The supply and installation of high mast lights at Ndlambe Eco Sun Village at Ndlambe Multi-purpose Centre (MPC) for the CSIR

RFQ Number: 6388 25/10/2024

Date of issue	Wednesday, 09/10/2024	
Compulsory On-line Briefing Session	Date and Time	Thursday, 17/10/2024@ 10h30-11h15
	Link	**Join the meeting now** Meeting ID: 368 724 794 17 Passcode: iDPvjr
Last date for submission of enquiries/clarifications	Tuesday, 22/10/2024 @ 16h30	
Closing Date and Time	Friday, 25/10/2024 @ 16h30 (late submissions will not be accepted)	
RFQ Validity Period	90 calendar days (Commencing from the RFQ closing date)	
Enquiries and submission of proposals	For submission of quotations or any other enquiries: Email tender@csir.co.za (***Please use RFQ No and RFQ Description as subject reference)***	
CSIR Hours	08h00 – 16h30	

1 INTRODUCTION

The Council for Scientific and Industrial Research (CSIR) is one of the leading scientific research and technology development organisations in Africa. In partnership with national and international research and technology institutions, the CSIR undertakes directed and multidisciplinary research and technology innovation that contributes to the improvement of the quality of life of South Africans. The CSIR's main site is in Pretoria while it is represented in other provinces of South Africa through regional offices.

The CSIR is coordinating the construction of the EcoSun Green Village in Ndlambe Municipality in the Eastern Cape, where various innovative technologies are being demonstrated for application in human settlements. The Green Village consists of a community hall (multi-purpose centre), ten small houses, and a landscaped park area.

2 INVITATION FOR QUOTATION

Quotations are hereby invited for the supply and install high mast lighting at Ndlambe Municipality on the EcoSun Green Village site (Ndlambe Multi-purpose Centre (MPC), Anglers Way, Kenton on Sea).

3 SPECIFICATION AND SCOPE OF WORK

Description of works

The work shall include design, supply, testing and commissioning of Solar powered LED based high mast lighting system for the public park area at Ndlambe multi-purpose Centre, including five years comprehensive warranty and maintenance.

The objective of the outdoor lighting is to provide a sense of security to the residents within the EcoSun Green village.

The detailed specification is outlined under **Error! Reference source not found..**

The work is to commence in October 2024 and is to be completed within 6 weeks.

Scope of services

The scope of service includes:

1. Supply and installation of four high mast lights and additional equipment that is applicable.
2. Excavation and construction of high mast post foundations
3. Connection (configuration) of the lights
4. Supply configuration plans

Requirements from the Service provider

The Service Provider must:

- produce weekly progress reports to CSIR.
- ensure all work is signed off by CSIR at each work stage.
- liaise, co-operate and provide the necessary information with project stakeholders in all work stages.

The Service Provider is expected to:

- Inspect the site and advise on the necessary surveys, analysis, tests and site or other investigations, where such information will be required;
- Convene a project team;
- Confirm the services and scope of work required;
- Develop a project program and execution plan;
- Liaise, cooperate and share information with project sponsors and other parties contracted by the client throughout the different stages of the project;
- Prepare design drawings and submit to local authority, where necessary;
- Monitor work on site;
- Provide a close-out report at the end of the project.

Competencies of service provider

The Service Provider is required to provide evidence of the following competencies:

1. Registration of team technical lead with the ECSA (Engineering Council Of South Africa)
2. Project management capability (provide evidence of similar projects that have been successfully managed).
3. Construction project grading with CIDB of 1EP or higher.

4 PRICING REQUIREMENTS

4.1 Pricing must be provided in South African Rand (including all applicable taxes less all unconditional discounts).
4.2 Prices that are subject to escalation and exchange rate fluctuations are to be clearly indicated, with the currency and ROE used in the quotation must be clearly indicated.
4.3 Price should include additional cost elements such as freight, insurance until acceptance, duty where applicable, etc.
4.4 Payment will be according to the CSIR Payment Terms and Conditions.
4.5 Please provide a detail pricing using the Bill of Quantities outlined under **Annexure B.**

Bidders are to price their quotations using the Bill of Quantities. Explanatory notes must be provided in the quotation when deviating from the Bill of Quantities

5 RETURNABLES

Returnables are required for evaluation purposes. Bidders' responses will be evaluated based on compliance with the listed administration and mandatory bid requirements. The bidder(s) proposal may be disqualified for non-submission of any of the documents.

5.1 Essential Returnable Documents

Without limiting the generality of the CSIR's other critical requirements for this Bid, bidder(s) must submit the documents listed in Table 1 below. All documents must be completed and signed by the duly authorized representative of the prospective bidder(s).

Please confirm submission of the Essential Returnable Documents detailed below by so indicating [Yes or No] in the table below:

Table 1

ESSENTIAL RETURNABLE DOCUMENTS	SUBMITTED [Yes/No]
Annexure C: Standard Bidding Document (SBD) 1 Form	
Annexure D: Standard Bidding Document (SBD) 4 Form	
Annexure E: Preference Points Award Form (Mandatory documents to claim preference points)	
Annexure F: Mutual Non-Disclosure Agreement	

5.2 Mandatory Returnable Documents

Failure to submit **all** Mandatory Returnable Documents by the closing date and time of this RFQ will result in a Respondent's disqualification. Bidders are therefore urged to ensure that all these documents are returned with their RFQ.

Please confirm submission of the Mandatory Returnable Documents detailed below by so indicating [Yes or No] in the table below:

Table 2

MANDATORY RETURNABLE DOCUMENTS	SUBMITTED [Yes/No]
Annexure B: Pricing Schedule	
Valid letter of good standing from the Department of Employment and Labour (DEL) in compliance with the COID Act	

Proof of professional registrations with Engineering Council of South Africa (ECSA)	
Proof of experience in similar projects (Two certificates of completion of a similar project, or letter of reference, or close-out reports).	

6 EVALUATION PROCESS AND CRITERIA

The RFQ will be evaluated as per the following:

Phase 1 – Elimination Criteria
The bidders will be evaluated on the elimination criteria as stated in Point 6.1 below. Bidders that are eliminated during this phase will not be evaluated further on price and preference points.

Phase 2 – Price and Preference Points Evaluation
Bidders will be evaluated as per the preference points system stated in point 6.2 below.

6.1 Elimination Criteria

Bidders will be eliminated if they fail to provide the following information:

a) Bidder that submit late bids will not be considered.
b) Bidder that submit to the incorrect location or email address will not be considered.
c) Bidder that is listed on the NT database of restricted suppliers will not be considered.
d) Bidder that is registered on the NT Register of Tender Defaulters will not be considered.
e) Bidder that is not registered or active on CIDB with grade **1 EP** or higher
f) Bidder that did not submit mandatory returnable documents as listed on paragraph 5.2 (**Table 2**).
g) Bidder that fail to meet the specification requirements will not be considered.

6.2 Preferential Points System Evaluation Criteria

Selection of suppliers will be based on the 80/20 preference point system as stipulated in **Annexure E: Preference Points Award Form**.

7 OBJECTIVE CRITERIA

The CSIR reserves the right to award this tender to a bidder that did not score the highest total number of points in accordance with Section (2) (1) (f) of the PPPFA (Act 5 of 2000)", under the following conditions:

- The directors, shareholders or officers of the bidder must not be formally charged of fraudulent or illegal conduct which could harm the CSIR's reputation by associating with the bidder.

8 SUBMISSION REQUIREMENTS

8.1 All quotations must be submitted electronically to tender@csir.co.za
8.2 Respondents must use the RFQ number and RFQ Description as the subject reference number when submitting their bids.
8.3 The email and file sizes must not exceed a total of 25MB per email.
8.4 Documents submitted via cloud solutions such as: WeTransfer, Google Drive, Dropbox, etc. will not be considered.
8.5 The naming / labelling syntax of files or documents must be short and simple.

9 CONSTRUCTION INDUSTRY DEVELOPMENT BOARD (CIDB)

9.1 Only those tenderers who are registered with the CIDB or are capable of being so prior to the closing date and time of this RFQ submissions, with a grading of **1EP or higher** class of construction works, will be considered.

9.2 Joint ventures are eligible to **submit** proposals provided that:

- Every member of the joint venture is registered with the CIDB;
- The lead partner has a contractor grading designation in the **1EP or higher** class of construction work; or not lower than one level below the required grading designation in the class of works construction works under consideration and possess the required recognition status;
- The combined contractor grading designation calculated in accordance with the Construction Industry Development Regulations is equal to **1EP or higher** class of construction work.

10 MEDIUM OF COMMUNICATION

All documentation submitted in response to this RFQ must be in English.

11 CORRECTNESS OF RESPONSES

11.1 The bidder must confirm satisfaction regarding the correctness and validity of their proposal and that all prices and rates quoted cover all the work/items specified in the RFQ. The prices and rates quoted must cover all obligations under any resulting contract.

11.2 The bidder accepts that any mistakes regarding prices and calculations will be at their own risk.

12 VERIFICATION OF DOCUMENTS

12.1 Bidders should check the numbers of the pages to satisfy themselves that none are missing or duplicated. No liability will be accepted by the CSIR in regard to anything arising.

12.2 Pricing schedule and specific goals credentials should be submitted with the RFQ response.

13 PREPARATION COSTS

The Bidder will bear all its costs in preparing, submitting and presenting any response or Tender to this bid and all other costs incurred by it throughout the bid process. Furthermore, no statement in this bid will be construed as placing the CSIR, its employees or agents under any obligation whatsoever, including in respect of costs, expenses or losses incurred by the bidder(s) in the preparation of their response to this bid.

14 OTHER TERMS AND CONDITIONS

14.1 No bidder shall under any circumstances offer, promise or make any gift, payment, loan, reward, inducement, benefit or other advantage, which may be construed as being made to solicit any favour, to any CSIR employee or its representatives. Such an act shall constitute a material breach of the Agreement and the CSIR shall be entitled to terminate the Agreement forthwith, without prejudice to any of its rights.

14.2 Bidders shall not assume that information and/or documents supplied to CSIR, at any time prior to this request, are still available to CSIR, and shall consequently not make any reference to such information document in its response to this request.

14.3 Changes by a bidder to its submission will not be considered after the closing date and time.

14.4 Bidders confirm that by submitting a tender, they confirm that I am satisfied with regards to the correctness and validity of my quotation; that the price(s) and rate(s) quoted cover all the services specified in the quotation documents; that the price(s) and rate(s) cover all my

obligations and I accept that any mistakes regarding price(s) and rate(s) and calculations will be at my own risk.

14.5 Bidders further confirm that by submitting a tender, they accept to take accept full responsibility for the proper execution and fulfilment of all obligations and conditions devolving on them under this RFQ as the principal liable for the due fulfilment of this RFQ process.

14.6 No goods and/or services shall be delivered to the CSIR without an official CSIR Purchase order. CSIR purchase order number must be quoted on the invoice. Invoices without CSIR purchase order numbers will be returned to the supplier.

15 SPECIAL CONDITIONS

The CSIR reserves the right to

15.1 Extend the closing date of this RFQ;
15.2 Correct any mistakes at any stage of the tender that may have been in the Bid documents or occurred at any stage of the tender process;

15.2 Verify any information contained in the bidder's submission;
15.3 Request documentary proof regarding the bidder's submission;
15.4 Carry out site inspections, product evaluations or explanatory meetings in order to verify the nature and quality of the product/service offered by the bidder(s) or verify any information whether before or after the adjudication of this RFQ;
15.5 Award this tender to a bidder that did not score the highest total number of points, only in accordance with Section 2(1)(f) of the PPPFA (Act 5 of 2000);
15.6 Request audited financial statements or other documents for the purpose of a due diligence exercise to determine if the bidder will be able to execute the contract;
15.7 Award this RFQ as a whole or in part;
15.8 Award this RFQ to multiple bidders;
15.9 Cancel and/or terminate the tender process at any stage, including after the Closing Date and/or after presentations have been made, and/or after tenders have been evaluated and/or after the preferred bidder(s) have been notified of their status as such;
15.10 Post tender negotiate on any elements on the bid, including but not limited to technical, transformation, price, and contractual terms and conditions.;
15.11 Not to award a contract to a bidder who is associated with a security breach that materially adversely affects other entities or if any directors or officers of a bidder are formally charged of fraudulent or illegal conduct which, would harm the CSIR's reputation by its continued association with the bidder.

16 CONFIDENTIALITY

Some of the information contained in the Tender Documents may be of a confidential nature and must only be used for purposes of responding to this RFQ. This confidentiality clause

extends to bidder partners whom you may decide to involve in preparing a response to this RFQ. Bidders must complete and sign **ANNEXURE F:** Non- Disclosure Agreement.

Except as may be required by operation of law, by a court or by a regulatory authority having appropriate jurisdiction, no information contained in or relating to this bid or a bidder's tender(s) will be disclosed by any bidder or other person not officially involved with the CSIR's examination and evaluation of a Tender.

No part of the bid may be distributed, reproduced, stored or transmitted, in any form or by any means, electronic, photocopying, recording or otherwise, in whole or in part except for the purpose of preparing a Tender. This bid and any other documents supplied by the CSIR remain proprietary to the CSIR and must be promptly returned to the CSIR upon request together with all copies, electronic versions, excerpts or summaries thereof or work derived there from.

Throughout this bid process and thereafter, bidder(s) must secure the CSIR's written approval prior to the release of any information that pertains to (i) the potential work or activities to which this bid relates; or (ii) the process which follows this bid. Failure to adhere to this requirement may result in disqualification from the bid process and civil action.

17 PROTECTION OF PERSONAL INFORMATION

17.1 Each Party consents to the other Party holding and processing "personal information" (as defined in the POPI Act) relating to it for legal, personnel, administrative and management purposes (including, if applicable, any "special personal information" relating to him/her, as defined in the POPI Act). Notwithstanding the generality of the aforesaid, each Party hereby undertakes to comply with all relevant provisions of the POPI Act and any other applicable data protection laws. The Client further agrees to comply with all CSIR's reasonable internal governance requirements pertaining to data protection.

17.2 Each Party consents to the other Party making such information available to those who provide products or services to such parties (such as advisers, regulatory authorities, governmental or quasi-governmental organisations and potential purchasers of such Party or any part of their business).

17.3 The Client consents to the transfer of such information to CSIR's business contacts outside South Africa in order to further its business interests.

17.4 While performing any activity where a Party is handling personal information as a "responsible party" (as defined in the POPI Act), each Party undertakes that it will process the personal information strictly in accordance with the terms of the POPI Act, this Contract, and the other Party's instructions from time to time, and take appropriate operational measures to safeguard the data against any unauthorised access.

17.5 Each Party acknowledges that in the course of conducting business with each other, each Party intends to maintain and process personal information about the other Party in an

internal database. By signing this Contract, each Party consents to the maintenance and processing of such personal information.

17.6 Where relevant, the Client shall procure that all of its personnel, agents, representatives, contractors, sub-contractors and mandataries shall comply with the provisions of this clause 16 (Personal Information). The CSIR shall be entitled on reasonable notice to conduct an inspection or audit Client's compliance with the requisite POPI Act safeguards.

18 INDEMNITY

If a bidder breaches the conditions of this bid and, as a result of that breach, the CSIR incurs costs or damages (including, without limitation, the cost of any investigations, procedural impairment, repetition of all or part of the bid process and/or enforcement of intellectual property rights or confidentiality obligations), then the bidder indemnifies and holds the CSIR harmless from any and all such costs which the CSIR may incur and for any damages or losses the CSIR may suffer.

19 TAX COMPLIANCE

No tender shall be awarded to a bidder who is not tax compliant. If a recommended bidder is not tax complaint, the bidder will be notified in writing of their non- compliant status and the bidder will be requested to submit written proof from SARS of their tax compliant status or proof that they have made an arrangement to meet their outstanding tax obligations within seven (7) working days. Should they fail to do so CSIR will reject their bid.

The CSIR reserves the right to withdraw an award made, or cancel a contract concluded with a successful bidder in the event that it is established that such bidder was in fact not tax compliant at the time of the award or has submitted a fraudulent Tax Clearance Certificate to the CSIR, or whose verification against the Central Supplier Database (CSD) proves non-compliant. The CSIR further reserves the right to cancel a contract with a successful bidder in the event that such bidder does not remain tax compliant for the full term of the contract.

20 LIMITATION OF LIABILITY

A bidder participates in this bid process entirely at its own risk and cost. The CSIR shall not be liable to compensate a bidder on any grounds whatsoever for any costs incurred or any damages suffered as a result of the Bidder's participation in this Bid process.

21 MISREPRESENTATIONS DURING THE LIFECYCLE OF THE CONTRACT

21.1 The bidder should note that the terms of its Tender will be incorporated in the proposed contract by reference and that the CSIR relies upon the bidder's Tender as a material representation in making an award to a successful bidder and in concluding an agreement with the bidder.

21.2 It follows therefore that misrepresentations in a Tender may give rise to service termination and a claim by the CSIR against the bidder notwithstanding the conclusion of the Service Level Agreement between the CSIR and the bidder for the provision of the Service in question. In the event of a conflict between the bidder's proposal and the Service Level Agreement concluded between the parties, the Service Level Agreement will prevail.

22 DISCLAIMER

This RFQ is a request for Quotations only and not an offer document. Answers to this RFQ must not be construed as acceptance of an offer or imply the existence of a contract between the parties. By submission of its proposal, bidders shall be deemed to have satisfied themselves with and to have accepted all Terms & Conditions of this RFQ. The CSIR makes no representation, warranty, assurance, guarantee or endorsements to bidder concerning the RFQ, whether with regard to its accuracy, completeness or otherwise and the CSIR shall have no liability towards the bidder or any other party in connection therewith.

23 NATIONAL TREASURY CENTRAL SUPPLIER DATABASE

23.1 Bidders are required to be registered on the Central Supplier Database and the National Treasury shall verify the bidder's tax compliance status through the Central Supplier Database. Registrations can be completed online at: www.csd.gov.za;

23.2 Where Consortia / Joint Ventures / Sub-contractors are involved, each party must be registered on the Central Supplier Database and their tax compliance status will be verified through the Central Supplier Database.

Annexure A

1 Scope of work:

The work shall include design, supply, testing and commissioning of Solar powered LED based high mast lighting system for the public park area at Ndlambe multi-purpose Centre, including five years comprehensive warranty and maintenance.

Figure 1. Google earth image for Ndlambe multi-purpose centre (-33.676613, 26.670594; altitude 221m) showing boundaries for the installation site.

The objective of the outdoor lighting is to provide a sense of security to the residents within the EcoSun Green village.

2 Technical requirements

2.1 Design

2.1.1 Light levels for the residential and park areas shall meet the minimum safety levels as per SANS 10389-3:2004.

2.1.2 Uniform light Illuminance levels for the residential and park areas shall meet the requirements for SANS 10389-3 Section 2.7.4, assuming and environmental lighting zone of E3 (suburban) using post-curfew limits (for all-night lighting); limitation of spill lighting to properties outside the boundary of the EcoSun Green Village must be limited to 2 lux as per Table 2.2 of SANS 10389-3. Each luminaire shall be limited to 1 000 cd, as per Table 2.3 of SANS 10389-3.

2.1.3 The lighting design shall be done to ensure no lighting pollution, ie. lighting should not be cast skyward. **Sly glow shall be limited as per Table 2.5 of SANS 10389-3.**

2.1.4 The light colour temperature should not exceed 4 000 K.

2.1.5 The solar powered LED based high mast lighting system shall include a step dim driver to ensure energy efficiency.

2.2 Light Source

2.2.1 The light source shall be of LED type.

2.2.2 The illumination should be uniform without dark bands or abrupt variations and soothing to the eye.

2.2.3 The LED housing should be made of pressure die cast aluminium having sufficient area for heat dissipation and heat resistant toughened clear glass/ high quality poly carbonate fitted with pressurized die cast aluminium frame with SS screws. The temperature of heat sink should not increase more than 30 degree C above ambient temperature even after 48 hrs of continuous operation. This condition should be complied for the dusk to dawn operation of the lamps while battery operating at any voltage between the loads disconnect and charge regulation set point.

2.2.4 The LED efficiency should be more than 140 lumen / watt.

2.2.5 Lumen depreciation shall be LM80B10-TM21- 50 000 hours.

2.3 **Electronics Efficiency**

2.3.1 MPPT charge controller to maximize energy drawn from the Solar PV array. The MPPT charger shall be microcontroller based. The MPPT should have four stage charging facilities i.e Bulk, Absorption, Float and Equalization. The auto equalization facilities for every (30+_3 days) and provision to verify it during testing. The PV charging efficiency shall not be less than 90% and shall be suitably designed to meet array capacity. The charge controller shall confirm to IEC 62093, IEC 60068 as per specifications.

2.3.2 Protection against polarity reversal of PV array and battery, Over Current, Short Circuit, Deep Discharge, Input Surge Voltage, Blocking diode protection against battery night time leakage through PV Module

2.3.3 The system should have protection against battery overcharge and deep discharge conditions. The numerical values of the cut off limits of lower voltage should not be less than 12 Volt

2.3.4 The system should have protection against Microwave radar sensor auto Dimming system

2.3.5 Full protection against open circuit, accidental short circuit and reverse polarity should be provided.

2.3.6 Charge controller shall have automatic dusk-dawn circuit based on SPV module as sensor for switching on/off the high mast light without manual intervention. The sensor must not get triggered by impulse lighting like lightning flashes and firecrackers.

2.3.7 The self-consumption of the charge controller shall not be more than 20 mA at rated voltage and rated current. Adequate protection shall also be incorporated under no-load conditions (i.e. when the system is ON & the load (LED Lamp is removed)

2.3.8 The system should be provided with 2 LED indicators: a green light to indicate charging in progress and a red LED to indicate deep discharge condition of the battery. The green LED should glow only when the battery is actually being charged.

2.3.9 All capacitors shall be rated for maximum temperature of 105° C.

2.3.10 Resistances shall preferably be made of metal film of adequate rating.

2.4 **High mast pole specifications**

2.4.1 The high mast pole shall have a hoisting unit for height adjustments and maintenance.

2.4.2 The steel used in manufacture of poles shall comply with SABS 1431 Grade 355 WA with minimum yield strength of 355 MPa. Bidder to provide test and analysis certificates. No steel sections shall be less than 3mm wall thickness.

2.4.3 All welding shall be carried out by coded welders only. Proof that all welders have been tested shall be provided on request.

2.4.4 The high mast shall be provided with earthing straps and rod which shall be fastened to mast as a safety measure.

2.4.5 All parts of the pole and its associated parts shall be hot dip galvanized to SANS 121 ISO 1461 specifications. Contractor to provide an inspection certificate upon request.

2.4.6 No welding, drilling, punching, bending or removal of burrs shall be carried out after galvanizing.

2.4.7 All poles shall be designed according to SANS 10225, to carry the luminaires as specified.

2.5 **Base**

2.5.1 The high mast foundations shall be designed and constructed in accordance with SANS 10100 (Pt 1 & Pt 2) to withstand the forces imposed by the mast.

2.5.2 The soil conditions and the soil bearing capacity shall be determined by a set of DCP tests for each individual mast. The results of these tests shall be recorded and placed in the project file for each high mast installation.

2.5.3 The concrete cover of the reinforcing bars shall be not less than 50 mm in all cases.

2.5.4 The contractor shall provide evidence of the actual concrete cover achieved for the base and the plinth.

2.5.5 The concrete shall have a design compressive strength of not less than 25 MPa after 28 days.

2.5.6 The concrete strength of the base and the plinth shall be measured after 28 days by the Schmidt Hammer Test method for each foundation.

2.5.7 The test results shall be recorded in the high mast project file.

2.5.8 The plinth shall be designed to have a projection of not less than 300mm above nominal ground level after backfill compaction has been completed.

2.6 **Lightning conductor**

2.6.1 Each high mast shall be fitted with a lightning conductor spike at the top point of the luminaire.

2.6.2 This spike shall be connected to the high mast earthing system.

2.6.3 The steel high mast may be used as the earth path provided that a 70 mm^2 flexible copper cable is installed at hinge point to ensure that electrical currents do not pass through the hinge joint.

2.6.4 The high mast shall be connected to the earthing system by means of a 16 mm diameter stud welded to the inside of the mast.

2.7 **Geo technical survey**

2.7.1 The contractor shall be responsible to determine the soil conditions for each high mast location. This information shall be to the satisfactions and approval of the municipality to ensure design confidence. A geotechnical survey of the site is available (see Annexure G)

2.8 Solar rechargeable battery

The solar rechargeable battery shall have the following features:

2.8.1 The battery should be at least 57AH at 12,8VDC Li Ferro Phosphate battery packs.

2.8.2 Battery service Life shall be more than 2000 times, under normal conditions.

2.8.3 Operate in temperatures of between -30°C and 60°C.

2.8.4 Have a charged maintenance ability according to IEC standards.

2.8.5 Be capable of rapid charging in 1 to 6 hours.

2.8.6 Battery enclosure shall be secured by means of steel tamper-proof allen/hex bolts to minimize theft and vandalism.

2.9 Solar PV Module

2.9.1 Crystalline high power/efficiency cells shall be used in the Solar Photovoltaic module.

2.9.2 PV module must be warranted for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years.

2.9.3 PV modules must qualify to IEC 61730 Part 1- requirements for construction & Part 2 – requirements for testing, for safety qualification.

2.9.4 Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided and if required, blocking diode(s) may also be provided.

2.10 Theft and vandalism

2.10.1 Battery Enclosure and Solar Panels shall be secured by means of steel tamper-proof allen/hex bolts to minimize theft and vandalism.

3 Procedures regards existing services and excavations

3.1.1 The contractor shall be required to take special care to locate existing services that would be affected by the installation of the high mast.

3.1.2 The contractor shall be responsible for the repair and reinstatement to any services damaged by them or any of their subcontractors.

3.1.3 In the event of damage occurring to any existing services, the contractor shall immediately notify the Ndlambe Municipality.

3.1.4 All repairs to these services shall be to the satisfaction of the Ndlambe Municipality.

3.1.5 Penalties including consequential damage shall be levied at the sole discretion of the Municipality for damage to existing services caused under the following circumstances:

- Damage due to unauthorized excavation
- Damage due to unauthorized blasting activities.

4 Normative references

4.1.1 The following table contains provisions that, through reference in the text, constitute requirements of the specifications. At the time of publication, the editions indicated were valid.

4.1.2 All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below.

SANS STANDARDS	STANDARD DESCRIPTION
SANS 121	Hot dip galvanized coatings on fabricated iron and steel articles
SANS 1200 C	Site clearance
SANS 62305-3	Protection against lightning
SANS 10225	The design and construction of lighting masts
SANS 10214	The design, fabrication and inspection of articles for hot dip galvanizing
SANS 10162	The structural use of steel : The limit states design of hot rolled steelwork
SANS 10100	The structural use of concrete (Part 1 and 2)
SANS 1200 HC	Corrosion protection of structural steelwork

5 Warranty

5.1.1 The bidder shall provide warranty that the goods supplied under the contract are new, unused, of the most recent or current models and incorporate all recent improvements in design and materials.

5.1.2 The bidder shall warrant that all goods supplied under this contract shall have no defect, arising from design, materials, or workmanship or from any act or omission of the supplier, that may develop under normal use of the supplied goods under prevailing site conditions.

5.1.3 The bidder shall warrant that each luminaire supplied under the contract shall have a maximum lumen depreciation of not more than 10% of the original lumen output of the luminaire during the period of warranty.

5.1.4 The warranty shall remain valid for fifty-four (54) months after the goods or any portion thereof as the case may be, have been delivered.

5.1.5 The Ndlambe municipality shall promptly notify the service provider in writing of any claims arising under this warranty.

5.1.6 Upon receipt of such notice, the service provider shall, within the specified period and with all reasonable speed, repair or replace the defective goods or parts thereof, without costs to the municipality.

5.1.7 If the service provider, having been notified, fails to remedy the defect(s) within the specified period, the municipality may proceed to take such remedial action as may be necessary, at the service provider's risk and expense and without prejudice to any other rights which the municipality may have against the service provider under the contract.

5.1.8 The lighting system (including the battery) shall be warranted for a period of five years from the date of supply.

5.1.9 The PV module(s) will be warranted for a minimum period of 25 years from the date of supply. The PV modules must be warranted for their output peak watt capacity, which should not be less than 90% at the end of Ten (10) years and 80% at the end of Twenty five (25) years.

5.1.10 The Warranty Card to be supplied with the system must contain the details of the system.

During the warranty following maintenance will be required to be carried out by the contractor.

- The Selected Bidder shall be solely responsible for commencement to completion of the work. It shall be responsible for any loss or damage happens at the workplace or during the erection of the system, and shall arrange for repair or compensation at its own cost. The Selected Bidder(s) shall warranty that the equipment used in installing the system are new and unused.
- The Selected Bidder shall provide warranty, in the name of the Primary Beneficiary, of the complete system towards any defect in design of the system, equipment used including spare parts for a period of five (5) years from the date of Commissioning of the system. The Warranty period shall be 25 Years for the PV modules.
- Any defect noticed in the system during the period of five (5) years from the date of Commissioning of the system shall be rectified/replaced by the Selected Bidder.
- The replacement of the defective component at the cost of successful Bidder shall be made with similar and/or equivalent make. The replaced component shall not, in any situation, reduce the performance of the system.
- The Selected Bidder shall commence the replacement/rectification of the defect within seven (7) days from the date of identification of such defect.
- The Selected Bidder shall provide warranty certificate along with the Commissioning report.
- The bidder shall maintain the system under annual maintenance contract with the end user.
- The safety and security of the system shall be sole responsibility of the end user.
- Necessary maintenance spares for five years trouble free operation shall also be supplied with the system.
- The supplier shall be responsible to replace free of cost (including transportation and insurance expenses) to the purchaser whole or any part of supply which under normal and proper use become dysfunctional within one month of issue of any such complaint by the purchaser.

6 Operation and maintenance manual

6.1.1 An Operation, Instruction and Maintenance Manual, in English and the local language, should be provided with the High Mast System. The following minimum details must be provided in the Manual:

- Basic principles of Photovoltaic. A small write-up (with a block diagram) on the High Mast Lighting System - its components, PV module, battery, electronics and luminaire and expected performance.
- Type, Model number, Voltage & capacity of the solar panel, LED & battery, used in the system.
- The make, model number, country of origin and technical characteristics (including IESNA LM-79 & 80 report) of W-LEDs used in the lighting system.
- About Charging and Significance of indicators.
- Clear instructions about erection of pole and mounting of PV module (s), and lamp housing assembly on the pole.
- Clear instructions on regular maintenance and trouble shooting of the System.
- DO's and DONT's.
- Name , address, contact no, email, office address of the contact person for repair and maintenance, in case of non-functionality of the system

7 Installation, commissioning and handing over certificates

7.1.1 Installation, Commissioning and Handing Over Certificates shall be provided upon project completion.

4. Site location

The site location is at **Kenton on sea in Eastern cape, coordinates S33.676560, E26.670585**.

The detail of the required work is provided in Table 2.

Table 1. Specifications

Item No	Description of the work
1	Lighting design fees
2	Light source (Materials as per specifications provided in Annexure A)
3	High mast pole (Materials and labour as per specifications provided in Annexure A)
4	Base and foundation (Design, Materials and labour as per specifications provided in Annexure A)
5	Lighting conductor (Materials as per specifications provided in Annexure A)
6	Solar rechargeable battery (Materials as per specifications provided in Annexure A)
7	Solar PV (Materials as per specifications provided in Annexure A)
8	Site preparations and removal of rubble and cleaning of area
9	Earthworks
10	Commissioning
11	Remote monitoring solutions to keep track of system performance, battery health, and potential issues in real time.
12	Disbursements (including travel, site establishment, etc). If applicable.

a. Site location reference pictures.

Figure 2.Kenton on Sea locality plan

Annexure B

1. Pricing Schedule

This schedule is to be completed and returned. Please do not fill this in by hand as handwriting can be illegible. The CSIR will provide this schedule in excel format upon request.

Table 2. Pricing schedule

Item No	Description of the work	Quantity	Unit Price (VAT Excl)	Total Price (VAT Excl)
1	Lighting design fees	1		
2	Light source (Materials as per specifications provided in Annexure A)	4		
3	High mast pole (Materials and labour as per specifications provided in Annexure A)	4		
4	Base and foundation (Materials and labour as per specifications provided in Annexure A)	4		
5	Lighting conductor (Materials as per specifications provided in Annexure A)	4		
6	Solar rechargeable battery (Materials as per specifications provided in Annexure A)	4		
7	Solar PV (Materials as per specifications provided in Annexure A)	4		
8	Site preparations and removal of rubble and cleaning of area	1		
9	Earthworks	1		
10	Commissioning	1		
11	Remote monitoring solutions to keep track of system performance, battery	4		

	health, and potential issues in real time.			
12	Disbursements (including travel, site establishment, etc). If applicable.	1		
Subtotal				
Contingency Sum (5%)				
Preliminary and General (Ps & Gs)				
Total Price (VAT Excl.)				
VAT (15%)				
Total Price (VAT Incl.)				

Annexure C
Standard Bidding Document (SBD) 1

PART A: INVITATION TO BID

YOU ARE HEREBY INVITED TO BID FOR REQUIREMENTS OF THE CSIR					
BID NUMBER:	RFQ6388 25/10/2024	CLOSING DATE:	25/10/2024	CLOSING TIME:	16h30
DESCRIPTION	***The supply and installation of high mast lights at Ndlambe Eco Sun Village for the CSIR***				

BID RESPONSE DOCUMENTS MAY BE DEPOSITED IN THE BID BOX SITUATED AT *(STREET ADDRESS)*

The CSIR requires that all tender submissions be submitted electronically to tender@csir.co.za. Should tender file size exceed 25MB, bidders submit tender in multiple emails. Use the tender number RFQ 6388/25/10/2024 and description of the tender as the subject on your email.

BIDDING PROCEDURE ENQUIRIES MAY BE DIRECTED TO		**TECHNICAL ENQUIRIES MAY BE DIRECTED TO:**	
CONTACT PERSON	Supply Chain Management	CONTACT PERSON	Supply Chain Management
TELEPHONE NUMBER	N/A	TELEPHONE NUMBER	N/A
FACSIMILE NUMBER	N/A	FACSIMILE NUMBER	N/A
E-MAIL ADDRESS	tender@csir.co.za	E-MAIL ADDRESS	tender@csir.co.za

SUPPLIER INFORMATION					
NAME OF BIDDER					
POSTAL ADDRESS					
STREET ADDRESS					
TELEPHONE NUMBER	CODE		NUMBER		
CELLPHONE NUMBER					
FACSIMILE NUMBER	CODE		NUMBER		
E-MAIL ADDRESS					
VAT REGISTRATION NUMBER					
SUPPLIER COMPLIANCE STATUS	TAX COMPLIANCE SYSTEM PIN:		**OR**	CENTRAL SUPPLIER DATABASE No:	MAAA
1 ARE YOU THE ACCREDITED REPRESENTATIVE IN SOUTH AFRICA FOR THE GOODS /SERVICES /WORKS OFFERED?	☐Yes ☐No [IF YES ENCLOSE PROOF]		**2** ARE YOU A FOREIGN BASED SUPPLIER FOR **THE GOODS /SERVICES /WORKS OFFERED?**	☐Yes ☐No [IF YES, ANSWER THE QUESTIONNAIRE BELOW]	

QUESTIONNAIRE TO BIDDING FOREIGN SUPPLIERS

IS THE ENTITY A RESIDENT OF THE REPUBLIC OF SOUTH AFRICA (RSA)? ☐ YES ☐ NO

DOES THE ENTITY HAVE A BRANCH IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE A PERMANENT ESTABLISHMENT IN THE RSA?	☐ YES ☐ NO
DOES THE ENTITY HAVE ANY SOURCE OF INCOME IN THE RSA?	☐ YES ☐ NO
IS THE ENTITY LIABLE IN THE RSA FOR ANY FORM OF TAXATION?	☐ YES ☐ NO

IF THE ANSWER IS "NO" TO ALL OF THE ABOVE, THEN IT IS NOT A REQUIREMENT TO REGISTER FOR A TAX COMPLIANCE STATUS SYSTEM PIN CODE FROM THE SOUTH AFRICAN REVENUE SERVICE (SARS) AND IF NOT REGISTER AS PER 2.3 BELOW.

PART B: TERMS AND CONDITIONS FOR BIDDING

1. BID SUBMISSION:

1.1. BIDS MUST BE DELIVERED BY THE STIPULATED TIME TO THE CORRECT ADDRESS. LATE BIDS WILL NOT BE ACCEPTED FOR CONSIDERATION.

1.2. **ALL BIDS MUST BE SUBMITTED ON THE OFFICIAL FORMS PROVIDED–(NOT TO BE RE-TYPED) OR IN THE MANNER PRESCRIBED IN THE BID DOCUMENT.**

1.3. THIS BID IS SUBJECT TO THE PREFERENTIAL PROCUREMENT POLICY FRAMEWORK ACT, 2000 AND THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022, THE GENERAL CONDITIONS OF CONTRACT (GCC) AND, IF APPLICABLE, ANY OTHER SPECIAL CONDITIONS OF CONTRACT.

1.4. **THE SUCCESSFUL BIDDER WILL BE REQUIRED TO FILL IN AND SIGN A WRITTEN CONTRACT FORM (SBD7).**

2. TAX COMPLIANCE REQUIREMENTS

2.1 BIDDERS MUST ENSURE COMPLIANCE WITH THEIR TAX OBLIGATIONS.

2.2 BIDDERS ARE REQUIRED TO SUBMIT THEIR UNIQUE PERSONAL IDENTIFICATION NUMBER (PIN) ISSUED BY SARS TO ENABLE THE ORGAN OF STATE TO VERIFY THE TAXPAYER'S PROFILE AND TAX STATUS.

