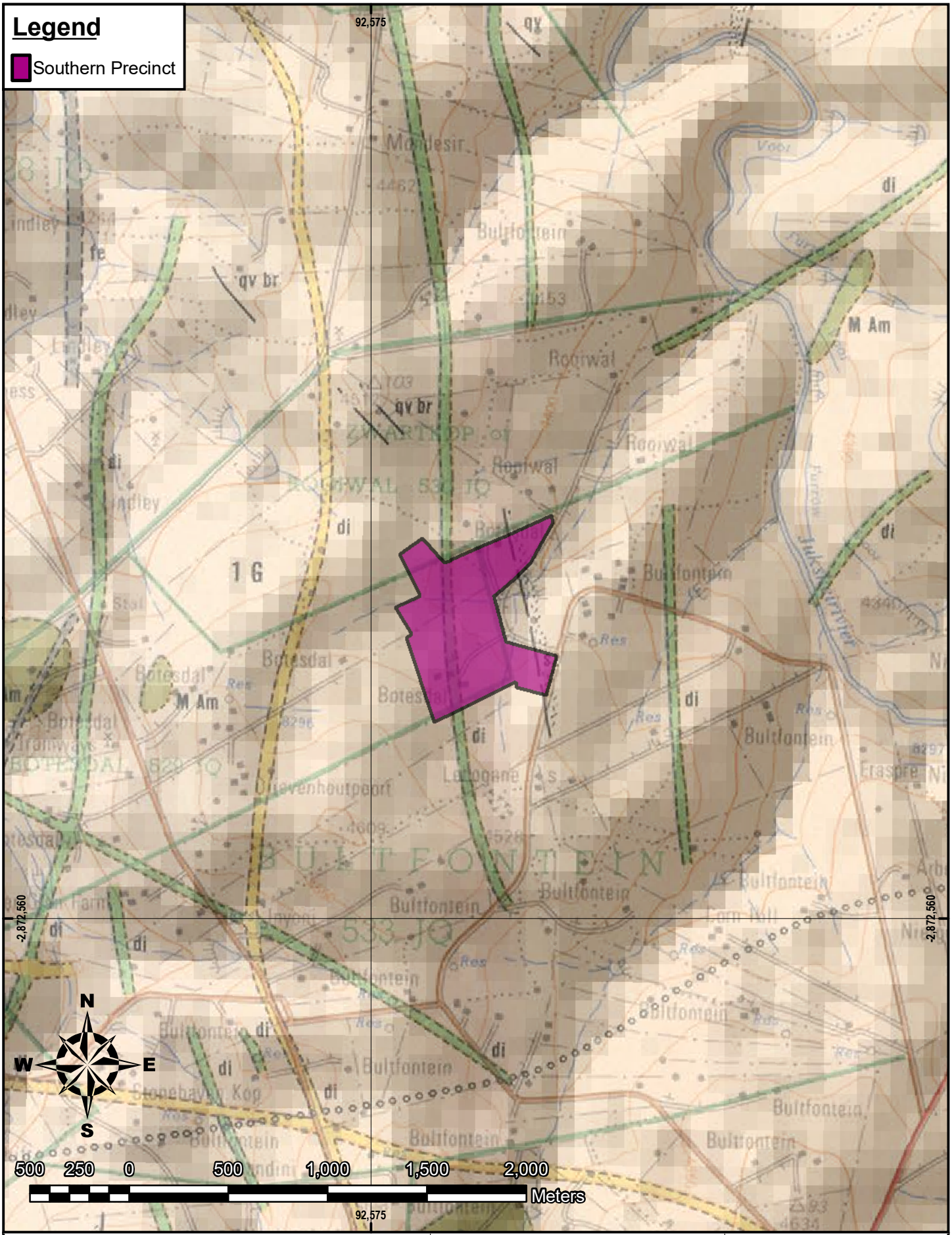

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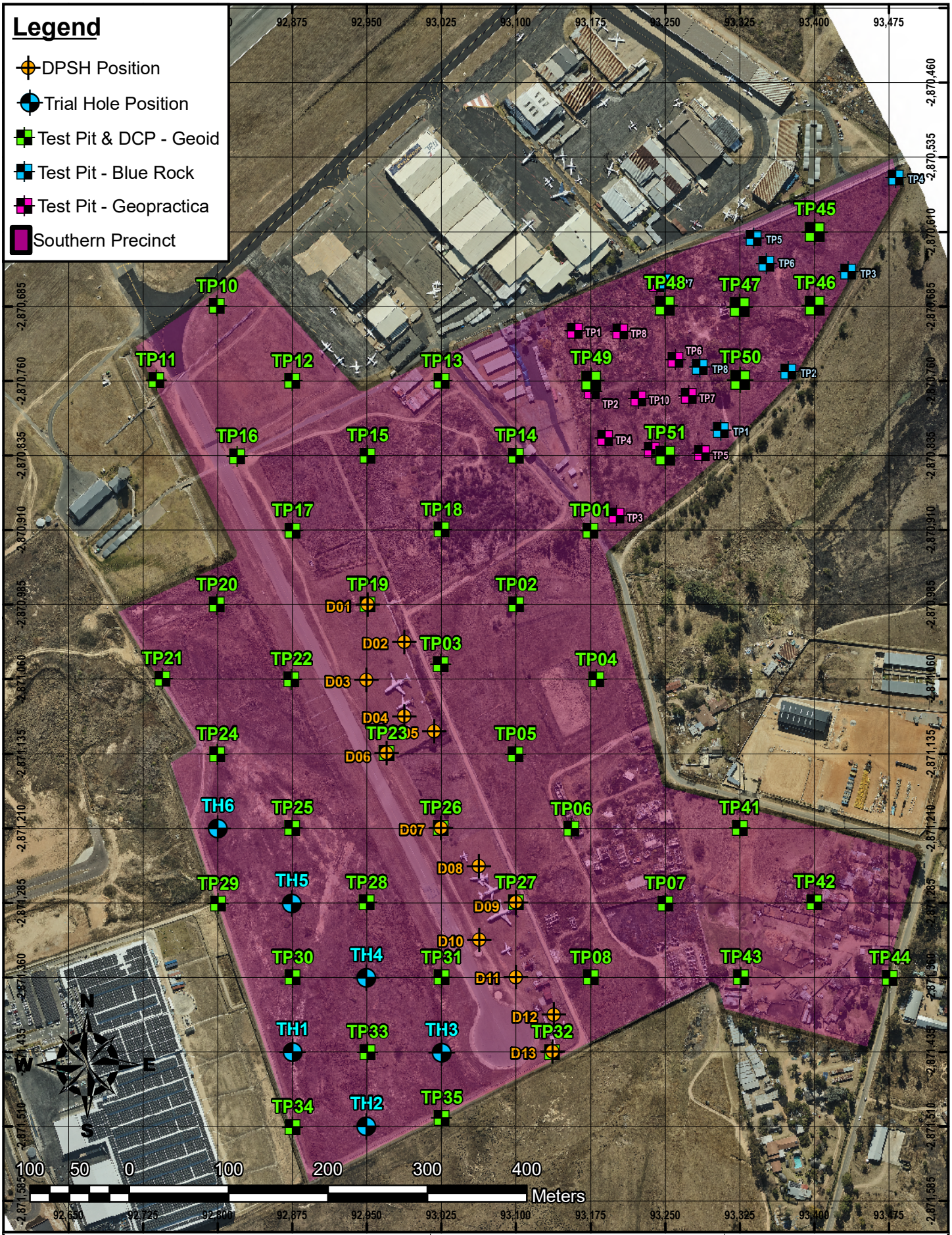
TITLE:
Lanseria Airport: Southern Precinct Regional Geological Setting

CLIENT:
EDS Engineering Design Services

PROJECT NUMBER:	**GGE/23031**
DRAWING NUMBER:	**Figure 2**
REVISION:	**0**
DATE:	**20/02/2024**
ENGINEER:	**CS Morgan**
SCALE:	**1:25,000**
DATUM:	**WG27**



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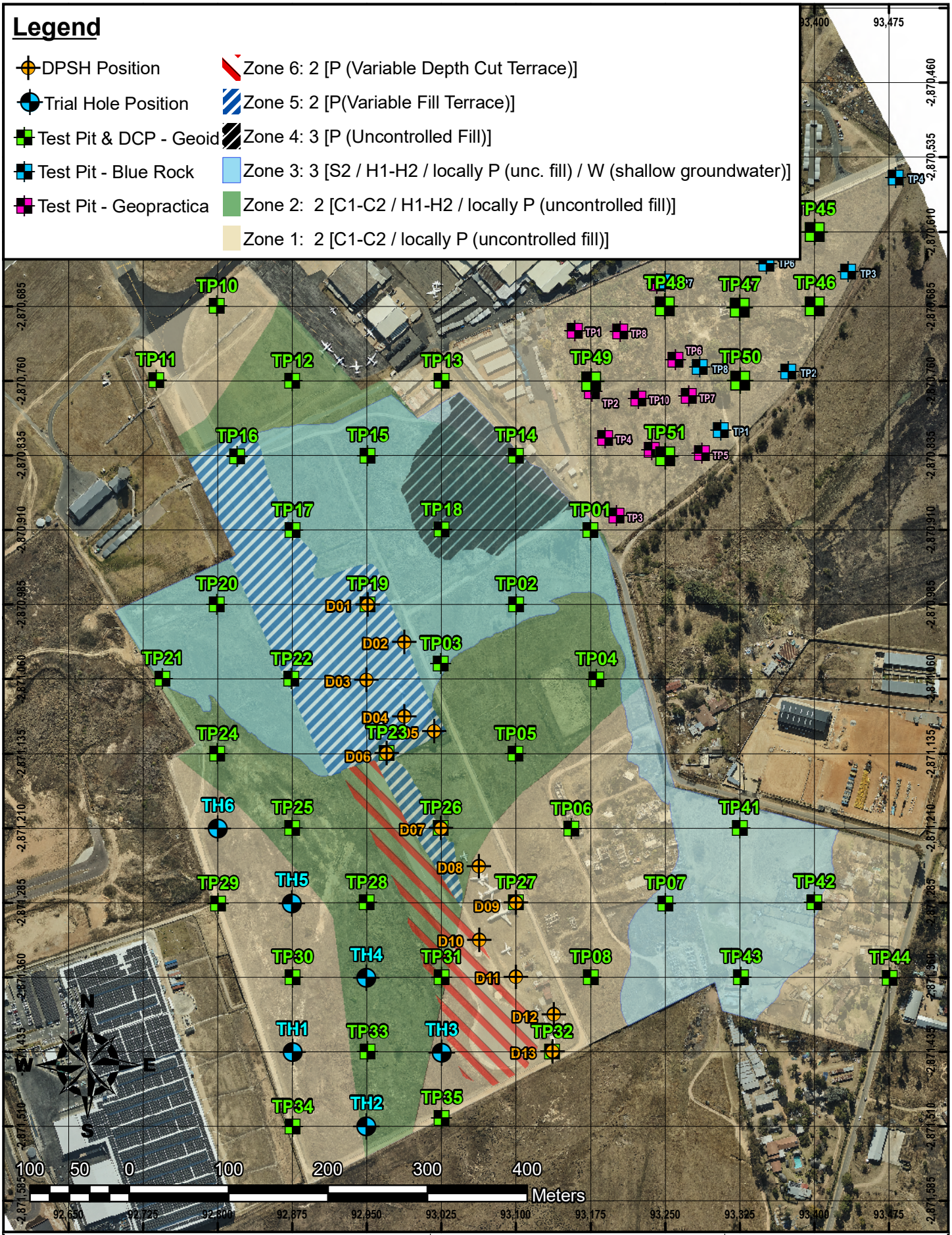
TITLE:
Lanseria Airport: Southern Precinct Approximate Fieldwork Positions

CLIENT:
EDS Engineering Design Services

PROJECT NUMBER:	GGE/23031
DRAWING NUMBER:	Figure 3
REVISION:	0
DATE:	10/04/2024
ENGINEER:	CS Morgan
SCALE:	1:5,000
DATUM:	WG27



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TITLE:
Lanseria Airport: Southern Precinct Provisional Geotechnical Zonation

CLIENT:
EDS Engineering Design Services

PROJECT NUMBER:	GGE/23031
DRAWING NUMBER:	Figure 4
REVISION:	0
DATE:	10/04/2024
ENGINEER:	CS Morgan
SCALE:	1:5,000
DATUM:	WG27

APPENDIX B

Tables

Table 1: Summary of Soil Index and Material Properties

Hole No	Material	Depth (m)	Atterberg Limits, Grading Analysis and Moisture Content									Mod AASHTO Compaction		CBR			Swell at 100% MA	Consolidation Test							pH	Resist	PRA	USC	TRH14
			LL	PI (425)	LS	GM	NMC	PI (w)	425	075	002	MDD	OMC	90	93	95		DD	e_0	P_0	CP	Swell	PMA	P_c					
TP01	Gullywash	0.5-0.7	57	22	11	0.34	23	19	89	77	19	-	-	-	-	-	-	1,334	0.84	8	-	-	63%	~100	-	-	A.7.5	MH	G10*
TP16	Hillwash / Gullywash	1.5-1.7	NP	NP	0	1.17	5	NP	52	32	0	-	-	-	-	-	-	1,543	0.70	24	-	-	72%	~75	-	-	A.2.4	SM	
TP21	Gullywash	1.0-2.0	35	12	6	1.73	12	4	36	29	4	2,102	8.1	4	6	7	0.79	-	-	-	-	-	-	-	6.6	5,319	A.2.6	SC	G10*
TP5	Hillwash	0.0-0.4	NP	NP	1	1.41	-	NP	55	14	-	2,057	7.3	14	26	34	0.09	-	-		-	-	-	-	-	-	-	SM	G6
TP04	Hillwash	0.6-0.8	15	5	2	0.95	2	4	65	39	4	-	-	-	-	-	-	1,486	0.68	13	5%	-	73%	-	-	-	A.4	SM-SC	G7*
TP10	Hillwash / PM	0.1-0.5	NP	NP	0	1.99	4	NP	25	16	1	2,116	5.4	23	37	50	0.31	1,346	0.93	5	-	-	64%	~100	6.5	5,714	A.1.b	SM	G5
TP26	Hillwash (NMC)	0.1-0.8	NP	NP	0	1.42	9	NP	49	32	1	2,191	6.5	13	20	25	0.19	1,433	0.80	13	-	-	65%	~700**	6.3	4,975	A.2.4	SM	G7
	Hillwash (Soaked)																	1,417	0.82	13	-	-	65%	~225					
TP30	Hillwash	0.1-0.5	NP	NP	0	1.18	7	NP	55	34	1	2,202	6.2	22	34	46	0.38	-	-	-	-	-	-	-	-	-	A.2.4	SM	G7 (G5)
TP3	Talus (Pebble Marker)	0.0-0.4	35	14	7	2.22	4	3	24	20	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	GC	G6*
TP6	Talus (Pebble Marker)	0.0-0.9	19	6	3	2.67	-	1	13	4	3	2,206	4.7	44	74	94	0.08	-	-	-	-	-	-	-	-	-	-	GW/GP	G5
TP05	Ferruginous Pebble Marker	0.2-0.55	26	6	3	1.88	4	2	36	22	3	2,236	6.4	15	23	31	0.26	-	-	-	-	-	-	-	-	-	A.2.4	SM-SC	G7
TP35	Ferruginous Pebble Marker	0.3-0.8	NP	NP	0	2.48	6	NP	16	10	0	2,183	6.4	42	65	86	0.35	-	-	-	-	-	-	-	6.5	5,102	A.1.a	GP-GC	G4
TP1	Reworked Residual Granite	0.7-1.2	29	10	5	1.63	21	4	39	34	8	-	-	-	-	-	-	1,341	1.07	21	2%	-	65%	~200	-	-	-	SC	G5*
TP4	Reworked Residual Granite	1.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,522	0.76	11	1%	-	74%	~125	-	-	-	SC	G7*
TP6	Reworked / Residual Granite	1.0-2.5	38	16	8	0.66	17	11	72	62	40	-	-	-	-	-	-	-	-		-	-	-	-	-	-	-	CL	G8*
TP6	Fer. Altered Reworked Granite	0.8	31	11	7	0.96	-	7	67	49	15	2,095	7.2	8	16	26	-	-	-		-	-	-	-	6.2	4,000?	A.6.3	SC	G7
TP7	Reworked Residual Granite	1.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,498	0.80	19	1%	-	73%	~250	-	-	-	-	-
TP8	Reworked Residual Granite	0.3-1.5	32	14	7	1.79	-	6	43	18	-	1,995	10.6	6	11	15	0.14	-	-		-	-	-	-	-	-	-	GC	G10
TP11	Rew & Residual Granite (NMC)	1.4-1.6	33	13	6	1.24	12	6	49	39	6	2,060	8.6	6	9	12	0.12	1,551	0.66	23	-	-	75%	~500	6.3	5,051	A.6	SC	G10
	Rew & Residual Granite (Soaked)	0.7-2.5																1,542	0.67	23	-	-	75%	~500					
TP19	Fill (Residual Granite)	0.1-2.7	36	7	3	1.83	6	2	32	20	1	2,220	6.2	14	21	29	0.05	-	-	-	-	-	-	-	7.5	4,405	A.2.4	SM-SC	G7

Hole No	Material	Depth (m)	Atterberg Limits, Grading Analysis and Moisture Content									Mod AASHTO Compaction		CBR			Swell at 100% MA	Consolidation Test							pH	Resist	PRA	USC	TRH14
			LL	PI (425)	LS	GM	NMC	PI (w)	425	075	002	MDD	OMC	90	93	95		DD	e_0	P_0	CP	Swell	PMA	P_c					
TP3	Reworked / Residual Granite	0.8-1.6	19	7	3	1.33	8	4	51	37	4	-	-	-	-	-	-	1,408	0.90	18	3%	-	-	~125	-	-	-	SM/GM	G6*
TP4	Residual Granite	1.5-2.5	39	18	9	1.07	13	9	53	45	18	-	-	-	-	-	-	1,522	0.755	-	-	-	-	-	-	-	-	SC	G7*
TP10	Residual Granite (NMC)	2.0-2.2	35	11	6	0.77	18	8	71	54	9	-	-	-	-	-	-	1,326	0.96	4	-	-	64%	~450	-	-	A.6	ML/CL	G7
	Residual Granite (Soaked)																	1,318	0.70	4	-	-	64%	~225					
TP11	Rew & Residual Granite (NMC)	1.4-1.6	33	13	6	1.24	12	6	49	39	6	2,060	8.6	6	9	12	0.12	1,551	0.66	23	-	-	75%	~500	-	-	A.6	SC	G10
	Rew & Residual Granite (Soaked)	0.7-2.5																1,542	0.67	23	-	-	75%	~500					
TP34	Transported & Residual Granite	0.1-2.4	NP	NP	0	2.25	6	NP	24	16	1	2,157	5.4	47	72	97	0.25	-	-	-	-	--	-	-	5.7	4,545	A.1.b	GM	G4
TH1	Residual Granite + Granite Rock	2.6-3.6	35	15	7	1.98	8	5	33	20	1	2,218	4.1	25	38	50	0.16	-	-		-	-	-	-	5.9	4,505	A.2.6	SC	G5
TH5?	Reworked Granite + Granite Rock	1.3-4.0	NP	NP	0	1.84	6	NP	36	22	1	2,137	6.9	8	12	16	0.21	-	-	-	-	-	-	-	-	-	A.1.b	SM	G9
TH6	Reworked & Residual Granite	1.4-3.6	NP	NP	0	2.23	3	NP	21	14	0	2,145	7.6	9	14	18	0.43	-	-	-	-	-	-	-	7.2	4,854	A.1.a	SM	G9 (G7)
TP1	Residual Granite (Residual Diabase?)	1.5-2.5	41	15	7	0.30	23	13	90	80	20	-	-	-	-	-	-	1,341	1.07	-	2%	-	68%	~200	-	-	-	CL	G9*
TP2	Colluvium + Reworked Granite	0.4-1.4	30	15	7	1.44	3	8	51	22	-	2,005	9.8	3	4	5	0.05	1,980	-	-	-	-	99%	-	-	-	-	SC/GC	G10
TP04	Ferruginous Alt Reworked Granite	1.0-1.5	30	9	5	0.96	8	6	71	43	7	2,036	10.4	1	1	2	0.87	-	-	-	-	-	-	-	-	-	A.4	SC	sub-G10
TP06	Altered Reworked Residual Granite	1.4-2.5	30	13	7	1.04	12	8	65	40	7	2,037	9.2	1	1	2	0.79	1,424	0.80	29	-	0.45%	70%	~250	-	-	A.6	SC	sub-G10
TP23	Altered Reworked Residual Granite	1.6-2.3	32	18	9	1.02	11	11	59	46	9	1,986	8.5	1	2	3	0.85	1,588	0.63	30	-	-	80%	~225	6.1	3,984	A.6	SC	<G10
TP33	Reworked Residual Diabase	1.2-2.8	35	15	7	0..77	14	11	74	58	9	1,834	14.3	1	1	2	1.13	-	-		-	-	-	-	-	-	A.6	CL	sub-G10
TH2	Reworked Residual Diabase	2.9-3.9	32	13	6	2.08	7	4	28	23	3	2,029	9.6	3	5	7	0.54	-	-		-	-	-	-	6.7	5,000	A.2.6	GC	G10
TH4	Reworked Residual Diabase	1.4-3.6	33	14	7	0.71	19	11	80	60	11	1,866	12.3	1	1	2	1.13	-	-	-	-	-	-	-	6.8	5,917	A.6	CL	sub-G10

KEY

LL:	Liquid limit	425:	Percentage passing 425 μm sieve	PI (w):	Plasticity index of whole sample
PI (425):	Plasticity index of sample fines portion	075:	Percentage passing 75 μm sieve	CBR:	California Bearing Ratio at Mod AASHTO compaction
LS:	Linear shrinkage	002:	Percentage passing 2 μm sieve	OMC:	Optimum moisture content at Mod AASHTO compaction (%)
GM:	Grading modulus	DD:	Dry density (kg/m^3)	MDD:	Maximum dry density at Mod AASHTO compaction (kg/m^3)
ε:	Material strain (%) at given load in kPa	e_0:	Initial Void Ratio	PRA:	AASHTO Soil Classification
NMC:	Natural moisture content	P_C:	Estimated pre-consolidation pressure (kPa)	USC:	Unified Soil Classification
pH:	Acidity / Alkalinity Index	Conduct:	Conductivity (μS/cm)	TRH14:	Road Construction Material Classification
Resist:	Resistivity (Ω/cm)	CP:	Collapse potential at 200kPa	*:	Estimate only, to be confirmed by CBR tests
PMA:	Estimated % Mod AASHTO density (Based on own CBR where available, otherwise average)	Swell:	Free swell (%) at 10kPa confinement	**:	NMC Oedometer curve is very similar to Saturated - by P_c value is excessively high and considered unreliable

Table 2: Depth and Inferred Thicknesses of the Soils / Rocks Underlying the Site; Excavation Classification According to *SANS 1200D: Earthworks*

Hole No.	Hole Depth (m)	Depth to the Base of Horizon (m)									Depth to Top of Rock (m)	Depth (m) to Base of		Hard Rock Excavation From (m)	Boulder Excavation Class A (<0.8m)	Depth to Ground Water (m)
		Fill	Hillwash / Sandy Gullywash	Clayey Gullywash	Pebble Marker	Hardpan Ferricrete	Reworked Diabase	Residual Diabase	Reworked Residual Granite	Residual Granite		Soft Excavation	Intermediate Excavation			
TEST HOLES																
TP01	1.60	-	0.45	1.20	-	(1.60)+	-	-	1.60 [1]	-	NP	1.60	1.60+	NP	NE	NE
TP02	1.60	-	0.40	1.60+ [1]	-	-	-	-	-	-	NP	0.40	1.60+	NP	NE	NE
TP03	2.10	0.25	0.60	2.10+	-	-	-	-	-	-	NP	2.10+	NP	NP	NE	0.6
TP04	1.50	0.40	0.80	-	1.00 [1]	(1.50)+	1.50 [1,2]	-	1.50 [1,2]	-	NP	1.00	1.50+	NP	NE	NE
TP05	0.55	-	0.20	-	0.55 [1]	0.55+	-	-	-	-	NP	0.30	0.55+	NP	NE	NE
TP06	2.25	-	0.15	-	1.00 [1]	-	2.25 [1,2]	-	1.40	2.25 [1,2]	NP	2.25+	NP	NP	NE	1.0
TP07	0.45	-	0.35	-	-	0.45+	-	-	-	-	NP	0.35	0.45+	NP	NE	NE
TP08	2.00	-	0.25	-	1.00 [1]	-	-	-	1.40	2.00+	NP	2.00+	NP	NP	NE	NE
TP09	OMITTED															
TP10	2.60	-	0.50	-	1.10 [1]	-	-	-	2.00	2.60	2.60	2.60	2.60+	NP	NE	NE
TP11	2.50	0.20	-	-	0.70 [1]	-		-	1.60	2.50	2.50	2.50	2.50+	NP	NE	NE
TP12	2.10	-	0.60	-	1.20 [1]	-	2.10	-	1.75	2.10 [3]	2.10	2.10	NP	2.10	2.10	NE
TP13	2.20	0.55	0.80	-	0.90 [1]	-	-	-	1.50	2.20	2.20	2.20	2.20+	NP	NE	1.20
TP14	2.30	1.80	2.10	-	2.30+ [1]	-	-	-	-	-	NP	2.30+	NP	NP	NE	NE
TP15	0.70	-	-	0.60	-	0.70+	-	-	-	-	NP	0.60	0.70+	NP	NE	0.70
TP16	2.40	1.40	2.40	-	-	2.40+	-	-	-	-	NP	2.40	2.40+	NP	NE	NE
TP17	3.00	2.70	3.00+	-	-	-	-	-	-	-	NP	3.00+	NP	NP	NE	NE
TP18	2.70	2.70+		-	-	-	-	-	-	-	NP	2.70+	NP	NP	Small (Fill)	NE
TP19	2.70	2.40	2.70+	-	-	-	-	-	-	-	NP	2.70+	NP	NP	Rock Frag.	NE
TP20	2.00	-		0.80	0.90	-	2.00+	-	-	-	NP	2.00+	NP	NP	NE	surface
TP21	2.00	-	1.00	-	-	-	2.00+	-	-	-	NP	2.00+	NP	NP	NE	1.0
TP22	2.30	1.30	2.00	-	-	-	2.30	-	-	-	2.30	2.30	NP	2.3	NE	NE
TP23	2.30	0.90	-	1.20	-	-	-	-	1.60 [1,2]-	2.30 [2]+	NP	2.30+	NP	NP	NE	NE
TP24	2.00	-	0.50	-	0.70 [1]	-	1.40	-	-	2.00	1.4	1.40	2.00	2.0	NE	NE

Table 2: Depth and Inferred Thicknesses of the Soils / Rocks Underlying the Site; Excavation Classification According to *SANS 1200D: Earthworks*

Hole No.	Hole Depth (m)	Depth to the Base of Horizon (m)									Depth to Top of Rock (m)	Depth (m) to Base of		Hard Rock Excavation From (m)	Boulder Excavation Class A (<0.8m)	Depth to Ground Water (m)
		Fill	Hillwash / Sandy Gullywash	Clayey Gullywash	Pebble Marker	Hardpan Ferricrete	Reworked Diabase	Residual Diabase	Reworked Residual Granite	Residual Granite		Soft Excavation	Intermediate Excavation			
TP25	1.60	-	0.20 [1]	-	-	0.60	1.00	-	-	-	1.00	1.00	1.60	1.60	NE	NE
TP26	2.90	-	0.80	-	-	1.40	-	-	2.00 [2]	2.90 [2]+	NP	2.90+	NP	NP	NE	NE
TP27	2.35	-	0.20	-	1.10 [1]	-	-	-	1.50 [2]	2.35+	NP	1.50	2.35+	NP	NE	NE
TP28	1.40	1.40+	-	-	-	-	-	-	-	-	NP	1.40	1.40+	NP	LARGE	NE
TP29	1.25	-	0.80 [1]	-	-	-	-	-	1.25	-	1.25	1.25	1.25+	NP	NE	NE
TP30	1.70	-	0.50	-	-	-	-	-	1.00 [1]	-	1.00	1.00	1.70	1.70	NE	1.60
TP31	1.65	-	-	-	-	-	0.70 [2]	-	0.70 [2]	1.65	1.65	1.65	1.65+	NP	NE	NE
TP32	2.70	-	0.40	-	0.50	1.25	-	-	1.80	2.70	2.70	2.70	2.70+	NP	NE	NE
TP33	2.80	-	0.75 [1]	-	1.20	-	2.70	2.80+	-	-	NP	2.80+	NP	NP	NE	NE
TP34	2.40	-	0.20	-	0.55	-		-	1.10	1.80	1.80	1.80	2.40	2.40	NE	0.80; 1.80
TP35	2.00	-	0.30	-	0.85 [1]	-	1.40 [2]	-	1.40 [2]	2.00	NP	2.00	2.00+	NP	LARGE	NE
TP41	2.20	-	1.00	-	-	-	-	-	2.20+	-	NP	2.20+	NP	NP	NE	NE
TP42	2.30	-	0.30	-	0.55	-	-	-	2.00	2.30+	NP	2.30+	NP	NP	NE	NE
TP43	1.40	-	1.40 [1]	-	-	1.40+	-	-	-	-	NP	1.40	1.40+	NP	NE	1.10
TP44	1.10	0.30	0.70	-	0.80	-	-	-	1.10+	-	NP	1.10+	NP	NP	NE	NE
TP45	1.80	-	0.30	-	0.60	-	-	-	1.40	1.80	1.80	1.60	1.80+	NP	NE	NE
TP46	2.10	-	-	-	0.70	-	-	-	1.40	2.10	NP	2.10	2.10+	NP	NE	NE
TP47	2.50	-	-	-	0.50 [4]	-	-	-	1.70	2.50+	NP	2.50+	NP	NP	VEINS	NE
TP48	2.10	-	-	-	0.35 [4]	-	-	-	1.70	2.10+	NP	2.10	2.10+	NP	VEINS	NE
TP49	2.35	-	-	-	0.45 [4]	-	-	-	1.40	2.35+	NP	2.35+	NP	NP	VEINS	NE
TP50	2.50	-	-	-	0.70	-	-	-	2.00	2.50+	NP	2.50+	NP	NP	NE	NE
TP51	2.50	-	-	-	1.40 [4]	-	-	-	2.50+	-	NP	2.50+	NP	NP	NE	NE

Table 2: Depth and Inferred Thicknesses of the Soils / Rocks Underlying the Site; Excavation Classification According to *SANS 1200D: Earthworks*

Hole No.	Hole Depth (m)	Depth to the Base of Horizon (m)									Depth to Top of Rock (m)	Depth (m) to Base of		Hard Rock Excavation From (m)	Boulder Excavation Class A (<0.8m)	Depth to Ground Water (m)
		Fill	Hillwash / Sandy Gullywash	Clayey Gullywash	Pebble Marker	Hardpan Ferricrete	Reworked Diabase	Residual Diabase	Reworked Residual Granite	Residual Granite		Soft Excavation	Intermediate Excavation			
TRIAL HOLES																
TH1	4.00	-	-	-	0.60 [1]	-	0.90 [3]	-	0.90 [3]	1.30 [2]	1.3	1.30	4.00	**4.00**	NE	**0.80** **3.10**
TH2 East Side	6.80	-	-	-	0.70 [1]	-	6.00	6.80	-	-	NP	6.00	6.80+	NP	**6.80**	**4.20**
TH2 West Side	6.80	-	-	-	0.70 [1]	-	6.00	6.80	1.80	5.00	NP	6.00	6.80+	NP	**6.80**	**4.20**
TH3	4.20	-	-	-	0.80 [1]	-	-	-	1.30 [2]	2.50	4.20	2.50	4.20	**4.20**	NE	NE
TH4	4.30	-	0.25	-	1.40	1.10	3.60	-	-	-	3.60	3.60	4.30	**4.30**	NE	**4.20**
TH5	4.90	-	-	-	-	0.80	-	-	1.40	-	1.4	1.40	4.90	**4.90**	NE	NE
TH6	10.70	-	-	0.60	1.00	-	2.00	-	2.00 [2]	5.20	5.2	5.20	5.20	**5.20**	NE	**2.80** **3.80** **10.50**
Average	**2.6**	**1.3**	**0.8**	**1.2**	**0.9**	**1.2**	**2.4**	**5.5**	**1.6**	**2.4**	**2.2**	**2.2**	**2.5**	**3.2**	**5.2**	**2.6**
Maximum	**10.7**	**2.7**	**3.0**	**2.1**	**2.3**	**2.4**	**6.0**	**6.8**	**2.5**	**5.2**	**5.2**	**6.0**	**6.8**	**5.2**	**6.8**	**10.5**
Minimum	**0.5**	**0.2**	**0.2**	**0.6**	**0.4**	**0.5**	**0.7**	**2.8**	**0.7**	**1.3**	**1.0**	**0.3**	**0.5**	**1.6**	**2.1**	**0.6**
S/Deviation	**1.7**	**0.9**	**0.7**	**0.5**	**0.4**	**0.5**	**1.5**	**1.9**	**0.4**	**0.9**	**1.1**	**1.1**	**1.6**	**1.3**	**2.2**	**2.5**
# Readings	**52**	**13**	**33**	**7**	**31**	**12**	**16**	**3**	**32**	**25**	**18**	**52**	**31**	**11**	**3**	**16**

KEY:

NP: Not proven
NE: Not encountered
1: Ferruginous
2: Granite is altered by nearby diabase intrusion
3: Uncertain whether this should be classified a diabase rather than a granite
4: Talus

Excavation Classification System:

Soft excavation - generally possible by hand or using conventional light earth-moving equipment (**TLB** and the like).
Intermediate excavation - necessitates the use of heavier plant (**tracked excavator**) and/or pneumatic ground-engaging-tools for economic excavation.
Hard excavation - requires **drill-and-blast** operations.
Boulder excavation - which may require **large plant** and/or **pneumatic fragmentation** of large particulate material for the practicable transportation thereof.

APPENDIX C

Soil Profiles

APPENDIX C1

Test Pit Soil Profiles

Geoid Geotechnical Engineers

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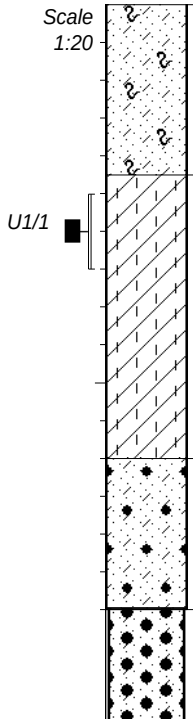
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP01**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Very moist, grey, loose, porous, clayey sand; roots. HILLWASH / GULLYWASH
0.45	Moist to very moist, grey mottled mustard-orange and pale grey, soft to firm, slickensided, silty clay. GULLYWASH
1.20	Moist, pale yellow blotched pale grey and mustard-orange, medium dense becoming dense, partially intact and relict-structured, clayey sand with ferricrete nodules. FERRUGINOUS REWORKED RESIDUAL GRANITE
1.60	End of hole at refusal on mustard-orange blotched pale grey stained black, very dense, well cemented, HARDPAN FERRICRETE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater despite proximity to reeds.
3) Undisturbed sample U1/1 taken from 0.5m--0.7m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP01**
Low vlei

GEOID Geotechnical Engineers
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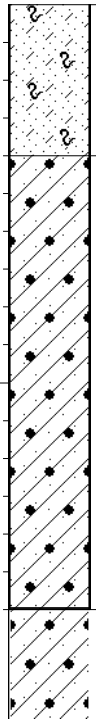
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP02**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00 — Slightly moist to moist, grey, loose, porous, clayey sand; roots.

HILLWASH / GULLYWASH

0.40 — Slightly moist, light grey blotched dark grey and yellowish-brown, stiff, well cemented, sandy clay with trace ferricrete nodules.

FERRUGINOUS GULLYWASH

1.60 — End of hole at practical refusal on well cemented, FERRUGINOUS GULLYWASH

NOTES

1) Stable test pit sidewalls.
2) No groundwater despite proximity to drainage line.
3) Partially undisturbed sample U2/1 taken from 1.5m--1.6m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP02**
Drainage line

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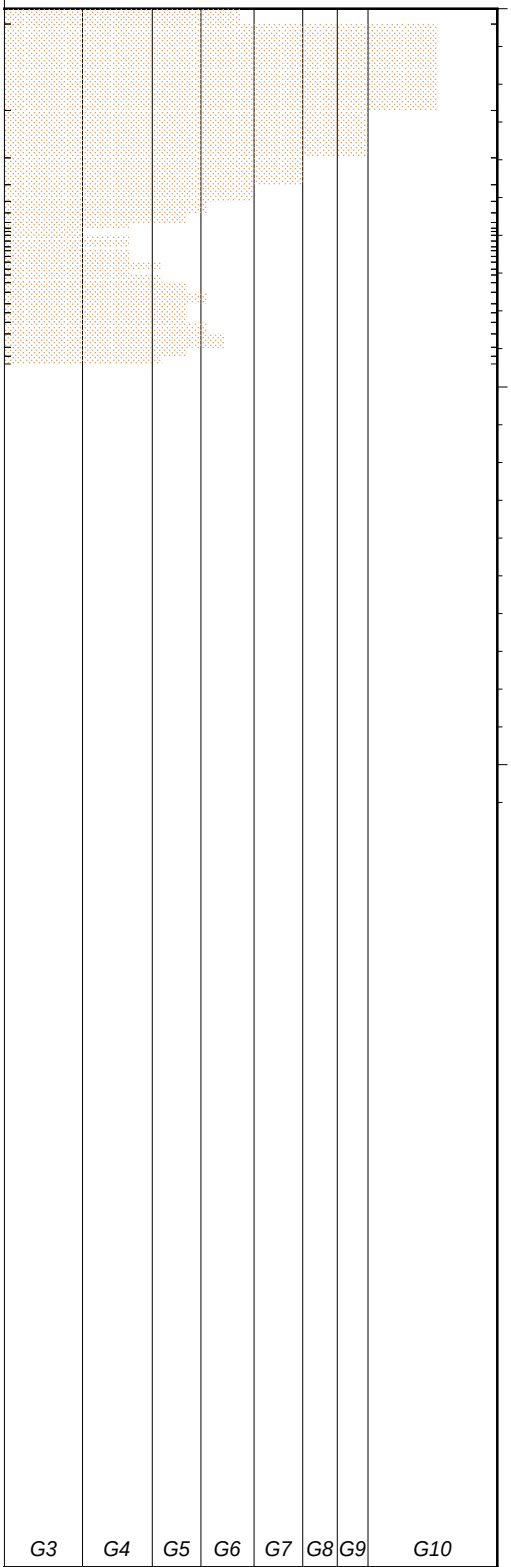
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP03**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Sightly moist, yellowish-brown, loose, porous, silty sand and gravel.

MIXED FILL

Slightly moist, grey becoming pale grey, loose to medium dense, leached, porous, slightly clayey silty sand.

HILLWASH

Slightly moist, mustard-orange blotched pale grey and black becoming pale grey, stiff becoming firm, slightly sandy silty clay.

GULLYWASH ?

End of hole not at refusal - continues on pale grey spotted black, firm, porous, sandy clay with ferricrete, FERRUGINOUS GULLYWASH

NOTES

1) Stable test pit sidewalls.
2) Historic seepage plane ant 0.6m.
3) No samples taken.

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP03**
Runway embankment

TYPE SET BY : CSM
SETUP FILE : DPL.SET

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

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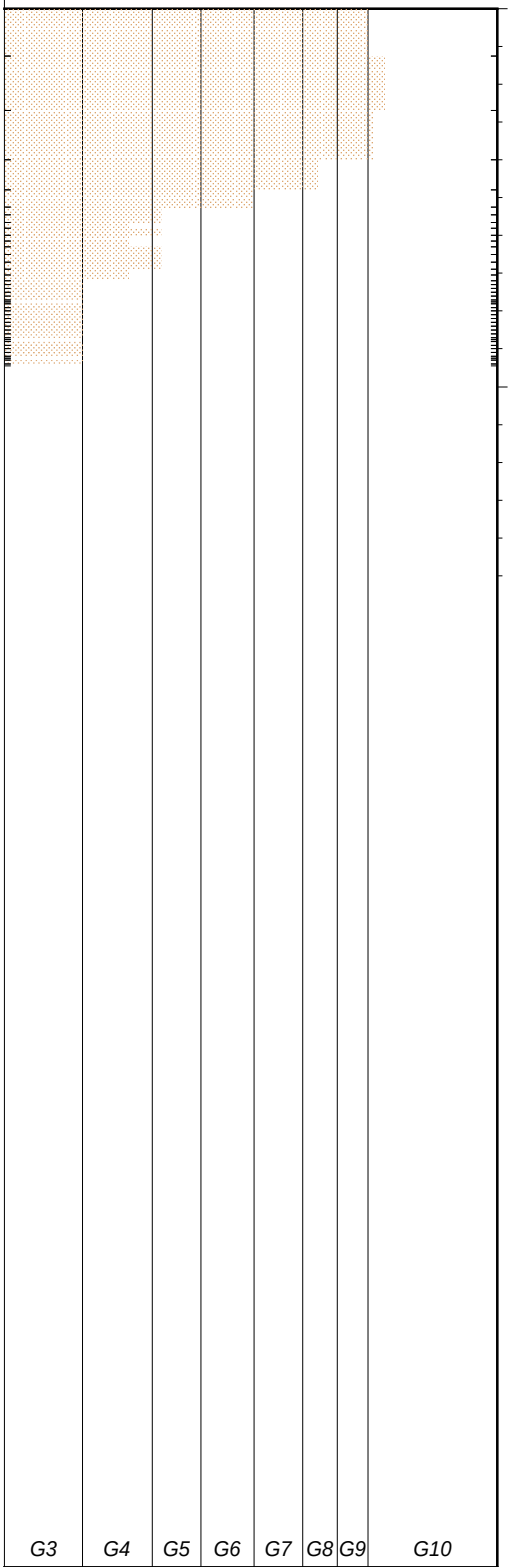
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: TP04
Sheet 1 of 1

JOB NUMBER: GGE/23031



Slightly moist to moist, light greyish-brown, loose, porous, silty sand; roots.

FILL TERRACE (HILLWASH)

Slightly moist, greyish-brown becoming light greyish-brown, loose becoming dense, porous, slightly clayey silty sand; roots.

HILLWASH

Moderately abundant sub-angular quartz gravel in a matrix of slightly moist, pale grey blotched mustard-orange and black, medium dense through dense, porous, moderately well cemented, silty sand through clayey sand.

FERRUGINOUS PEBBLE MARKER

Slightly moist, grey mottled and blotched mustard-orange, pale grey and dark grey, stiff, cemented, sandy clay.

FERRUGINOUS ALTERED REWORKED RESIDUAL GRANITE

End of hole at refusal on grey blotched dark grey, mustard-orange and -red, very stiff, sandy clay with ferricrete nodules, FERRICRETE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater encountered.
3) Undisturbed sample U4/1 taken from 0.6m--0.8m.
4) Bulk sample B4/1 taken from 1.0m--1.5m.

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : CSM
SETUP FILE : DPL.SET

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

HOLE No: TP04
Jumping terrace

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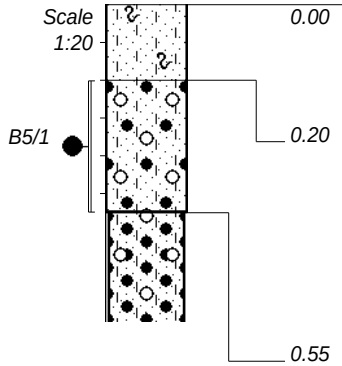
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP05**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Slightly moist to moist, greyish-brown, loose, porous, silty sand; roots.

HILLWASH

Scattered sub-angular quartz gravel and cobbles in a matrix of slightly moist to moist, light brown blotched reddish-orange and black, loose through very dense, porous, silty sand with ferricrete concentration increasing with depth.

FERRUGINOUS PEBBLE MARKER

End of hole at refusal on mustard-red blotched black and mustard-yellow, very dense, HARDPAN FERRICRETE.

NOTES

1) Stable test pit sidewalls.

2) No groundwater encountered.

3) Bulk sample B5/1 taken from 0.2m--0.55m.

G3	G4	G5	G6	G7	G8	G9	G10
Design Equivalent Material Class							

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : CSM
SETUP FILE : DPL.SET

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

HOLE No: **TP05**
Upper Paddock

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LANSERIA AIRPORT EXPANSION PROJECT
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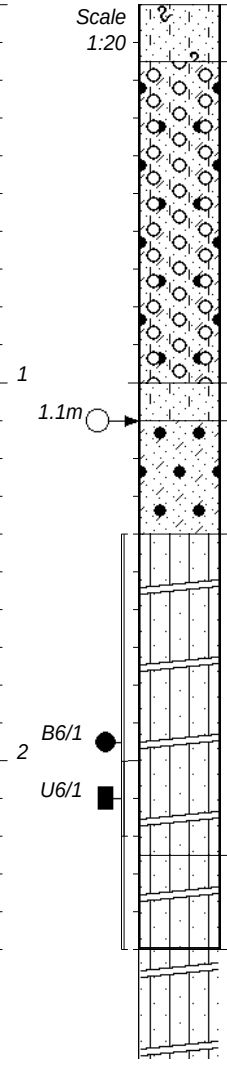
EDS Engineering Design Services

HOLE No: **TP06**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



Design Equivalent Material Class	Depth	Description
G3 G4 G5 G6 G7 G8 G9 G10	0.00	Slightly moist to moist, light greyish-brown, loose to medium dense, porous, silty sand; roots.
		HILLWASH
	0.15	Moderately abundant sub-angular quartz gravel in a matrix of slightly moist, pale grey blotched mustard-orange and black, medium dense through dense, porous, moderately well cemented, silty sand through clayey sand.
		FERRUGINOUS PEBBLE MARKER
	1.00	Slightly moist, pale grey, loose, porous, highly leached, silty sand.
		REWORKED RESIDUAL GRANITE
	1.10	Slightly moist to moist, mustard-yellow blotched pale grey and black, medium dense to dense, partially cemented, clayey sand with abundant ferricrete nodules.
		FERRUGINOUS REWORKED RESIDUAL GRANITE
	1.40	Slightly moist to moist, reddish-orange blotched grey and mustard-yellow mustard-red and khaki mottled pale yellow and black, firm, partially intact and relict-structured, sandy silt with clay lenses.
		ALTERED REWORKED RESIDUAL GRANITE
	2.25	Moist, mustard-red and khaki mottled pale yellow and black, firm, intact and relict-structured, sandy silt with clay lenses.
		ALTERED RESIDUAL GRANITE
	2.50	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) Historic seepage plane at 1.1m.
3) Undisturbed sample U6/1 taken from 2.0m--2.2m.
4) Bulk sample B6/1 taken from 1.4m--2.5m.

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP06**
Centre

TYPE SET BY : CSM
SETUP FILE : DPL.SET

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

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LANSERIA AIRPORT EXPANSION PROJECT
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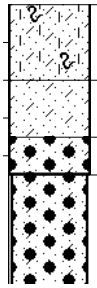
HOLE No: TP07
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Slightly moist, greyish-brown, loose, porous, slightly clayey silty sand; roots.	
	TOPSOIL (HILLWASH)	
0.20	Slightly moist to moist, grey mottled reddish-brown, loose, porous, clayey sand.	
	HILLWASH / GULLYWASH	
0.35	Dry to slightly moist, grey mottled reddish-brown, very dense, well cemented, clayey sand.	
	HARDPAN FERRICRETE	
0.45	End of hole at refusal on HARDPAN FERRICRETE.	

NOTES

1) Stable test pit sidewalls.
2) No groundwater encountered.
3) No samples taken.

G3	*G4*	*G5*	*G6*	*G7*	*G8*	*G9*	*G10*
Design Equivalent Material Class							

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

DATE : 26/02/2024 14:30
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ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP07
Effluent zone

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LANSERIA AIRPORT EXPANSION PROJECT
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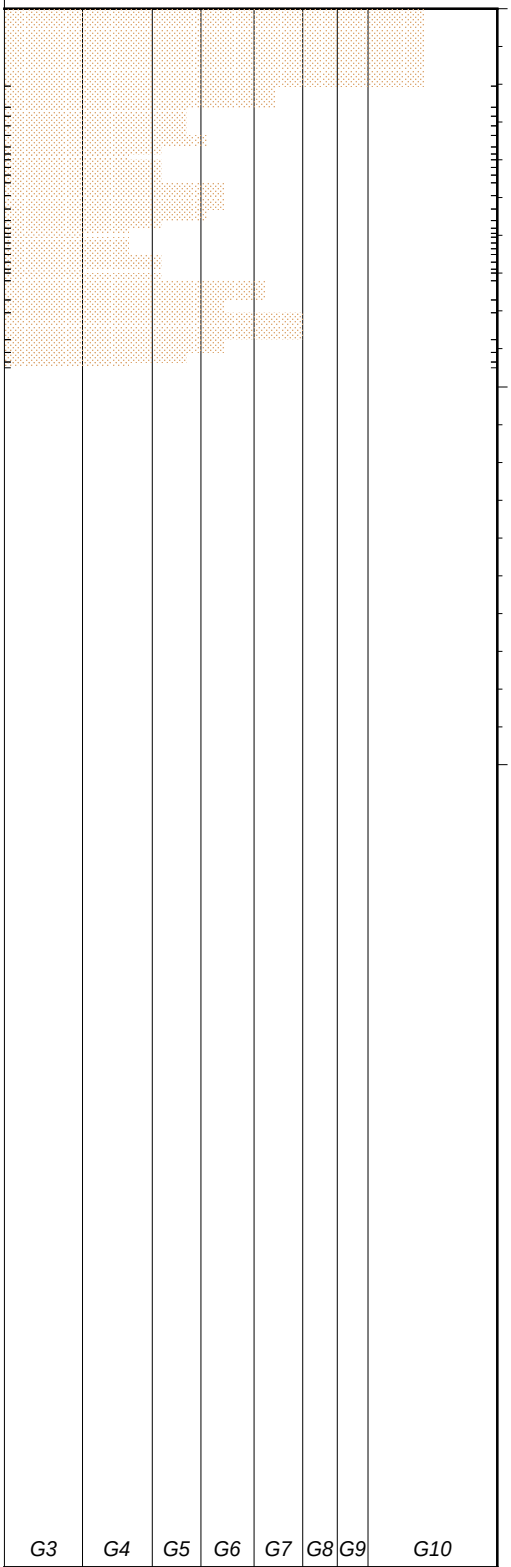
HOLE No: **TP08**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Slightly moist to moist, grey mottled reddish-brown, loose, porous, slightly clayey silty sand; roots.

HILLWASH / GULLYWASH

Scattered sub-angular quartz gravel and cobbles in a matrix of slightly moist to moist, grey blotched orange becoming mustard-orange and black, loose through very dense, porous, silty sand with ferricrete concentration increasing with depth.

FERRUGINOUS PEBBLE MARKER

Slightly moist to moist, mustard-yellow blotched pale grey and black, medium dense to dense, partially cemented, clayey sand with abundant ferricrete nodules.

FERRUGINOUS REWORKED RESIDUAL GRANITE

Moist, dull orange mottled black, pale grey and pale yellow, medium dense, partially intact and relict-structured, clayey sand.

REWORKED RESIDUAL GRANITE

End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater encountered.
3) No samples taken.

CONTRACTOR : Hire All
MACHINE : JCB.3CX
DRILLED BY :
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 11 November 2019
DATE : 11 November 2019

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP08**
South-west

TYPE SET BY : CSM
SETUP FILE : DPL.SET

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

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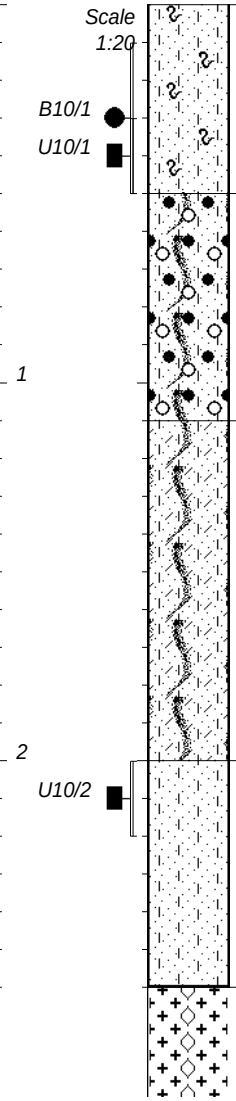
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP10**
Sheet 1 of 1

JOB NUMBER: **GGE/23031**



0.00	Dry to slightly moist, greyish-brown, loose, porous, silty sand; roots. HILLWASH
0.50	Slightly moist, light grey blotched mustard-orange and black, dense, well cemented, honeycomb ferricrete in silty sand, with scattered gravel and loose runnels. FERRUGINOUS PEBBLE MARKER
1.10	Moist, pinkish-orange blotched pale grey and black, medium dense, partially relict-structured, silty sand with clayey pockets. REWORKED RESIDUAL GRANITE
2.00	Moist, pink spotted olive-green and off-white, medium dense, partly relict-structured, silty sand. RESIDUAL GRANITE
2.60	Near refusal on highly weathered, very soft rock GRANITE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Undisturbed sample U10/1 taken from 0.3m--0.5m.
4) Bulk sample B10/1 taken from 0.1m--0.5m.
5) Undisturbed sample U10/2 taken from 2.0m--2.2m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP10**

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LANSERIA AIRPORT EXPANSION PROJECT
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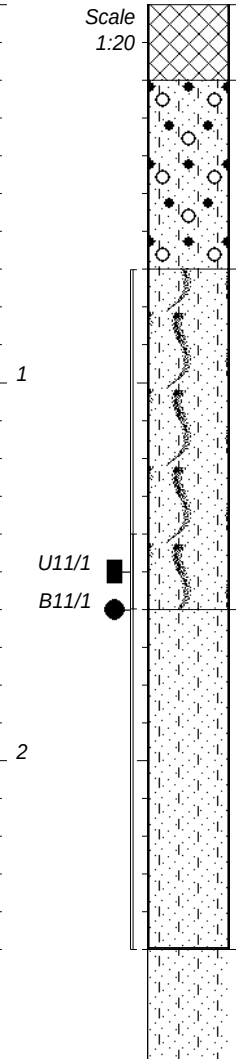
EDS Engineering Design Services

HOLE No: **TP11**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Slightly moist to moist, greyish-brown banded brown, medium dense, moderately compacted, mixed silty sand and gravels. FILL
0.20	Slightly moist to moist, grey blotched reddish-orange, medium dense, silty sand, with scattered quartz gravels and abundant weak ferricrete nodules. FERRUGINOUS PEBBLE MARKER
0.70	Moist, pale grey blotched mustard-red and black, medium dense, porous, leached, partially relict-structured, micaceous silty sand with loose runnels. REWORKED RESIDUAL GRANITE
1.60	Very moist, orange speckled red pale yellow, medium dense, intact and relict-structured, silty sand. RESIDUAL GRANITE
2.50	Approaching refusal on very dense RESIDUAL GRANITE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Undisturbed sample U11/1 taken from 1.4m--1.6m.
4) Bulk sample B11/1 taken from 0.7m--2.5m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP11**

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LANSERIA AIRPORT EXPANSION PROJECT
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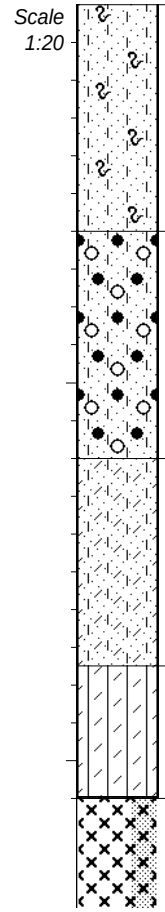
HOLE No: **TP12**
Sheet 1 of 1

JOB NUMBER: **GGE/23031**



0.00	Dry to slightly moist, greyish-brown, loose, porous, silty sand; roots. HILLWASH
0.60	Dry to slightly moist, greyish-brown blotched mustard-orange and black, dense, porous, leached, silty sand, with abundant ferricrete nodules and concretions, and scattered gravels. FERRUGINOUS PEBBLE MARKER
1.20	Slightly moist, pale green blotched mustard-orange, medium dense, partially intact and relict-structured, leached, clayey silty sand. REWORKED RESIDUAL GRANITE
1.75	Slightly moist to moist, mustard-orange stained black, firm, clayey silt. REWORKED RESIDUAL DIABASE
2.10	Abrupt refusal on black mottled pink and off-white, highly weathered medium hard rock DIABASE BOULDER.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP12**

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LANSERIA AIRPORT EXPANSION PROJECT
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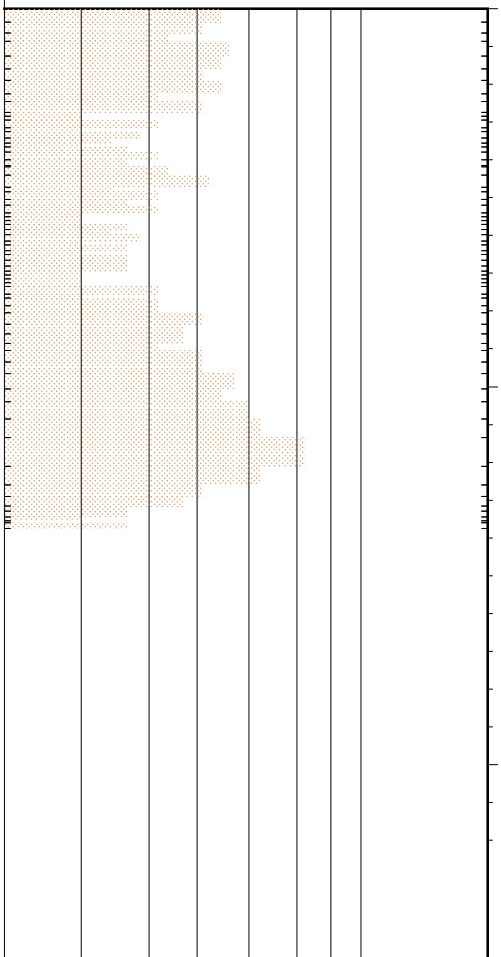
HOLE No: **TP13**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Slightly moist brown blotched reddish-brown, moderately compacted, mixed gravelly silty sand. MIXED FILL
0.55	Moist, greyish-brown, loose to medium dense, porous, silty sand. HILLWASH
0.80	Abundant clast-supported gravels in a matrix of moist to very moist, grey, blotched reddish-orange, silty sand with traces of ferricrete. FERRUGINOUS PEBBLE MARKER
0.90	Very moist, pale grey blotched reddish-orange becoming mustard-yellow, medium dense, partially intact and relict-structured, silty sand, with loose leached runnels. REWORKED RESIDUAL GRANITE
1.50	Slightly moist, pinkish-orange speckled grey and off-white, dense, intact and relict-structured, silty sand. RESIDUAL GRANITE
2.20	End of hole at refusal on very soft rock GRANITE.

NOTES

1) Stable test pit sidewalls.
2) Seepage encountered at 1.2m.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP13**

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LANSERIA AIRPORT EXPANSION PROJECT
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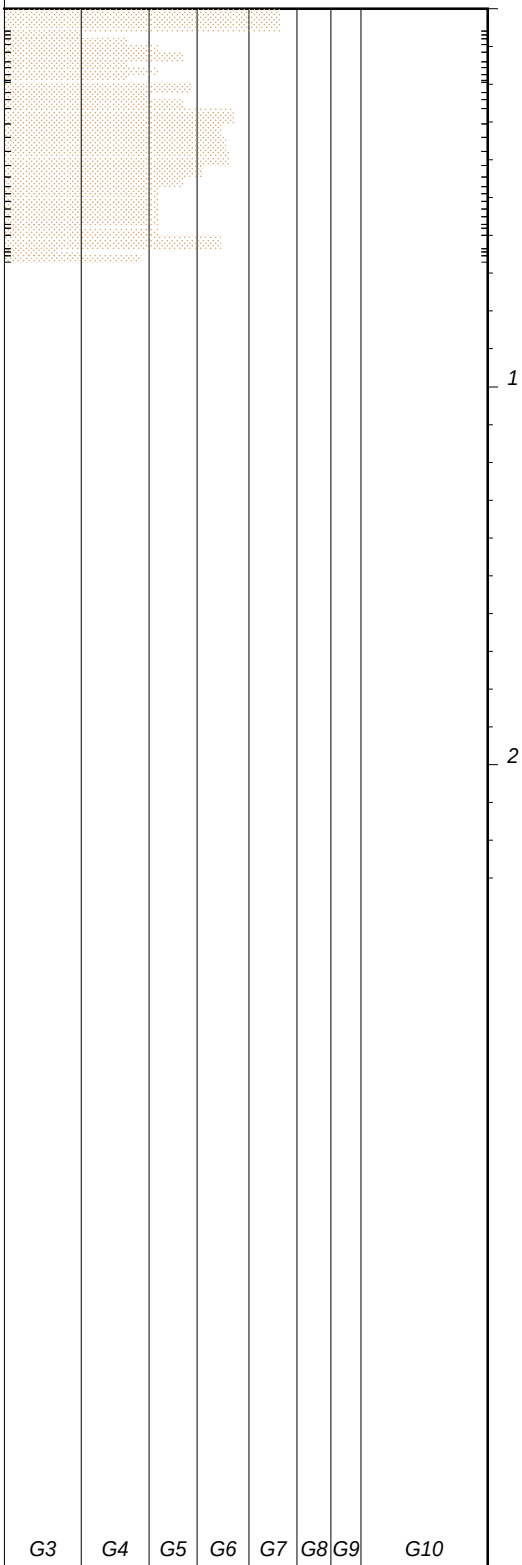
HOLE No: **TP14**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Bands of slightly moist, brownish-orange blotched greyish-brown, loose to medium dense, mixed silty sand with pockets of granite. UNCONTROLLED FILL (Transported and Residual Granite)
1.80	Dry to slightly moist, greyish-brown, medium dense, porous, silty fine sand. HILLWASH
2.10	Slightly moist, brown blotched mustard-orange, medium dense to dense, silty sand with abundant ferricrete. FERRUGINOUS PEBBLE MARKER
2.30	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP14**

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LANSERIA AIRPORT EXPANSION PROJECT
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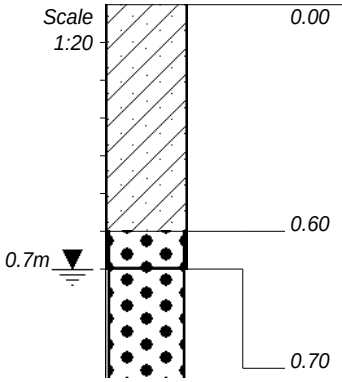
HOLE No: **TP15**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Moist to very moist, pale grey blotched brown, soft, sandy clay.