2.3 APPLICATION FOR TAX COMPLIANCE STATUS (TCS) PIN MAY BE MADE VIA E-FILING THROUGH THE SARS WEBSITE WWW.SARS.GOV.ZA.

2.4 BIDDERS MAY ALSO SUBMIT A PRINTED TCS CERTIFICATE TOGETHER WITH THE BID.

2.5 IN BIDS WHERE CONSORTIA / JOINT VENTURES / SUB-CONTRACTORS ARE INVOLVED, EACH PARTY MUST SUBMIT A SEPARATE TCS CERTIFICATE / PIN / CSD NUMBER.

2.6 WHERE NO TCS PIN IS AVAILABLE BUT THE BIDDER IS REGISTERED ON THE CENTRAL SUPPLIER DATABASE (CSD), A CSD NUMBER MUST BE PROVIDED.

2.7 NO BIDS WILL BE CONSIDERED FROM PERSONS IN THE SERVICE OF THE STATE, COMPANIES WITH DIRECTORS WHO ARE PERSONS IN THE SERVICE OF THE STATE, OR CLOSE CORPORATIONS WITH MEMBERS PERSONS IN THE SERVICE OF THE STATE."

NB: FAILURE TO PROVIDE / OR COMPLY WITH ANY OF THE ABOVE PARTICULARS MAY RENDER THE BID INVALID.

SIGNATURE OF BIDDER:

……

CAPACITY UNDER WHICH THIS BID IS SIGNED:

……

(Proof of authority must be submitted e.g. company resolution)

DATE:

……...

Annexure D
Standard Bidding Document (SBD) 4

BIDDER'S DISCLOSURE

1. PURPOSE OF THE FORM

Any person (natural or juristic) may make an offer or offers in terms of this invitation to bid. In line with the principles of transparency, accountability, impartiality, and ethics as enshrined in the Constitution of the Republic of South Africa and further expressed in various pieces of legislation, it is required for the bidder to make this declaration in respect of the details required hereunder.

Where a person/s are listed in the Register for Tender Defaulters and / or the List of Restricted Suppliers, that person will automatically be disqualified from the bid process.

2. Bidder's declaration

2.1 Is the bidder, or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest[1] in the enterprise, employed by the state? **YES** ☐ **/NO** ☐

2.1.1 If so, furnish particulars of the names, individual identity numbers, and, if applicable, state employee numbers of sole proprietor/ directors / trustees / shareholders / members/ partners or any person having a controlling interest in the enterprise, in table below.

Full Name	**Identity Number**	**Name of State institution**

2.2 Do you, or any person connected with the bidder, have a relationship with any person who is employed by the procuring institution? **YES** ☐ **/NO** ☐

[1] the power, by one person or a group of persons holding the majority of the equity of an enterprise, alternatively, the person/s having the deciding vote or power to influence or to direct the course and decisions of the enterprise.

2.2.1 If so, furnish particulars:

……
……

2.3 Does the bidder or any of its directors / trustees / shareholders / members / partners or any person having a controlling interest in the enterprise have any interest in any other related enterprise whether or not they are bidding for this contract? **YES** ☐ **/NO** ☐

2.3.1 If so, furnish particulars:

……
……

3 DECLARATION

I, the undersigned, (name)……in submitting the accompanying bid, do hereby make the following statements that I certify to be true and complete in every respect:

3.1 I have read and I understand the contents of this disclosure;

3.2 I understand that the accompanying bid will be disqualified if this disclosure is found not to be true and complete in every respect;

3.3 The bidder has arrived at the accompanying bid independently from, and without consultation, communication, agreement or arrangement with any competitor. However, communication between partners in a joint venture or consortium[2] will not be construed as collusive bidding.

3.4 In addition, there have been no consultations, communications, agreements or arrangements with any competitor regarding the quality, quantity, specifications, prices, including methods, factors or formulas used to calculate prices, market allocation, the intention or decision to submit or not to submit the bid, bidding with the intention not to win the bid and conditions or delivery particulars of the products or services to which this bid invitation relates.

3.4 The terms of the accompanying bid have not been, and will not be, disclosed by the bidder, directly or indirectly, to any competitor, prior to the date and time of the official bid opening or of the awarding of the contract.

3.5 There have been no consultations, communications, agreements or arrangements made by the bidder with any official of the procuring institution in relation to this procurement process prior to and during the bidding process except to provide clarification on the bid submitted where so required by the institution; and the bidder was not involved in the drafting of the specifications or terms of reference for this bid.

3.6 I am aware that, in addition and without prejudice to any other remedy provided to combat any restrictive practices related to bids and contracts, bids that are suspicious will be reported to the Competition Commission for investigation and possible imposition of administrative penalties in terms of

[2] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

section 59 of the Competition Act No 89 of 1998 and or may be reported to the National Prosecuting Authority (NPA) for criminal investigation and or may be restricted from conducting business with the public sector for a period not exceeding ten (10) years in terms of the Prevention and Combating of Corrupt Activities Act No 12 of 2004 or any other applicable legislation.

I CERTIFY THAT THE INFORMATION FURNISHED IN PARAGRAPHS 1, 2 and 3 ABOVE IS CORRECT.
I ACCEPT THAT THE STATE MAY REJECT THE BID OR ACT AGAINST ME IN TERMS OF PARAGRAPH 6 OF PFMA SCM INSTRUCTION 03 OF 2021/22 ON PREVENTING AND COMBATING ABUSE IN THE SUPPLY CHAIN MANAGEMENT SYSTEM SHOULD THIS DECLARATION PROVE TO BE FALSE.

…… ……

Signature Date

…… ……

Position Name of bidder

Annexure E
Preference Points Award Form in Terms of the Preferential Procurement Regulations 2022

This preference form must form part of all bids invited. It contains general information and serves as a claim form for the preference points allocated on the basis of specific goals outlined in point 3 below.

NB: BEFORE COMPLETING THIS FORM, BIDDERS MUST STUDY THE GENERAL CONDITIONS, DEFINITIONS AND DIRECTIVES APPLICABLE IN RESPECT OF SPECIFIC GOALS, AS PRESCRIBED IN THE PREFERENTIAL PROCUREMENT REGULATIONS, 2022

---

1. GENERAL CONDITIONS

1.1 The following preference point systems are applicable to this bid:

- the 80/20 system for requirements with a Rand value of up to R50 000 000 (all applicable taxes included).

1.2 Points for this bid shall be awarded for:

(a) Price; and

(b) Preference Points based on specific goals.

1.3 The maximum points for this bid are allocated as follows:

	POINTS
PRICE	80
Preference Points	20
Total points for Price and Preference Points must not exceed	**100**

1.4 Failure on the part of a bidder to submit proof of preference points together with the bid, will be interpreted to mean that preference points are not claimed.

1.5 The CSIR reserves the right to require of a bidder, either before a bid is adjudicated or at any time subsequently, to substantiate any claim in regard to preferences, in any manner required by the CSIR.

2. POINTS AWARDED FOR PRICE

2.1 THE 80/20 PREFERENCE POINT SYSTEMS

A maximum of 80 points is allocated for price on the following basis:

80/20

$$Ps = 80\left(1 - \frac{Pt - P\min}{P\min}\right)$$

Where

Ps = Points scored for price of bid under consideration

Pt = Price of bid under consideration

Pmin = Price of lowest acceptable bid

3. PREFERENCE POINTS AWARDED

3.1 In terms of Regulation 4 (2) and 4 (2) of the Preferential Procurement Regulations, preference points may be awarded to a bidder for the specific goal specified for the tender in accordance with the table below:

3.2 Specific goals must be determined per tender.

Specific Goals	Preference Points
Black Ownership	20
Total	**20**

3.3 Total preference points per specific goal to be determined per tender.

1.3.1. Total preference points per specific goal to be awarded as follows:

1.3.1.1. Preferential points for black ownership will be awarded as follows:

Black Ownership	% of Preferential points
Bidder with 100% black ownership	100%
Bidder with 51% to 99% black ownership	50%
Bidder with less than 51% black ownership	0%

1.4. Joint Ventures, Consortiums and Trusts

A trust, consortium or joint venture[3], will qualify for preference points as a legal entity (Incorporated), provided that the entity submits its valid B-BBEE certificate. Only valid BBBEE certificates issued by SANAS accredited verification agency will be considered for allocation of points.

A trust, consortium or joint venture will qualify for preference points as an unincorporated entity, provided that the entity submits their consolidated B-BBEE scorecard as if they were a group structure and that such a consolidated B-BBEE scorecard is prepared for every separate bid. Only valid consolidated BBBEE

[3] Joint venture or Consortium means an association of persons for the purpose of combining their expertise, property, capital, efforts, skill and knowledge in an activity for the execution of a contract.

certificates issued by SANAS accredited verification agency will be considered for allocation of points.

Bidders must submit concrete proof of the existence of joint ventures and/or consortium arrangements. The CSIR will accept signed agreements as acceptable proof of the existence of a joint venture and/or consortium arrangement. Furthermore, in bids where unincorporated joint venture and/or consortium/sub-contractors are involved, each party must submit a separate TCS PIN and CSD number.

The joint venture and/or consortium agreements must clearly set out the roles and responsibilities of the Lead Partner and the joint venture and/or consortium party. The agreement must also clearly identify the Lead Partner, who shall be given the power of attorney to bind the other party/parties in respect of matters pertaining to the joint venture and/or consortium arrangement.

1.5. Sub-contracting

A bidder must not be awarded preference points if it is indicated in the tender documents that such a bidder intends sub- contracting more than 25% of the value of the contract to any other enterprise that does not qualify for at least the points that such a bidder qualifies for, unless the intended sub-contractor is an EME that has the capability and ability to execute the sub-contract.

A bidder awarded a contract may not sub-contract more than 25% of the value of the contract to any other enterprise that does not have an equal or higher B-BBEE status level than the bidder concerned, unless the contract is sub-contracted to an EME that has the capability and ability to execute the sub-contract.

2. BID DECLARATION

Bidders who claim points in respect of specific goals **must** submit the following documents:

Mandatory documents to claim preference points	**Submitted**	
	Yes √	**No** √
Valid copy of BBBEE certificate/ sworn affidavit to claim Black Ownership, Black Woman Ownership, Black Youth Ownership, Disability Ownership and RDP (EMEs and QSEs) preference points[4]		

DECLARATION WITH REGARD TO COMPANY/FIRM

Name of company/firm:……

….

[4] In case of unincorporated trust, consortium or joint venture, they must submit their consolidated B-BBEE scorecard with submitting their **individual B-BBEE Certificate or Sworn Affidavit**, and each party must submit a separate TCS PIN and CSD number.
In case of sub-contracting both parties must submit copies of their valid BBBEE certificates

VAT registration number:……

Company registration number:…….

I/we, the undersigned, who is / are duly authorised to do so on behalf of the company/firm, certify that the documents submitted to claim preference points based on the specific goals are valid, and I / we acknowledge that:

i) The information furnished is true and correct;

ii) The preference points claimed are in accordance with the General Conditions as indicated in paragraph 3 of this form;

iii) In the event of a contract being awarded as a result of points claimed as shown in paragraphs 3, the contractor may be required to furnish further documentary proof to the satisfaction of the CSIR that the awarded are correct;

iv) If any document is obtained on a fraudulent basis or any of the conditions of contract have not been fulfilled, the CSIR may, in addition to any other remedy it may have –

(a) disqualify the person from the bidding process;

(b) recover costs, losses or damages it has incurred or suffered as a result of that person's conduct;

(c) cancel the contract and claim any damages which it has suffered as a result of having to make less favourable arrangements due to such cancellation;

(d) recommend that the bidder or contractor, its shareholders and directors, or only the shareholders and directors who acted on a fraudulent basis, be restricted by the National Treasury from obtaining business from any organ of state for a period not exceeding 10 years, after the *audi alteram partem* (hear the other side) rule has been applied; and

(e) forward the matter for criminal prosecution.

v) If the CSIR is of the view that a bidder submitted false information regarding a specific goal, it must—

(a) inform the bidder accordingly; and

(b) give the bidder an opportunity to make representations within 14 days as to why the tender may not be disqualified or, if the tender has already been awarded to the bidder, the contract should not be terminated in whole or in part.

vi) After considering the representations referred to in subregulation (v)(b), the CSIR may, if it concludes that such information is false—

(a) disqualify the bidder or terminate the contract in whole or in part; and

(b) if applicable, claim damages from the bidder.

WITNESSES

1. ……..

2. …….

……
SIGNATURE(S) OF BIDDERS(S)

DATE: ……..

ADDRESS……

Annexure F
Mutual Non-Disclosure Agreement

MUTUAL NON-DISCLOSURE AGREEMENT

1 Preamble

The Parties as identified herein are engaged in discussions relating to their potential collaboration in the Field as likewise described therein; are by virtue thereof are required to disclose Confidential Information to one another, and have agreed to do so subject to the terms and conditions as set out in this agreement.

2 Definitions

2.1 The following words and/or phrases, when used in this agreement, shall have the following meanings:

2.1.1 "Confidential Information" shall mean all scientific, technical, business, financial, past, present or future research, development, business activities, products, services and technical knowledge or marketing information , whether inside or outside the Field, which one party (the "Disclosing Party") discloses to the other party (the "Receiving Party") in connection with the discussions, and either has been identified in writing as confidential or is of such a nature (or has been disclosed in such a way) that it should be obvious to the Receiving Party that it constitutes Confidential Information. (Without limiting the generality of the aforegoing, "Confidential Information" shall include any information that falls within the definition of 'Personal Information'

2.1.2 "Disclosing Party" shall mean the Party disclosing Confidential Information under this agreement;

2.1.3 "Disclosing Purpose" shall mean, as pertains to any particular joint opportunity(ies) in the Field, the discussions held or to be held between the Parties regarding their possible collaboration and future working relationship with regards to any such opportunity(ies);

2.1.4 "Effective Date' shall mean the date of the commencement of this agreement herein";

2.1.5 "Notice" shall mean a written document addressed by one Party to the other and either delivered by hand; sent per registered post or telefaxed to the addresses as indicated herein";

2.1.6 "Personal Information" means any information that falls within the definition of 'Personal Information' as defined in the Protection of Personal Information Act, No 4 of 2013 ("POPI");

2.1.7 "Receiving Party" shall mean the Party receiving Confidential Information under this agreement;

"Responsible Party" means a public or private body or any other person which, alone or in conjunction with others, determines the purpose of and means for processing personal information, as defined in POPI.

3 Obligation of Confidentiality

3.1 The Receiving Party undertakes and agrees:

3.1.1 to use the Disclosing Party's Confidential Information only to give effect to the Disclosing Purpose;

3.1.2 to hold in strict confidence and not to publish or disclose to any unauthorised third parties any of the Confidential Information of the Disclosing Party without the prior written consent of the Disclosing Party;

3.1.3 to use the same degree of care (and in any event not less than reasonable care) to safeguard the confidentiality of the Disclosing Party's Confidential Information that it uses to protect its own information of like kind;

3.1.4 to limit any disclosure of such Confidential Information only to those of its employees and professional advisors who have a specific need – to- know to access such Confidential Information and either entered into a written agreement which impose, or are otherwise bound by the same restrictions as those imposed upon it by virtue of this agreement;

3.1.5 not to disclose or reveal to any third party, whomsoever, either the fact that discussions or negotiations are taking, or have taken, place between the Parties; the content of any such discussions, or other facts relating to the Disclosing Purpose;

3.1.6 on termination of this agreement, to act with the Disclosing Party's Confidential Information in accordance with a Notice delivered to it by the Disclosing Party, and if no such Notice is delivered to the Recipient, to destroy the Disclosing Party's Confidential Information in a similar manner to which it would destroy its own Confidential Information.

4 Protection of Personal Information

4.1 The Party(ies) undertake(s) to:-

4.1.1 comply with the provisions of POPI as well as all applicable legislation as amended or substituted from time to time;

4.1.2 treat all Personal Information strictly as defined within the parameters of POPI;

4.1.3 process Personal Information only in accordance with the consent it was obtained for, for the purpose agreed, any lawful and reasonable written instructions received from the applicable Responsible Party and as permitted by law;

4.1.4 process Personal Information in compliance with the requirements of all applicable laws;

4.1.5 secure the integrity and confidentiality of any Personal Information in its possession or under its control by taking appropriate, reasonable technical and organisational measures to prevent loss, damage, unauthorised destruction, access, use, disclosure or any other unlawful processing of Personal Information;

4.1.6 not transfer any Personal Information to any third party in a foreign country unless such transfer complies with the relevant provisions of POPI regarding transborder information flows; and

4.1.7 not retain any Personal Information for longer than is necessary for achieving the purpose in terms of this Agreement or in fulfilment of any other lawful requirement.

4.2 The Party(ies) undertake(s) to ensure that all reasonable measures are taken to:

4.2.1 identify reasonably foreseeable internal and external risks to the Personal Information in its possession or under its control;

4.2.2 establish and maintain appropriate security safeguards against the identified risks;

4.2.3 regularly verify that the security safeguards are effectively implemented;

4.2.4 ensure that the security safeguards are continually updated in response to new risks or deficiencies in previously implemented safeguards;

4.2.5 provide immediate notification to the Responsible Party if a breach in information security or any other applicable security safeguard occurs; provide immediate notification to the Responsible Party where there are reasonable grounds to believe that the Personal Information has been accessed or acquired by any unauthorised person;

4.2.6 remedy any breach of a security safeguard in the shortest reasonable time and provide the Responsible Party with the details of the breach and, if applicable, the reasonable measures implemented to address the security safeguard breach;

4.2.7 provide immediate notification to the Responsible Party where either party has, or reasonably suspects that, Personal Information has been processed outside of the purpose agreed to or consented to;

4.2.8 provide the Responsible Party, upon request, with all information of any nature whatsoever relating to the processing of the Personal Information for the purpose in terms of this Agreement and any applicable law; and

4.2.9 notify the CSIR, if lawful, of receipt of any request for access to Personal Information, in its possession and relating to the CSIR.

4.3 The CSIR reserves the right to inspect the Personal Information processing operations, as well as the technical and organisational information security measures employed by the contracting Party to ensure compliance with the provisions of clause 4.

4.4 The provisions of clause 4 shall survive the termination of this Agreement, regardless of cause, in perpetuity.

5 Exclusions

5.1 The Receiving Party recognises that this agreement is not intended to restrict use or disclosure of any portion of the Disclosing Party's Confidential Information which:

5.1.1 is as at the Effective Date, or later, made known to the public or otherwise enters the public domain through no default by the Receiving Party of its obligations under this Agreement;

5.1.2 it can show was in its possession prior to the earliest disclosure by the Disclosing Party, as evidenced by written documents in its files;

5.1.3 is rightfully received by it from a third party having no obligation of confidentiality to the Disclosing Party;

5.1.4 is independently developed by the Receiving Party by a person(s) who did not have access to the Confidential Information of the Disclosing Party;

5.1.5 is disclosed by the Receiving Party after receipt of written permission from the Disclosing Party; or

5.1.6 it is requested or required by subpoena, court order, or similar process to disclose, provided that, in such an event, it will provide the Disclosing Party with prompt written notice of such request(s) so that the latter may seek an appropriate protective order and/or waive the Receiving Party's compliance with the provisions of this agreement.

6 Ownership and Provision of Infomration

6.1 The Disclosing Party shall retain ownership of all its Confidential Information as disclosed hereunder.

6.2 Nothing contained in this agreement or in any disclosures made hereunder shall create or imply, or be construed as to grant to the Receiving Party any license or other rights in or to the Confidential Information and/or any intellectual property rights attached thereto, or act as a waiver of any rights that the Disclosing Party may have to prevent infringement or misappropriation of any patents, patent applications, trademarks, copyright, trade secrets, know-how or other intellectual property rights owned or controlled by the Disclosing Party as at the Effective Date.

6.3 The Disclosing Party provides the Confidential Information "as is" and accordingly no disclosure thereof by it hereunder shall constitute any representation, warranty, assurance, guarantee or inducement by such Disclosing Party with respect to infringement of patents or other rights of third parties, nor is any warranty or representation as to the accuracy, completeness, or technical or scientific quality of any of the Disclosing Party's Confidential Information provided hereunder. (For the avoidance of doubt it is stated expressly that the Disclosing Party neither makes, nor have made, any representation or warranty as to the merchantability or fitness for a particular purpose of any Confidential Information disclosed hereunder).

7 Term of Obligation

7.1 The Parties' obligations concerning non-disclosure of Confidential Information contained in the above clauses shall commence on the Effective Date and shall continue for five (5) years from the date of each disclosure, unless otherwise agreed between the parties in writing, where after such obligations shall forthwith terminate.

8 No Violation

8.1 Each party represents that its compliance with the provisions of this agreement will not violate any duty which such party may have towards any third party, including obligations concerning the provision of services to others, confidentiality of information and assignment of inventions, ideas, patents or copyright.

9 Breach

9.1 It is acknowledged that the breach of this agreement by the Receiving Party would cause the Disclosing Party irreparable injury not compensable in monetary damages alone. Accordingly, in the event of a breach, or a threat of a breach, the Disclosing Party, in addition to its other remedies, is entitled to a restraining order, preliminary injunction or similar relief so as to specifically enforce the terms of this agreement or prevent, cure or reduce the adverse effects of the breach.

10 DOMICILIUM CITANDI ET EXECUTANDI

10.1 The Parties hereto respectively choose as their *domicilium citandi et executandi* for all purposes of, and in connection with this agreement, the physical addresses and contact details stated herein.

11 Notices

11.1 Any Notice to be given hereunder shall be given in writing and may be given either personally or may be sent by post or facsimile and addressed to the relevant party at its *domicilium citandi et executandi* address as chosen herein. Any notice given by post shall be deemed to have been served on the expiry of 7 (seven) working days after same is posted by recorded delivery post or air mail. Any notice delivered personally or sent by facsimile shall be deemed to have been served at the time of delivery or sending.

12 Governing Law and Jurisdiction

12.1 This agreement will be governed and construed by the laws of the Republic of South Africa and the Parties hereby submit to the exclusive jurisdiction of the South African courts to hear any dispute arising therefrom which the Parties are unable to settle amicably.

13 General

13.1 This agreement comprises the entire agreement between the parties concerning the subject matter and supersedes all prior oral and written agreements between them.

13.2 No waiver, alteration or cancellation of any of the provisions of the Agreement shall be binding unless made in writing and signed by the party to be bound.

13.3 The parties hereby warrant that the officials signing this agreement have the power to do so on behalf of the parties.

13.4 No public announcement, such as a media release, or disclosure beyond those disclosures authorised for Confidential Information hereunder may be made by either party concerning this agreement without the prior written approval of the other party.

13.5 Neither party is, by virtue of this agreement, authorised to use the name, logo(s) or trademarks of the other in connection with any advertising, publicity, marketing or promotional materials or activities, or for any other purpose whatsoever, without the prior written consent of the other party. For purposes of this clause, it is also recognised that, under the provisions of section 15 (1) of the Merchandise Marks Act, Act No 17 of 1941 of the Republic of South Africa, the use of the abbreviation of the name of the Council for Scientific and Industrial Research, "WNNR" and CSIR , is prohibited in connection with any trade, business, profession or occupation or in connection with a trade mark, mark or trade description applied to goods, other than with the consent of the CSIR.

13.6 Both Parties shall remain free to use, in the normal course of its business, its general knowledge, skills and experience incurred before, during or after the discussions envisaged hereunder. (To this end, it is also recorded that nothing in this Agreement shall be construed as constituting an exclusive arrangement between the parties and both Parties shall remain free to explore market opportunities in the Field, unless otherwise agreed to in writing in a subsequent agreement.)

ANNEXURE F: MUTUAL NDA

14 Parties to the NDA

THE CSIR, a statutory council, duly established under Act 46 of 1988,

and

The Bidder (Name)……

Company registration number:…… ……, with limited liability duly incorporated under the applicable laws of the Republic of South Africa herein represented by …… ……

in his/her capacity as …… …… ……

and he/she being duly authorised thereto.

15 Contact Details for Purposes of Clause 10:

15.1 **The CSIR**

Physical Address:
Meiring Naude Road
Brummeria
Pretoria
0002

Postal Address:
PO BOX 395
Pretoria
0001

Email: Tender@csir.co.za

The Bidder (Name)……..……

Physical Address: …… ……

Postal Address: …… ……

Email: …… ……..……

16 Signature (Bidder): ……

SIGNED ON THIS THE……DAY OF……AT…… IN

THE PRESENCE OF THE FOLLOWING WITNESSES:

1. ……

2.

……

Annexure G: Geotechnical Survey
Report prepared by: SRK Consulting SA (Pty) Ltd ("SRK")

Executive Summary

Summary of principal objectives

The aim of the investigation is to:

- Determine the geotechnical constraints related to the site.
- Investigate the presence and/or absence of a permanent or perched water table.
- Investigate the presence and/or absence of bedrock.
- Investigate the potential for slope instability.
- Provide an indication of the excavatability of the subsurface material in relation to hand excavation methods.
- Investigate and assess the existence and extent of any potentially problematic soils e.g. heaving clay, collapsible sand.
- Provide a residential site class designation for each erf.
- Determine the founding conditions and suitable foundation type.
- Comment on the drainage conditions for the site and aggressiveness of the soil w.r.t buried concrete e.g. concrete sewer pipes.
- Recommend any special precautionary measures related to the construction of the units and development as a whole.

Outline of work programme

- Excavation of 24 trial holes to 2 m or refusal.
- Soil profiling of exposed soil layers according to Jennings et al (1973) and assessment of ground water and/or bedrock.
- Drive Dynamic Probe Light (DPL) penetrometers from surface to -2.0 m or refusal.
- Collection of disturbed soil samples from selected material for the analysis of grading, Atterberg Limits, clay content, maximum dry density, CBR and aggressivity of soil towards buried concrete.

Focus on results

- Two separate soil profile types have been identified within the site with various subdivisions. Soil Profile A is characterised by Aeolian fine sand overlying very weakly to weakly cemented sand. Soil Profile B is characterised by colluvium overlying partially pedogenic clayey sand. Pedogenesis, in the form of calcretisation, is only partially developed in the form of weathered 'patches' and hardpan nodules.
- No groundwater seepage was intersected during the excavation of the test pits.
- Water quality is generally potable provided the underlying Bokkeveld Group is not penetrated but sodium, calcium and chloride often exceeds maximum recommended limits.
- No bedrock was intersected on site to a maximum depth of 2.30 m.
- Development of a permanent or perched water table less than 1.50 m below surface, erodible soils due to the low cohesion associated with fine sand deposits and occasional steep slopes along with flat topography are the main geotechnical constraints for the site.
- Problems associated with heaving soils are not anticipated for this site.
- The Aeolian sand and colluvium is classified as G10 at best.
- The upper 750 mm of the soil profile is characterised by SM and SC-SM material.
- The site classifies as 'Soft Class Excavation A' below roughly 1 m from surface.
- Slope stability will not prove problematic on site.
- The residential site class designation is 'S1' (500 erven, numbers not supplied).

Recommendations

- Favourable conditions for the development of a perched water table and evidence for a possible fluctuating groundwater table indicate that caution must be exercised during construction with adequate monitoring.
- Installation of shoring or any other trench sidewall stabilisation measure of the bulk services trenches must be accommodated in the construction costs
- The position of the 1:50 year floodline will need to be determined before any approval w.r.t the enrolment of subsidy housing is given.
- The Aeolian fine sand and colluvium is suitable for use a ‘controlled’ and ‘engineered’ fill.
- Preparation of the in situ subgrade will only require rolling to create an even surface before placement of the road layer works.
- Two foundation options have been proposed; namely, conventional strip footings with nominal reinforcement where required and slab-on-ground.

Action Points

- Commence with the design of the houses and infrastructure.
- Commission the Phase 2 Investigation once the service trenches have been excavated.

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Disclaimer

The opinions presented in this report apply to the site conditions and features as they existed at the time of SRK's investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this Report, about which SRK had no prior knowledge nor had the opportunity to evaluate.

1 Introduction

SRK Consulting SA (Pty) Ltd ("SRK") was appointed by Lukhozi Consulting Engineers ("Lukhozi") to conduct a geotechnical investigation for 500 additional subsidy housing units at the existing Ekuphumleni township adjacent to Kenton-on-Sea in the Eastern Cape.

2 Information

2.1 Description and list of the information assimilated and used in the study

2.1.1 List of Information Used

Meyer, P.S. (1998) An Explanation of the 1:500 000 General Hydrogeological Map, Port Elizabeth 3324. Department of Water Affairs and Forestry.

(Johnson, M.R & Le Roux, F.G (1994) The Geology of the Grahamstown Area, Council for Geoscience).

Code of Practice: Foundations and Superstructures for Single Storey Residential Buildings of Masonry Construction

2.1.2 Nature of Investigation

The fieldwork was undertaken from the 15th to 16th February 2012. Trial holes were excavated using a tractor-loaded backhoe (TLB) excavator.

Trial holes were excavated to approximately 2 m below surface. TH15 was abandoned as the TLB intersected a disused main water line which flooded the hole. SRK were requested by the Ndlambe Municipality to expose the pipeline further in order to conduct the necessary repairs.

Eight bulk disturbed samples (40-60 kg) were collected below the underside of the topsoil layer at varying depths and submitted for the analysis of foundation indicators, maximum dry density with optimum moisture content and CBR respectively. An additional two disturbed samples (~5 kg) were collected and submitted for the analysis of foundation indicators. Three samples were submitted to determine the aggressivity of the subsurface soil to buried concrete.

Dynamic Probe Light (DPL) penetrometer tests were conducted from surface to 2m or refusal adjacent to each test pit.

2.2 General location and description of site

The proposed additional erven are located in three separate areas located east, northwest and southwest of the existing Ekuphumleni township. The site is currently occupied by informal shacks and rural roads. It is easily accessible via the R72 (to East London) and Remainder Road (main road through existing township).

There is minimal vegetation except for a thin covering of grass and the occasional medium-sized tree.

2.3 Evaluation procedures used in the investigation

The following terms of reference are applicable to the investigation:

- Excavation of 24 trial holes to 3 m or refusal using a tractor-loaded backhoe (TLB) excavator.
- Profiling of the exposed soil layers according to Jennings et al (1973).

- Assessment of groundwater and bedrock conditions (if present).
- Capture photographs of in situ soil layers and stockpile material.
- Conduct one Dynamic Probe Light (DPL) penetrometer test from surface and adjacent to each trial hole to 1.5 m or refusal (whichever comes first). Conduct an additional DPL test from -1.5 m to refusal (whichever comes first). The DPL tests will provide an indication of the bearing capacity and founding levels for house foundations as well as the in situ CBR for road design.
- The collection of representative disturbed samples from the underside of the topsoil layer and the submission to a SANAS-accredited laboratory for the analysis of:
  - Grading
  - Atterberg Limits
  - Clay content
  - Maximum Dry Density
  - CBR
  - Aggressivity of soil towards buried concrete
- Submission of a geotechnical report according to the format as set out in the GFSH-2 document

2.4 Geology and geohydrology of the site

According to published geological maps the Study Area is largely situated on sediments of the Nanaga Formation (Algoa Group). This formation is underlain by the Alexandria Formation (Algoa Group), which is again underlain by formations of the Bokkeveld Group.

The Nanaga Formation consists of semi- to well-consolidated calcareous sandstone and sandy limestone, displaying large scale aeolian cross-bedding. A layer of surficial calcrete (up to 3 m thick) or a red soil commonly caps these sediments. The Nanaga formation varies in thickness, but reaches up to 250 m west of Alexandria. This formation forms smooth, rounded hills with undulating ridges trending sub-parallel to the present shoreline.

The underlying Alexandria Formation consists of alternating layers of calcareous sandstone, conglomerate and coquinite containing a rich assemblage of marine invertebrates. A conglomeratic zone is commonly present at the base of this formation, but is not laterally persistent. The coquinite, conglomerate and certain sandstones are well indurated and cause the formation to form resistant ridges on weathering.

The Bokkeveld Group is highly folded and poorly exposed in this area making it difficult to identify its individual formations. It consists mostly of mudrock with alternating thinner subordinate sandstone.

The Algoa Group aquifer is a unique intergranular aquifer, with water seeping rapidly through the porous media to the contact with the underlying impervious pre-Algoa rocks (Bokkeveld Group). Here the groundwater flows seawards within the basal conglomerate, frequently emerging as springs near sea level. Borehole in this aquifer generally yields < 0.5 L/s. Water quality is generally potable provided the underlying Bokkeveld Group is not penetrated. Conductivities of < 300 mS/m are normally encountered, but sodium, calcium and chloride often exceeds maximum recommended limits.

2.4.1 Soil Profile

Two separate soil profile types have been identified on site and are demarcated in Figure 1 on page 12.

Soil Profile A – Fine Aeolian Sand (TH1 to TH11)

Soil Profile A is characterised by a thin layer of slightly moist, dark brown to occasionally light brown fine sand with abundant roots. The soil becomes more clayey sand with blocky texture in the vicinity of existing trees. No topsoil was intersected in TH10 and TH11.

The topsoil is underlain by slightly moist, brown gravely fine sand fill with soft subangular gravel. The thickness of the fill layer ranges from 0.15 m to 0.85 m (av. 0.35 m). This material was not intersected in TH1 – TH3, TH6, TH8 and TH10 – TH11 pointing towards a sporadic distribution across the site.

The fill and/or topsoil is underlain by dry to slightly moist, orange to reddish brown and creamish brown Aeolian uniformly graded fine sand with minor pinhole voids and occasional fine roots. The thickness of the Aeolian sand ranges from 0.70 m to 1.95 m (av. 1.25 m). This material was not intersected in TH4 and TH8 – TH9.

The Aeolian fine sand is underlain by what appears to be a relict topsoil layer formed before the deposition of the windblown sand. This layer is characterised by dark brown fine sand with trace pinhole voids ranging in thickness from 0.35 m to 0.80 m (av. 0.50 m). This 'topsoil' layer was only intersected in TH3 – TH4 and TH8 – TH9 beneath the fill and / or Aeolian sand layers.

The relict topsoil is underlain by slightly moist, orange to reddish brown with creamish mottles weakly cemented clayey fine sand with occasional roots and trace to minor pinhole voids. The mottles are characterised by highly weathered calcrete nodules which generally breakdown when squeezed between the fingers. The 'more resistant' nodules are classified as *very soft rock*. The weakly cemented soil matrix and presence of weathered calcrete nodules indicates partial pedogenesis.

The following soil profile subdivisions intersected within Soil Profile A (designated as 'A1' to 'A5' in Figure 1) are presented below.

SPA 1 (TH5 & TH7)

0.00 – 0.10 m Topsoil with abundant fine roots

0.10 – 0.45 m Gravelly fine sand fill

0.45 – 1.70 m Aeolian fine sand

1.70 – 2.20 m Relict topsoil layer

> 2.20 m Pedogenic clayey fine sand

SPA 2 (TH1, TH2, TH6 and TH10 to TH13)

0.00 – 0.10 m Topsoil with abundant fine roots

0.10 – 1.35 m Aeolian fine sand

1.35 – 2.00 m Pedogenic clayey fine sand

SPA 3 (TH3)

0.00 – 0.10 m Topsoil with abundant fine roots

0.10 – 1.35 m Aeolian fine sand

1.35 – 1.85 m Relict topsoil

1.85 – 2.00 m Pedogenic clayey fine sand

SPA 4 (TH4)

0.00 – 0.10 m Topsoil with abundant fine roots

0.10 – 0.45 m Gravelly fine sand fill

0.45 – 0.95 m Relict topsoil

0.95 – 2.00 m Pedogenic clayey fine sand

SPA 5 (TH8 & TH9)

0.00 – 0.10 m Topsoil with abundant fine roots

0.10 – 0.60 m Relict topsoil

0.60 – 1.20 m Aeolian fine sand with gravel

1.20 – 2.00 m Pedogenic clayey fine sand

Soil Profile B – Clayey sand Colluvium (TH14 to TH24)

Soil Profile B is characterised by slightly moist, reddish brown silty fine sand topsoil with blocky texture and fine roots ranging in thickness from 0.10 m to 0.30 m (av. 0.15 m).

The topsoil is underlain by dry to slightly moist, reddish brown to yellowish brown silty-to-clayey fine sand colluvium with minor pinhole voids up to 2-3 mm in diameter, occasional fine roots, angular hardpan calcrete nodules with *soft rock to medium hard rock* hardness and very occasional sandstone boulder. The thickness ranges from 0.75 m to 1.90 m (av. 1.45 m).

The colluvium is underlain by dry, creamish off white pedogenic calcretised fine sand with *medium hard rock* calcrete nodules ranging in thickness from 0.05 m to 0.50 m (av. 0.20 m). This material was only intersected in TH14, TH19 and a very thin layer (50 mm) in TH24.

OR

Slightly moist, khaki green / orange brown / yellowish khaki brown speckled off white weakly- cemented clayey sand with fissured appearance, blocky texture with decreasing weathered calcrete patches (partial pedogenesis) with depth.

The following soil profile combinations intersected within Soil Profile B (designated as ‘B1’ to ‘B5’ in Figure 1) are presented below.