GULLYWASH

Very moist, reddish-orange, very dense, well cemented, gravelly silty sand.

HARDPAN FERRICRETE

End of hole at refusal on
HARDPAN FERRICRETE

NOTES

1) Stable test pit sidewalls.

2) Standing water encountered at 0.7m.

3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10
Design Equivalent Material Class							

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP15**

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LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
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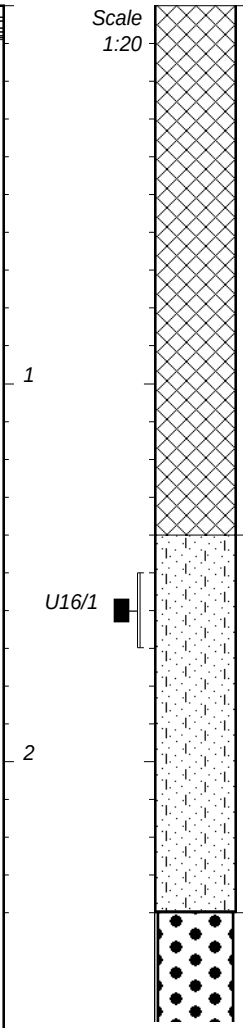
HOLE No: **TP16**
Sheet 1 of 1

JOB NUMBER: **GGE/23031**

Scale 1:20



0.00	Slightly moist, brown banded brown blotched reddish-grey, medium dense, moderately compacted, mixed gravelly silty sand. FILL (RESIDUAL GRANITE)
1.40	Moist to very moist, greyish-brown, loose, porous, silty fine sand. HILLWASH / GULLYWASH
2.40	Abrupt refusal on mustard-orange blotched black HARDPAN FERRICRETE.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) Undisturbed sample U16/1 taken from 1.5m--1.7m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP16**

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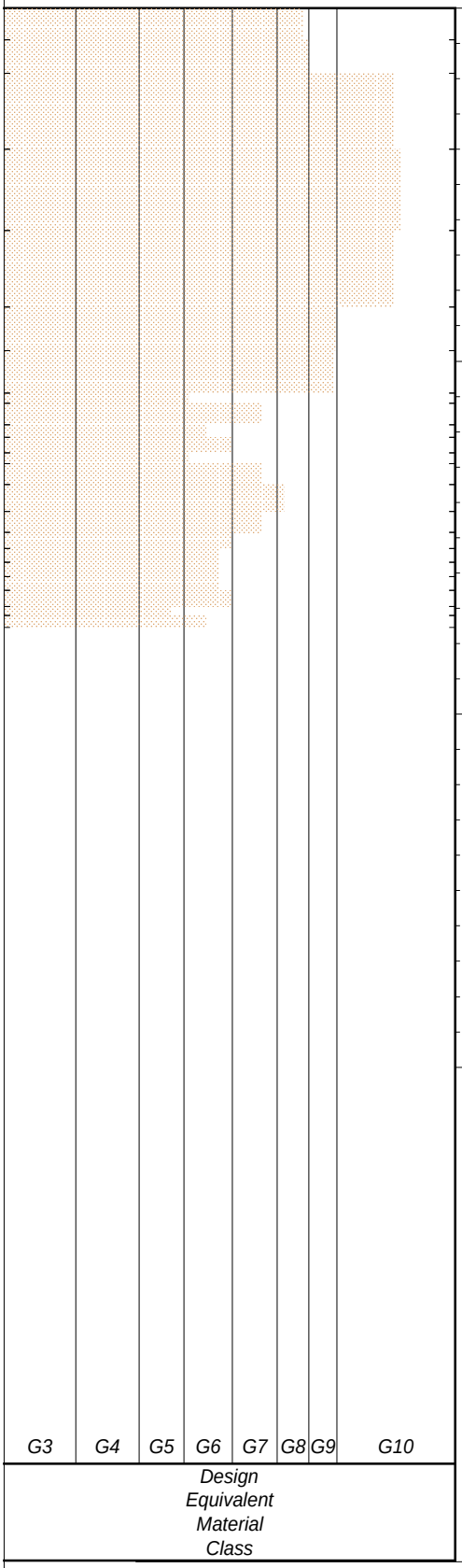
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP17**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Bands of slightly moist to moist, brown through brownish-orange, loose, porous, mixed gravelly clayey sand. UNCONTROLLED FILL (ESTIMATED G8 QUALITY)
1.10	Moist, light brown speckled pale yellow and silver, loose, porous, mixed silty sand. FILL (RESIDUAL GRANITE)
2.70	Moist to very moist, dark grey, loose, porous, clayey sand. GULLYWASH
3.00	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP17**

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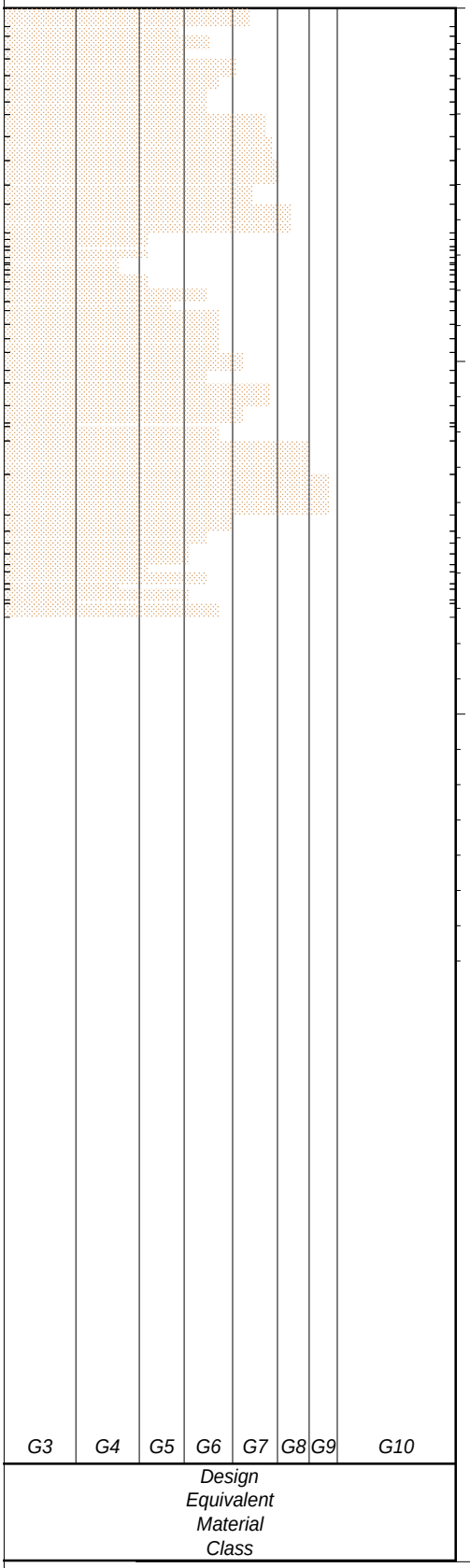
LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP18**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00

Bands of slightly moist, pale yellowish-brown speckled black and orange, loose through medium dense, mixed silty sand with pockets of gravel and small boulders.

FILL (RESIDUAL GRANITE)

2.70

End of hole not at refusal - continues as above.

NOTES

1) Material possibly from cutting at Taxiway Charlie.
2) Stable test pit sidewalls.
3) No groundwater proven in depth of excavation.
4) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP18**

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LANSERIA AIRPORT EXPANSION PROJECT
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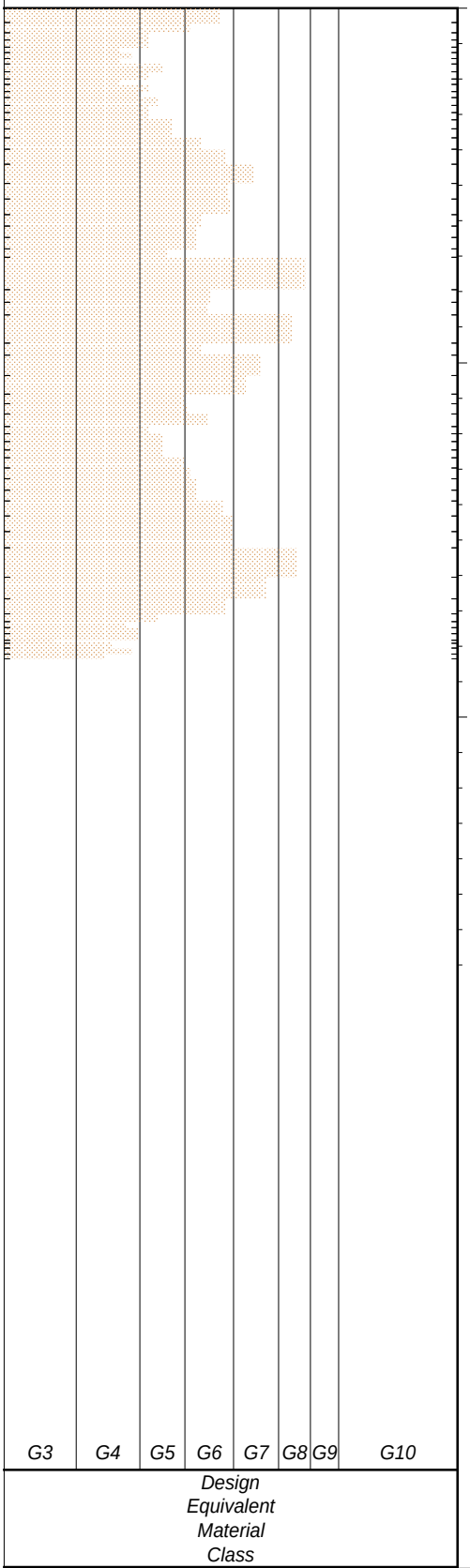
HOLE No: **TP19**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00 — Moist to very moist, brownish-orange mottled / blotched pale yellow and orange, medium dense through loose to medium dense below 0.9m, becoming loose below 2m, poorly compacted, slightly clayey silty coarse sand with scattered gravels and rock fragments.

FILL (RESIDUAL GRANITE)

2.40 — Moist, light grey, loose, porous, clayey silty sand, with scattered gravels.

GULLYWASH

2.70 — End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) Bulk sample B19/1 taken from 0.1m--2.7m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP19**

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LANSERIA AIRPORT EXPANSION PROJECT
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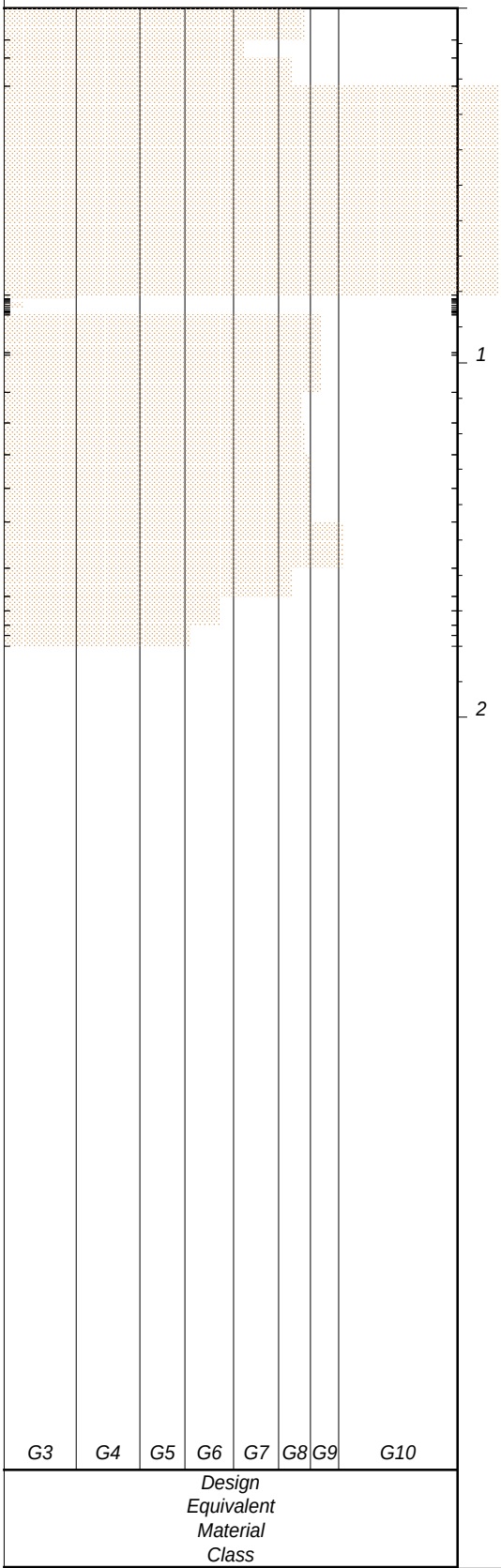
HOLE No: **TP20**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Very moist, dark grey, loose, sand. GULLYWASH
0.80	Moist, light grey, loose, porous, clayey silty sand with abundant gravels. PEBBLE MARKER
0.90	Very moist, light grey mottled reddish-orange, soft, sandy clay. REWORKED RESIDUAL DIABASE
2.00	End of hole not at refusal - continues as above.

NOTES

1) Profile inferred from TP21 using the DCP probe trace.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

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TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
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HOLE No: **TP20**

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LANSERIA AIRPORT EXPANSION PROJECT
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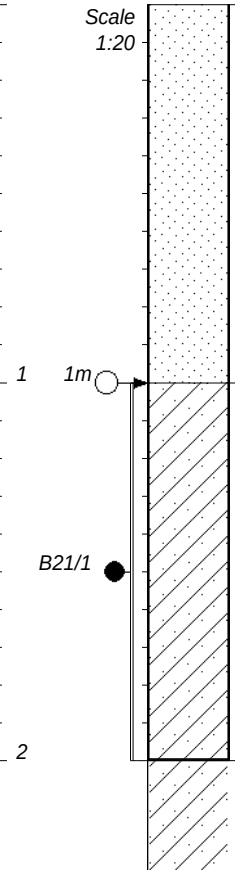
HOLE No: **TP21**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00 — Very moist, dark grey, loose, sand.

GULLYWASH

1.00 — Very moist, light grey mottled reddish-orange, soft, sandy clay.

REWORKED RESIDUAL DIABASE

2.00 — End of hole not at refusal - continues as above.

NOTES

1) Hole collapsing and unsafe to profile in situ.
2) Rapid seepage from sidewalls from approximately 1m.
3) Bulk sample B21/1 taken from 1.0m--2.0m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
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HOLE No: **TP21**

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LANSERIA AIRPORT EXPANSION PROJECT
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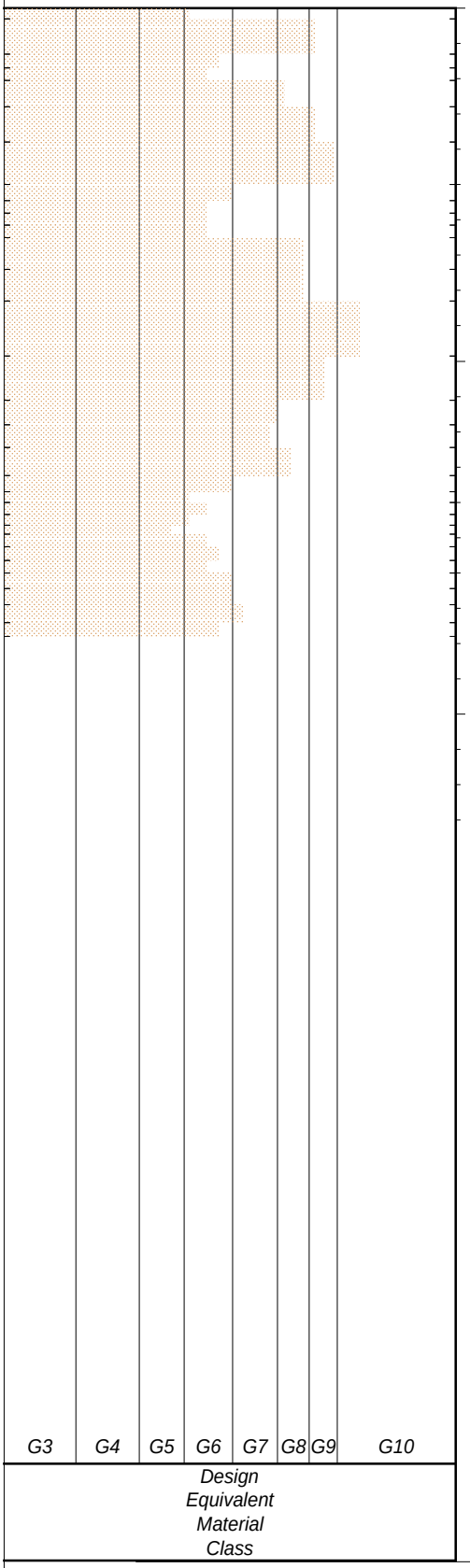
HOLE No: **TP22**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Slightly moist to moist, brown, loose, porous, mixed silty sand. FILL (RESIDUAL GRANITE)
1.30	Very moist, dark grey, loose, sand. GULLYWASH
2.00	Very moist, light grey mottled reddish-orange, soft, sandy clay. REWORKED RESIDUAL DIABASE
2.30	End of hole at refusal on medium hard rock DIABASE.

NOTES

1) Test pit sidewalls not stable, hole collapsing.
2) Ground water encountered at 2.2m.
3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP22**

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LANSERIA AIRPORT EXPANSION PROJECT
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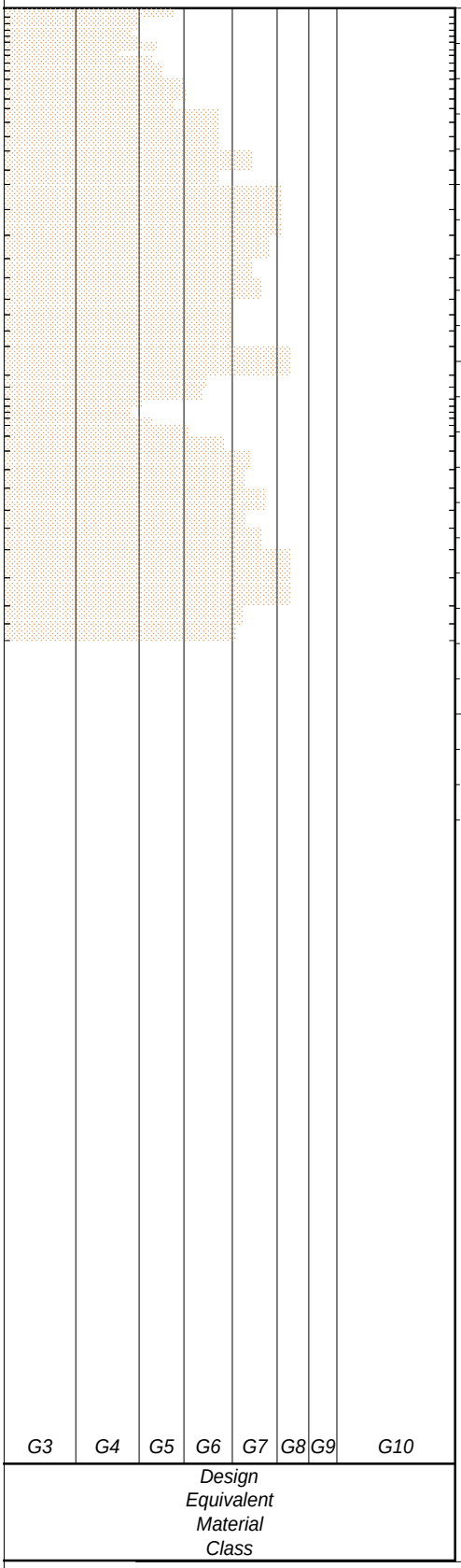
HOLE No: **TP23**
Sheet 1 of 1

JOB NUMBER: **GGE/23031**



Bands of slightly moist to moist, brown light grey and blotched orange, medium dense, lightly compacted, mixed gravelly clayey sand.

FILL (MIXED RESIDUAL GRANITE AND TRANSPORTED)

Moist to very moist, light grey, loose, porous, slightly clayey silty sand, with scattered sub-angular quartz gravels.

HILLWASH (PEBBLE MARKER)

Moist to very moist, light orange-brown light grey blotched reddish-black, medium dense, porous, clayey silty sand with abundant sub-angular gravel and scattered weak ferricrete.

FERRUGINOUS ALTERED REWORKED RESIDUAL GRANITE

Very moist, light grey mottled brownish-orange, loose, porous, clayey sand.

ALTERED REWORKED RESIDUAL GRANITE

Moist to very moist, medium grey mottled brownish-orange, firm, silty sand with clay bands.

ALTERED RESIDUAL GRANITE

End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Undisturbed sample U23/1 taken from 1.8m--2.0m.
4) Bulk sample B23/1 taken from 1.6m--2.3m.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
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HOLE No: **TP23**

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LANSERIA AIRPORT EXPANSION PROJECT
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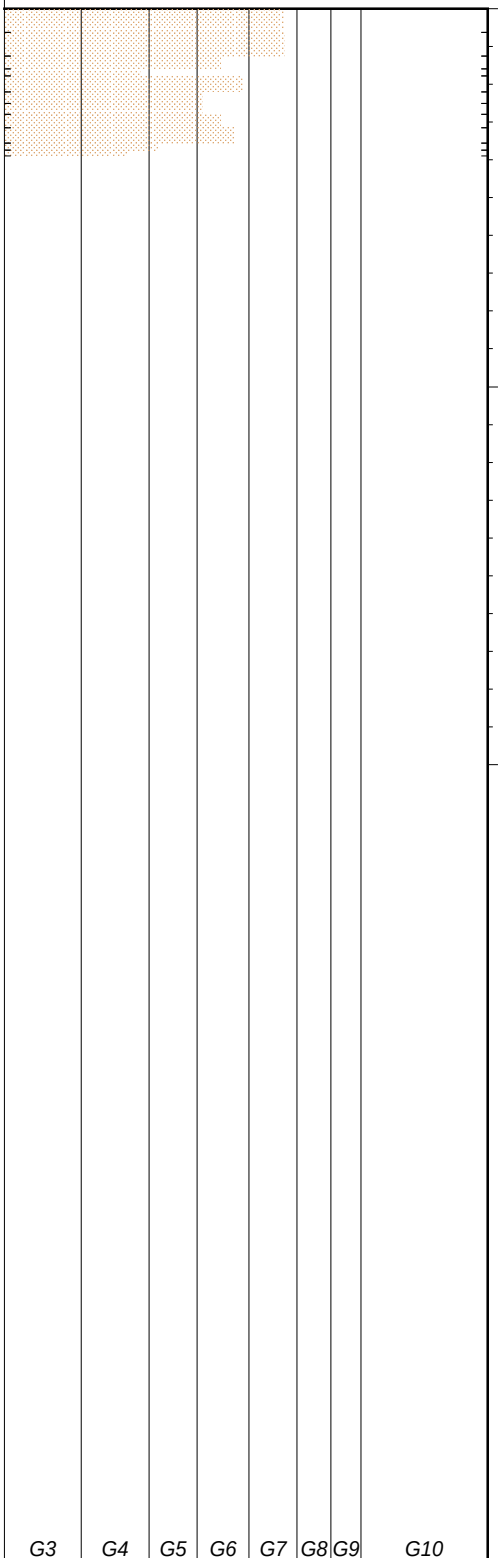
HOLE No: **TP24**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Moist, light brown, loose, porous, silty sand. HILLWASH
0.50	Moist, light brown, loose, porous, silty sand, with ferricrete concretions and scattered gravels. FERRUGINOUS PEBBLE MARKER
0.70	Moist, pale grey blotched mustard-orange, firm, gravelly clay. REWORKED RESIDUAL DIABASE
1.40	Pale orange through off-white mottled black highly weathered, intact, friable, vertically jointed, silty sand and soft rock. RESIDUAL GRANITE
2.00	End of hole at refusal on medium hard rock GRANITE.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP24**

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LANSERIA AIRPORT EXPANSION PROJECT
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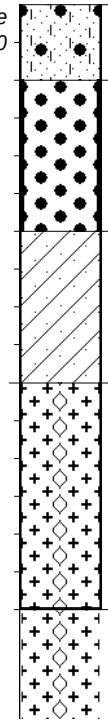
HOLE No: **TP25**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Slightly moist, pale grey blotched reddish-orange, loose, porous, silty sand, with abundant ferricrete nodules.	
	FERRUGINOUS HILLWASH	
0.20	Slightly moist, brown blotched grey and off-white, very dense, hardpan ferricrete.	
	FERRUGINOUS PEBBLE MARKER	
0.60	Very moist, light grey blotched mustard-yellow, firm, fissured, sandy clay.	
	REWORKED RESIDUAL DIABASE	
1.00	Moist, off-white blotched pale orange, highly weathered, brittle, jointed, soft rock.	
	GRANITE	
1.60	End of hole at refusal on medium hard rock GRANITE.	

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10
Design Equivalent Material Class							

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP25**

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LANSERIA AIRPORT EXPANSION PROJECT
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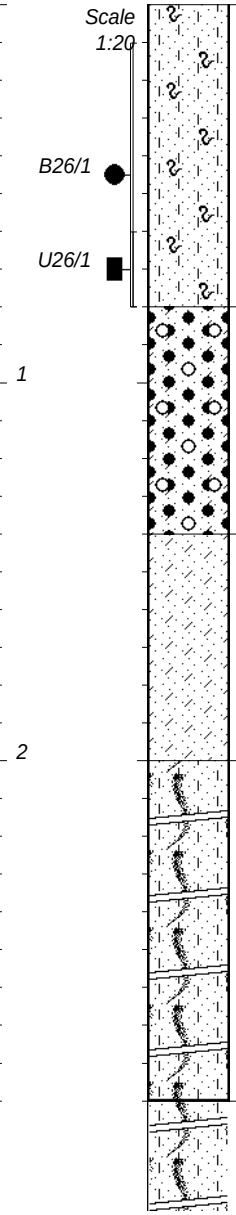
EDS Engineering Design Services

HOLE No: **TP26**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00 — Slightly moist, greyish-brown, loose, porous, silty sand; roots.

HILLWASH

0.80 — Moist, orange blotched black and pale grey, very dense, well cemented clayey sand with scattered gravels.

HARDPAN FERRICRETE

1.40 — Moist, light grey blotched brownish-orange and black, medium dense, intact, clayey sand.

ALTERED REWORKED RESIDUAL GRANITE

2.00 — Slightly moist to moist, orange speckled off-white and pale yellow, medium dense, intact and relict-structured, friable, silty sand with intermittent clay bands and loose pockets.

ALTERED RESIDUAL GRANITE

2.90 — End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Undisturbed sample U26/1 taken from 0.6m--0.8m.
4) Bulk sample B26/1 taken from 0.1m--0.8m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP26**

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LANSERIA AIRPORT EXPANSION PROJECT
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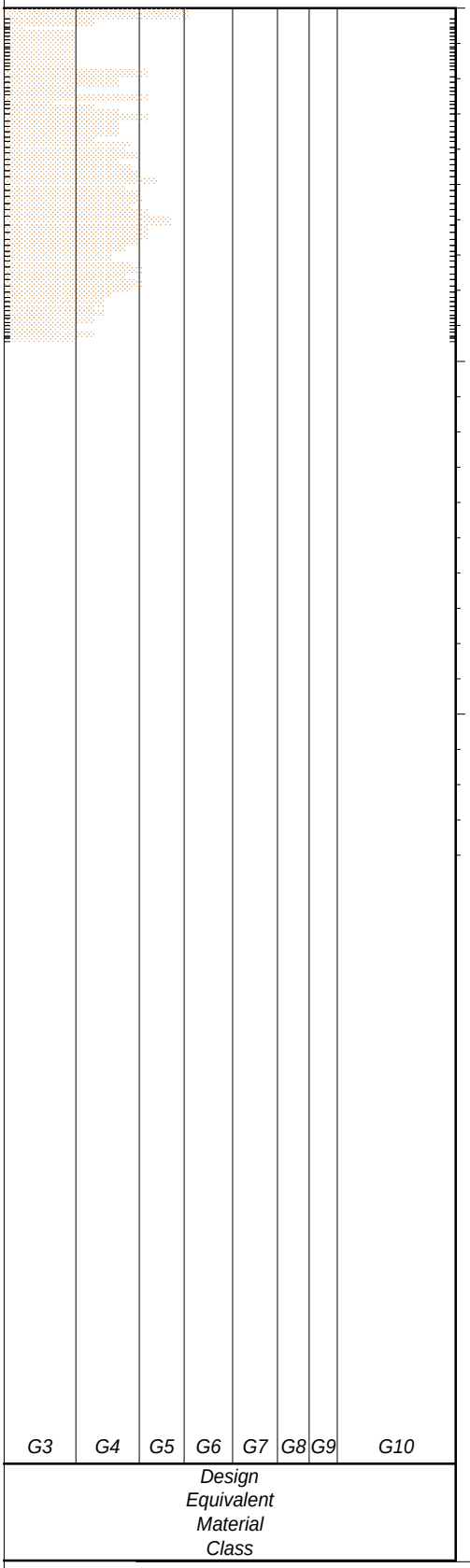
HOLE No: **TP27**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Slightly moist, light grey, loose, porous, silty sand.

HILLWASH

Abundant sub-angular quartz gravels in a matrix of slightly moist, light grey, medium dense, porous, silty sand.

PEBBLE MARKER

Moist, pale grey blotched mustard-orange, loose to medium dense, porous, silty sand with abundant weak ferricrete.

FERRUGINOUS PEBBLE MARKER

Moist, mottled blotched pale grey reddish-orange and pale yellow, firm, porous, intact and relict-structured, sandy silt.

ALTERED REWORKED RESIDUAL GRANITE

Slightly moist to moist, pale orange speckled pale yellow, medium dense to dense, intact and relict-structured, silty sand.

RESIDUAL GRANITE

End of hole nearing refusal on RESIDUAL GRANITE - as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP27**

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LANSERIA AIRPORT EXPANSION PROJECT
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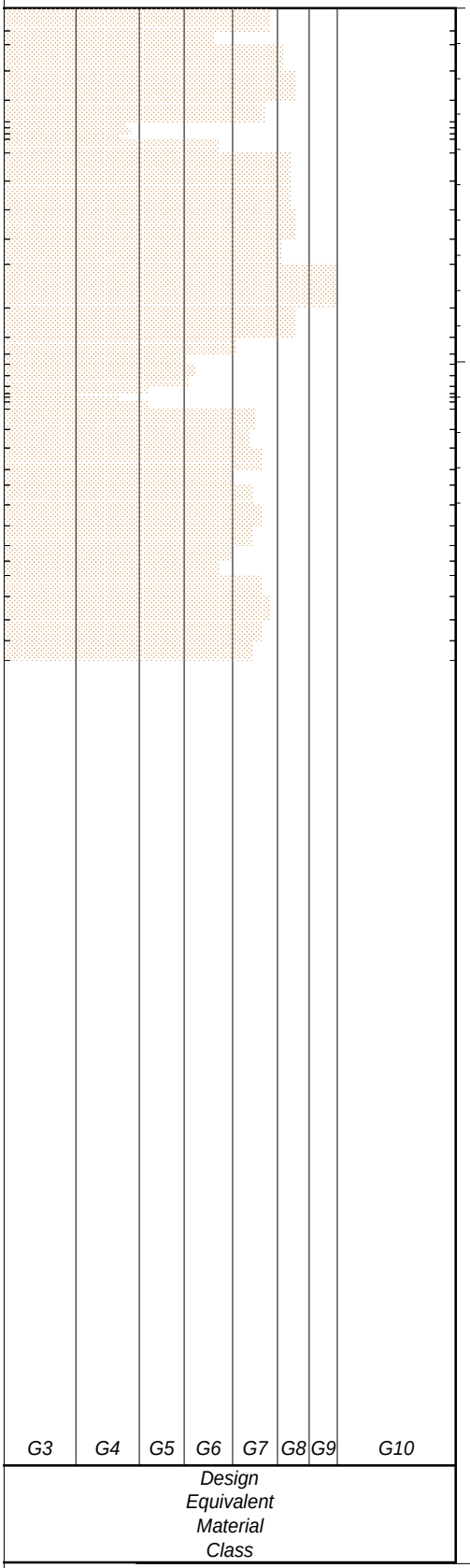
HOLE No: **TP28**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Slightly moist to moist, greyish-brown, loose, porous, mixed silty sand with scattered large boulders. FILL (HILLWASH and BOULDERS)	
1.40	End of hole at refusal on large boulders in FILL.	

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP28**

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LANSERIA AIRPORT EXPANSION PROJECT
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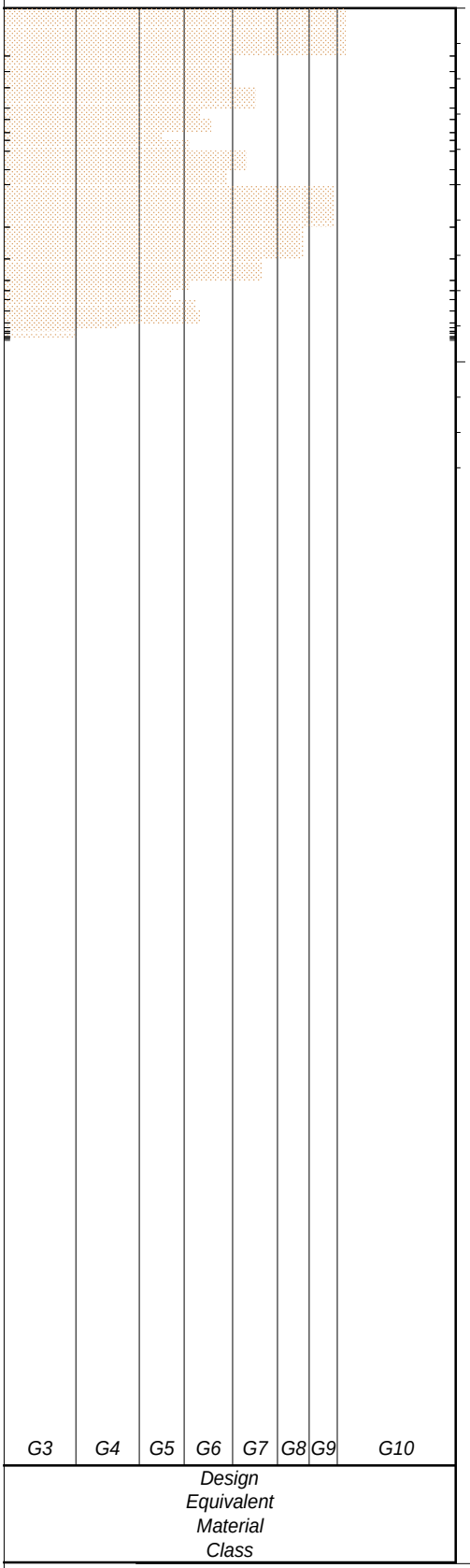
HOLE No: **TP29**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Moist becoming very moist, grey blotched mustard-orange and black, dense to very dense, porous, silty sand, with large ferricrete concretions. FERRUGINOUS HILLWASH	
0.80	Very moist, pale brown mottled orange and black, medium dense, intact and relict-structured, leached, clayey sand. REWORKED RESIDUAL GRANITE	
1.25	End of hole at refusal on pale orange speckled dull grey, intact, highly weathered, friable, very soft rock to soft rock GRANITE.	

NOTES

1) Stable test pit sidewalls.

2) Ground water encountered at 1.2m.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
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ELEVATION :
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Y-COORD :

HOLE No: **TP29**

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LANSERIA AIRPORT EXPANSION PROJECT
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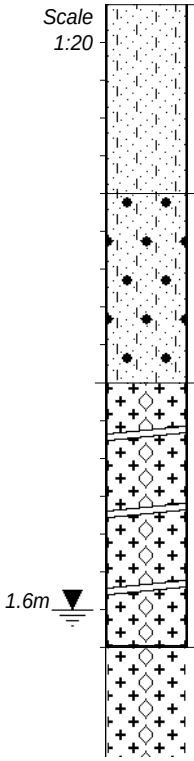
HOLE No: **TP30**
Sheet 1 of 1

JOB NUMBER: **GGE/23031**

Scale 1:20



0.00 — Moist, orange-brown mottled reddish-orange, loose, porous, silty sand.

HILLWASH

0.50 — Very moist, pale grey / pale brown blotched black and reddish-orange, loose, porous, leached, silty sand, with scattered ferricrete.

FERRUGINOUS REWORKED RESIDUAL GRANITE

1.00 — Angular jointed medium hard rock with infill of grey-green, sandy clay.

GRANITE

1.70 — End of hole at refusal on medium hard rock GRANITE.

NOTES

1) Stable test pit sidewalls.
2) Standing water at 1.6m.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP30**

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LANSERIA AIRPORT EXPANSION PROJECT
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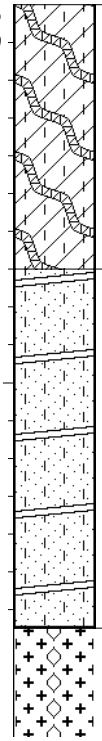
HOLE No: **TP31**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00

Abundant angular highly fractured soft rock pegmatite in a matrix of moist, brown blotched orange, firm, silty clay.

ALTERED REWORKED RESIDUAL GRANITE

0.70

Slightly moist to moist, dull yellowish-orange speckled off-white, medium dense to dense, friable, silty sand with abundant jointed very soft rock granite hosting a stringer of diabase.

RESIDUAL GRANITE

1.65

End of hole at refusal on angular, jointed, soft rock to medium hard rock GRANITE.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

G3	*G4*	*G5*	*G6*	*G7*	*G8*	*G9*	*G10*
Design Equivalent Material Class							

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP31**

GEOID Geotechnical Engineers
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mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
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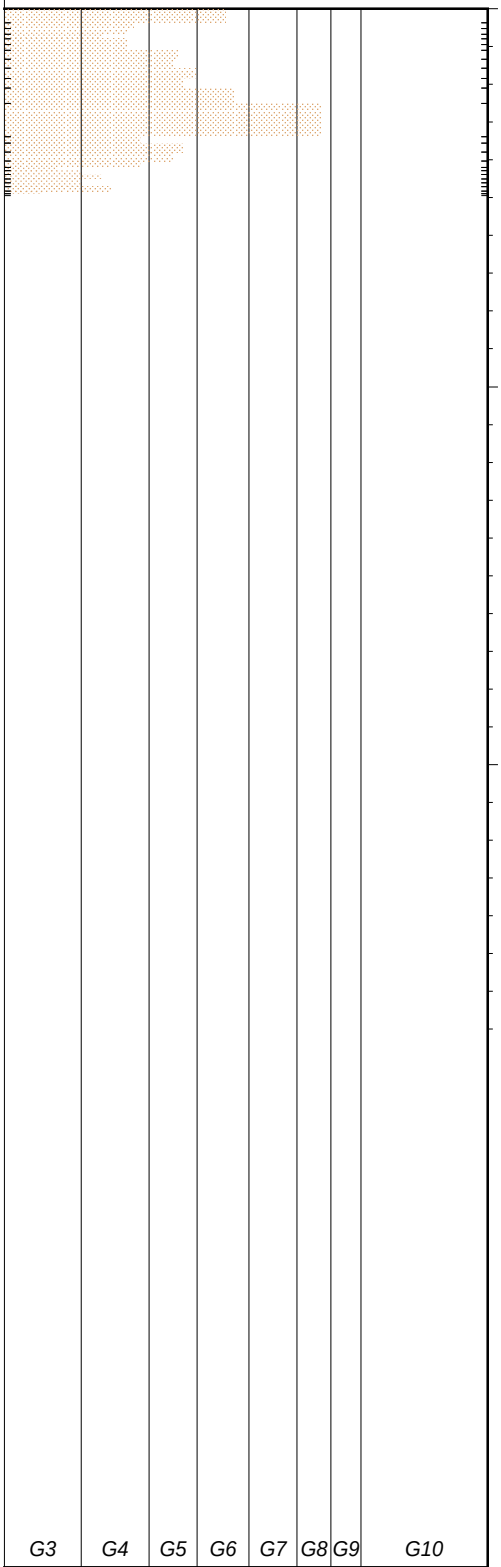
HOLE No: **TP32**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Dry to slightly moist, light brown, loose to medium dense, porous, silty sand. HILLWASH
0.40	Abundant clast supported gravel in a matrix of slightly moist, light brown, medium dense, silty sand. PEBBLE MARKER
0.50	Mustard-yellow blotched pale grey and black, very dense, well compacted, hardpan ferricrete with leached runnels. FERRUGINOUS PEBBLE MAKER
1.25	Slightly moist, olive-grey blotched grey and mustard-orange, dense, intact and relict-structured, clayey sand. REWORKED RESIDUAL GRANITE
1.80	Slightly moist, olive-green mottled orange speckled pale yellow, medium dense to dense, intact and relict-structured, slightly clayey silty sand. RESIDUAL GRANITE
2.70	End of hole nearing refusal on very soft rock GRANITE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP32**

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LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
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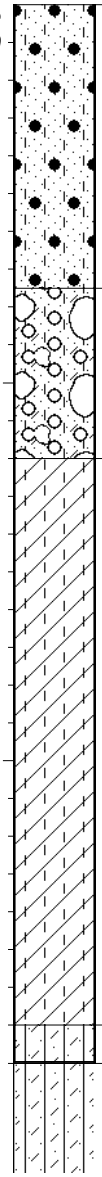
HOLE No: **TP33**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Slightly moist to moist, light grey blotched mustard-orange and black, loose to medium dense, silty sand, with scattered through abundant ferricrete concretions. FERRUGINOUS HILLWASH
0.75	Scattered sub-angular quartz gravels and cobbles in a matrix of slightly moist, orange blotched pale yellow, medium dense to dense, porous, clayey silty sand. PEBBLE MARKER
1.20	Moist, pale grey blotched mustard-orange, firm, fissured, silty clay. REWORKED RESIDUAL DIABASE
2.70	Moist, orange-brown speckled pale yellow, firm, intact, sandy clayey silt. RESIDUAL DIABASE
2.80	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

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ELEVATION :
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HOLE No: **TP33**

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LANSERIA AIRPORT EXPANSION PROJECT
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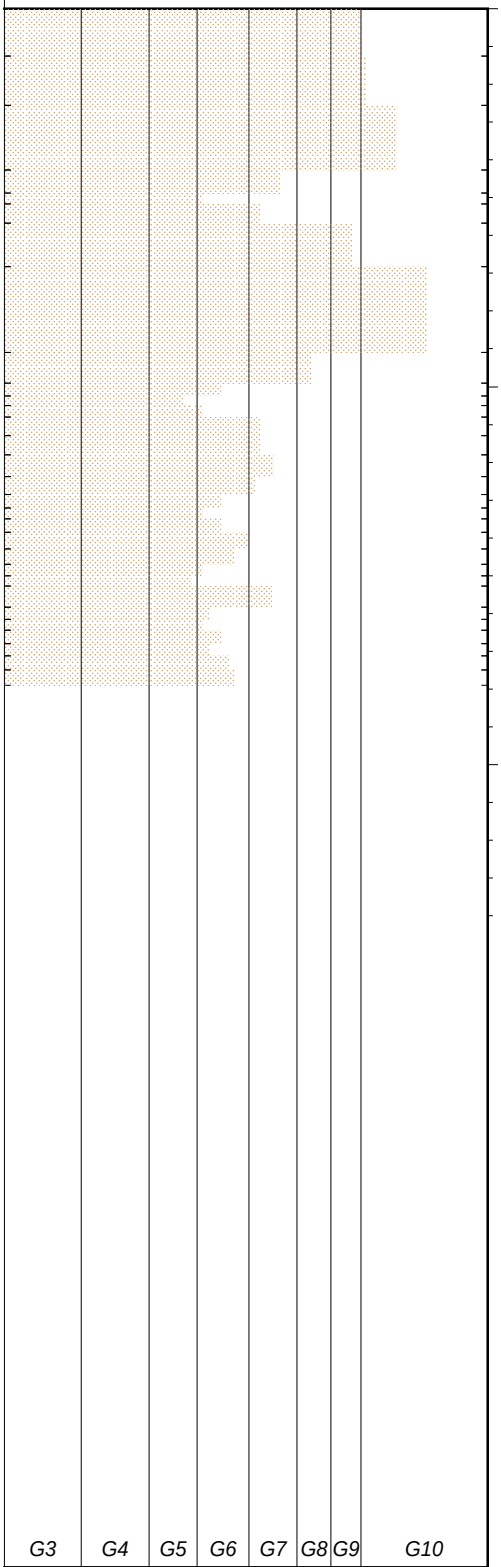
HOLE No: **TP34**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Slightly moist, light brown, loose, porous, silty sand; roots.

HILLWASH

Abundant sub-angular quartz gravels in a matrix of slightly moist to moist, light grey blotched mustard-yellow, loose to medium dense, porous, silty sand.

PEBBLE MARKER

Moist, light grey blotched mustard-orange, loose to medium dense, porous, clayey silty sand.

REWORKED RESIDUAL GRANITE

Slightly moist, orange speckled green pale yellow and silver, dense, intact and relict-structured, micaceous silty sand.

RESIDUAL GRANITE

Orange speckled silver mottled pale yellow, intact, jointed, highly weathered, soft rock though medium hard rock.

GRANITE

End of hole at refusal on medium hard rock GRANITE.

NOTES

1) Stable test pit sidewalls.
2) Seepage encountered at 0.8m and 1.8m.
3) Bulk sample B34/1 taken from 0.1m--2.4m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

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ELEVATION :
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HOLE No: **TP34**

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LANSERIA AIRPORT EXPANSION PROJECT
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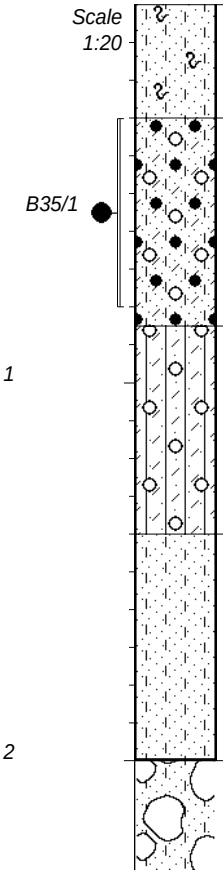
HOLE No: **TP35**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Slightly moist, light grey, loose, porous, silty sand; roots.

HILLWASH

Abundant ferricrete nodules and scattered quartz gravels in a matrix of moist, grey, loose to medium dense, porous, clayey silty sand.

FERRUGINOUS PEBBLE MARKER

Slightly moist, mottled / blotched grey, firm, sandy clayey silt, with trace gravels.

ALTERED REWORKED RESIDUAL GRANITE

Slightly moist to moist, pale orange speckled black and pale yellow, medium dense, friable, mixed silty sand.

RESIDUAL GRANITE.

End of hole at partial refusal on medium hard rock granite boulders in a matrix as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Bulk sample B35/1 taken from 0.3m--0.8m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
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Y-COORD :

HOLE No: **TP35**

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LANSERIA AIRPORT EXPANSION PROJECT
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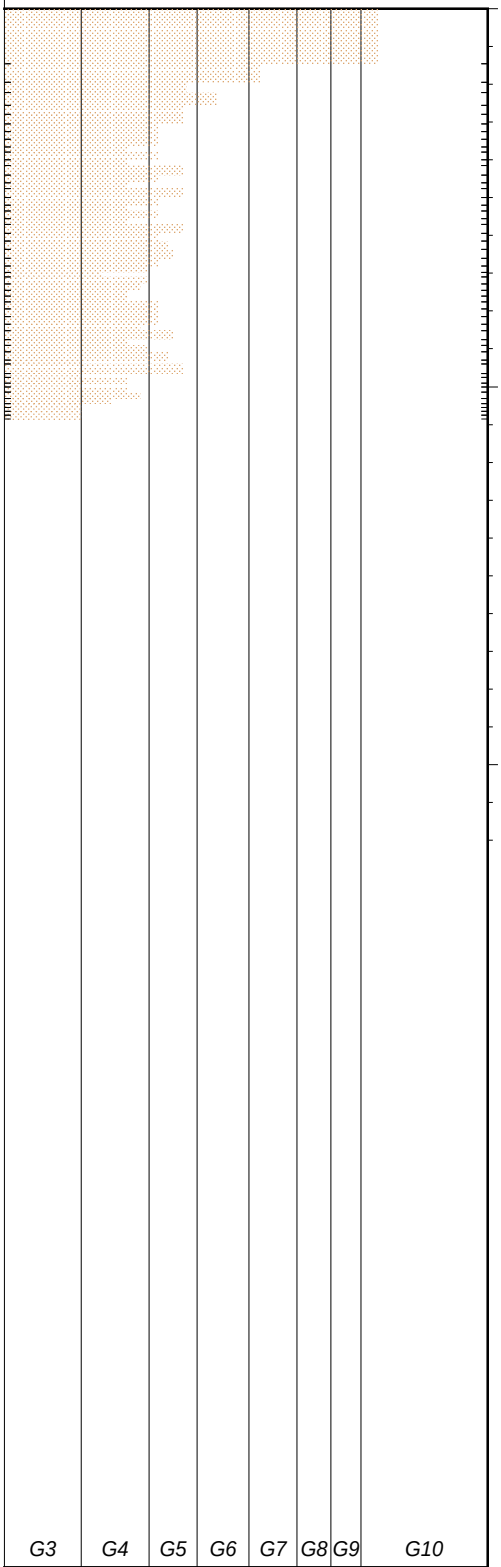
HOLE No: **TP41**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00

Dry to slightly moist, light grey, medium dense to dense, porous, silty sand.

GULLYWASH

1.00

Dry to slightly moist, mottled orange blotched light grey, dense, leached, porous, clayey sand, with traces of ferricrete.

REWORKED RESIDUAL GRANITE

2.20

End of hole nearing refusal - continues as above.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

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ELEVATION :
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Y-COORD :

HOLE No: **TP41**

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LANSERIA AIRPORT EXPANSION PROJECT
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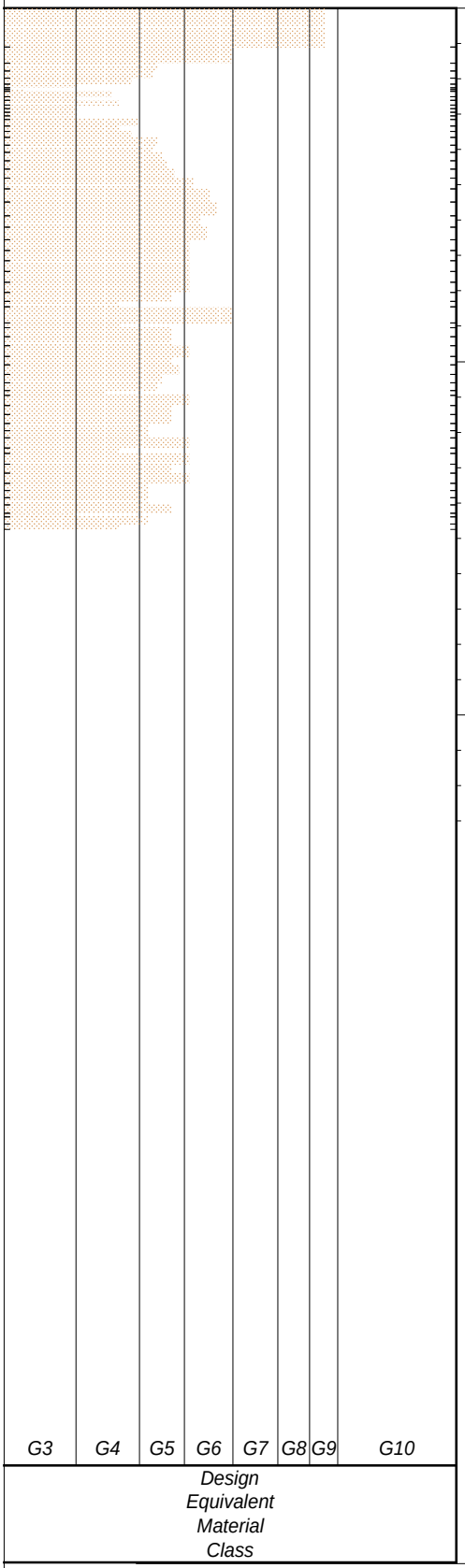
HOLE No: **TP42**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Dry to slightly moist, brown, loose, porous, clayey sand.
	GULLYWASH
0.30	Abundant sub-angular quartz gravels in a matrix of slightly moist, brown blotched reddish-orange, medium dense, porous, clayey sand; roots.
	PEBBLE MARKER
0.55	Dry to slightly moist, reddish-orange blotched mustard-yellow and pale brown, medium dense to dense, clayey silty sand; roots.
	REWORKED RESIDUAL GRANITE
2.00	Slightly moist, pinkish red mustard-yellow blotched black, medium dense to dense, intact and relict-structured, silty sand.
	RESIDUAL GRANITE
2.30	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP42**

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LANSERIA AIRPORT EXPANSION PROJECT
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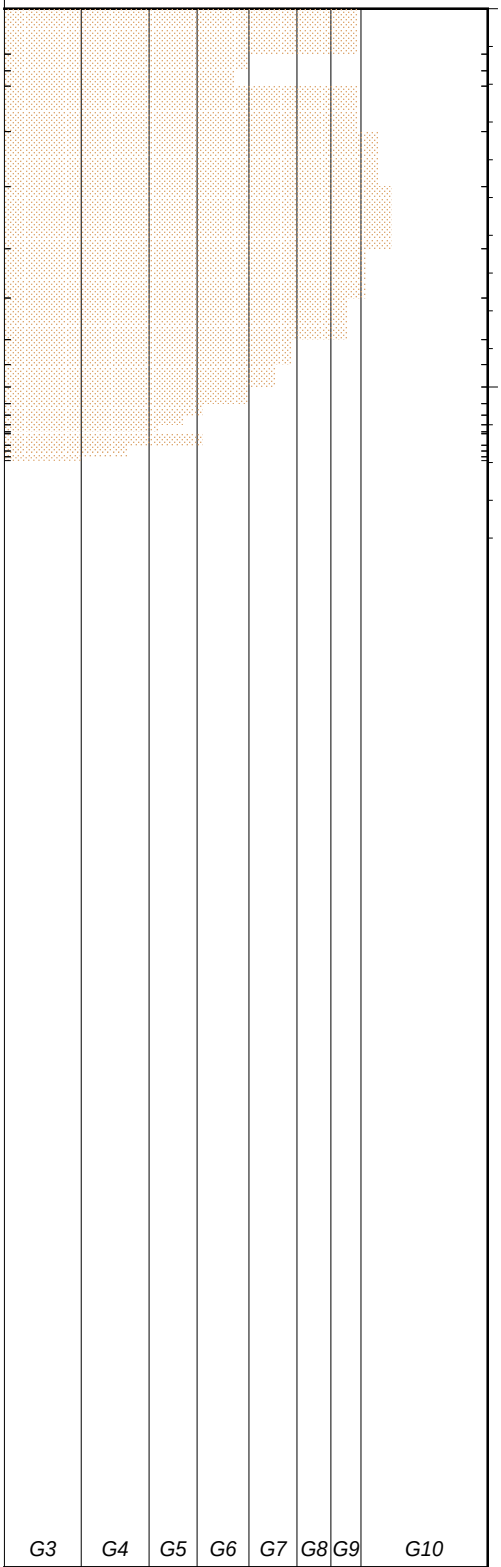
HOLE No: **TP43**
Sheet 1 of 1

JOB NUMBER: GGE/23031



Moist, yellowish-brown, loose, porous, silty sand becoming clayey sand.

GULLYWASH

Moist, pale grey blotched reddish-orange, loose, porous, clayey sand, with abundant ferricrete gravels.

FERRUGINOUS GULLYWASH

End of hole at abrupt refusal on reddish-orange blotched pale grey and dusky-red, well cemented, hardpan ferricrete.

NOTES

1) Stable test pit sidewalls.

2) Seepage encountered at 1.1m.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP43**

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LANSERIA AIRPORT EXPANSION PROJECT
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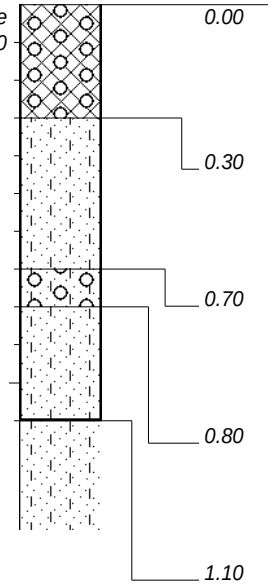
HOLE No: **TP44**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



Abundant sub-angular quartz gravels in a matrix of slightly moist, light greyish-brown, loose, porous, silty sand.

FILL

Dry to slightly moist, light brown, loose to medium dense, silty sand.

HILLWASH

Scattered sub-angular gravels in a matrix of dry to slightly moist, light brown, loose, porous, silty sand.

PEBBLE MARKER

Dry to slightly moist, reddish-orange blotched pale yellow, medium dense to dense, silty sand.

REWORKED RESIDUAL GRANITE

End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

G3	*G4*	*G5*	*G6*	*G7*	*G8*	*G9*	*G10*
Design Equivalent Material Class							

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

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TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP44**

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LANSERIA AIRPORT EXPANSION PROJECT
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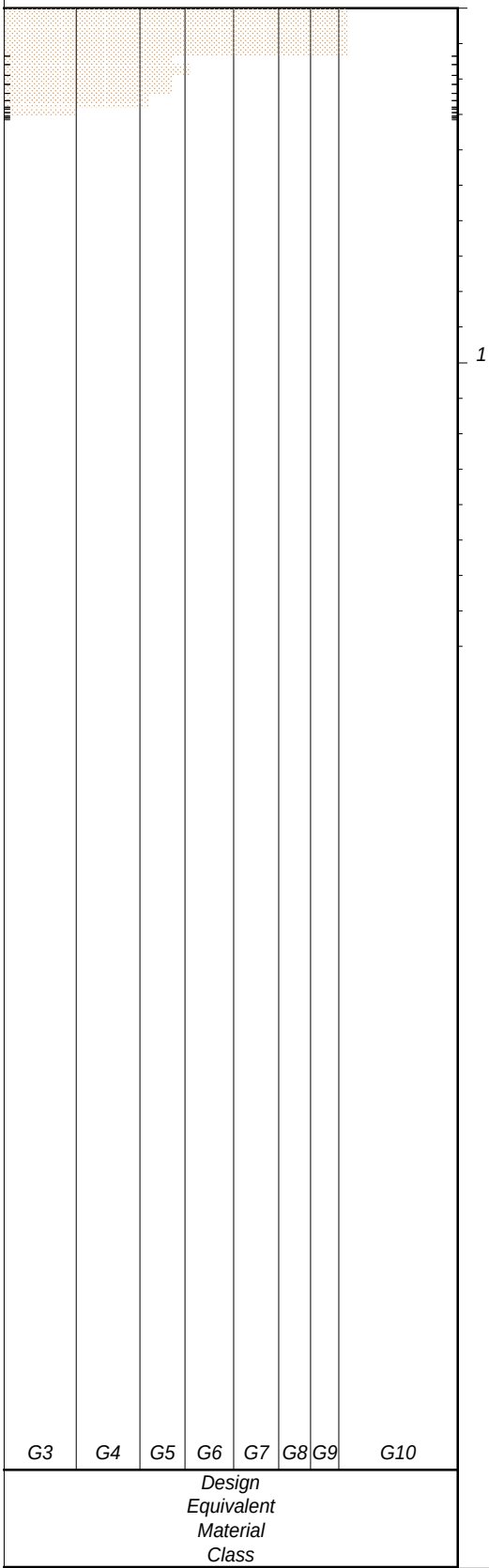
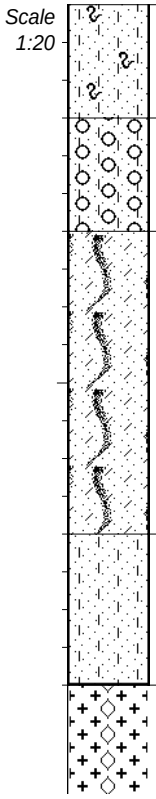
HOLE No: **TP45**
Sheet 1 of 1

JOB NUMBER: GGE/23031





Dry to slightly moist, greyish-brown, loose, porous, silty sand; roots.

HILLWASH

Dry to slightly moist, greyish-brown, medium dense, porous, silty sand with abundant sub-rounded quartz gravel.

PEBBLE MARKER

Dry to slightly moist, yellowish-brown, medium dense to dense, partially intact and relict-structured, clayey sand, with loose leached runnels.

REWORKED RESIDUAL GRANITE

Slightly moist, pale orange speckled pale yellow, dense to very dense, intact and relict-structured, silty sand, with traces of soft rock.