SPB 1 (TH14, TH19 & TH24)

0.00 – 0.15 m Topsoil

0.15 – 1.60 m Silty-to-clayey fine sand colluvium

1.60 – 1.80 m Pedogenic calcrete

SPB 2 (TH15 to TH18 and TH20 to TH23)

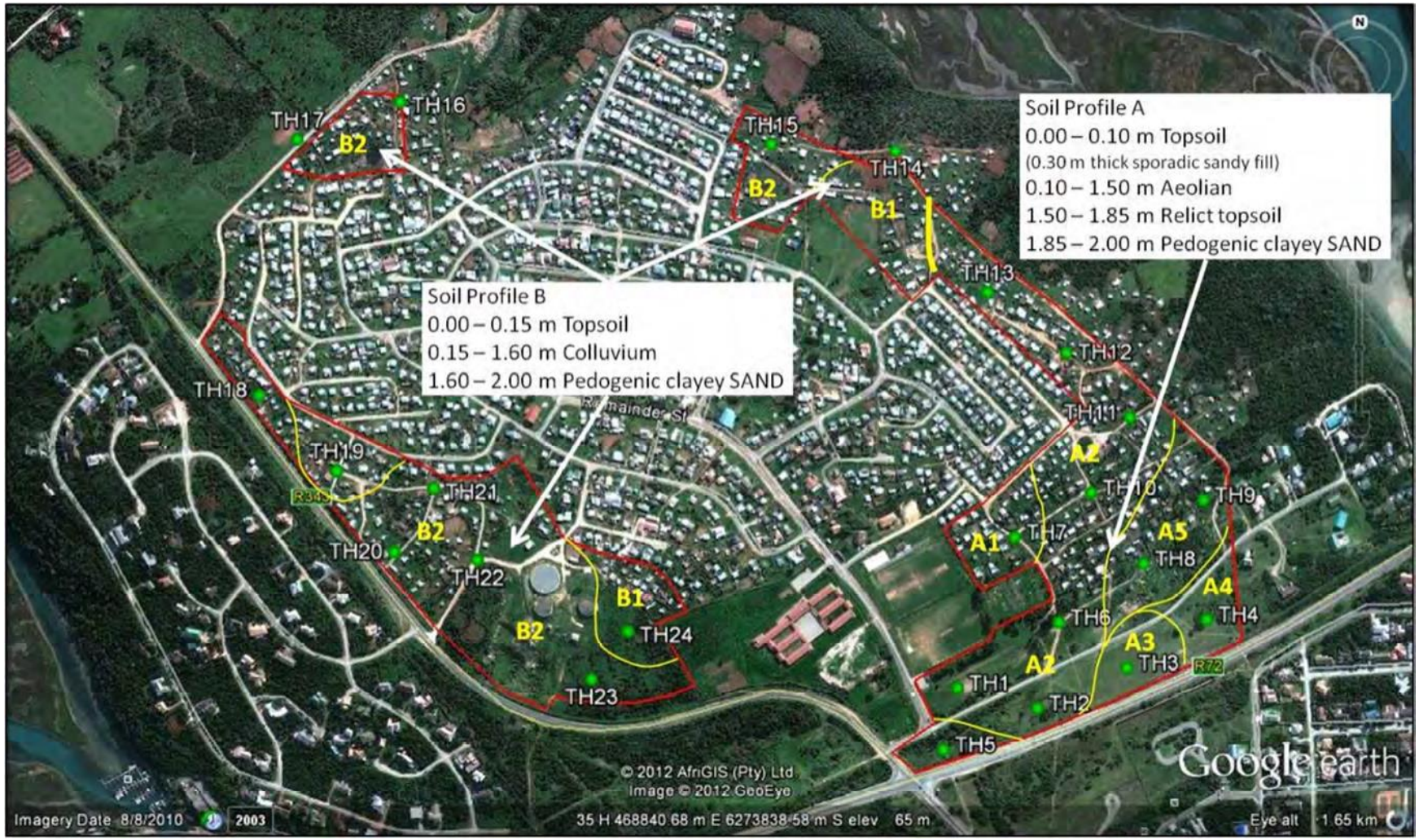
0.00 – 0.15 m Topsoil

0.15 – 1.60 m Silty-to-clayey fine sand colluviums

1.60 – 2.00 m Weakly-cemented clayey sand with decreasing pedogenesis

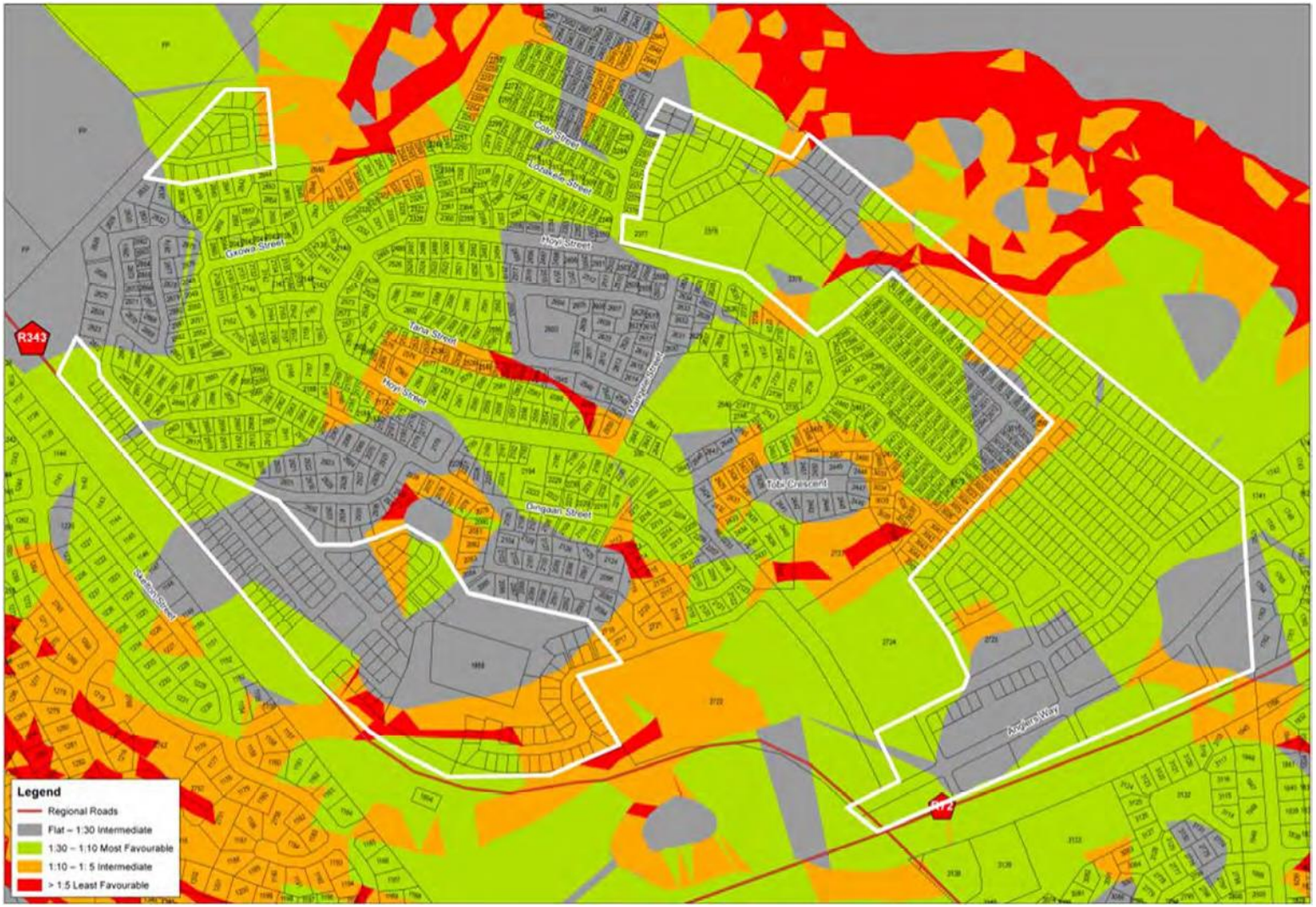
No bedrock was intersected to a maximum depth of 2.30 m below surface.

The detailed soil profiles are included under Appendix A.



srk consulting	**EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION** TRIAL HOLE AND SOIL PROFILE LAYOUT	Project No. 445340

Figure 1: Trial hole and soil profile areas layout.



srk consulting	**EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION** TERRAIN ANALYSIS WITH OUTLINE OF SITE BOUNDARY (WHITE)	Project No. 445340

Figure 2: Terrain analysis.

2.4.2 Water Table/s

No groundwater seepage was observed during the excavation of the test pits to a maximum depth of 2.30 m below surface. Conditions are favourable for the development of a perched water on the contact between the 'more permeable' Aeolian fine sand and the underlying 'less permeable' pedogenic clayey sand / weakly cemented clayey sand intersected at approximately 1.50 m below surface in Soil Profile A and 1.60 m below surface in Soil Profile B respectively. The mottled grey creamish and yellowish brown clayey sand intersected in TH11 possibly points towards a fluctuating water table.

No groundwater seepage was intersected during the excavation of the test pits. However, the favourable conditions for the development of a perched water table and possible fluctuating groundwater table indicate that caution must be exercised during construction with adequate monitoring.

2.5 Terrain Mapping Units (TMU)

The geotechnical character of the site is compared against the constraints listed in Table 1 (page 15) below to determine the terrain mapping unit/s.

The TMU for the site is **2BDEI**. Therefore, problems can be expected w.r.t the following:

- Development of a permanent or perched water table less than 1.50 m below surface.
- Low to moderate soil compressibility due to anticipated low in situ consistency, e.g. *loose*
- Erodible soils due to the low cohesion associated with fine sand deposits.
- Moderately steep slopes along with flat topography.

The position of the 1:50 year flood line will need to be determined before any approval w.r.t the enrolment of subsidy housing is given.

3 Geotechnical Evaluation

3.1 Engineering and material characteristics

The laboratory results are summarised in Table 3 below. The laboratory certificates are filed under Appendix B.

3.1.1 USCS Classification of upper 750 mm of soil

The following samples were collected within the upper 1 m of the soil profile and a USCS classification derived from an assessment of the laboratory test results.

TH ID	Soil Interval	USCS
TH1	0.05 – 1.20 m	SM
TH7	0.30 – 1.00 m	SM
TH12	0.10 – 1.00 m	SM
TH17	0.15 – 1.10 m	SM
TH19	0.10 – 1.05 m	SC-SM
TH24	0.10 – 1.25 m	SM

The results indicate that the upper 750 mm of the soil profile is characterised by SM material, i.e. silty sand with the exception of TH19 which returned a SC-SM classification.

Table 1: Geotechnical Classification for Urban Development extracted from GFSH-2 document.

	CONSTRAINT	MOST FAVOURABLE (1)	INTERMEDIATE (2)	LEAST FAVOURABLE (3)
A	Collapsible Soil	Any collapsible horizon or consecutive horisons totaling a depth of < 750 mm in thickness*	Any collapsible horizon or consecutive horisons totaling a depth of > 750 mm in thickness	At least favourable situation for this constraint does not occur
B	Seepage	Permanent or perched water table > 1.50 m below ground surface	Permanent or perched water table < 1.50 m below ground surface	Swamps and marshes
C	Active Soil	Low soil-heave potential anticipated*	Moderate soil-heave potential anticipated	High soil-heave potential anticipated
D	Highly compressible soil	Low soil compressibility anticipated*	Moderate soil compressibility anticipated	High soil compressibility anticipated
E	Erodibility of soil	Low	Intermediate	High
F	Difficulty of excavation to 1.50 m depth	Scattered or occasional boulders < 10 % of the total volume	Rock or hardpan pedocretes between 10 - 40 % of the total volume	Rock or hardpan pedocretes > 40 % of the total volume
G	Undermined ground	Undermining at a depth > 240 m below surface (except where total extraction mining has not occurred)	Old undermined areas to a depth of 90 - 240 m below surface where stope closure has ceased	Mining within < 90 - 240 m of surface or where total extraction mining has taken place
H	Stability (dolomite & limestone)	Possibly stable. Areas of dolomite overlain by Karoo rocks or intruded by sills. Areas of Black Reef rocks. Anticipated Inherent Risk Class I.	Potentially characterised by instability. Anticipated Inherent Risk Classes II - V	Known sinkholes and dolines. Anticipated Inherent Risk Classes VI - VIII
I	Steep Slopes	Between 2 - 6° (all regions)	Slopes between 6 - 18° and < 2° (Natal & Western Cape). Slopes between 6 - 12° and < 2° (all other regions)	> 18° (Natal & Western Cape). > 12° (all other regions)
J	Areas of unstable natural slopes	Low risk	Intermediate risk	High risk (especially in areas subject to seismic activity)
K	Areas subject to seismic activity	10 % probability of an event < 100 cm/s^2 within 50 years	Mining-induced seismic activity > 100 cm/s^2	Natural seismic activity > 100 cm/s^2
L	Areas subject to flooding	A 'most favourable' situation for this constraint does not occur	Areas adjacent to a known drainage channel or floodplain with slope < 1°	Areas within a known drainage channel or floodplain

3.1.2 Potentially problematic soils

Heaving Soils

Two samples were collected from clayey sand material (TH11 and TH16) below approximately 1.20 m from surface and submitted to the laboratory to determine the heave potential. The soil profiling noted that this material had a 'blocky' (shattered) texture with occasional polished surfaces. These descriptors are indicative of a heaving soil with the degree of heave an unknown variable.

The laboratory results indicate that the material is non-plastic with a negligible clay content (0 – 2%). A plot of the PI versus clay content on Van Der Merwe's Heave chart shows that the material has a low potential for expansion.

Problems associated with heaving soils are not anticipated for this site.

3.1.3 TRH14 Classification

Samples collected below the underside of the topsoil layer (average depth interval 0.15 – 1.10 m below surface) show that the in situ subgrade ranges from G9 (TH1 & TH7), G10 (TH17) to no classification at all (TH4, TH12, TH19 & TH24).

The subgrade is classified as G10 at best.

3.1.4 Use of in situ material for construction purposes

The requirements listed for a controlled fill are:

- Contains little or no organic matter.
- Excludes stones of average dimensions larger than 75 mm.
- Can be placed without significant voids.

The requirements listed for an engineered fill are:

- Contains little or no organic matter.
- Excludes stones of average dimensions larger than 100 mm.
- Can be placed without significant voids.

Silty SAND (~0.15 – 1.10 m)

This material complies with the specification for both a 'controlled fill' and 'engineered fill' – approximately 99% of the material falls below the 2 mm size fraction.

This material is suitable for use as a 'controlled and/or engineered fill'. However, careful control of the moisture content will be required during compaction due to the moderate silt content (av. 36%) which may begin to pump with oversaturation.

SAND with silt and gravel (~1.10 – 1.95 m)

This material complies with the specification for both a 'controlled fill' and 'engineered fill' – 60 to 94% of the material falls below the 2 mm size fraction. The grading curves (brown and orange in Figure 3, page 19) show that the maximum particle size is 20 mm.

This material is suitable for use as a 'controlled and/or engineered fill'.

3.1.5 Road Subgrade

The in situ CBR values were correlated with the DPL mm/blow for material present beneath the underside of the topsoil/fill material to a maximum depth of 1 m below surface, the results are presented below:

TH ID	Material Description	In situ CBR	Laboratory CBR
TH1	Fine SAND	3 – 10, av. 7	13% @ 93% Mod AASHTO
TH7	Fine SAND	5 – 10, av. 7	7% @ 93% Mod AASHTO
TH12	Silty fine SAND	4 – 7, av. 4	2% @ 93% Mod AASHTO
TH17	Silty fine SAND	5 – 11, av. 8	4% @ 93% Mod AASHTO
TH19	Silty fine SAND	2 – 7, av. 5	2% @ 93% Mod AASHTO
TH24	Silty fine SAND	2 – 27, av. 12	1% @ 93% Mod AASHTO

The results indicate that the in situ CBR is higher on average than the reworked material. This indicates that the strength of the reworked material will be lower than that of the naturally consolidated material.

In most cases the CBR is low beneath the road bed and measures must be taken to reduce the possibility of the subgrade becoming saturated as this could cause localised road failure. Attention therefore needs to be paid to drainage.

The subgrade will only require rolling (vibratory roller) to create a level surface before placement and compaction of the layer works.

3.1.6 Performance of in situ material as wearing course

A comparison between the shrinkage product and grading coefficient gives an indication on the likely behaviour of the material as a wearing course, listed below:

TH1 Ravels & corrugates

TH7 Ravels & corrugates

TH12 Ravels & corrugates

TH17 Erodible

TH19 Erodible

Th24 Ravels & corrugates

The results clearly indicate that the material is likely to ravel and corrugate and exhibit erodible behaviour and is considered unsuitable for use as a wearing course

3.2 Slope stability and erosion

An analysis of the slope gradient using the topographical survey supplied by the client shows that the majority of the site is either flat-lying (grey shading) or slightly undulating (green shading). Steeper slopes (orange and red shading) are encountered along the NE boundary and S-SW corner of the site.

The terrain modelling has revealed that there are minimal steep natural slopes on the site (shaded red on Figure 3). As a result, slope instability will not prove problematic.

The degree of erosion will depend on the level of cohesion within the soil matrix. The higher the cohesion, the increased likelihood that larger ‘soil clods’ will form. The energy of the erosive agent, whether it may be wind or water, will need to increase in order to transport the larger particles. The silty fine sand nature of the material within the upper 1 m of the profile is likely to be susceptible to wind and water erosion. The silt fraction will impart a level of cohesion but is unlikely to withstand a strong current, high energy impact of rainfall etc.

It is advisable to cover exposed areas upon completion of construction with grass or any other suitable vegetative cover to limit the impact of erosion on the exposed fine grained soils.

3.3 Excavation classification with respect to services

Soft excavation Class A is characterised by material which, using a pick or equivalent hand swing tool, can only be excavated with difficulty. The following depth intervals, terminating at 1.50 m below surface, were extracted from the DPL results.

Soft Class Excavation A	>1.50 m	TH2, 3, 5, 8 & 16
	1.17 – 1.50 m	TH1, 7, 9, 10, 13 & 17 to 21
	0.95 – 1.50 m	TH12, 14, 15, & 23
	0.66 – 1.50 m	TH4, 6, 11 & 24

The results indicate that suitable hand excavation conditions exist within the upper 1 m soil across the majority of the site with the exception of TH4, 6, 11 & 24 above.

3.4 In situ consistency

The DPL tests were conducted adjacent to each test pit from surface to approximately 1.90 m below surface. Near refusal conditions were encountered at TH19 (1.75 m) and TH24 (1.50 m) within *very dense* material. The following in situ consistency profiles have been extracted from the DPL results:

TH1, TH7, TH13, TH16, TH18 – TH20 and TH24

0.00 – 0.80 m *Loose*

0.80 – 1.30 m *Medium dense*

1.30 – 1.90 m *Dense*

TH5, TH14 – TH15 & TH17

0.00 – 0.45 m *Medium dense to dense*

0.45 – 0.90 m *Loose*

0.90 – 1.90 m *Medium dense to dense*

TH4, TH6, TH10 – TH11

0.00 – 0.90 m *Medium dense*

0.90 – 1.60 m *Dense*

1.60 – 1.90 m *Medium dense*

TH2 – TH3, TH8 – TH9, TH12, TH21 & TH23

0.00 – 1.10 m *Loose*

1.10 – 1.90 m *Medium dense to dense*

The DPL graphs are filed under Appendix C.

3.5 Impact of the Geotechnical Character of the Site on Subsidy Housing Developments

Conditions suitable for the development of a perched water table exist on site with a layer of uniformly graded Aeolian fine sand underlain by partially calcretised, weakly cemented silty sand. Dewatering of foundation and service trenches must be allowed for in the construction costs despite the fact that no groundwater was intersected during the field investigation.

The layer of *loose* material within the upper 1 m of the soil profile points towards a low bearing capacity. Soil compressibility is likely to be moderate for conventional strip footings reducing to low compressibility should a slab on ground foundation be used. In any event, the bearing pressure of the foundations will need to be reduced.

The upper 1 m of the soil profile consists of mostly fine sand (0.075 – 0.425 mm diameter) with a low to moderate silt content. Fine sand is considered the most susceptible to erosion. The silt content will impart a certain level of cohesion which binds the finer particles together to form 'clods' requiring an increase in the energy of the erosive agent to transport the material. However, there is zero to negligible clay present so the material will be prone to erosion mostly from water, e.g. high rainfall with associated run off and wind to a lesser extent. It is advisable to quickly revegetate disturbed areas once construction has been completed.

The terrain analysis has revealed the presence of moderately steep slopes (orange shading) and flat areas (grey shading) within the site boundary. The flat areas, particularly where the gradient is less than 1:100 will pose problems for storm water and water-borne sewerage removal. Service trenches will need to be graded away from the development to adequately remove the storm water and sewerage. The moderately steep slopes, particularly areas where the gradient exceeds 1: 10 will require the construction of terraces to create level platforms for the houses. There is likely to be differential settlement between the in situ material and reworked engineered fill material which will need to be addressed by the engineer during design of the foundations. Additional earthworks will be required for road construction, e.g. cut to fill areas, cut slopes and fill slopes within small valleys.

4 Site Classification

The site is classified as 'S1' for compressible soils of low plasticity with an expected range of total soil movement of between 10 mm and 20 mm due to the presence of *loose* material extending to approximately 1 m below surface (Table 2).

Erf numbers (none provided but number of erven to be developed equals 500).

Table 2: Residential Site Class Designation (after Watermeyer and Tromp (1992) and the Joint Structural Division)

TYPICAL FOUNDING MATERIAL	CHARACTER OF FOUNDING MATERIAL	EXPECTED RANGE OF TOTAL SOIL MOVEMENT (mm)	ASSUMED DIFFERENTIAL MOVEMENT (%OF TOTAL)	SITE CLASS
Rock (excluding mud rocks which may exhibit swelling to some depth)	STABLE	NEGLIGIBLE	-	R
Fine grained soils with moderate to very high plasticity (clay, silty clays, clayey silts, and sandy clays)	EXPANSIVE SOILS	< 7,5 7.5 – 15 15 – 30 >30	50% 50% 50% 50%	H H1 H2 H3
Silty sands, sands, sandy and gravely soils	COMPRESSIBLE AND POTENTIALLY COLLAPSIBLE SOILS	<5 5 – 10 >10	75% 75% 75%	C C1 C2
Fine grained soils (clayey silts and clayey sands of low plasticity), sands, sandy and gravely soils	COMPRESSIBLE SOILS	<10 10 – 20 >20	50% 50% 50%	S S1 S2
Contaminated soils, controlled fill, dolomitic areas, landslip,	VARIABLE	VARIABLE		P

landfill, marshy areas, marine waste fill, mining subsidence, reclaimed areas, uncontrolled fill, very soft silts / silty clays				

Table 3: Summarised laboratory results.

Test Pit	In situ \Profile Description	Profile Interval (m)	LL	PI	LS %	GM	% Gravel	% Sand	% Silt	% Clay	USCS	Group Name	Potential Expansion	Mod AASHTO	OMC	CBR @ 100%	CBR @ 98%	CBR @ 95 %	CBR @ 93 %	CBR @ 90 %	Swell	AASHTO	TRH14
TH1	Fine SAND	0.05 - 1.20	0	NP	0.0	0.73	0	73	27	0	SM	Silty SAND	Low	2049	8.3	66	45	25	13	5	0.0	A-2-4 (0)	G9
TH4	Fine SAND	0.90 - 2.00	0	NP	0.0	0.94	0	94	6	0	SP-SM	Poorly graded SAND with silt	Low	1889	9.7	58	36	17	5	1	0.0	A-3 (0)	
TH7	Slightly clayey fine SAND	0.30 - 1.00	0	SP	0.5	0.61	0	61	36	3	SM	Silty SAND	Low	2028	10.4	12	10	8	7	5	0.0	A-4 (0)	G9
TH11	Clayey SAND	1.20 - 2.00	0	NP	0.0	1.33	23	60	17	0	SM	Silty SAND with gravel	Low										
TH12	Silty fine SAND	0.10 - 1.00	18	2	1.0	0.60	0	60	40	0	SM	Silty SAND	Low	1760	12.6	5	4	2	2	1	1.9	A-3 (0)	
TH15	Silty fine SAND	1.20	0	NP	0.0	0.78	0	78	22	0	SM	Silty SAND	Low	1836	11.4	45	28	13	9	6	0.8	A-3 (0)	G9
TH16	Clayey SAND	1.20 - 1.85	0	NP	0.0	1.27	17	70	11	2	SW-SM	Well-graded SAND with silt and gravel	Low										
TH17	Silty fine SAND	0.15 - 1.10	21	3	1.5	0.55	0	65	45	0	SM	Silty SAND	Low	1892	11.7	18	12	6	4	3	1.1	A-3 (0)	G10
TH19	Silty fine SAND	0.10 - 1.05	24	5	2.5	0.67	0	67	32	1	SC-SM	Silty, clayey SAND	Low	1833	14.8	3	3	3	2	1	0.5	A-2-4 (0)	
TH24	Silty fine SAND	0.10 - 1.25	0	SP	0.0	0.63	0	63	37	0	SM	Silty SAND	Low	1748	14.0	11	5	2	1	0	1.4	A-4 (0)	

Notes:

USC = Unified Soil Classification
LL = Liquid Limit
PI = Plasticity Index
LS = Linear Shrinkage
GM = Grading Modulus
SP = Slightly plastic
NP = Non plastic
PE = Potential Expansion
OMC = Optimum Moisture Content

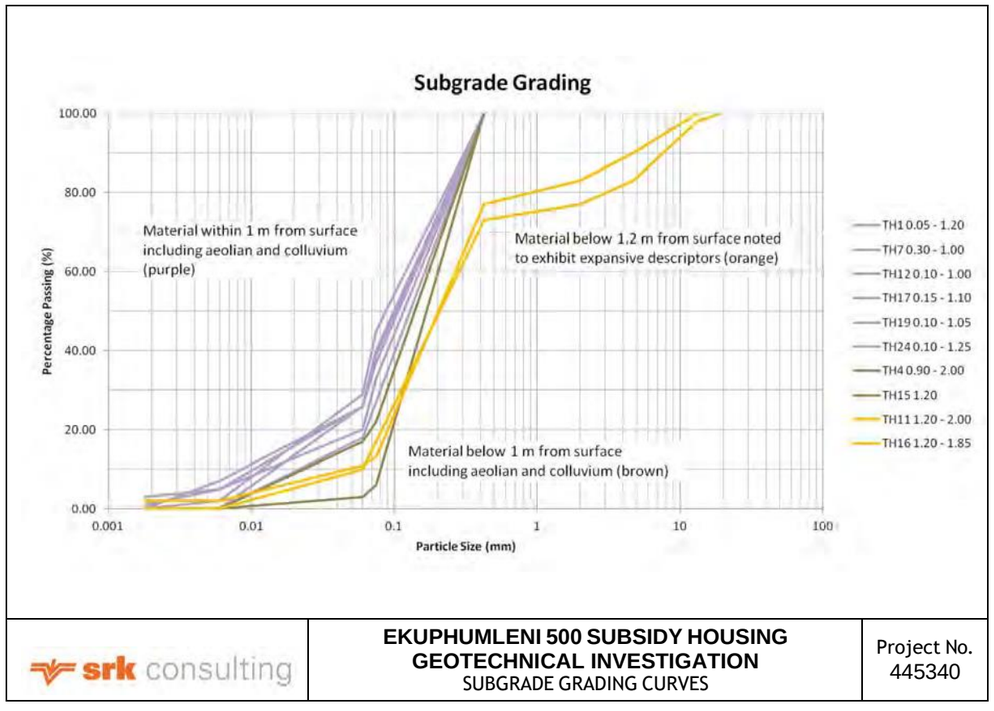


Figure 3: Ekuphumleni 500 Subsidy Housing subgrade grading.

5 Foundation Recommendations and Solutions

The following foundation recommendations are extracted from Table 4.2 in the Code of Practice for Foundations and Superstructures for Single Storey Residential Buildings of Masonry Construction:

5.1 Option 1 – Normal strip footings

- Rip and remove all topsoil material to stockpile within boundary of foundation trench.
- Rip and remove all fill material to spoil.
- Construct normal strip footings founded at a minimum depth of 0.40 m below surface (except where founded on rock). It is recommended that the base of the foundation trenches are nominally compacted, either by hand tamping or a mechanical compactor.
- Limit the bearing pressure to 50 kPa.
- Unreinforced foundations will suffice on shallower slopes (areas shaded grey in Figure 2) provided the base of the foundation trench is compacted using a wacker compactor prior to casting.
- On the steeper slopes (areas shaded green to red in Figure 2 where the slope gradient falls close to / and exceeds the 1:10 m limit), foundations may have to stepped or cast at different levels below the natural ground level (where level strip foundations are desirable), in these areas consideration should be given to the nominal reinforcement of the foundations (to limit the potential for differential settlement across the units). Clearly foundation reinforcement will be required if strip foundations are partly placed within in situ material and partly within compacted fill material. The placement of strip foundations on compacted fill material is however discouraged due to the problems of controlling compaction levels.
- Foundation trenches must be kept free of water.
- The thickness of the foundation must not be less than 200 mm.
- A ‘controlled fill’ must be used if the height between the underside of the floor slab and natural ground level is less than 400 mm and an ‘engineered fill’ if the height is greater than 400 mm.

5.2 Option 2 – Slab-on-ground foundation

- Rip and remove all topsoil material to stockpile.
- Rip and remove all fill material to spoil.
- The site shall be cut and filled, where necessary, to create a level platform for the slab;
- A reinforced 75 mm thick concrete slab, thickened to a minimum of 450 mm below all external load bearing walls and 150 mm below all internal non-load bearing walls, to be cast at a minimum founding depth of 300 mm;
- Underfloor membranes (not less than 0.25 mm thick) shall be placed beneath the slab and beam thickenings. The joint overlaps between sheets shall not be less than 200 mm.
- The maximum area of the slab will be 200 m^2.
- The slab must not contain any contraction joints.
- The maximum surface level change is 400 mm.
- It is recommended that the slab-on-ground be cast on the in situ material as far as possible to limit the volume of fill material required to create an engineered platform along with the associated differential settlement expected to occur between the in situ and platform material.
- Site conditions may dictate that an engineered platform will be required e.g. erven falling within areas shaded green to orange with a gradient close to / and exceeding 1: 10 m (Figure 2). The following points are presented for consideration:
  - The material must be compacted in layers not exceeding 200mm to 93% Mod AASHTO dry of the optimum moisture content. Careful control will be required during compaction due to the moderate silt content ranging from 27 – 45% which may begin to pump under oversaturated conditions;
  - The slab should be cast at a minimum depth of 300 mm below the platform surface;

- The minimum distance between the edge of the slab and crest of the engineered slope should be 1000 mm with a fall of ground of roughly 1: 50 (v: h);
- The slope will need to be battered back to a slope gradient of 1: 1 (v: h);
- A compacted fill (erosion control) battered to a 1: 2 (v: h) gradient should be constructed to cover the leading edge of the engineered fill.

6 Drainage

The site is generally undulating with 'pockets' of flat lying ground (highlighted grey in Figure 2). These areas are likely to create drainage problems where the gradient is less than or equal to 1: 100 as there will not be sufficient fall of ground to divert storm water and/or water borne sewerage away from the individual (refer to Section 7 below).

6.1 Aggressivity of soil towards buried concrete

The corrosivity and Basson Indices results were unavailable at the time of report submission. The results and discussion will be submitted at a later date as an addendum to the main report.

7 Special Precautionary Measures

The surface of the ground immediately adjacent to the houses shall fall 30 mm over the first 1.5 m.

Garden beds shall not be located adjacent to the houses and care must be taken to avoid overwatering (wherever practical) of gardens in close proximity to the houses.

Service trenches (storm water and sewerage) will have to be sloped to divert water away from the houses.

A fall of ground will need to be created for each erf where the average slope is flatter than 1: 100 due to difficulties associated with the provision of waterborne sanitation and drainage of the site (applicable to the areas highlighted as grey in Figure 2).

Terracing for houses, additional earthworks to roads and storm water control measures will be required for erven where the average slope exceeds 1: 20.

Building platforms on steeper slopes must be designed to ensure that no differential settlement takes place.

Special attention needs to be paid to foundations in areas where fill platforms have to be created.

On site supervision will be important to ensure that foundations are carried down to the correct level and that the soils are compacted.

Revegetate disturbed areas as soon as possible after construction (use the stockpiled topsoil material and compact gently) to reduce the impact of erosion.

8 Conclusions

The site is considered suitable for the development of subsidy houses provided the following geotechnical constraints are accounted for during the design phase of the development:

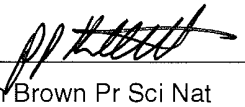
- Low bearing capacity within 1 m from surface.
- Diversion of storm water and sewerage within flat-lying areas with a gradient less than 1:100.

Prepared by

Brent Cock Pr Sci Nat

Senior Engineering Geologist

Reviewed by



John Brown Pr Sci Nat

Partner & Principal Engineering Geologist

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

Appendices

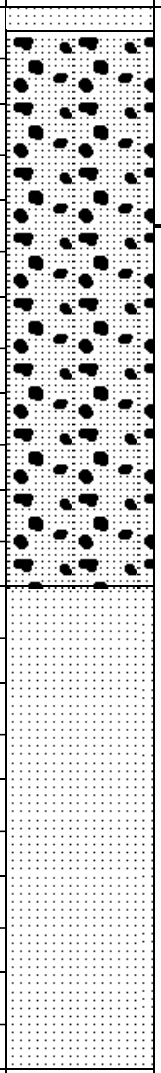
Appendix A: Soil Profiles

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 1

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.20 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727994
EASTING (Y): 30835
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6		**MDD/CBR/ F.I @ 0.45 mbgl**	**fine SAND** Slightly moist, dark brown, loose, fine SAND with abundant roots. Topsoil **fine SAND with gravel** Slightly moist, brown with occasional darker brown mottles, medium dense, minor pinhole voids, occasional fine roots, uniformly graded fine SAND. Aeolian **fine SAND** Dry to slightly moist, yellowish creamish brown, dense to very dense, highly weathered hardpan calcrete nodules, minor pinhole voids, weakly cemented fine SAND. Pedogenic? (mottles are highly weathered hardpan calcrete nodules), (easily breakdown when squeezed between fingers), (occasional 'resistant' nodules very soft rock consistency).

EXCAVATIBILITY: Soft 0.00 - 2.20 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 10

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727733
EASTING (Y): 30667
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**fine SAND** Slightly moist, mottled brown and dark brown, medium dense, thin surface coverin of medium dense to dense (30 - 40mm) witihin rural road reserve, fine SAND. Aeolian.
0.4			**silty fine SAND** Slightly moist, yellowish brown to orange brown, medium dense, minor pinhole voids with occasional very fine roots, silty fine SAND. Aeolian.
0.6		**MDD/CBR/ F.I @ 0.60 mbgl**.	
0.8			
1.0			
1.2			**cemented fine SAND** Slightly moist, yellowish brown speckled off white, dense, highly weathered hardpan calcrete nodules (likely to breakdown under compaction), weakly to moderately cemented fine SAND. Pedogenic?
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			

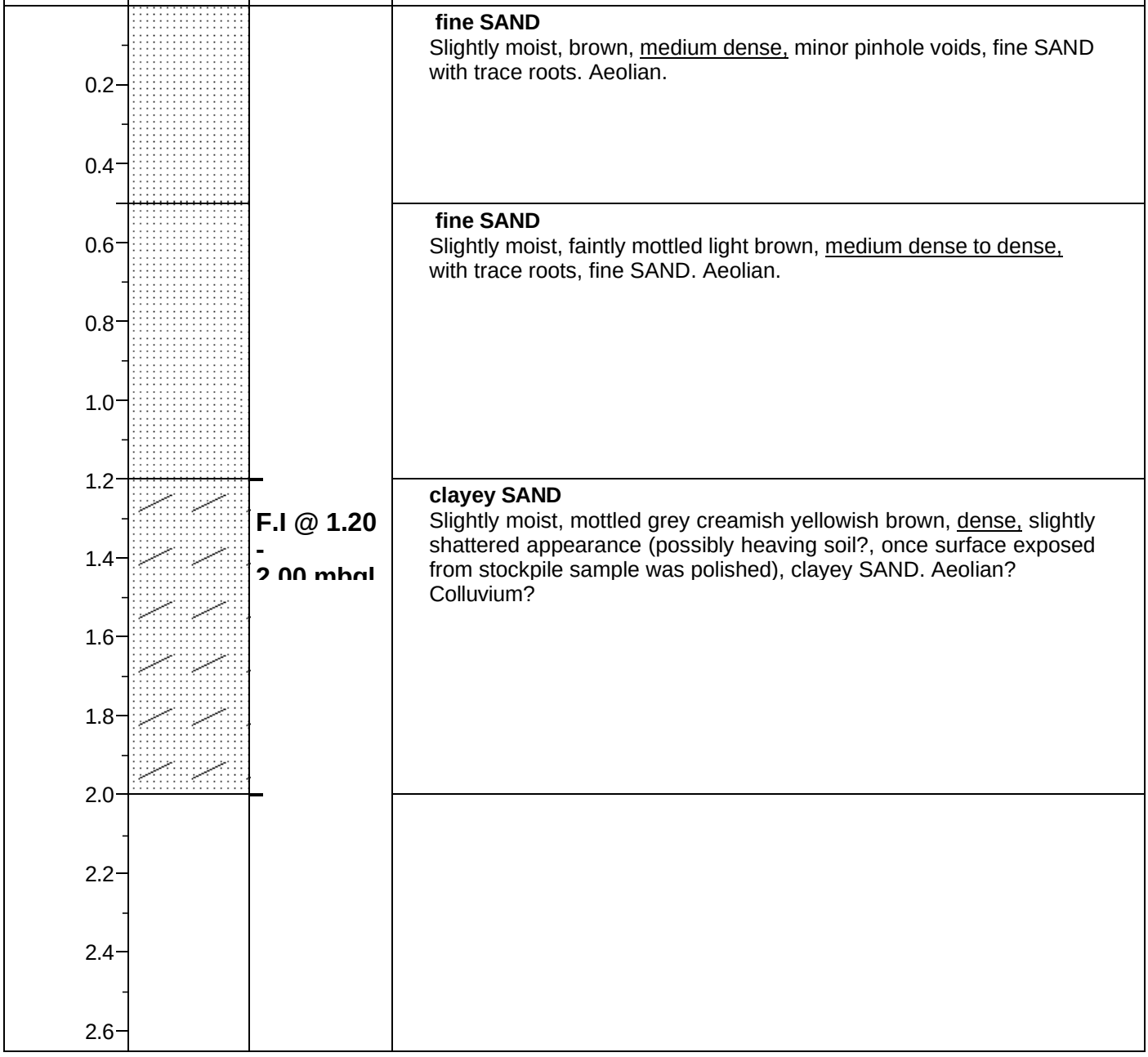
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal but slow excavation within 1.10 - 2.00 mbgl

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 11

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727633
EASTING (Y): 30619
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012



EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

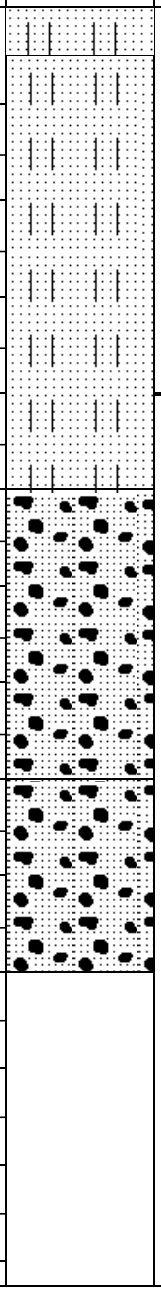
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 12

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727552
EASTING (Y): 30711
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6		**MDD/CBR/ F.I @ 0.80 mbgl.**	**silty fine SAND** Slightly moist, dark brown, loose to medium dense, blocky texture, silty fine SAND. Topsoil. **silty fine SAND** Slightly moist, reddish orange brown, medium dense, trace voids with occasional fine roots, silty fine SAND. Aeolian. **gravely fine SAND** Slightly moist, yellowish brown speckled off white, dense, completely weathered calcrete nodules (likely to breakdown under compaction), weakly to moderately cemented fine SAND. Pedogenic? **gravely fine SAND** Dry to slightly moist, yellowish brown speckled off white, dense, subangular hardpan calcrete gravel (soft rock to medium hard rock consistency - unlikely to breakdown under compaction), within very weakly cemented sand, gravely fine SAND. Pedogenic.