RESIDUAL GRANITE

End of hole at partial refusal on soft rock GRANITE.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

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TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP45**

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LANSERIA AIRPORT EXPANSION PROJECT
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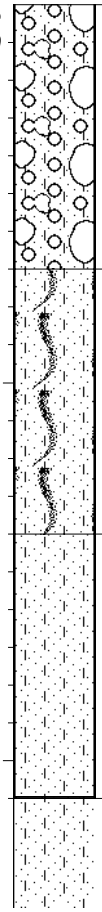
HOLE No: **TP46**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Dry to slightly moist, greyish-brown, loose becoming medium dense, porous, silty sand, with abundant sub-angular gravels and scattered quartz cobbles. PEBBLE MARKER
0.70	Dry to slightly moist, reddish-orange blotched pale brown, medium dense to dense, porous, silty sand, with loose leached runnels. REWORKED RESIDUAL GRANITE
1.40	Slightly moist, reddish-orange speckled black and off-white, dense, intact and relict-structured, silty sand. RESIDUAL GRANITE
2.10	End of hole nearing refusal on very dense, RESIDUAL GRANITE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP46**

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LANSERIA AIRPORT EXPANSION PROJECT
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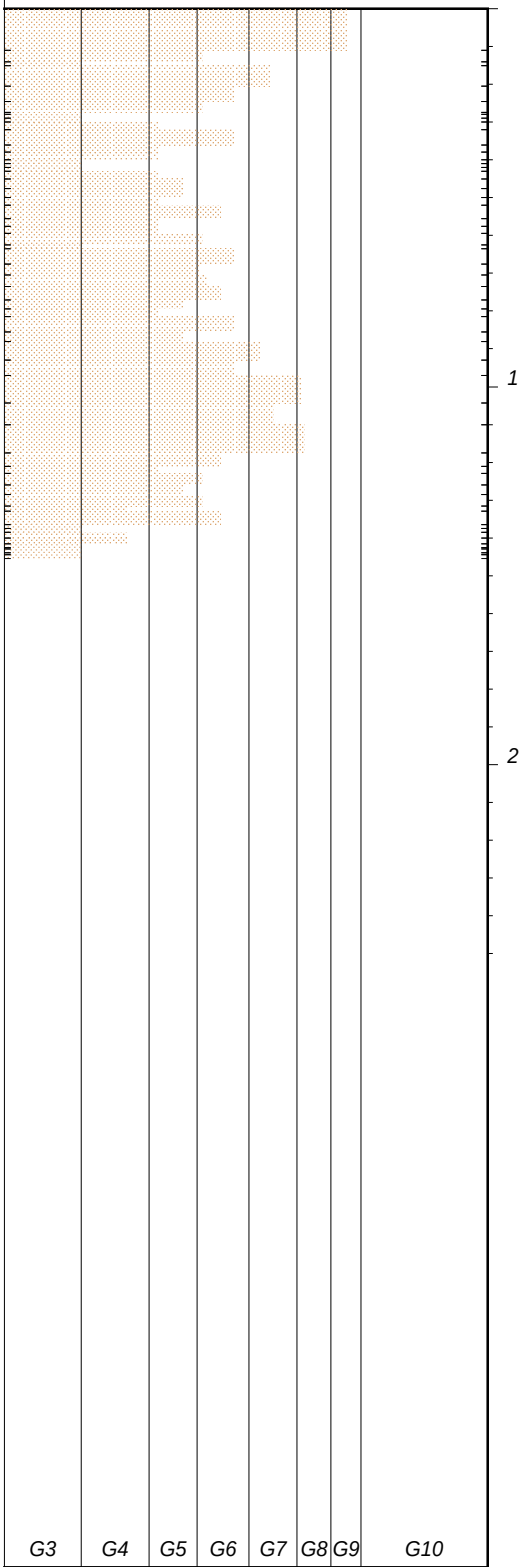
HOLE No: **TP47**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Abundant sub-rounded gravels and cobbles in a matrix of slightly moist, brown, medium dense, porous, silty sand. TALUS (PEBBLE MARKER)
0.50	Slightly moist, brownish-orange blotched dusky-red speckled pale yellow, medium dense to dense, porous, partially relict-structured, silty sand; root runnels. REWORKED RESIDUAL GRANITE
1.70	Slightly moist, reddish-orange blotched dusky-red speckled pale yellow locally blotched pale yellow, dense, friable, intact and relict-structured, silty sand; pockets of pegmatite. RESIDUAL GRANITE
2.50	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.

2) No groundwater proven in depth of excavation.

3) No samples taken.

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
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ELEVATION :
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Y-COORD :

HOLE No: **TP47**

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LANSERIA AIRPORT EXPANSION PROJECT
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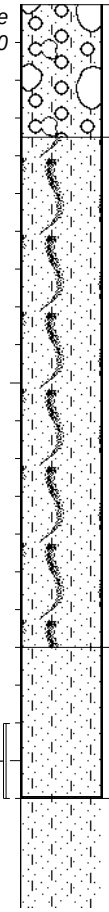
HOLE No: **TP48**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00 — Abundant sub-rounded gravels and cobbles in a matrix of slightly moist, brown, medium dense, porous, silty sand.

TALUS (PEBBLE MARKER)

0.35 — Slightly moist, brownish-orange blotched dusky-red speckled pale yellow, medium dense, porous, partially relict-structured, silty sand; root runnels.

REWORKED RESIDUAL GRANITE

1.70 — Slightly moist, reddish-orange blotched dusky-red speckled pale yellow, dense, friable, intact and relict-structured, silty sand.

RESIDUAL GRANITE

2.10 — End of hole approaching refusal on very dense, RESIDUAL GRANITE.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Undisturbed sample U48/1 taken from 1.9m--2.1m.

G3	G4	G5	G6	G7	G8	G9	G10

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
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TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP48**

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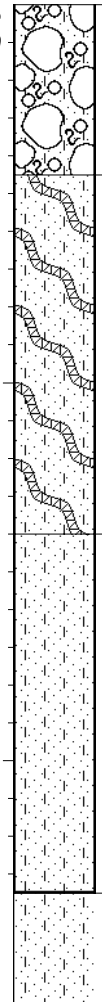
HOLE No: **TP49**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00

Abundant sub-angular gravels and small boulders in a matrix of dry to slightly moist, greyish-brown, medium dense, porous, silty sand; heavy roots.

TALUS

0.45

Dry to slightly moist, reddish-orange light brown mustard-yellow, medium dense to dense, partially intact, silty sand; root runnels and scattered quartz veins.

REWORKED RESIDUAL GRANITE

1.40

Slightly moist, reddish-orange speckled pale yellow black and off-white, medium dense, friable, relict-structured and jointed, silty sand.

RESIDUAL GRANITE

2.35

End of hole not at refusal - continues as above.

NOTES

1) Between TP48 and TP49 large quartz vein seen at surface.
2) Stable test pit sidewalls.
3) No groundwater proven in depth of excavation.
4) No samples taken.

G3	*G4*	*G5*	*G6*	*G7*	*G8*	*G9*	*G10*

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP49**

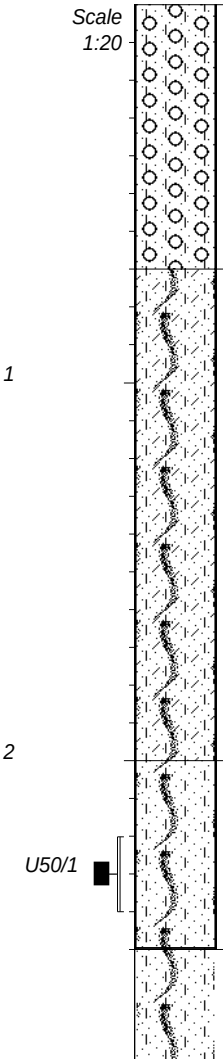
GEOID Geotechnical Engineers
21 Glenluce Drive
Douglasdale
Sandton, 2191
South Africa
T: +27-11-704-3131
F: +27-86-503-8312
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP50**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Abundant sub-angular quartz gravels in a matrix of slightly moist, greyish-brown, medium dense, porous, silty sand.	
	PEBBLE MARKER	
0.70	Dry to slightly moist, reddish-orange and pale grey, medium dense, porous, clayey silty sand, with abundant runnels.	G3
	REWORKED RESIDUAL GRANITE	G4
2.00	Dry to slightly moist, pale orange speckled pale yellow blotched grey, medium dense, partially intact and relict-structured, silty sand, with scattered runnels.	G5 G6 G7 G8 G9
	SLIGHTLY REWORKED RESIDUAL GRANITE	G10
2.50	End of hole not at refusal - continues as above.	

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) Undisturbed sample U50/1 taken from 2.2m--2.4m.

Design Equivalent Material Class

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP50**

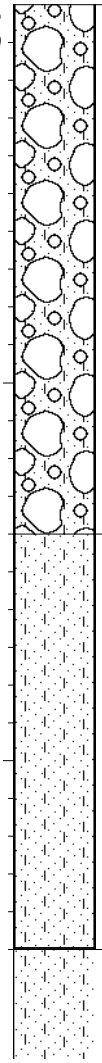
GEOID Geotechnical Engineers
21 Glenluce Drive
Douglasdale
Sandton, 2191
South Africa
T: +27-11-704-3131
F: +27-86-503-8312
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TP51**
Sheet 1 of 1

JOB NUMBER: GGE/23031

Scale 1:20



0.00	Abundant sub-angular quartz gravels and small boulders in a matrix of slightly moist, brown, medium dense, porous, silty sand. TALUS (PEBBLE MARKER)
1.40	Dry to slightly moist, brown blotched reddish-orange and black, becoming pale grey blotched mustard-yellow with depth, medium dense, partially intact and relict-structured, silty sand. REWORKED RESIDUAL GRANITE
2.50	End of hole not at refusal - continues as above.

NOTES

1) Stable test pit sidewalls.
2) No groundwater proven in depth of excavation.
3) No samples taken.

G3	G4	G5	G6	G7	G8	G9	G10
Design Equivalent Material Class							

CONTRACTOR : HireAll
MACHINE : Cat 428.F
DRILLED BY : Alpheus
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : DPL.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 26/02/2024 14:30
TEXT : ..3031Lanseriaprofiles.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TP51**

APPENDIX C2

Test Pit Soil Profiles

Blue Rock

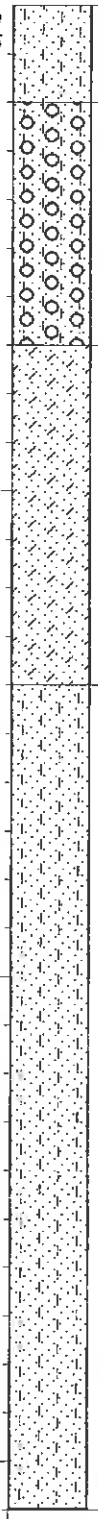
blue rock Geotechnics

Geomechanics (Pty) Ltd
Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 1
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:15



0.00 Slightly moist light greyish brown loose intact silty SAND. Hillwash.

0.20 Tightly packed coarse, medium and fine sub-angular quartz GRAVEL in a matrix as above overall consistency is dense. Talus.

0.70 Moist to very moist greyish brown blotched orange brown medium dense to dense intact clayey SAND. Reworked residual granite. Slightly ferruginised in places.

1.40 Slightly moist orange brown speckled white dense becoming very dense relict jointed silty SAND. Residual granite.

3.10 Not excavated to refusal.

NOTES

1) No water encountered.

2) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

REVISION :
SETUP FILE : BR_TP.SET

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

ELEVATION :
X-COORD : 2870809
Y-COORD : -93306

HOLE No: TP 1

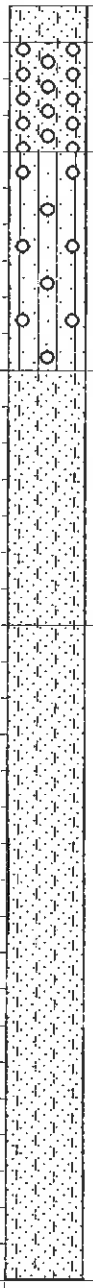
dot.PLOT 5002 J&W

Geomechanics (Pty) Ltd
Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 2
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:20



0.00	Slightly moist light greyish brown loose intact silty SAND. Hillwash.
0.10	Closely packed coarse, medium and fine sub-angular quartz GRAVEL in a matrix as above overall consistency is dense. Talus.
0.40	Slightly moist orange brown mottled dark reddish brown dense intact sandy SILT with minor fine gravel. Moderately ferruginised reworked residual granite.
1.00	Slightly moist orange brown mottled yellowish brown dense intact silty SAND. Reworked residual granite.
1.70	Slightly moist orange brown speckled white medium dense to dense relict jointed silty SAND. Residual granite.
3.50	Not excavated to refusal.

NOTES

1) No water encountered.

2) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

REVISION :
SETUP FILE : BR_TP.SET

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

ELEVATION :
X-COORD : 2870750
Y-COORD : -93374

HOLE No: TP 2

dot.PLOT 5002 J&W

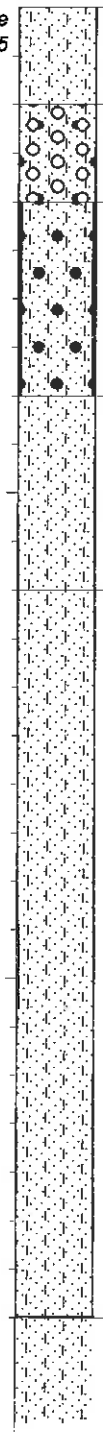
blue rock Engineering

Geomechanics (Pty) Ltd
Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 3
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:15



0.00	Slightly moist light greyish brown loose intact silty SAND. Hillwash.
0.20	Tightly packed medium and fine angular quartz GRAVEL in a matrix as above. Overall consistency is medium dense. Minor soft ferruginous concretions present. Talus.
0.40	Slightly moist orange brown mottled light grey dense to very dense well cemented silty SAND. Reworked residual granite. Hardpan ferricrete in places.
0.80	Moist orange brown blotched yellowish brown and grey dense silty SAND. Reworked residual granite.
1.20	Moist yellowish brown speckled reddish brown very dense closely jointed silty SAND. Residual granite with scattered vertical pegmatite veins up to 0.1 m wide.
2.70	Refusal in residual granite as above.

NOTES

1) No water encountered.

2) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

ELEVATION :
X-COORD : 2870650
Y-COORD : -93434

HOLE No: TP 3

REVISION :
SETUP FILE : BR_TP.SET

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

dot.PLOT 5002 J&W

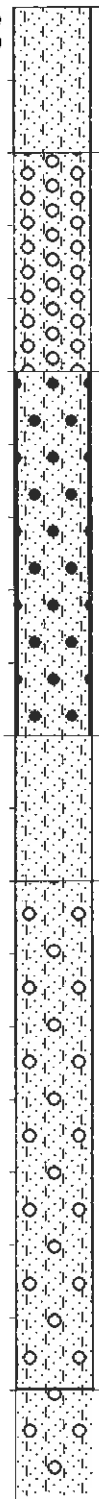
Geomechanics (Pty) Ltd

Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 4
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:10



0.00	Slightly moist light greyish brown loose intact silty SAND. Hillwash.
0.20	Tightly packed medium and fine angular quartz GRAVEL in a matrix as above. Overall consistency is medium dense. Minor soft ferruginous concretions present. Talus.
0.50	Slightly moist orange brown mottled light grey dense to very dense well cemented silty SAND. Hardpan ferricrete in places.
1.00	Moist yellowish brown mottled orange brown dense intact silty SAND with occasional veins of pale brown loose silty sand. Reworked residual granite.
1.20	Slightly moist yellowish brown speckled white dense relict jointed silty SAND with traces of fine gravel. Residual granite.
1.90	Refusal in residual granite as above but very dense to very soft rock.

NOTES

1) No water encountered.

2) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

ELEVATION :
X-COORD : 2870555
Y-COORD : -93482

HOLE No: TP 4

REVISION :
SETUP FILE : BR_TP.SET

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

dot.PLOT 5002 J&W

blue rock

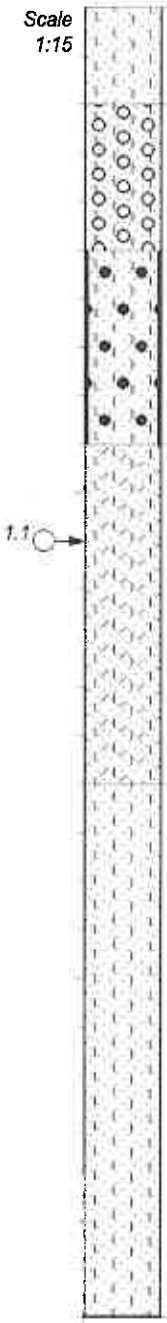
Geomechanics (Pty) Ltd

Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 5
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:15



0.00 Moist light greyish brown loose intact silty SAND. Hillwash.

0.20 Very moist light greyish brown medium dense intact silty SAND with abundant coarse, medium and fine sub-angular quartz gravel. Talus.

0.50 Moist yellowish brown mottled dark orange brown dense well cemented silty SAND. Reworked residual granite.

0.90 Wet yellowish brown blotched grey and reddish brown medium dense to dense slightly clayey silty SAND. Residual granite.

1.60 Wet orange brown speckled grey brown medium dense to dense closely jointed silty SAND. Residual granite.

2.70 Not excavated to refusal.

NOTES

1) Very slow water seepage from below 1.1 m.

2) Approximately 50 mm water in base of pit after 3 hours.

3) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

ELEVATION :
X-COORD : 2870616
Y-COORD : -93339

HOLE No: TP 5

REVISION :
SETUP FILE : BR_TP.SET

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

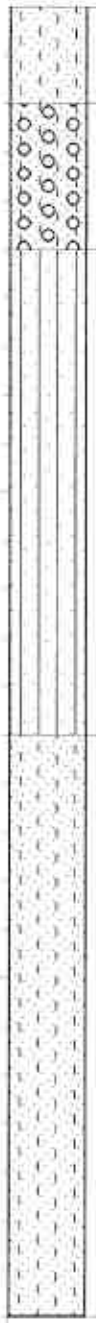
dot.PLOT 5002 J&W

blue rock

Geomechanics (Pty) Ltd
Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 6
Sheet 1 of 1

JOB NUMBER: 2006-0050



0.00 Slightly moist light greyish brown loose intact silty SAND. Hillwash.

0.20 Tightly packed coarse, medium and fine sub-angular quartz GRAVEL in a matrix as above. Overall consistency is dense. Talus.

0.50 Moist reddish brown mottled grey brown medium dense intact sandy SILT. Slightly ferruginised reworked residual granite.

1.50 Slightly moist reddish brown speckled white dense to very dense closely jointed silty SAND. Residual granite.

2.70 Not excavated to refusal.

NOTES

1) No water encountered.

2) Disturbed sample U494 taken from 0.80 m.

3) Bulk disturbed sample V098 taken from 0.1–0.5 m.

4) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

REVISION :
SETUP FILE : BR_TP.SET

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

ELEVATION :
X-COORD : 2870642
Y-COORD : -93352

HOLE No: TP 6

dot.PLOT 5002 J&W

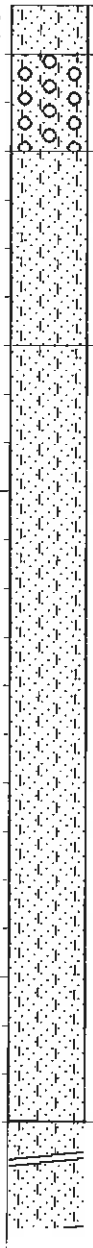
blue rock

Geomechanics (Pty) Ltd
Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 7
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:15



0.00 Slightly moist light greyish brown loose intact silty SAND. Hillwash.

0.10 Tightly packed coarse, medium and fine sub-angular quartz GRAVEL in a matrix as above. Overall consistency is dense. Talus.

0.30 Slightly moist orange brown mottled reddish brown dense intact silty SAND. Slightly ferruginised reworked residual granite.

0.70 Slightly moist orange brown speckled white closely jointed dense intact silty SAND. Residual granite.

2.30 Stopped near refusal in residual granite as above but very dense with bands of very soft rock.

NOTES

1) No water encountered.

2) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

ELEVATION :
X-COORD : 2870660
Y-COORD : -93250

HOLE No: TP 7

REVISION :
SETUP FILE : BR_TP.SET

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

dot.PLOT 5002 J&W

blue rock

Geomechanics (Pty) Ltd
Portion 80 of the Farm Bultfontein 533IQ

HOLE No: TP 8
Sheet 1 of 1

JOB NUMBER: 2006-0050

Scale 1:15

0.00 Slightly moist light greyish brown loose intact silty SAND. Hillwash.

0.10 Tightly packed coarse, medium and fine sub-angular quartz GRAVEL in a matrix as above. Overall consistency is dense. Talus.

0.40 Very moist orange brown blotched dark reddish brown medium dense to dense intact silty SAND. Reworked residual granite.

1.00 Slightly moist orange brown speckled white dense relict jointed silty SAND. Residual granite.

2.80 Not excavated to refusal.

NOTES

1) No water encountered.

2) Termite nest 0.5 m diameter at a depth of 1.2 m.

3) Coordinates and elevations were recorded using a hand held GPS. Map datum is WGS84.

CONTRACTOR : Paul Heslop Plant Hire
MACHINE : Bell 310SG
DRILLED BY : Million
PROFILED BY : tab

REVISION :
SETUP FILE : BR_TP.SET

INCLINATION :
DIAM : 650 mm wide.
DATE DRILLED : 08/09/2006
DATE PROFILED : 08/09/2006

DATE : 04/04/07 11:03
TEXT : ..C:\PROFILES\2006-0~1.DOC

ELEVATION :
X-COORD : 2870746
Y-COORD : -93285

HOLE No: TP 8

dot.PLOT 5002 J&W

APPENDIX C3

Test Pit Soil Profiles

Geostrategies

GEOSTRATEGIES

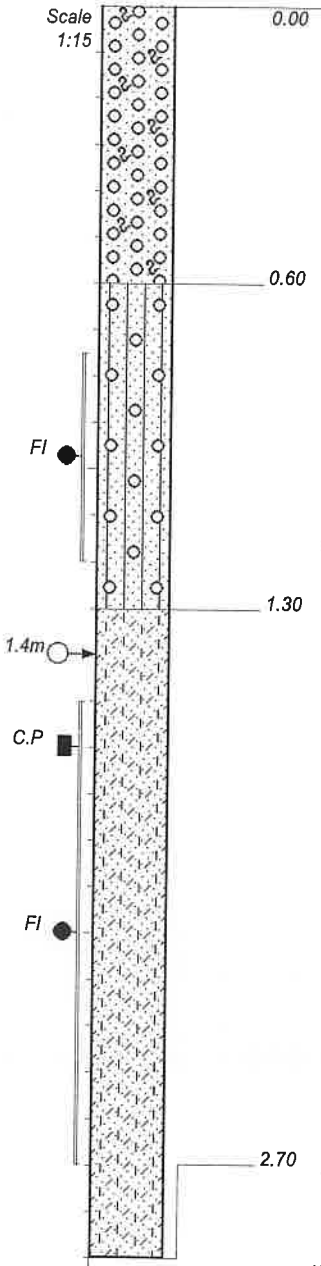
Consulting Engineers

Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 1
Sheet 1 of 1

JOB NUMBER: 07257



Dry, grey brown, medium dense to dense, pin-hole structures, sub-angular to sub-rounded gravels in a sand matrix and roots. Transported.

Moist, red brown mottled grey grading to grey mottled red brown, medium dense to dense, slightly ferruginised gravelly silt sand with weathering runnels and occasional corestones. Reworked Residual Granite

Moist, yellow brown mottled grey, soft to firm/ medium dense, slightly ferruginised clayey silty sand. Reworked Residual Granite.

NOTES

1) EOH refusal

2) Slightly water seepage @ 1.4m

3) Disturbed sample FI @ 1.5--2.5m

4) Disturbed sample FI @ 0.75--1.2m

5) Undisturbed sample C.P @ 1.6m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION : Vertical
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 1

GEOSTRATEGIES

Consulting Engineers

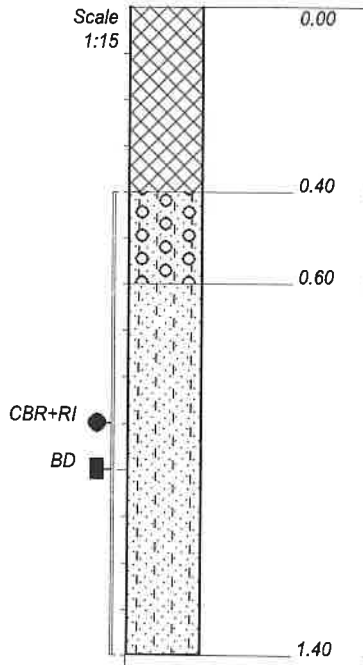
Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 2
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 – 0.40: Dry, grey brown, medium dense, silty sand with builders rubble and roots. Fill.

0.40 – 0.60: Dry, brown, dense, close-packed sub-rounded gravels in a matrix of silty sand. Transported.

0.60 – 1.40: Dry, pale orange mottled red grey, dense to very dense, relic jointed, silty sand with thin weathering runnels. Reworked Residual Granite.

NOTES

1) EOH refusal on very dense residual granite

2) No water seepage

3) Undisturbed sample BD @ 1.0m

4) Disturbed sample CBR+RI @ 0.4--1.4m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 2

GEOSTRATEGIES

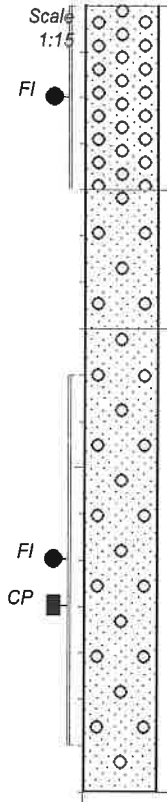
Consulting Engineers

Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 3
Sheet 1 of 1

JOB NUMBER: 07257



0.00 — Moist, grey, loose to medium dense, intact, close-packed sub-angular to sub- rounded quartz gravels in sand matrix. Transported.

0.40 — Slightly moist, pale pink to red brown, mottled grey, medium dense to dense, gravelly sand with weathering runnels filled with transported sand. Highly Reworked Residual Granite

0.70 — Slightly moist, pale pink, dense to very dense, relic jointed, gravelly sand. Reworked Residual Granite.

1.70

NOTES

1) EOH refusal on very dense residual granite

2) No water seepage

3) Disturbed sample FI @ 0--0.4m

4) Disturbed sample FI @ 0.8--1.6m

5) Undisturbed sample CP @ 1.3m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 3

GEOSTRATEGIES

Consulting Engineers

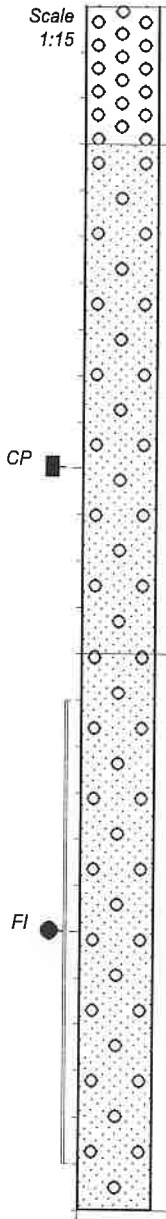
Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 4
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 Moist, grey, loose to medium dense, intact, close-packed sub-angular to sub- rounded quartz gravels. Transported

0.30 Slightly moist, pale pink to red brown, mottled grey, medium dense to dense, slightly ferruginised gravelly sand. Highly Reworked Residual Granite

1.40 Slightly moist, pale pink orange brown, dense to very dense, relic jointed, gravelly sand. Reworked Residual Granite.

2.60

NOTES

1) EOH hard dig

2) No water seepage

3) Disturbed sample FI @ 1.5--2.5m

4) Undisturbed sample CP @ 1.0m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.

TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007

DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 4

GEOSTRATEGIES

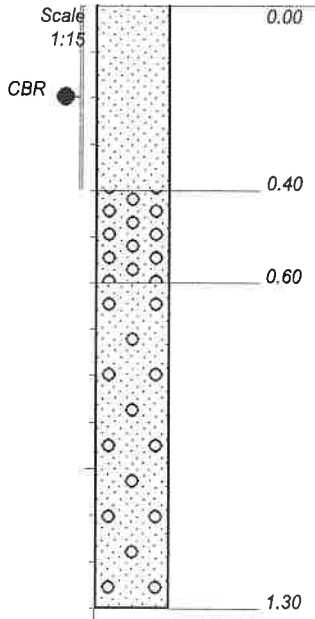
Consulting Engineers

Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 5
Sheet 1 of 1

JOB NUMBER: 07257



0.00 – Dry, grey, loose, intact, sand. Hillwash.

0.40 – As above but dense as a matrix for close-packed, sub-rounded quartz gravels. Pebble Marker.

0.60 – Dry, orange brown mottled grey, dense to very dense, ferruginised gravelly sand. Reworked Residual Granite

1.30

NOTES

1) EOH refusal on very dense Pedogenic

2) No water seepage

3) Disturbed sample CBR + RI @ 0--0.4m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 5

GEOSTRATEGIES

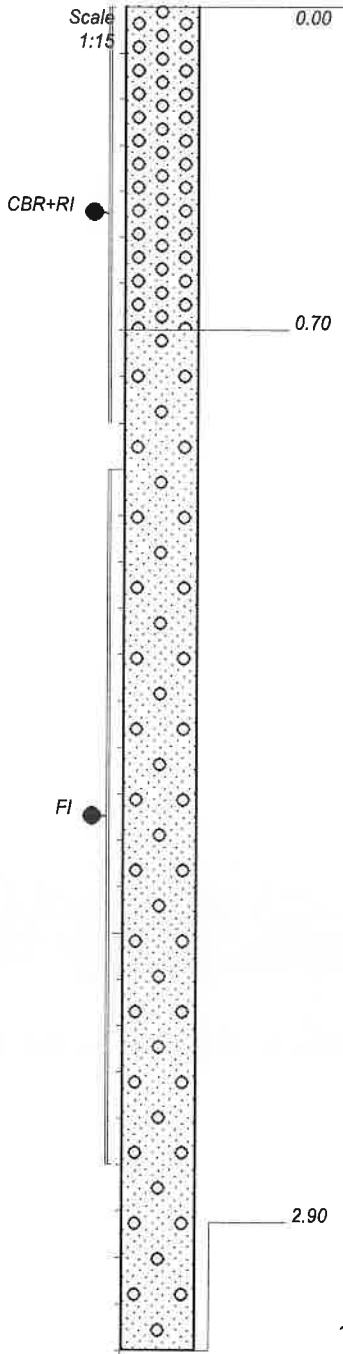
Consulting Engineers

Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 6
Sheet 1 of 1

JOB NUMBER: 07257



0.00 Slightly moist, grey, medium dense, close-packed gravels and pebbles in a matrix of sand. Transported.

0.70 Moist, yellow brown mottled red and grey and slightly speckled black, dense, intact, gravelly sand. Reworked Residual Granite.

2.90

NOTES

1) EOH medium hard dig

2) No water seepage

3) Disturbed sample FI @ 1.0--2.5m

4) Disturbed sample CBR+RI @ 0--0.9m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 6

GEOSTRATEGIES

Consulting Engineers

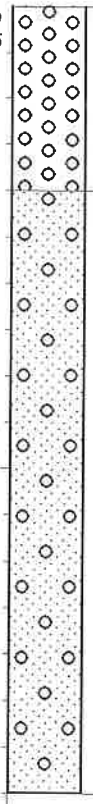
Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 7
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 Moist, grey, loose to medium dense, intact, close-packed, sub-angular to sub- rounded quartz gravels in a sand matrix. Transported.

0.40 Slightly moist, yellow brown mottled grey grading to pale pink mottled grey, dense to very dense, slightly ferruginised gravelly sand. Reworked Residual Granite.

CP

1.70

NOTES

1) EOH refusal very dense residual reworked granite

2) No water seepage

3) Undisturbed sample CP @ 1.3m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 7

GEOSTRATEGIES

Consulting Engineers

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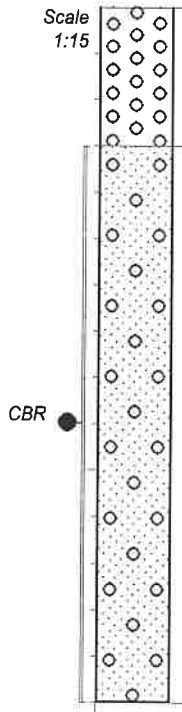
Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 8
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 Moist, grey, loose to medium dense, intact, close-packed, sub-angular to sub- rounded quartz gravels in a sand matrix. Transported.

0.30 Slightly moist, yellow brown mottled grey grading to pale pink mottled grey, dense to very dense, slightly ferruginised gravelly sand. Reworked Residual Granite.

1.50

NOTES

1) EOH refusal on very dense reworked residual granite

2) No water seepage

3) Disturbed sample CBR + RI @ 0.3--1.5m

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.

TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007

DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 8

GEOSTRATEGIES

Consulting Engineers

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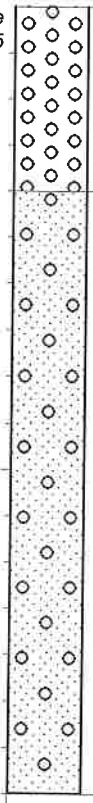
Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 9
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 Moist, grey, loose to medium dense, intact, close-packed sub-angular to sub- rounded quartz gravels in a sand matrix. Transported

0.40 Slightly moist, yellow brown mottled grey grading to pale pink mottled grey, dense to very dense, slightly ferruginised gravelly sand. Reworked Residual Granite.

1.70

NOTES

1) EOH refusal on very dense reworked residual granite

2) No water seepage

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.

TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007

DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 9

D043

dot.PLOT 4015 J&W

GEOSTRATEGIES

Consulting Engineers

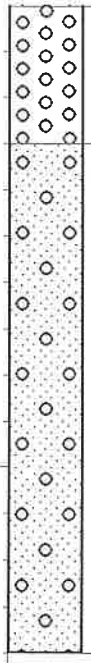
Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 10
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 Moist, grey, loose to medium dense, intact, close-packed sub-angular to sub- rounded quartz gravels in a sand matrix. Transported.

0.30 Slightly moist, yellow brown mottled grey grading to pale pink mottled grey, dense to very dense, slightly ferruginised gravelly sand. Reworked Residual Granite.

1.40

NOTES

1) EOH refusal

2) No water seepage

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 10

GEOSTRATEGIES

Consulting Engineers

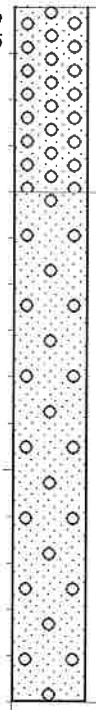
Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

HOLE No: TP 11
Sheet 1 of 1

JOB NUMBER: 07257

Scale 1:15



0.00 Moist, grey, loose to medium dense, intact, close-packed sub-angular to sub- rounded quartz gravels in a sand matrix.Transported.

0.40 Slightly moist, yellow brown mottled grey grading to pale pink mottled grey, dense to very dense, slightly ferruginised gravelly sand. Reworked Residual Granite.

1.50

NOTES

1) EOH refusal

2) No water seepage

CONTRACTOR : Davies Civils
MACHINE : CASE 580 Super R
DRILLED BY :
PROFILED BY : M.R.
TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM : Trench
DATE : 19/7/2007
DATE : 19/7/2007
DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TP 11

GEOSTRATEGIES

Consulting Engineers

Tel 011 674 1325 : Fax 011 674 4513

Davies Civils
Holding 1, Sunrella A.H

LEGEND
Sheet 1 of 1

JOB NUMBER: 07257

	GRAVELS	{SA02}
	GRAVELLY	{SA03}
	SAND	{SA04}
	SILT	{SA06}
	SILTY	{SA07}
	CLAYEY	{SA09}
	FILL	{SA32}
Name	UNDISTURBED SAMPLE	{SA37}
Name	DISTURBED SAMPLE	{SA38}
	ROOTS	{SA40}
10.5	WATER SEEPAGE/water strike	{CH50}

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY :

TYPE SET BY :
SETUP FILE : STRAT.SET

INCLINATION :
DIAM :
DATE :
DATE :

DATE : 29/08/07 16:42
TEXT : ..\TXTFILES\07257.TXT

ELEVATION :
X-COORD :
Y-COORD :

LEGEND
SUMMARY OF SYMBOLS

APPENDIX C4

Trial Hole Soil Profiles

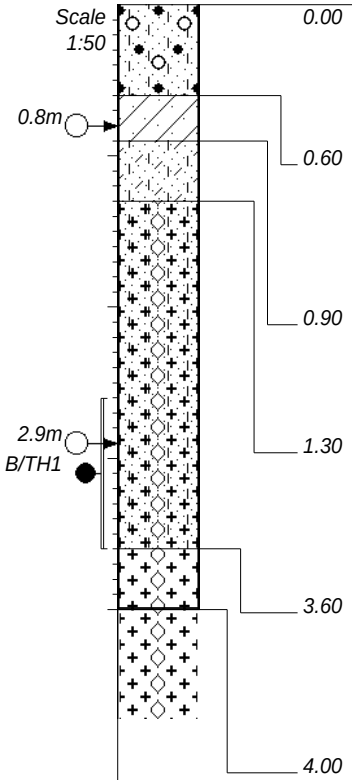
Geoid Geotechnical Engineers

GEOID Geotechnical Engineers
21 Glenluce Drive
Douglasdale
Sandton, 2191
South Africa
T: +27-11-704-3131
F: +27-86-503-8312
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TH1**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00 Moist, greyish-brown through blotched mustard-orange, loose through medium dense, porous, gravelly silty sand becoming progressively ferruginised.

FERRUGINOUS PEBBLE MARKER

0.60 Very moist, light grey speckled off-white, soft to firm, partially intact and relict structured, sandy clay.

REWORKED RESIDUAL DIABASE

0.90 Moist, dark grey mottled off-white, medium dense, intact and relict structured, clayey silty sand.

ALTERED RESIDUAL GRANITE

1.30 Slightly moist, reddish-orange speckled olive-green and silver, friable, silty sand through highly weathered, soft rock.

GRANITE

3.60 Khaki in profile, reddish-orange speckled olive-green and silver, highly weathered, soft to medium hard rock.

GRANITE

4.00 End of hole at proven refusal on medium hard rock GRANITE.

NOTES

1) Bulk sample B/TH1 taken from 2.6m--3.6m.
2) Stable trial hole sidewalls.
3) Seepage encountered at 0.8m and 2.9m.
4) No samples taken

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

HOLE No: **TH1**

GEOID Geotechnical Engineers
21 Glenluce Drive
Douglasdale
Sandton, 2191
South Africa
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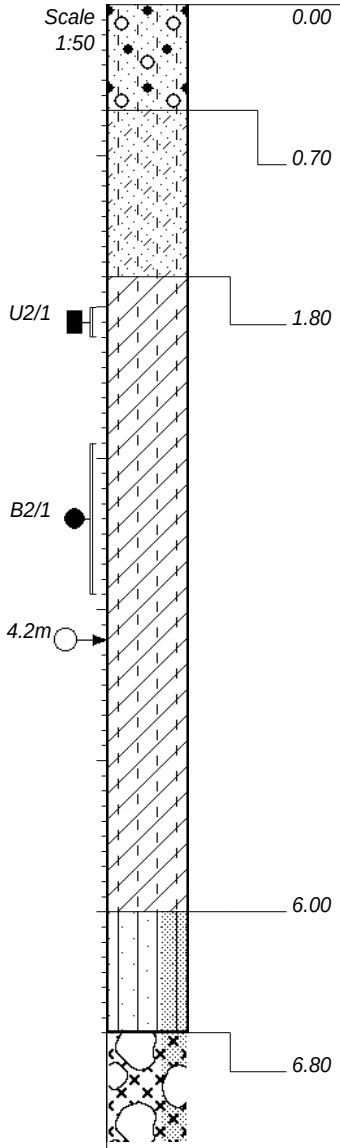
F: +27-86-503-8312
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: TH2-EAST
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Moist, grey blotched mustard-orange yellow and black, loose to medium dense, porous, silty sand, hosting gravels and ferricrete.
	FERRUGINOUS PEBBLE MARKER
0.70	Slightly moist to moist, pale yellow blotched pale grey and mustard-orange, medium dense to dense, partially intact and relict structured, clayey silty sand.
	REWORKED RESIDUAL GRANITE
1.80	Slightly moist to moist, pinkish-red blotched pale grey and black, firm to stiff, shattered, silty clay.
	REWORKED RESIDUAL DIABASE
6.00	Slightly moist, dull pinkish-brown varved olive-green, stiff, sandy silt, becoming very soft rock below 6.0m.
	RESIDUAL DIABASE
6.80	End of hole refusal not proven - inferred to have terminated on DIABASE BOULDER.

NOTES

1) Stable trial hole sidewalls.
2) Seepage encountered at 4.2m.
3) Undisturbed sample U2/1 taken from 2.0m--2.2m.
4) Bulk sample B2/1 taken from 2.9m--3.9m.

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH2-EAST

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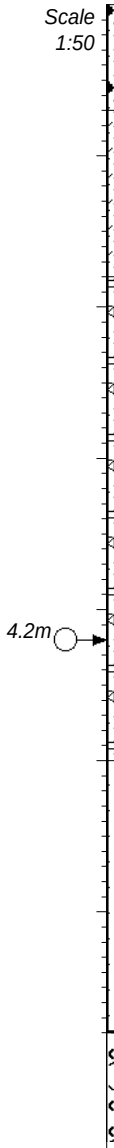
F: +27-86-503-8312
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: TH2-WEST
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Moist, grey blotched mustard-orange yellow and black, loose to medium dense, porous, silty sand, hosting gravels and ferricrete.
	FERRUGINOUS PEBBLE MARKER
0.70	Slightly moist to moist, pale yellow blotched pale grey and mustard-orange, medium dense to dense, partially intact and relict structured, clayey silty sand.
	REWORKED RESIDUAL GRANITE
1.80	Moist, pale orange-brown, speckled off-white stained red, dense, intact and relict structured, silty sand with minor clay lenses and bands of soft rock and quartz veins.
	RESIDUAL GRANITE
5.00	Slightly moist, dull pinkish-brown varved olive-green, stiff, sandy silt, becoming very soft rock below 6.0m.
	RESIDUAL DIABASE
6.80	End of hole refusal not proven - inferred to have terminated on DIABASE BOULDER.

NOTES

1) Stable trial hole sidewalls.

2) Seepage encountered at 4.2m.

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: TH2-WEST

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Sandton, 2191
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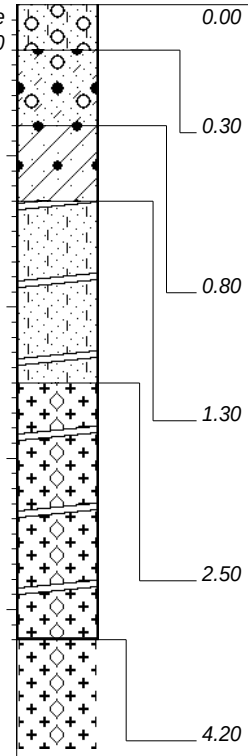
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: **TH3**
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00 — Slightly moist, greyish-brown, loose, porous, silty sand, with gravels.

PEBBLE MARKER

0.30 — Moist, mustard-orange blotched black and red, dense to very dense, clayey sand, with abundant honeycomb ferricrete with scattered gravel.

FERRUGINOUS PEBBLE MARKER

0.80 — Moist, mustard-orange blotched pale grey, firm, sandy clay, with weak ferricrete.

ALTERED REWORKED GRANITE

1.30 — Slightly moist to moist, mustard-yellow blotched pale grey, dense, intact and relict structured, silty sand with clay seams.

RESIDUAL GRANITE

2.50 — Dull orange stained red and black, highly weathered, friable, very soft rock / soft rock granite with clay seams, and intermittent fragments of medium hard rock.

GRANITE

4.20 — End of hole at refusal on medium hard rock GRANITE.

NOTES

1) Stable trial hole sidewalls.
2) No seepage encountered.
3) No samples taken

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

ELEVATION :
X-COORD :
Y-COORD :

HOLE No: **TH3**

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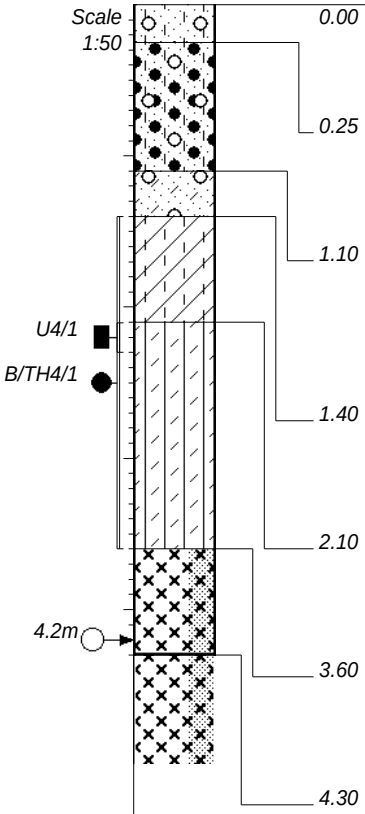
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: TH4
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Moist, grey, loose, porous, silty sand and scattered gravel.
	HILLWASH
0.25	Moist, mustard-orange blotched black and red, very dense, massive, hardpan ferricrete.
	FERRUGINOUS PEBBLE MARKER
1.10	Scattered sub-rounded quartz gravel and cobbles in a matrix of moist, pale grey blotched mustard-orange, medium dense, porous, clayey sand.
	PEBBLE MARKER
1.40	Moist, khaki blotched pale grey, firm, slickensided, silty clay.
	REWORKED RESIDUAL DIABASE
2.10	Slightly moist to moist, orange mottled pale grey, firm, fissured, clayey silt.
	SLIGHTLY REWORKED RESIDUAL DIABASE
3.60	Khaki blotched black and pale grey, highly weathered, very soft rock with clay infill on joints.
	DIABASE
4.30	End of hole at refusal on medium hard rock, DIABASE.

NOTES

1) Stable trial hole sidewalls.
2) Seepage encountered at 4.2m.
3) Bulk sample B/TH4/1 taken from 1.4m--3.6m.
4) Undisturbed sample U4/1 taken from 2.1m--2.3m.

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

HOLE No: TH4

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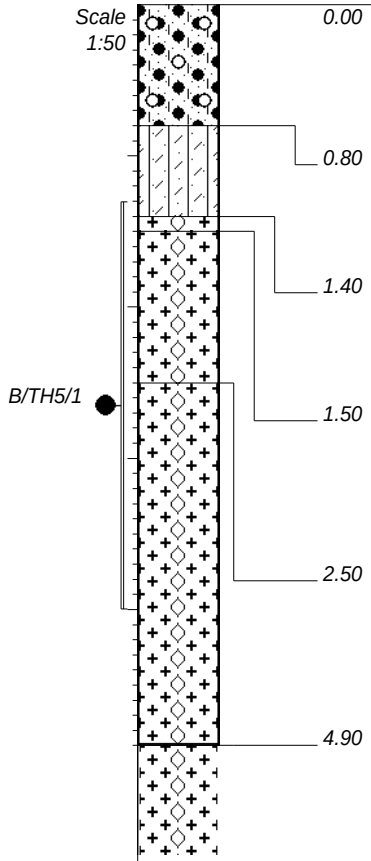
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: TH5
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00 Slightly moist, mustard-orange blotched grey, very dense, massive, hardpan ferricrete with leached pockets.

FERRUGINOUS PEBBLE MARKER

0.80

Moist, light grey blotched mustard-yellow, firm, sandy clayey silt.

REWORKED RESIDUAL GRANITE

1.40

Off-white mottled black and pink, highly weathered, friable, soft rock.

GRANITE

1.50

Off-white speckled grey and mottled mustard-yellow, highly weathered, vertically jointed, medium hard rock with silt infill on joints.

GRANITE

2.50

Olive-green speckled reddish-orange, highly weathered, friable, very soft rock / soft rock with bands of medium hard rock.

GRANITE

4.90

End of hole at reported refusal on medium hard rock GRANITE.

NOTES

1) Stable trial hole sidewalls.

2) No groundwater encountered.

3) Bulk sample B/TH5/1 taken from 1.3m--4.0m.

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

ELEVATION :
X-COORD :
Y-COORD :

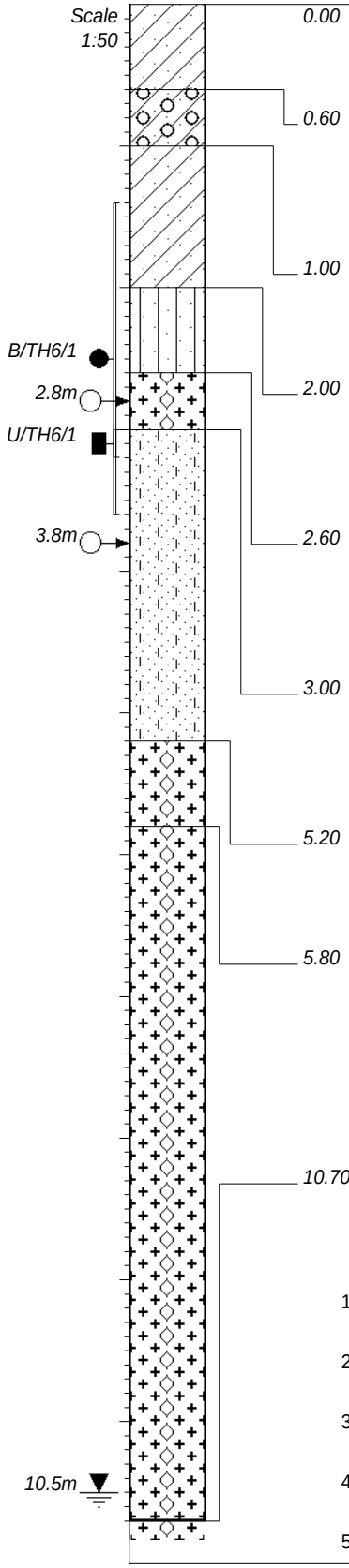
HOLE No: TH5

GEOID Geotechnical Engineers
21 Glenluce Drive
Douglasdale
Sandton, 2191
South Africa
T: +27-11-704-3131
F: +27-86-503-8312
mail@geoid.co.za

LANSERIA AIRPORT EXPANSION PROJECT
SOUTHERN PRECINCT
EDS Engineering Design Services

HOLE No: TH6
Sheet 1 of 1

JOB NUMBER: GGE/23031



0.00	Moist, grey, loose through firm, sandy through sandy clay.
	GULLYWASH
0.60	Scattered sub-rounded gravel in a matrix of slightly moist to moist, pale green blotched mustard-yellow-orange and black, firm, sandy clay.
	PEBBLE MARKER
1.00	Moist, pale grey blotched mustard-orange, soft to firm, slickensided, sandy clay.
	ALTERED REWORKED RESIDUAL GRANITE
2.00	Slightly moist to moist, pale orange speckled olive-green and off-white banded grey, medium dense, intact and relict structured, sandy silt.
	RESIDUAL GRANITE
2.60	Off-white blotched red and black, highly weathered, friable, soft rock / very soft rock, with quartz gravels.
	GRANITE
3.00	Very moist, olive-green stained black speckled off-white, intact and relict structured, medium dense to dense, friable, mixed silty sand.
	RESIDUAL GRANITE
5.20	Mustard-orange and khaki stained black, highly weathered, very soft rock / soft rock.
	GRANITE
5.80	Mustard-orange and khaki stained black, highly weathered, soft rock with intermittent bands of medium hard rock.
	GRANITE
10.70	End of hole at reported refusal on medium hard rock GRANITE.

NOTES

1) Stable trial hole sidewalls.
2) Seepage encountered at 2.8m and 3.8m.
3) Undisturbed sample U/TH6/1 taken from 3.0m--3.2m.
4) Bulk sample B/TH6/1 taken from 1.4m--3.6m.
5) Standing water encountered at 10.5m, precluding checking the hole base.

CONTRACTOR : Makarios Geotechnical Dynamics
MACHINE : Casagrande B125
DRILLED BY : Litha
PROFILED BY : CS Morgan

INCLINATION : Vertical
DIAM : 0.75m
DATE : 14 February 2024
DATE : 14 February 2024

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : CSM
SETUP FILE : STANDARD.SET

DATE : 08/04/2024 18:51
TEXT : ..31LanseriaprofilesTH.txt

HOLE No: TH6

APPENDIX D

DPSH Probe Traces

GEOID Geotechnical Engineers
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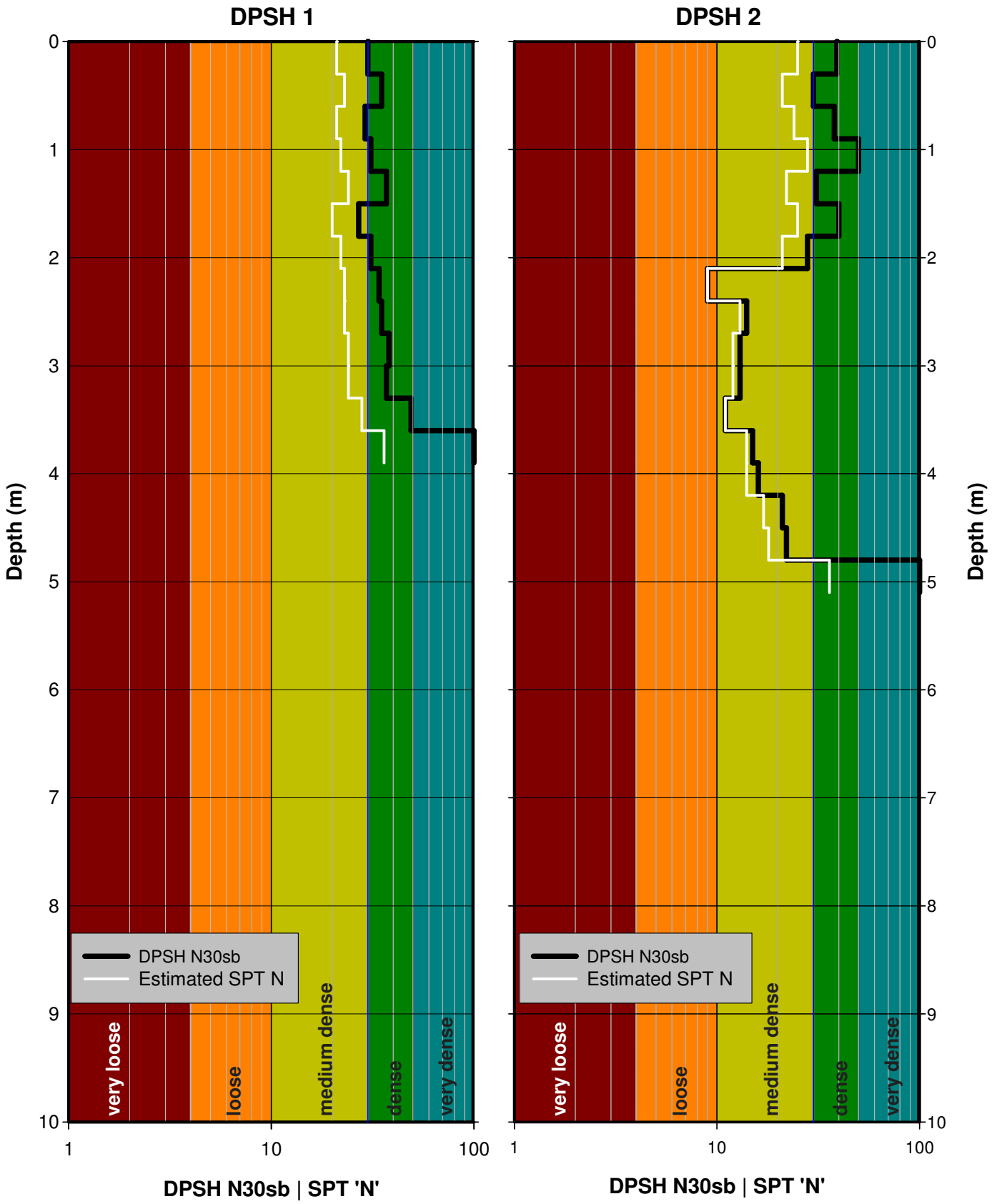
+27-83-326-5395
www.geoid.co.za

Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 1-2	**Conducted By:**	RotoCore



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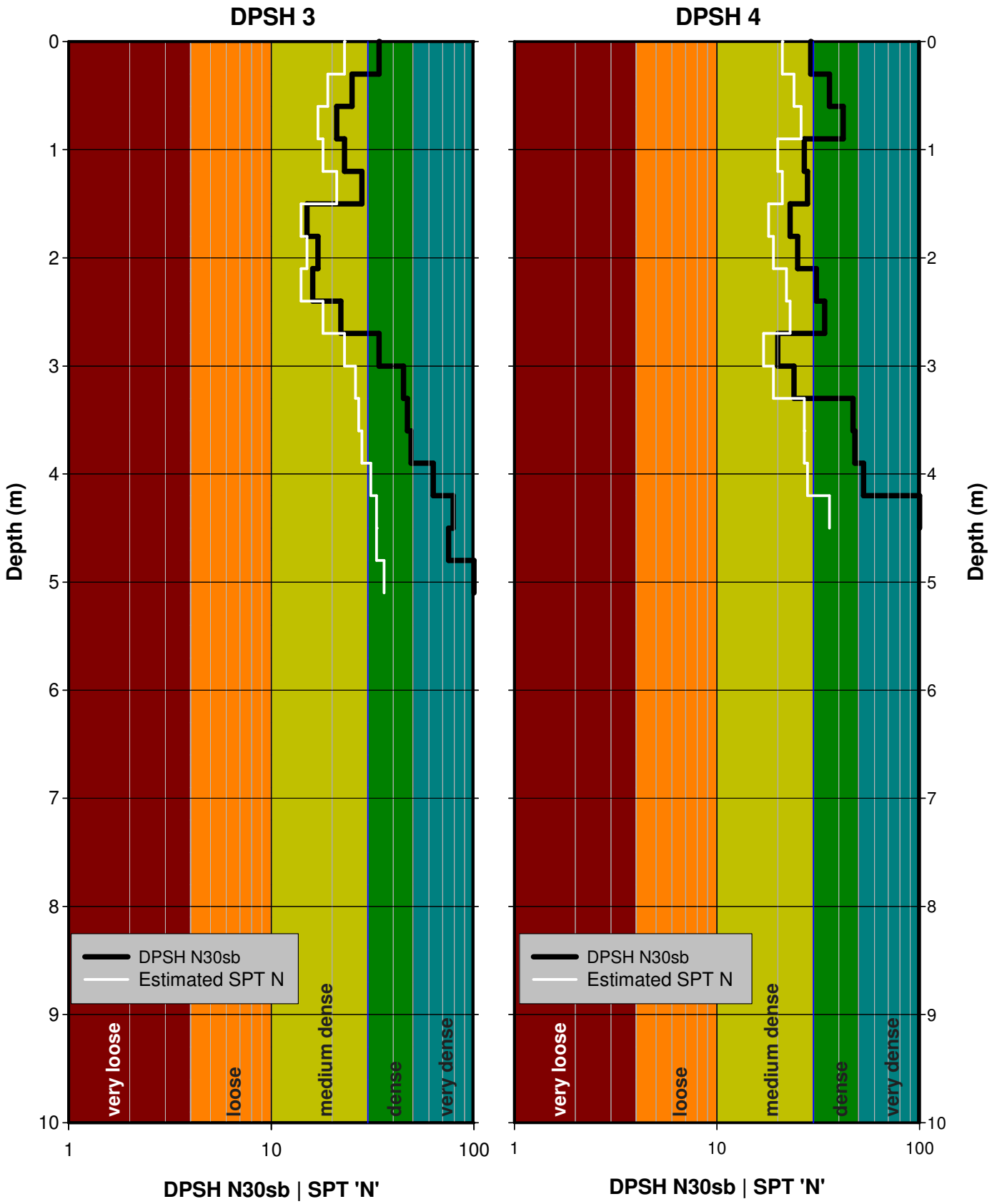
www.geoid.co.za

Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 3-4	**Conducted By:**	RotoCore



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mail@geoid.co.za
+27-83-326-5395
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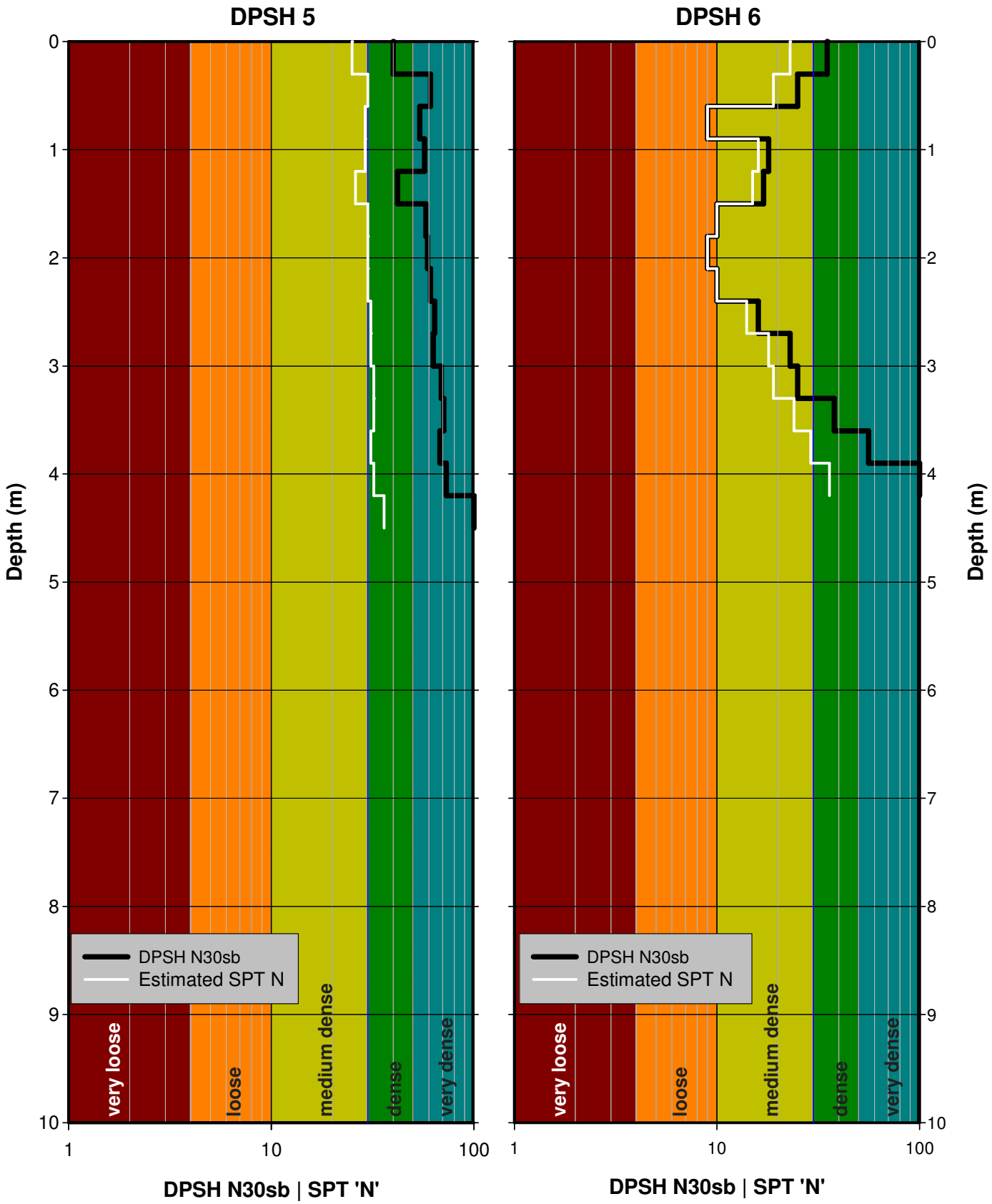
Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 5-6	**Conducted By:**	RotoCore



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+27-83-326-5395
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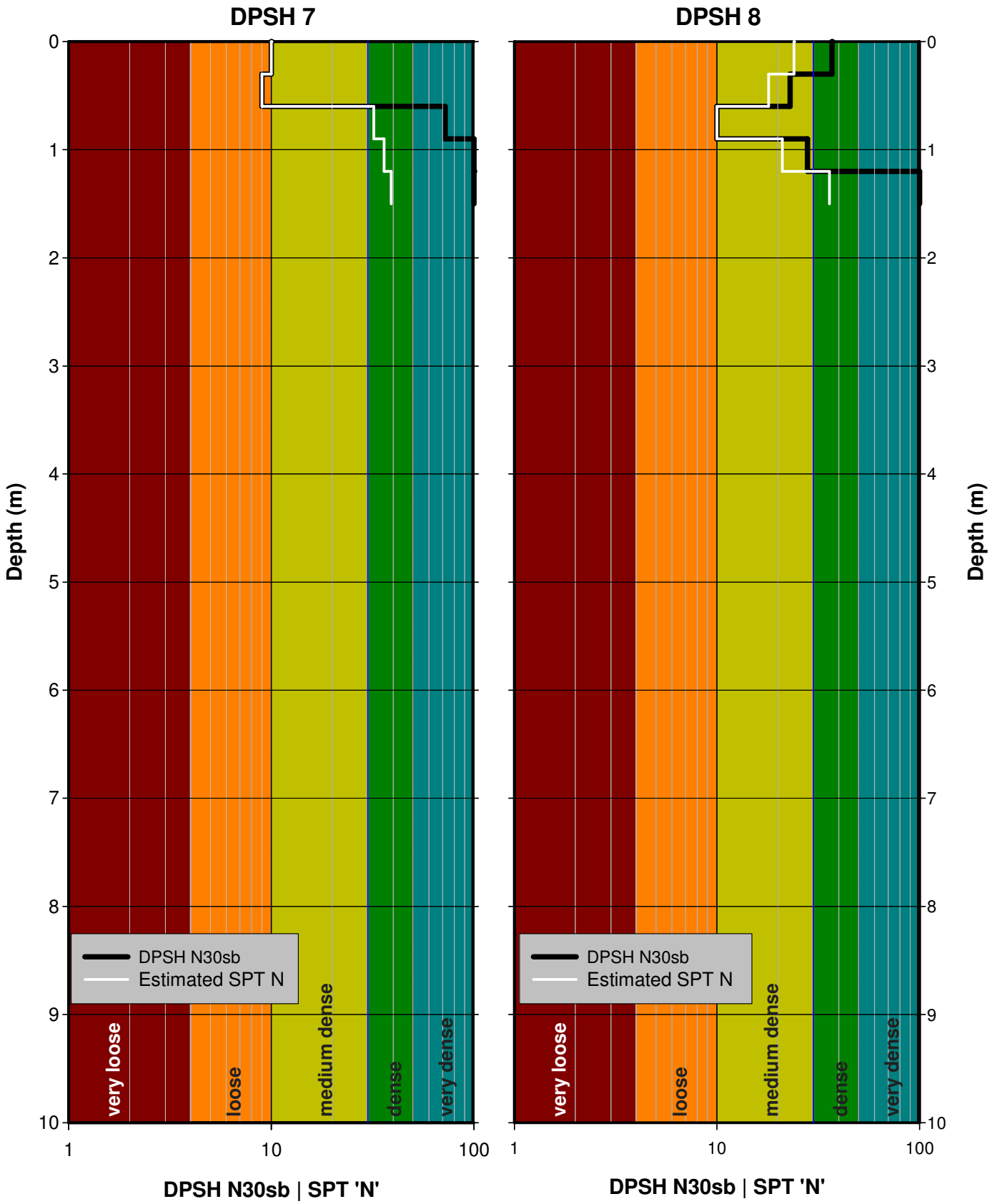
Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 7-8	**Conducted By:**	RotoCore



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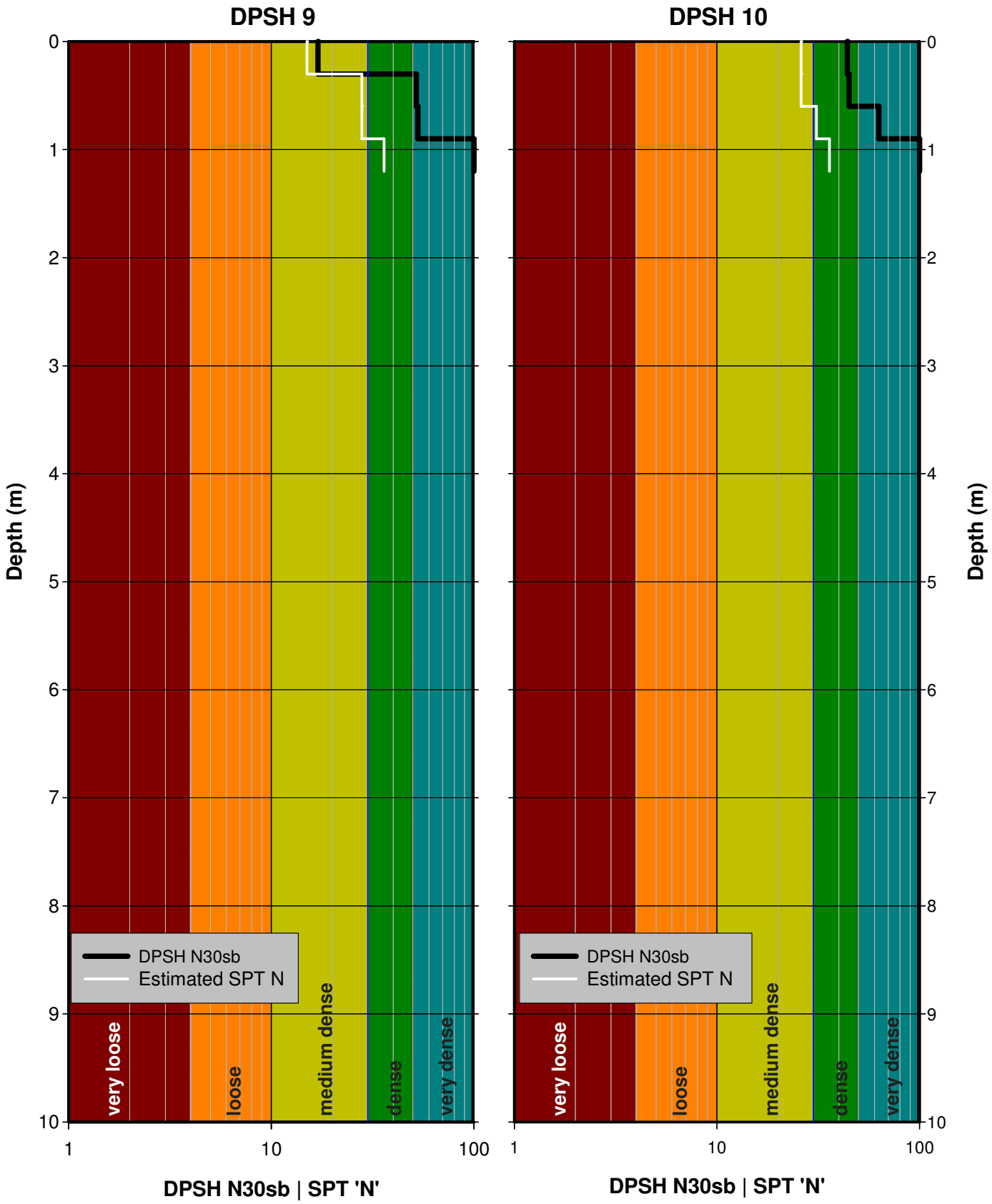
mail@geoid.co.za
+27-83-326-5395
www.geoid.co.za

Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 9-10	**Conducted By:**	RotoCore



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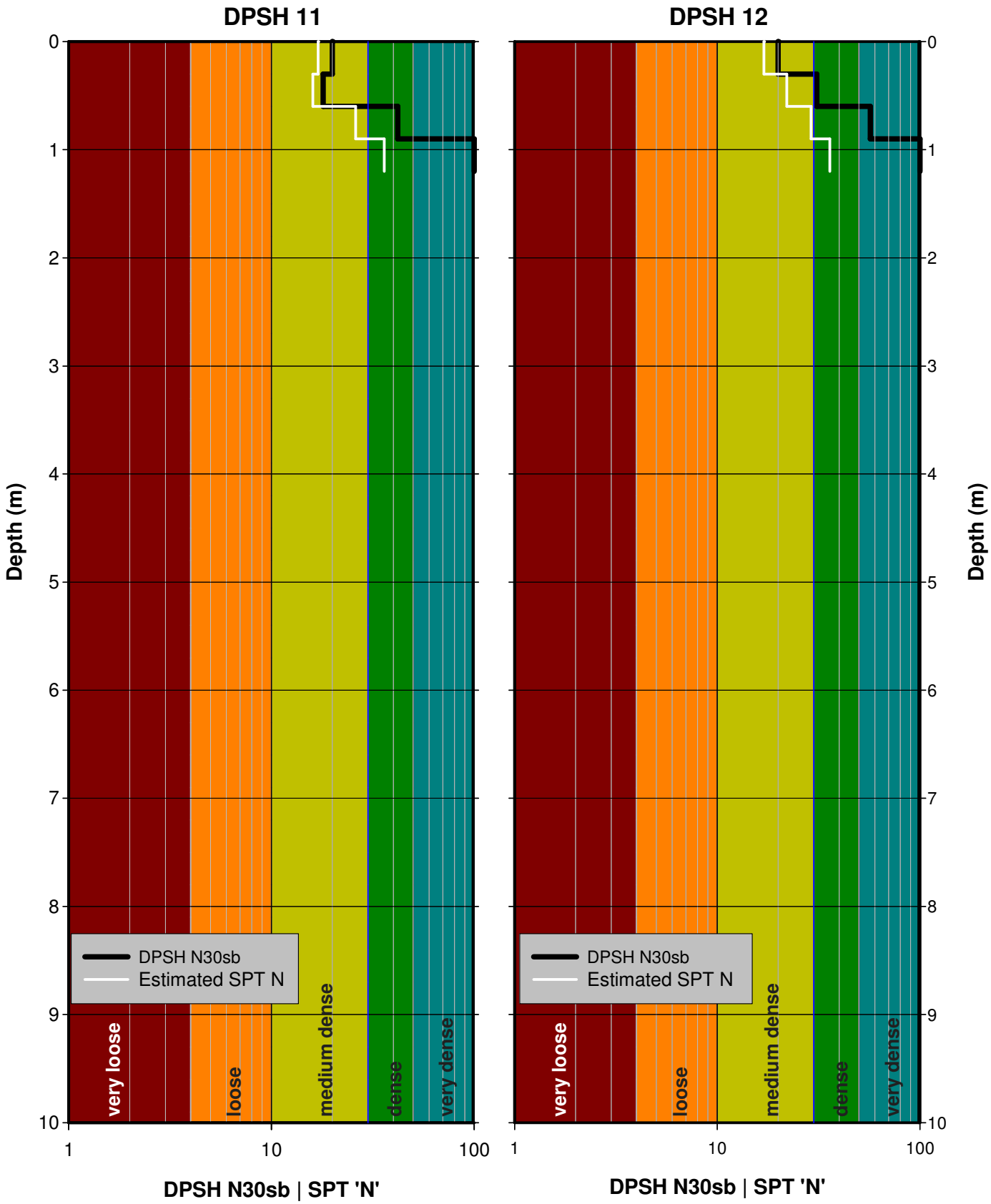
+27-83-326-5395
www.geoid.co.za

Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 11-12	**Conducted By:**	RotoCore



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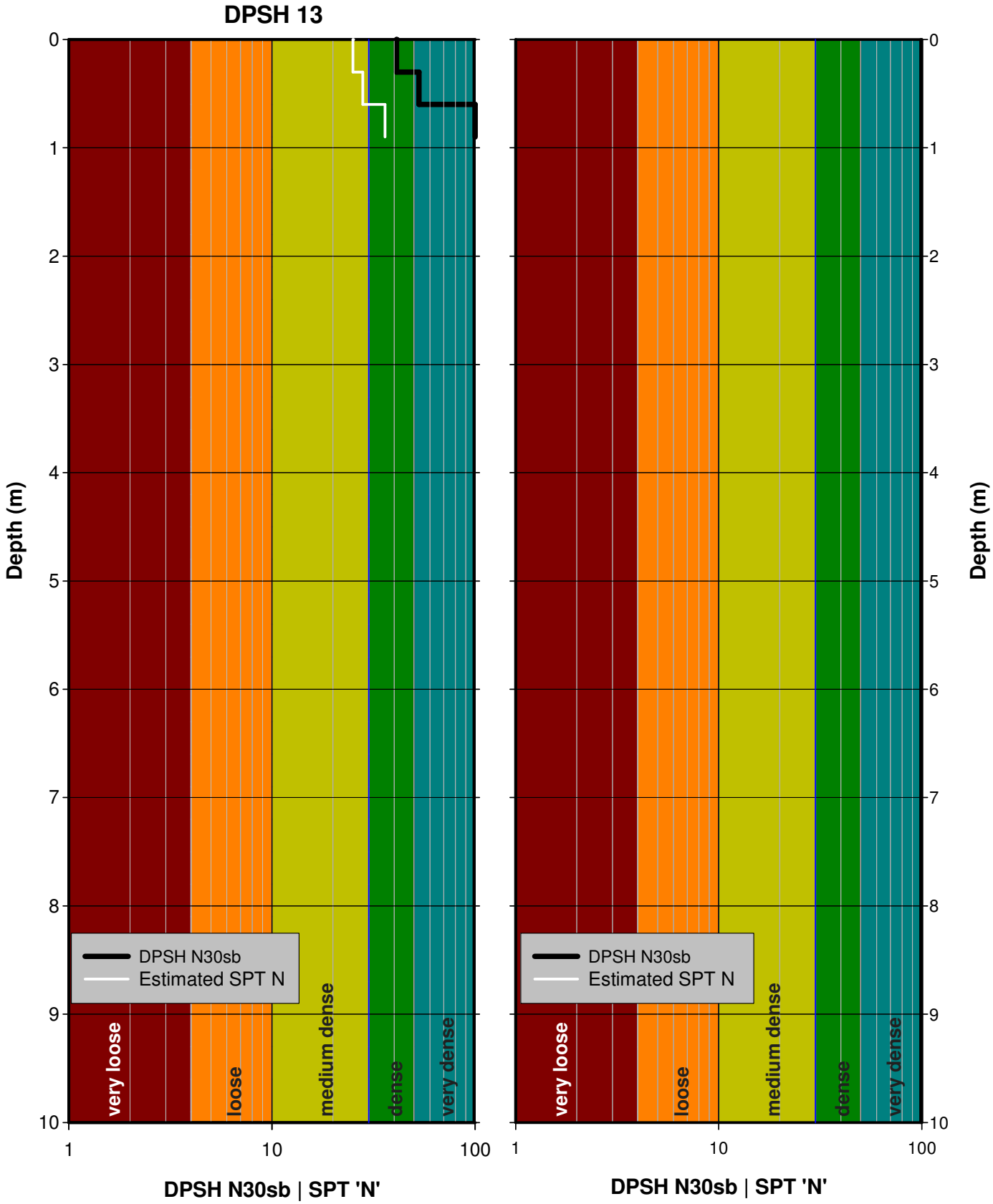
Project:	Lanseria International Airport: Southern Precinct	**Number:**	GGE/23031
Date:	07/02/2024	**Nature of Test:**	DPSH Rig
Test No:	DPSH 13	**Conducted By:**	RotoCore



APPENDIX E

Laboratory Test Results

Geopractica
SOILS & MATERIALS TESTING
P.O.BOX 227, MARAISBURG, 1700
TEL: (011) 674 1325
FAX: (011) 674 4513
e mail: lab@geopractica.co.za

FOUNDATION INDICATOR

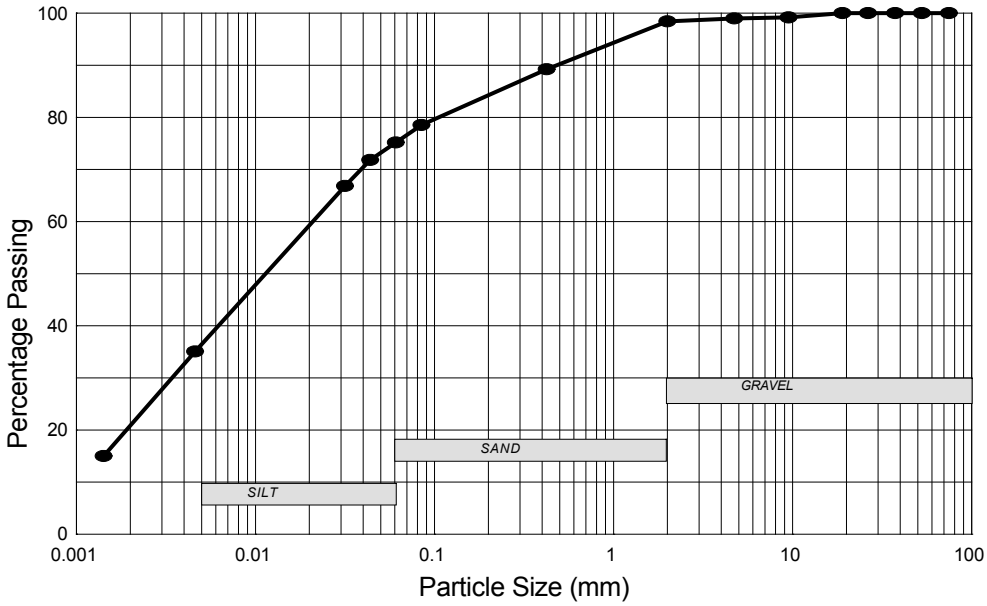
Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE U 1 / 1 @ 0,5 - 0,7m		
Date	25 NOVEMBER 2019	Test No	3603
Job No	19359	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	99.23
4.75	99.02
2.00	98.46
0.425	89.25

GRADING ANALYSIS



HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0847	78.56
0.0609	75.21
0.0437	71.87
0.0316	66.86
0.0046	35.10
0.0014	15.04

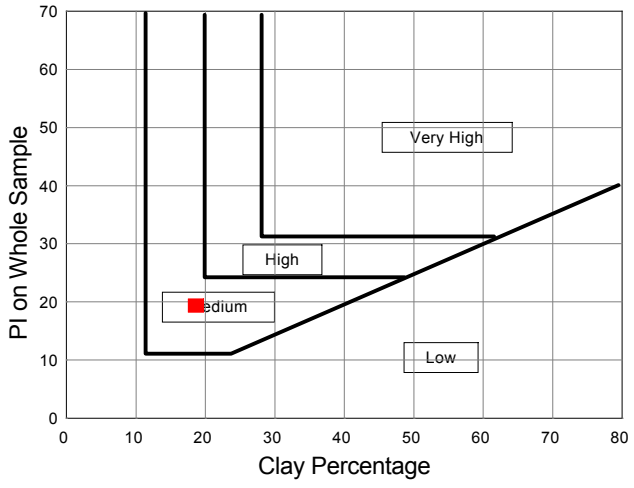
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	57
Plastic Limit	35
Plastic Index	22
Linear Shrinkage	11
Grading Modulus	0.34
Moisture Content	23.07
PI on Whole Sample	19
PRA Classification	A.7.5
Unified Classification	See Plasticity Chart

ESTIMATED COMPOSITION (As BS 1377)

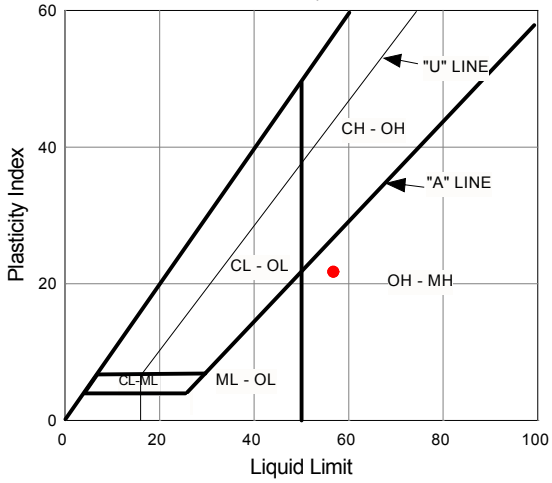
Clay (<0.002)	18.68
0.002 < Silt < 0.06	56.37
0.06 < Sand < 2.0	23.41
Gravel > 2.0	1.54
% less than 0.075	77.20

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FAX: (011) 674 4513
e mail: lab@geopractica.co.za

FOUNDATION INDICATOR

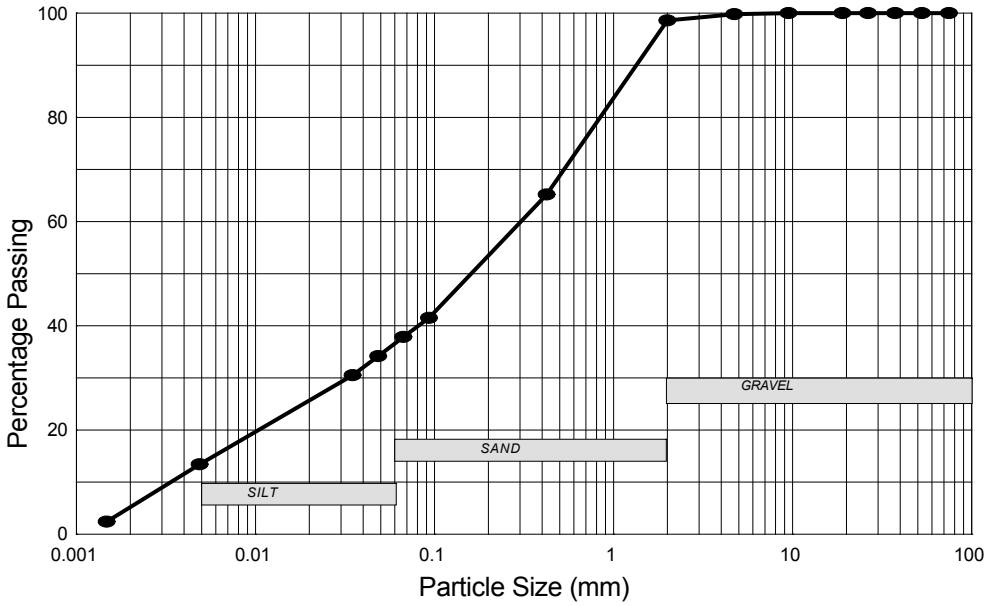
Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE U 4 / 1 @ 0,6 - 0,8m		
Date	25 NOVEMBER 2019	Test No	3605
Job No	19359	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	99.85
2.00	98.63
0.425	65.23

GRADING ANALYSIS



HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0934	41.54
0.0674	37.87
0.0486	34.21
0.0350	30.54
0.0049	13.44
0.0015	2.44

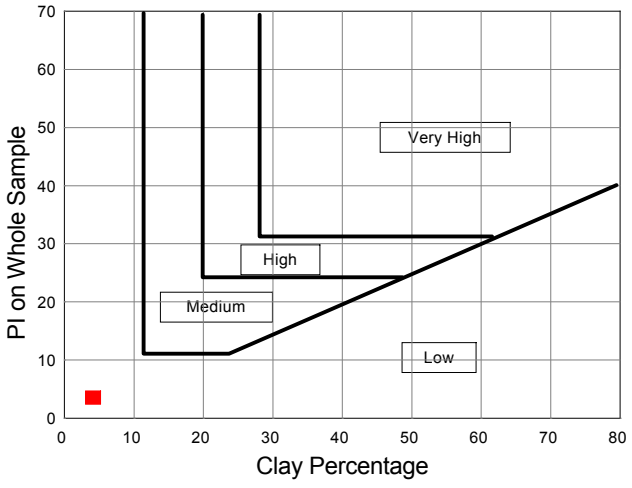
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	15
Plastic Limit	9
Plastic Index	5
Linear Shrinkage	2
Grading Modulus	0.95
Moisture Content	1.73
PI on Whole Sample	4
PRA Classification	A.4
Unified Classification	SM - SC

ESTIMATED COMPOSITION (As BS 1377)

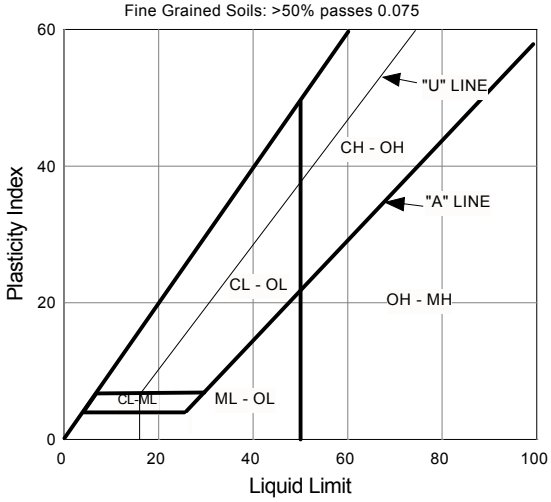
Clay (<0.002)	4.15
0.002 < Silt < 0.06	32.29
0.06 < Sand < 2.0	62.20
Gravel > 2.0	1.37
% less than 0.075	38.95

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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TEL: (011) 674 1325
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e mail: lab@geopractica.co.za

FOUNDATION INDICATOR

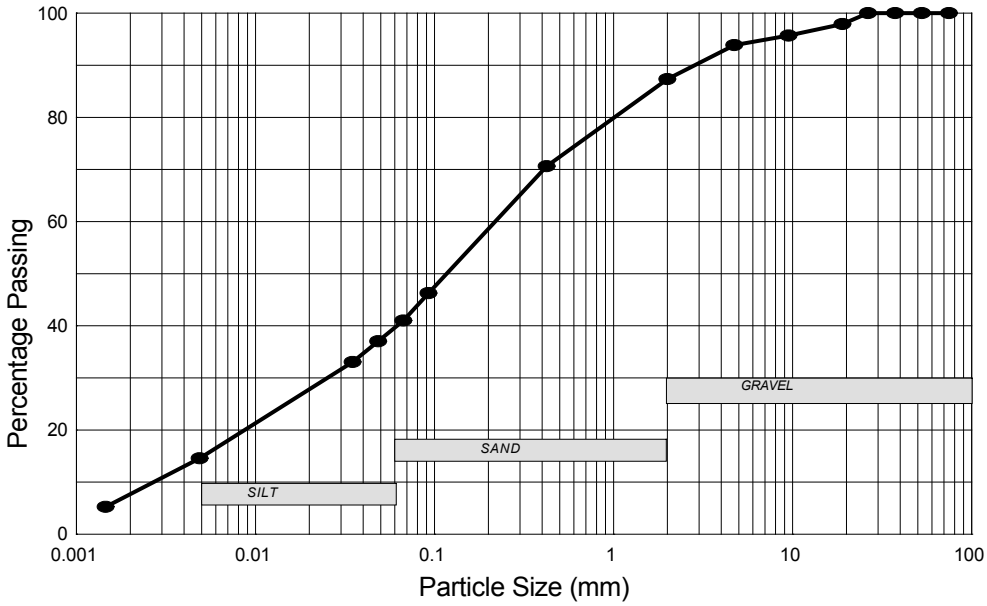
Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE B4 / 1 @ 1,0 - 1,5m		
Date	25 NOVEMBER 2019	Test No	3608
Job No	19359	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	97.92
9.50	95.75
4.75	93.91
2.00	87.39
0.425	70.67

GRADING ANALYSIS



HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	46.32
0.0674	41.03
0.0486	37.06
0.0350	33.09
0.0049	14.56
0.0015	5.29

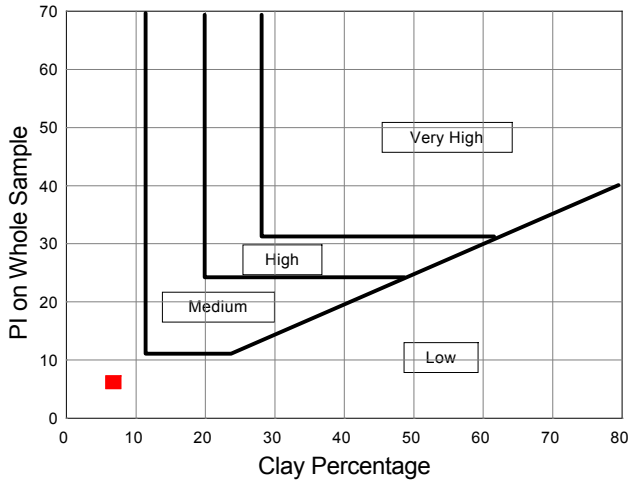
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	30
Plastic Limit	21
Plastic Index	9
Linear Shrinkage	5
Grading Modulus	0.96
Moisture Content	8.32
PI on Whole Sample	6
PRA Classification	A.4
Unified Classification	SC

ESTIMATED COMPOSITION (As BS 1377)

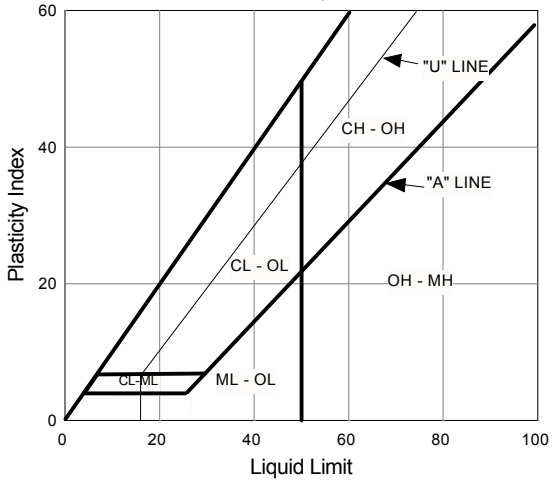
Clay (<0.002)	6.75
0.002 < Silt < 0.06	32.72
0.06 < Sand < 2.0	47.92
Gravel > 2.0	12.61
% less than 0.075	42.63

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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TEL: (011) 674 1325
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FOUNDATION INDICATOR

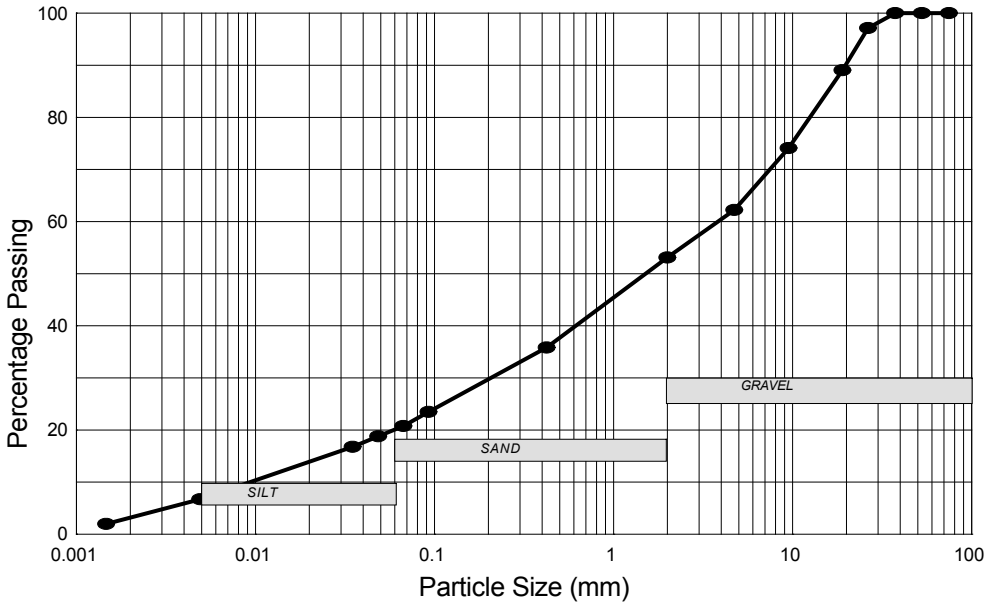
Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE B5 / 1 @ 0,2 - 0,55m		
Date	25 NOVEMBER 2019	Test No	3610
Job No	19359	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	97.20
19.00	89.08
9.50	74.16
4.75	62.22
2.00	53.12
0.425	35.86

GRADING ANALYSIS



HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0927	23.51
0.0674	20.82
0.0486	18.80
0.0350	16.79
0.0049	6.72
0.0015	2.01

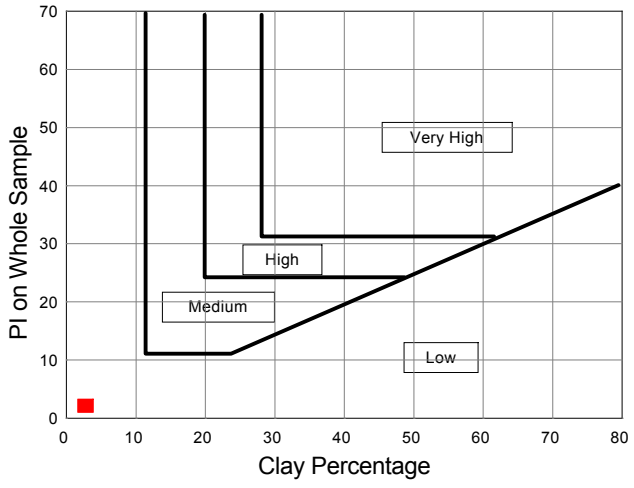
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	26
Plastic Limit	20
Plastic Index	6
Linear Shrinkage	3
Grading Modulus	1.88
Moisture Content	4.26
PI on Whole Sample	2
PRA Classification	A.2.4
Unified Classification	SM - SC

ESTIMATED COMPOSITION (As BS 1377)

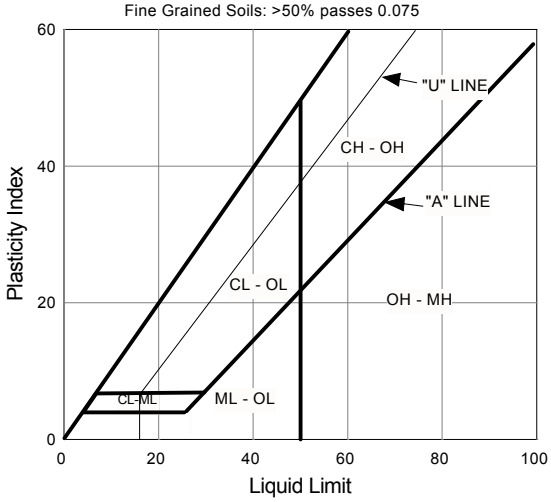
Clay (<0.002)	2.74
0.002 < Silt < 0.06	17.29
0.06 < Sand < 2.0	33.09
Gravel > 2.0	46.88
% less than 0.075	21.63

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

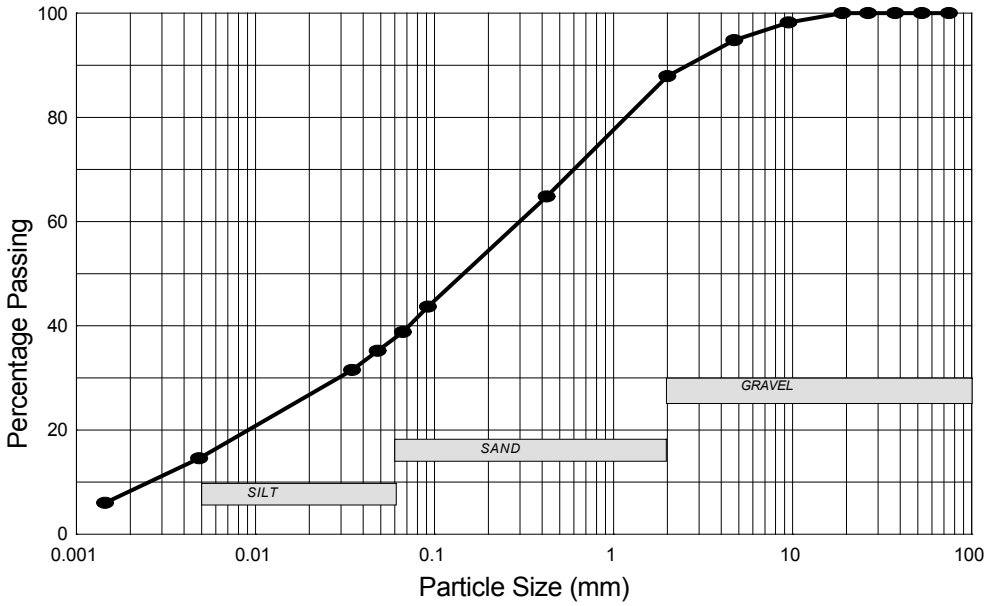
Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE B6 / 1 @ 1,4 - 2,5m		
Date	25 NOVEMBER 2019	Test No	3612
Job No	19359	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	98.24
4.75	94.82
2.00	87.94
0.425	64.81

GRADING ANALYSIS



HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0921	43.69
0.0669	38.84
0.0482	35.20
0.0348	31.56
0.0049	14.56
0.0015	6.07

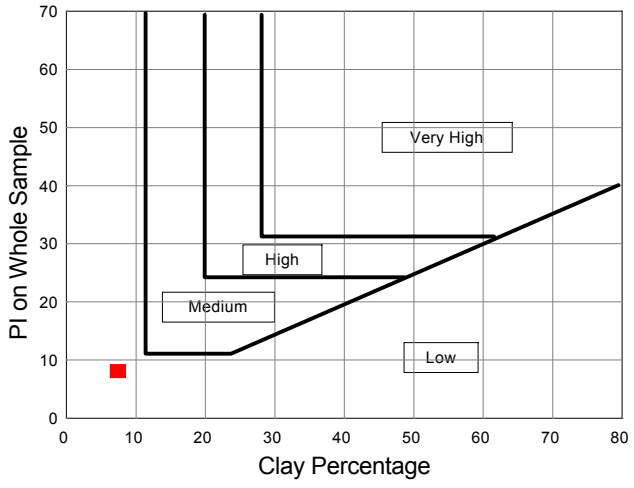
ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	30
Plastic Limit	18
Plastic Index	13
Linear Shrinkage	7
Grading Modulus	1.04
Moisture Content	12.16
PI on Whole Sample	8
PRA Classification	A.6
Unified Classification	SC

ESTIMATED COMPOSITION (As BS 1377)

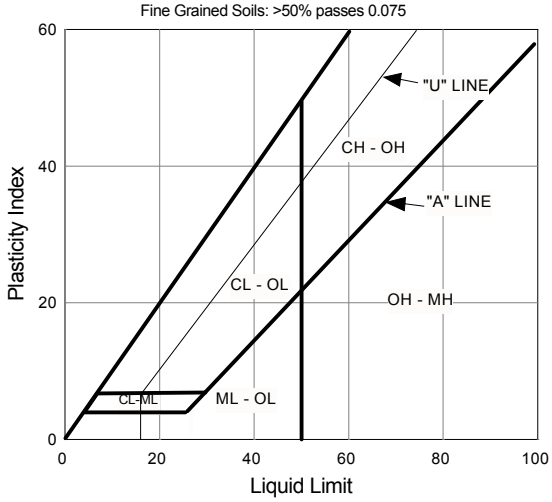
Clay (<0.002)	7.44
0.002 < Silt < 0.06	30.05
0.06 < Sand < 2.0	50.45
Gravel > 2.0	12.06
% less than 0.075	40.40

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



SOILS & MATERIALS TESTING
1164 Minnie Postma, Florida Ext 11
TEL: (011) 674 1325
e mail: lab@geopractica.co.za

FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B10/1 @ 0,1 - 0,5m	
Date	06-Mar-24	Test No	1116
Job No	24075	Checked By	EB

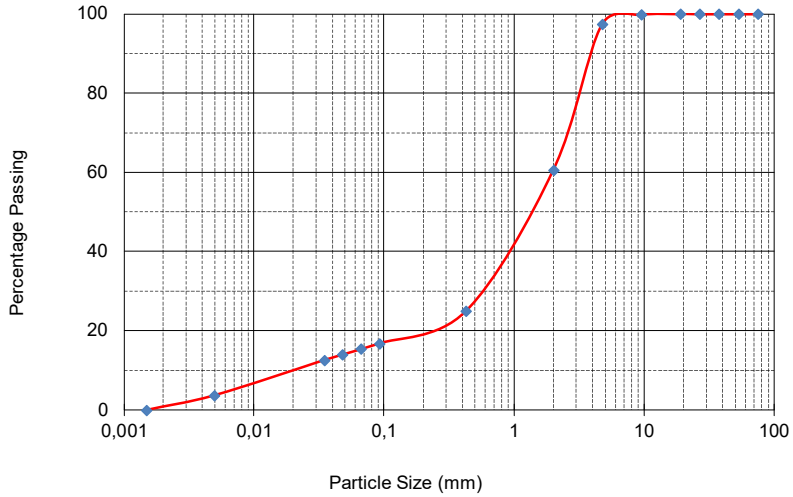
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	99,80
4,75	97,38
2	60,57
0,425	24,96

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0921	16,83
0,0665	15,43
0,0479	14,02
0,0346	12,62
0,0050	3,74
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

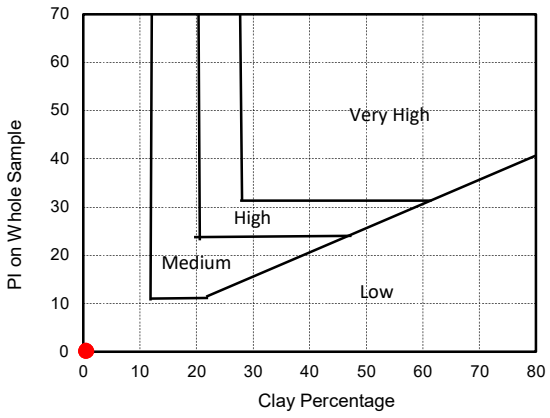
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1,99
Moisture Content	4,3
PI on Whole Sample	Non Plastic
PRA Classification	A.1.b
Unified Classification	SM
Coefficient of Curvature Cc	6,76
Coefficient of Uniformity Cu	100,00

ESTIMATED COMPOSITION (As BS 1377)

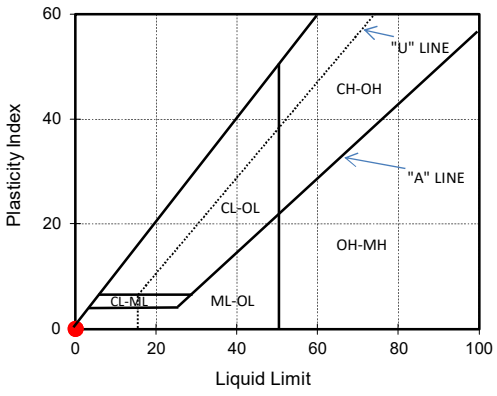
Clay (<0.002)	0,55
0.002 < Silt < 0.06	14,39
0.06 < Sand < 2.0	45,64
Gravel > 2.0	39,43
% less than 0.075	15,89

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria U10/2 @ 2,0 - 2,2m		
Date	06-Mar-24	Test No	1237
Job No	24075	Checked By	EB

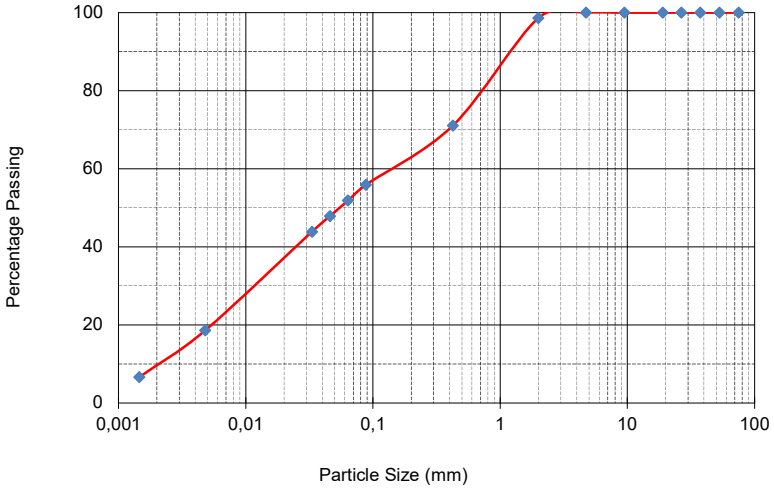
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	100,00
4,75	100,00
2	98,60
0,425	71,06

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0881	55,89
0,0637	51,90
0,0460	47,91
0,0332	43,91
0,0048	18,63
0,0015	6,65

ATTERBERG LIMITS & OTHER VALUES

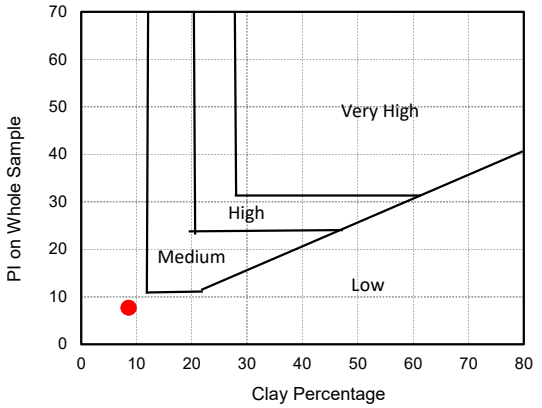
(SANS 3001 - GR10)

Liquid Limit	35
Plastic Limit	24
Plastic Index	11
Linear Shrinkage	6
Grading Modulus	0,77
Moisture Content	18,2
PI on Whole Sample	8
PRA Classification	A.6
Unified Classification	See Plasticity Chart
Coefficient of Curvature Cc	0,00
Coefficient of Uniformity Cu	6666,67

ESTIMATED COMPOSITION (As BS 1377)

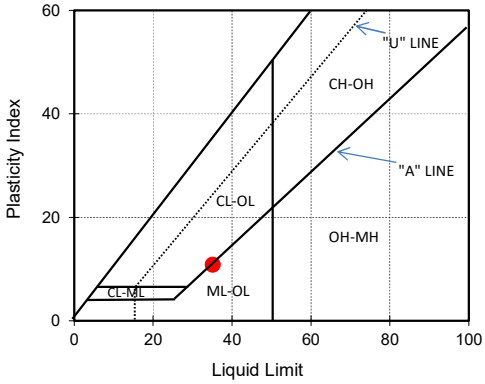
Clay (<0.002)	8,61
0.002 < Silt < 0.06	42,44
0.06 < Sand < 2.0	47,54
Gravel > 2.0	1,40
% less than 0.075	53,75

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B11/1 @ 0,7 - 2,5m	
Date	06-Mar-24	Test No	1118
Job No	24075	Checked By	EB

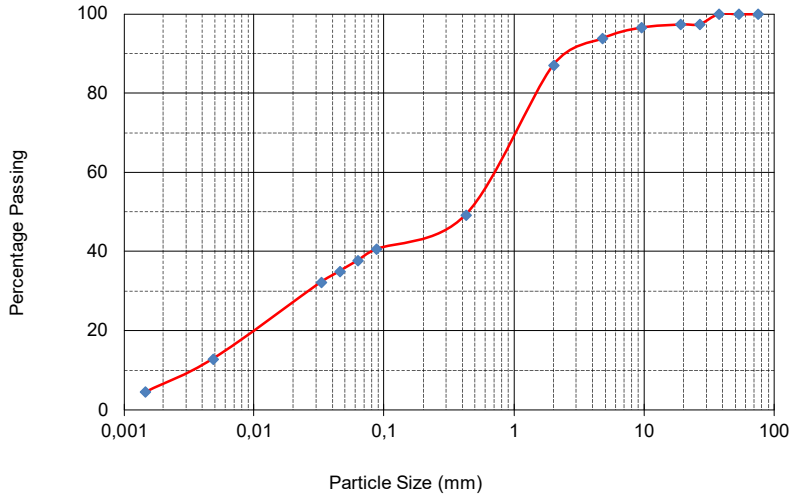
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	97,39
19	97,39
9,5	96,59
4,75	93,85
2	87,13
0,425	49,28

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0867	40,61
0,0628	37,84
0,0454	35,07
0,0328	32,30
0,0048	12,92
0,0015	4,61

ATTERBERG LIMITS & OTHER VALUES

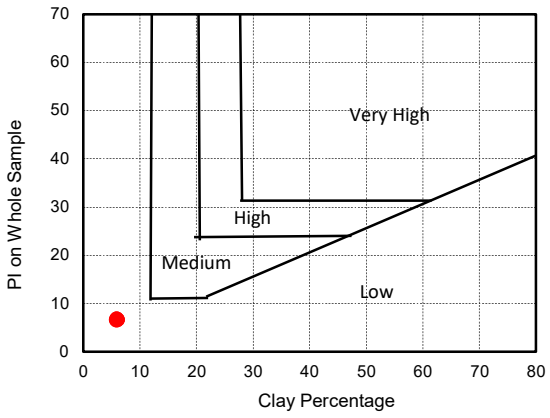
(SANS 3001 - GR10)

Liquid Limit	33
Plastic Limit	20
Plastic Index	13
Linear Shrinkage	6
Grading Modulus	1,24
Moisture Content	11,7
PI on Whole Sample	6
PRA Classification	A.6
Unified Classification	SC
Coefficient of Curvature Cc	0,33
Coefficient of Uniformity Cu	203,13

ESTIMATED COMPOSITION (As BS 1377)

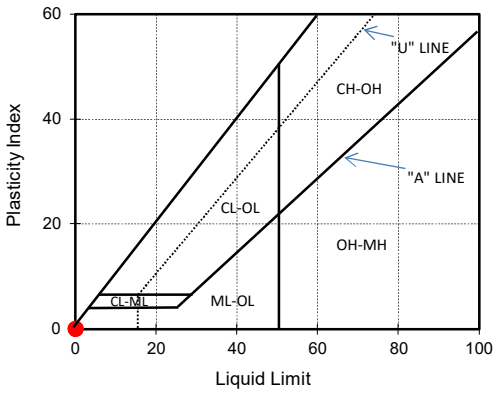
Clay (<0.002)	5,97
0.002 < Silt < 0.06	31,42
0.06 < Sand < 2.0	49,73
Gravel > 2.0	12,87
% less than 0.075	39,25

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria U16/1 @ 1,5 - 1,7m		
Date	06-Mar-24	Test No	1240
Job No	24075	Checked By	EB

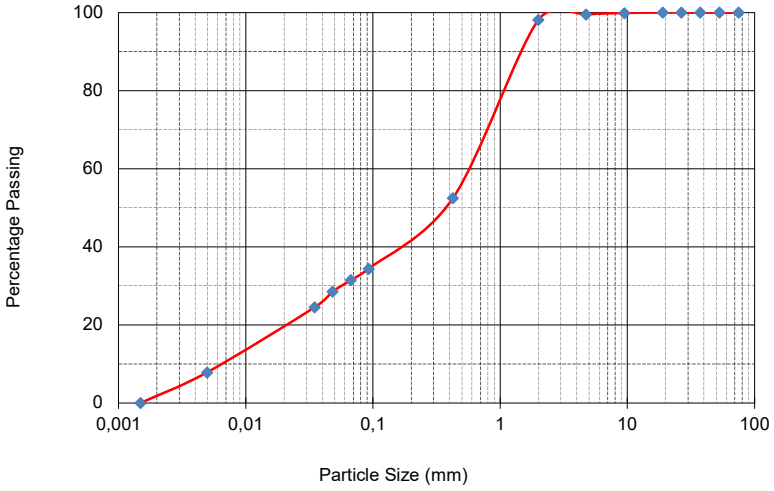
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	99,86
4,75	99,49
2	98,11
0,425	52,47

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0927	34,39
0,0669	31,45
0,0482	28,50
0,0350	24,57
0,0050	7,86
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

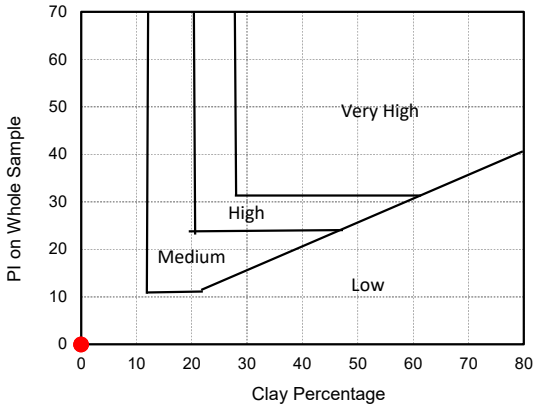
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1,17
Moisture Content	4,5
PI on Whole Sample	Non Plastic
PRA Classification	A.2.4
Unified Classification	SM
Coefficient of Curvature Cc	1,08
Coefficient of Uniformity Cu	92,86

ESTIMATED COMPOSITION (As BS 1377)

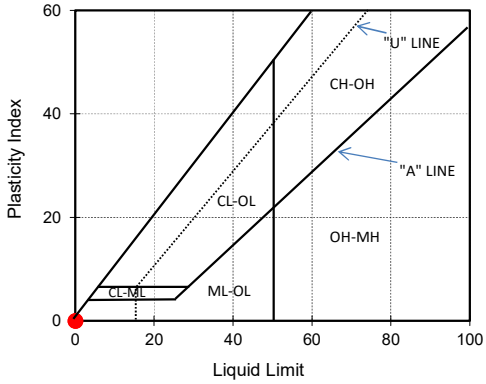
Clay (<0.002)	0,00
0.002 < Silt < 0.06	30,35
0.06 < Sand < 2.0	67,75
Gravel > 2.0	1,89
% less than 0.075	32,37

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B21/1 @ 1,0 - 2,0m	
Date	06-Mar-24	Test No	1122
Job No	24075	Checked By	EB

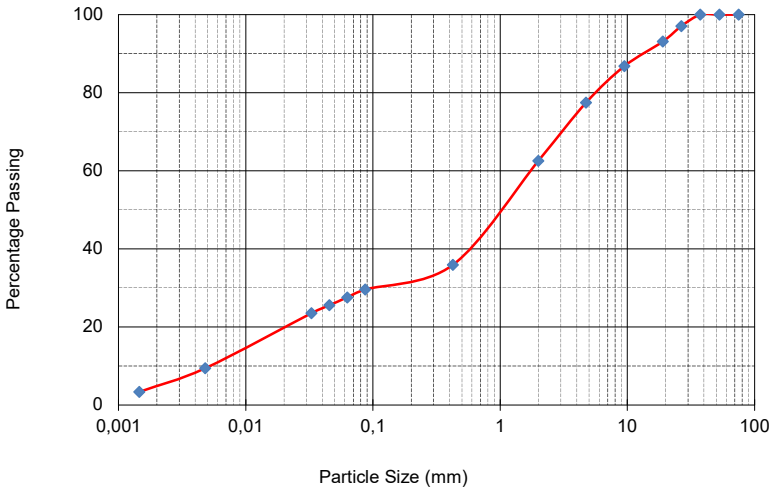
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	97,02
19	93,09
9,5	86,80
4,75	77,51
2	62,53
0,425	35,93

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0867	29,61
0,0628	27,59
0,0454	25,57
0,0328	23,55
0,0048	9,42
0,0015	3,36

ATTERBERG LIMITS & OTHER VALUES

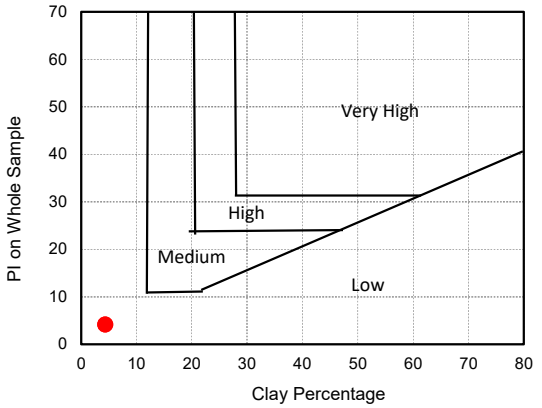
(SANS 3001 - GR10)

Liquid Limit	35
Plastic Limit	23
Plastic Index	12
Linear Shrinkage	6
Grading Modulus	1,73
Moisture Content	11,6
PI on Whole Sample	4
PRA Classification	A.2.6
Unified Classification	SC
Coefficient of Curvature Cc	0,94
Coefficient of Uniformity Cu	346,15

ESTIMATED COMPOSITION (As BS 1377)

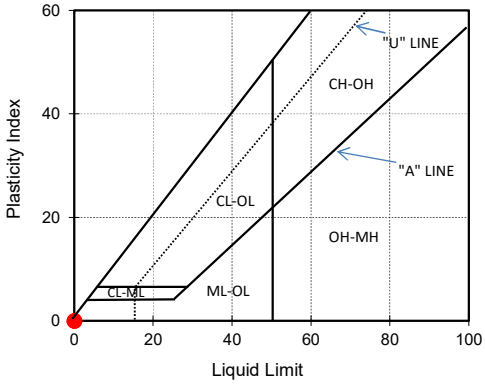
Clay (<0.002)	4,36
0.002 < Silt < 0.06	22,91
0.06 < Sand < 2.0	35,27
Gravel > 2.0	37,47
% less than 0.075	28,62

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria B19/1 @ 0,1 - 2,7m		
Date	06-Mar-24	Test No	1120
Job No	24075	Checked By	EB

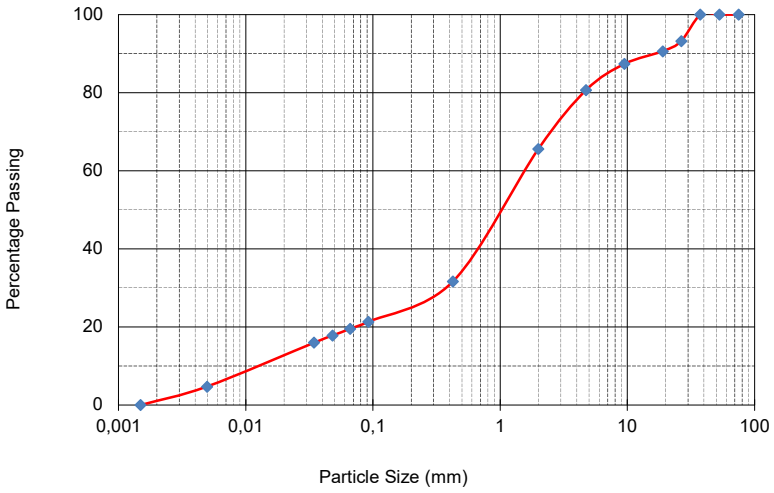
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	93,23
19	90,61
9,5	87,35
4,75	80,69
2	65,59
0,425	31,65

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0921	21,34
0,0665	19,56
0,0479	17,78
0,0346	16,01
0,0050	4,74
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

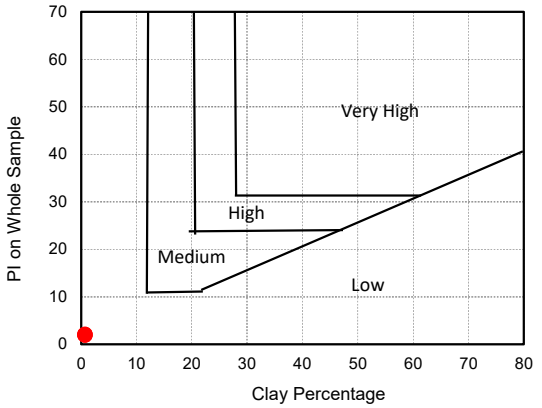
(SANS 3001 - GR10)

Liquid Limit	36
Plastic Limit	29
Plastic Index	7
Linear Shrinkage	3
Grading Modulus	1,83
Moisture Content	5,6
PI on Whole Sample	2
PRA Classification	A.2.4
Unified Classification	SM - SC
Coefficient of Curvature Cc	6,76
Coefficient of Uniformity Cu	100,00

ESTIMATED COMPOSITION (As BS 1377)

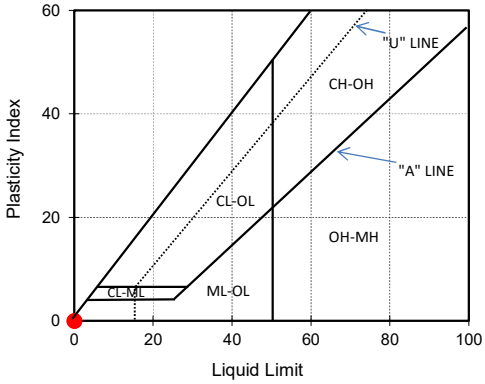
Clay (<0.002)	0,70
0.002 < Silt < 0.06	18,24
0.06 < Sand < 2.0	46,65
Gravel > 2.0	34,41
% less than 0.075	20,15

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B23/1 @ 0,6 - 2,3m	
Date	06-Mar-24	Test No	1124
Job No	24075	Checked By	EB

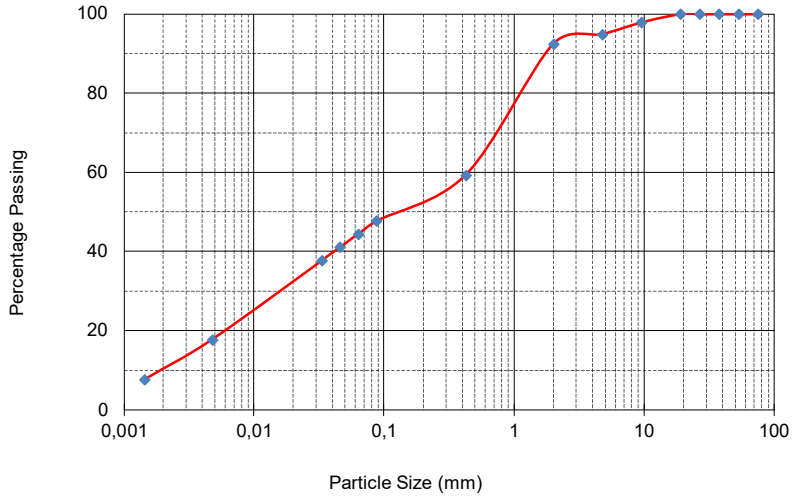
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	97,87
4,75	94,84
2	92,41
0,425	59,31

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0874	47,76
0,0633	44,43
0,0457	41,10
0,0330	37,77
0,0048	17,77
0,0014	7,78