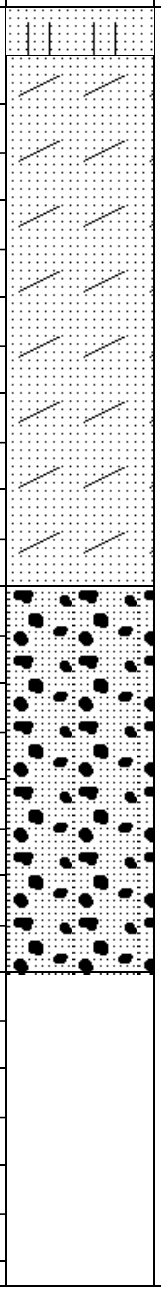
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 13

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727458
EASTING (Y): 30853
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6			**silty fine SAND** Slightly moist, dark brown, loose, blocky texture, silty fine SAND with abundant roots (grass cover). Topsoil. **clayey fine SAND** Slightly moist, orange brown, loose to medium dense, occasional fine roots, slightly clayey fine SAND. Aeolian?. **gravely fine SAND** Dry to slightly moist, yellowish brown speckled off white, dense, soft rock to medium hard rock calcrete nodules within sandy matrix, gravely fine SAND. Pedogenic?

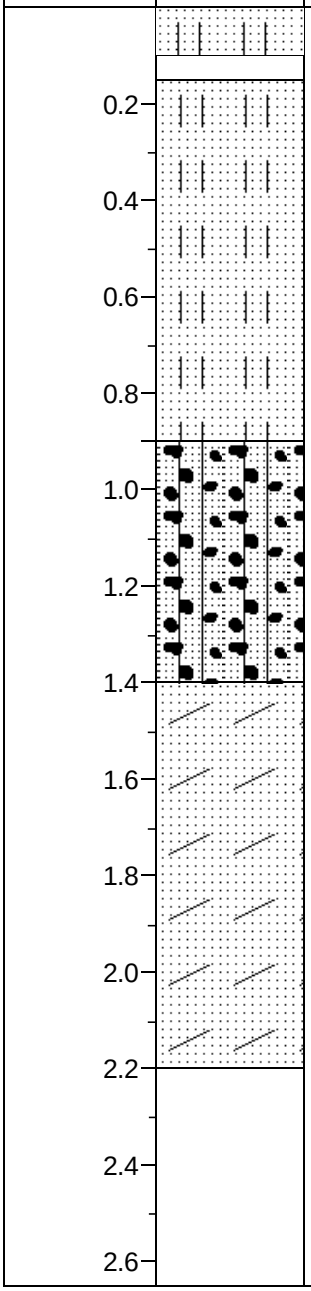
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal and slow excavation

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 14

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727292
EASTING (Y): 30934
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012



DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.0 – 0.9			**silty fine SAND** Slightly moist, dark brown, loose to med, blocky texture, silty fine SAND with abundant roots (grass cover). Topsoil. **silty fine SAND** Dry to slightly moist, reddish brown, dense, minor pinhole voids with occasional large (2 - 3mm) voids (bioturbation?), occasional fine roots, silty fine SAND. Colluvium.
0.9 – 1.4			**gravely silty SAND** Dry, creamish off white, dense, calcretised fine sand with medium hard rock calcrete nodules, gravely silty SAND. Pedogenic.
1.4 – 2.2			**clayey SAND** Slightly moist, khaki green speckled off white, dense, weathered calcrete patches decreasing with depth, clayey SAND (blocky texture and partial pedogenesis). Residual? (slightly fissured becoming mottled khaki green orange below 2m - fluctuating water table?)
2.2 – 2.6			

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal and slow excavation

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 15

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 1.40 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727288
EASTING (Y): 31101
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0			
1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6		**MDD/CBR/ F.I @ 1.20 mbgl**.	**silty fine SAND** Slightly moist, reddish orange brown, medium dense to dense, material most likely silty fine SAND with partial pedogenesis. Colluvium.

EXCAVATIBILITY: Soft 0.00 - 1.40 mbgl
GROUNDWATER: Hole abandoned due to burst water pipe
REFUSAL: No Refusal

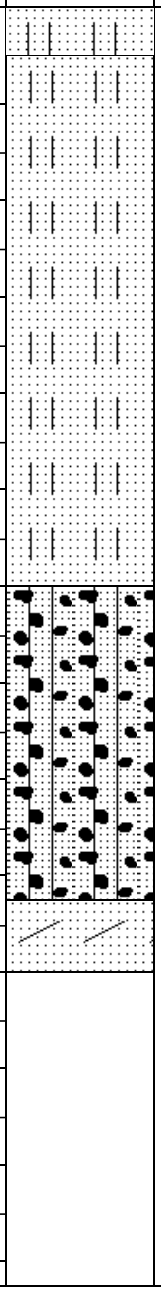
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 16

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727246
EASTING (Y): 31591
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6			**silty fine SAND** Slightly moist, dark brown, loose, silty fine SAND with abundant roots. Topsoil. **silty fine SAND** Slightly moist, reddish brown, medium dense, minor pinhole voids, occasional very fine roots, silty fine SAND. Colluvium?. **clayey SAND with gravel** Slightly moist, yellowish brown, medium dense to dense, angular hardpan calcrete nodules within clayey sand matrix, clayey SAND with gravel. Colluvium. **calcretised clayey SAND** Slightly moist, orange brown speckled off white, dense, highly weathered calcrete patches within clayey sand matrix, weakly cemented partially calcretised clayey SAND. Pedogenic / Colluvium?

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

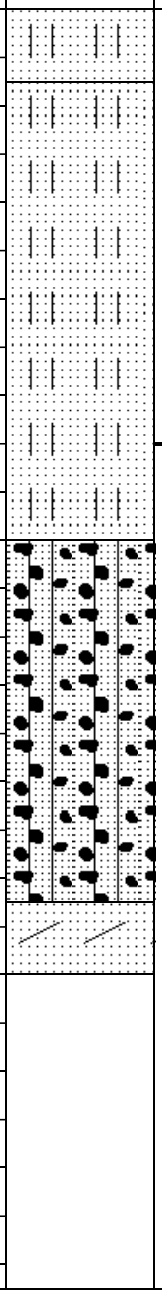
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 17

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727300
EASTING (Y): 31720
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012



DEPTH	SAMPLE	DESCRIPTION
0.00		**silty fine SAND** Slightly moist, dark brown, loose, silty fine SAND with abundant roots. Topsoil.
0.20		**silty fine SAND** Slightly moist, reddish brown, medium dense, minor pinhole voids, occasional very fine roots, silty fine SAND. Colluvium?.
0.90	**MDD/CBR/ F.I @ 0.90 mbgl.**	
1.10		**gravely clayey SAND** Slightly moist, yellowish khaki brown speckled off white, dense, subrounded hardpan calcrete gravel (soft rock to medium hard rock) and occasional sandstone boulder within slightly shattered clayey sand matrix, gravely clayey SAND. Colluvium.
1.90		**calcretised clayey SAND** Slightly moist, orange brown speckled off white, dense, highly weathered calcrete patches within clayey sand matrix, calcretised clayey SAND. Pedogenic

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

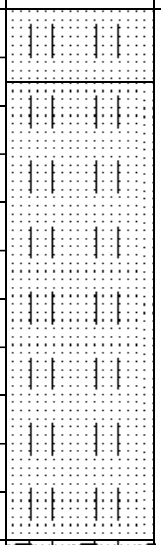
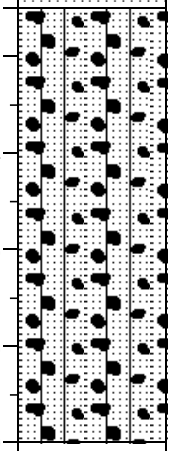
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 18

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727636
EASTING (Y): 31759
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**silty fine SAND** Slightly moist, dark brown, loose, silty fine SAND with abundant roots. Topsoil.
0.4			**silty fine SAND** Slightly moist, reddish brown, medium dense, minor pinhole voids, occasional very fine roots, silty fine SAND. Colluvium (increase in consistency below 0.70m)
0.6			
0.8			
1.0			
1.2			**gravely clayey SAND** Slightly moist, yellowish khaki brown speckled off white, dense, subrounded hardpan calcrete gravel (soft rock to medium hard rock) within slightly shattered clayey sand matrix, gravely clayey SAND. Colluvium.
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			

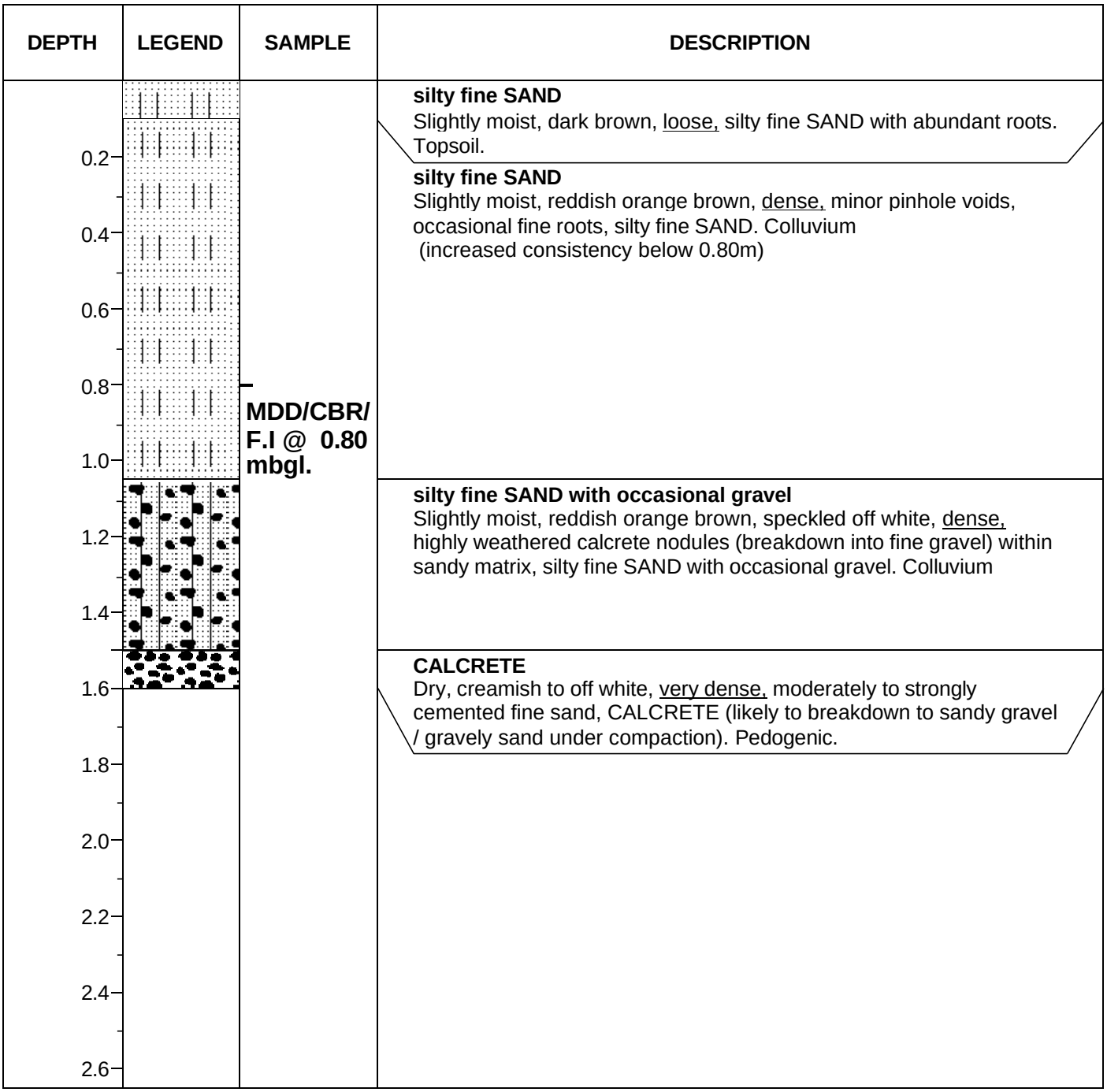
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 19

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 1.60 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727738
EASTING (Y): 31650
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012



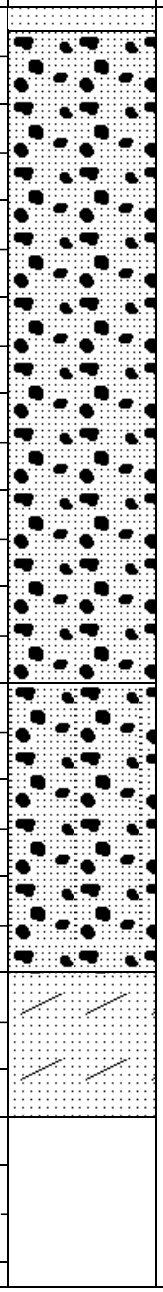
EXCAVATIBILITY: Soft 0.00 - 1.60 mbgl
GROUNDWATER: No GW
REFUSAL: Slow excavation within calcrete

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 2

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.30 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3728018
EASTING (Y): 30729
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6			**fine SAND** Slightly moist, dark brown, loose, fine SAND with abundant roots. Topsoil **fine SAND with gravel** Slightly moist, uniform reddish brown, medium dense, minor pinhole voids, occasional fine roots, uniformly graded fine SAND. Aeolian **fine SAND with gravel** Slightly moist, uniform reddish brown, medium dense to dense, minor pinhole voids, occasional fine roots, uniformly graded fine SAND. Aeolian **clayey fine SAND** Slightly moist, yellowish brown, speckled light grey, medium dense, but more towards loose on boundary, highly weathered hardpan calcrete nodules, minor pinhole voids, clayey fine SAND. Pedogenic? (mottles are highly weathered hardpan calcrete nodules), (easily breakdown when squeezed between fingers), (occasional 'resistant' nodules very soft rock consistency).

EXCAVATIBILITY: Soft 0.00 - 2.30 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 20

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727834
EASTING (Y): 31577
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**silty fine SAND** Slightly moist, dark brown, loose, silty fine SAND with abundant roots. Topsoil.
0.4			**silty fine SAND** Slightly moist, reddish brown, medium dense, minor pinhole voids, occasional very fine roots, silty fine SAND. Colluvium (increased consistency below 1.20m)
0.6			
0.8			
1.0			
1.2			
1.4			
1.6			**clayey fine SAND** Slightly moist, orange brown, medium dense to dense, no visible internal structure (intact?), slightly clayey fine SAND. Colluvium
1.8			
2.0			
2.2			
2.4			
2.6			

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

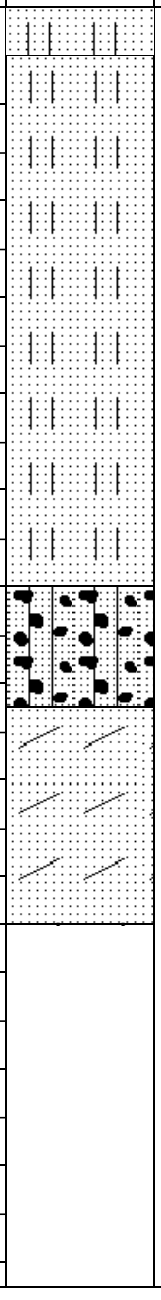
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 21

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 1.90 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727757
EASTING (Y): 31519
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6			**silty fine SAND** Slightly moist, dark brown, loose, silty fine SAND with abundant roots. Topsoil. **silty fine SAND** Slightly moist, reddish brown, medium dense, minor pinhole voids, occasional very fine roots, silty fine SAND. Colluvium **clayey SAND with gravel** Slightly moist, yellowish brown, dense, angular hardpan calcrete nodules within clayey sand matrix, clayey SAND with gravel. Colluvium. **clayey SAND** Slightly moist, orange brown speckled off white, dense - very dense, highly weathered calcrete patches within clayey sand matrix, weakly cemented and reduced calcretised patches, clayey SAND. Pedogenic / Colluvium?

EXCAVATIBILITY: Soft 0.00 - 1.90 mbgl
GROUNDWATER: No GW
REFUSAL: Slow excavation within clayey sand

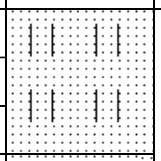
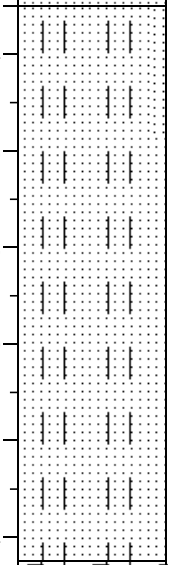
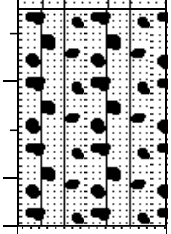
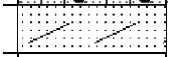
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 22

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727841
EASTING (Y): 31469
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**silty fine SAND** Dry, grey, dense, subangular gravel within sandy matrix, sandy GRAVEL. Wearing course.
0.4 0.6 0.8 1.0 1.2 1.4			**silty fine SAND** Slightly moist, reddish brown, dense, minor voids (some 4mm), silty fine SAND. Colluvium
1.6 1.8			**silty fine SAND with gravel** Dry to slightly moist, yellowish khaki brown, dense, occasional calcrete gravel (breakdown under compaction) within sandy matrix, silty fine SAND with gravel. Colluvium.
2.0 2.2 2.4 2.6			**clayey SAND** Slightly moist, orange brown speckled off white, dense - very dense, highly weathered calcrete patches within clayey sand matrix, weakly cemented and reduced calcretised patches, clayey SAND. Colluvium / Pedogenic?

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 23

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727985
EASTING (Y): 31289
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**silty fine SAND** Slightly moist, dark brown, loose, blocky texture, silty fine SAND with minor roots. Topsoil.
0.4			**silty fine SAND** Slightly moist, reddish brown, medium dense, becoming more dense below 0.65 m, minor pinhole voids, gradational contact, silty fine SAND. Colluvium
0.6			
0.8			
1.0			
1.2			**cemented fine SAND** Slightly moist, yellowish brown mottled off white, dense, highly weathered calcrete patches (more gravely sand), slightly shattered with occasional polished surface (heaving soil?), partially calcretised clayey SAND. Pedogenic / Colluvium?
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 24

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727922
EASTING (Y): 31279
LOCATION: Kenton
ELEVATION (m msl):
DATE: 16 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6		**F.I/MDD/CBR @ 1.00 mbgl**	**silty fine SAND** Slightly moist, dark brown, loose, silty fine SAND with abundant fine roots. Topsoil. **silty fine SAND** Slightly moist, reddish brown, dense, minor voids (some 4mm) becoming more clayey and dense towards basal contact, silty fine SAND. Colluvium **cemented fine SAND** Dry, creamish off white, medium dense, with 50mm dense hardpan calcrete layer @ 1.25m, very weakly cemented fine SAND with weak calcretisation. Pedogenic.

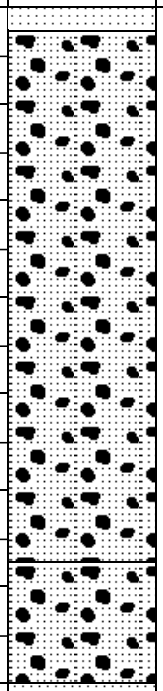
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 3

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.10 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727962
EASTING (Y): 30612
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**fine SAND** Slightly moist, dark brown, loose, fine SAND with abundant roots. Topsoil
0.4			**fine SAND with gravel** Slightly moist, uniform reddish brown, medium dense to dense, minor pinhole voids, occasional fine roots, uniformly graded fine SAND. Aeolian
0.6			
0.8			
1.0			
1.2			**gravely fine SAND** Slightly moist, dark brown, medium dense, highly weathered subangular hardpan calrete fragments, (very soft rock - likely to breakdown under compaction), gravely fine SAND. Colluvium
1.4			**clayey fine SAND** Slightly moist, yellowish brown, speckled light grey, medium dense, but more towards loose on boundary, highly weathered reduced hardpan calcrete nodules, minor pinhole voids, clayey fine SAND. Pedogenic? (mottles are highly weathered reduced hardpan calcrete nodules), (easily breakdown when squeezed between fingers), (occasional 'resistant' nodules very soft rock consistency).
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			

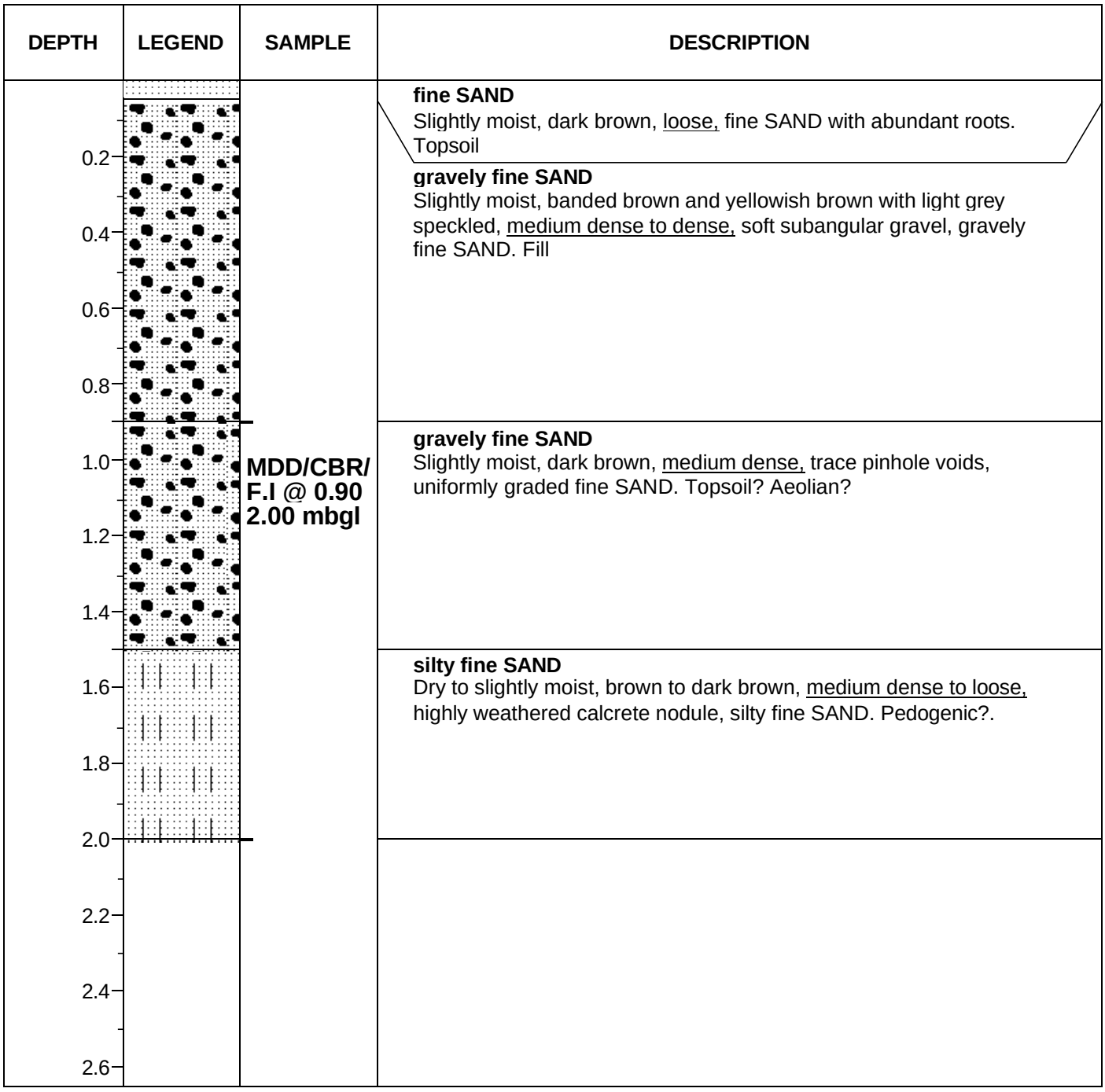
EXCAVATIBILITY: Soft 0.00 - 2.10 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 4

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727901
EASTING (Y): 30501
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012



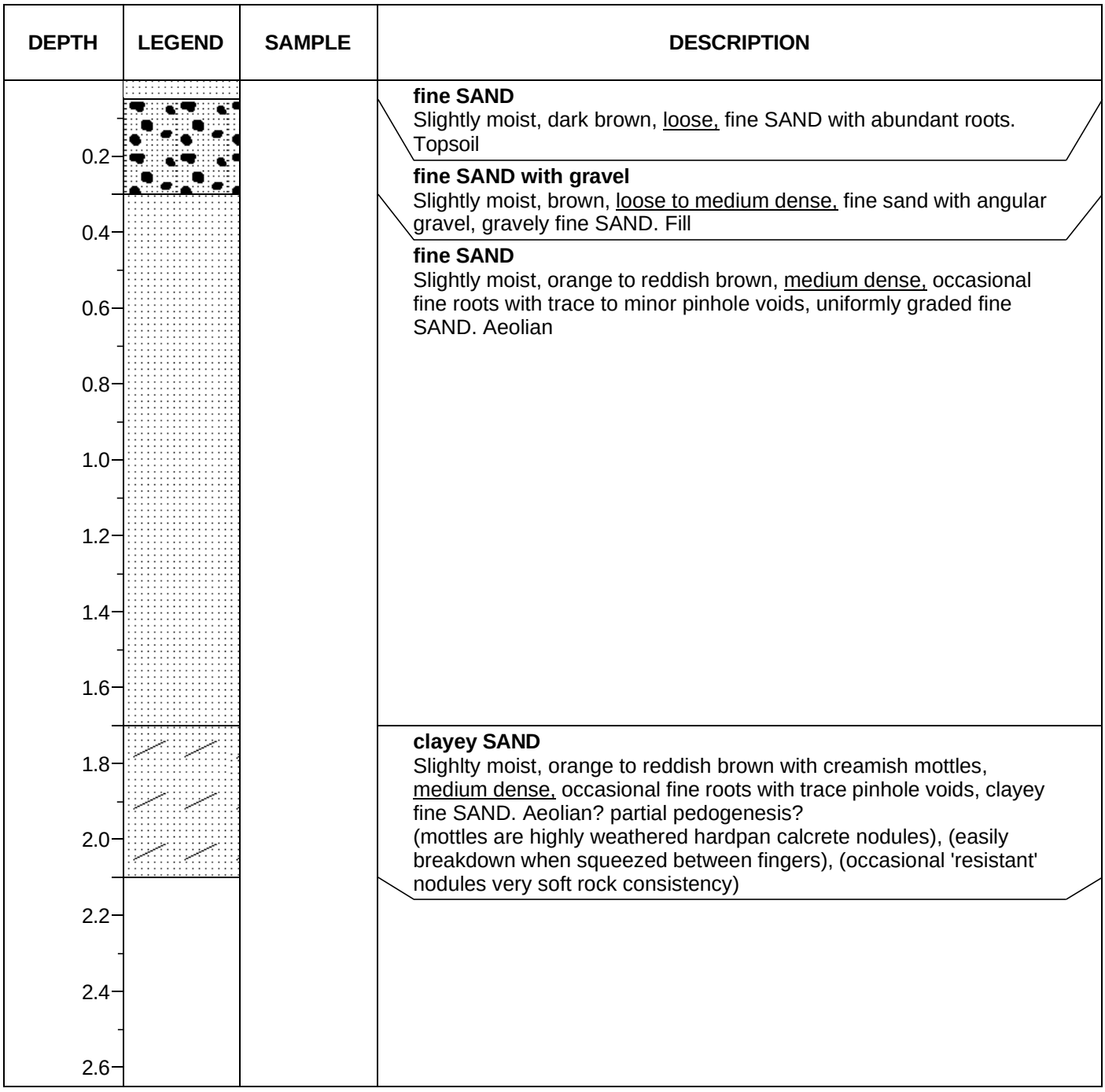
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 5

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.10 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3728075
EASTING (Y): 30852
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012



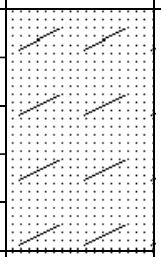
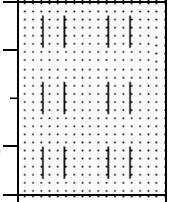
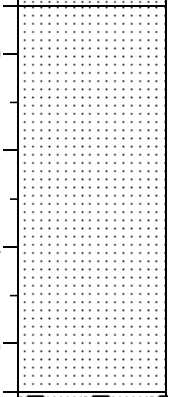
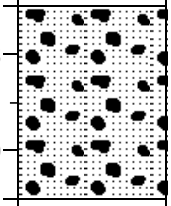
EXCAVATIBILITY: Soft 0.00 - 2.10 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 6

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.10 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727905
EASTING (Y): 30703
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2 0.4			**clayey SAND** Slightly moist, dark brown, medium dense, slightly shattered appearance, clayey SAND with abundant thick roots (close proximity to large trees).Topsoil
0.6 0.8			**silty fine SAND** Dry to slightly moist, light brown, medium dense, occasional roots, minor pinhle voids, silty fine SAND. Aeolian.
1.0 1.2 1.4 1.6			**fine SAND** Slightly moist, reddish brown, medium dense to dense, minor pinhole voids, occasional very fine roots, uniformly graded fine SAND. Aeolian
1.8 2.0			**fine SAND with trace gravel** Slightly moist, yellowish brown, medium dense to dense, occasional medium hard rock quartz sandstone pebble, very weakly cemented fine SAND with trace gravel. Aeolian? Colluvium?
2.2 2.4 2.6			

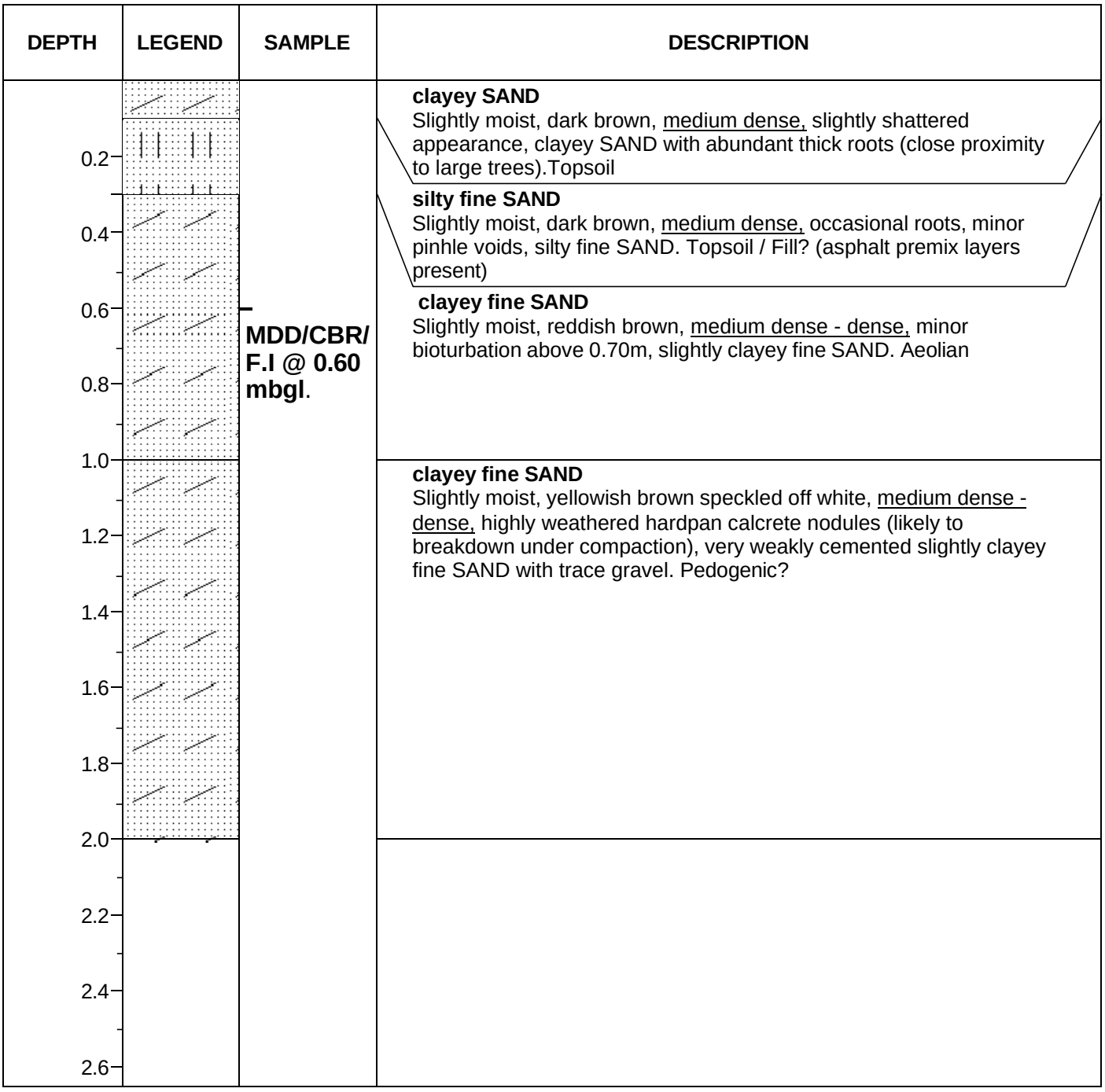
EXCAVATIBILITY: Soft 0.00 - 2.10 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 7

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.00 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727793
EASTING (Y): 30760
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012



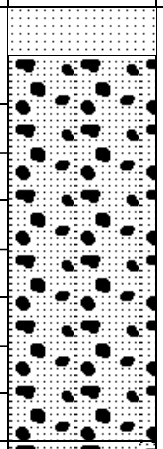
EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal but slow excavation within 1.00 - 2.00 mbgl

PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 8

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.15 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727825
EASTING (Y): 30593
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**fine SAND** Slightly moist, dark brown, loose, fine SAND with abundant roots. Topsoil
0.4			**gravely fine SAND** Slightly moist, dark brown, medium dense, trace pinhole voids, uniformly graded fine SAND. Topsoil? Aeolian? (roots terminate @ 0.45m), (gradational contact)
0.6			
0.8			
1.0			**fine SAND with trace gravel.** Slightly moist, brown, medium dense, occasional fine roots, uniformly graded fine SAND with trace gravel. Aeolian. (more clayey than TH 9 intersection).
1.2			
1.4			
1.6			**cemented fine SAND with hardpan calcrete nodules** Slightly moist, yellowish brown patchy off white, dense to very dense, trace to minor pinhole voids, very soft rock hardpan calcrete nodules within very weakly cemented fine SAND. Pedogenic. (quartz sandstone cobble medium hard rock), (calcrete to breakdown under compaction - exhibit sand behaviour)
1.8			
2.0			
2.2			
2.4			
2.6			

EXCAVATIBILITY: Soft 0.00 - 2.00 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal

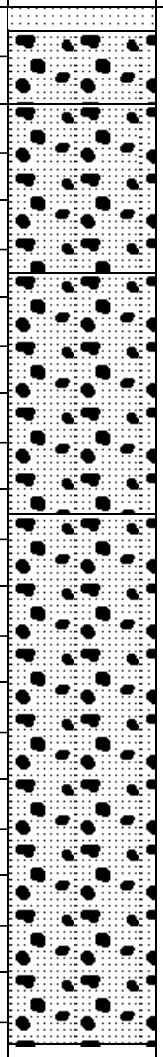
PROJECT NUMBER: 445340

TEST PIT NUMBER: TH 9

srk consulting

PROJECT: Kenton Housing Geotech
EXCAVATION METHOD: TLB Excavator
CONTRACTOR: Hennie Venter TLB Hire
DEPTH: 2.15 mbgl
LOGGED BY: Brent Cock

NORTHING (X): 3727756
EASTING (Y): 30522
LOCATION: Kenton
ELEVATION (m msl):
DATE: 15 February 2012

DEPTH	LEGEND	SAMPLE	DESCRIPTION
0.2			**fine SAND** Slightly moist, dark brown, loose, fine SAND with abundant roots. Topsoil
0.4			**gravely fine SAND** Slightly moist, banded brown and yellowish brown with light grey speckles, medium dense - dense, soft subangular gravel, gravely fine SAND. Fill.
0.6			**gravely fine SAND** Slightly moist, dark brown, medium dense, trace pinhole voids, uniformly graded fine SAND. Topsoil? Aeolian?
0.8			**fine SAND with trace gravel.** Slightly moist, brown, medium dense, occasional fine roots, uniformly graded fine SAND with trace gravel. Aeolian.
1.0			
1.2			**cemented fine SAND with hardpan calcrete nodules** Slightly moist, yellowish brown patchy off white, dense to very dense, trace to minor pinhole voids, vary occasional subrounded quartz sandstone cobble, very soft rock hardpan calcrete nodules within weakly cemented fine SAND. Pedogenic. (quartz sandstone cobble medium hard rock), (calcrete to breakdown under compaction - exhibit sand behaviour)
1.4			
1.6			
1.8			
2.0			
2.2			
2.4			
2.6			

EXCAVATIBILITY: Soft 0.00 - 2.15 mbgl
GROUNDWATER: No GW
REFUSAL: No Refusal but slow excavaton

Appendix B: Laboratory Certificates

Labco
63b Pickering Street, Newton Park, Port Elizabeth, 6045
PO Box 10114, Linton Grange, Port Elizabeth, 6015
E-Mail: info@labco.co.za Web: www.labco.co.za
Tel: 041 364-1290 Fax: 041 364-1291

sanas Testing Laboratory

CIVIL ENGINEERING MATERIALS TESTING SERVICES (PTY) Ltd T0227

CUSTOMER : SRK Consulting
P. O. Box 21842
Port Elizabeth
6000

ATTENTION : Mr. B. Cock

JOB CARD No. : C14153 / P4490

SAMPLING PROCEDURE: Delivered to the laboratory

PROJECT : Ekuphumleni 500 Subsidy Housing Geotechnical Investigation (445340)

SUBMISSION DATE : 17.02.2012

DATE TESTED : 27.02.2012

REPORT DATE : 27.02.2012

PKG

INDICATOR / CBR RESULT SUMMARY

SAMPLE NUMBER	X135403	X135404	X135405	X135407	X135408	X135410
LAYER						
CO-ORDINATES						
STAKE VALUE	TH 1	TH 4	TH 7	TH 12	TH 15	TH 17
OFF SET						
DEPTH m	0.45	0.90-2.00	0.60	0.80	1.20	0.90
DESCRIPTION	Fine Sand		Slightly clayey fine Sand	Silty fine Sand		
AASHTO CLASSIFICATION	A-2-4(0)	A-3(0)	A-4(0)	A-3(0)	A-3(0)	A-3(0)
Indicator & CBR results comply to TRH14 Specification of	G9		G9		G9	G10

SIEVE ANALYSIS - TMH 1 Test Method A1(a)

% PASSING 105.0 mm						
75.0 mm						
63.0 mm						
53.0 mm						
37.5 mm						
26.5 mm						
19.0 mm						
13.2 mm						
4.75 mm						
2.00 mm						
0.425 mm	100	100	100	100	100	100
0.075 mm	27	6	39	40	22	45

SOIL MORTAR ANALYSIS - TMH 1 Test Method A5

COARSE SAND	(%)	0	0	0	0	0	0
COARSE FINE SAND	(%)	18	29	15	17	25	10
MEDIUM FINE SAND	(%)	36	56	27	25	30	26
FINE FINE SAND	(%)	19	9	19	18	24	20
PASSING 0.075mm	(%)	27	6	39	40	22	45
GRADING MODULUS		0.73	0.94	0.61	0.60	0.78	0.55

ATTERBERG LIMITS : TMH 1 Test Method A2 - A4

LIQUID LIMIT				18		21
PLASTICITY INDEX	NP	NP	SP	2	NP	3
LINEAR SHRINKAGE	0.0	0.0	0.5	1.0	0.0	1.5

C.B.R. : TMH 1 Test Method A7 - A8

MOD AASHTO (Kg/m^3)	2049	1889	2028	1760	1836	1892
O.M.C. (%)	8.3	9.7	10.4	12.6	11.4	11.7
C.B.R. @ 100% COMPACTION	66	58	12	5	45	18
C.B.R. @ 98 % COMPACTION	45	36	10	4	28	12
C.B.R. @ 95 % COMPACTION	25	17	8	2	13	6
C.B.R. @ 93 % COMPACTION	13	5	7	2	9	4
C.B.R. @ 90 % COMPACTION	5	1	5	1	6	3
SWELL (MAASHTO) %	0.0	0.0	0.0	1.9	0.8	1.1

Deviation from Test Method : Moisture Contents dried overnight at 105 - 110°C.

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sanas Testing Laboratory

CIVIL ENGINEERING MATERIALS TESTING SERVICES (PTY) Ltd T0227

CUSTOMER : SRK Consulting
P. O. Box 21842
Port Elizabeth
6000

ATTENTION : Mr. B. Cock

JOB CARD No. : C14153 / P4490

SAMPLING PROCEDURE: Delivered to the laboratory

PROJECT : Ekuphumleni 500 Subsidy Housing Geotechnical Investigation (445340)

SUBMISSION DATE : 17.02.2012

DATE TESTED : 27.02.2012

REPORT DATE : 27.02.2012

PKG

INDICATOR / CBR RESULT SUMMARY

SAMPLE NUMBER	X135411	X135412				
LAYER						
CO-ORDINATES						
STAKE VALUE	TH 19	TH 24				
OFF SET						
DEPTH m	0.80	1.00				
DESCRIPTION	Silty fine Sand					
AASHTO CLASSIFICATION	A-2-4(0)	A-4(0)				
Indicator & CBR results comply to TRH14 Specification of						

SIEVE ANALYSIS - TMH 1 Test Method A1(a)

% PASSING 105.0 mm						
75.0 mm						
63.0 mm						
53.0 mm						
37.5 mm						
26.5 mm						
19.0 mm						
13.2 mm						
4.75 mm						
2.00 mm						
0.425 mm	100	100				
0.075 mm	33	37				

SOIL MORTAR ANALYSIS - TMH 1 Test Method A5

COARSE SAND (%)	0	0				
COARSE FINE SAND (%)	16	14				
MEDIUM FINE SAND (%)	26	37				
FINE FINE SAND (%)	25	13				
PASSING 0.075mm (%)	33	37				
GRADING MODULUS	0.67	0.63				

ATTERBERG LIMITS : TMH 1 Test Method A2 - A4

LIQUID LIMIT	24					
PLASTICITY INDEX	5	SP				
LINEAR SHRINKAGE	2.5	0.5				

C.B.R. : TMH 1 Test Method A7 - A8

MOD AASHTO (Kg/m^3)	1833	1748				
O.M.C. (%)	14.8	14.0				
C.B.R. @ 100% COMPACTION	3	11				
C.B.R. @ 98 % COMPACTION	3	5				
C.B.R. @ 95 % COMPACTION	3	2				
C.B.R. @ 93 % COMPACTION	2	1				
C.B.R. @ 90 % COMPACTION	1	0				
SWELL (MAASHTO) %	0.5	1.4				

Deviation from Test Method : Moisture Contents dried overnight at 105 - 110°C.

Name : Wouter Steyn

Position : Laboratory Manager

Revision 7
17.11.2008
Labco SF 33

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CIVIL ENGINEERING MATERIALS TESTING SERVICES (PTY) Ltd

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CLIENT : SRK Consulting
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Port Elizabeth
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ATT : Mr. B. Cock

PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012
CO-ORDINATES : -
OFFSET : -
POSITION : TH 1 @ 0.45m

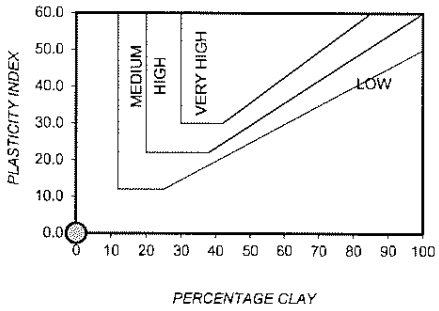
PKG

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

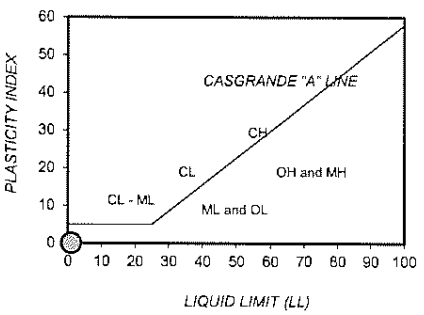
S/No. & Description		X135403
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	27
	0.060	18
	0.006	0
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	18.0
	Medium Fine Sand	36.0
	Fine Fine Sand	19.0
	Passing 0.075	27.0
Oversize Index		0.0
Shrinkage Product		0.0
Grading Coefficient		0.0
Grading modulus		0.73
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	NP
	Linear Shrinkage	0.0

Fine Sand

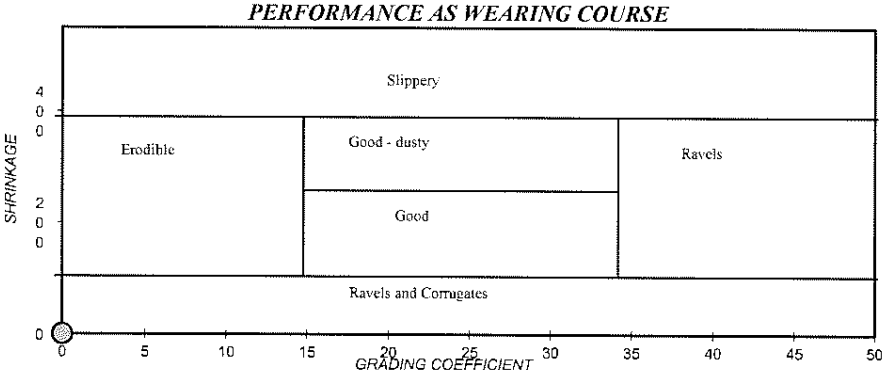
POTENTIAL EXPANSION



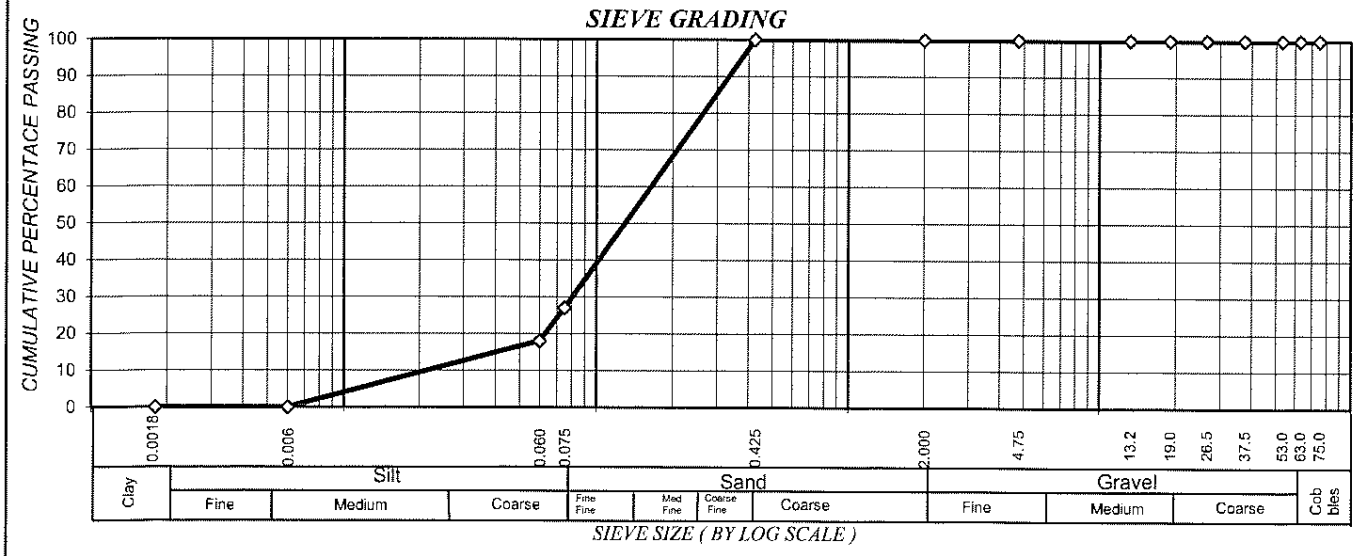
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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CLIENT : SRK Consulting
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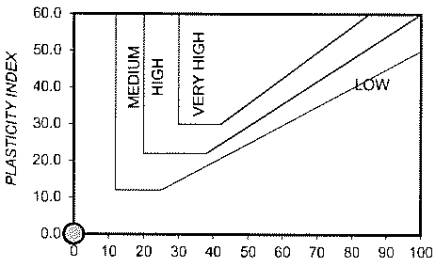
ATT : Mr. B. Cock

PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012 PKG
CO-ORDINATES : -
OFFSET : -
POSITION : TH 4 @ 0.90-2.00m

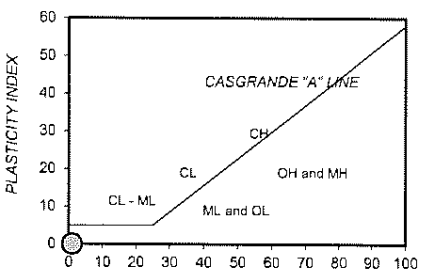
FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

S/No. & Description		X135404
Fine Sand		
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	6
	0.060	3
	0.006	0
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	29.0
	Medium Fine Sand	56.0
	Fine Fine Sand	9.0
	Passing 0.075	6.0
Oversize Index		0.0
Shrinkage Product		0.0
Grading Coefficient		0.0
Grading modulus		0.94
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	NP
	Linear Shrinkage	0.0

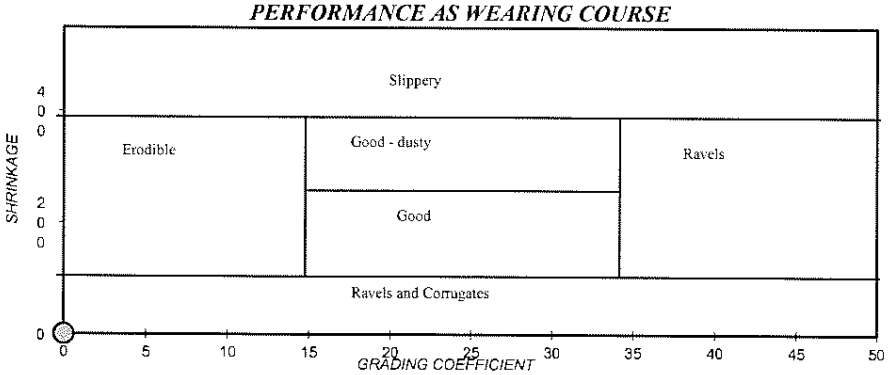
POTENTIAL EXPANSION



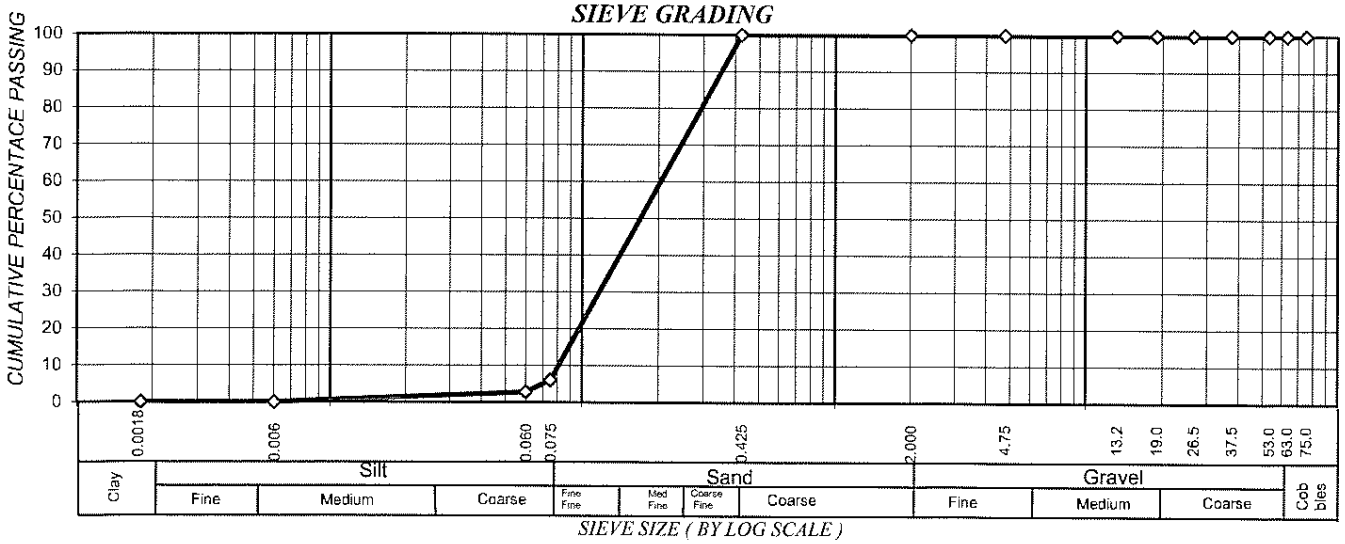
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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CIVIL ENGINEERING MATERIALS TESTING SERVICES (PTY) Ltd

T0227

CLIENT : SRK Consulting
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Port Elizabeth
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ATT : Mr. B. Cock

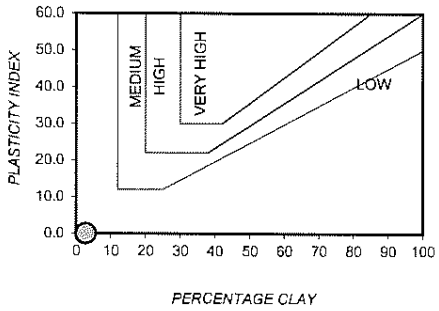
PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012 PKG
CO-ORDINATES : -
OFFSET : -
POSITION : TH 7 @ 0.60m

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

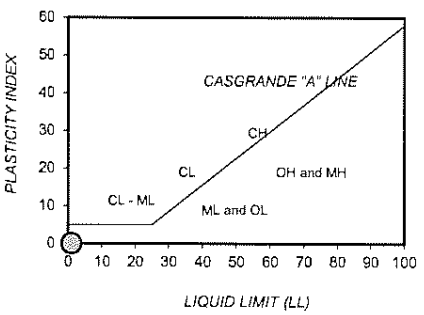
S/No. & Description		X135405
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	39
	0.060	26
	0.006	5
	0.0018	3
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	15.0
	Medium Fine Sand	27.0
	Fine Fine Sand	19.0
	Passing 0.075	39.0
Oversize Index		0.0
Shrinkage Product		50.0
Grading Coefficient		0.0
Grading modulus		0.61
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	SP
	Linear Shrinkage	0.5

Slightly clayey fine Sand

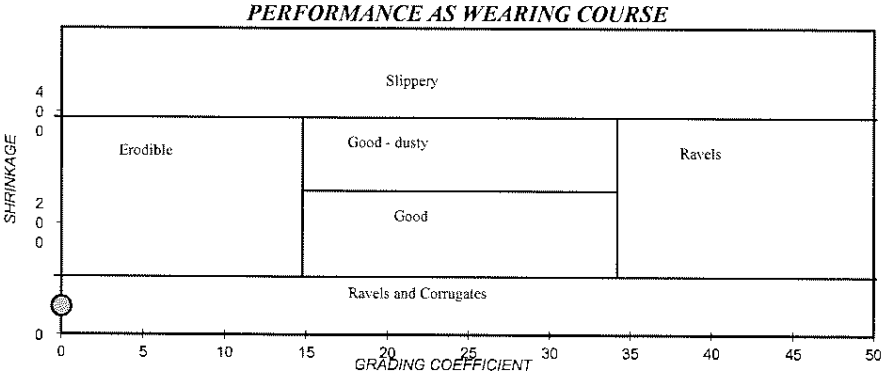
POTENTIAL EXPANSION



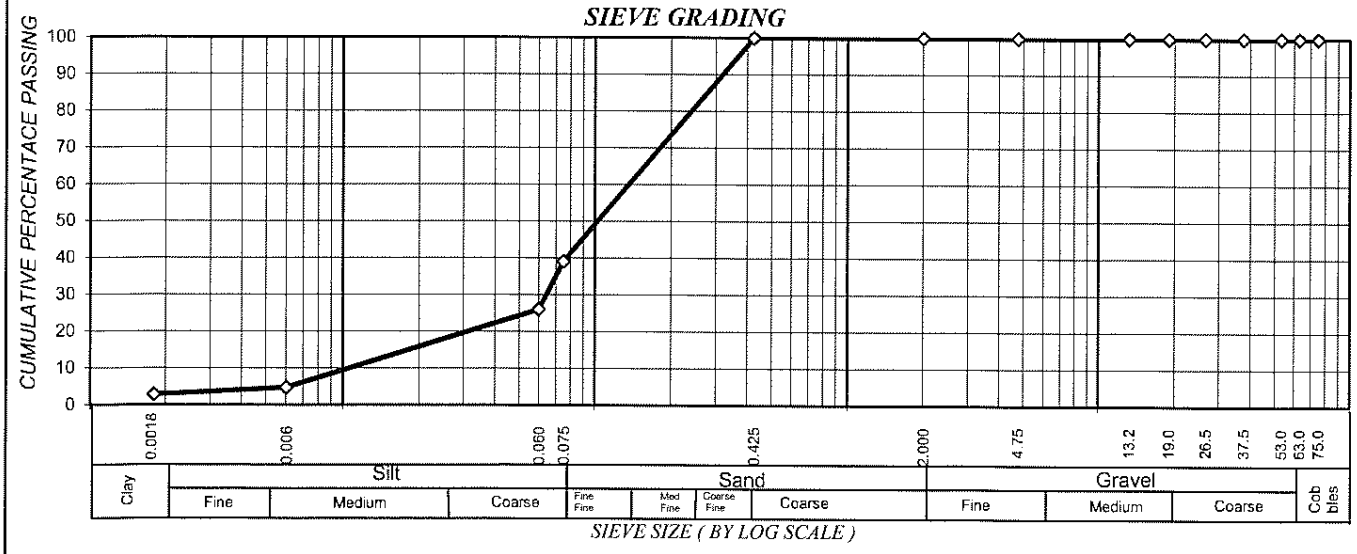
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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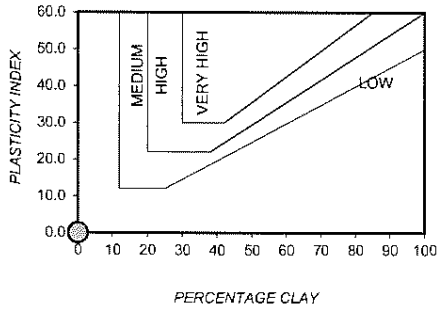
ATT : Mr. B. Cock

PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 24.02.2012
REPORT DATE : 24.02.2012 PKG
CO-ORDINATES : -
OFFSET : -
POSITION : TH 11 @ 1.20-2.00m

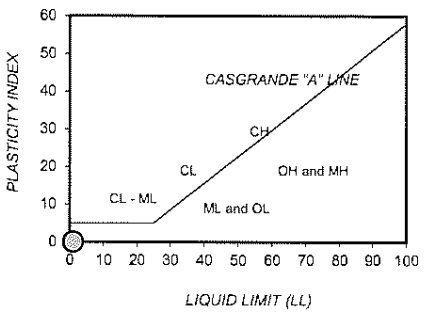
FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

S/No. & Description		X135406 Clayey Sand
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	98
	4.75	83
	2.000	77
	0.425	73
	0.075	17
	0.060	10
	0.006	0
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	5.0
	Coarse Fine Sand	21.0
	Medium Fine Sand	35.0
	Fine Fine Sand	18.0
	Passing 0.075	22.0
Oversize Index		0.0
Shrinkage Product		0.0
Grading Coefficient		19.1
Grading modulus		1.33
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	NP
	Linear Shrinkage	0.0

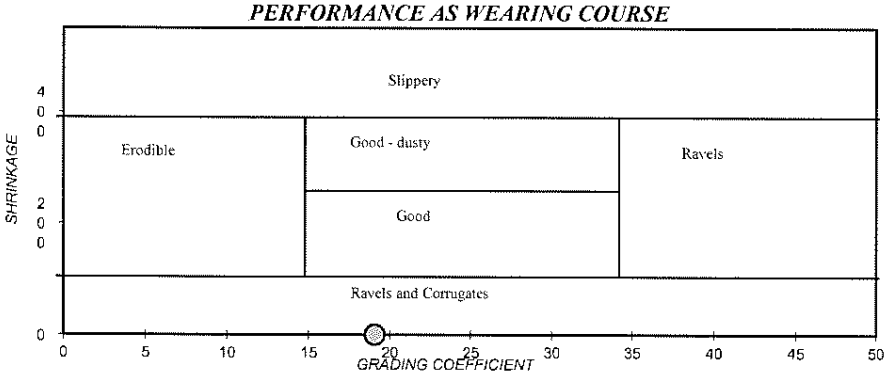
POTENTIAL EXPANSION



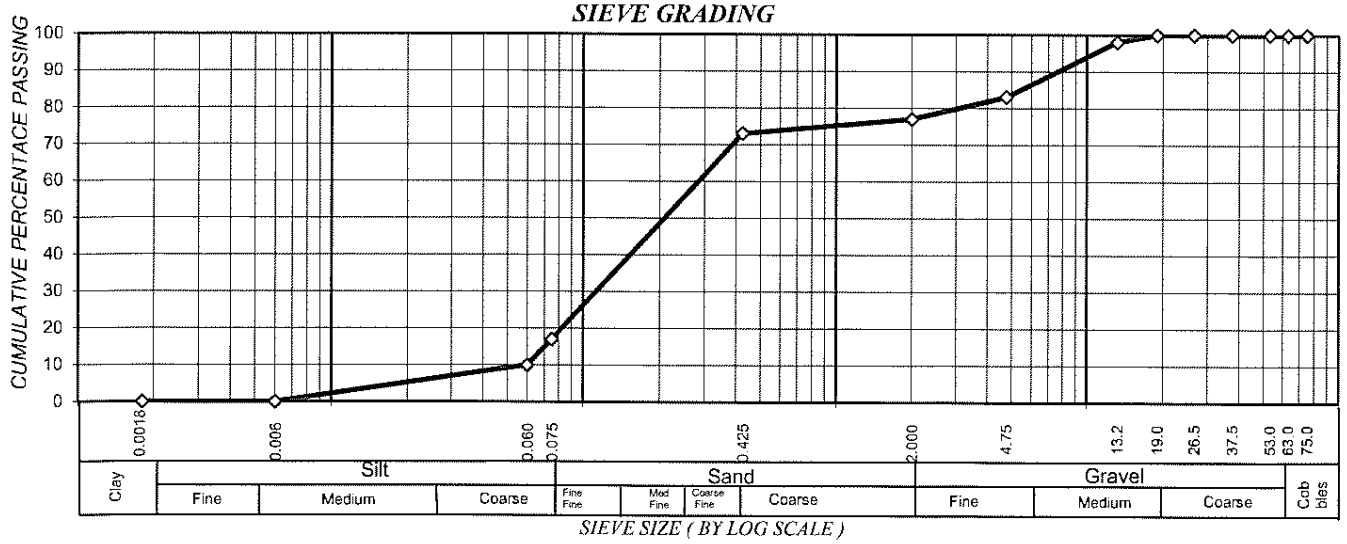
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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Position: Laboratory Manager

Revision 2
04.08.2010
Labco SF 296

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CLIENT : SRK Consulting
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Port Elizabeth
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ATT : Mr. B. Cock

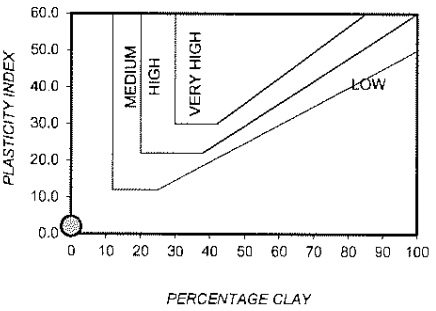
PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012 PKG
CO-ORDINATES : -
OFFSET : -
POSITION : TH 12 @ 0.80m

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

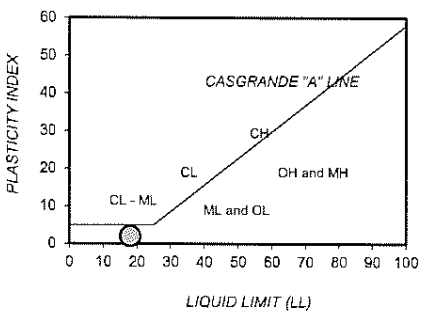
S/No. & Description		X135407
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	40
	0.060	26
	0.006	0
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	17.0
	Medium Fine Sand	25.0
	Fine Fine Sand	18.0
	Passing 0.075	40.0
Oversize Index		0.0
Shrinkage Product		100.0
Grading Coefficient		0.0
Grading modulus		0.60
Atter-berg Limits	Liquid Limit	18
	Plasticity Index	2
	Linear Shrinkage	1.0

Silty fine Sand

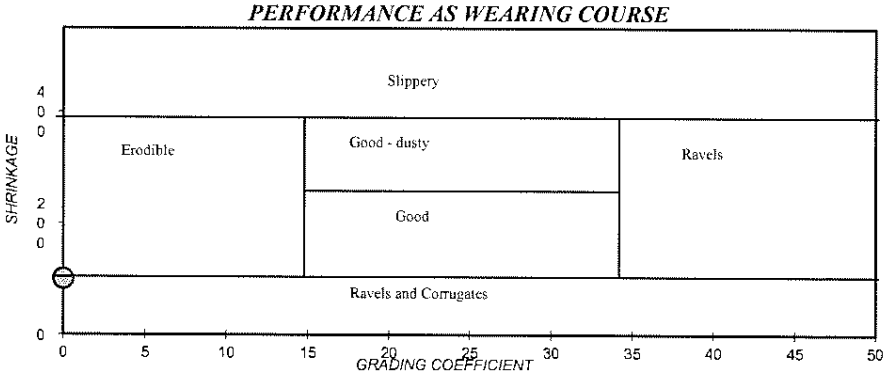
POTENTIAL EXPANSION



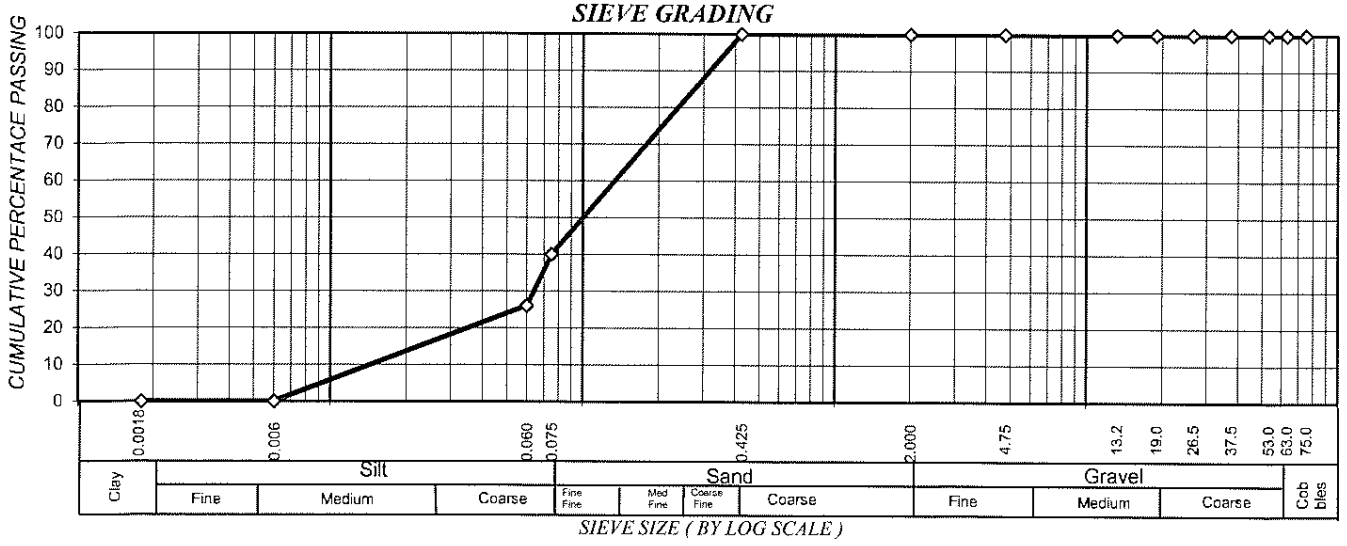
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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CIVIL ENGINEERING MATERIALS TESTING SERVICES (PTY) Ltd

T0227

CLIENT : SRK Consulting
P. O. Box 21842
Port Elizabeth
6000

ATT : Mr. B. Cock

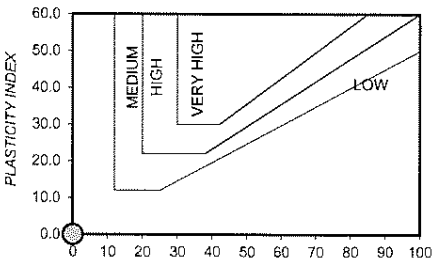
PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012 PKG
CO-ORDINATES : -
OFFSET : -
POSITION : TH 15 @ 1.20m

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

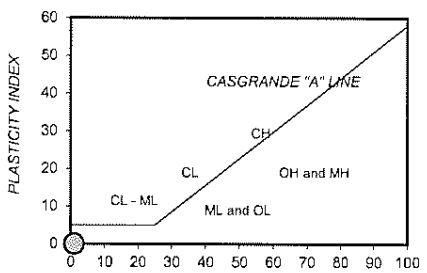
S/No. & Description		X135408
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	22
	0.060	17
	0.006	0
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	25.0
	Medium Fine Sand	30.0
	Fine Fine Sand	24.0
	Passing 0.075	22.0
Oversize Index		0.0
Shrinkage Product		0.0
Grading Coefficient		0.0
Grading modulus		0.78
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	NP
	Linear Shrinkage	0.0

Silty fine Sand

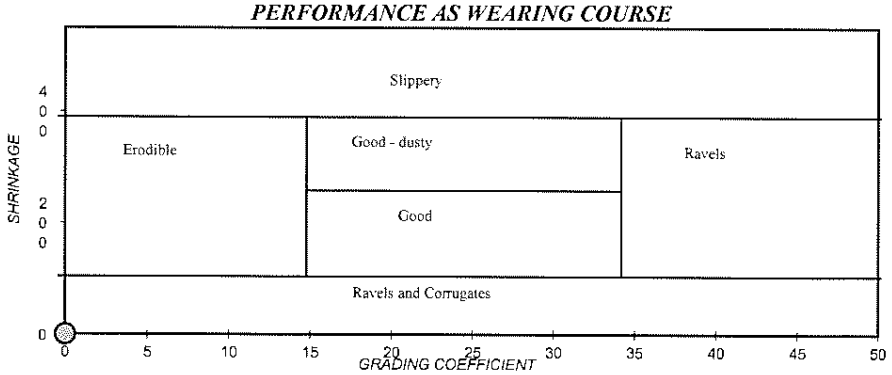
POTENTIAL EXPANSION



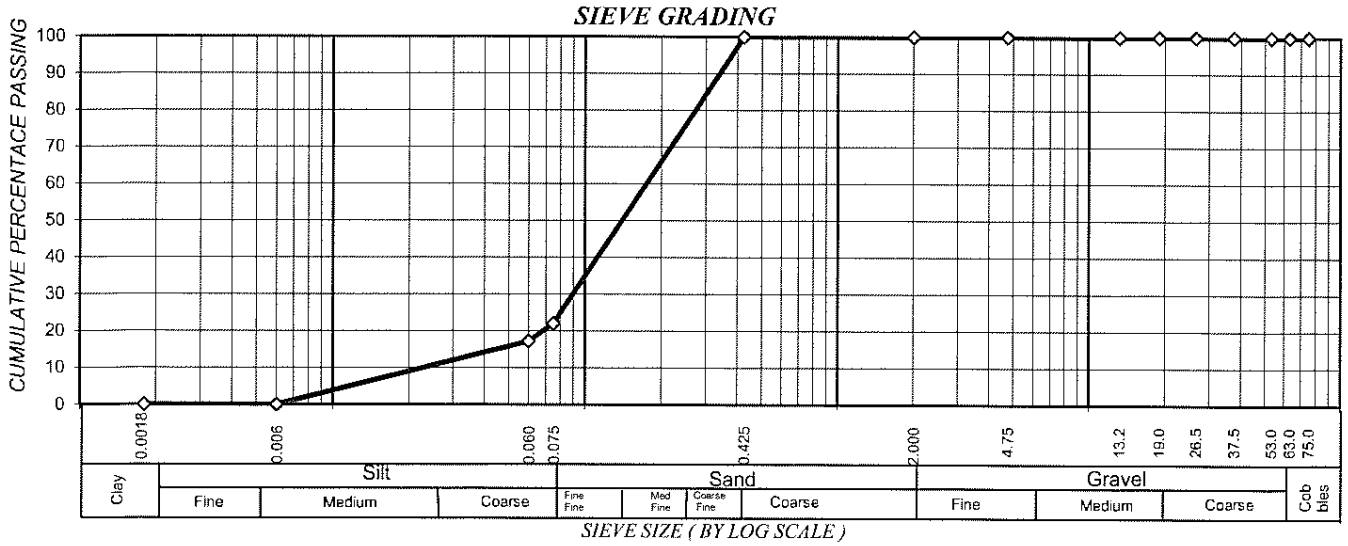
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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sanas Testing Laboratory

CIVIL ENGINEERING MATERIALS TESTING SERVICES (PTY) Ltd

T0227

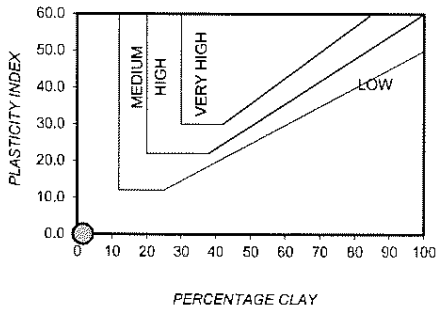
CLIENT : SRK Consulting	**PROJECT :** Ekuphumleni 500 Subsidy Housing (445340)
P. O. Box 21842	**JOB CARD No :** C14153 / P4490
Port Elizabeth	**SUBMISSION DATE :** 17.02.2012
6000	**DATE TESTED :** 24.02.2012
	REPORT DATE : 24.02.2012 PKG
	CO-ORDINATES : -
	OFFSET : -
ATT : Mr. B. Cock	**POSITION :** TH 16 @ 1.20-1.85m