ATTERBERG LIMITS & OTHER VALUES

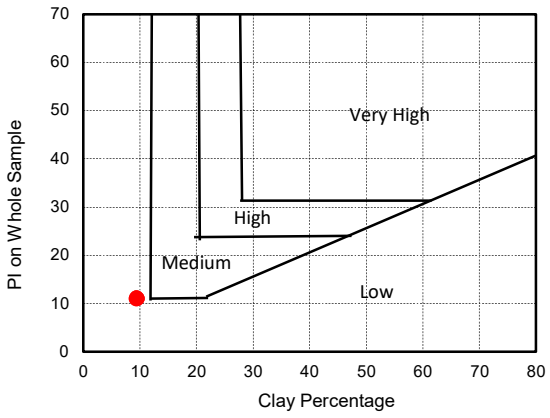
(SANS 3001 - GR10)

Liquid Limit	32
Plastic Limit	14
Plastic Index	18
Linear Shrinkage	9
Grading Modulus	1,02
Moisture Content	10,9
PI on Whole Sample	11
PRA Classification	A.6
Unified Classification	SC
Coefficient of Curvature Cc	0,28
Coefficient of Uniformity Cu	225,00

ESTIMATED COMPOSITION (As BS 1377)

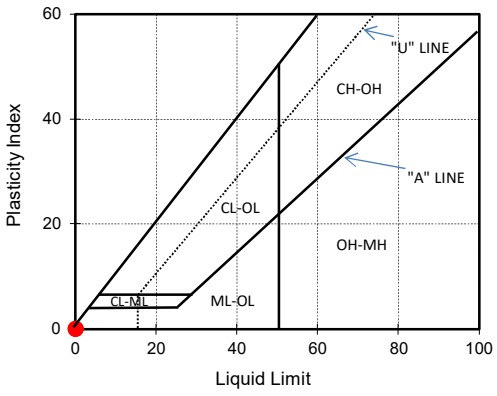
Clay (<0.002)	9,46
0.002 < Silt < 0.06	34,35
0.06 < Sand < 2.0	48,60
Gravel > 2.0	7,59
% less than 0.075	46,05

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B26/1 @ 0,1 - 0,8m	
Date	06-Mar-24	Test No	1126
Job No	24075	Checked By	EB

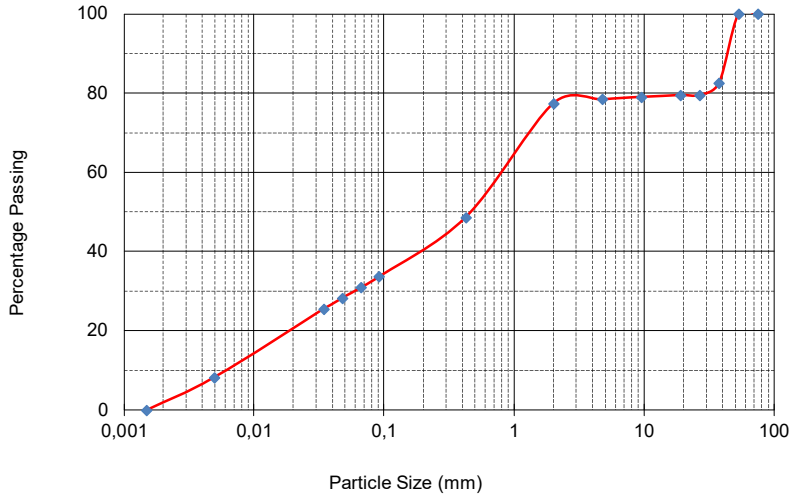
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	82,62
26,5	79,50
19	79,50
9,5	79,03
4,75	78,46
2	77,39
0,425	48,65

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0914	33,71
0,0660	30,98
0,0476	28,25
0,0343	25,51
0,0049	8,20
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

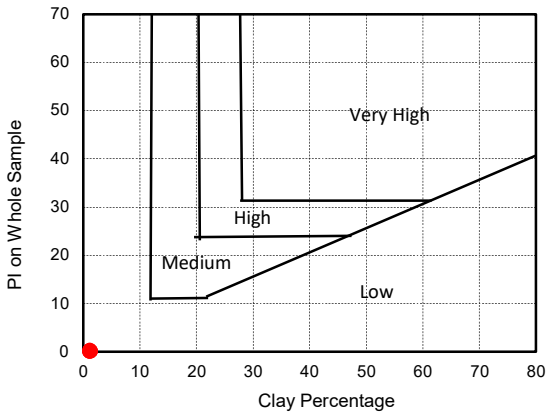
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1,42
Moisture Content	9,1
PI on Whole Sample	Non Plastic
PRA Classification	A.2.4
Unified Classification	SM
Coefficient of Curvature Cc	0,75
Coefficient of Uniformity Cu	133,33

ESTIMATED COMPOSITION (As BS 1377)

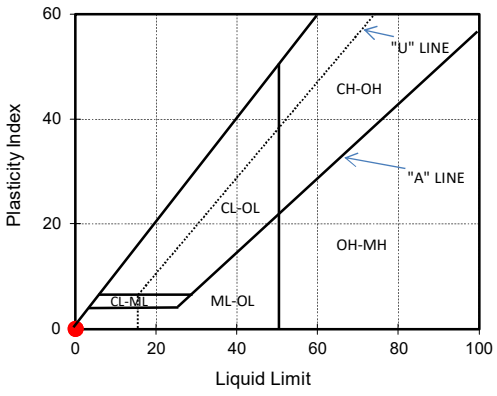
Clay (<0.002)	1,21
0.002 < Silt < 0.06	28,87
0.06 < Sand < 2.0	47,30
Gravel > 2.0	22,61
% less than 0.075	31,94

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



Revision Number	2	**Revised By**	SR		**Page No.**	Page 1 of 1
Date	15-Sep-18		10-Jun-20	**Compiled by**	Steve Robinson	
Document Number	GTR 008	**SANS & TMH**		**Authorised by**	Colin Dalton	

SOILS & MATERIALS TESTING
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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria TH30 / B30/1 @ 0,1 - 0,5m		
Date	06-Mar-24	Test No	1256
Job No	24075	Checked By	EB

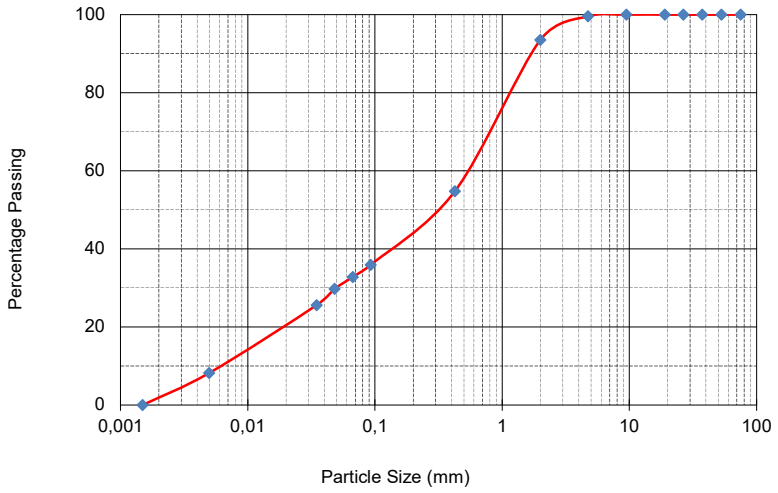
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	100,00
4,75	99,57
2	93,47
0,425	54,78

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0927	35,90
0,0669	32,83
0,0482	29,75
0,0350	25,65
0,0050	8,21
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

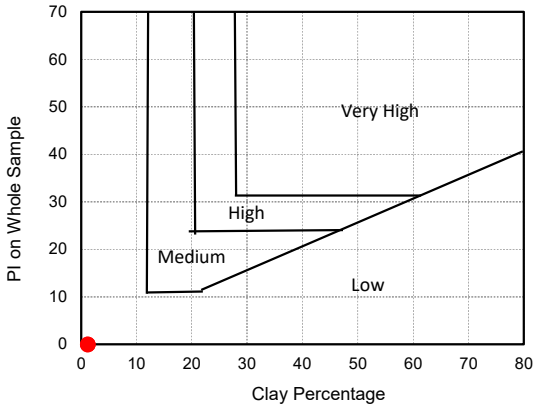
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1,18
Moisture Content	6,8
PI on Whole Sample	Non Plastic
PRA Classification	A.2.4
Unified Classification	SM
Coefficient of Curvature Cc	0,76
Coefficient of Uniformity Cu	89,66

ESTIMATED COMPOSITION (As BS 1377)

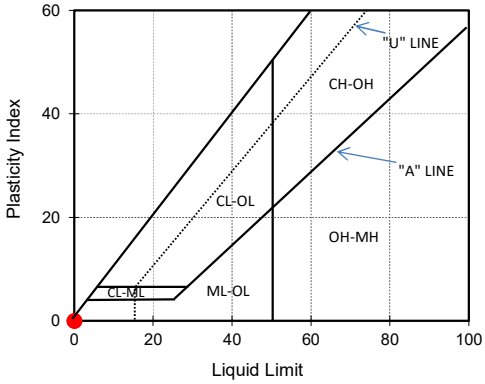
Clay (<0.002)	1,21
0.002 < Silt < 0.06	30,48
0.06 < Sand < 2.0	61,78
Gravel > 2.0	6,53
% less than 0.075	33,79

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria TH33 / B33/1 @ 1,2 - 2,8m		
Date	06-Mar-24	Test No	1254
Job No	24075	Checked By	EB

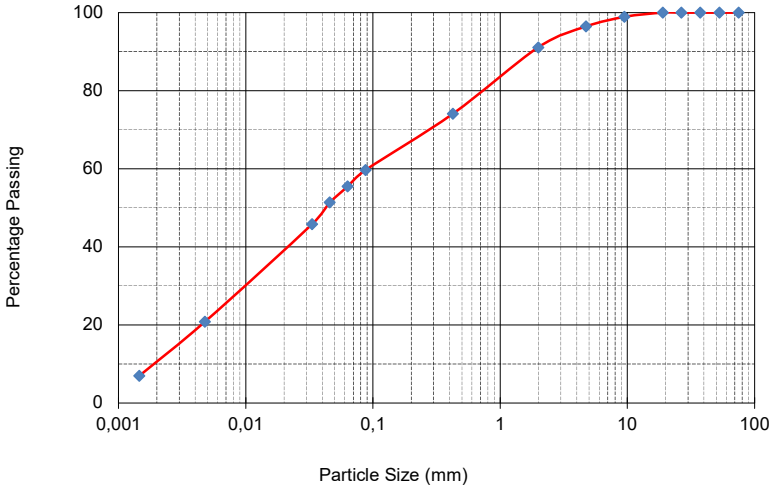
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	98,88
4,75	96,46
2	91,11
0,425	74,10

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0874	59,67
0,0633	55,51
0,0457	51,35
0,0332	45,80
0,0048	20,82
0,0015	6,94

ATTERBERG LIMITS & OTHER VALUES

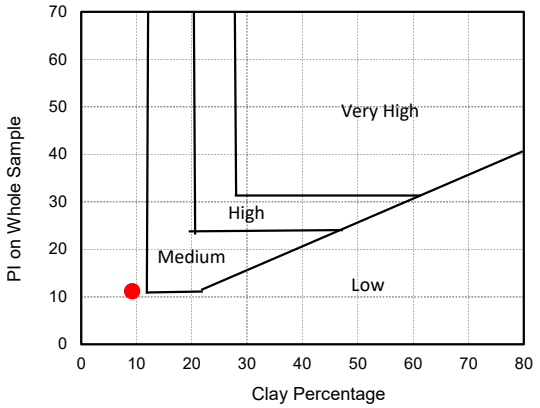
(SANS 3001 - GR10)

Liquid Limit	35
Plastic Limit	20
Plastic Index	15
Linear Shrinkage	7
Grading Modulus	0,77
Moisture Content	14,2
PI on Whole Sample	11
PRA Classification	A.6
Unified Classification	See Plasticity Chart
Coefficient of Curvature Cc	68,40
Coefficient of Uniformity Cu	43,33

ESTIMATED COMPOSITION (As BS 1377)

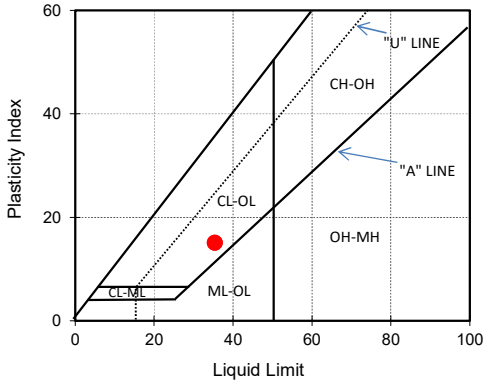
Clay (<0.002)	9,23
0.002 < Silt < 0.06	45,51
0.06 < Sand < 2.0	36,38
Gravel > 2.0	8,89
% less than 0.075	57,53

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria B34/1 @ 0,1 - 2,4m		
Date	06-Mar-24	Test No	1128
Job No	24075	Checked By	EB

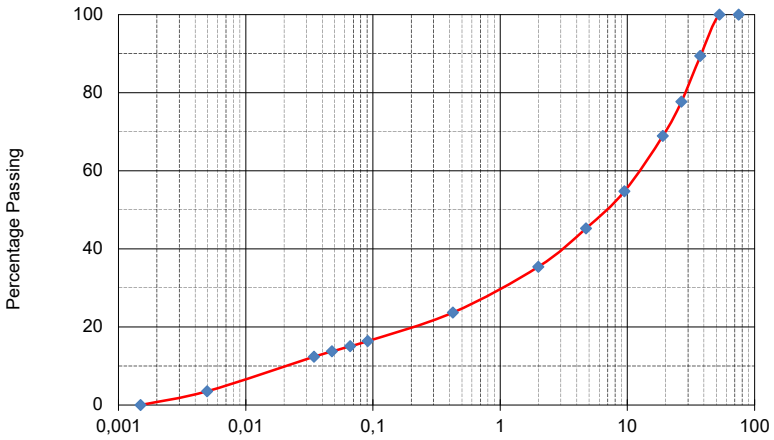
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	89,43
26,5	77,63
19	68,90
9,5	54,76
4,75	45,30
2	35,44
0,425	23,66

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0914	16,39
0,0660	15,06
0,0476	13,73
0,0343	12,41
0,0050	3,54
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

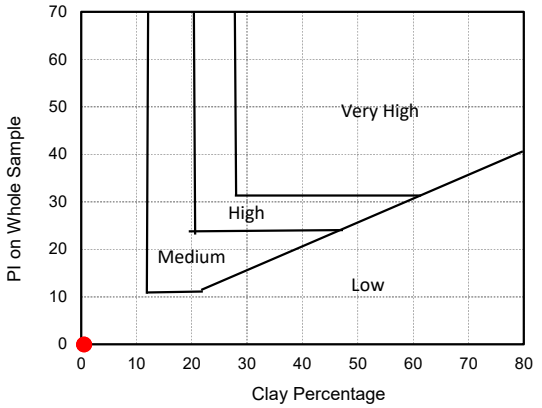
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2,25
Moisture Content	5,5
PI on Whole Sample	Non Plastic
PRA Classification	A.1.b
Unified Classification	GM
Coefficient of Curvature Cc	3,62
Coefficient of Uniformity Cu	722,22

ESTIMATED COMPOSITION (As BS 1377)

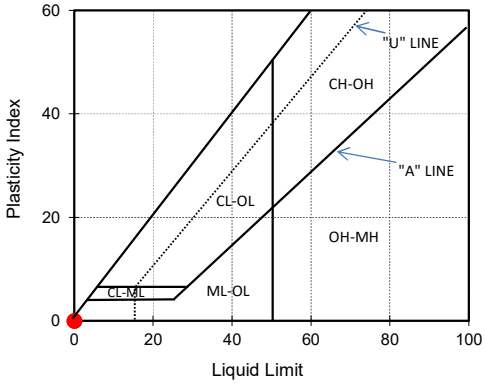
Clay (<0.002)	0,52
0.002 < Silt < 0.06	14,11
0.06 < Sand < 2.0	20,81
Gravel > 2.0	64,56
% less than 0.075	15,53

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B35/1 @ 0,3 - 0,8m	
Date	06-Mar-24	Test No	1130
Job No	24075	Checked By	EB

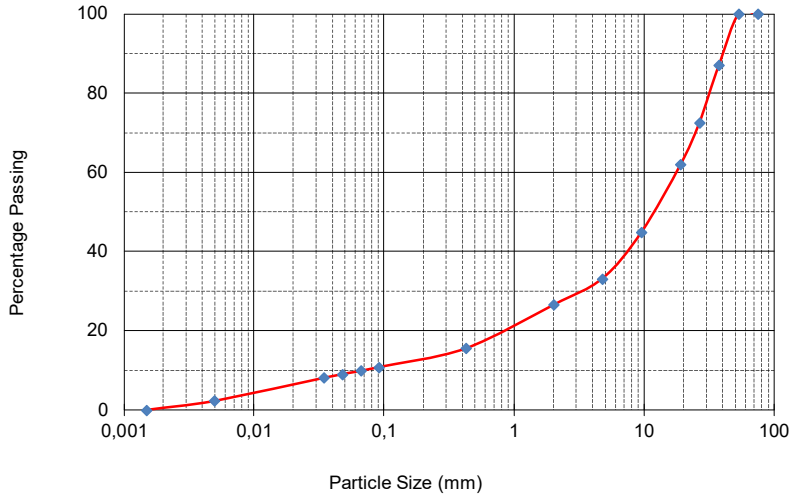
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	87,13
26,5	72,51
19	62,04
9,5	44,92
4,75	33,09
2	26,61
0,425	15,59

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0914	10,80
0,0660	9,93
0,0476	9,05
0,0343	8,18
0,0050	2,34
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

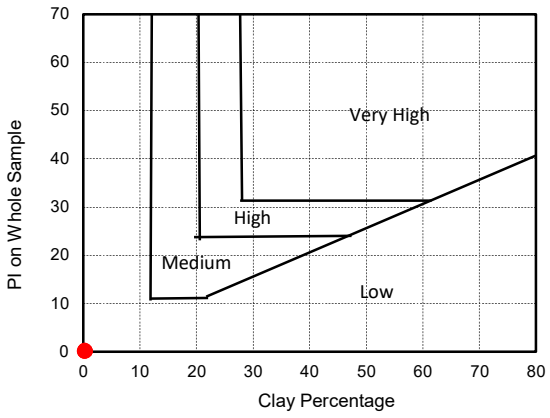
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2,48
Moisture Content	5,9
PI on Whole Sample	Non Plastic
PRA Classification	A.1.a
Unified Classification	GP - GC
Coefficient of Curvature Cc	7,59
Coefficient of Uniformity Cu	240,00

ESTIMATED COMPOSITION (As BS 1377)

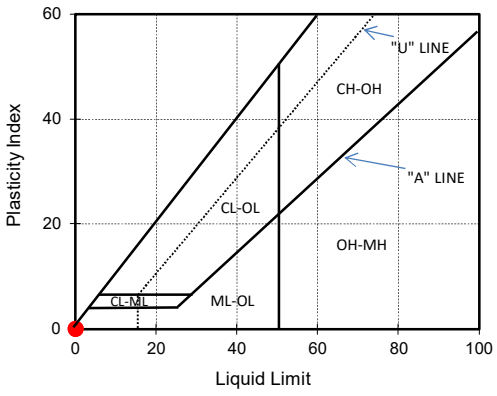
Clay (<0.002)	0,34
0.002 < Silt < 0.06	9,30
0.06 < Sand < 2.0	16,97
Gravel > 2.0	73,39
% less than 0.075	10,24

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria TH1 / B1/1 @ 2,6 - 3,6m		
Date	06-Mar-24	Test No	1258
Job No	24075	Checked By	EB

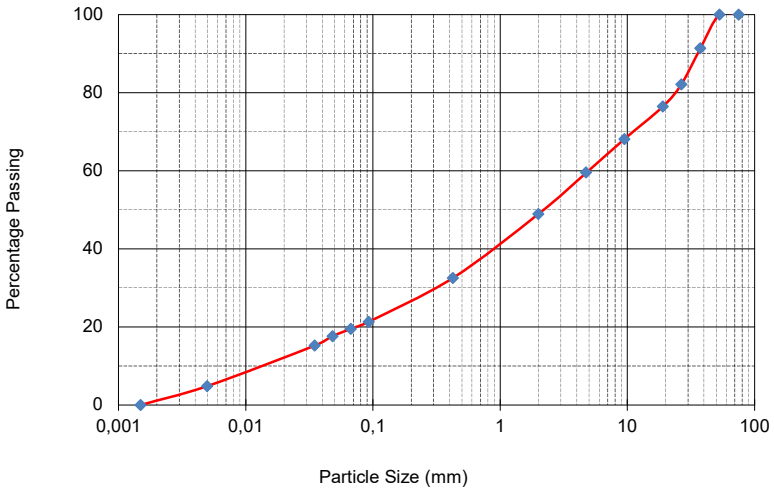
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	91,42
26,5	82,12
19	76,44
9,5	68,14
4,75	59,53
2	48,90
0,425	32,55

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0927	21,34
0,0669	19,51
0,0482	17,68
0,0350	15,24
0,0050	4,88
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

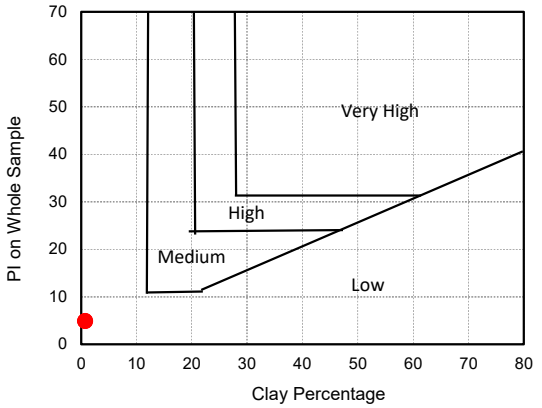
(SANS 3001 - GR10)

Liquid Limit	35
Plastic Limit	20
Plastic Index	15
Linear Shrinkage	7
Grading Modulus	1,98
Moisture Content	7,7
PI on Whole Sample	5
PRA Classification	A.2.6
Unified Classification	SC
Coefficient of Curvature Cc	1,26
Coefficient of Uniformity Cu	369,23

ESTIMATED COMPOSITION (As BS 1377)

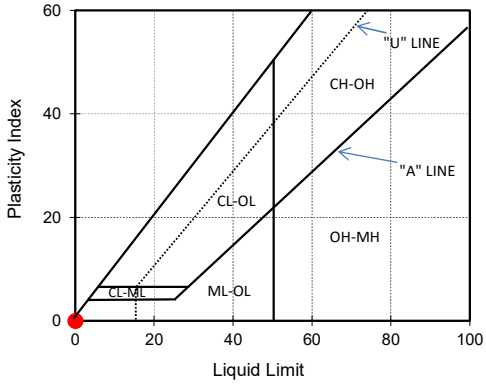
Clay (<0.002)	0,72
0.002 < Silt < 0.06	18,11
0.06 < Sand < 2.0	30,07
Gravel > 2.0	51,10
% less than 0.075	20,08

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria	B/TH2/1 @ 2,9 - 3,9m	
Date	06-Mar-24	Test No	1134
Job No	24075	Checked By	EB

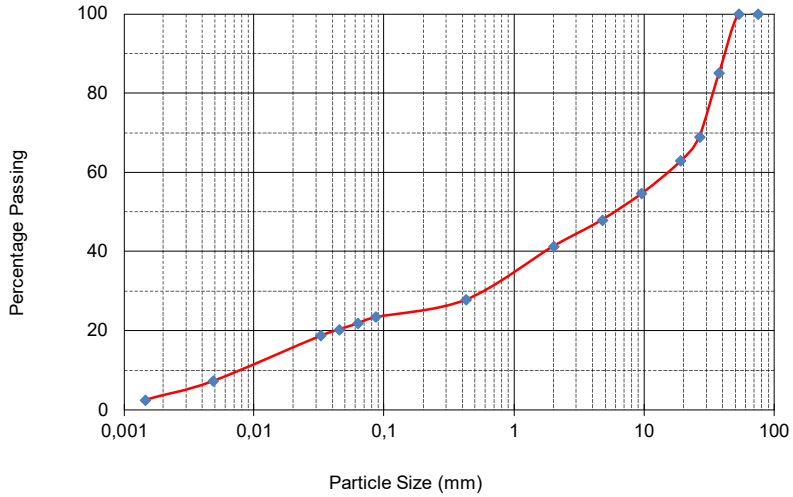
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	85,12
26,5	69,04
19	62,93
9,5	54,68
4,75	48,01
2	41,34
0,425	27,87

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0861	23,49
0,0623	21,92
0,0451	20,36
0,0326	18,79
0,0048	7,31
0,0015	2,61

ATTERBERG LIMITS & OTHER VALUES

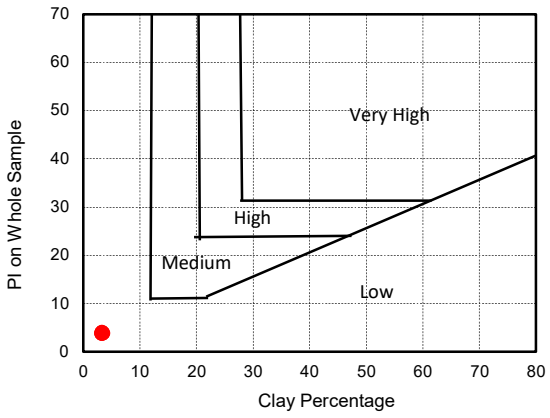
(SANS 3001 - GR10)

Liquid Limit	32
Plastic Limit	19
Plastic Index	13
Linear Shrinkage	6
Grading Modulus	2,08
Moisture Content	7,2
PI on Whole Sample	4
PRA Classification	A.2.6
Unified Classification	GC
Coefficient of Curvature Cc	2,43
Coefficient of Uniformity Cu	2133,33

ESTIMATED COMPOSITION (As BS 1377)

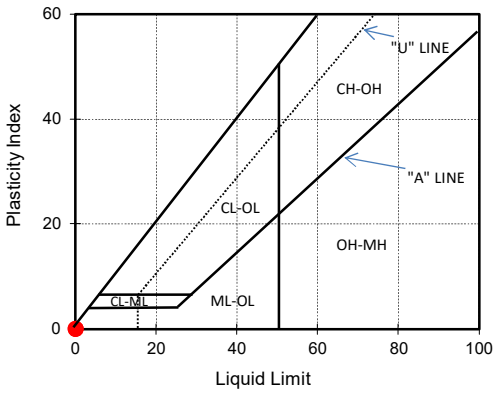
Clay (<0.002)	3,38
0.002 < Silt < 0.06	18,33
0.06 < Sand < 2.0	19,63
Gravel > 2.0	58,66
% less than 0.075	22,76

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria TH4/B4/1 @ 1,4 - 3,6m		
Date	06-Mar-24	Test No	1138
Job No	24075	Checked By	EB

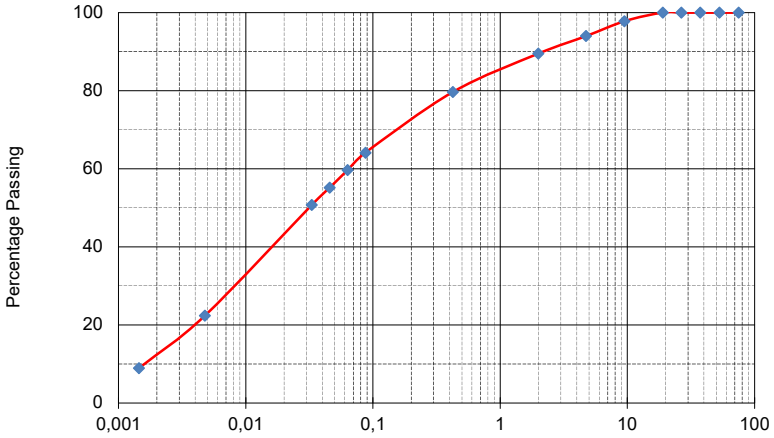
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	100,00
19	100,00
9,5	97,79
4,75	94,02
2	89,47
0,425	79,66

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0874	64,15
0,0633	59,67
0,0457	55,20
0,0330	50,72
0,0048	22,38
0,0014	8,95

ATTERBERG LIMITS & OTHER VALUES

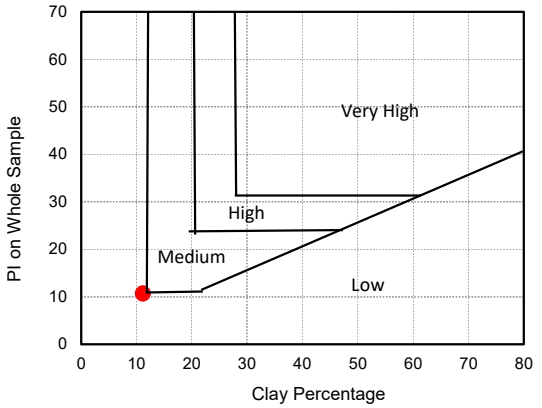
(SANS 3001 - GR10)

Liquid Limit	33
Plastic Limit	20
Plastic Index	14
Linear Shrinkage	7
Grading Modulus	0,71
Moisture Content	18,5
PI on Whole Sample	11
PRA Classification	A.6
Unified Classification	See Plasticity Chart
Coefficient of Curvature Cc	0,56
Coefficient of Uniformity Cu	37,65

ESTIMATED COMPOSITION (As BS 1377)

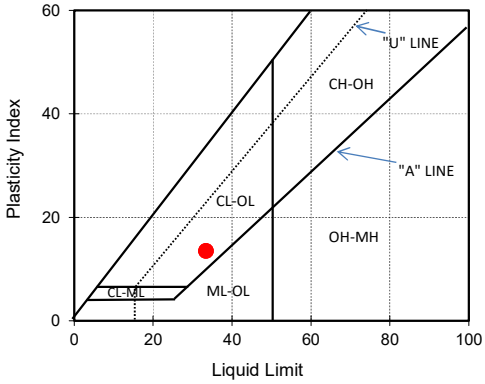
Clay (<0.002)	11,17
0.002 < Silt < 0.06	47,67
0.06 < Sand < 2.0	30,63
Gravel > 2.0	10,53
% less than 0.075	59,67

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria B/ TH1/1 @ 1,3 - 4,0m		Tag damaged - possibly TH5
Date	06-Mar-24	Test No	1132
Job No	24075	Checked By	EB

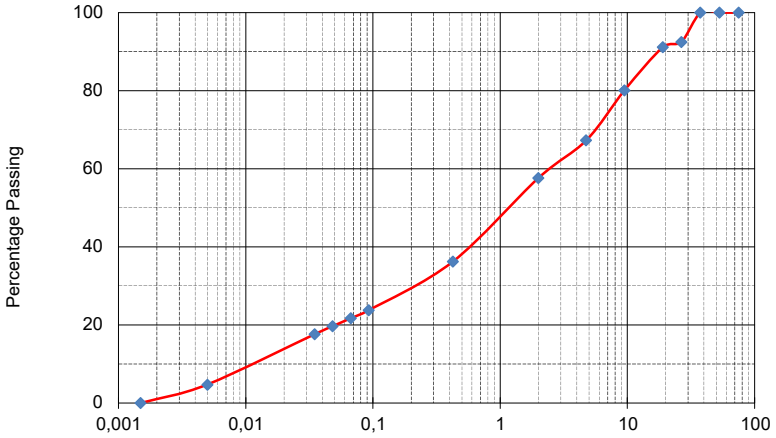
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	92,41
19	91,12
9,5	80,07
4,75	67,30
2	57,64
0,425	36,26

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0927	23,77
0,0669	21,73
0,0482	19,69
0,0348	17,65
0,0050	4,75
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

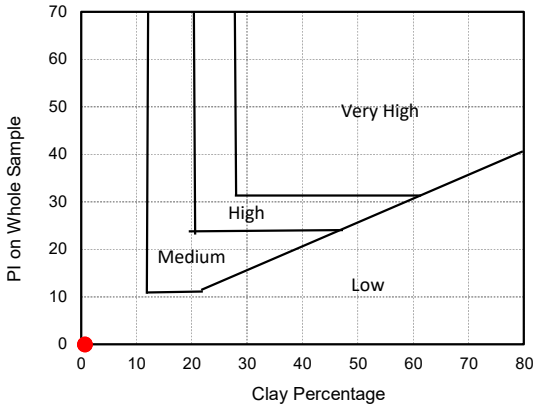
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	1,84
Moisture Content	6,0
PI on Whole Sample	Non Plastic
PRA Classification	A.1.b
Unified Classification	SM
Coefficient of Curvature Cc	1,28
Coefficient of Uniformity Cu	216,67

ESTIMATED COMPOSITION (As BS 1377)

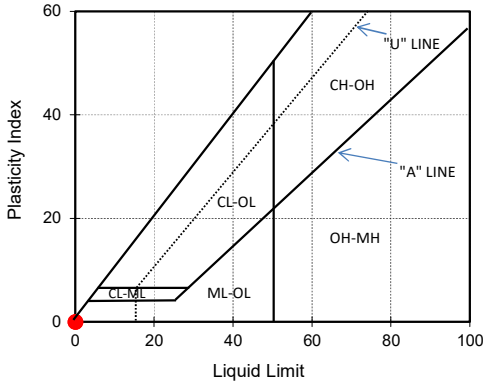
Clay (<0.002)	0,69
0.002 < Silt < 0.06	20,28
0.06 < Sand < 2.0	36,66
Gravel > 2.0	42,36
% less than 0.075	22,37

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



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FOUNDATION INDICATOR

Client	GEOID Geotechnical Engineers		
Location	Lanseria TH6/B6/1 @ 1,4 - 3,6m		
Date	06-Mar-24	Test No	1142
Job No	24075	Checked By	EB

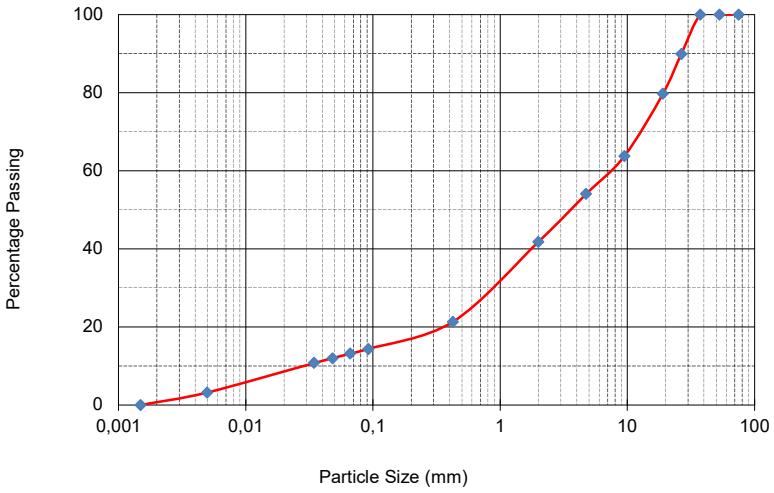
TEST DONE ACCORDING TO SANS & TMH METHODS

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75	100,00
53	100,00
37,5	100,00
26,5	89,91
19	79,69
9,5	63,75
4,75	54,11
2	41,77
0,425	21,34

GRADING ANALYSIS



HYDROMETER ANALYSIS

(TMH 1 Method A6)
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0,0921	14,39
0,0665	13,19
0,0479	11,99
0,0346	10,79
0,0050	3,20
0,0015	0,00

ATTERBERG LIMITS & OTHER VALUES

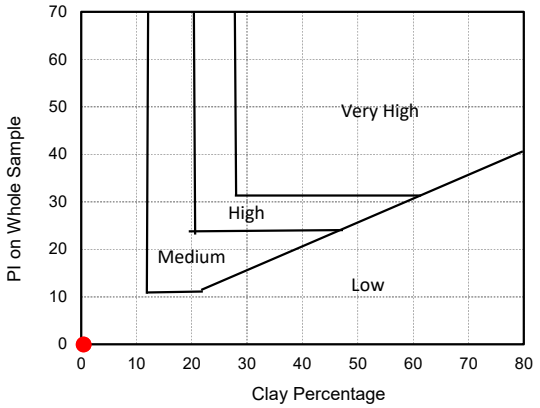
(SANS 3001 - GR10)

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	0
Grading Modulus	2,23
Moisture Content	3,0
PI on Whole Sample	Non Plastic
PRA Classification	A.1.a
Unified Classification	SM
Coefficient of Curvature Cc	3,25
Coefficient of Uniformity Cu	276,92

ESTIMATED COMPOSITION (As BS 1377)

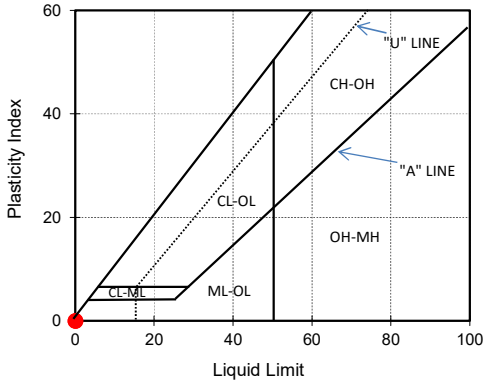
Clay (<0.002)	0,47
0.002 < Silt < 0.06	12,30
0.06 < Sand < 2.0	29,00
Gravel > 2.0	58,23
% less than 0.075	13,59

ACTIVITY CHART



PLASTICITY CHART

Fine Grained Soils: >50% passes 0.075



Revision Number	2	**Revised By**	SR		**Page No.**	Page 1 of 1
Date	15-Sep-18		10-Jun-20	**Compiled by**	Steve Robinson	
Document Number	GTR 008	**SANS & TMH**		**Authorised by**	Colin Dalton	

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FOUNDATION INDICATOR

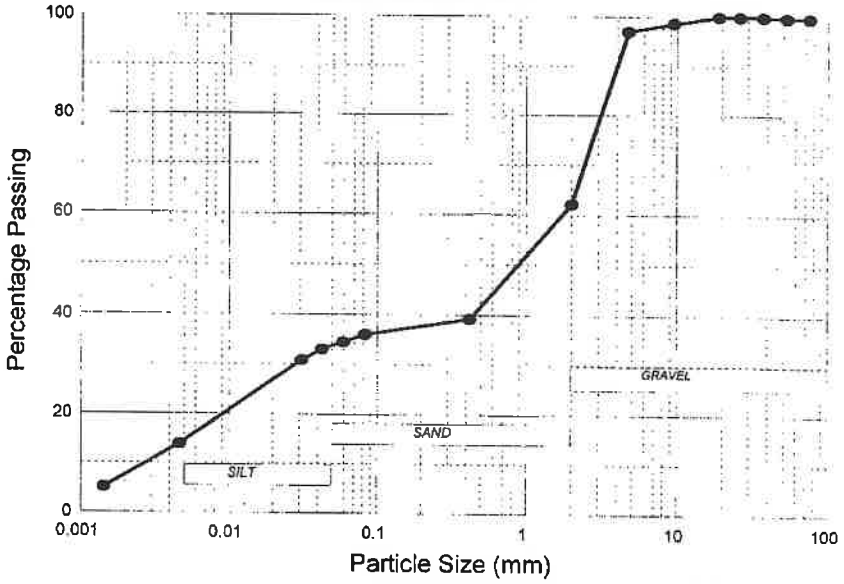
Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 1 @ 0,7 - 1,2m		
Date	25 JULY 2007	Test No	1228
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	98.67
4.75	97.05
2.00	62.13
0.425	39.26

GRADING ANALYSIS



HYDROMETER ANALYSIS

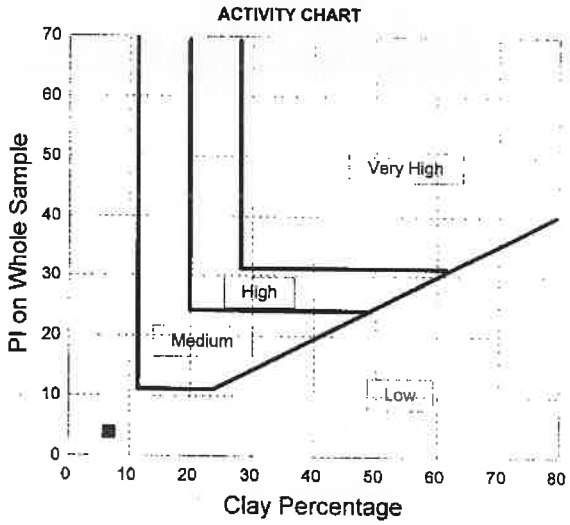
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0832	36.03
0.0599	34.56
0.0430	33.09
0.0312	30.88
0.0047	13.97
0.0014	5.15

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	29
Plastic Limit	19
Plastic Index	10
Linear Shrinkage	5
Grading Modulus	1.63
Moisture Content	21.48
PI on Whole Sample	4

ACTIVITY CHART



CHECKED BY:
M. RAMUNTSHI
DATE: 07/08/007

Programed Date
Revision No 3 (06/04/2001)

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FOUNDATION INDICATOR

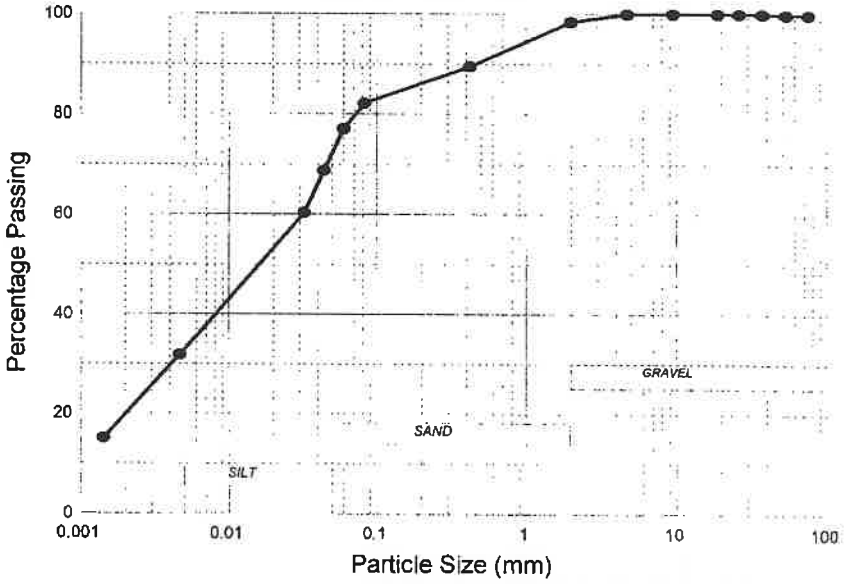
Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 1 @ 1,5 - 2,5m		
Date	25 JULY 2007	Test No	1229
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	100.00
2.00	98.43
0.425	89.54

GRADING ANALYSIS



HYDROMETER ANALYSIS

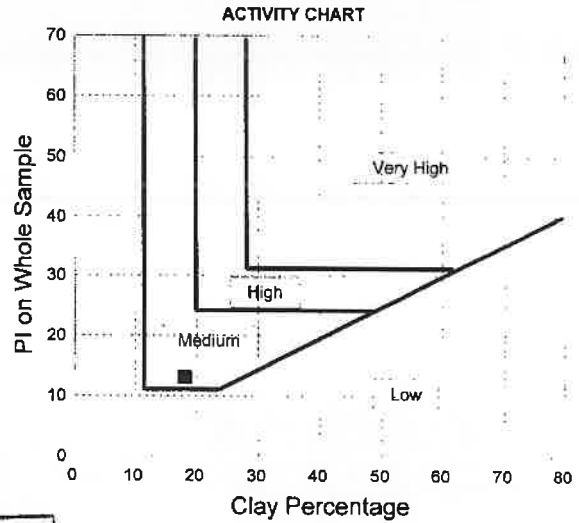
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0832	82.17
0.0604	77.14
0.0444	68.75
0.0326	60.37
0.0047	31.86
0.0014	15.09

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	41
Plastic Limit	26
Plastic Index	15
Linear Shrinkage	7
Grading Modulus	0.30
Moisture Content	23.27
PI on Whole Sample	13

ACTIVITY CHART



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FOUNDATION INDICATOR

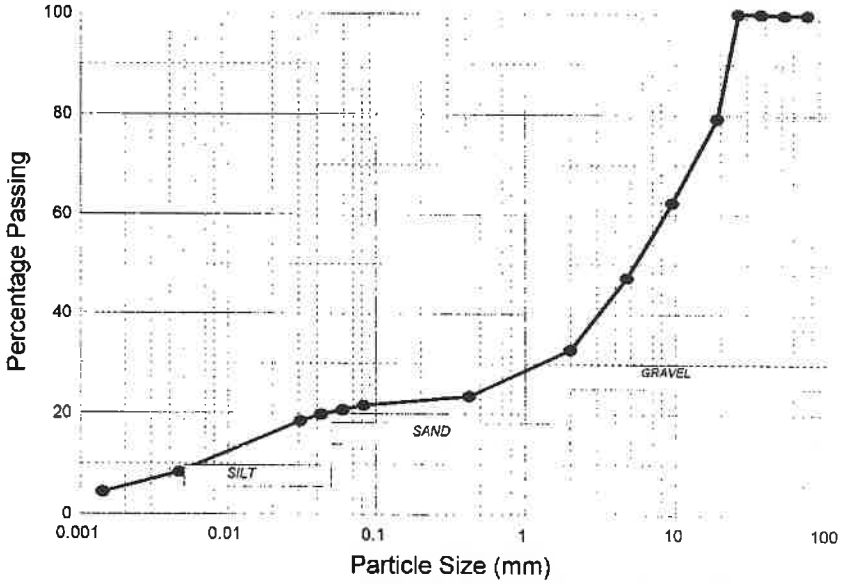
Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 3 @ 0,0 - 0,4m		
Date	25 JULY 2007	Test No	1230
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	79.28
9.50	62.42
4.75	47.33
2.00	32.80
0.425	23.60

GRADING ANALYSIS



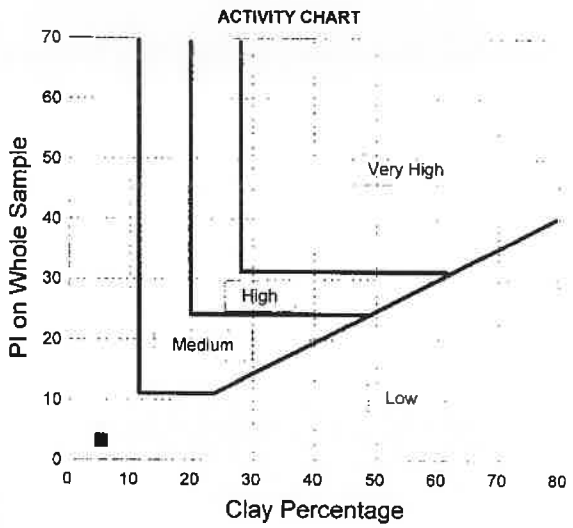
HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0832	21.66
0.0599	20.77
0.0430	19.89
0.0312	18.56
0.0047	8.40
0.0014	4.42

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	35
Plastic Limit	21
Plastic Index	14
Linear Shrinkage	7
Grading Modulus	2.22
Moisture Content	4.15
PI on Whole Sample	3



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FOUNDATION INDICATOR

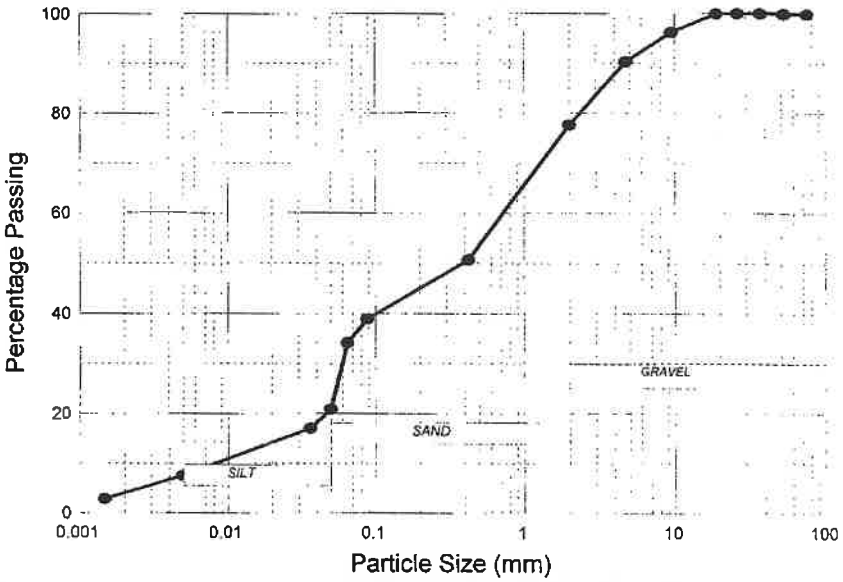
Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 3 @ 0,8 - 1,6m		
Date	25 JULY 2007	Test No	1231
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	96.31
4.75	90.33
2.00	77.67
0.425	50.74

GRADING ANALYSIS

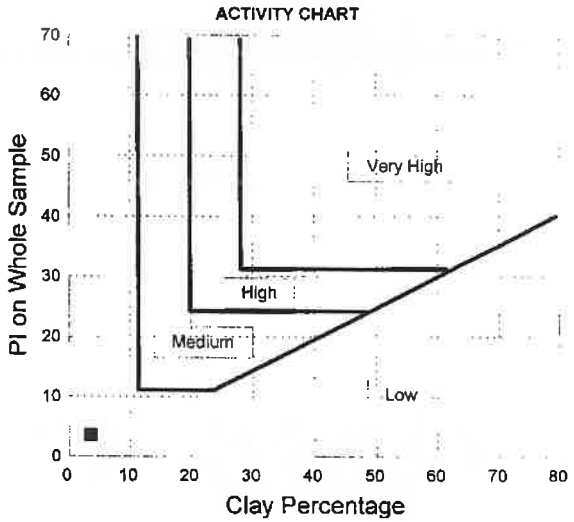


HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0888	38.96
0.0651	34.21
0.0504	20.91
0.0364	17.10
0.0050	7.60
0.0015	2.85

ACTIVITY CHART



ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	19
Plastic Limit	12
Plastic Index	7
Linear Shrinkage	3
Grading Modulus	1.33
Moisture Content	8.08
PI on Whole Sample	4

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FOUNDATION INDICATOR

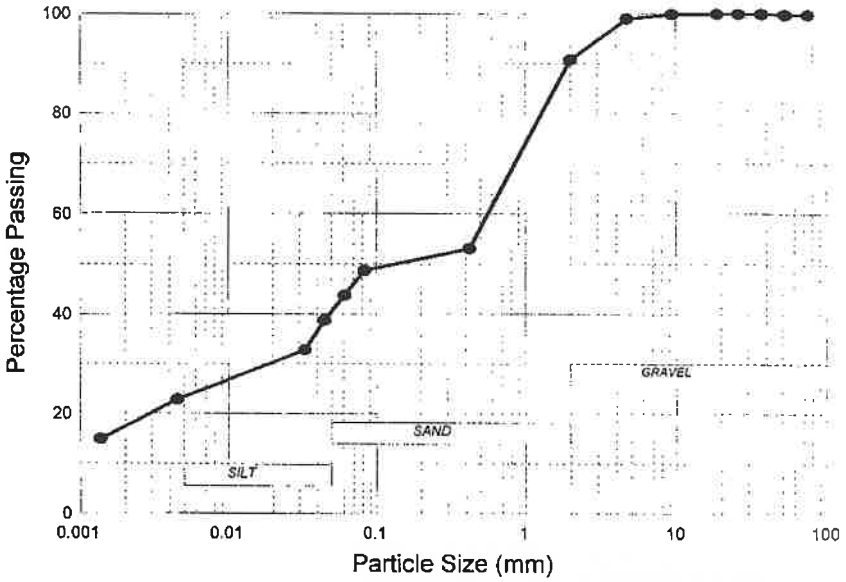
Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 4 @ 1,5 - 2,5m		
Date	25 JULY 2007	Test No	1232
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	99.94
4.75	99.03
2.00	90.77
0.425	53.09

GRADING ANALYSIS

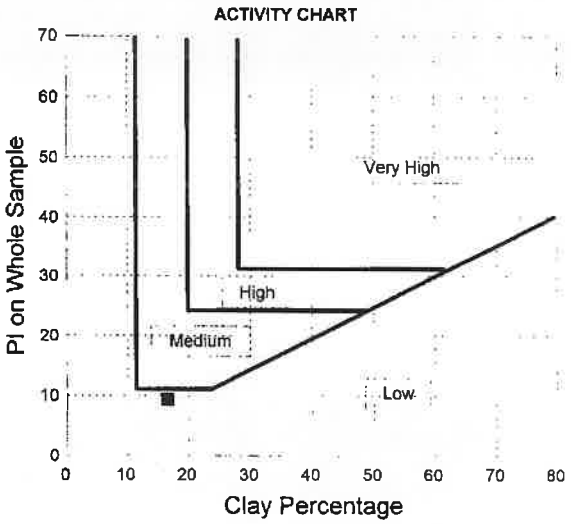


HYDROMETER ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0832	48.72
0.0613	43.75
0.0451	38.78
0.0332	32.81
0.0046	22.87
0.0014	14.91

ACTIVITY CHART



ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	39
Plastic Limit	21
Plastic Index	18
Linear Shrinkage	9
Grading Modulus	1.07
Moisture Content	13.33
PI on Whole Sample	9

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FOUNDATION INDICATOR

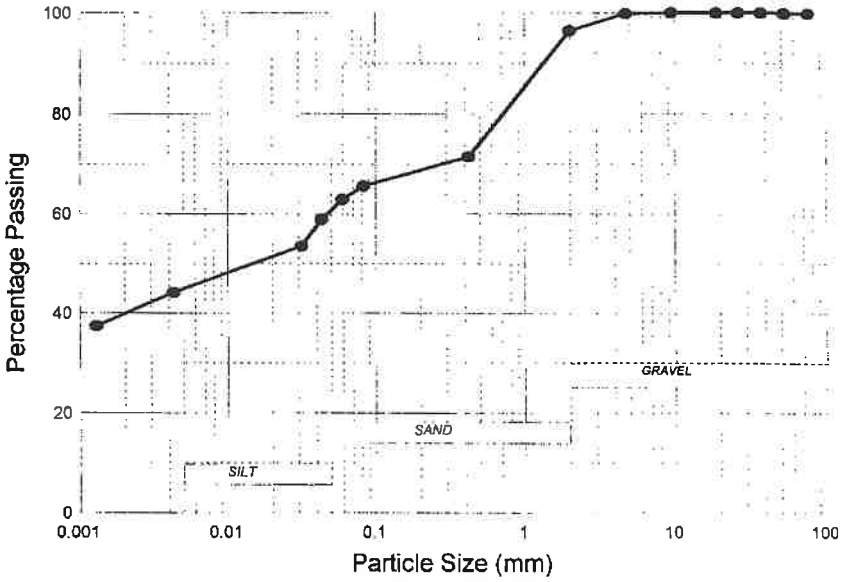
Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 6 @ 1,0 - 2,5m		
Date	25 JULY 2007	Test No	1233
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
75.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	100.00
9.50	100.00
4.75	99.91
2.00	96.48
0.425	71.50

GRADING ANALYSIS



HYDROMETER ANALYSIS

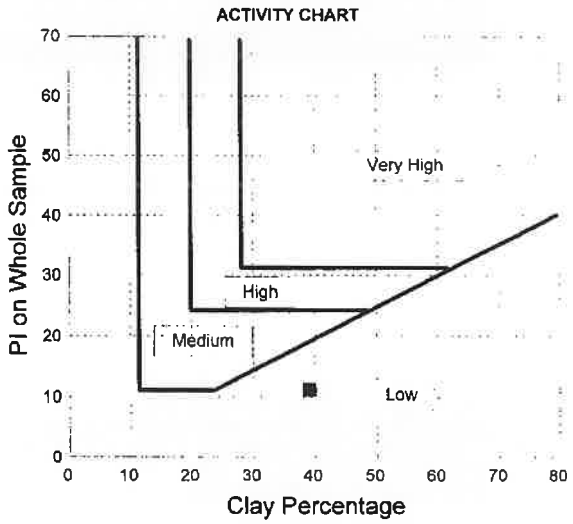
Values are expressed as a percentage of total sample

Sieve Size (mm)	Total Passing (%)
0.0832	65.61
0.0599	62.93
0.0434	58.92
0.0316	53.56
0.0043	44.19
0.0013	37.49

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	38
Plastic Limit	22
Plastic Index	16
Linear Shrinkage	8
Grading Modulus	0.66
Moisture Content	17.12
PI on Whole Sample	11

ACTIVITY CHART



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ROAD INDICATOR

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 2 @ 0,4 - 1,4m		
Date	25 JULY 2007	Test No	1235
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of the total sample

Sieve Size (mm)	Total Passing (%)
63.00	100.00
53.00	100.00
37.50	100.00
26.50	100.00
19.00	98.47
13.20	97.50
4.75	92.63
2.00	83.22
0.425	51.38
0.075	21.58
0.050	18.50

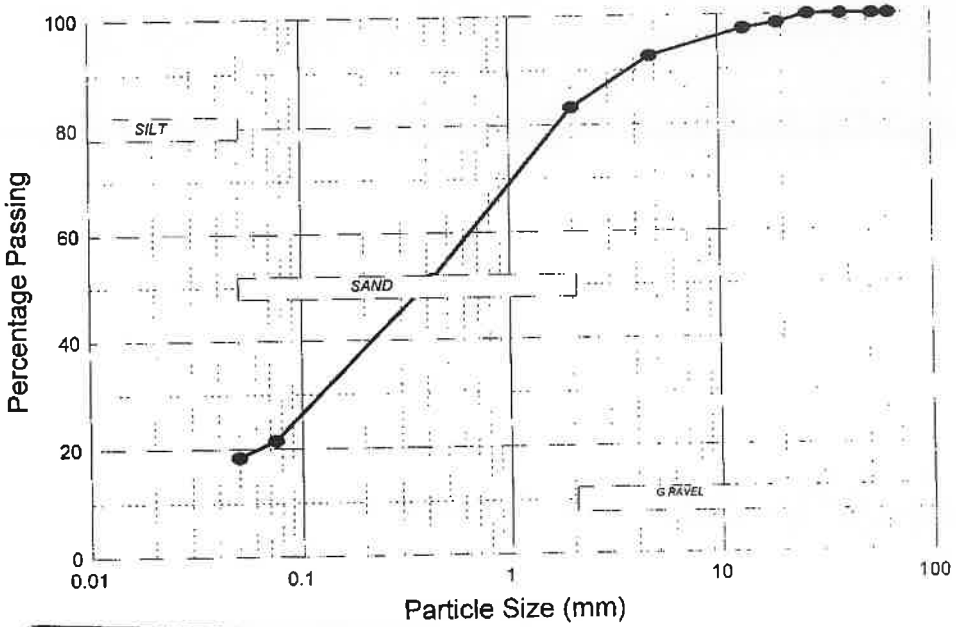
SOIL MORTAR ANALYSIS

Values are expressed as a percentage of the soil mortar

Coarse Sand : 2.0>CS>0.425	38.26
Fine Sand : 0.425>FS>0.05	39.51
Silt : 0.05>S>0.005	18.52
Clay : 0.005>C	3.70

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	30
Plastic Limit	15
Plastic Index	15
Linear Shrinkage	7
Grading Modulus	1.44
PI on Whole Sample	8



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14/08/007
M. RAMUNTSHI
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ROAD INDICATOR

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 5 @ 0,0 - 0,4m		
Date	25 JULY 2007	Test No	1236
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of the total sample

Sieve Size (mm)	Total Passing (%)
63.00	100.00
53.00	100.00
37.50	93.82
26.50	93.82
19.00	93.82
13.20	93.57
4.75	92.58
2.00	90.50
0.425	54.66
0.075	14.21
0.050	11.48

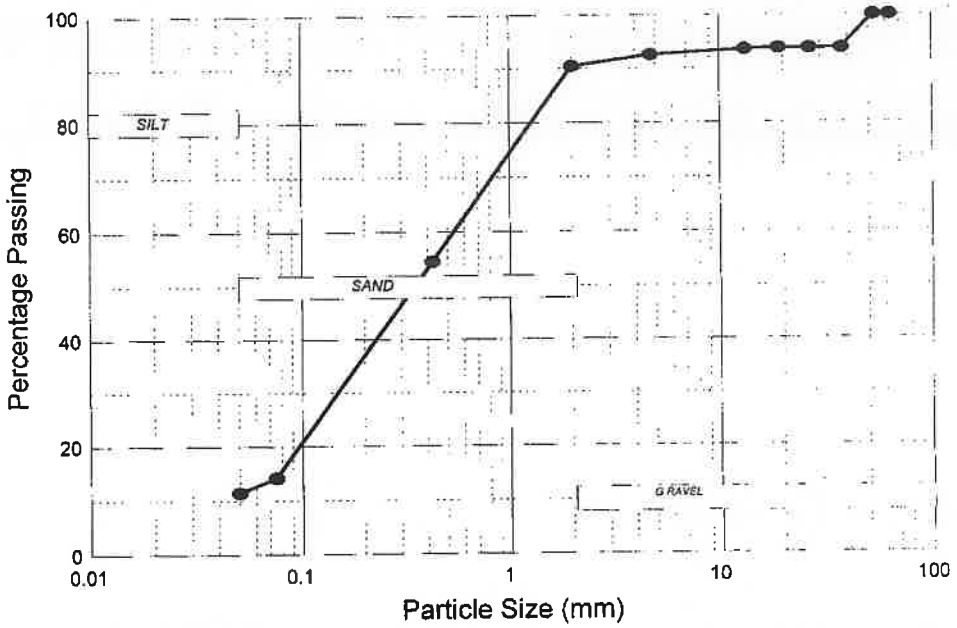
SOIL MORTAR ANALYSIS

Values are expressed as a percentage of the soil mortar

Coarse Sand : 2.0>CS>0.425	39.60
Fine Sand : 0.425>FS>0.05	47.71
Silt : 0.05>S>0.005	9.66
Clay : 0.005>C	3.02

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	Non Plastic
Plastic Limit	Non Plastic
Plastic Index	Non Plastic
Linear Shrinkage	1
Grading Modulus	1.41
PI on Whole Sample	Non Plastic



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ROAD INDICATOR

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 6 @ 0,0 - 0,9m		
Date	25 JULY 2007	Test No	1237
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of the total sample

Sieve Size (mm)	Total Passing (%)
63.00	100.00
53.00	87.69
37.50	60.18
26.50	53.65
19.00	48.43
13.20	42.69
4.75	24.52
2.00	16.59
0.425	12.65
0.075	3.92
0.050	3.29