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

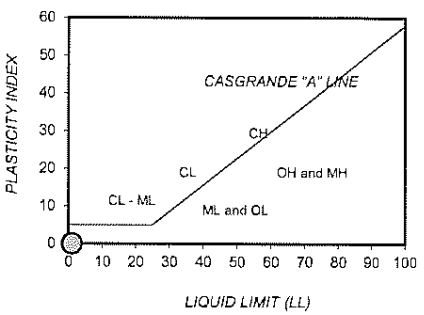
S/No. & Description		X135409
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	90
	2.000	83
	0.425	77
	0.075	13
	0.060	11
	0.006	2
	0.0018	2
Soil Mortar Analysis % < 2.00mm	Coarse Sand	7.0
	Coarse Fine Sand	42.0
	Medium Fine Sand	26.0
	Fine Fine Sand	9.0
	Passing 0.075	16.0
Oversize Index		0.0
Shrinkage Product		0.0
Grading Coefficient		15.3
Grading modulus		1.27
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	NP
	Linear Shrinkage	0.0

Clayey Sand

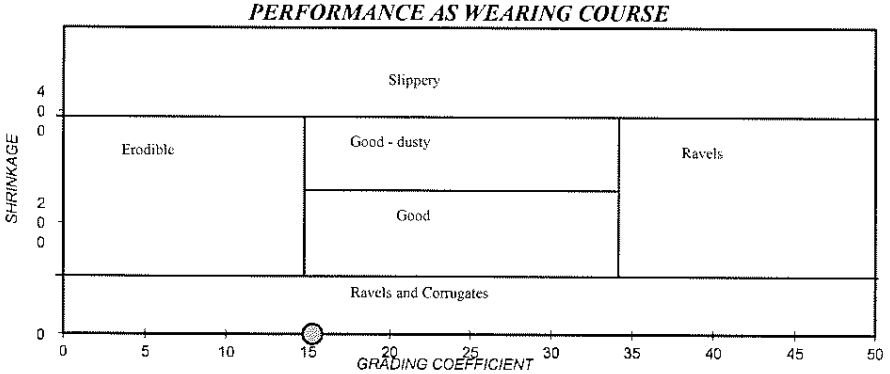
POTENTIAL EXPANSION



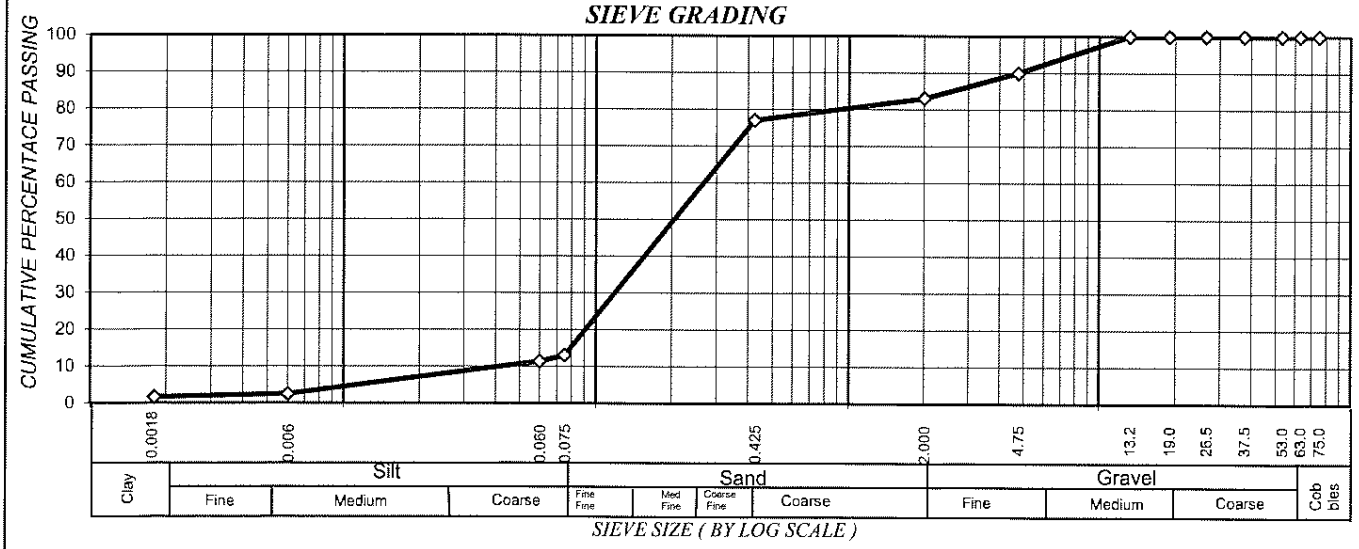
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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T0227

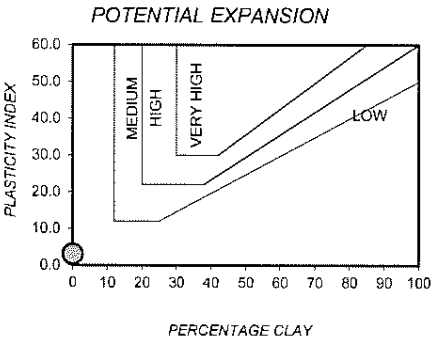
CLIENT : SRK Consulting
P. O. Box 21842
Port Elizabeth
6000

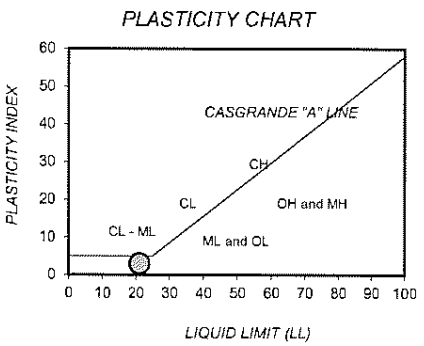
ATT : Mr. B. Cock

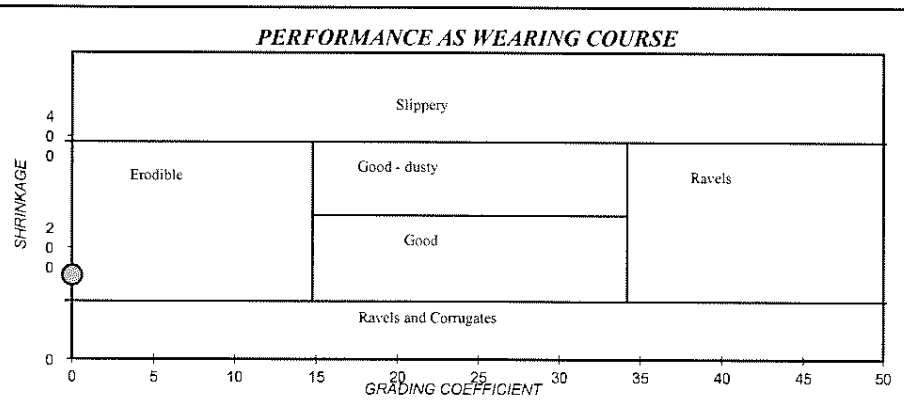
PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012
CO-ORDINATES : -
OFFSET : -
POSITION : TH 17 @ 0.90m

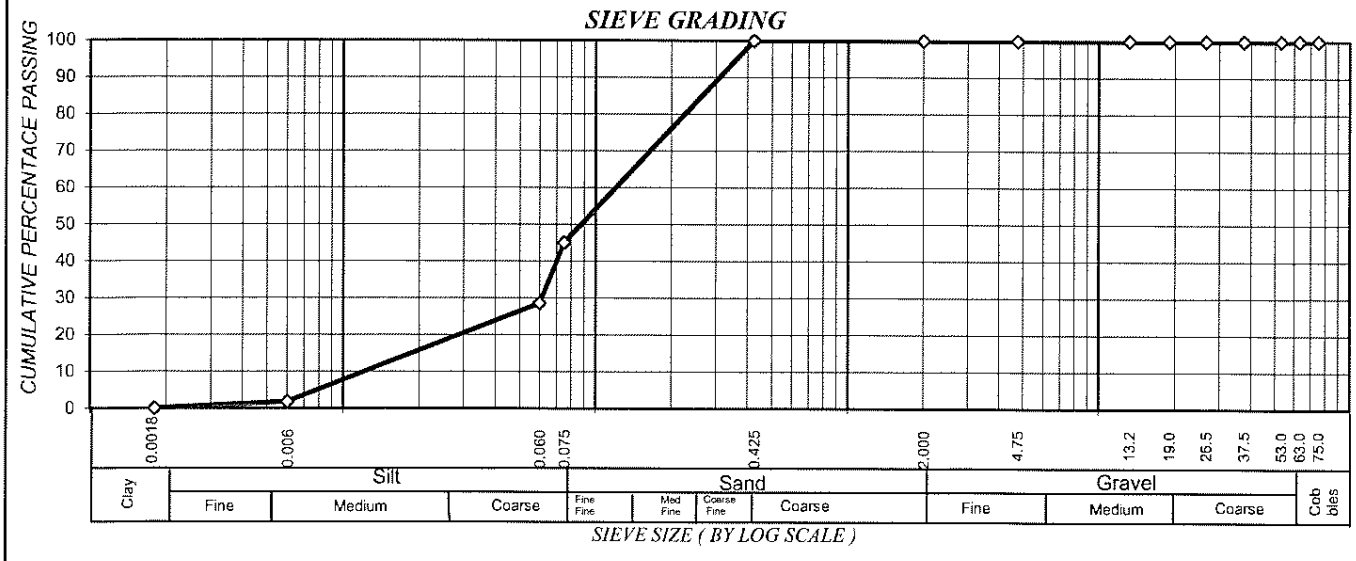
FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

S/No. & Description		X135410 Silty fine Sand
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	45
	0.060	29
	0.006	2
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	10.0
	Medium Fine Sand	26.0
	Fine Fine Sand	20.0
	Passing 0.075	45.0
Oversize Index		0.0
Shrinkage Product		150.0
Grading Coefficient		0.0
Grading modulus		0.55
Atter-berg Limits	Liquid Limit	21
	Plasticity Index	3
	Linear Shrinkage	1.5









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T0227

CLIENT : SRK Consulting
P. O. Box 21842
Port Elizabeth
6000

ATT : Mr. B. Cock

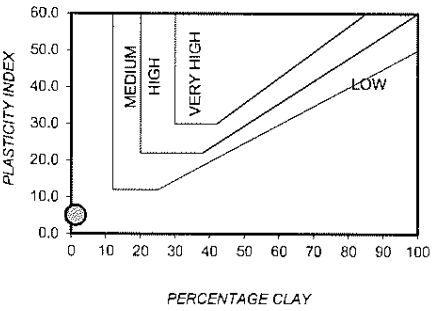
PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012
CO-ORDINATES : -
OFFSET : -
POSITION : TH 19 @ 0.80m

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

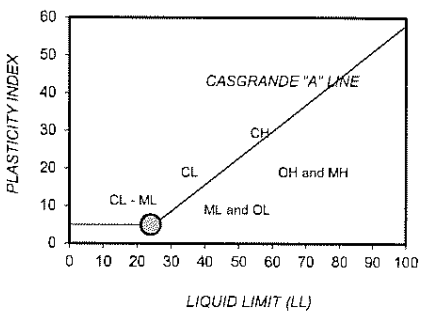
S/No. & Description		X135411
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	33
	0.060	20
	0.006	5
	0.0018	1
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	16.0
	Medium Fine Sand	26.0
	Fine Fine Sand	25.0
	Passing 0.075	33.0
Oversize Index		0.0
Shrinkage Product		250.0
Grading Coefficient		0.0
Grading modulus		0.67
Atter-berg Limits	Liquid Limit	24
	Plasticity Index	5
	Linear Shrinkage	2.5

Silty fine Sand

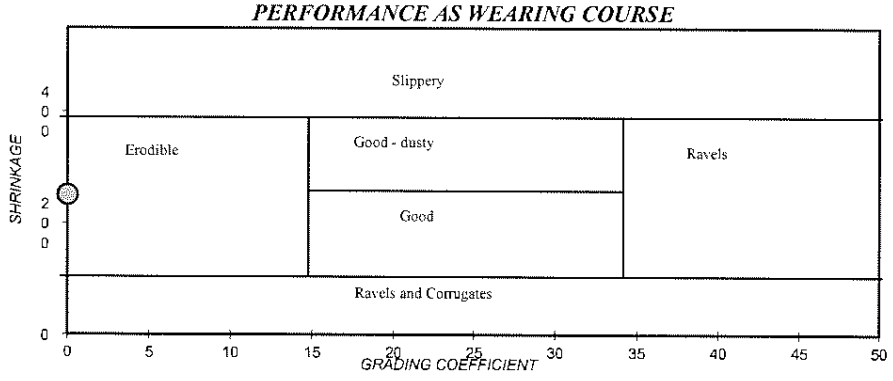
POTENTIAL EXPANSION



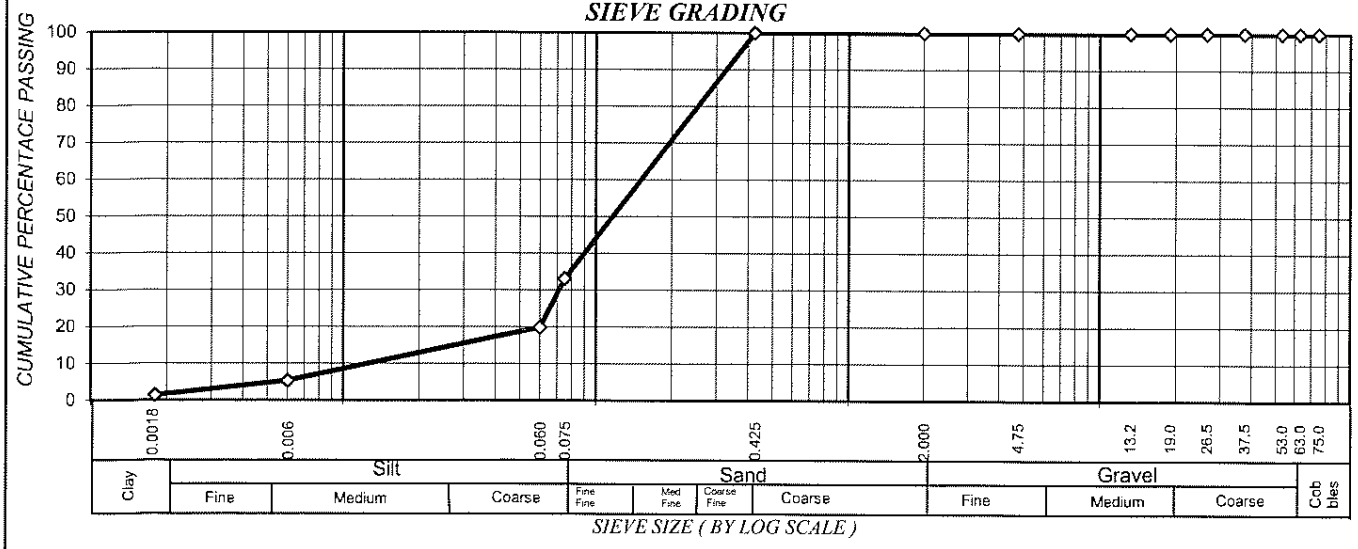
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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ATT : Mr. B. Cock

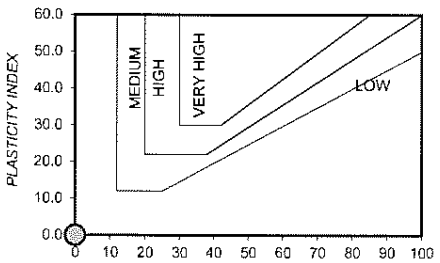
PROJECT : Ekuphumleni 500 Subsidy Housing (445340)
JOB CARD No : C14153 / P4490
SUBMISSION DATE : 17.02.2012
DATE TESTED : 23.02.2012
REPORT DATE : 23.02.2012
CO-ORDINATES : -
OFFSET : -
POSITION : TH 24 @ 1.00m

FOUNDATION INDICATOR (TMH 1 :1979 methods A1, A2, A3, A4, A5 & A6*)

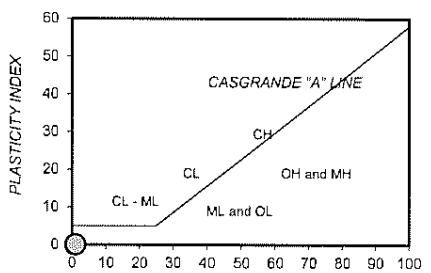
S/No. & Description		X135412
Sieve analysis Cumulative percentage passing (mm)	75.0	100
	63.0	100
	53.0	100
	37.5	100
	26.5	100
	19.0	100
	13.2	100
	4.75	100
	2.000	100
	0.425	100
	0.075	37
	0.060	26
	0.006	7
	0.0018	0
Soil Mortar Analysis % < 2.00mm	Coarse Sand	0.0
	Coarse Fine Sand	14.0
	Medium Fine Sand	37.0
	Fine Fine Sand	13.0
	Passing 0.075	37.0
Oversize Index		0.0
Shrinkage Product		50.0
Grading Coefficient		0.0
Grading modulus		0.63
Atter-berg Limits	Liquid Limit	-
	Plasticity Index	SP
	Linear Shrinkage	0.5

Silty fine Sand

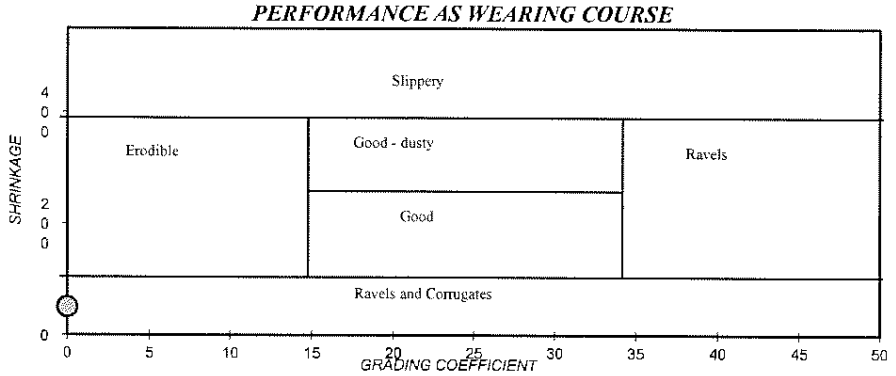
POTENTIAL EXPANSION



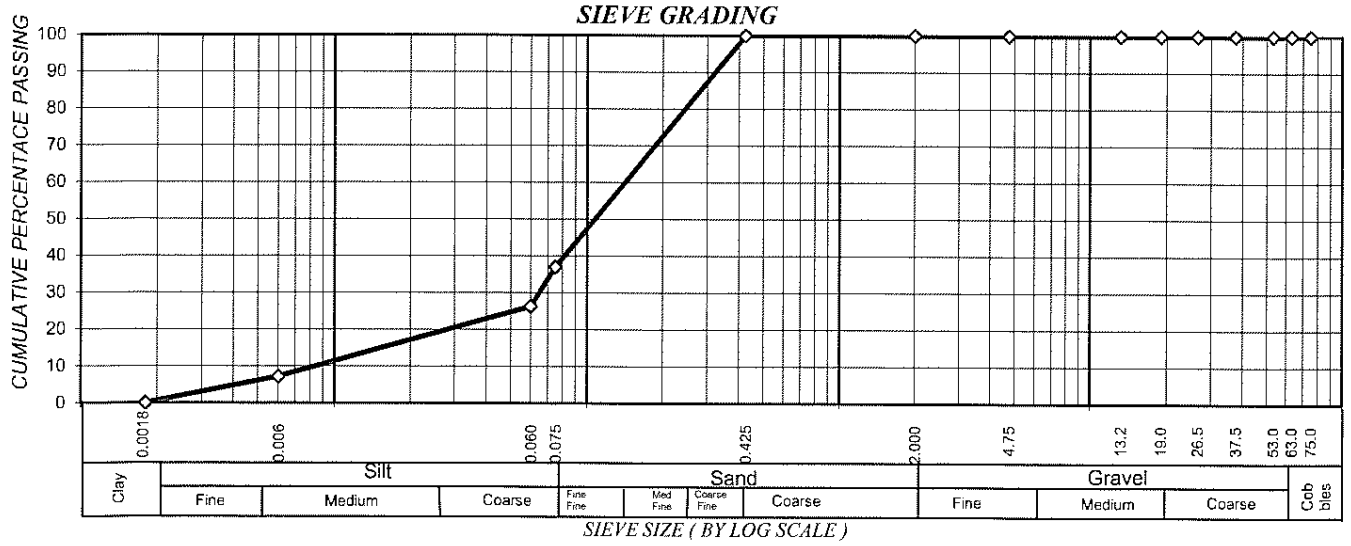
PLASTICITY CHART



PERFORMANCE AS WEARING COURSE



SIEVE GRADING



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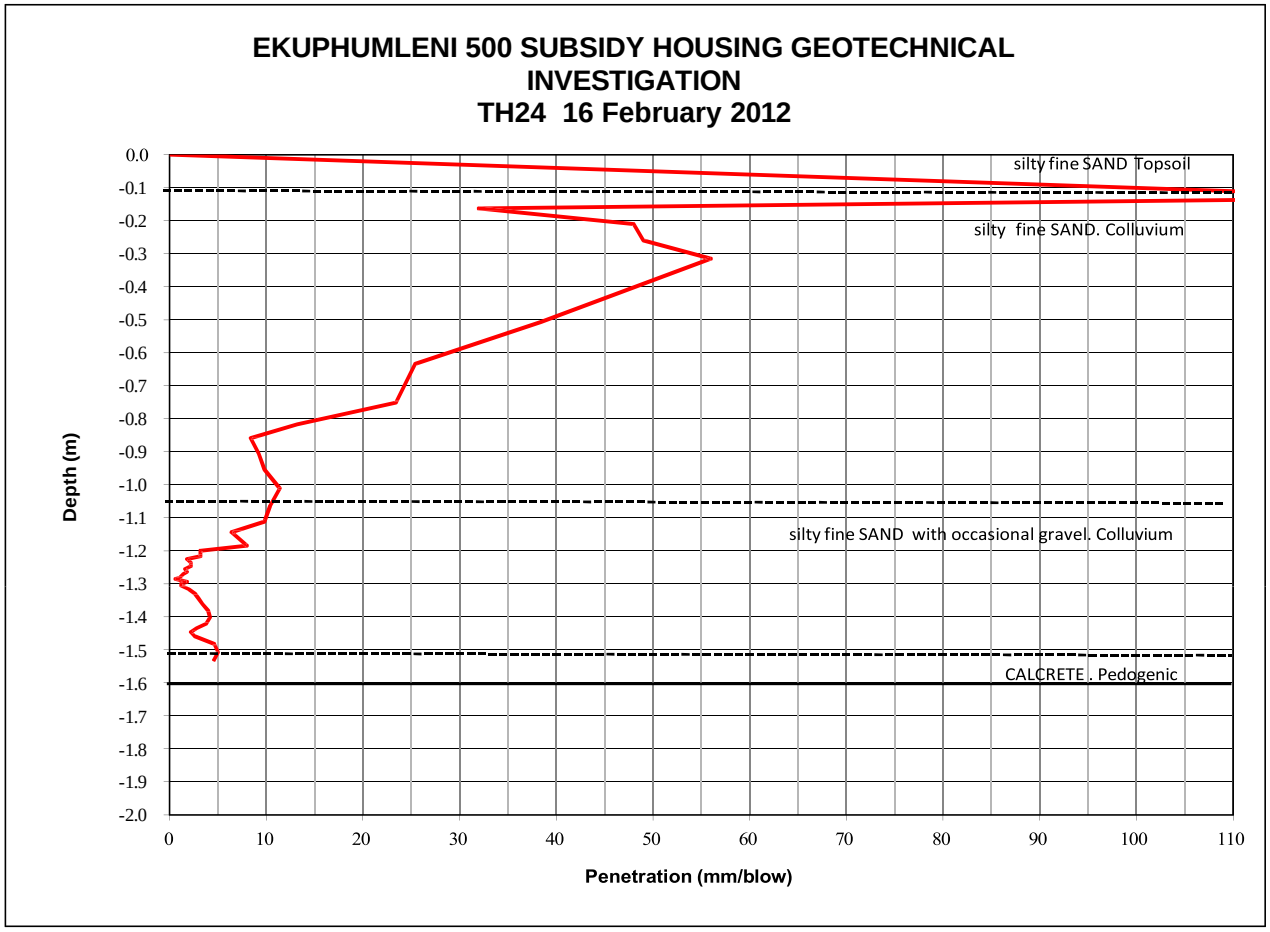
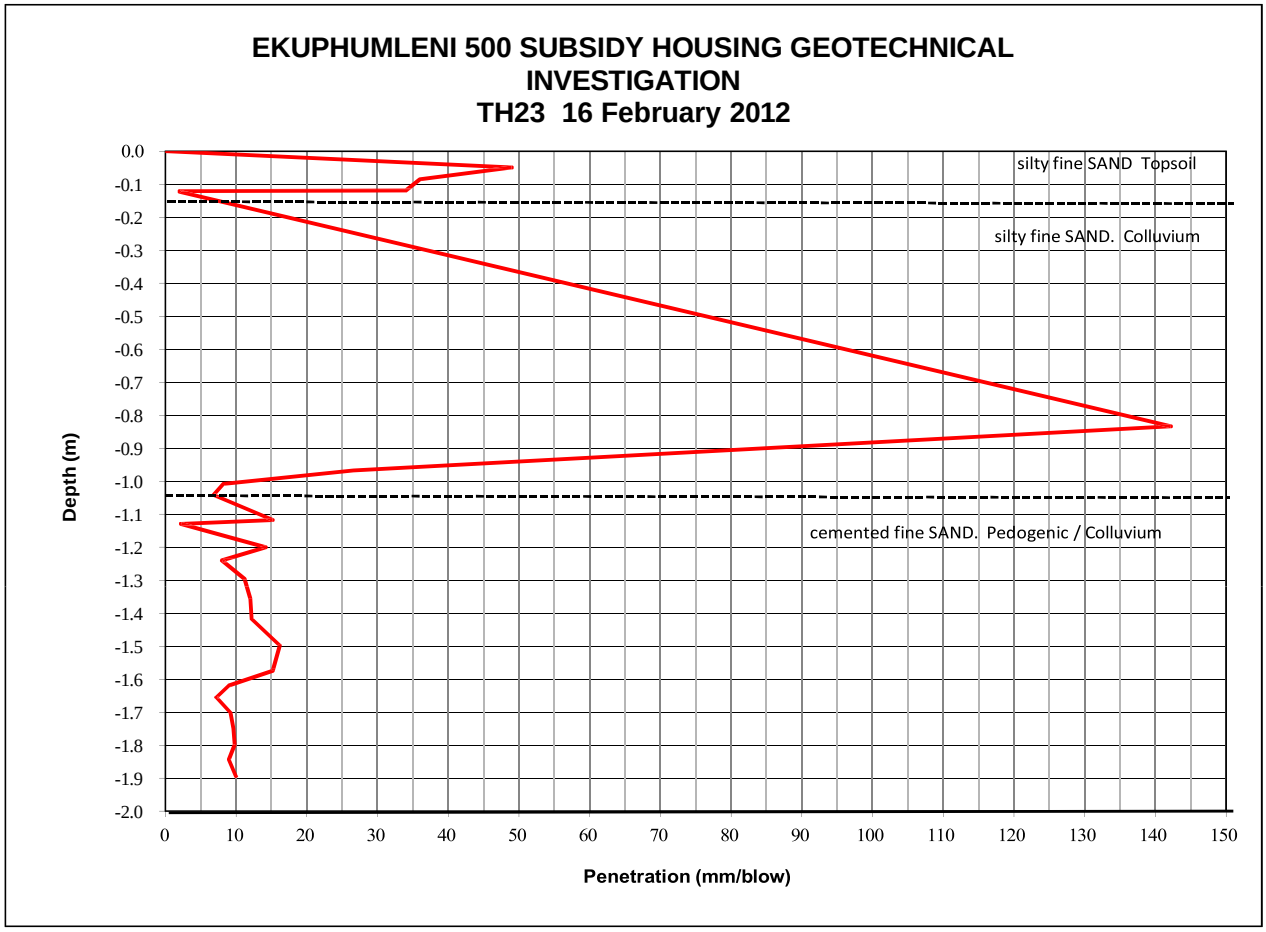
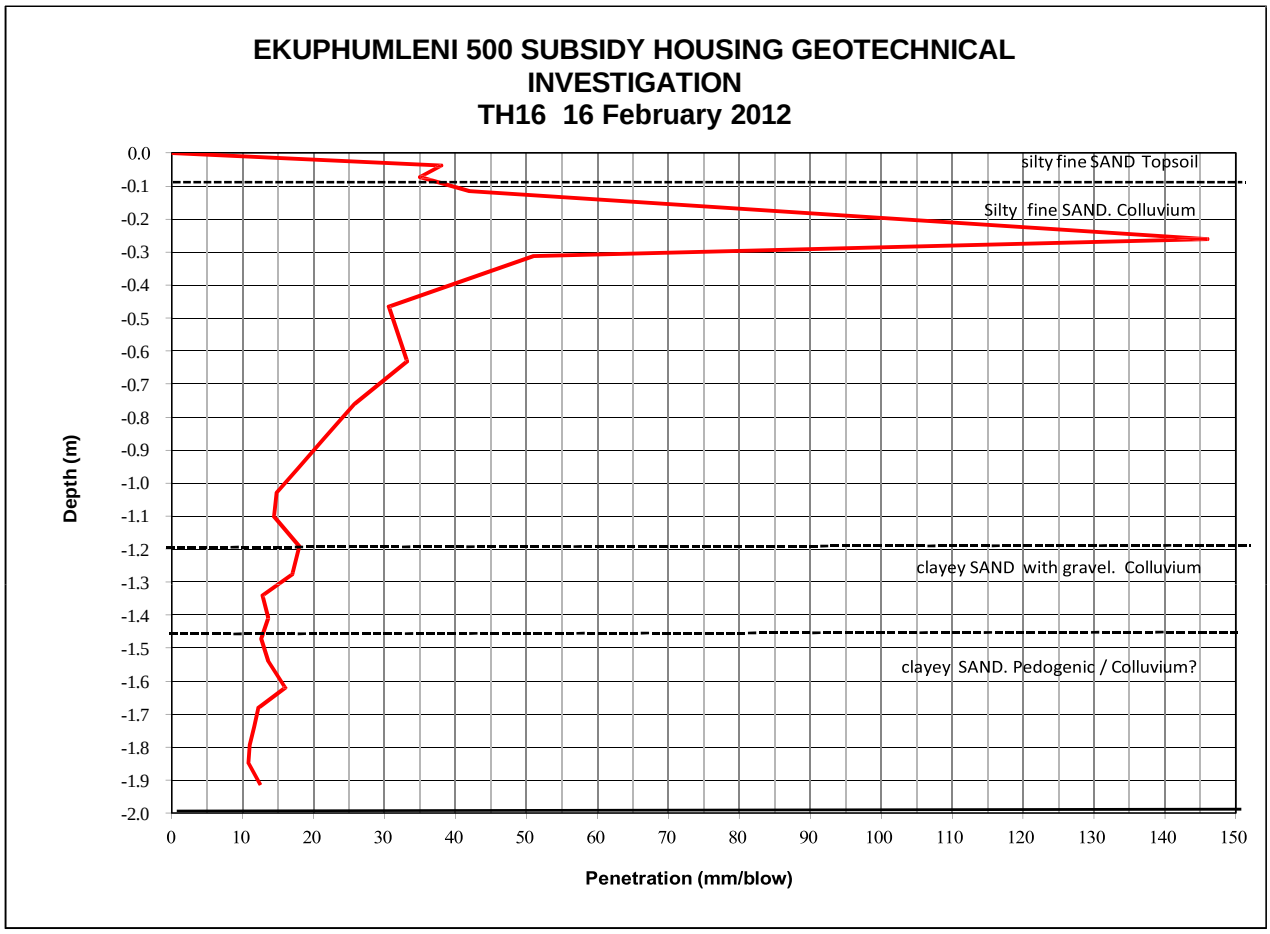
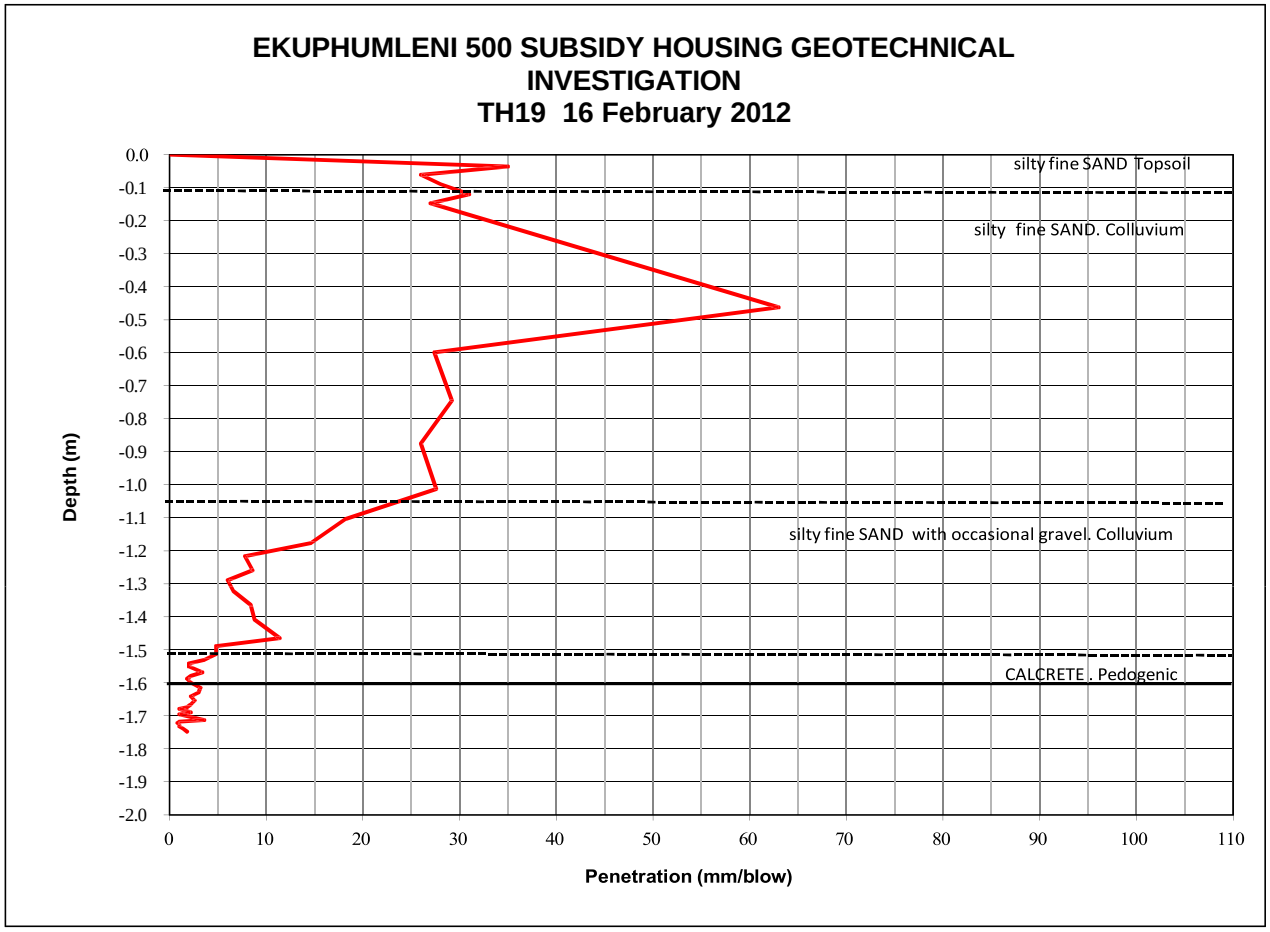
Position: Laboratory Manager

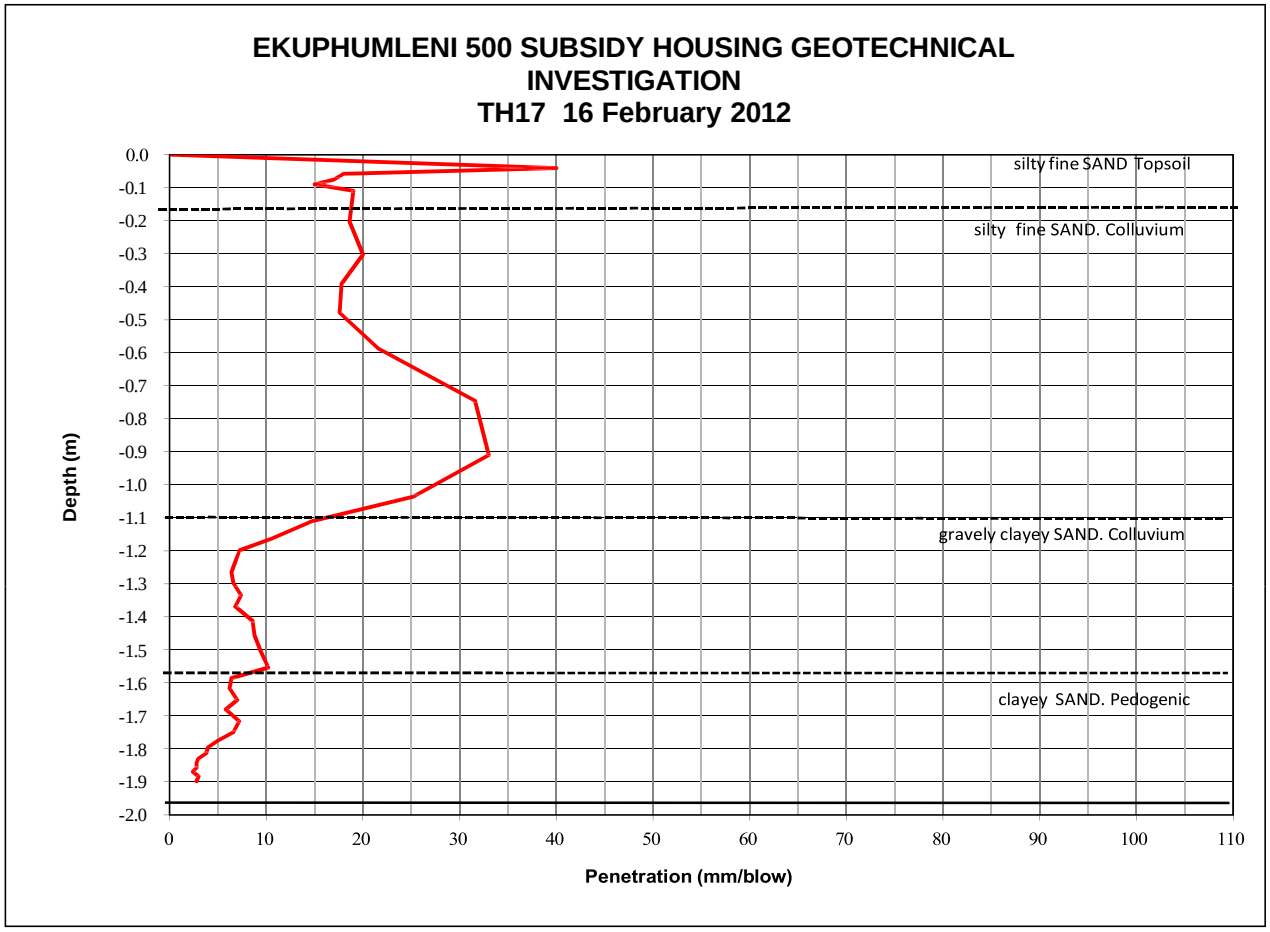
Appendix C: DPL Graphs

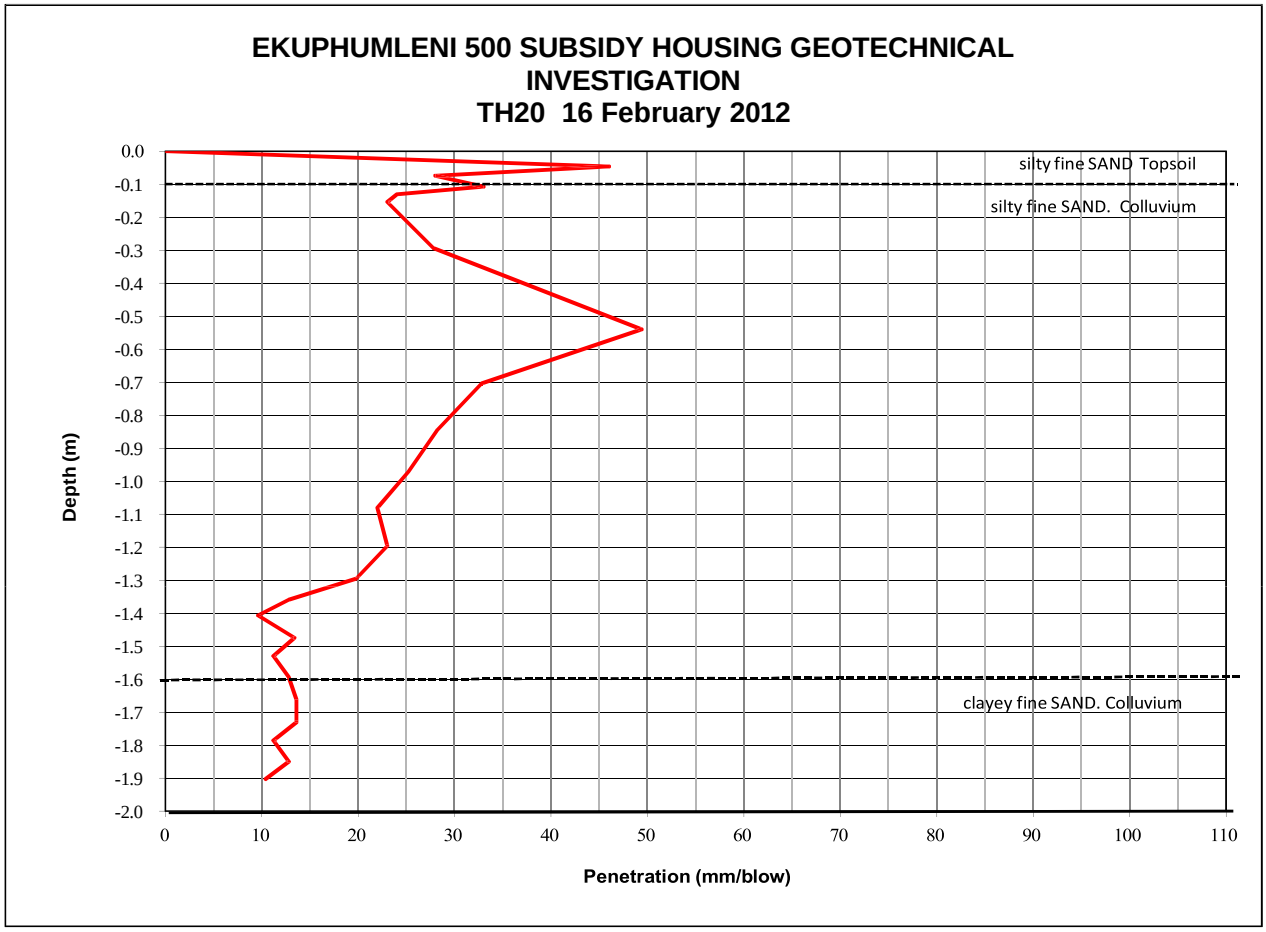

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH24 16 February 2012
silty fine SAND Topsoil
silty fine SAND. Colluvium
silty fine SAND with occasional gravel. Colluvium
CALCRETE . Pedogenic
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

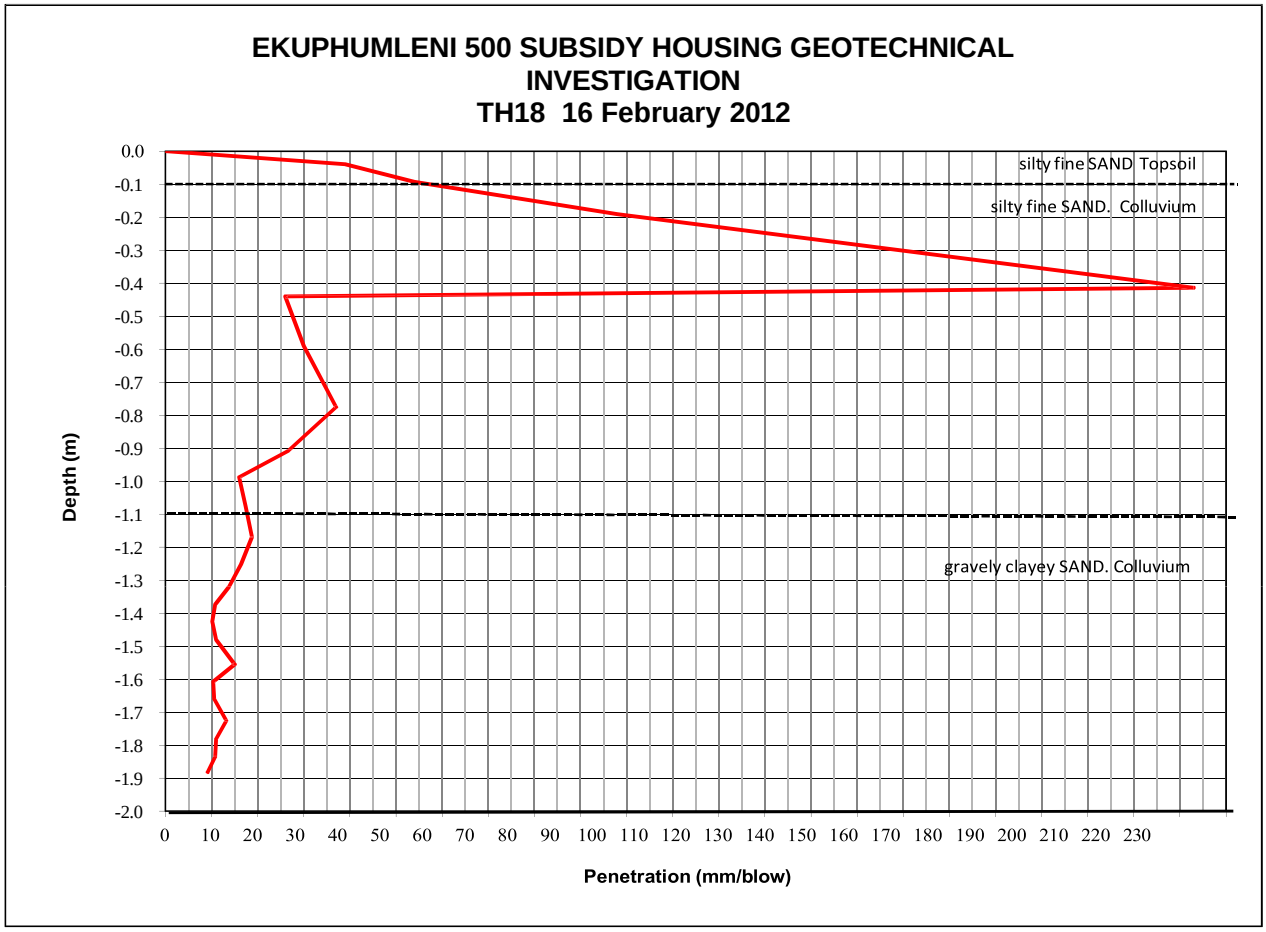

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH23 16 February 2012
silty fine SAND Topsoil
silty fine SAND. Colluvium
cemented fine SAND. Pedogenic / Colluvium
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Penetration (mm/blow)

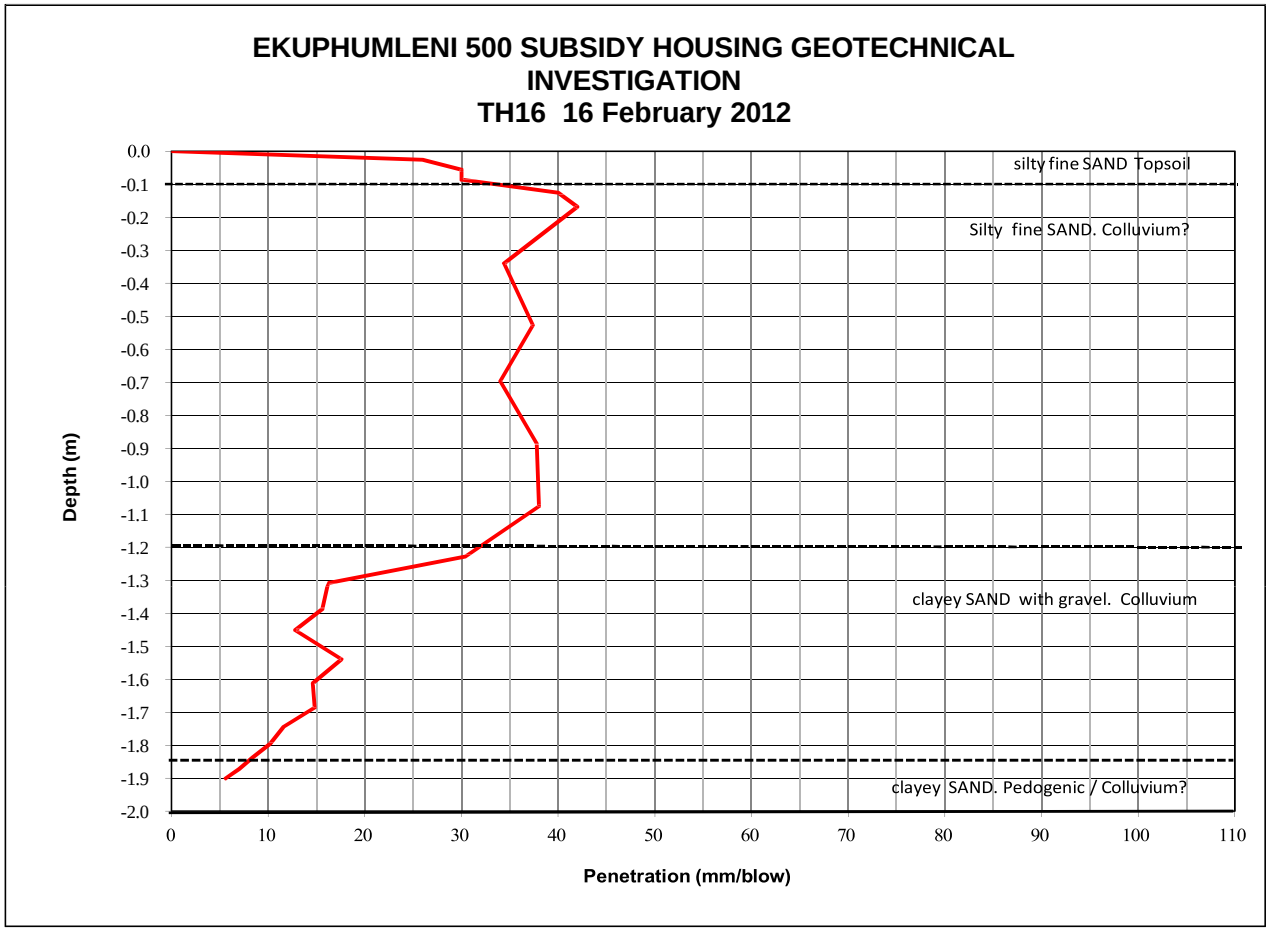

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH16 16 February 2012
silty fine SAND Topsoil
Silty fine SAND. Colluvium
clayey SAND with gravel. Colluvium
clayey SAND. Pedogenic / Colluvium?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Penetration (mm/blow)

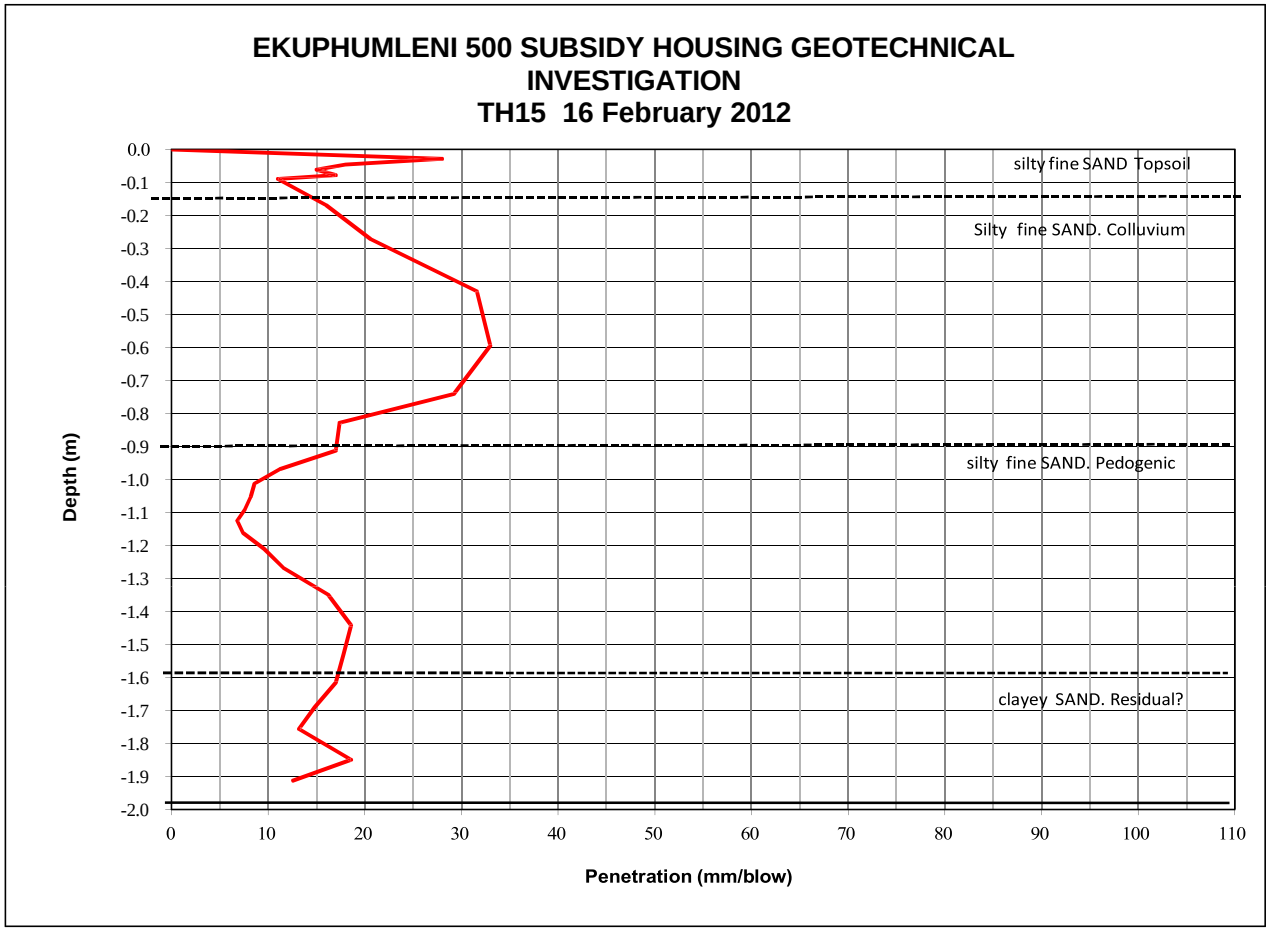

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH19 16 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)
silty fine SAND Topsoil
silty fine SAND. Colluvium
silty fine SAND with occasional gravel. Colluvium
CALCRETE . Pedogenic

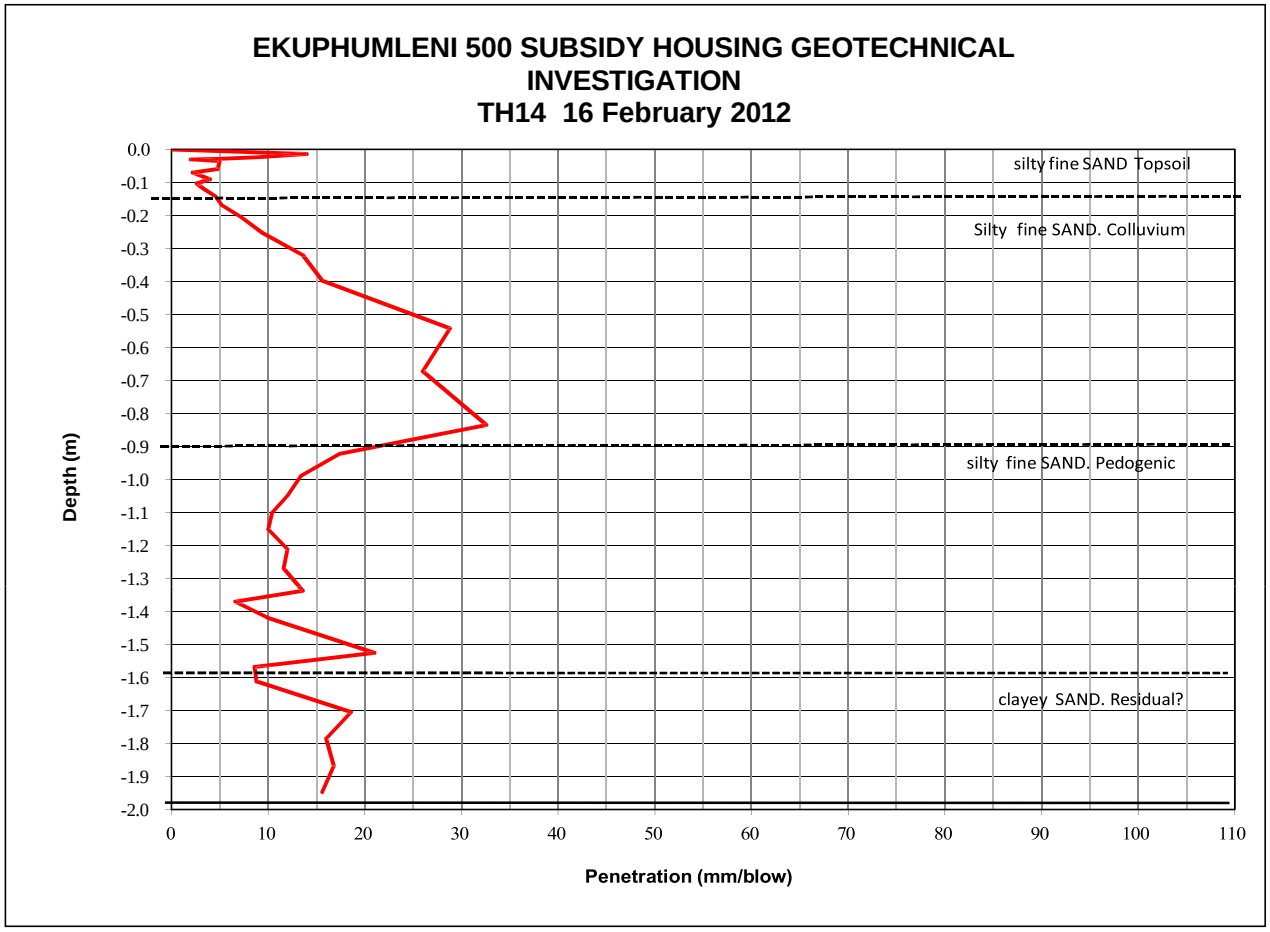

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH17 16 February 2012
silty fine SAND Topsoil
silty fine SAND. Colluvium
gravely clayey SAND. Colluvium
clayey SAND. Pedogenic
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

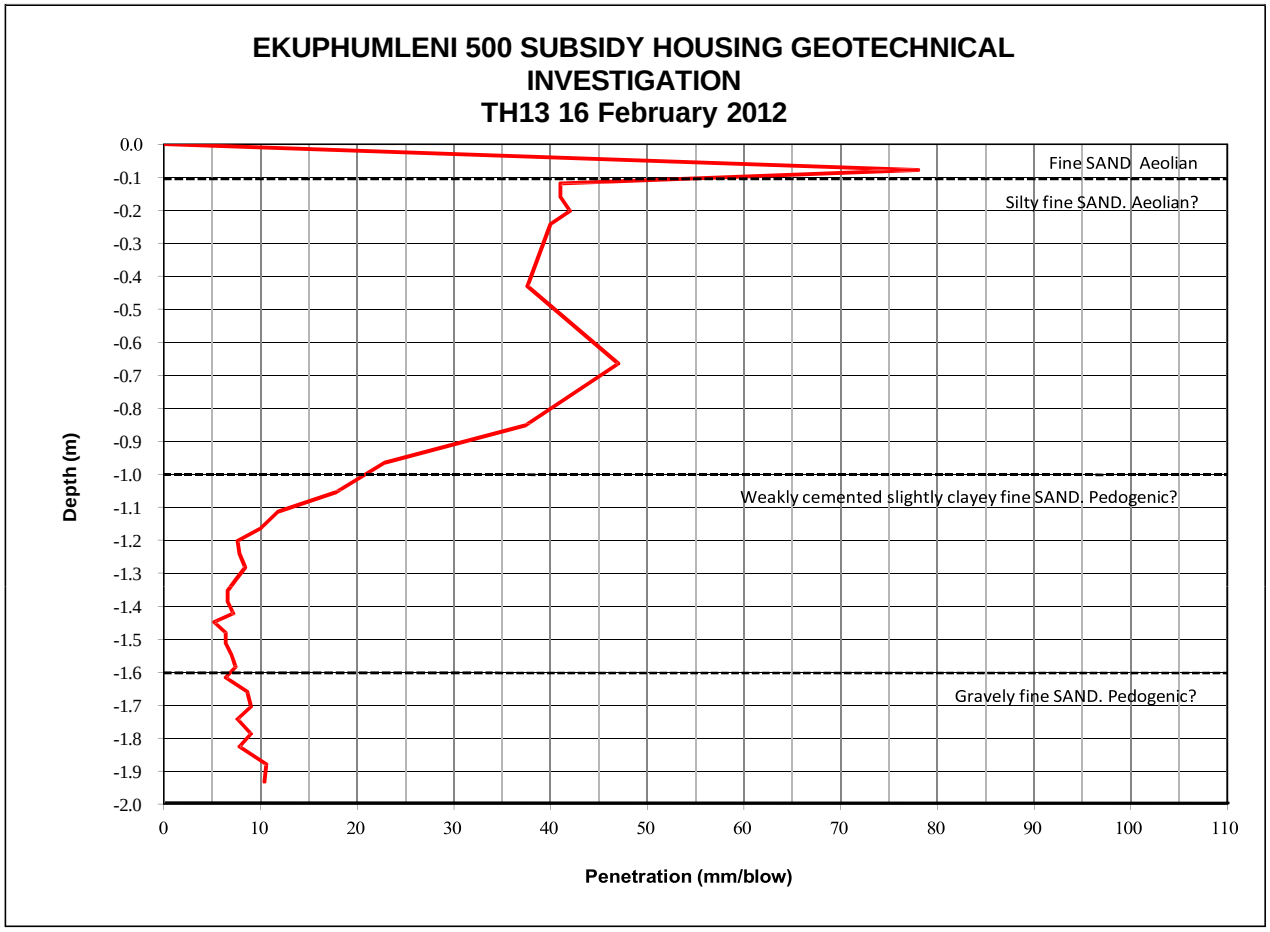

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH20 16 February 2012
silty fine SAND Topsoil
silty fine SAND. Colluvium
clayey fine SAND. Colluvium
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

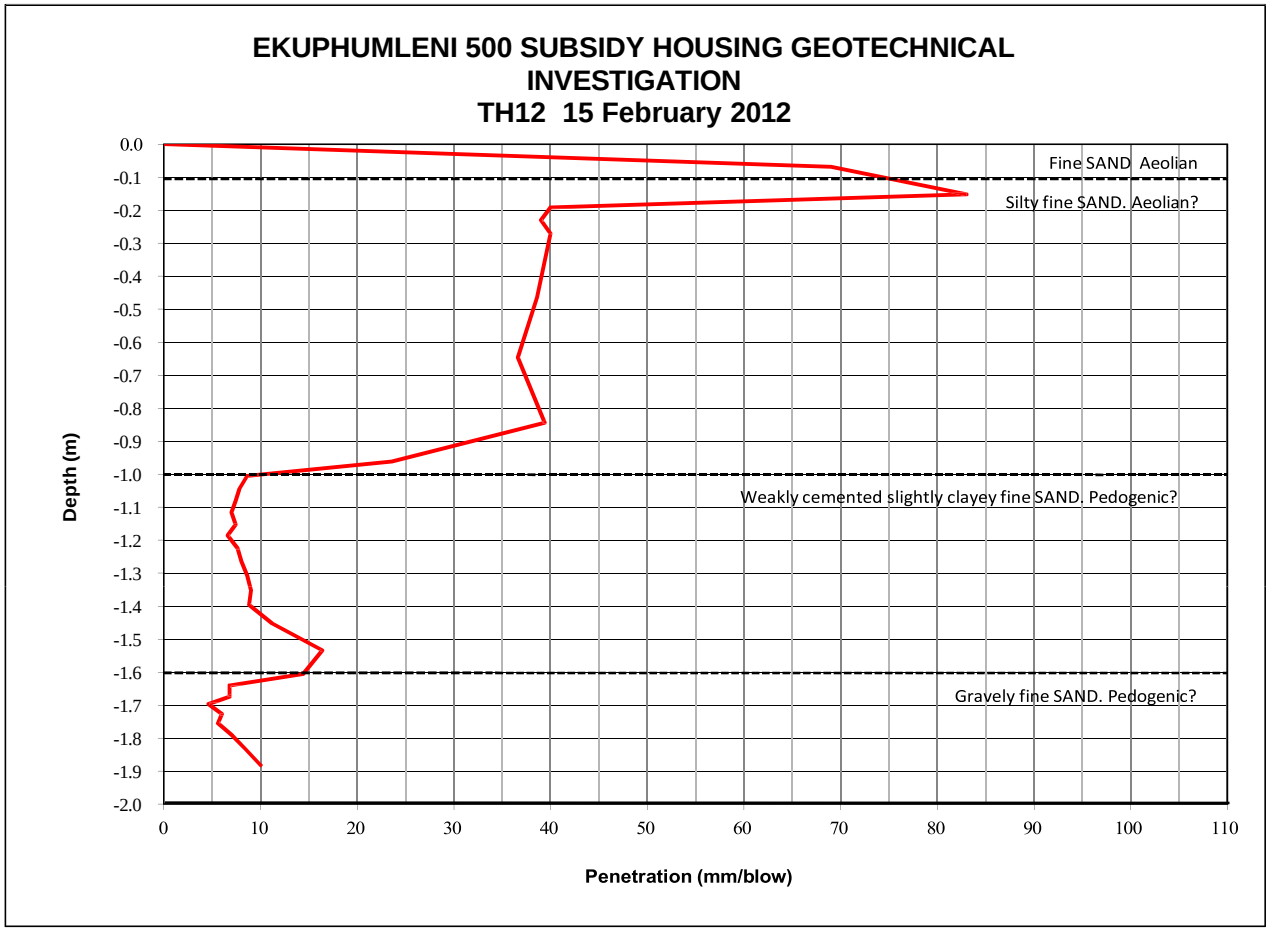

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH18 16 February 2012
silty fine SAND Topsoil
silty fine SAND. Colluvium
gravely clayey SAND. Colluvium
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230
Penetration (mm/blow)

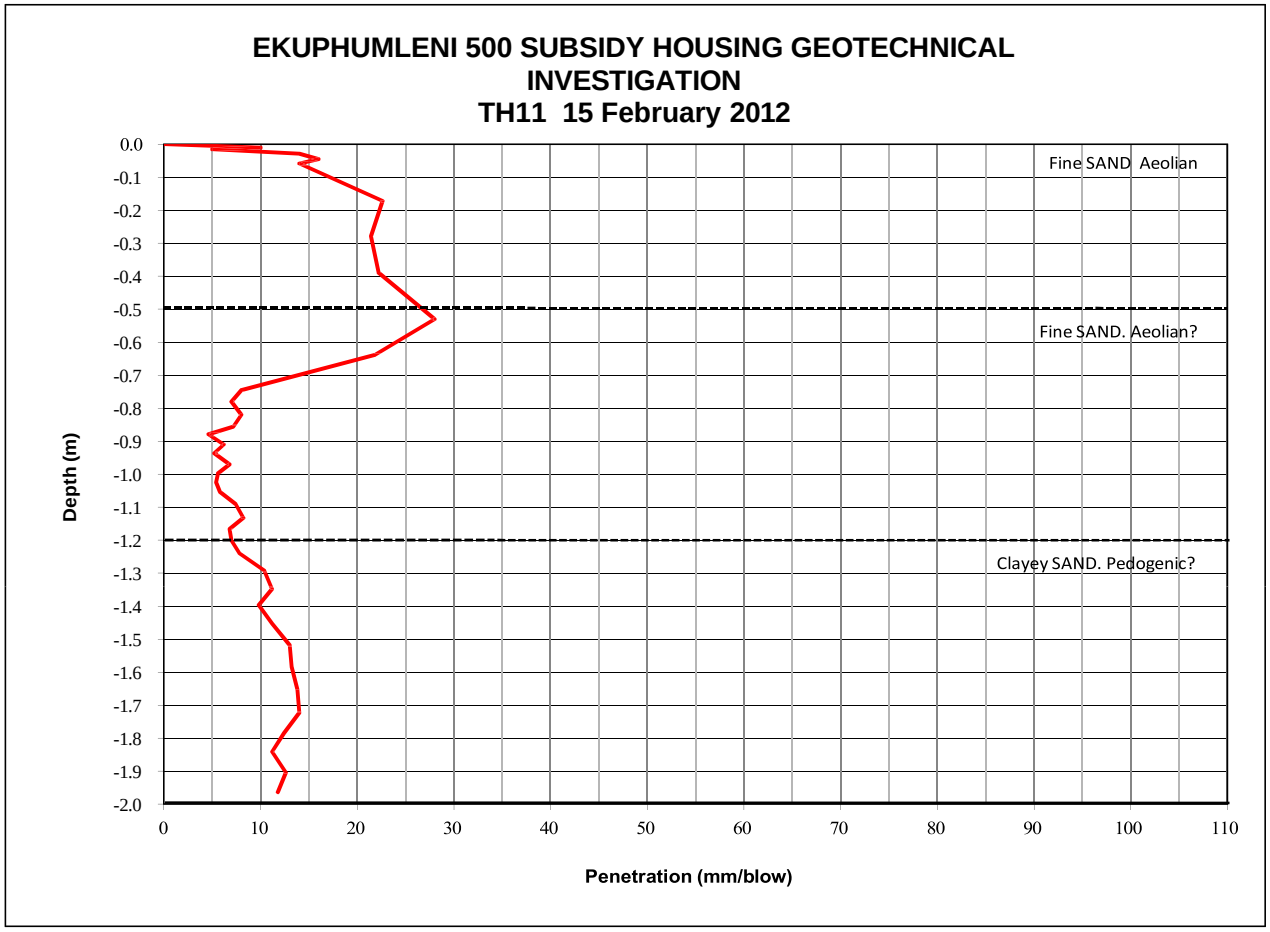

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH16 16 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)
silty fine SAND Topsoil
Silty fine SAND. Colluvium?
clayey SAND with gravel. Colluvium
clayey SAND. Pedogenic / Colluvium?

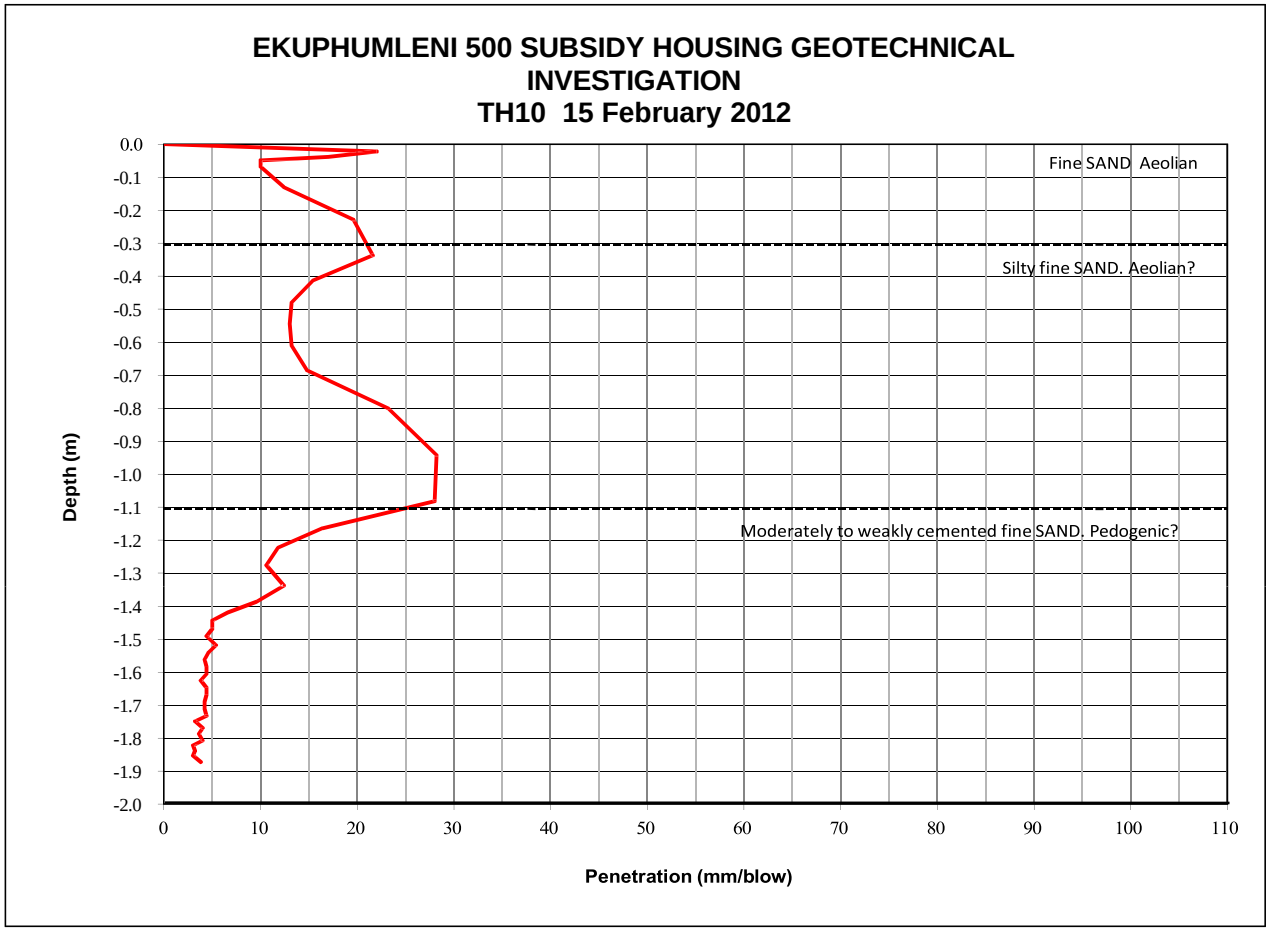

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH15 16 February 2012
silty fine SAND Topsoil
Silty fine SAND. Colluvium
silty fine SAND. Pedogenic
clayey SAND. Residual?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

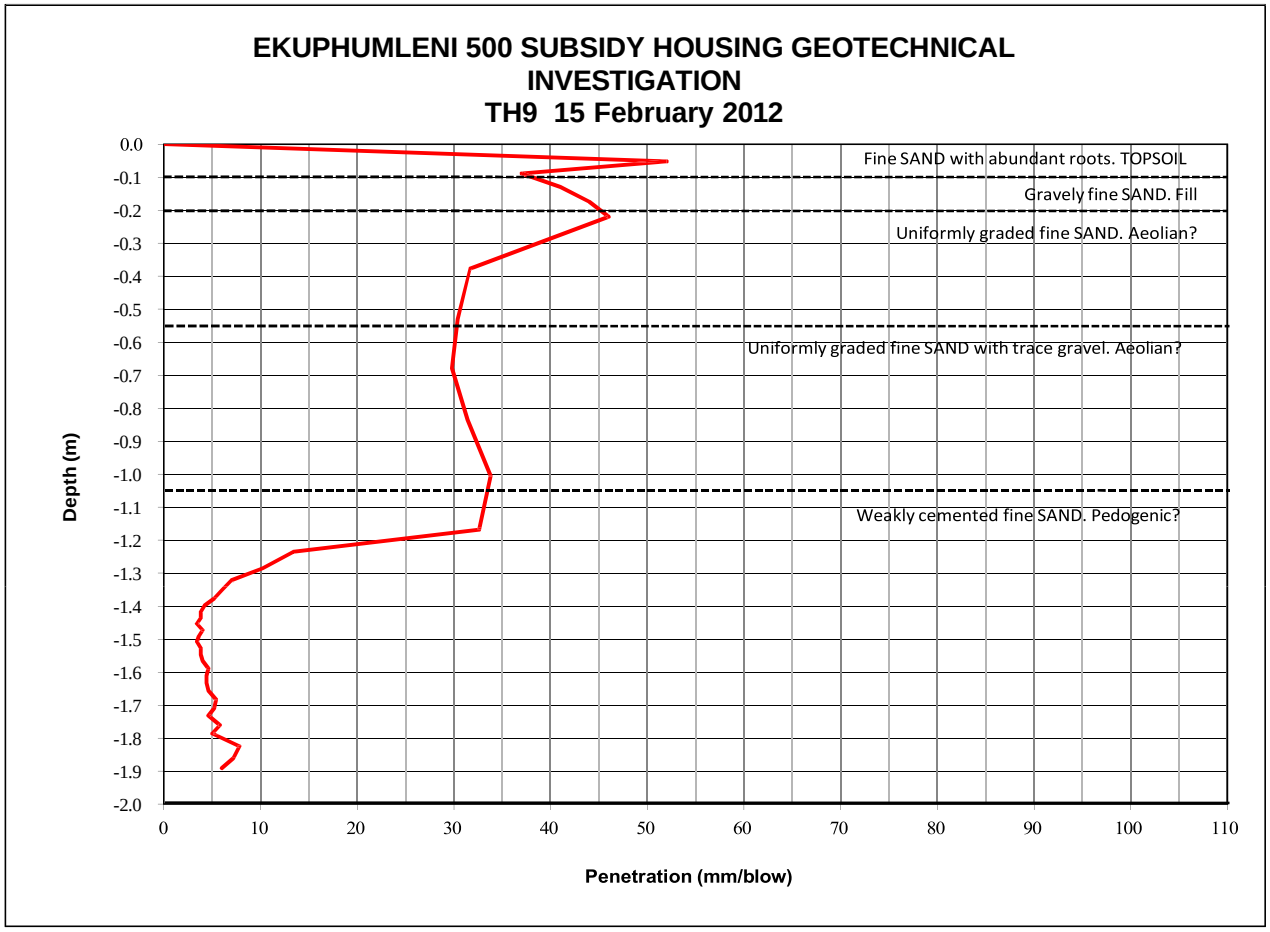

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH14 16 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)
silty fine SAND Topsoil
Silty fine SAND. Colluvium
silty fine SAND. Pedogenic
clayey SAND. Residual?