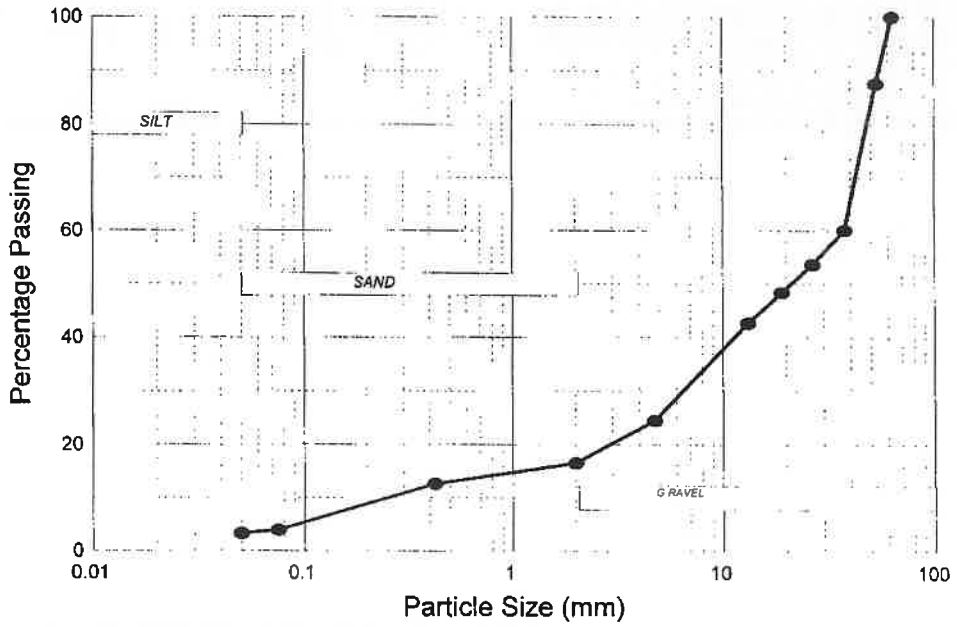
SOIL MORTAR ANALYSIS

Values are expressed as a percentage of the soil mortar

Coarse Sand : 2.0>CS>0.425	23.75
Fine Sand : 0.425>FS>0.05	56.42
Silt : 0.05>S>0.005	15.25
Clay : 0.005>C	4.57

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	19
Plastic Limit	13
Plastic Index	6
Linear Shrinkage	3
Grading Modulus	2.67
PI on Whole Sample	1



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ROAD INDICATOR

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 8 @ 0,3 - 1,5m		
Date	25 JULY 2007	Test No	1238
Job No	07257	Checked By	EB

SIEVE ANALYSIS

Values are expressed as a percentage of the total sample

Sieve Size (mm)	Total Passing (%)
63.00	100.00
53.00	100.00
37.50	80.24
26.50	80.24
19.00	79.07
13.20	76.89
4.75	68.16
2.00	59.79
0.425	43.23
0.075	18.16
0.050	15.56

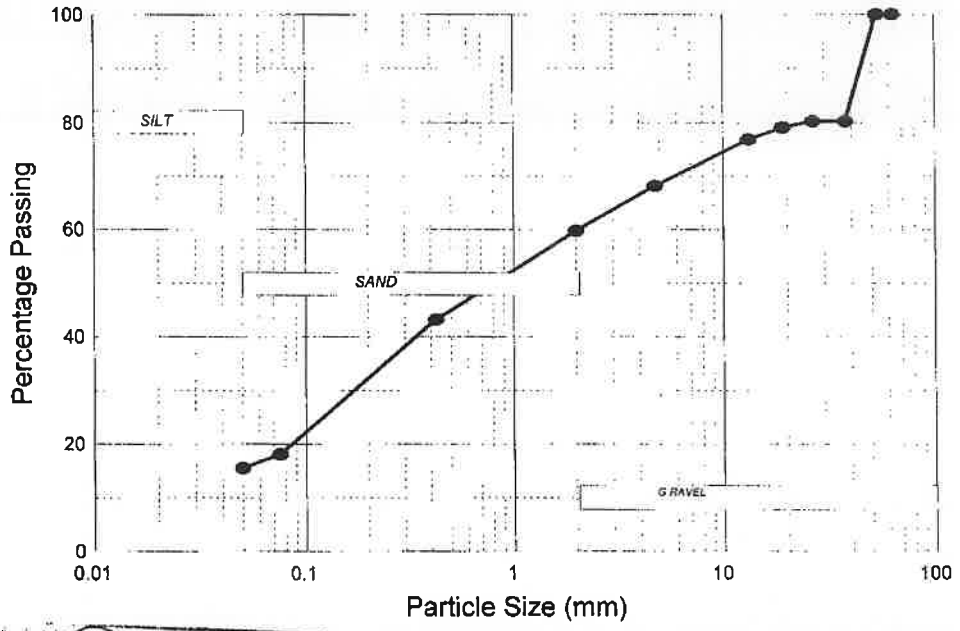
SOIL MORTAR ANALYSIS

Values are expressed as a percentage of the soil mortar

Coarse Sand : 2.0>CS>0.425	27.69
Fine Sand : 0.425>FS>0.05	46.28
Silt : 0.05>S>0.005	20.97
Clay : 0.005>C	5.06

ATTERBERG LIMITS & OTHER VALUES

Liquid Limit	32
Plastic Limit	18
Plastic Index	14
Linear Shrinkage	7
Grading Modulus	1.79
PI on Whole Sample	6



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Foundation Indicator Test Data

Project	ROSSITER STAND		
Project No.	F29/09/2006	Date	2 October 2006

Sample No.	U494		
Field Ref. No.	TP 6		
Depth	0.8		
Sieve size	%Passing	% Passing	% Passing
75.00	100		
63.00	100		
53.00	100		
37.50	100		
26.50	100		
19.00	100		
13.20	100		
4.75	94		
2.00	88		
0.85	77		
0.425	67		
0.25	63		
0.15	57		
0.075	49		
0.04	34		
0.02	25		
0.006	19		
0.002	15		

Sample No.	U494		
%Gravel	12		
%Sand	45		
%Silt	29		
%Clay	15		
NMC %	Not Tested		
Liquid Limit	31		
Plasticity Index	11		
Linear Shrink.	6.5		
Overall P.I.	7		
Grading Modulus	0.96		
H.R.B.	A-6 (3)		
Unified	SC		
Weston swell (%) at 1 kPa			

Analysis as per method D422 of ASTM of 1985
The results reported relate only to the samples tested.
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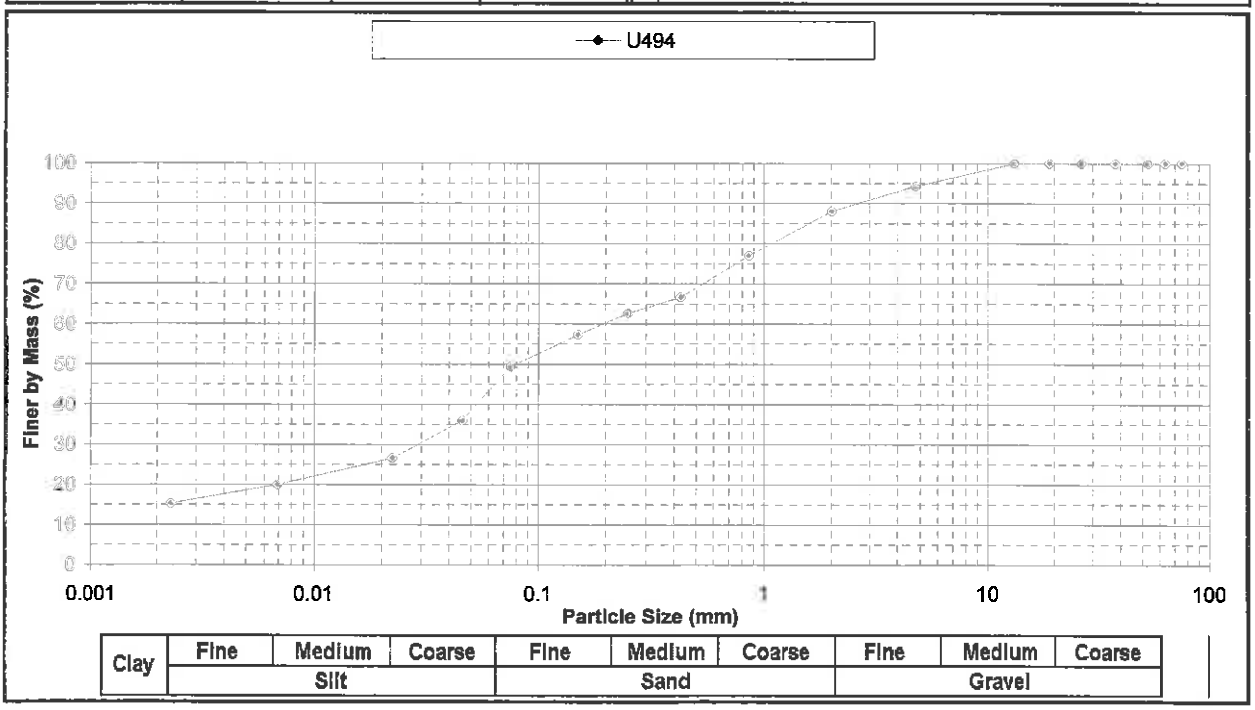

Remarks:

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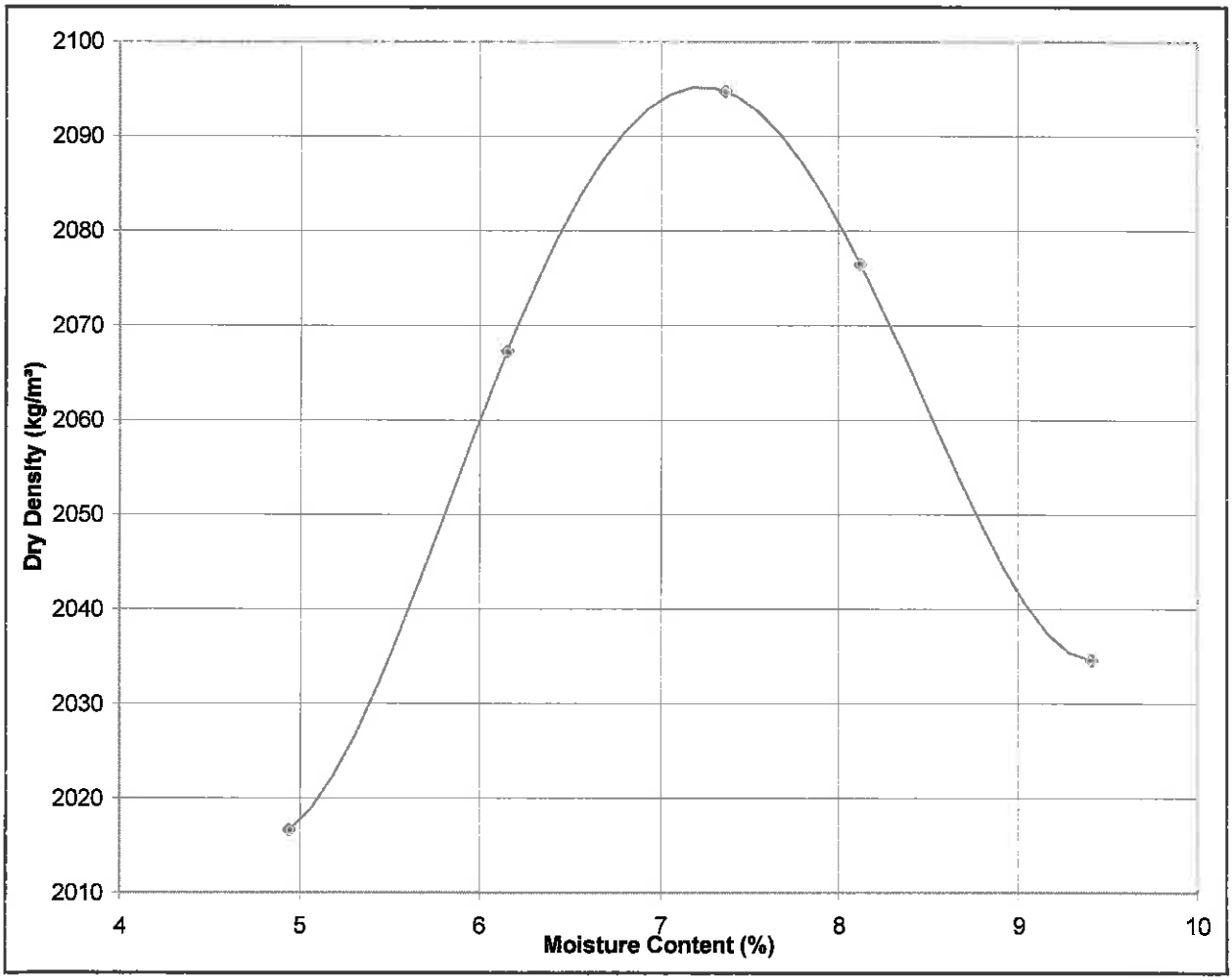
Moisture Density Relationship

Project:	ROSSITER'S - STAND		
Project No.:	1039/F12/10/2006	Date:	18 October 2006
Field Reference:	STD Rossiter	Laboratory Ref.:	V098
Depth (m):		Remarks:	Untreated
Description:			

Compactive Effort: **Mod. AASHTO**

Percent Water Content (%):	8.1	9.4	6.2	4.9	7.4				
Dry Density (kg/m^3):	2076	2035	2067	2017	2095				

Maximum Dry Density:	**2095 kg/m^3**	**Optimum Moisture Content:**	**7.2 %**



Analysis according to Method A7 of TMH1 of 1986.
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Remarks:

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Email: jhb@civilab.co.za • Website: www.civilab.co.za

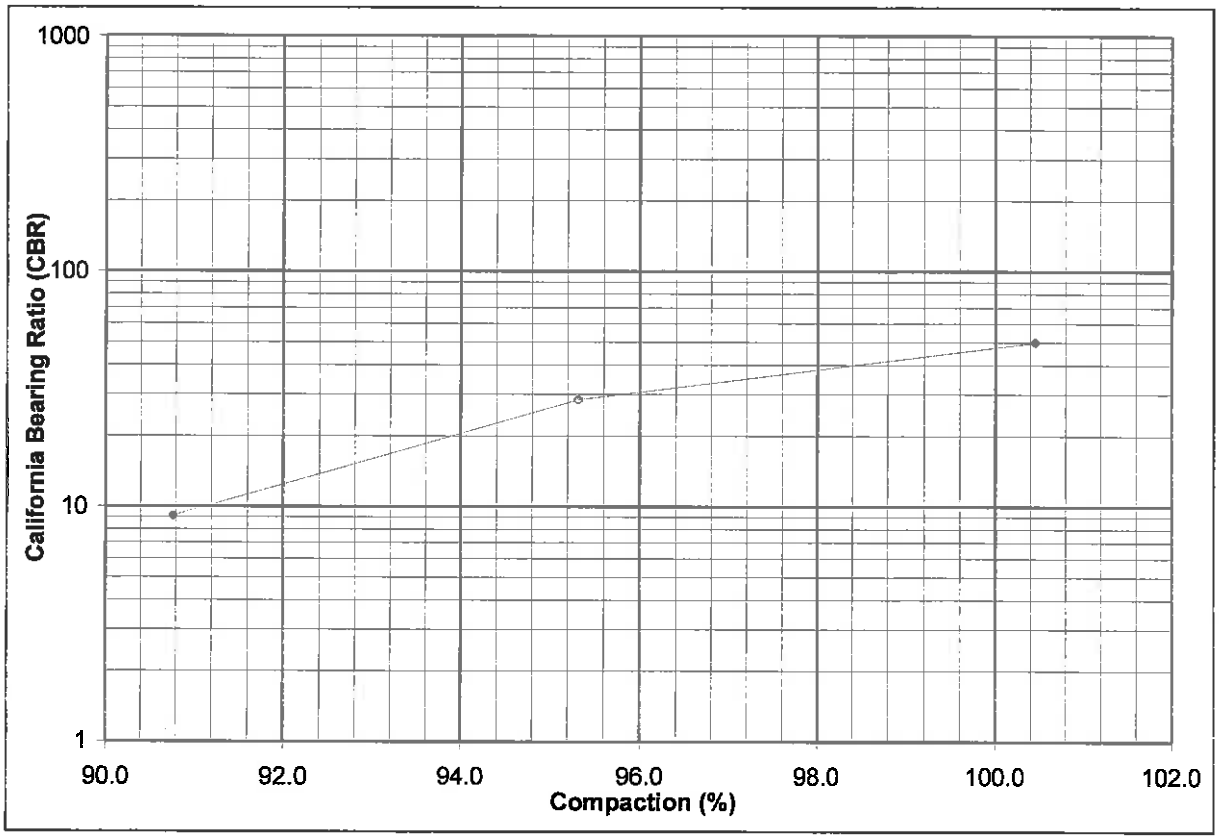
Civilab
Civil Engineering Testing Laboratories

California Bearing Ratio Results

Project:	ROSSITER'S - STAND		
Project No.:	1039/F12/10/2006	Date:	30 Oct 2006
Field Reference:	STD Rossiter	Lab. Sample Ref:	V098
Depth (m):		Remarks:	
Description:			

CBR at			Swell	Final Moisture Content	Mod AASHTO Data		CBR Compaction Data		
2.54 (mm)	5.08 (mm)	7.62 (mm)	(%)	(%)	Max Dry Density (kg/m³)	Optimum Moisture (%)	Dry Density (kg/m³)	Com-paction (%)	Moisture Content (%)
50	60	64	0.1	9.2	2095	7.2	2105	100.4	7.3
28	29	28	0.3	10.6			1997	95.3	
9	10	11	0.1	12.1			1902	90.8	

Interpolated Data	Compaction	90%	93%	95%	98%	100%
	CBR	7.5	15.9	26.3	38.2	47.5



The samples were tested in accordance with Method A8 of TMH1 of 1990.
The results reported relate only to the samples tested.

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C.B.R. DETERMINATION

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 2 @ 0,4 - 1,4m		
Date	25 JULY 2007	Test No	1235
Job No	07257	Checked By	EB

Direct Results from Test Procedure

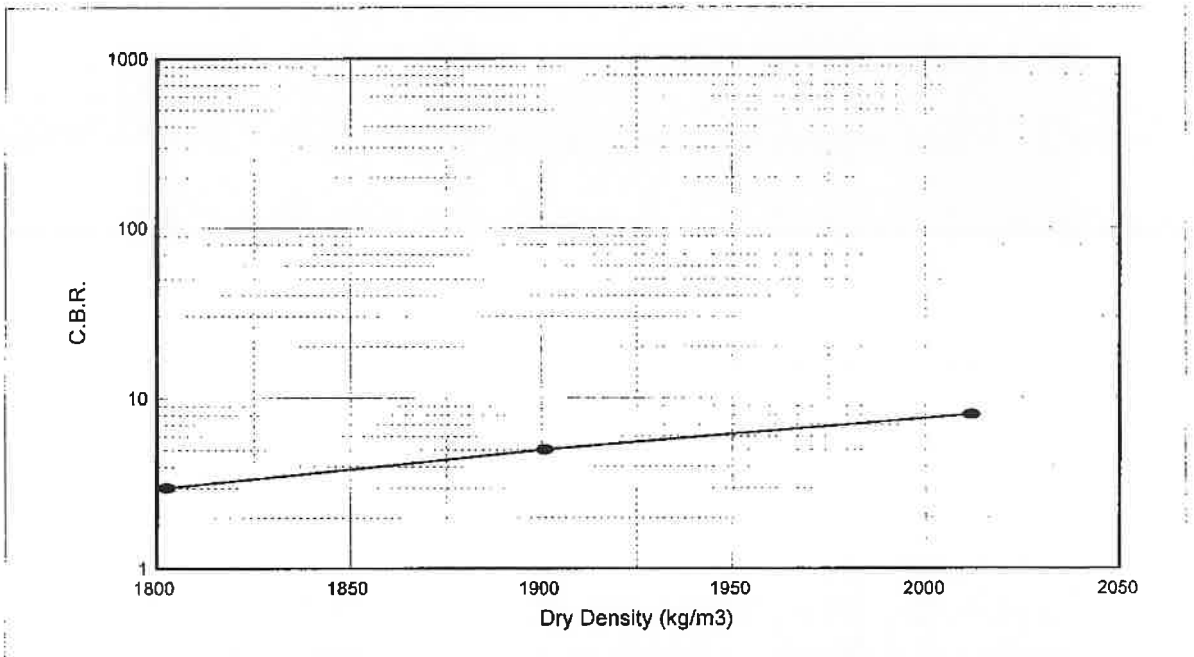
Maximum Dry Density (kg/m3)	2005

Optimum Moisture Content (%)	9.8

Percentage Mod AASHTO	100.3	94.8	89.9
CBR	8	5	3
Average Moisture Content (%)		9.8	
Percentage Swell	0.05	0.06	0.10

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	3	4	5	7	8



CHECKED BY:
M. RAMUNTSHI
DATE : 14/08/007

TRH 14 CLASSIFICATION
G8

Programed Data
Revision No 1 (28/02/2001)

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C.B.R. DETERMINATION

Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE B 4 /1 @ 1,0 - 1,5m		
Date	25 NOVEMBER 2019	Test No	3609
Job No	19359	Checked By	EB
Calibration Date	15 May 2018	Calibration Certificate	9475

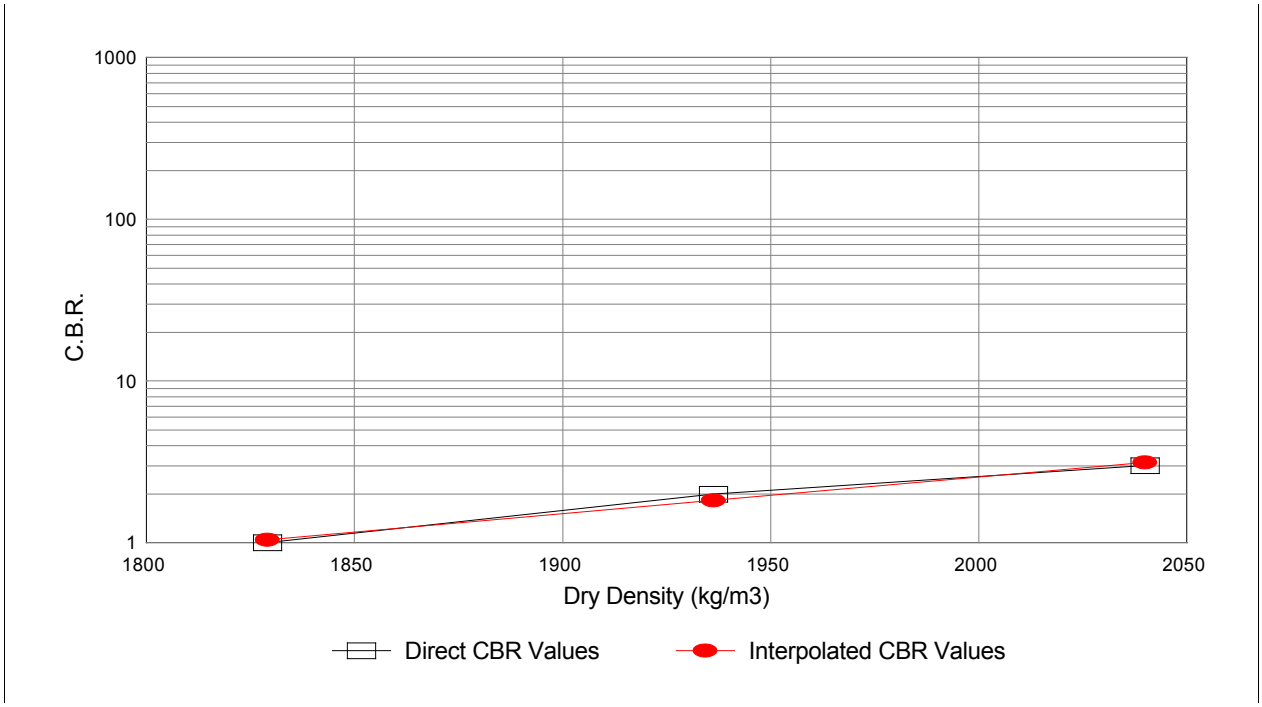
Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2036	Optimum Moisture Content (%)	10.4

Percentage Mod AASHTO	100.2	95.1	89.8
CBR @ 2.54mm	3	2	1
CBR @ 5.08mm	3	2	1
CBR@ 7.62mm	3	2	1
Average Moisture Content (%)	10.1		
Percentage Swell	0.87	0.91	1.02

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	1	1	2	2	3



Programed Data
Revision No 5 (1/11/2017)

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C.B.R. DETERMINATION

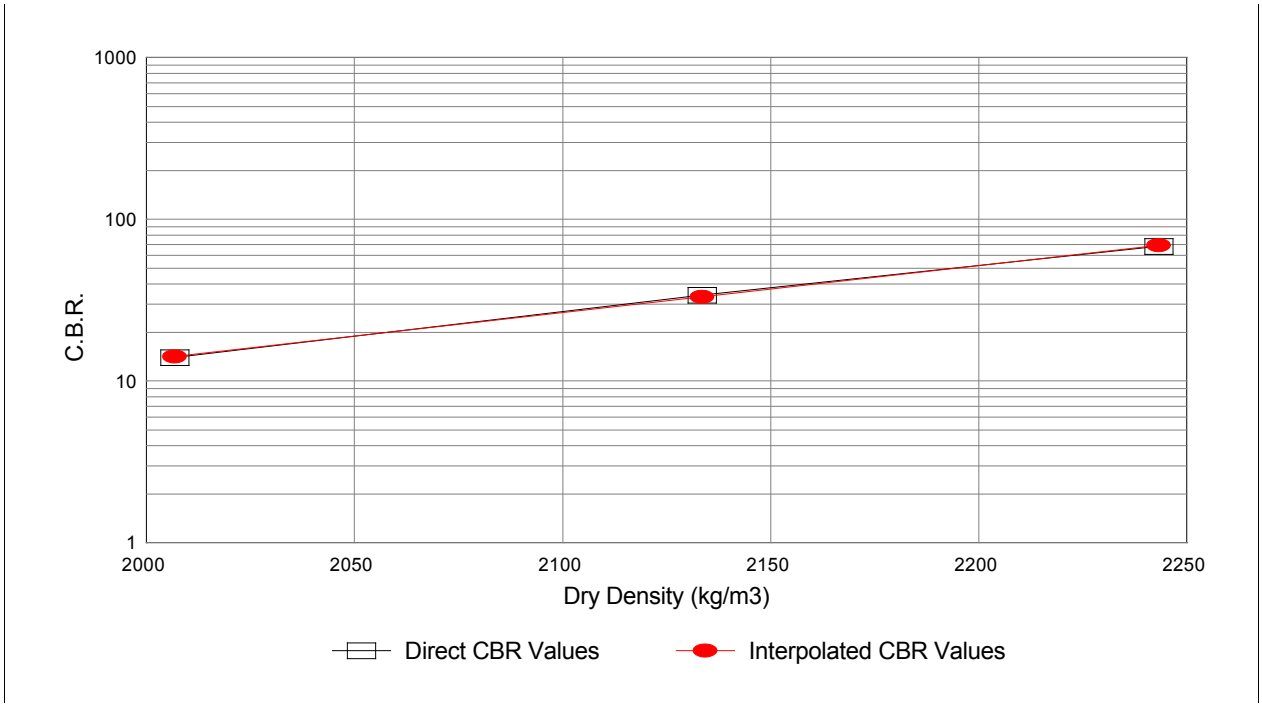
Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE B 5 /1 @ 0,2 - 0,55m		
Date	25 NOVEMBER 2019	Test No	3611
Job No	19359	Checked By	EB
Calibration Date	15 May 2018	Calibration Certificate	9475

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2236	Optimum Moisture Content (%)	6.4	
Percentage Mod AASHTO	100.3	95.4	89.8	
CBR @ 2.54mm	68	34	14	
CBR @ 5.08mm	69	34	14	
CBR@ 7.62mm	70	35	16	
Average Moisture Content (%)	6.4			
Percentage Swell	0.26	0.40	0.50	

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	15	23	31	49	66



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C.B.R. DETERMINATION

Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE	B 6 /1 @ 1,4 - 2,5m	
Date	25 NOVEMBER 2019	Test No	3613
Job No	19359	Checked By	EB
Calibration Date	15 May 2018	Calibration Certificate	9475

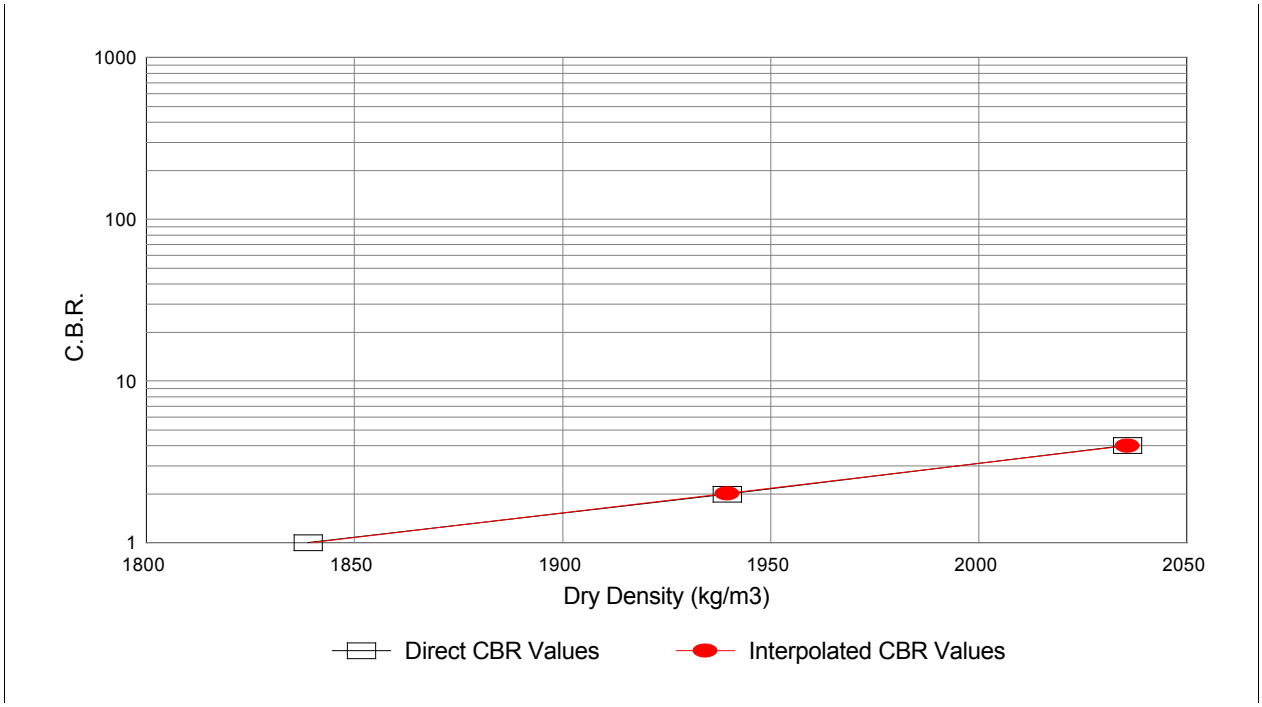
Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2037	Optimum Moisture Content (%)	9.2

Percentage Mod AASHTO	99.9	95.2	90.3
CBR @ 2.54mm	4	2	1
CBR @ 5.08mm	4	2	1
CBR@ 7.62mm	5	3	1
Average Moisture Content (%)		9.4	
Percentage Swell	0.79	0.88	0.99

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	1	1	2	3	4



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C.B.R. DETERMINATION

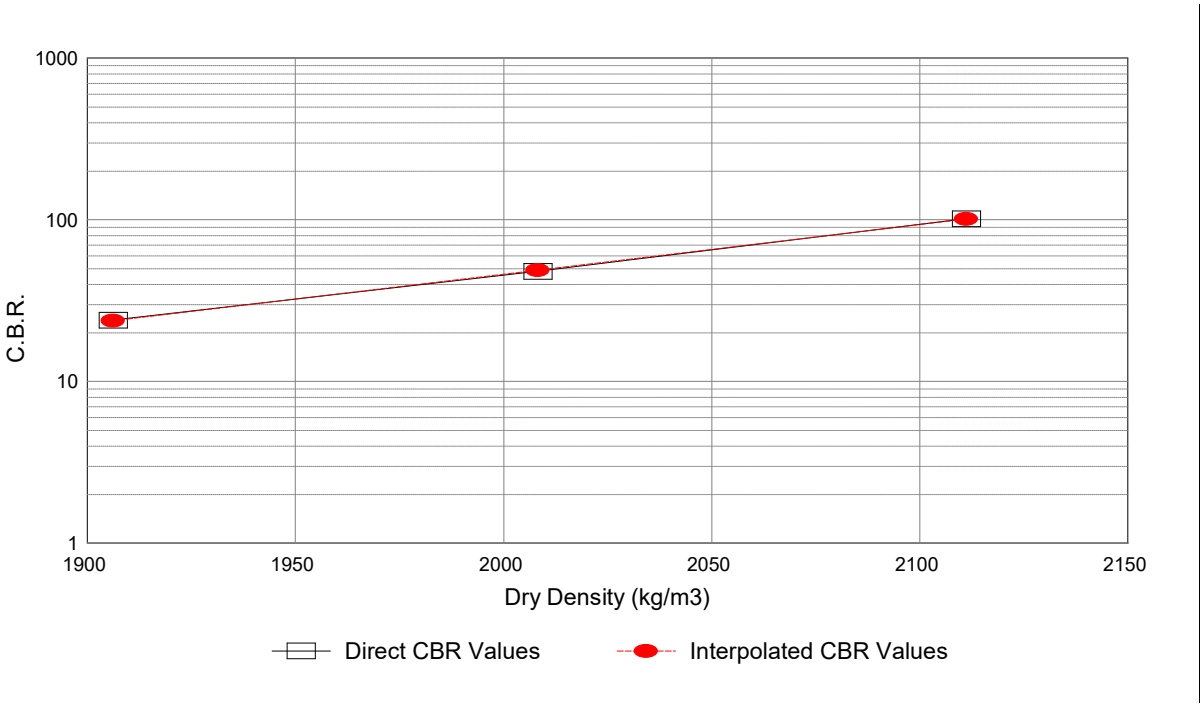
Client	GEOID Geotechnical Engineer		
Location	Lanseria	B10/1 @ 0,1 - 0,5m	
Date	06 March 2024	Test No	1117
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2116	Optimum Moisture Content (%)	5,4	
Percentage Mod AASHTO	99,8	94,9	90,1	
CBR @ 2.54mm	102	48	24	
CBR @ 5.08mm	104	52	27	
CBR@ 7.62mm	105	67	28	
Average Moisture Content (%)		5,5		
Percentage Swell	0,31	0,39	0,47	

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	23	37	50	78	105



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineer		
Location	Lanseria	B11/1 @ 0,7 - 2,5m	
Date	06 March 2024	Test No	1119
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

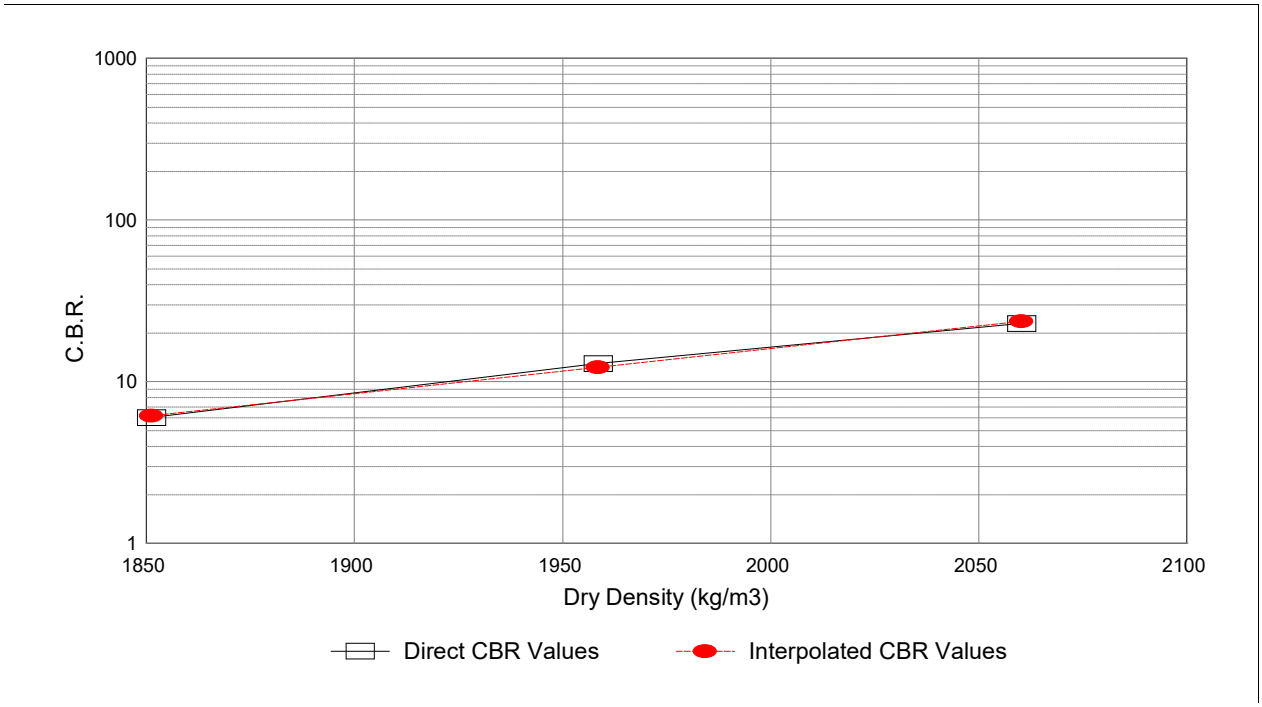
Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2060	Optimum Moisture Content (%)	8,6

Percentage Mod AASHTO	100,0	95,1	89,9
CBR @ 2.54mm	23	13	6
CBR @ 5.08mm	32	15	8
CBR@ 7.62mm	34	17	10
Average Moisture Content (%)		8,5	
Percentage Swell	0,12	0,17	0,23

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	6	9	12	18	24



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C.B.R. DETERMINATION

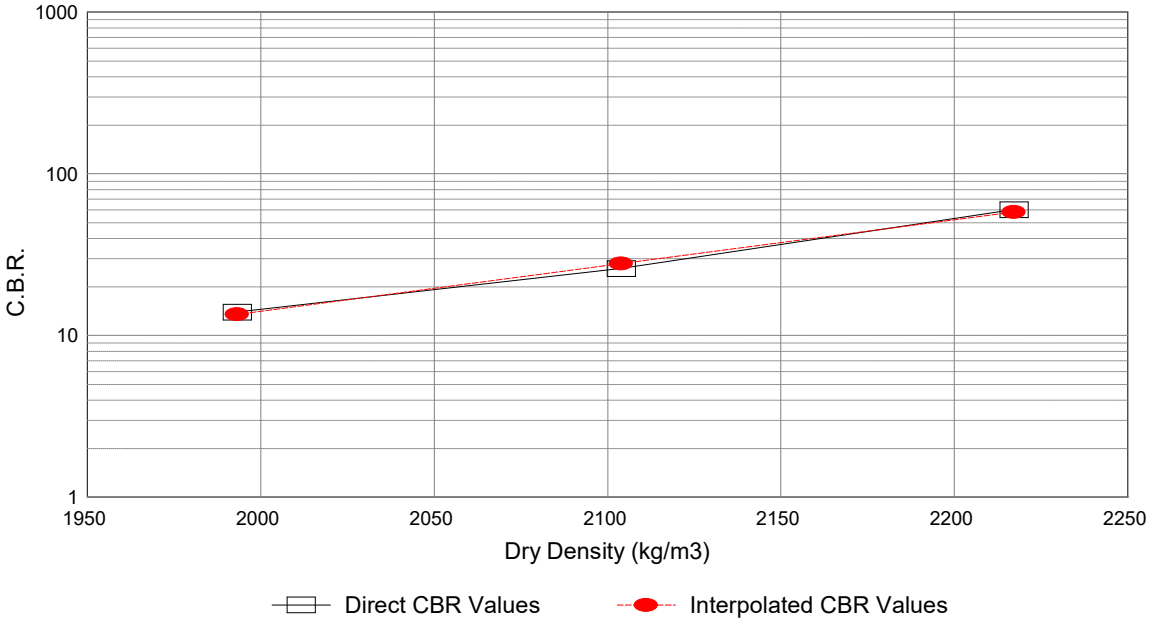
Client	GEOID Geotechnical Engineer		
Location	Lanseria	B19/1 @ 0,1 - 2,7m	
Date	06 March 2024	Test No	1121
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2220		Optimum Moisture Content (%)	6,2	
Percentage Mod AASHTO	99,9	94,8	89,8		
CBR @ 2.54mm	60	26	14		
CBR @ 5.08mm	63	33	15		
CBR@ 7.62mm	83	41	22		
Average Moisture Content (%)		6,2			
Percentage Swell	0,05	0,07	0,10		

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	14	21	29	44	59



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C.B.R. DETERMINATION

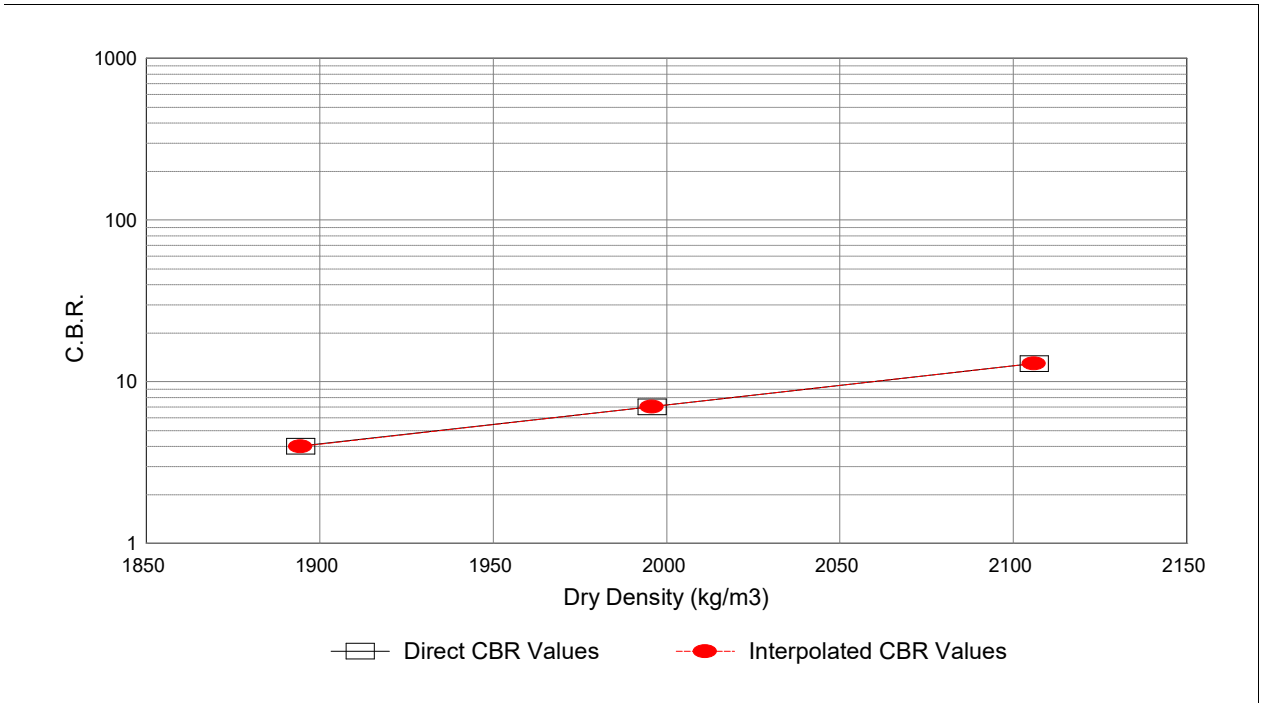
Client	GEOID Geotechnical Engineers		
Location	Lanseria	B21/1 @ 1,0 - 2,0m	
Date	06 March 2024	Test No	1123
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2102		Optimum Moisture Content (%)	8,1	
Percentage Mod AASHTO	100,2	95,0	90,1		
CBR @ 2.54mm	13	7	4		
CBR @ 5.08mm	16	8	4		
CBR@ 7.62mm	17	8	4		
Average Moisture Content (%)		8,2			
Percentage Swell	0,79	0,91	1,01		

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	4	6	7	10	13



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineer		
Location	Lanseria	B23/1 @ 1,6 - 2,3m	
Date	06 March 2024	Test No	1125
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

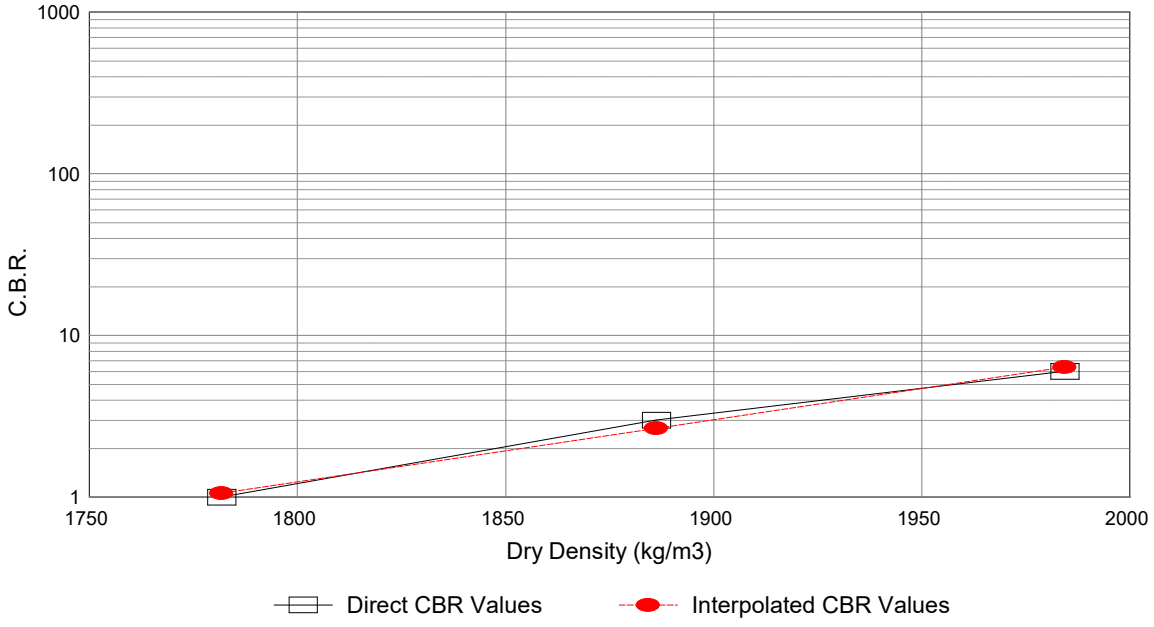
Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	1986	Optimum Moisture Content (%)	8,5

Percentage Mod AASHTO	99,9	95,0	89,7
CBR @ 2.54mm	6	3	1
CBR @ 5.08mm	5	3	1
CBR@ 7.62mm	6	3	1
Average Moisture Content (%)		8,7	
Percentage Swell	0,85	0,98	1,12

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	1	2	3	5	6



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C.B.R. DETERMINATION

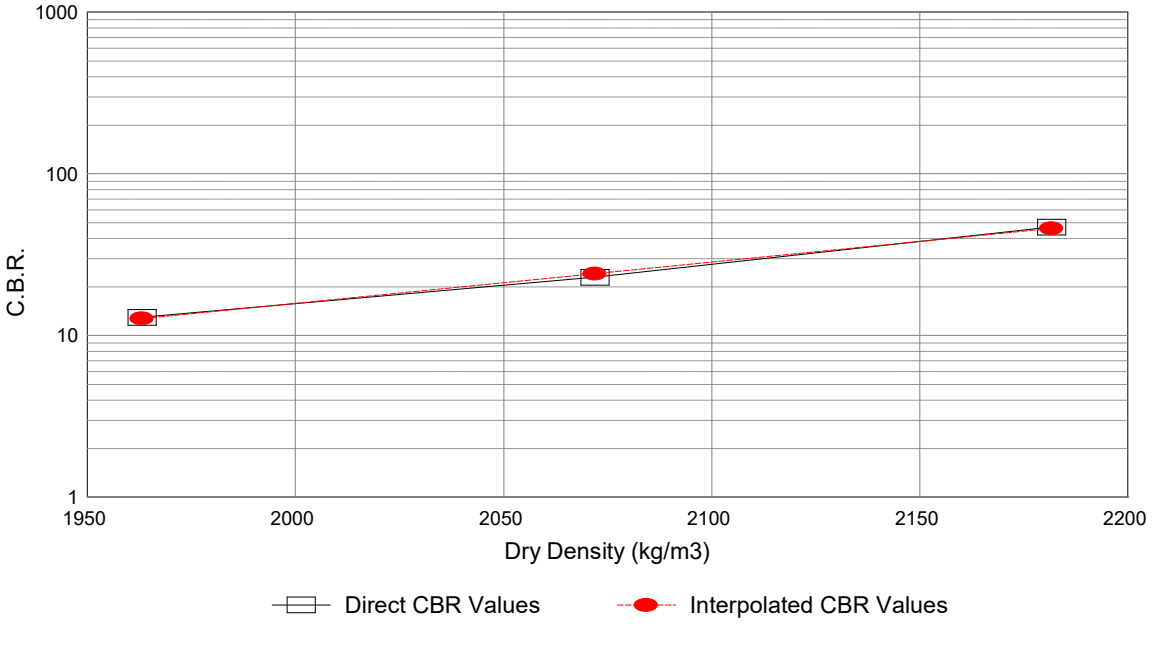
Client	GEOID Geotechnical Engineer		
Location	Lanseria	B26/1 @ 0,1 - 0,8m	
Date	06 March 2024	Test No	1127
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2191	Optimum Moisture Content (%)	6,5	
Percentage Mod AASHTO	99,6	94,6	89,6	
CBR @ 2.54mm	47	23	13	
CBR @ 5.08mm	54	33	16	
CBR@ 7.62mm	60	35	17	
Average Moisture Content (%)		6,6		
Percentage Swell	0,19	0,28	0,36	

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	13	20	25	37	48



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C.B.R. DETERMINATION

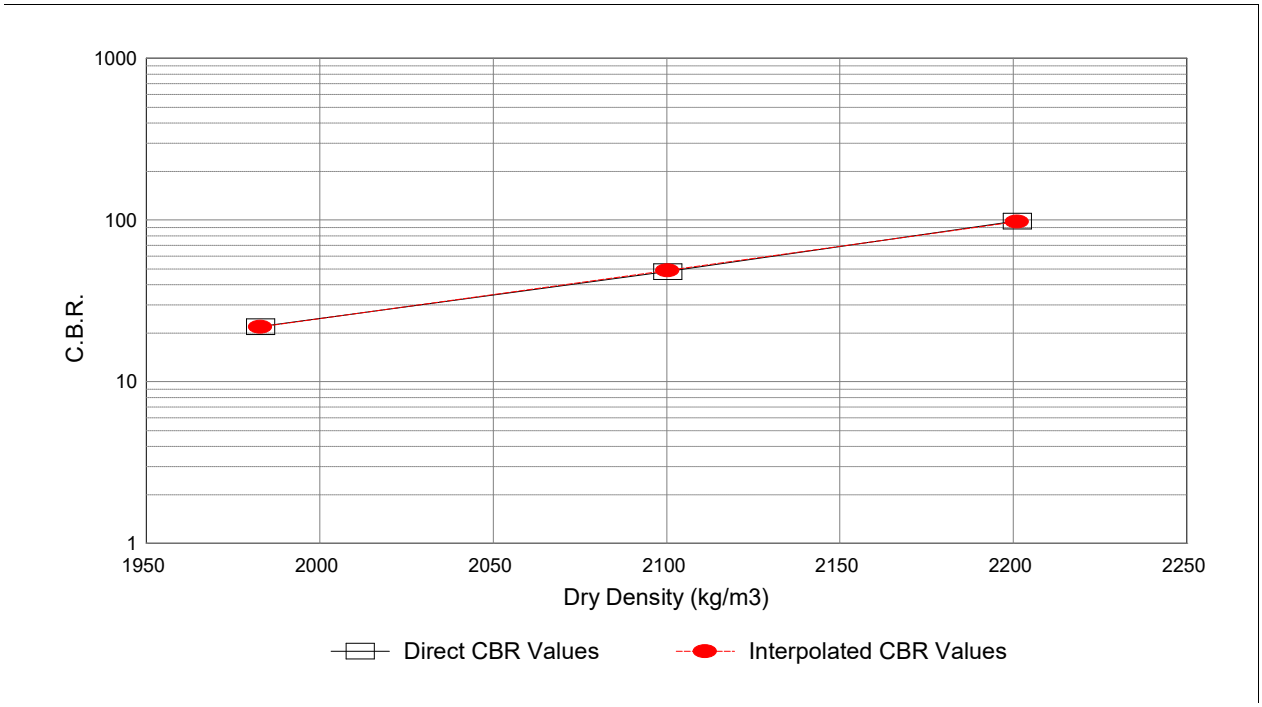
Client	GEOID Geotechnical Engineers		
Location	Lanseria	B30/1 @ 0,1 - 0,5m	
Date	06 March 2024	Test No	1257
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2202		Optimum Moisture Content (%)	6,2	
Percentage Mod AASHTO	99,9	95,4	90,0		
CBR @ 2.54mm	99	48	22		
CBR @ 5.08mm	105	52	24		
CBR@ 7.62mm	114	62	29		
Average Moisture Content (%)		6,2			
Percentage Swell	0,38	0,50	0,66		

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	22	34	46	73	99



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineers		
Location	Lanseria	TH 33/B33/1 @ 1,2 - 2,9m	
Date	06 March 2024	Test No	1255
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

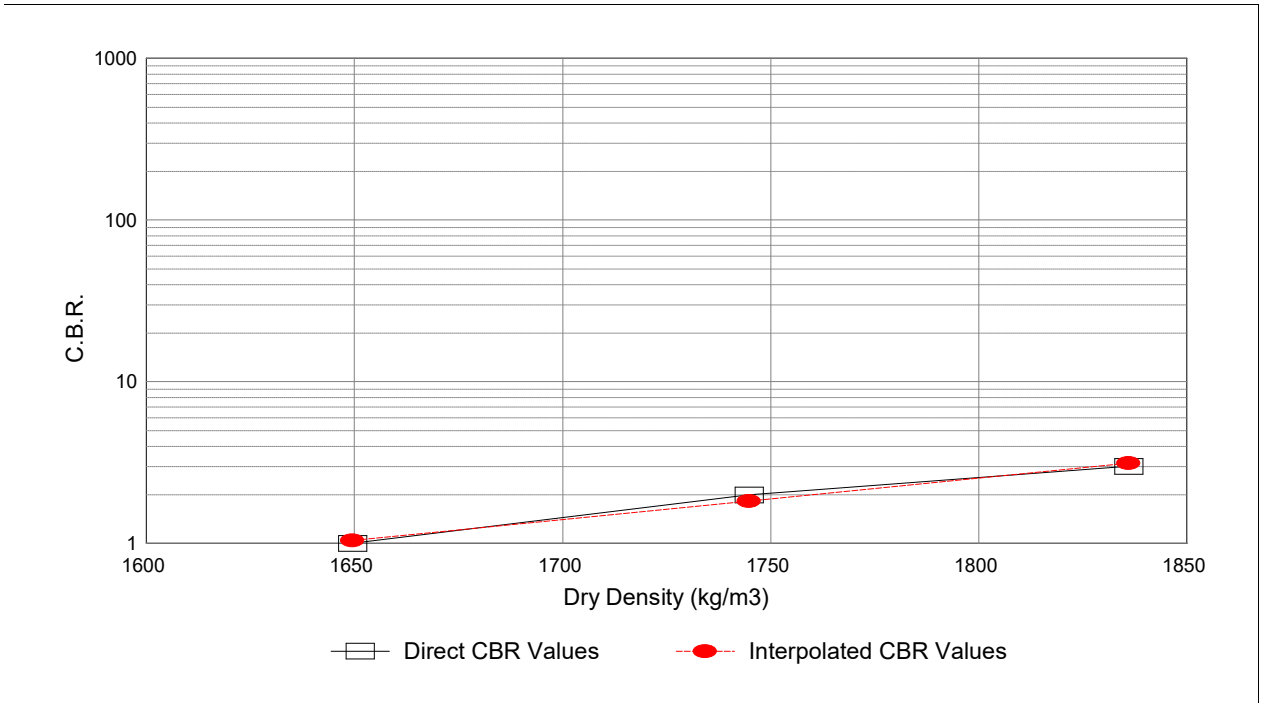
Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	1834	Optimum Moisture Content (%)	14,3

Percentage Mod AASHTO	100,1	95,1	89,9
CBR @ 2.54mm	3	2	1
CBR @ 5.08mm	3	2	1
CBR@ 7.62mm	3	2	1
Average Moisture Content (%)		13,9	
Percentage Swell	1,13	1,26	1,37

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	1	1	2	3	3



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineer		
Location	Lanseria	B34/1 @ 0,1 - 2,4m	
Date	06 March 2024	Test No	1129
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

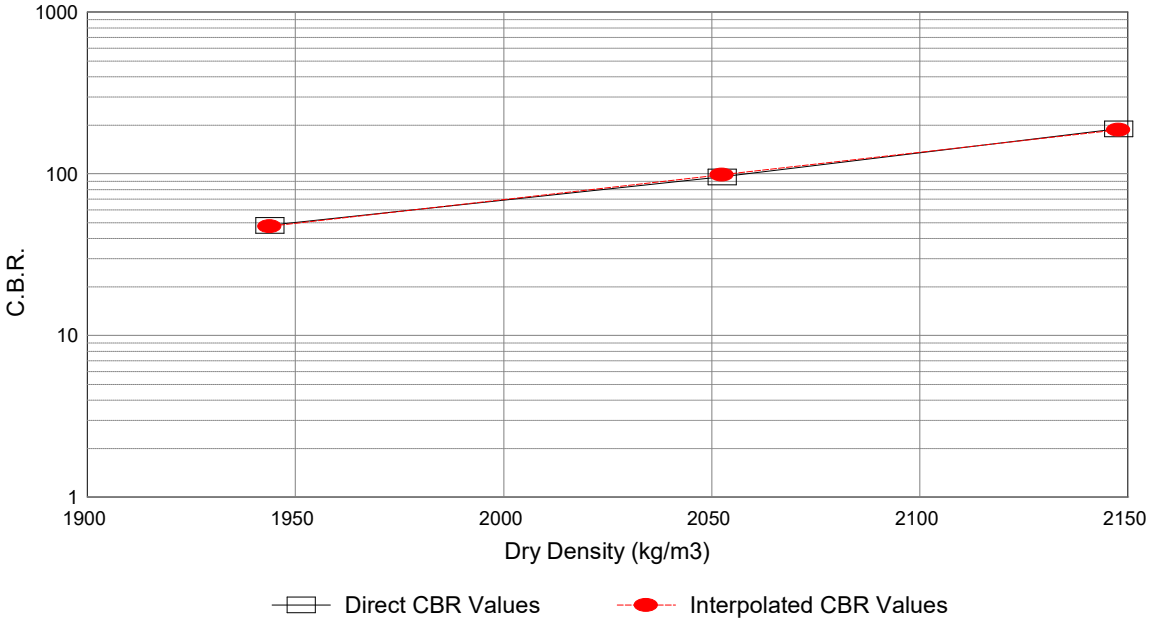
Maximum Dry Density (kg/m3)	2157

Optimum Moisture Content (%)	5,4

Percentage Mod AASHTO	99,6	95,1	90,1
CBR @ 2.54mm	190	96	48
CBR @ 5.08mm	198	99	49
CBR@ 7.62mm	208	105	49
Average Moisture Content (%)		5,2	
Percentage Swell	0,25	0,35	0,40

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	47	72	97	149	200



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineer		
Location	Lanseria	B35/1 @ 0,3 - 0,8m	
Date	06 March 2024	Test No	1131
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

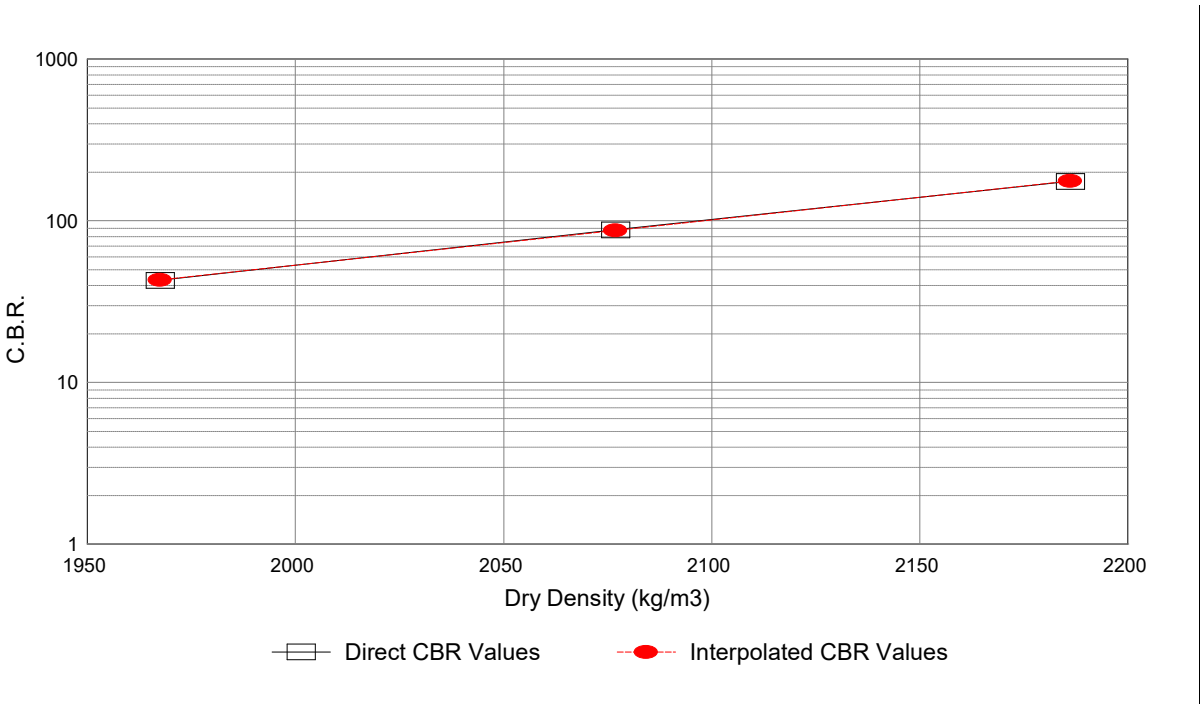
Maximum Dry Density (kg/m3)	2183

Optimum Moisture Content (%)	6,4

Percentage Mod AASHTO	100,1	95,1	90,1
CBR @ 2.54mm	176	88	43
CBR @ 5.08mm	189	98	48
CBR@ 7.62mm	202	110	52
Average Moisture Content (%)		6,3	
Percentage Swell	0,35	0,43	0,51

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	42	65	86	131	173



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineers		
Location	Lanseria	TH1/1 @ 2,6 - 3,6m	
Date	06 March 2024	Test No	1259
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

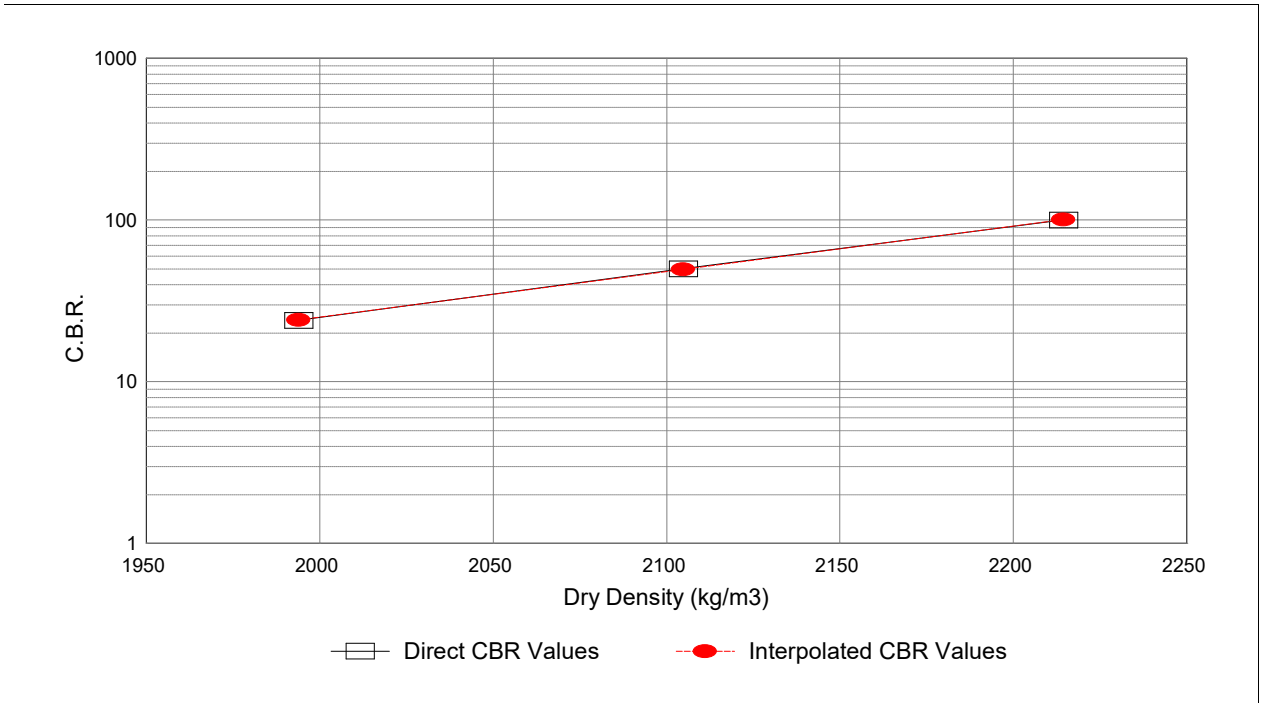
Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2218	Optimum Moisture Content (%)	4,1

Percentage Mod AASHTO	99,8	94,9	89,9
CBR @ 2.54mm	100	50	24
CBR @ 5.08mm	106	52	26
CBR@ 7.62mm	114	56	27
Average Moisture Content (%)		4,0	
Percentage Swell	0,16	0,24	0,31

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	25	38	50	77	103



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineer		
Location	Lanseria	B/TH2/1 @ 2,9 - 3,6m	
Date	06 March 2024	Test No	1135
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

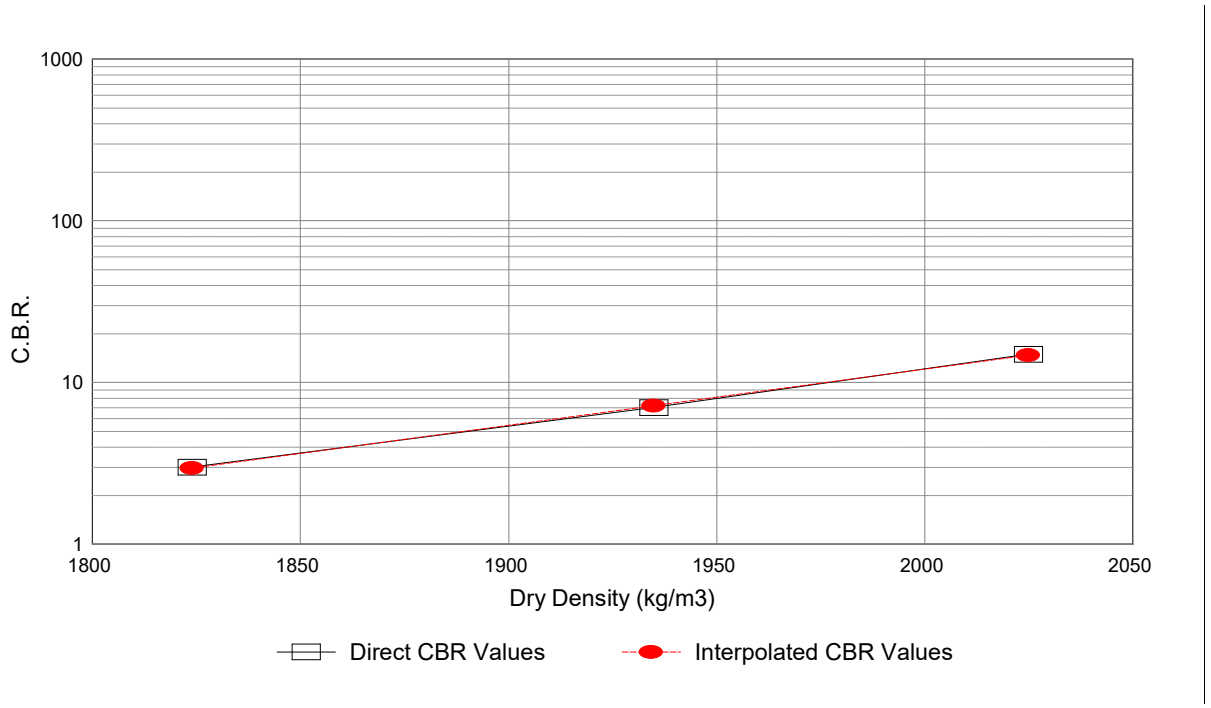
Maximum Dry Density (kg/m3)	2029

Optimum Moisture Content (%)	9,6

Percentage Mod AASHTO	99,8	95,3	89,9
CBR @ 2.54mm	15	7	3
CBR @ 5.08mm	17	7	4
CBR@ 7.62mm	19	9	4
Average Moisture Content (%)		9,5	
Percentage Swell	0,54	0,61	0,69

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	3	5	7	11	15



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C.B.R. DETERMINATION

Client	GEOID Geotechnical Engineer		
Location	Lanseria	B/ TH4/1 @ 1,4 - 3,6m	
Date	06 March 2024	Test No	1139
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

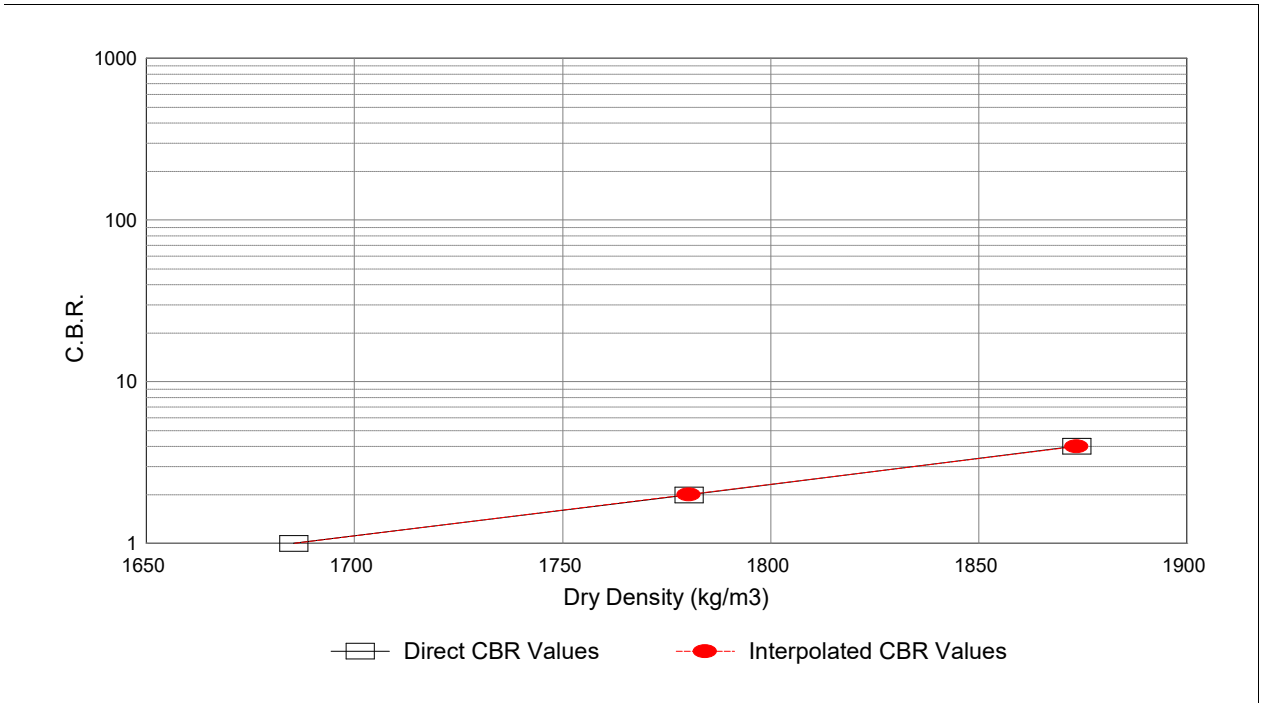
Maximum Dry Density (kg/m3)	1866

Optimum Moisture Content (%)	12,3

Percentage Mod AASHTO	100,4	95,4	90,3
CBR @ 2.54mm	4	2	1
CBR @ 5.08mm	4	2	1
CBR@ 7.62mm	4	2	1
Average Moisture Content (%)		12,3	
Percentage Swell	1,13	1,23	1,31

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	1	1	2	3	4



Programed Data

Revision No 5 (1/11/2017)

SOILS & MATERIALS TESTING

1164 Minnie Postma Ave, Florida Ext 11, 1700
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C.B.R. DETERMINATION

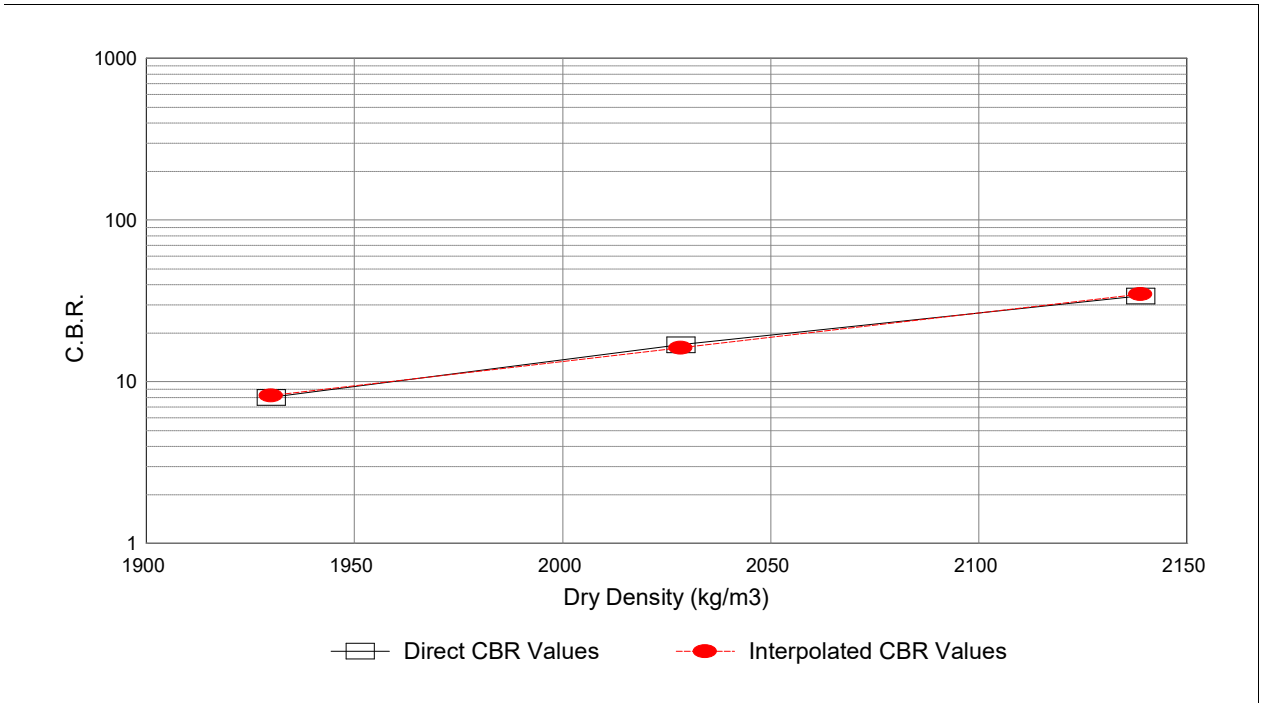
Client	GEOID Geotechnical Engineers		
Location	Lanseria	TH1/1 @ 1,3 - 4,0m	Tag damaged - possibly TH5
Date	06 March 2024	Test No	1133
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2137	Optimum Moisture Content (%)	6,9	
Percentage Mod AASHTO	100,1	94,9	90,3	
CBR @ 2.54mm	34	17	8	
CBR @ 5.08mm	38	18	9	
CBR@ 7.62mm	48	20	10	
Average Moisture Content (%)		7,1		
Percentage Swell	0,21	0,29	0,37	

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	8	12	16	25	34



Programed Data

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C.B.R. DETERMINATION

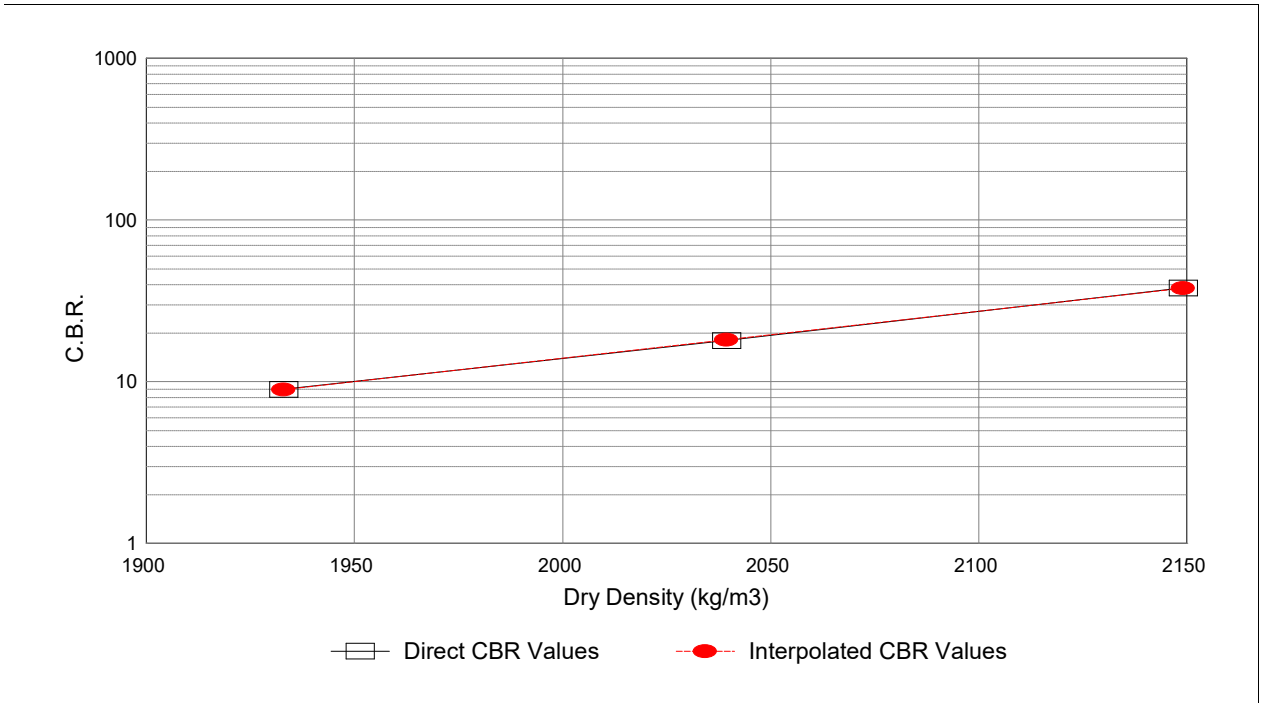
Client	GEOID Geotechnical Engineers		
Location	Lanseria	B/TH6/1 @ 1,4 - 3,6m	
Date	06 March 2024	Test No	1143
Job No	24075	Checked By	EB
Calibration Date	14 December 2022	Calibration Certificate	6784

Direct Results from Test Procedure

Maximum Dry Density (kg/m3)	2145		Optimum Moisture Content (%)	7,6	
Percentage Mod AASHTO	100,2	95,1	90,1		
CBR @ 2.54mm	38	18	9		
CBR @ 5.08mm	42	22	13		
CBR@ 7.62mm	50	26	15		
Average Moisture Content (%)		7,8			
Percentage Swell	0,43	0,53	0,61		

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	9	14	18	28	37



Programed Data

Revision No 5 (1/11/2017)

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C.B.R. DETERMINATION

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 5 @ 0,0 - 0,4m		
Date	25 JULY 2007	Test No	1236
Job No	07257	Checked By	EB

Direct Results from Test Procedure

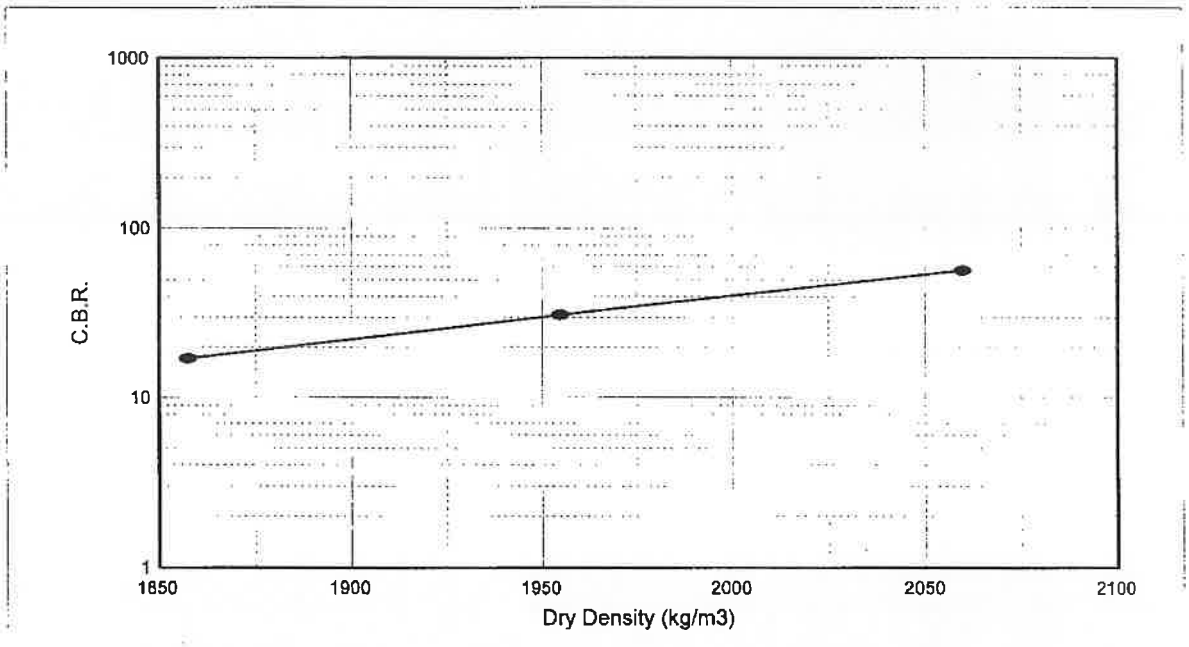
Maximum Dry Density (kg/m3)	2057

Optimum Moisture Content (%)	7.3

Percentage Mod AASHTO	100.1	95.0	90.3
CBR	57	31	17
Average Moisture Content (%)	7.1		
Percentage Swell	0.09	0.11	0.15

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	14	26	34	47	55



CHECKED BY:
M. RAMUNTSHI
DATE : 14/08/007

TRH 14 CLASSIFICATION
G6

Programed Data
Revision No 1 (28/02/2001)

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C.B.R. DETERMINATION

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 6 @ 0,0 - 0,9m		
Date	25 JULY 2007	Test No	1237
Job No	07257	Checked By	EB

Direct Results from Test Procedure

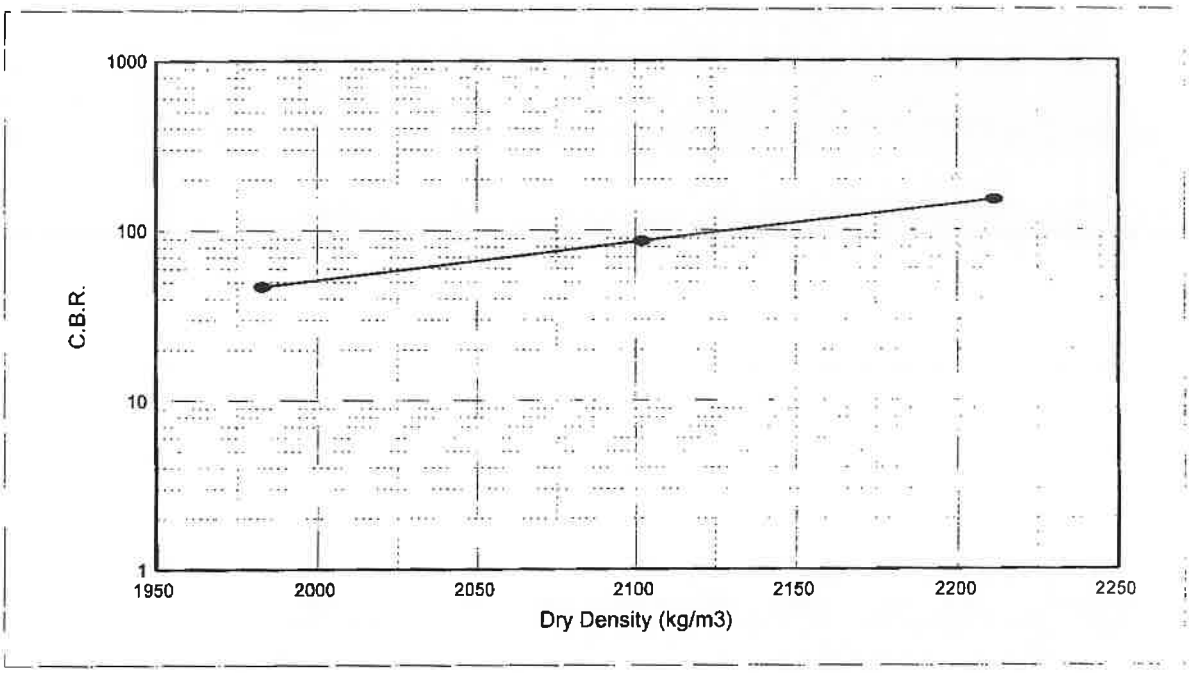
Maximum Dry Density (kg/m3)	2206

Optimum Moisture Content (%)	4.7

Percentage Mod AASHTO	100.2	95.3	89.9
CBR	151	87	47
Average Moisture Content (%)		4.6	
Percentage Swell	0.08	0.12	0.17

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	44	74	94	124	144



CHECKED BY:
M. RAMUNTSHI
DATE: 14/08/2007

TRH 14 CLASSIFICATION
G5

Programed Data
Revision No 1 (28/02/2001)

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C.B.R. DETERMINATION

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 8 @ 0,3 - 1,5m		
Date	25 JULY 2007	Test No	1238
Job No	07257	Checked By	EB

Direct Results from Test Procedure

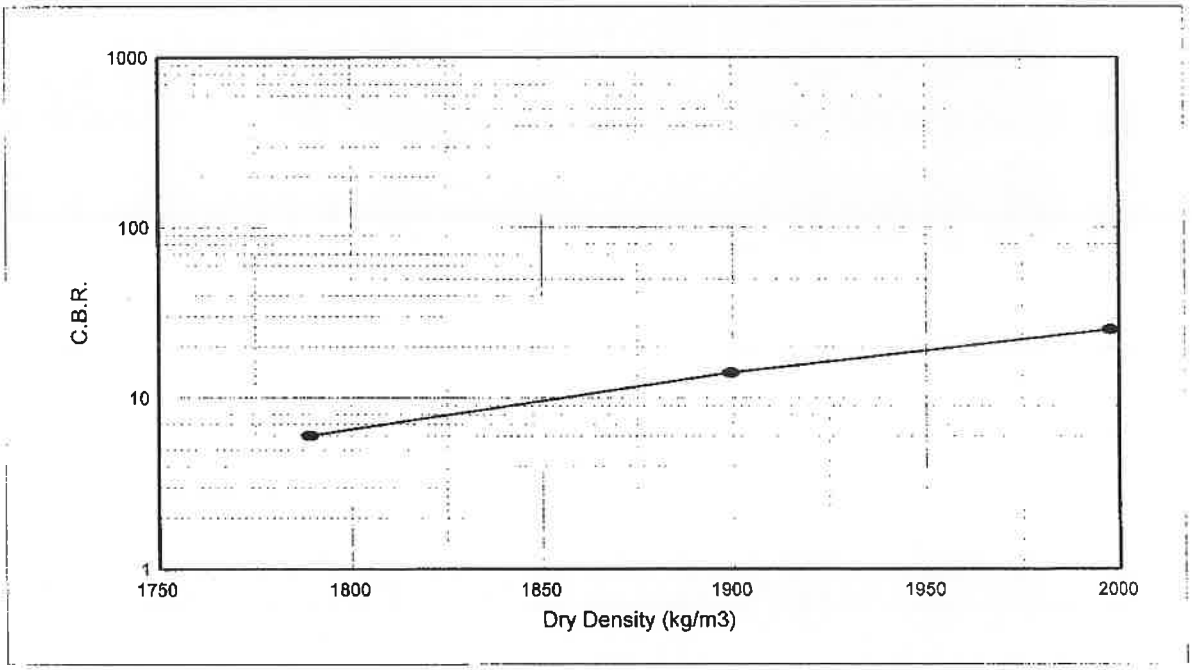
Maximum Dry Density (kg/m3)	1995

Optimum Moisture Content (%)	10.6

Percentage Mod AASHTO	100.2	95.2	89.7
CBR	25	14	6
Average Moisture Content (%)		10.9	
Percentage Swell	0.14	0.22	0.36

Interpolated Results

Percentage Mod AASHTO	90	93	95	98	100
CBR	6	11	15	20	24



Programed Data
Revision No 1 (26/02/2001)

CHECKED:
M. RAMUNYELA
DATE: 17/08/2007

TRH 14 CLASSIFICATION
G8

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SINGLE OEDOMETER CONSOLIDATION - SOAKED AT 10 kPa

Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE	U1 / 1 @ 0,5 - 0,7m	
Date	25 NOVEMBER 2019	Test No	3604
Job No	19359	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.454

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	150	0.840	0.00
10	360	152	0.838	0.10
33	1800	172	0.820	1.10
65	1920	193	0.801	2.15
127	2040	223	0.773	3.65
251	3480	257	0.742	5.35
498	3600	294	0.708	7.20
993	3800	333	0.672	9.15
1868	5280	375	0.633	11.25
743	5400	373	0.635	11.15
118	5520	360	0.647	10.50
10	5640	335	0.670	9.25

Moisture Content Calculations

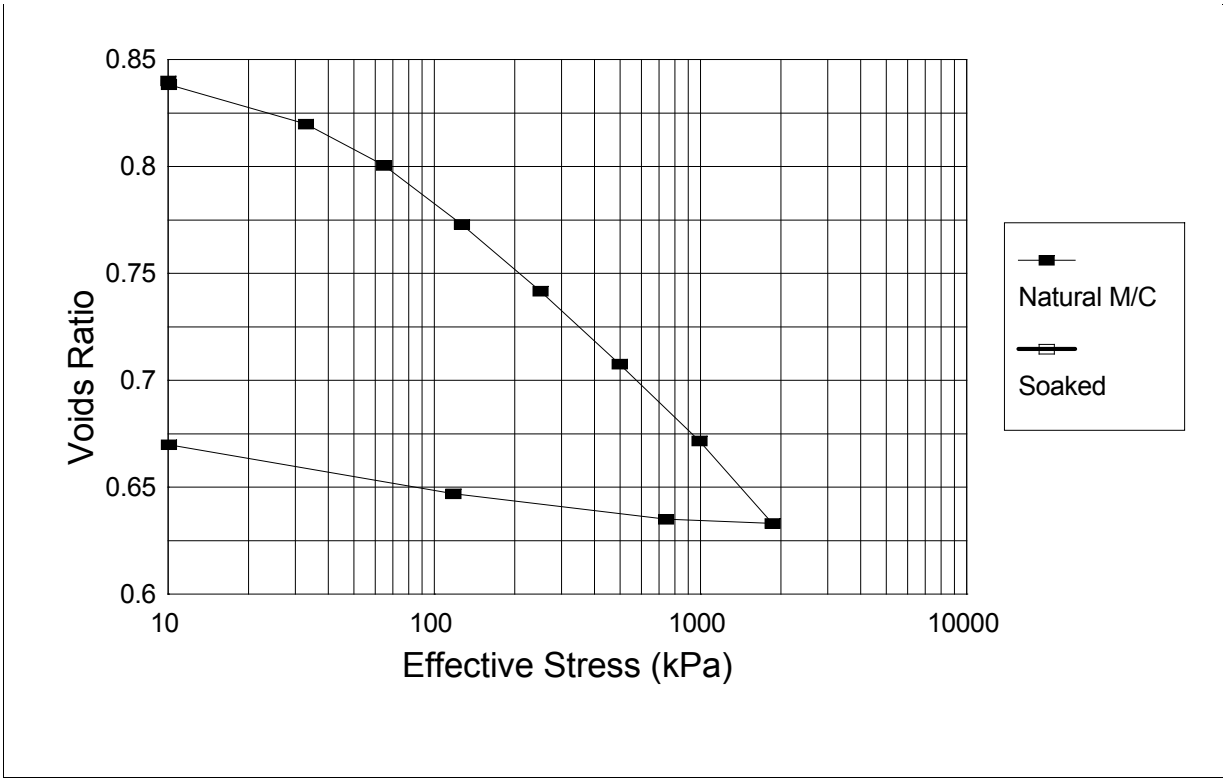
Mass wet sample plus ring before test (gms)	323.60
Mass wet sample plus ring after test (gms)	325.60
Mass dry sample plus ring (gms)	301.60
Mass ring (gms)	215.80
Moisture content before test (%)	**25.64**
Moisture content after test (%)	**27.97**

Other Data

Initial Dry Density (kg/m3)	**1334**
Initial Void Ratio	**0.84**

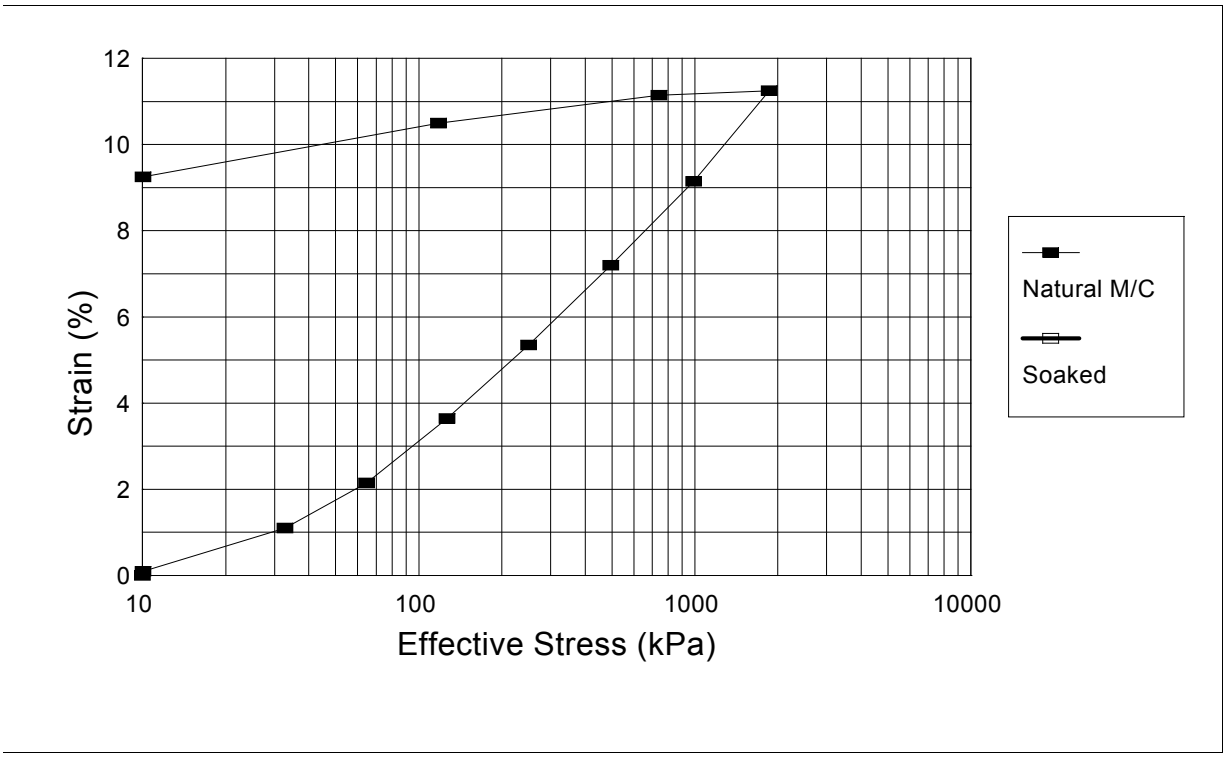
VOIDS RATIO v EFFECTIVE STRESS

Test No: 3604



STRAIN v EFFECTIVE STRESS

Test No: 3604



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COLLAPSE POTENTIAL at 200 kPa

Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE	U4 / 1 @ 0,6 - 0,8m	
Date	25 NOVEMBER 2019	Test No	3606
Job No	19359	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.5

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	60	1268	0.683	0.00
10	90	1269	0.682	0.05
33	130	1275	0.677	0.35
65	190	1283	0.670	0.75
127	310	1298	0.657	1.50
200	1750	1308	0.649	2.00
200	3190	1411	0.562	7.15
498	3430	1468	0.514	10.00
993	3670	1509	0.480	12.05
1868	5110	1553	0.443	14.25
743	5230	1547	0.448	13.95
118	5350	1525	0.466	12.85
10	5470	1513	0.476	12.25

Moisture Content Calculations

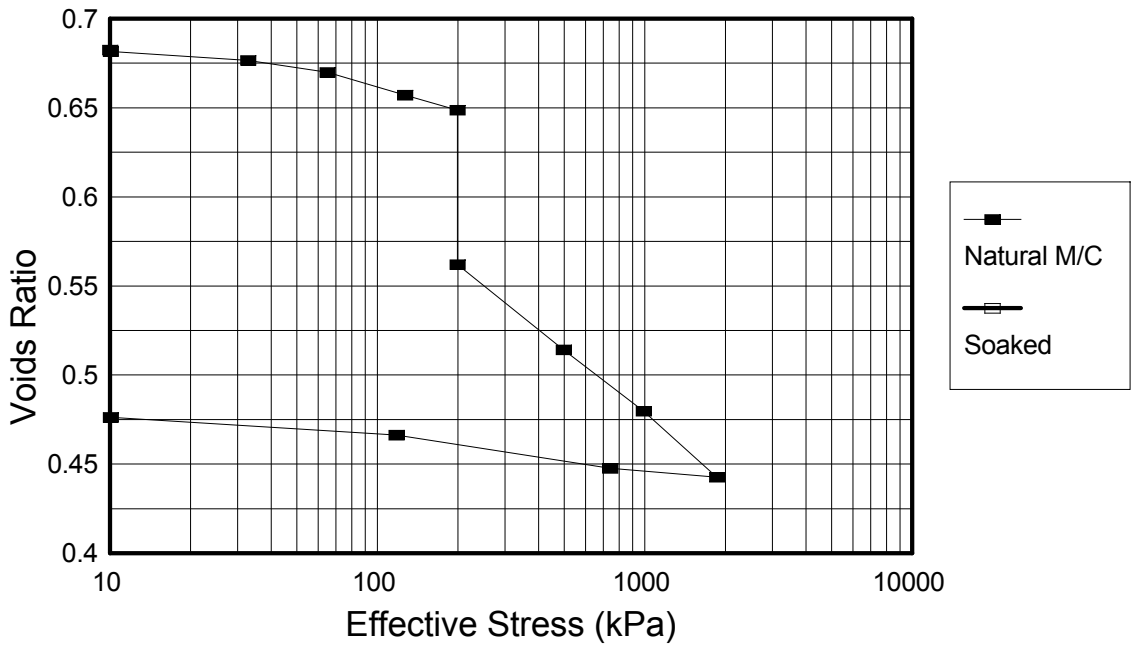
Mass wet sample plus ring before test (gms)	309.00
Mass wet sample plus ring after test (gms)	311.40
Mass dry sample plus ring (gms)	307.00
Mass ring (gms)	211.40
Moisture content before test (%)	**2.09**
Moisture content after test (%)	**4.60**

Other Data

Initial Dry Density (kg/m3)	**1486**
Initial Void Ratio	**0.68**

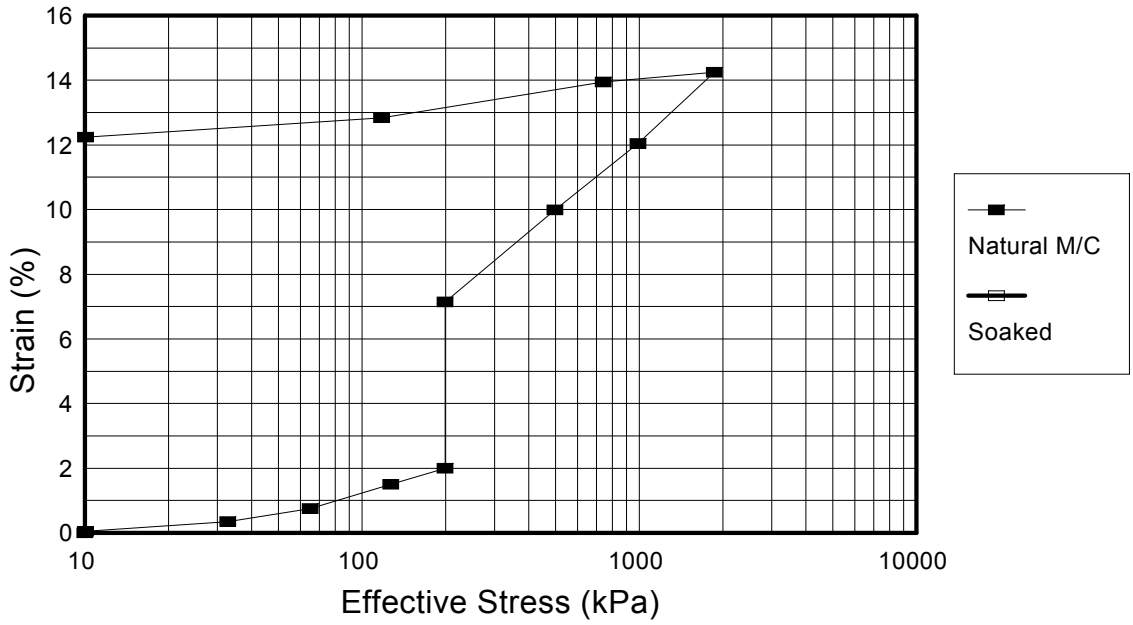
VOIDS RATIO v EFFECTIVE STRESS

Test No: 3606



STRAIN v EFFECTIVE STRESS

Test No: 3606



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SINGLE OEDOMETER CONSOLIDATION - SOAKED AT 10 kPa

Client	GEOID GEOTECHNICAL ENGINEERS		
Location	LANSERIA WAREHOUSE	U6 / 1 @ 2,0 - 2,2m	
Date	25 NOVEMBER 2019	Test No	3607
Job No	19359	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.563

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	702	0.800	0.00
10	360	693	0.808	-0.45
33	1800	718	0.786	0.80
65	1920	747	0.760	2.25
127	2040	775	0.735	3.65
251	3480	804	0.708	5.10
498	3600	832	0.683	6.50
993	3800	877	0.643	8.75
1868	5280	931	0.594	11.45
743	5400	912	0.611	10.50
118	5520	888	0.633	9.30
10	5640	869	0.650	8.35

Moisture Content Calculations

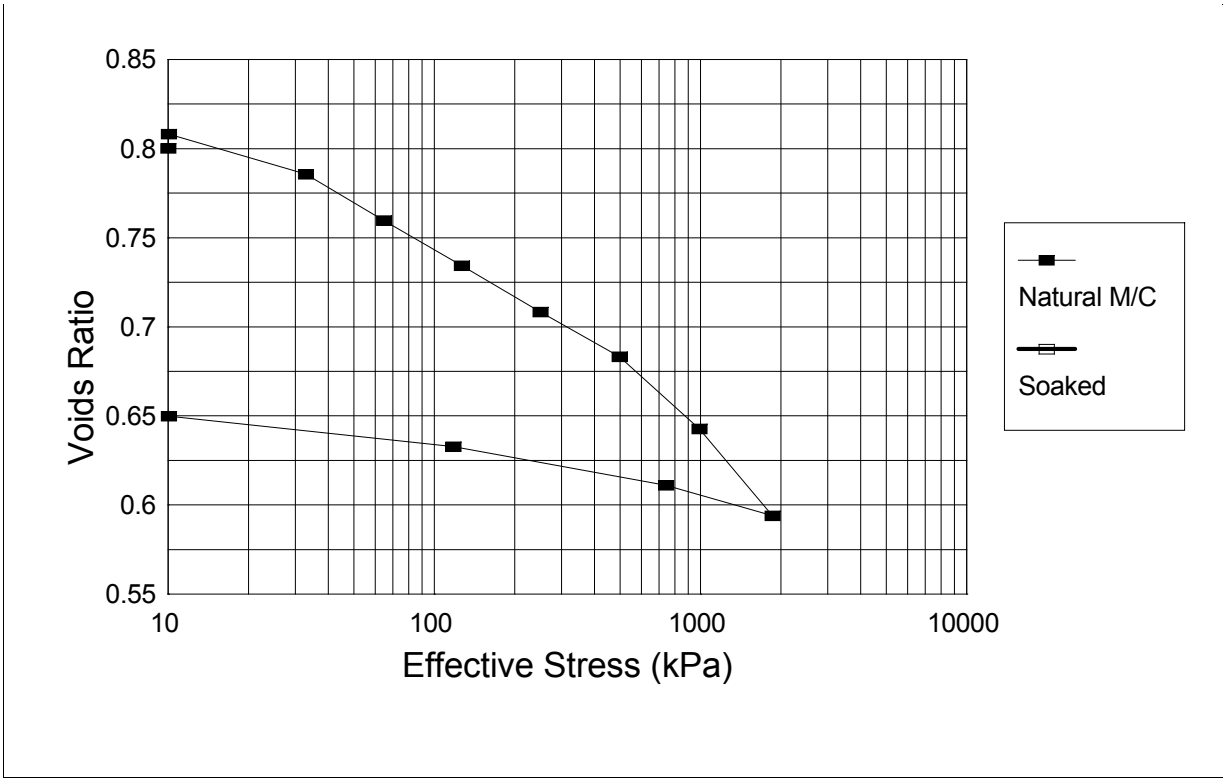
Mass wet sample plus ring before test (gms)	322.40
Mass wet sample plus ring after test (gms)	324.20
Mass dry sample plus ring (gms)	303.00
Mass ring (gms)	211.40
Moisture content before test (%)	**21.18**
Moisture content after test (%)	**23.14**

Other Data

Initial Dry Density (kg/m3)	**1424**
Initial Void Ratio	**0.80**

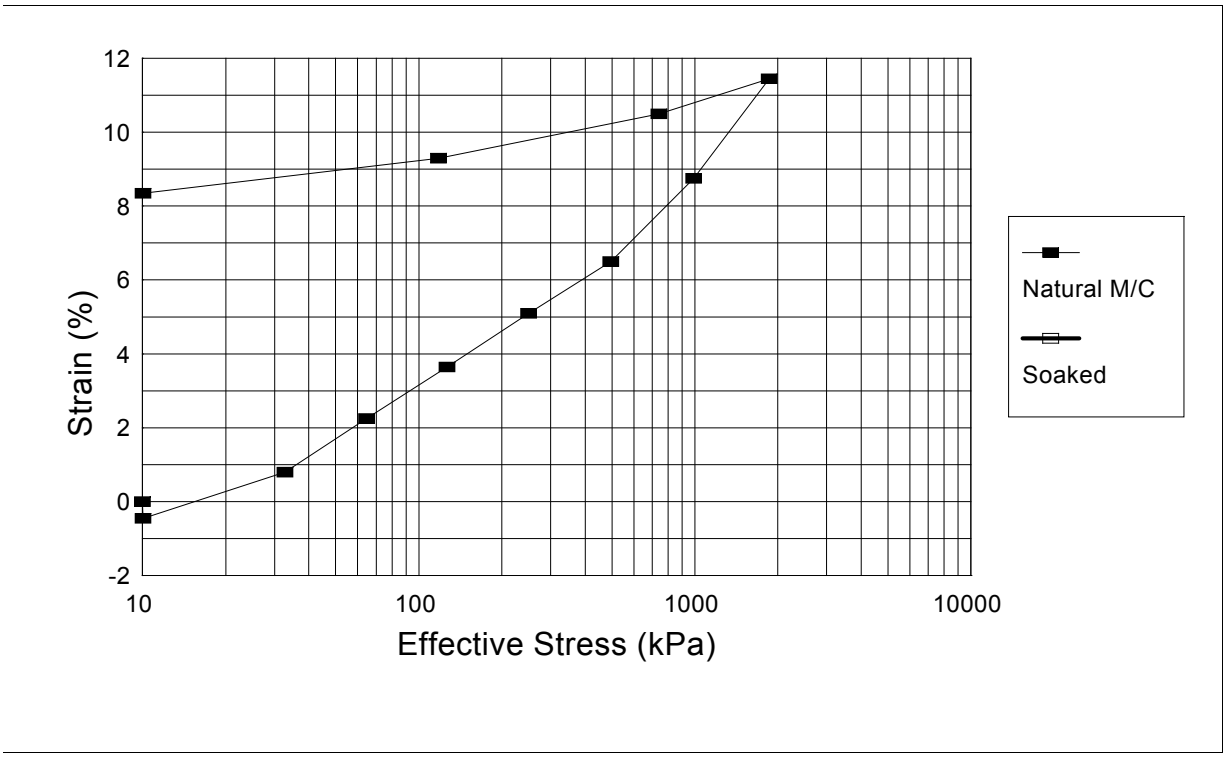
VOIDS RATIO v EFFECTIVE STRESS

Test No: 3607



STRAIN v EFFECTIVE STRESS

Test No: 3607



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SINGLE OEDOMETER CONSOLIDATION - SOAKED AT 10 kPa

Client	GEOID Geotechnical Engineers		
Location	Lanseria U 10/1 @ 0,3 - 0,5m		
Date	06 March 2024	Test No	1236
Job No	24075	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2,602

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	450	0,933	0,00
10	360	451	0,932	0,05
33	1800	463	0,921	0,65
65	1920	480	0,904	1,50
127	2040	501	0,884	2,55
251	3480	540	0,846	4,50
498	3600	570	0,817	6,00
993	3720	608	0,780	7,90
1868	5160	648	0,742	9,90
743	5280	637	0,752	9,35
118	5400	626	0,763	8,80
10	5520	606	0,782	7,80

Moisture Content Calculations

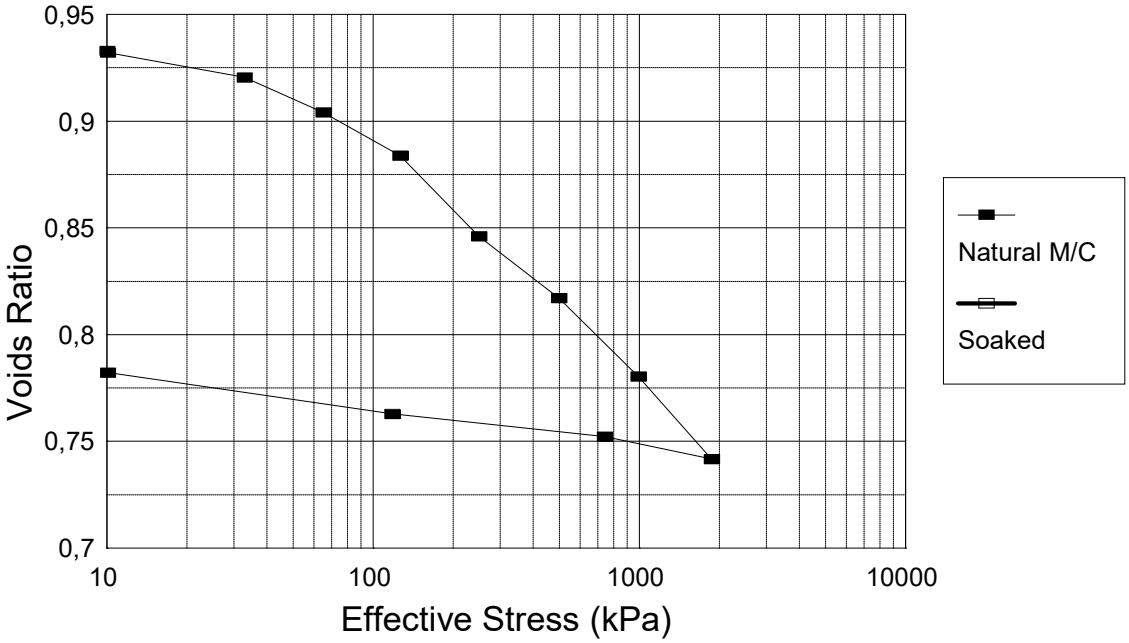
Mass wet sample plus ring before test (gms)	306,90
Mass wet sample plus ring after test (gms)	321,00
Mass dry sample plus ring (gms)	297,30
Mass ring (gms)	210,70
Moisture content before test (%)	**11,09**
Moisture content after test (%)	**27,37**

Other Data

Initial Dry Density (kg/m3)	**1346**
Initial Void Ratio	**0,93**

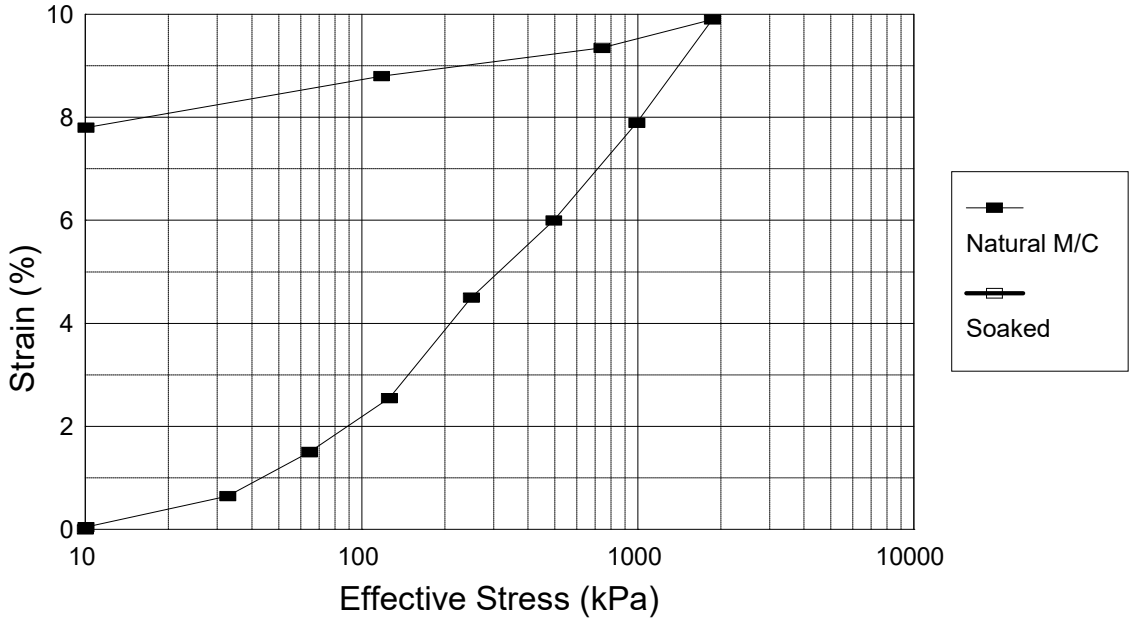
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1236



STRAIN v EFFECTIVE STRESS

Test No: 1236



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DOUBLE OEDOMETER

Client	GEOID Geotechnical engineers		
Location	Lanseria U10/1 @ 2,0 - 2,2m		
Date	06 March 2024	Test No	1238
Job No	24075	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2,594

Sample at NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	1155	0,957	0,00
10	1440	1156	0,956	0,05
33	1500	1160	0,952	0,25
65	1560	1165	0,947	0,50
127	1620	1169	0,943	0,70
251	1680	1180	0,932	1,25
498	1740	1200	0,913	2,25
993	1800	1242	0,871	4,35
1868	3240	1292	0,823	6,85
743	3360	1288	0,826	6,65
118	3480	1285	0,829	6,50
10	3600	1278	0,836	6,15

Sample Soaked

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	767	0,968	0,00
10	1440	768	0,967	0,05
33	1500	770	0,965	0,15
65	1560	782	0,953	0,75
127	1620	806	0,930	1,95
251	1680	839	0,897	3,60
498	1740	884	0,853	5,85
993	1800	945	0,793	8,90
1868	3240	1008	0,731	12,05
743	3360	995	0,744	11,40
118	3480	973	0,765	10,30
10	3600	938	0,800	8,55

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	308,60
Mass wet sample plus ring after test (gms)	296,20
Mass dry sample plus ring (gms)	292,90
Mass ring (gms)	207,60
Moisture content before test (%)	**18,41**
Moisture content after test (%)	**3,87**

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	307,70
Mass wet sample plus ring after test (gms)	315,50
Mass dry sample plus ring (gms)	291,50
Mass ring (gms)	206,70
Moisture content before test (%)	**19,10**
Moisture content after test (%)	**28,30**

Other Data

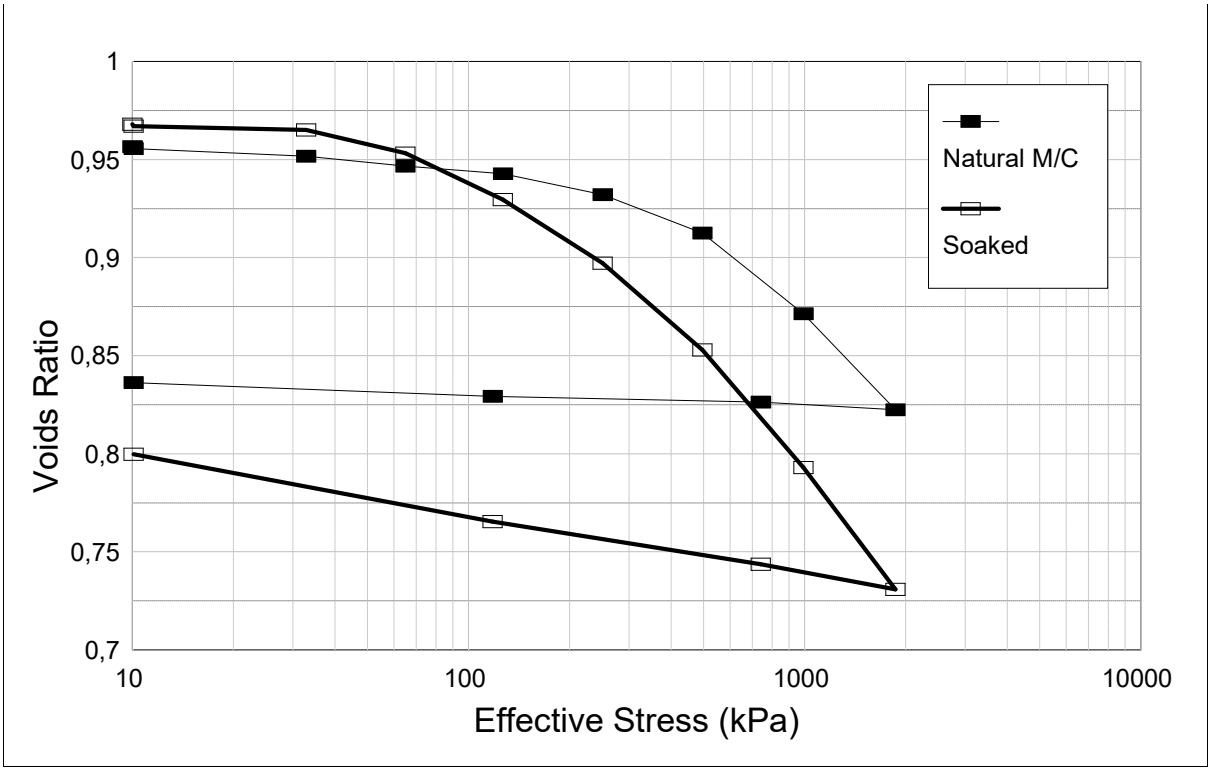
Initial Dry Density (kg/m3)	**1326**
Initial Void Ratio	**0,96**

Other Data

Initial Dry Density (kg/m3)	**1318**
Initial Void Ratio	**0,97**

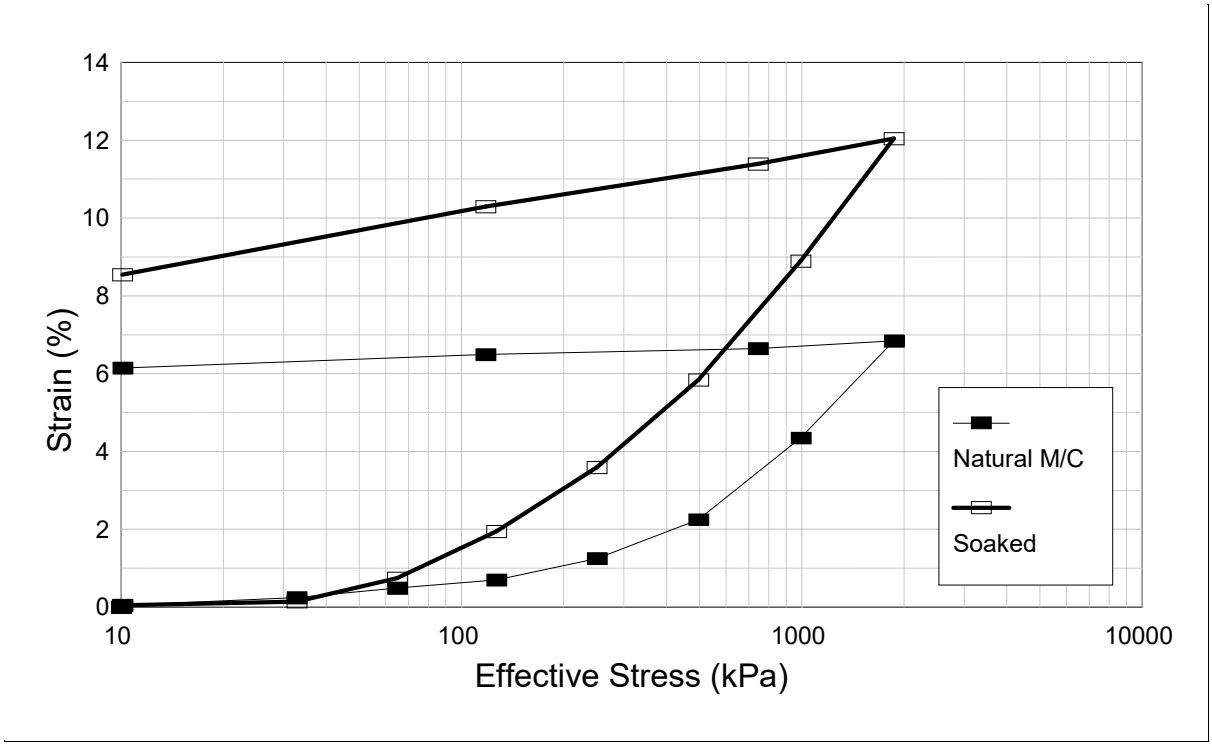
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1238



STRAIN v EFFECTIVE STRESS

Test No: 1238



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DOUBLE OEDOMETER

Client	GEOID Geotechnical engineers		
Location	Lanseria U11/1 @ 0,6 - 0,8m		
Date	06 March 2024	Test No	1239
Job No	24075	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2,577

Sample at NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	1131	0,661	0,00
10	1440	1132	0,661	0,05
33	1500	1136	0,657	0,25
65	1560	1144	0,651	0,65
127	1620	1155	0,641	1,20
251	1680	1168	0,631	1,85
498	1740	1182	0,619	2,55
993	1800	1204	0,601	3,65
1868	3240	1244	0,567	5,65
743	3360	1229	0,580	4,90
118	3480	1208	0,597	3,85
10	3600	1183	0,618	2,60

Sample Soaked

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	732	0,671	0,00
10	1440	735	0,669	0,15
33	1500	739	0,666	0,35
65	1560	748	0,658	0,80
127	1620	760	0,648	1,40
251	1680	772	0,638	2,00
498	1740	786	0,626	2,70
993	1800	814	0,603	4,10
1868	3240	862	0,563	6,50
743	3360	852	0,571	6,00
118	3480	828	0,591	4,80
10	3600	811	0,605	3,95

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	322,90
Mass wet sample plus ring after test (gms)	322,00
Mass dry sample plus ring (gms)	311,40
Mass ring (gms)	211,60
Moisture content before test (%)	**11,52**
Moisture content after test (%)	**10,62**

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	321,10
Mass wet sample plus ring after test (gms)	329,40
Mass dry sample plus ring (gms)	310,10
Mass ring (gms)	210,90
Moisture content before test (%)	**11,09**
Moisture content after test (%)	**19,46**

Other Data

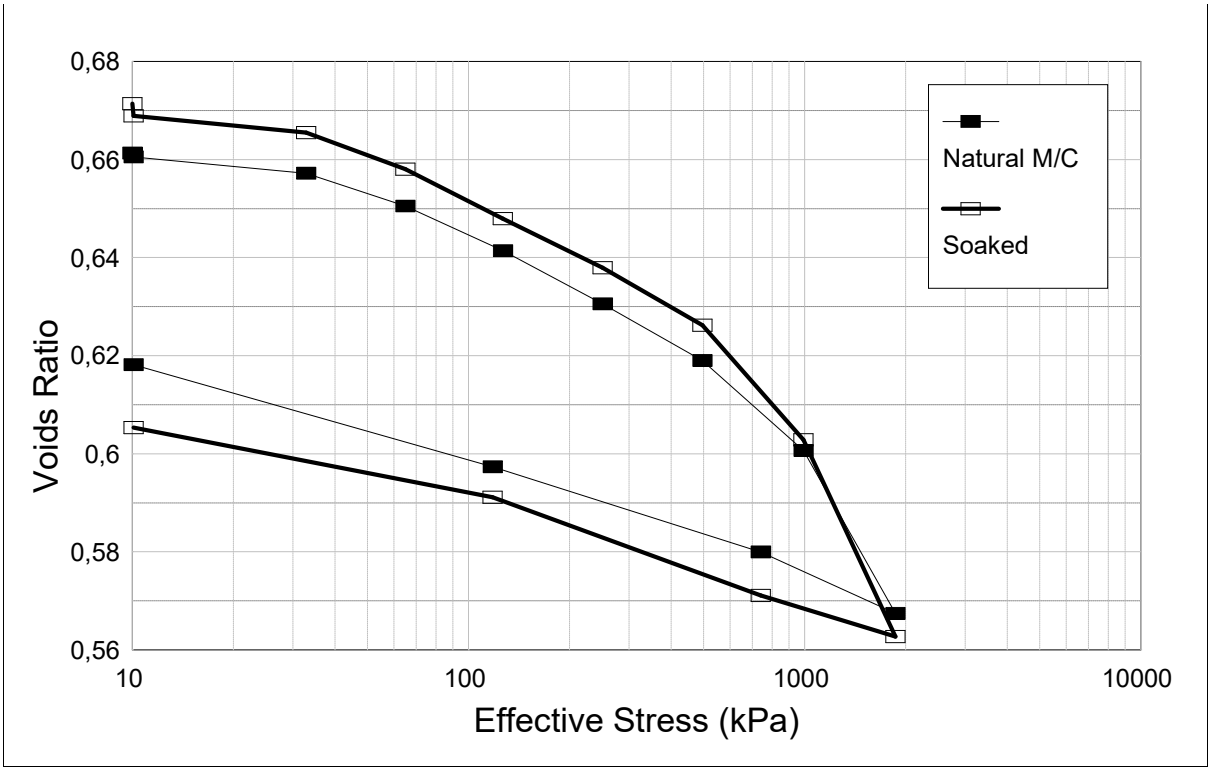
Initial Dry Density (kg/m3)	**1551**
Initial Void Ratio	**0,66**

Other Data

Initial Dry Density (kg/m3)	**1542**
Initial Void Ratio	**0,67**

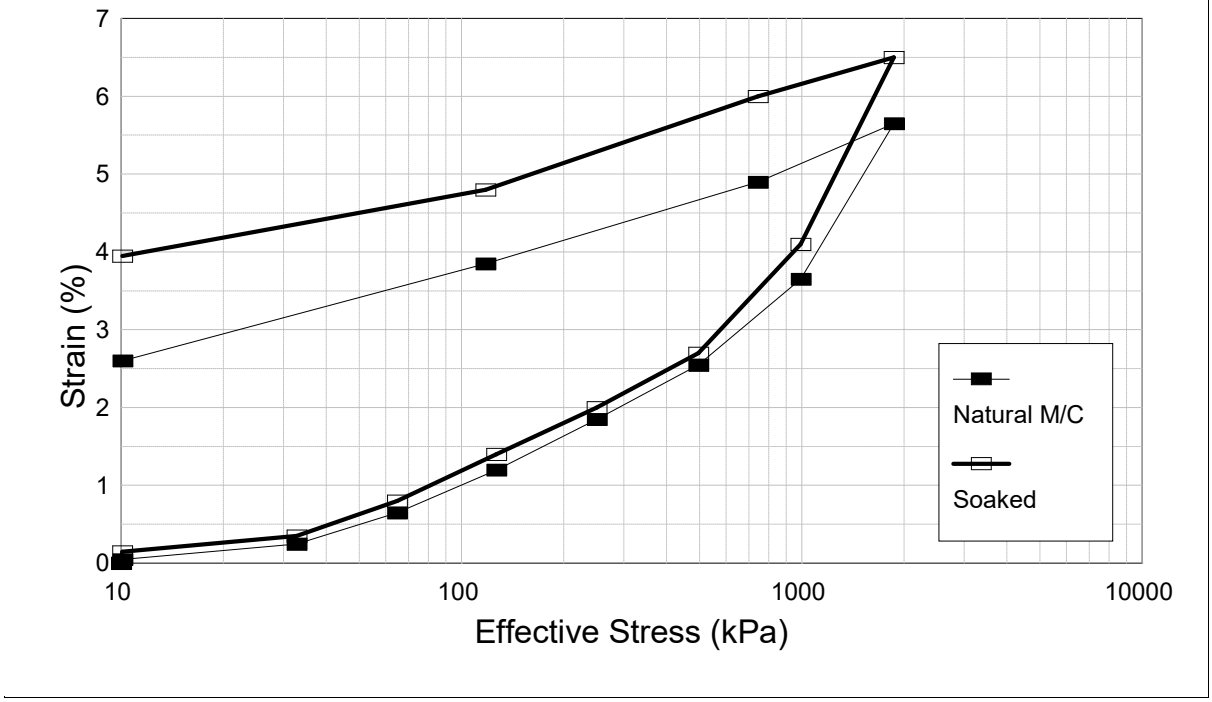
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1239



STRAIN v EFFECTIVE STRESS

Test No: 1239



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SINGLE OEDOMETER CONSOLIDATION - SOAKED AT 10 kPa

Client	GEOID Geotechnical Engineers		
Location	Lanseria U 16/1 @ 1,5 - 1,7m		
Date	06 March 2024	Test No	1241
Job No	24075	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2,621

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	1569	0,698	0,00
10	360	1568	0,699	-0,05
33	1800	1579	0,690	0,50
65	1920	1593	0,678	1,20
127	2040	1615	0,659	2,30
251	3480	1642	0,636	3,65
498	3600	1676	0,607	5,35
993	3720	1709	0,579	7,00
1868	5160	1731	0,561	8,10
743	5280	1723	0,567	7,70
118	5400	1711	0,578	7,10
10	5520	1699	0,588	6,50

Moisture Content Calculations

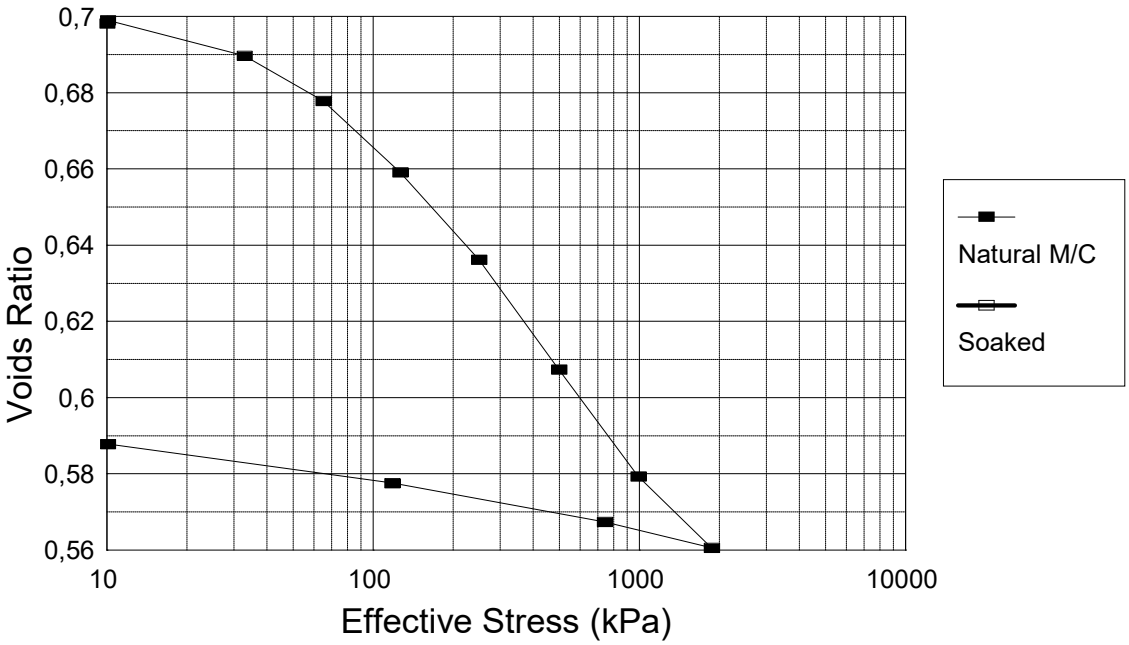
Mass wet sample plus ring before test (gms)	311,10
Mass wet sample plus ring after test (gms)	324,60
Mass dry sample plus ring (gms)	306,00
Mass ring (gms)	206,70
Moisture content before test (%)	**5,14**
Moisture content after test (%)	**18,73**

Other Data

Initial Dry Density (kg/m3)	**1543**
Initial Void Ratio	**0,70**

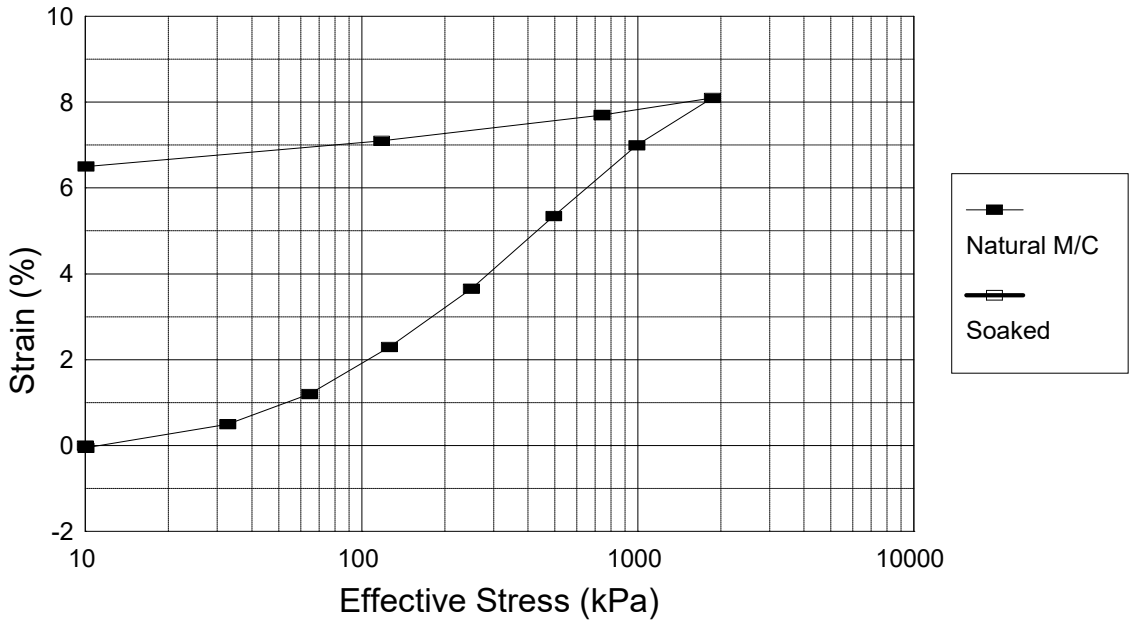
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1241



STRAIN v EFFECTIVE STRESS

Test No: 1241



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SINGLE OEDOMETER CONSOLIDATION - SOAKED AT 10 kPa

Client	GEOID Geotechnical Engineers		
Location	Lanseria U 23/1 @ 1,8 - 2,0m		
Date	06 March 2024	Test No	1244
Job No	24075	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2,591

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	714	0,631	0,00
10	360	714	0,631	0,00
33	1800	720	0,626	0,30
65	1920	731	0,617	0,85
127	2040	750	0,602	1,80
251	3480	790	0,569	3,80
498	3600	825	0,541	5,55
993	3720	910	0,471	9,80
1868	5160	995	0,402	14,05
743	5280	971	0,422	12,85
118	5400	960	0,431	12,30
10	5520	946	0,442	11,60

Moisture Content Calculations

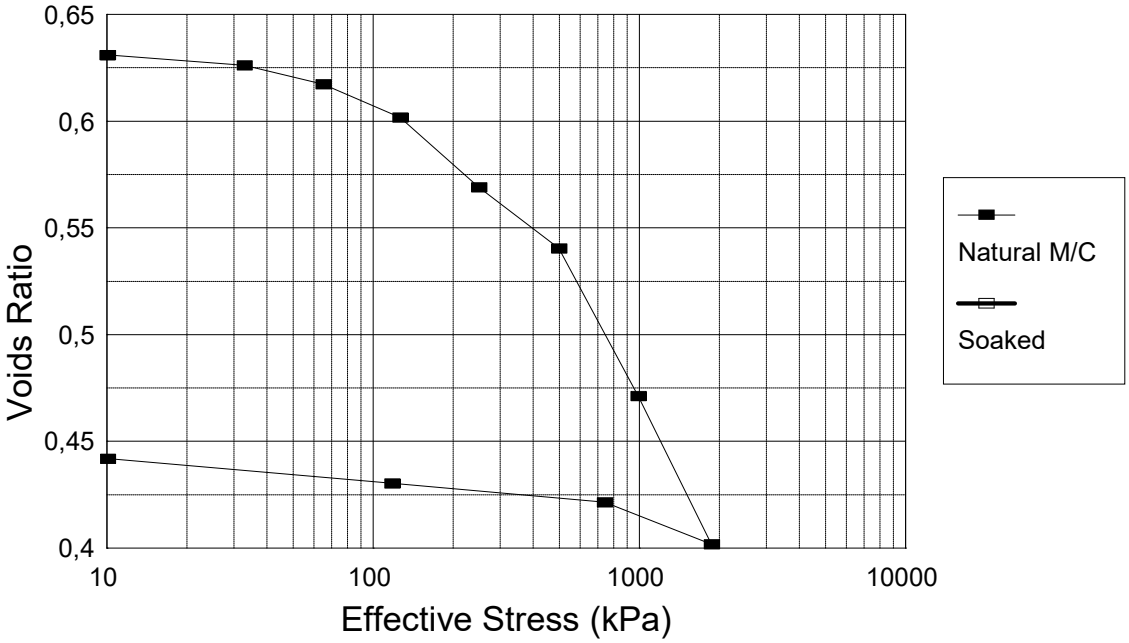
Mass wet sample plus ring before test (gms)	322,90
Mass wet sample plus ring after test (gms)	333,90
Mass dry sample plus ring (gms)	313,80
Mass ring (gms)	211,60
Moisture content before test (%)	**8,90**
Moisture content after test (%)	**19,67**

Other Data

Initial Dry Density (kg/m3)	**1588**
Initial Void Ratio	**0,63**

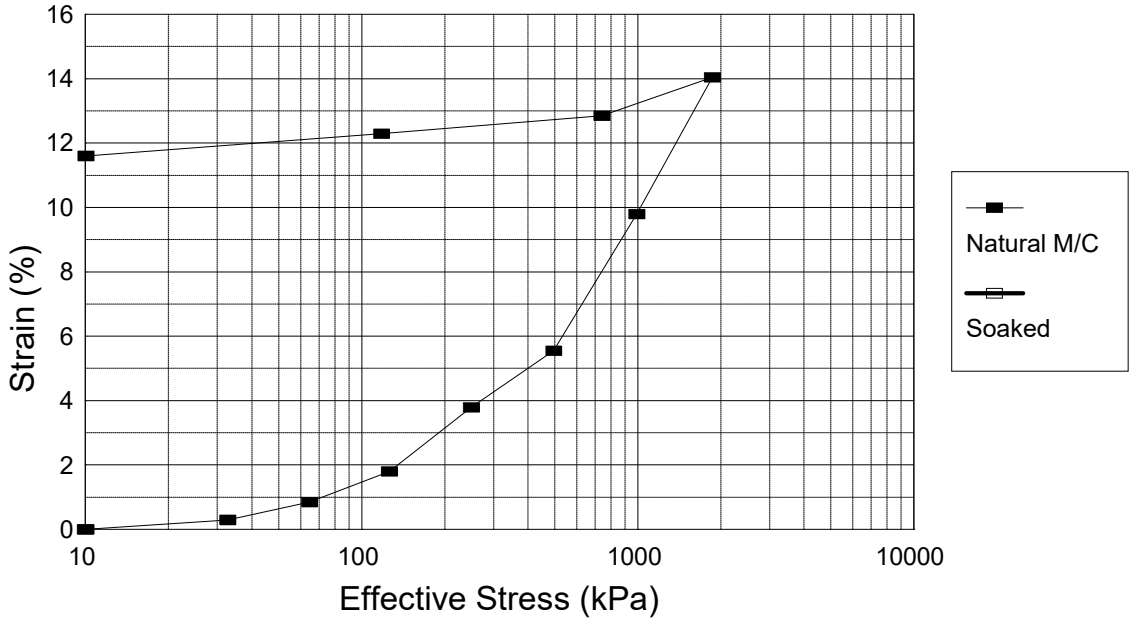
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1244



STRAIN v EFFECTIVE STRESS

Test No: 1244



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DOUBLE OEDOMETER

Client	GEOID Geotechnical engineers		
Location	Lanseria TP 26/1 @ 0,6 - 0,8m		
Date	06 March 2024	Test No	1246
Job No	24075	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2,582

Sample at NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	1039	0,802	0,00
10	1440	1040	0,801	0,05
33	1500	1045	0,796	0,30
65	1560	1048	0,794	0,45
127	1620	1055	0,787	0,80
251	1680	1076	0,768	1,85
498	1740	1114	0,734	3,75
993	1800	1164	0,689	6,25
1868	3240	1208	0,650	8,45
743	3360	1203	0,654	8,20
118	3480	1190	0,666	7,55
10	3600	1183	0,672	7,20

Sample Soaked

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	120	1112	0,822	0,00
10	1440	1115	0,819	0,15
33	1500	1121	0,813	0,45
65	1560	1130	0,805	0,90
127	1620	1142	0,794	1,50
251	1680	1160	0,778	2,40
498	1740	1190	0,751	3,90
993	1800	1231	0,713	5,95
1868	3240	1320	0,632	10,40
743	3360	1313	0,638	10,05
118	3480	1304	0,647	9,60
10	3600	1288	0,661	8,80

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	305,90
Mass wet sample plus ring after test (gms)	303,90
Mass dry sample plus ring (gms)	299,50
Mass ring (gms)	207,30
Moisture content before test (%)	**6,94**
Moisture content after test (%)	**4,77**

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	305,60
Mass wet sample plus ring after test (gms)	316,70
Mass dry sample plus ring (gms)	299,20
Mass ring (gms)	208,00
Moisture content before test (%)	**7,02**
Moisture content after test (%)	**19,19**

Other Data

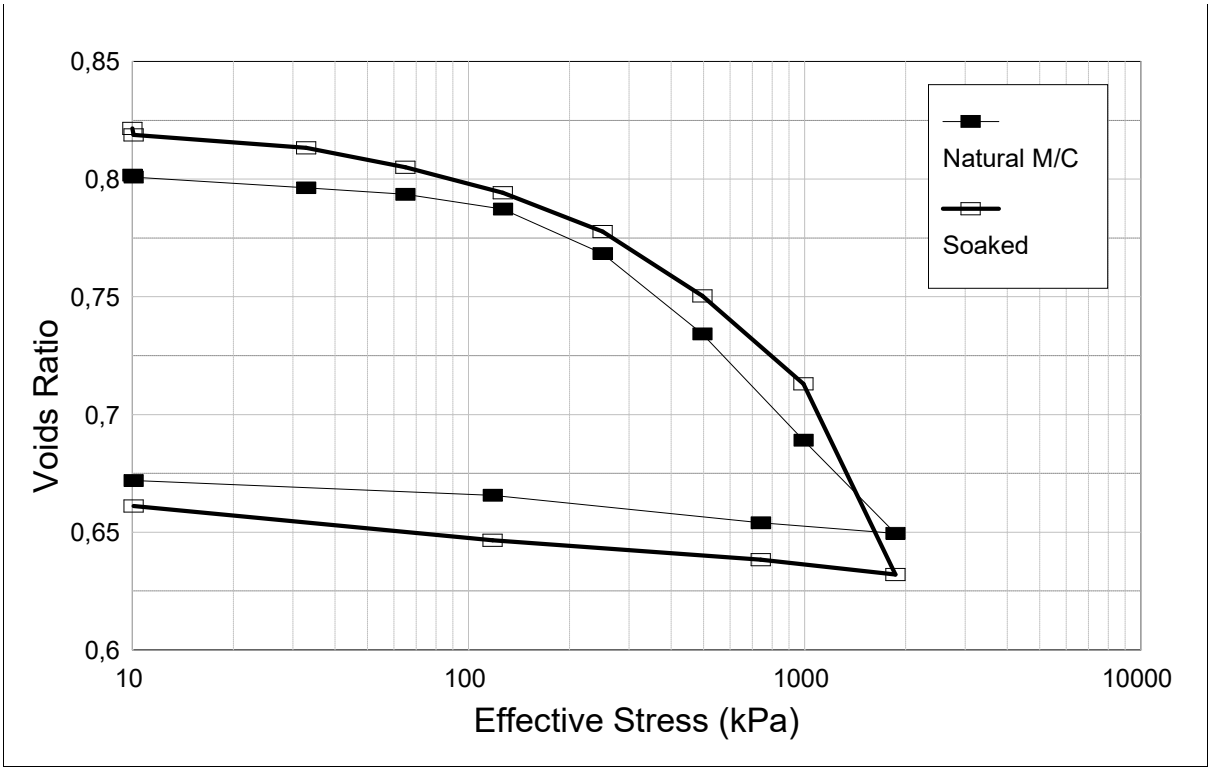
Initial Dry Density (kg/m3)	**1433**
Initial Void Ratio	**0,80**

Other Data

Initial Dry Density (kg/m3)	**1417**
Initial Void Ratio	**0,82**

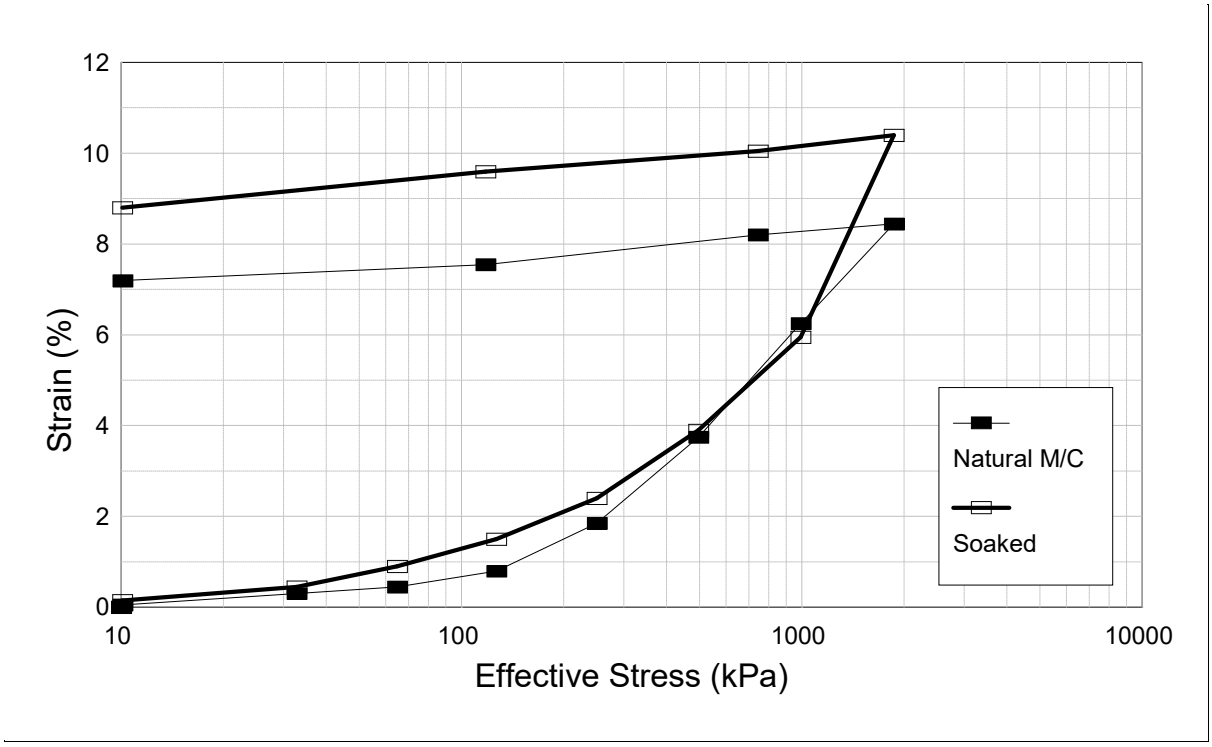
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1246



STRAIN v EFFECTIVE STRESS

Test No: 1246



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COLLAPSE POTENTIAL at 200 kPa

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA	TP 1 @ 1,6m	
Date	25 JULY 2007	Test No	1229
Job No	07257	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.773

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	803	1.067	0.00
10	70	803	1.067	0.00
33	130	828	1.042	1.25
65	250	850	1.019	2.35
127	340	875	0.993	3.60
200	490	891	0.976	4.40
200	1930	926	0.940	6.15
498	2170	1007	0.857	10.20
993	2410	1103	0.757	15.00
1868	3850	1177	0.681	18.70
743	3970	1149	0.710	17.30
118	4090	1088	0.773	14.25
10	4210	1028	0.835	11.25

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	328.00
Mass wet sample plus ring after test (gms)	330.40
Mass dry sample plus ring (gms)	306.50
Mass ring (gms)	220.20
Moisture content before test (%)	**24.91**
Moisture content after test (%)	**27.69**

Other Data

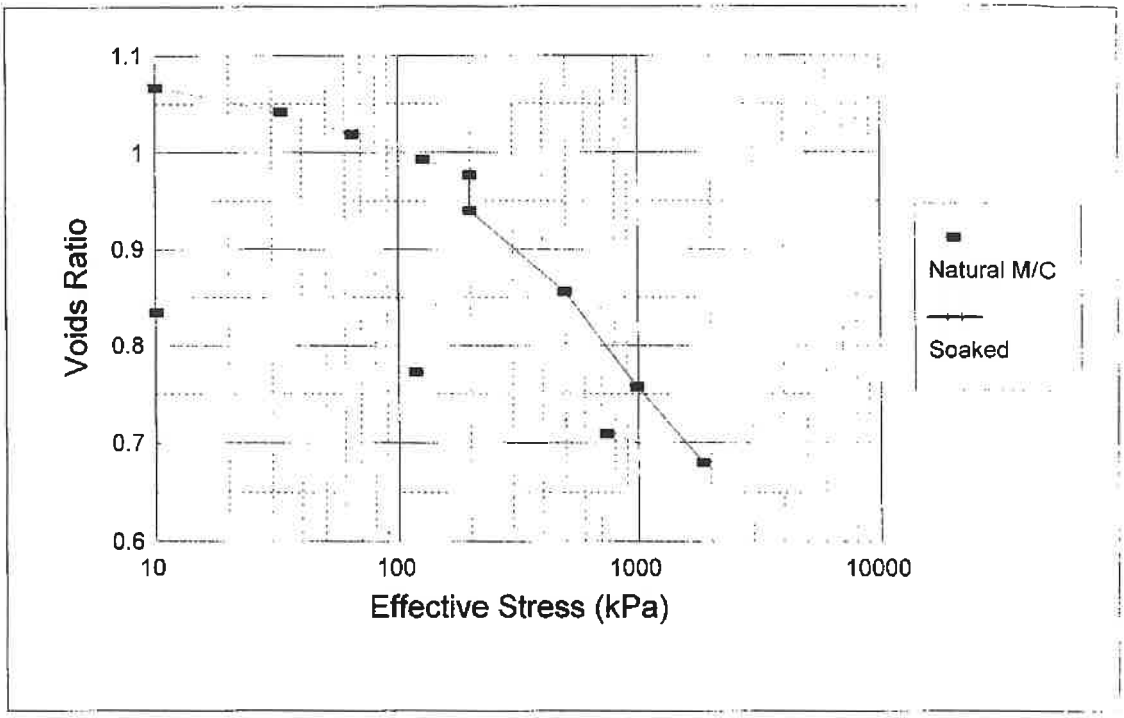
Initial Dry Density (kg/m3)	**1341**
Initial Void Ratio	**1.07**

CHECKED BY:
M. RAMUNTSHI
DATE : 07/08/007

Programe Data
Revision No 2 (19/03/2001)

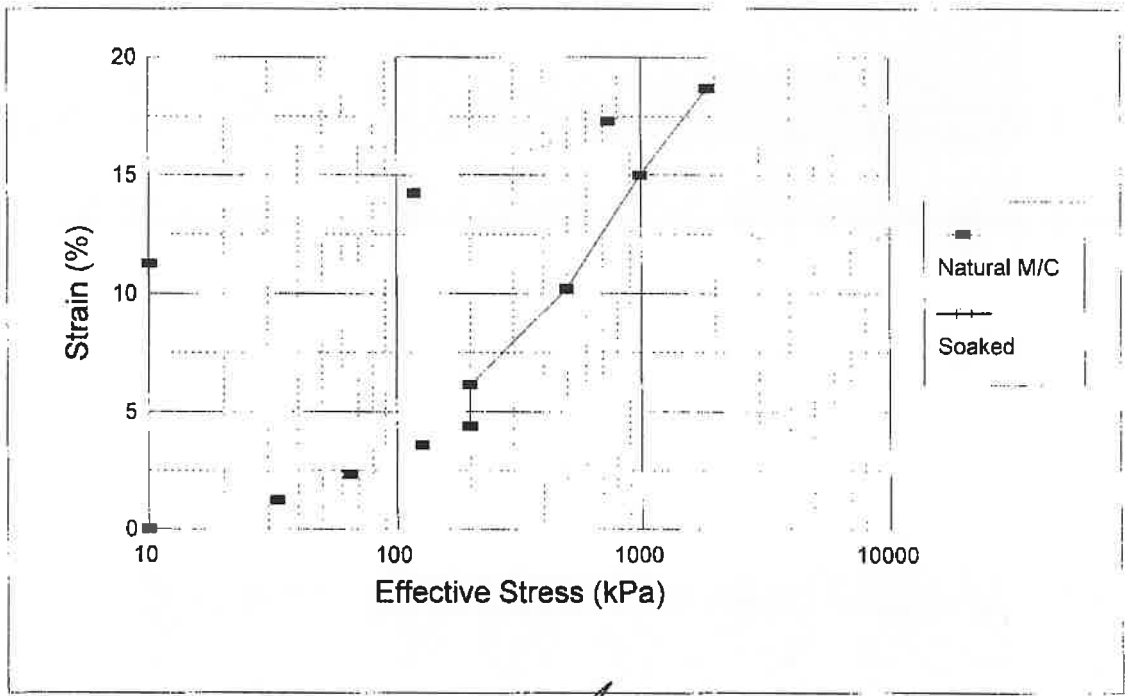
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1229



STRAIN v EFFECTIVE STRESS

Test No: 1229



CHECKED BY:
M. RAMUNTSHI
DATE: 07/08/007

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COLLAPSE POTENTIAL at 200 kPa

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA	TP 3 @ 1,3m	
Date	25 JULY 2007	Test No	1231
Job No	07257	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.671

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	324	0.897	0.00
10	70	324	0.897	0.00
33	130	330	0.891	0.30
65	250	335	0.886	0.55
127	340	384	0.840	3.00
200	490	432	0.794	5.40
200	1930	490	0.739	8.30
498	2170	563	0.670	11.95
993	2410	652	0.586	16.40
1868	3850	741	0.501	20.85
743	3970	730	0.512	20.30
118	4090	696	0.544	18.60
10	4210	662	0.576	16.90

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	323.90
Mass wet sample plus ring after test (gms)	332.60
Mass dry sample plus ring (gms)	310.90
Mass ring (gms)	220.30
Moisture content before test (%)	**14.35**
Moisture content after test (%)	**23.95**

Other Data

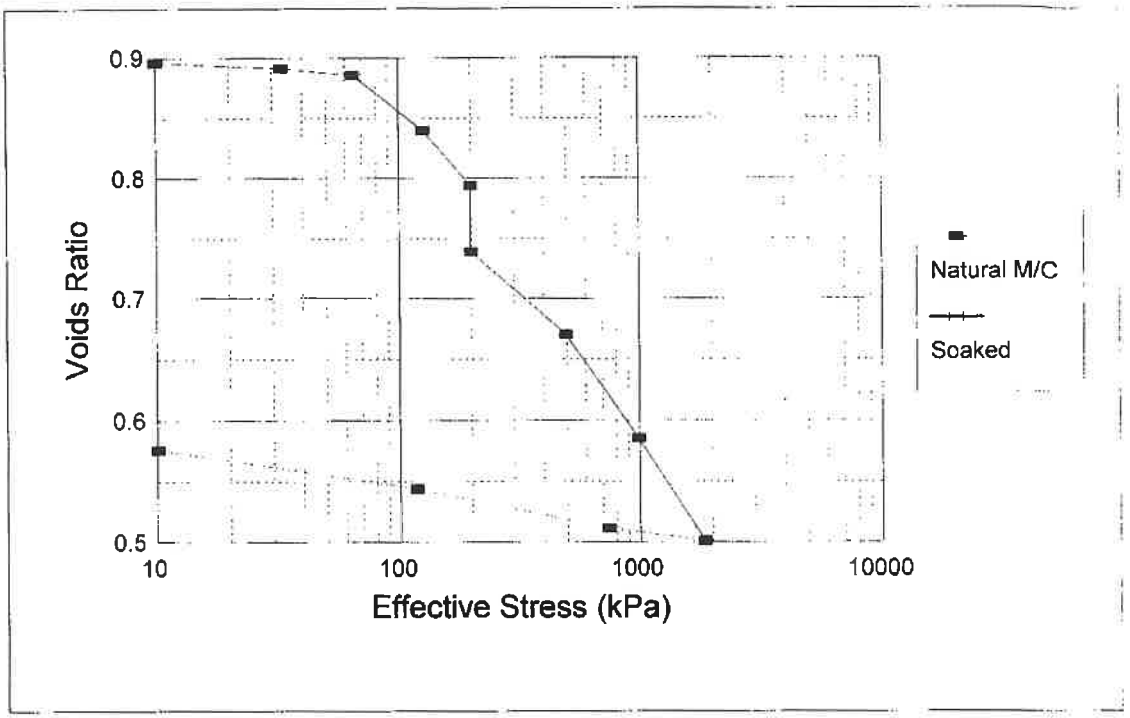
Initial Dry Density (kg/m3)	**1408**
Initial Void Ratio	**0.90**

CHECKED BY:
M. RAMUNTSHI
DATE : 07/08/007

Programe Data
Revision No 2 (19/03/2001)

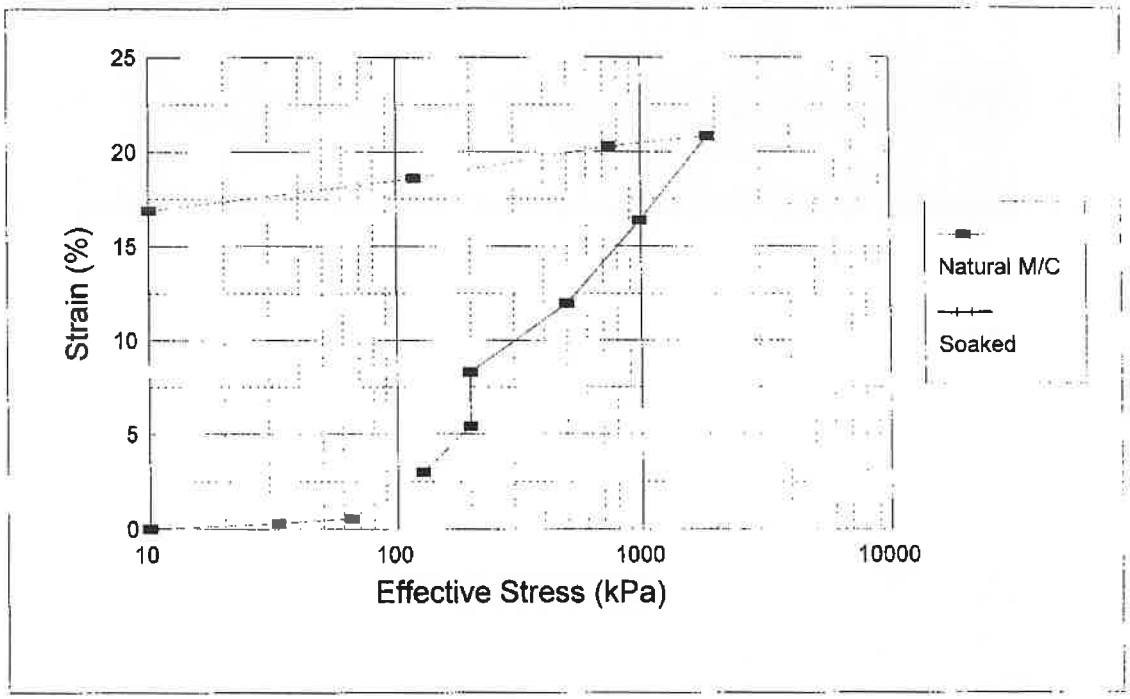
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1231



STRAIN v EFFECTIVE STRESS

Test No: 1231



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DATE : 07/08/007

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COLLAPSE POTENTIAL at 200 kPa

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA	TP 4 @ 1,0m	
Date	25 JULY 2007	Test No	1232
Job No	07257	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.67

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	722	0.755	0.00
10	70	722	0.755	0.00
33	130	738	0.741	0.80
65	250	758	0.723	1.80
127	340	790	0.695	3.40
200	490	810	0.678	**4.40**
200	1930	826	0.663	5.20
498	2170	874	0.621	7.60
993	2410	920	0.581	9.90
1868	3850	976	0.532	12.70
743	3970	972	0.535	12.50
118	4090	957	0.549	11.75
10	4210	929	0.573	10.35

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	338.20
Mass wet sample plus ring after test (gms)	344.50
Mass dry sample plus ring (gms)	321.40
Mass ring (gms)	223.50
Moisture content before test (%)	**17.16**
Moisture content after test (%)	**23.60**

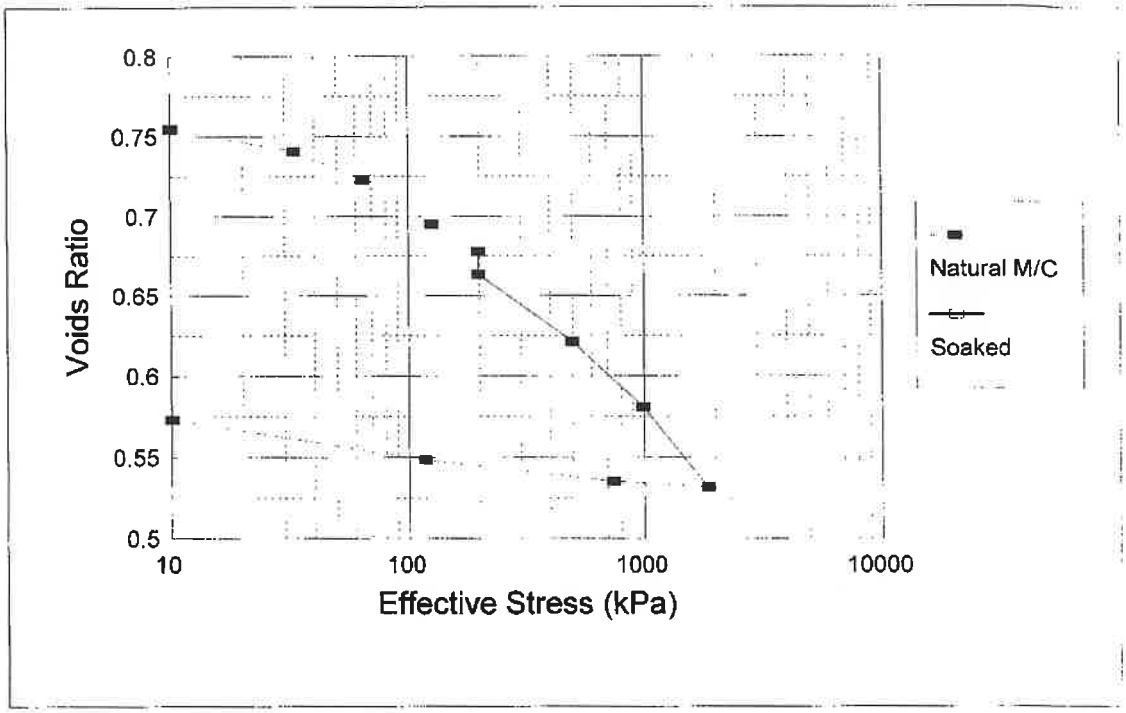
Other Data

Initial Dry Density (kg/m3)	**1522**
Initial Void Ratio	**0.75**

CHECKED BY:
M. RAMUNTSHI
DATE : 07/09/007

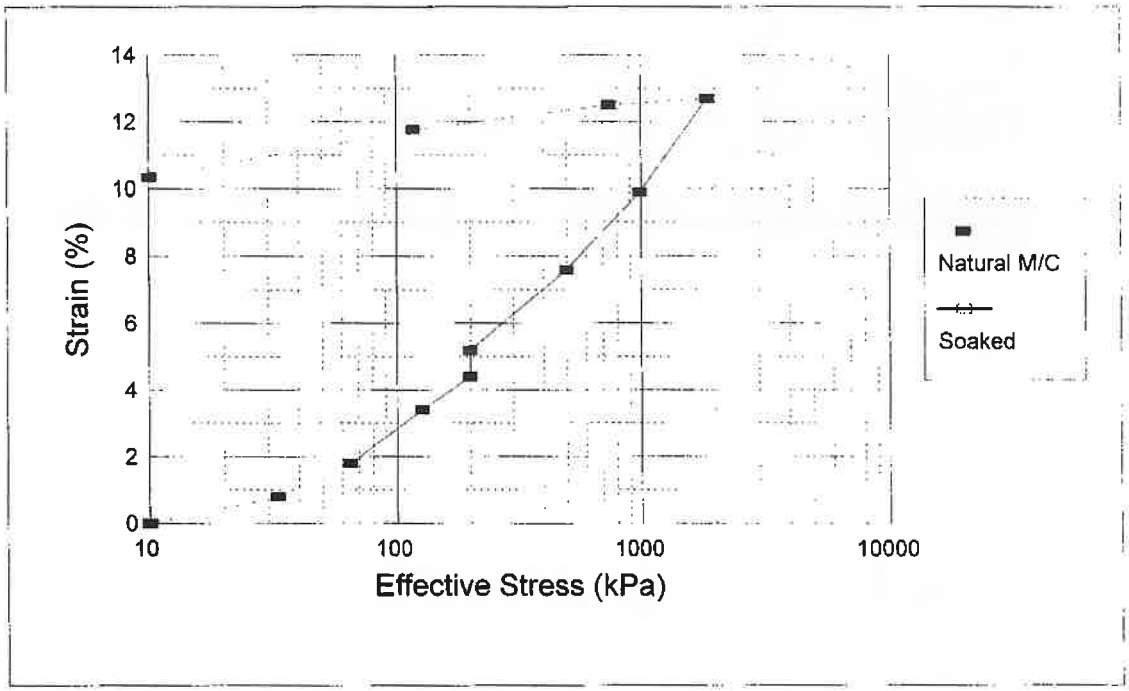
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1232



STRAIN v EFFECTIVE STRESS

Test No: 1232



CHECKED BY:
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DATE : 07/08/07

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COLLAPSE POTENTIAL at 200 kPa

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 7 @ 1,3		
Date	25 JULY 2007	Test No	1233
Job No	07257	Checked By	EB

Sample Height (mm)	20	Sample Diameter (mm)	64	Sample Specific Gravity	2.698

Sample Preparation	NMC

Effective Stress (kPa)	Time (mins)	Consolidation Reading	Voids Ratio	Strain (%)
10	10	674	0.801	0.00
10	70	675	0.800	0.05
33	130	689	0.787	0.75
65	250	700	0.777	1.30
127	340	718	0.761	2.20
200	490	729	0.751	2.75
200	1930	749	0.733	3.75
498	2170	788	0.698	5.70
993	2410	830	0.660	7.80
1868	3850	876	0.619	10.10
743	3970	873	0.622	9.95
118	4090	856	0.637	9.10
10	4210	815	0.674	7.05

Moisture Content Calculations

Mass wet sample plus ring before test (gms)	327.30
Mass wet sample plus ring after test (gms)	335.80
Mass dry sample plus ring (gms)	317.40
Mass ring (gms)	221.00
Moisture content before test (%)	**10.27**
Moisture content after test (%)	**19.09**

Other Data

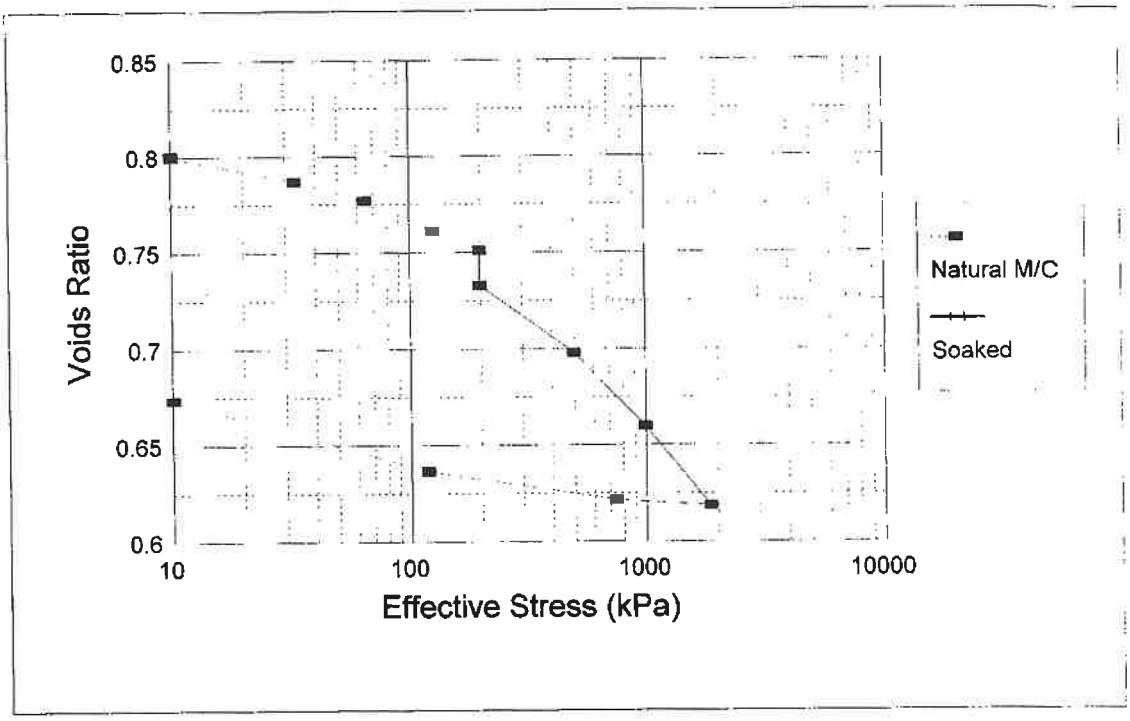
Initial Dry Density (kg/m3)	**1498**
Initial Void Ratio	**0.80**

CHECKED BY:
M. RAMUNYTSHI
DATE : 07/08/007

Programme Data
Revision No 2 (19/03/2001)

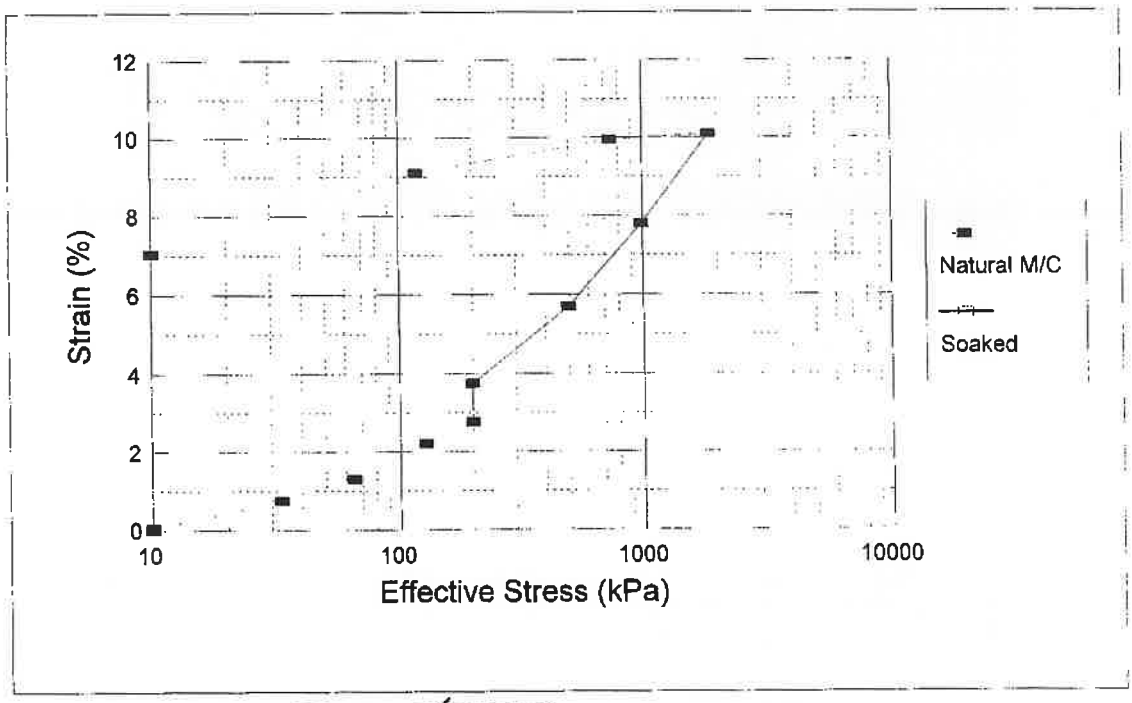
VOIDS RATIO v EFFECTIVE STRESS

Test No: 1233



STRAIN v EFFECTIVE STRESS

Test No: 1233



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DATE: 07/08/007

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VOIDS RATIO / BULK DENSITY / MOISTURE CONTENT DETERMINATION

Client	CARLISLE & ASSOCIATES		
Location	LANSERIA TP 2 @ 1.0m		
Date	25 JULY 2007	Test No	1234
Job No	07257	Checked By	EB

Specific Gravity of wax	0.9
Specific Gravity of soil	2616

	A	B	Average
Sample Number	TP 2	TP 2	
Depth (m)	1.0m	1.0m	
Wet mass in air (gm)	170.90	120.7	
Wet mass + wax coat in air (gm)	198.60	149.3	
Wet mass + wax coat in water (gm)	82.90	59.4	
Mass of wax (gm)	27.70	28.60	
Volume of wax (cc)	30.78	31.78	
Volume of soil + water + wax (cc)	115.70	89.90	
Volume of soil + water (cc)	84.92	58.12	
Wet density of soil (kg/m3)	**2,012**	**2,077**	**2,045**
Moisture Content Calculations			
Wet mass of soil (gm)	285.50	200.00	
Dry Mass of soil (gm)	276.00	194.00	
Moisture Content	3.44	3.09	3
Dry Density of soil (kg/m3)	**1,945**	**2,014**	**1,980**
Void Ratio Calculations			
Volume of solids (cc)	0.74	0.77	
Volume of voids	0.26	0.23	
Voids Ratio	**0.34**	**0.30**	**0.32**

CHECKED BY:
M. RAMUNTSHI
DATE: 07/08/007

RONEY HOFFMANN CONSULTANTS CC
WATER AND WASTE WATER PROCESS CONSULTANTS
141 Cresswell Road Silverton P.O. Box 11564 Queenswood 0121 Tel: (012) 804 8363 Fax: (012) 842 4293 Cell: 082 557 7860 E-mail: roney@iafrica.co.za

BASSON INDEX **REF : PM 2609/19b**

29 SEPTEMBER 2006

AGGRESSIVENESS TOWARDS CONCRETE : AGGRESSIVENESS INDEX
(PORTLAND CEMENT INSTITUTE - J.J. BASSON PUBLICATION)

CLIENT	CIVILAB	ORDER NO.
SAMPLE IDENTIFICATION	ROSSITER STAND	7247

DETERMINAND	TP 6 @ 0.8 m	VALUE	CONSTANT	INDEX
pH		6.2	200	660
Calcium Carbonate Saturated pH		8.7	-2000	5000
Calcium Hardness as CaCO3		2	2.2	1095.6
Total Ammonium as NH4		0.8	10	8
Magnesium as Mg		1	0.6	0.6
Sulphates as SO4		6	0.3	1.8
Chlorides as Cl		6	0.2	1.2
Total Dissolved Solids		26		
Leaching - corrosion sub-index , LCSI				2251.866667
Spalling - corrosion sub-index , SCSI				3.466666667
Final aggressiveness index at 25 Degr. C, corrected for stagnant conditions, Nc				**1129.4**

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2. INTERPRETATION OF CORROSIVITY INDICES

2.1 AGGRESSIVENESS TOWARDS CONCRETE AND ASBESTOS PIPES

INDEX	AGGRESSIVE	NEUTRAL	NON-AGGRESSIVE	COMMENTS
a) STABILITY pH, pHs	< pH	= pH	>pH	The corrosivity indices indicate that the soil will be highly aggressive towards concrete and metals
b) LANGELIER INDEX	NEG. VALUE	ZERO	POS. VALUE	
c) RYZNAR INDEX	> 7,5	6 - 7	< 6	
d) AGGRESSIVENESS INDEX, AI	< 10	10 - 12	> 12	

2.2 CORROSIVENESS TOWARDS METALS

	CORROSIVE
CORROSIVITY RATIO	> 0,2

JRH HOFFMANN 29 SEPTEMBER 2006

RONEY HOFFMANN CONSULTANTS CC
WATER AND WASTE WATER PROCESS CONSULTANTS

141 Cresswell Road Silverton P.O. Box 11864 Queenswood 0121 Tel: (012) 804 8363 Fax: (012) 842 4293 Cell: 082 557 9860 E-mail: roney@iscall.co.za

DETERMINATION OF CORROSIVITY OF SOIL SAMPLES

CLIENT	**CIVILAB**
SAMPLE IDENTIFICATION	**ROSSITER STAND**

RHC REF.	**PM 2609/19b**
ORDER NO.	**7247**
DATE RECEIVED	**19 SEPTEMBER 2006**

1.1 CHEMICAL ANALYSIS Results are in mg/l unless otherwise stated.	SAMPLE NO.	**1.2 CORROSIVITY INDICES**	
DETERMINAND : 2:1 WATER:SOIL EXTRACT	TP 6 @ 0.8 m	INDEX	TP 6 @ 0.8 m
pH	6.2	Stability pH (pHs) at 20°C	10.7
Conductivity (mS/m)	4	Langelier Index at 20°C	-4.5
Total dissolved solids (Calculated)	26	Ryznar Stability Index at 20°C	15.3
Total Hardness as CaCO3	4	Aggressiveness Index	7
Calcium Hardness as CaCO3	2	Cl and SO4 Corrosivity Index	3.7
Calcium as Ca	0.8	(Corrosivity Ratio)	
Magnesium as Mg	0.5		
Total Alkalinity as CaCO3	4		
Chloride as Cl	6		
Sulphate as SO4	6		

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GUIDELINES FOR ASSESSING FINAL INDEX

NAL INDEX	AGGRESSIVENESS	RECOMMENDATION
Under 350	**Non to mildly aggressive**	**Use concrete class as required for structural design**
350 - 750	Mildly to fairly aggressive	Good concrete design and construction essential
750 - 1000	Highly aggressive	Identify dominant corrosion sub-index Follow recommen - dations
Over 1000	Very highly corrosive	Do not use in con - tact with unpro - tected concrete

JRH HOFFMANN

SOILS & MATERIALS TESTING
1164 Minnie Postma, Florida Ext 11
TEL: (011) 674 1325
e mail: lab@geopractica.co.za

SOIL pH and CONDUCTIVITY TEST RESULT

Client	GEOID Geotechnical Engineers		
Location	Lanseria		
Sample Description			
Date	06-Mar-24	Test No	
Job No	24075	Checked By	SM

Sample Description	pH	Electrical Conductivity (µS-cm)	Total Dissolved Salts TDS (ppm)	Resistivity R (Ohm-cm)
B10/1 @ 0,1 - 0,5m	6.5	175	88	5714
B11/1 @ 0,7 - 2,5m	6.3	198	99	5051
B19/1 @ 0,1 - 2,7m	7.5	227	113	4405
B21/1 @ 1,0 - 2,0m	6.6	188	94	5319
B23/1 @ 1,6 2,3m	6.1	251	126	3984
B26/1 @ 0,1 - 2,4m	6.3	201	101	4975
B34/1 @ 0,1 - 2,4m	5.7	220	110	4545
B35/1 @ 0,3 - 0,8m	6.5	196	98	5102
B/TH1/1 @ 1,3 - 4,0m	5.9	222	111	4505
B/TH2/1 @ 2,9 - 3,9m	6.7	200	100	5000
B/TH4/1 @ 1,4 - 2,4m	6.8	169	85	5917
B/TH6/1 @ 1,4 - 3,6m	7.2	206	103	4854

pH	Degree of Acidity
< 4	Extremely Acidic
4. 0 - 5.4	Strongly Acidic
5.5 - 6.4	Moderately Acidic
6.5 - 7.0	Slightly Acidic
7.1 - 7.4	Slightly Alkaline
7.5 - 8.4	Moderately Alkaline
> 8.4	Strongly Alkaline

Resistivity (Ohms-cm)	Degree of Corrosivity (Duligal 1996)
0 - 2 000	Extremely Corrosive
2 000 - 4 000	Very Corrosive
4 000 - 5 000	Corrosive
5 000 - 10 000	Mildly Corrosive
> 10 000	Not Generally Corrosive

APPENDIX F

Site Classification Rationale

Site Classification Rationale

In terms of the investigation guidelines, it is necessary to classify the proposed township into Site Classes according to the requirements of the NHBRC Building Manual and the Code of Practice (COP) for Foundations and Superstructures for Single Storey Residential Buildings of Masonry Construction compiled by the Joint Structural Division of the SAICE and the IStructE.

According to the GFSH-2 *Guidelines for Urban Engineering Geological Investigation*, any site can be divided into one of three primary Geotechnical Sub-Areas which indicate the **general development potential** of an area, as summarised in Table 3. The first objective is thus to classify the site in terms of its development potential according to geotechnical, geo-hydrological and environmental considerations highlighted in the study.

The second objective is then met by applying the COP to categorise areas with **common site / founding characteristics** and **potential foundation movements**, giving recommendations for typical founding options for single-storey building of masonry construction. The assumptions on which these recommendations are based include a maximum foundation bearing pressure of 50kPa applied through minimum 0.6m wide strip foundations installed at approximately 0.4m below natural ground surface. A summary of the various Site Classes for which a site may be classified, is contained in Table 4.

As an example, a site class of 2/C/H/R(locally) as defined in accordance with Tables 1 and 2 is thus associated with a developable site (with precautions) (2), with collapse and/or consolidation settlement potential of less than 5mm (C), heave/shrinkage potential of less than 7,5mm (H) and (local) occurrences of rock outcrop or shallow sub-outcrop (R).

Geotechnical Constraints on Planned Development

Prefix	Development Potential	Impact of Geotechnical Character of Area on Construction Measures
1	The geotechnical conditions are such that urban development can take place without any special precautionary/remedial measures for geotechnical conditions.	- None - Normal building construction
2	Geotechnical conditions are such that the area may be developed for urban use, but appropriate remedial measures and/or precautionary measures are required in the context of the geotechnical constraints.	- Problem Soils - Special foundation and top structure requirements
3	Geotechnical conditions are such that urban development is not recommended.	- Severe Geotechnical or Environmental Constraints - Development not recommended / permitted

Typical Residential Site Class Designations

Site Class	Typical Founding Material	Character of Founding Material	Expected Range of Total Soil Movements (mm)	Assumed Differential Movement (% of Total)
R	Rock (excluding mud rocks which may exhibit swelling to some depth)	Stable	Negligible	-
H H1 H2 H3	Fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays)	Expansive Soils	<7.5 7.5 - 15 15 - 30 >30	50% 50% 50% 50%
C C1 C2	Silty sands, sands, sandy and gravelly soils	Compressible and Potentially Collapsible Soils	<5.0 5.0 - 10 >10	75% 75% 75%
S S1 S2	Fine grained soils (clayey silts and clayey sands of low plasticity), sands, sandy and gravelly soils	Compressible Soil	<10 10 - 20 >20	50% 50% 50%
P	Contaminated soils Controlled fill Uncontrolled fill Land fill Mine waste fill Mining subsidence Dolomitic areas Marshy areas Reclaimed areas Very soft silt/silty clays Landslip	Variable	Variable	
W	Development probably controlled by floodline considerations	N/A	N/A	N/A