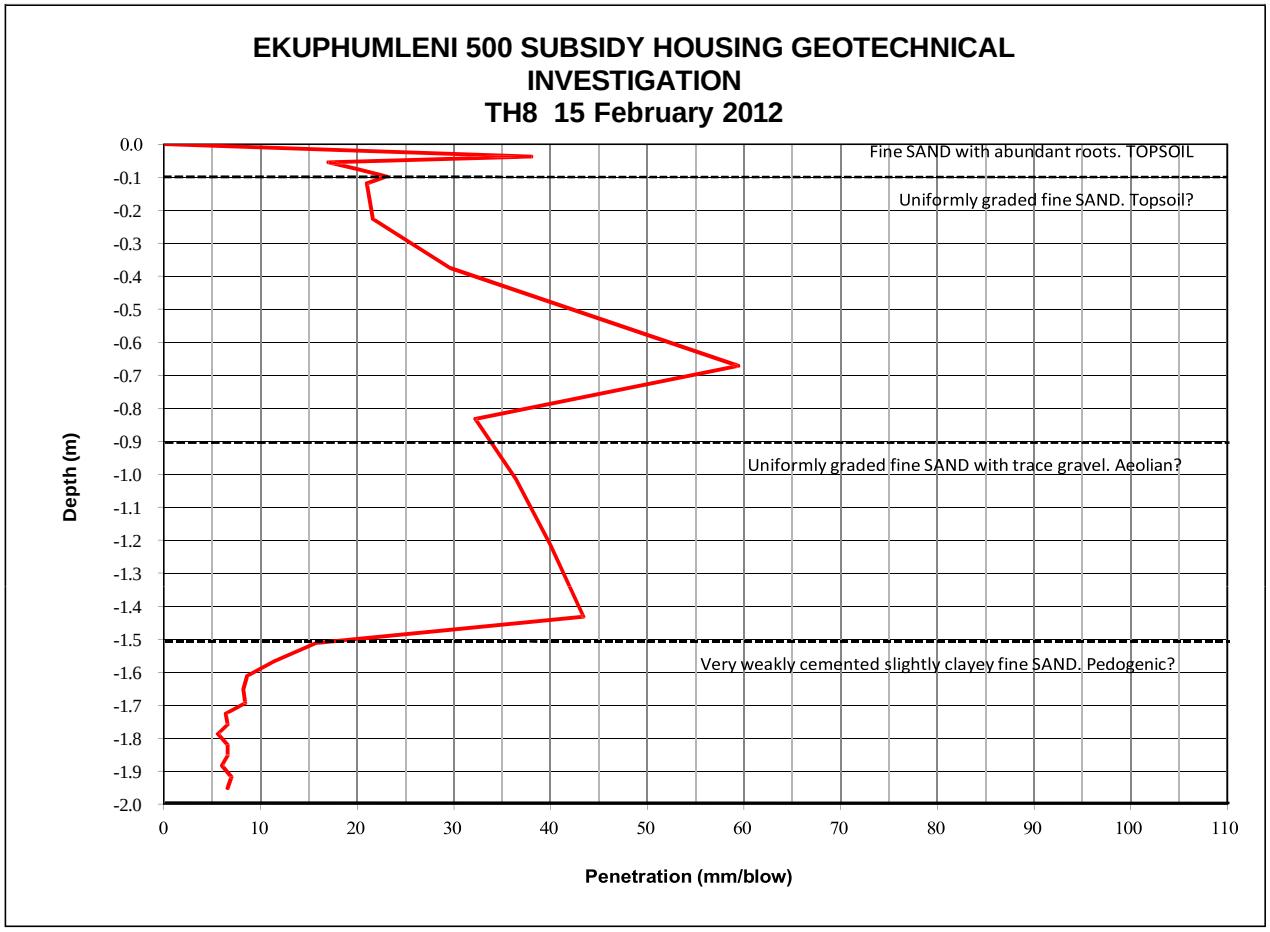

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH13 16 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)
Fine SAND Aeolian
Silty fine SAND. Aeolian?
Weakly cemented slightly clayey fine SAND. Pedogenic?
Gravely fine SAND. Pedogenic?

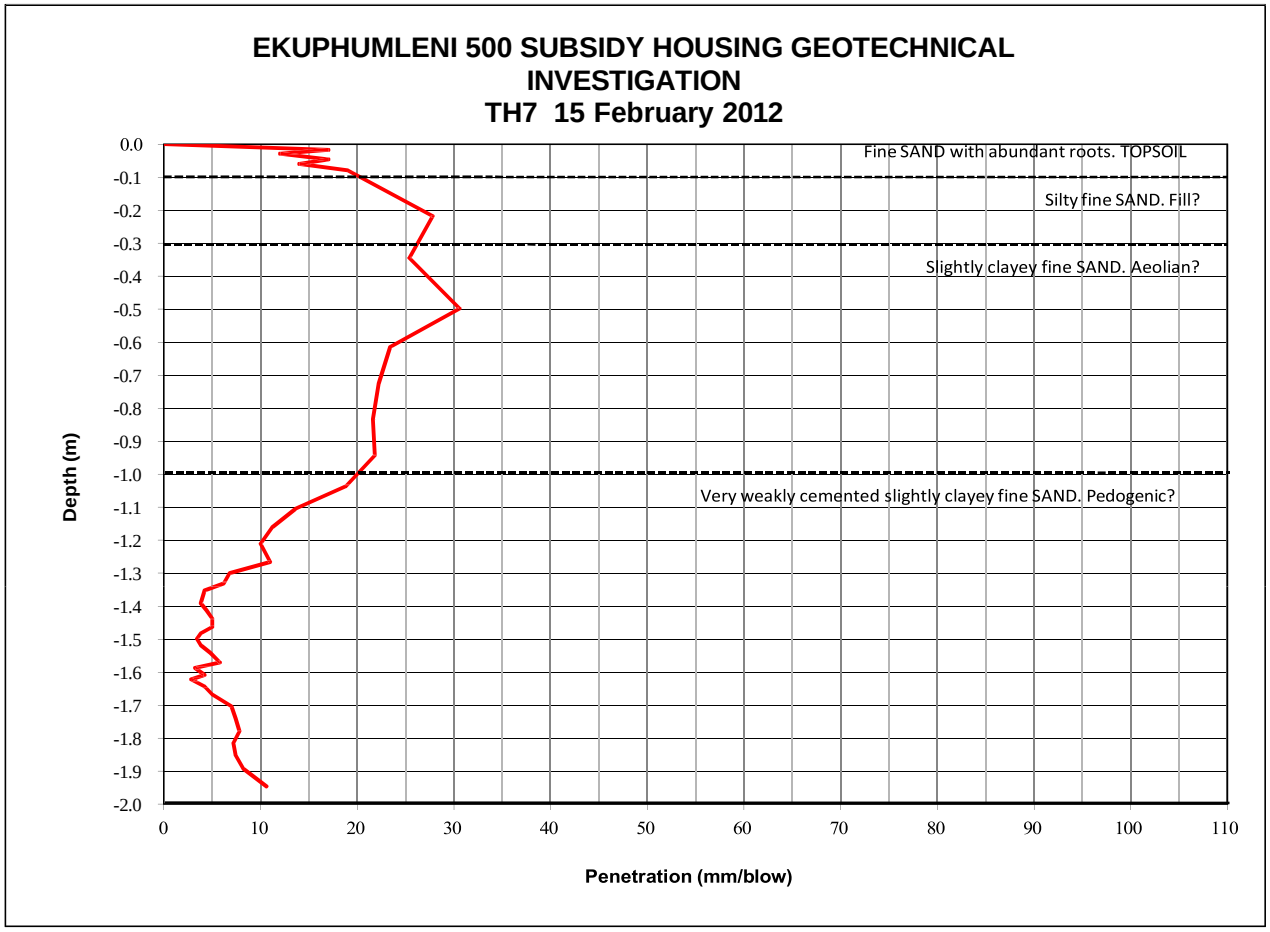

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH12 15 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)
Fine SAND Aeolian
Silty fine SAND. Aeolian?
Weakly cemented slightly clayey fine SAND. Pedogenic?
Gravely fine SAND. Pedogenic?

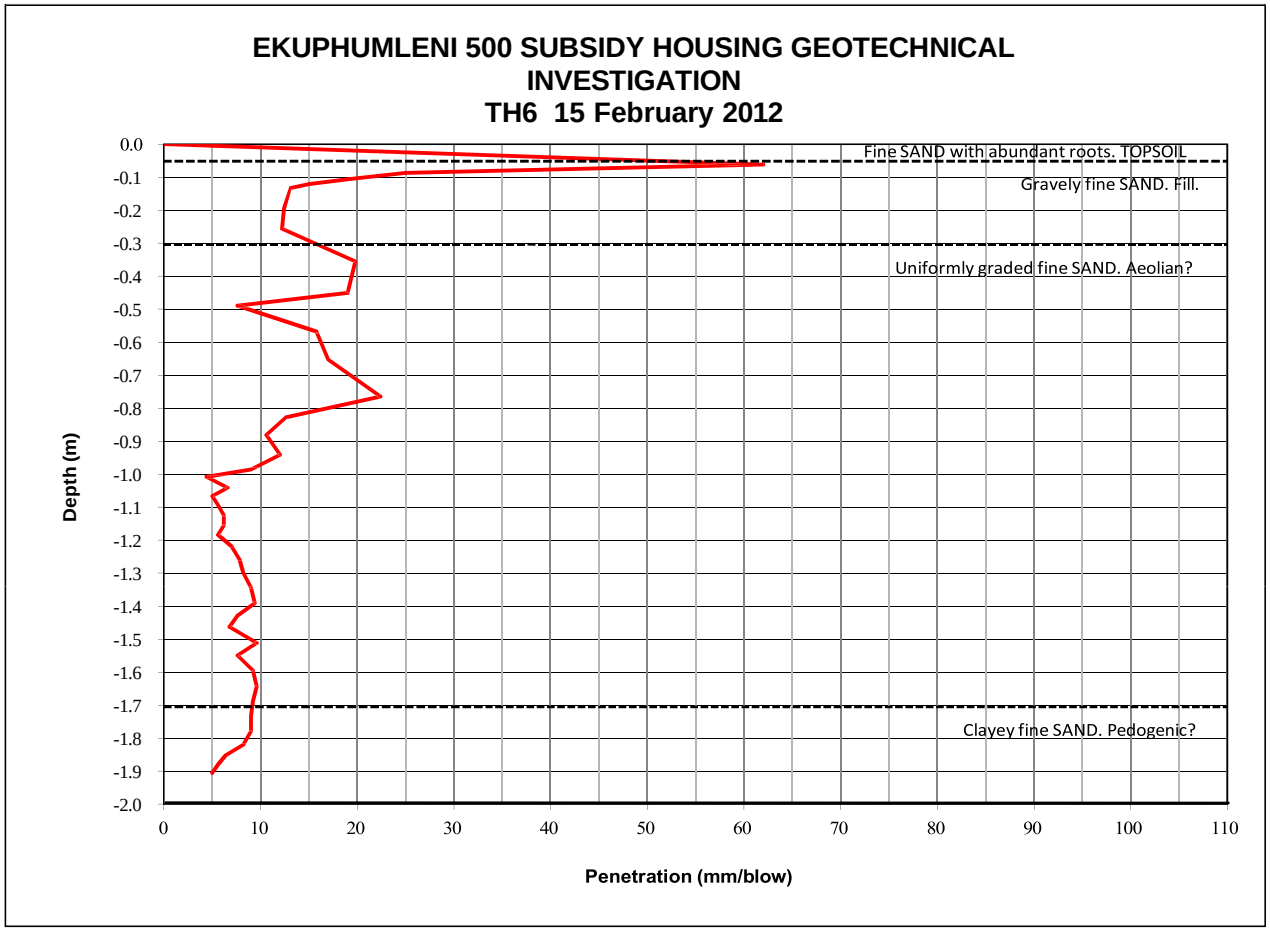

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH11 15 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)
Fine SAND Aeolian
Fine SAND. Aeolian?
Clayey SAND. Pedogenic?

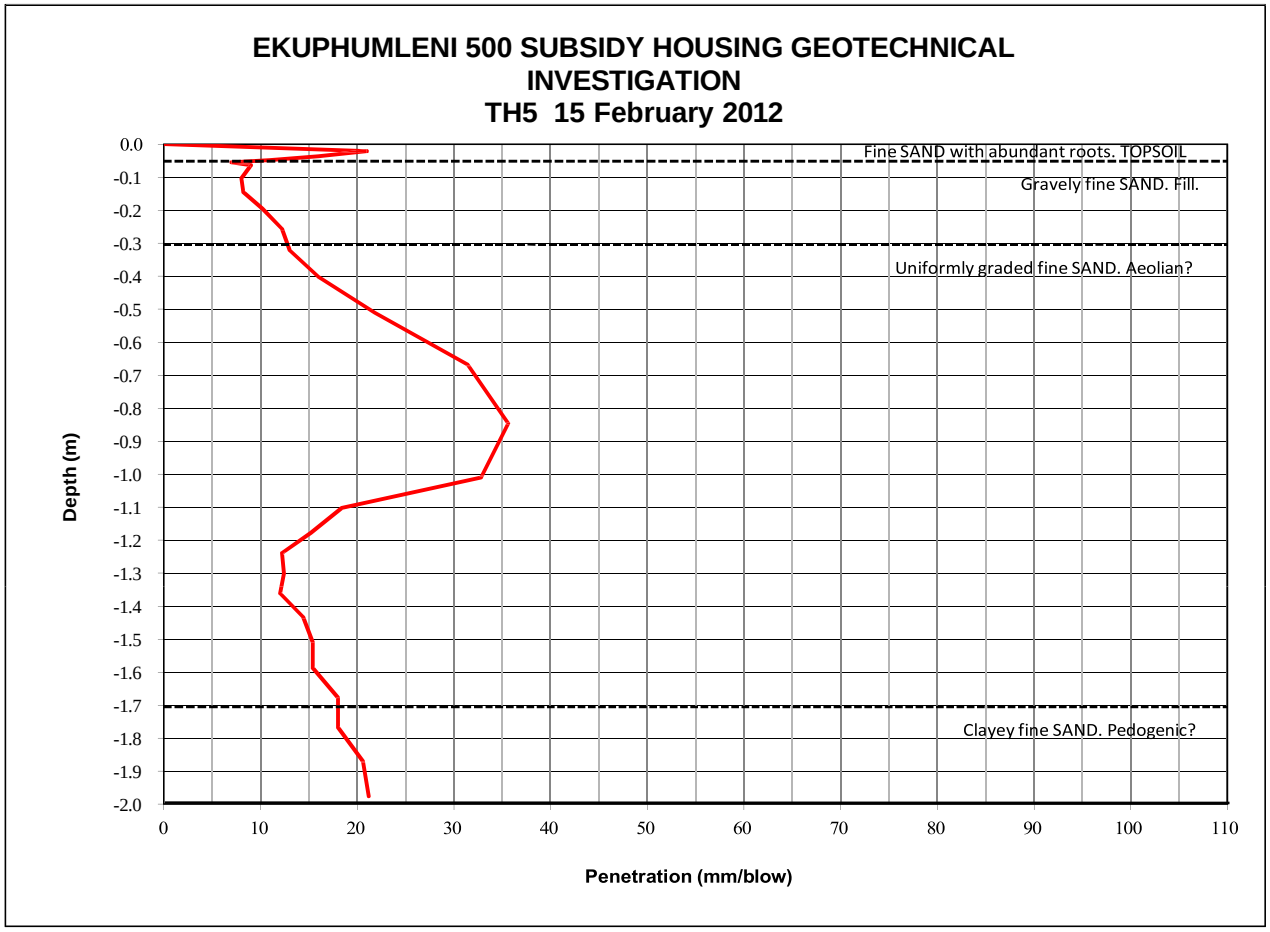

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH10 15 February 2012
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
Fine SAND Aeolian
Silty fine SAND. Aeolian?
Moderately to weakly cemented fine SAND. Pedogenic?
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

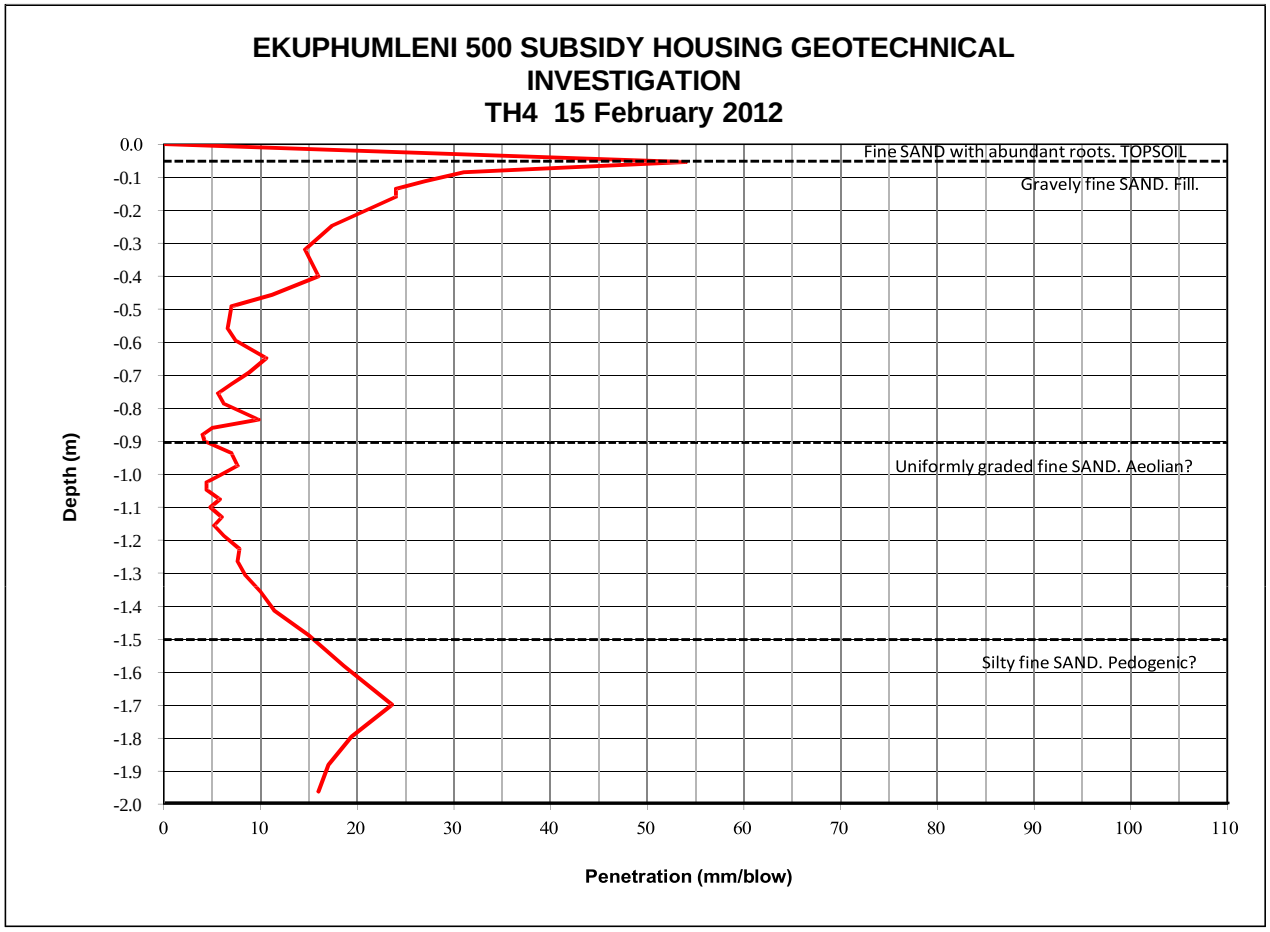

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH9 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Gravely fine SAND. Fill
Uniformly graded fine SAND. Aeolian?
Uniformly graded fine SAND with trace gravel. Aeolian?
Weakly cemented fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

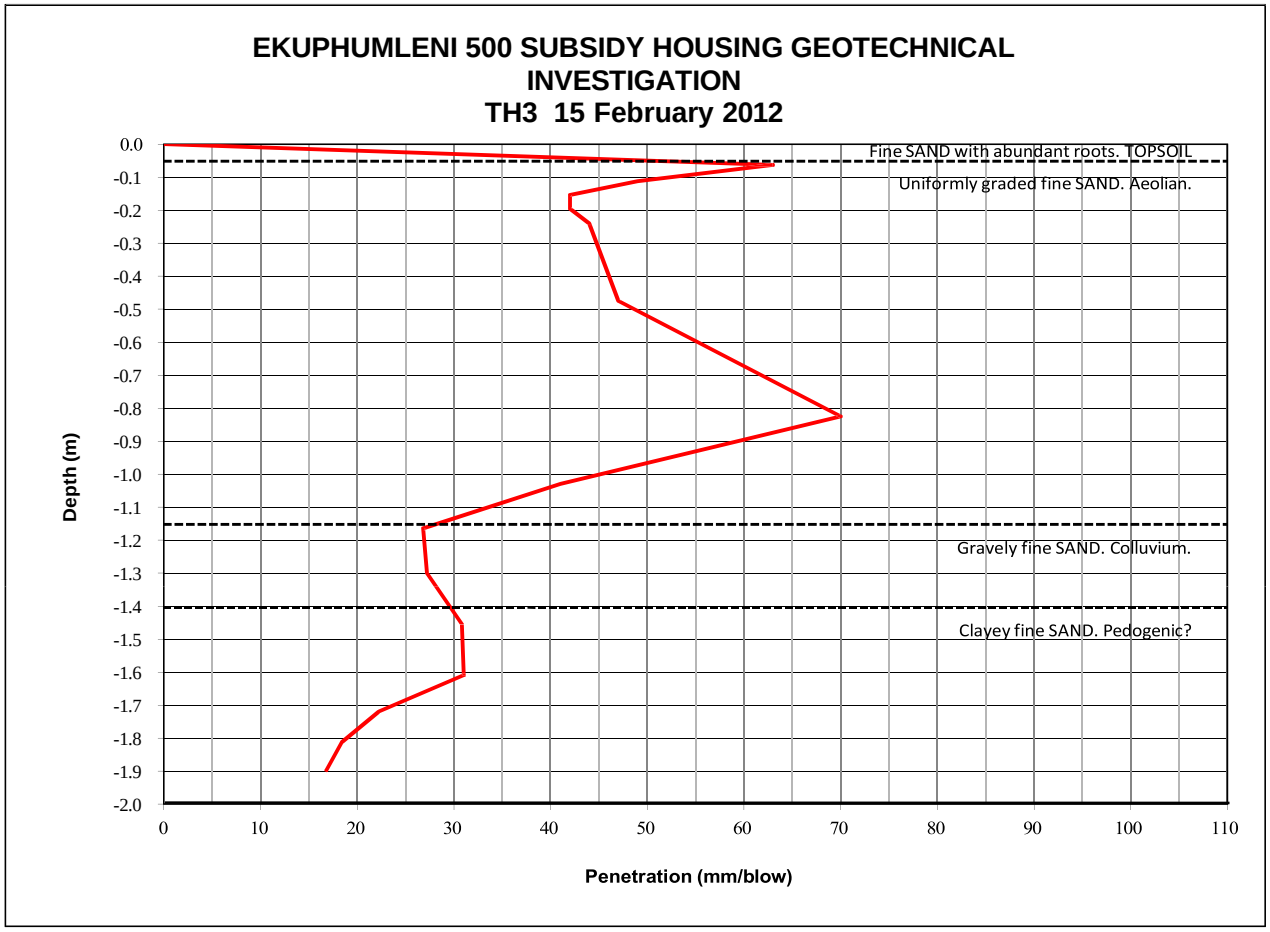

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH8 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Uniformly graded fine SAND. Topsoil?
Uniformly graded fine SAND with trace gravel. Aeolian?
Very weakly cemented slightly clayey fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

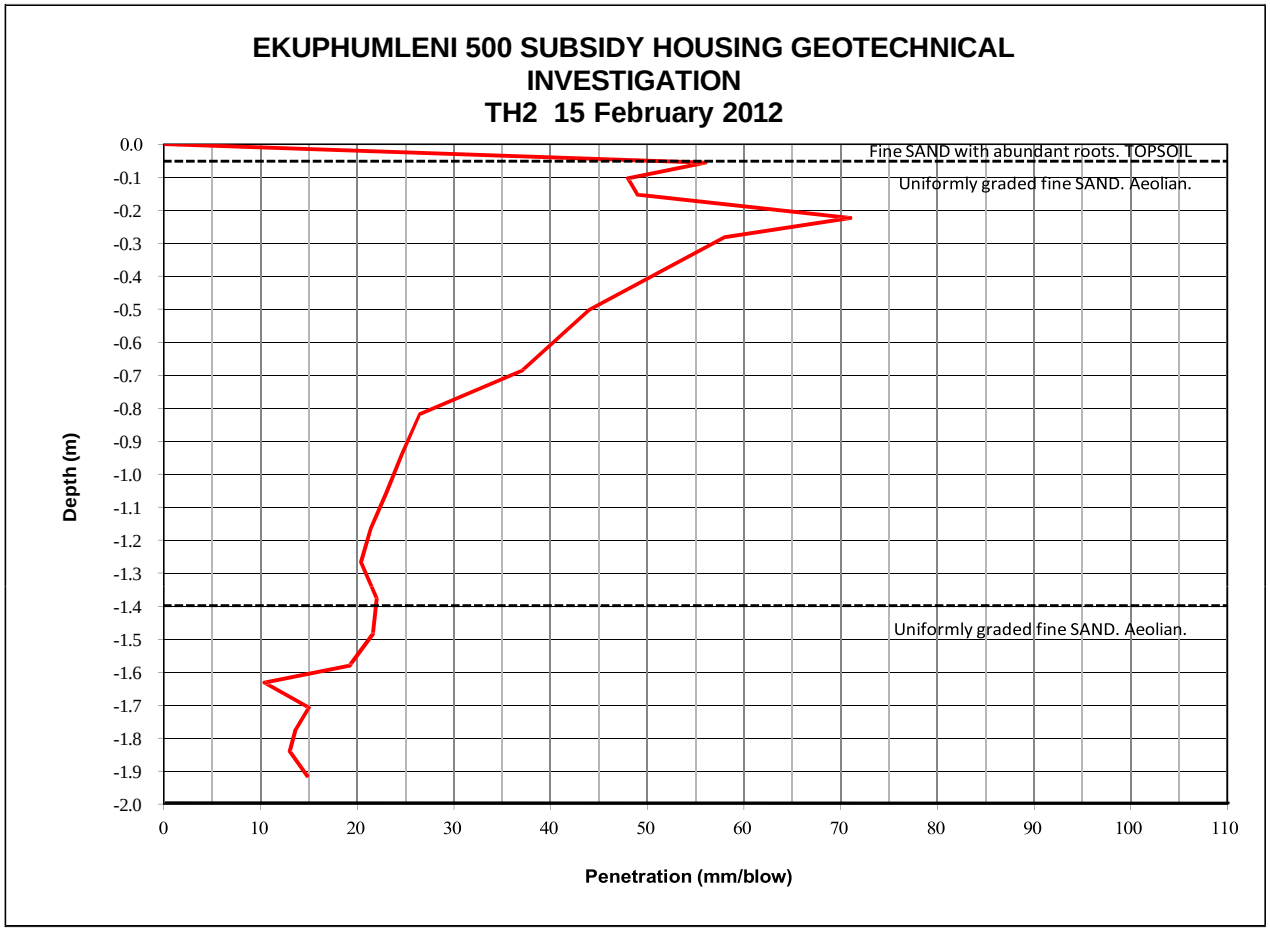

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH7 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Silty fine SAND. Fill?
Slightly clayey fine SAND. Aeolian?
Very weakly cemented slightly clayey fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

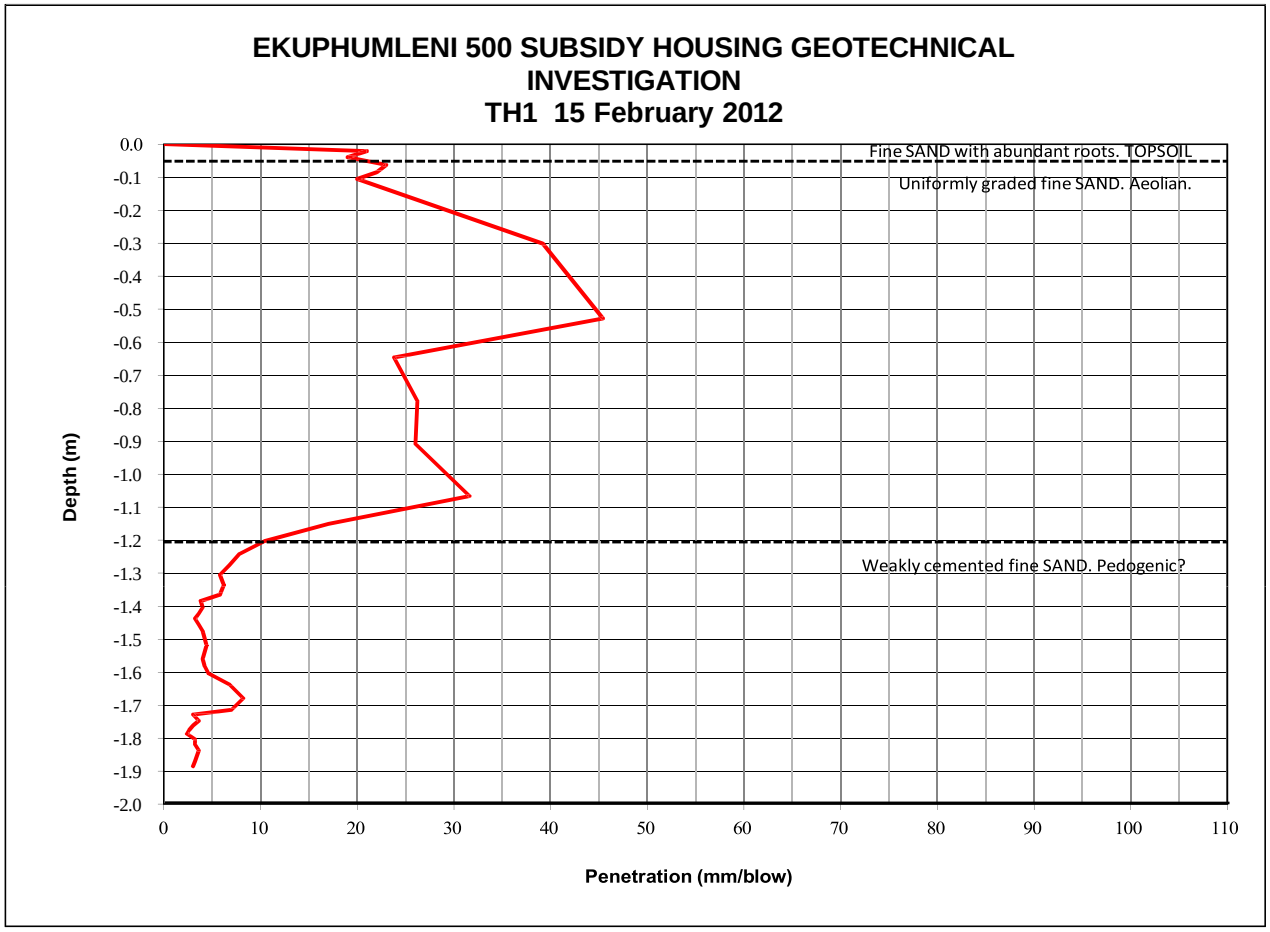

EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH6 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Gravely fine SAND. Fill.
Uniformly graded fine SAND. Aeolian?
Clayey fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)


EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH5 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Gravely fine SAND. Fill.
Uniformly graded fine SAND. Aeolian?
Clayey fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)


EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH4 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Gravely fine SAND. Fill.
Uniformly graded fine SAND. Aeolian?
Silty fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)


EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH3 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Uniformly graded fine SAND. Aeolian.
Gravely fine SAND. Colluvium.
Clayey fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)


EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH2 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Uniformly graded fine SAND. Aeolian.
Uniformly graded fine SAND. Aeolian.
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)


EKUPHUMLENI 500 SUBSIDY HOUSING GEOTECHNICAL INVESTIGATION
TH1 15 February 2012
Fine SAND with abundant roots. TOPSOIL
Uniformly graded fine SAND. Aeolian.
Weakly cemented fine SAND. Pedogenic?
Depth (m)
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
-0.7
-0.8
-0.9
-1.0
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2.0
0
10
20
30
40
50
60
70
80
90
100
110
Penetration (mm/blow)

Appendix D: Photographs

	
TH1	TH1
	
TH2	TH2
	
TH3	TH3

	
TH4	TH4
	
TH5	TH5
	
TH6	TH6

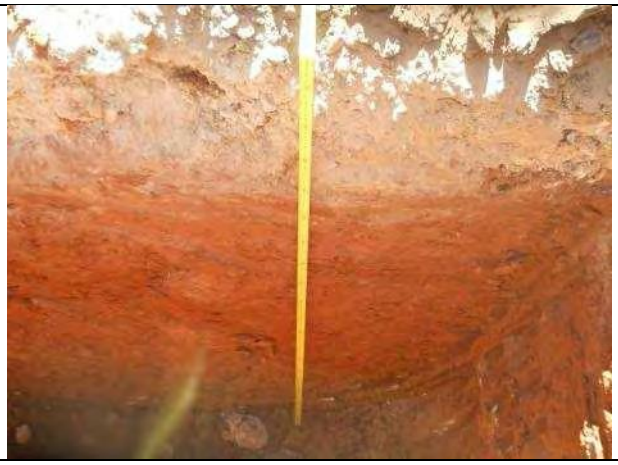
	
TH7	TH7
	
TH8	TH8
	
TH9	TH9

	
TH10	TH10
	
TH11	TH11
	
TH12	TH12

	
TH13	TH13
	
TH14	TH14
	
TH15	TH15

	
TH16	TH16
	
TH17	TH17
	
TH18	TH18

	
TH19	TH19
	
TH20	TH20
	
TH21	TH21

	
TH22	TH22
	
TH23	TH23
	
TH24	TH24

SRK Report Distribution Record

Report No. 445340/1

Copy No. 2

Name/Title	Company	Copy	Date	Authorised by
Greg Tucker	Lukhozi	1	9 March 2012	Brent Cock
Project File	SRK	2	9 March 2012	Brent Cock

Approval Signature: