SECTION 24G APPLICATION

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Proponent: Mangaung Metropolitan Municipality
MDA Ref No: 40727
Date: June 2020

mda

Town & Regional Planners,
Environmental & Development
Consultants

Physical Address: 9 Barnes Street,
Westdene, Bloemfontein, 9301
Postal Address: PO Box 100982,
Brandhof, 9324
Tel: 051 4471583, Fax: 051 448 9839
E-mail: admin@mdagroup.co.za

Application for Rectification Form: NEMA Section 24G

destea
department of
economic, small business development,
tourism and environmental affairs
FREE STATE PROVINCE

DEPARTMENT OF ECONOMIC, SMALL BUSINESS DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS

Application form for the rectification of unlawful commencement or continuation of a listed activity in terms of S24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended:

2014

Kindly note that:

1. This application form must be completed for all applications in terms of S24G of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.

2. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the application form have been published or produced by the relevant competent authority.

3. The content of the application for rectification form comprises of:

    Section A: Application Information
    Section B: Activity Information
    Section C: Description of Receiving Environment
    Section D: Preliminary Impact Assessment
    Section E: Alternatives
    Section F: Appendices
    Section G: Declarations

4. An independent EAP must be appointed to complete the application form on behalf of the applicant; the declaration of independence must be completed by the independent EAP and submitted with the application.

5. The required information must be typed within the spaces provided. The sizes of the spaces provided are not necessarily indicative of the amount of information to be provided. The space provided extend as each space is filled with typing. A legible font type and size must be used when completing the form. The font size should not be smaller than 10pt (e.g. Arial 10).

6. The use of *"not applicable"* in the application form must be done with circumspection.

7. No faxed or e-mailed applications will be accepted. This application form must be submitted by hand or mailed to the relevant competent.

8. Unless protected by law, all information contained in and attached to this application form may become public information on receipt by the competent authority. Upon request, any interested and affected party must be provided with the information contained in and attached to this application form.

9. This application form constitutes the initiation of the S24G application process.

DEPARTMENTAL DETAILS

St. Andrews Building
113 St. Andrews Street
Bloemfontein
9300

Private Bags X 20801
Bloemfontein
9300

Tel: +27 (0)51 400 4817/19
Fax: +27 (0)51 400 4842
e-mail: mkhosana@detea.fs.gov.za

SECTION A: APPLICATION INFORMATION

1. APPLICANT PROFILE INDEX

Cross out the appropriate box "☒".

1.1	The applicant is an individual		NO
1.2	The applicant is a company		NO
1.3	The applicant is a state-owned enterprise or municipality	YES	
1.4	Other (specify)		NO
1.5	There is more than one individual / company responsible for the unlawful commencement of listed activities		NO

Name of Project applicant:	MANGAUNG METROPOLITAN MUNICIPALITY												
RSA Identity number:	7	5	1	1	2	9	5	4	1	0	0	8	7
Contact person:	MR MZINGISI NKUNGWANA												
Position in company	HOD: SOCIAL SERVICES												
Registered Name of Company/ Closed Corporation	MANGAUNG METROPOLITAN MUNICIPALITY												
Trading name (if any):	MANGAUNG METROPOLITAN MUNICIPALITY												
Registration number	N/A												
Postal address:	P.O. BOX 3704												
	BLOEMFONTEIN	Postal code:	9300										
Telephone:	(051) 406 6304	Cell:											
E-mail:	MZINGISI.NKUNGWANA@MANGAUNG.CO.ZA	Fax:	( )										

Please Note: In instances where there is more than one individual / company responsible for the unlawful commencement of listed activities, please attach a list of with all contact details to the back of this page.

Environmental Assessment Practitioner (EAP):	MDA		
Contact person:	NEIL DEVENISH		
Postal address:	P.O. BOX 100982		
	BRANDHOF BLOEMFONTEIN	Postal code:	9324
Telephone:	(051)4471583	Cell:	0827700583
E-mail:	NEIL@MDAGROUP.CO.ZA	Fax:	(051)4489839
EAP Qualifications	B.A. M.TRP.		
EAP Registrations/Associations	PR.PLN (A/1133/1999) SAPI		

Name of Landowner(s):	MANGAUNG METROPOLITAN MUNICIPALITY		
Contact person(s):	MR MZINGISI NKUNGWANA		
Postal address:	P.O. BOX 3704		
	BLOEMFONTEIN	Postal code:	9300
Telephone:	(051) 406 6304	Cell:	
E-mail:	MZINGISI.NKUNGWANA@MANGAUNG.	Fax:	( )

	CO.ZA		

Please Note: In instances where there is more than one landowner, please attach a list of landowners with their contact details to the back of this page.

Municipality in whose area of jurisdiction the activity falls:	MANGAUNG METROPOLITAN MUNICIPALITY		
Contact person:	MR MZINGISI NKUNGWANA		
Postal address:	P.O. BOX 3704		
	BLOEMFONTEIN	Postal code:	9300
Telephone	(051) 406 6304	Cell:	
E-mail:	MZINGISI.NKUNGWANA@MANGAUNG.CO.ZA	Fax:	( )

Please Note: In instances where there is more than one Municipality involved, please attach a list of Municipalities with their contact details to the back of this page.

Project title:	THE EXPANSION OF THE NALISVIEW CEMETERY					
Property location:	THE REMAINDER OF THE FARM NALISVIEW 2835, BLOEMFONTEIN					
Farm/Erf name & number (incl. portion):	THE REMAINDER OF THE FARM NALISVIEW 2835					
SG21 Digit code:	F00300000000283500000					
Co-ordinates:	Latitude (S):			Longitude (E):		
	29°	14‘	57.67“	26°	14 ‘	13.37 “
Project title:	THE EXPANSION OF THE NALISVIEW CEMETERY					
Property location:	PORTION 1 OF THE FARM NALISVIEW 1060, BLOEMFONTEIN					
Farm/Erf name & number (incl. portion):	PORTION 1 OF THE FARM NALISVIEW 1060, BLOEMFONTEIN					
SG21 Digit code:	F00300000000106000001					
Co-ordinates:	Latitude (S):			Longitude (E):		
	29 °	15‘	27.18“	26 °	14‘	09.03’

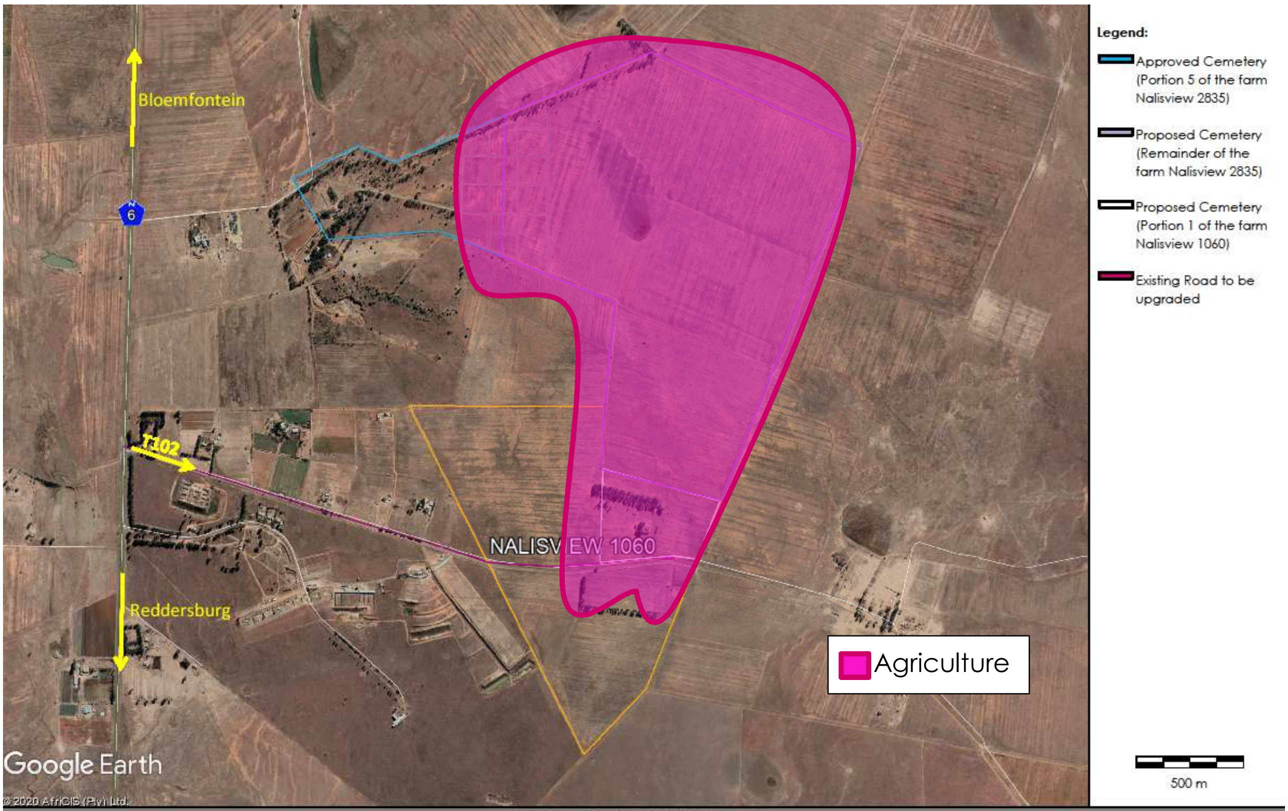
Please Note:
Where a large number of properties are involved (e.g. linear activities), attach a list of property descriptions to the back of this page.
Indicate the position of the activity using the latitude and longitude of the centre point of the site for each alternative site. The co-ordinates must be in degrees, minutes and seconds. The minutes must be given to at least three decimals to ensure adequate accuracy. The EAP is required to contact the relevant competent authority with regards to the projection that must be used.

Street address:	PORTION 1 OF THE FARM NALISVIEW 1060, T102 ROAD
Magisterial District or Town:	BLOEMFONTEIN

Please Note: In instances where there is more than one town or district involved, please attach a list of towns or districts as well as complete physical address information for the entire area to the back of this page.

Closest City/Town:	ROCKLANDS, BLOEMFONTEIN	Distance	1.8Km
Zoning of Property:	THE REMAINDER OF THE FARM NALISVIEW 2835: AGRICULTURE PORTION 1 OF THE FARM NALISVIEW 1060: AGRICULTURE NOTE: AN APPLICATION FOR CHANGE IN LAND-USE WILL BE SUBMITTED IN DUE COURSE		

Please Note: In instances where there is more than one zoning, please attach a map clearly indicating the zoning of the different portions.



TYPE OF PLAN: LOCALITY PLAN

mda Town & Regional Planners, Environmental & Development Consultants
T: 051 447 1583 | P.O. Box 20298, Willows, Bloemfontein, 9320
F: 086 455 2568 | 9 Barnes Street, Westdene, Bloemfontein, 9301

PROJECT:
THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY

PROJECT BY:
MANGAUNG METROPOLITAN MUNICIPALITY

DRAWN BY:
HS

Was a rezoning application required?	YES	
Was a consent use application required?	YES	

Please Note: Where planning approvals have been granted please attach the relevant approvals.

Owners consent:	**REMAINDER OF THE FARM NALISVIEW 2835:** N/A, AS THE APPLICANT IS THE LANDOWNER **PORTION 1 OF THE FARM NALISVIEW 1060:** THE EXISTING LANDOWNER IS CURRENTLY IN PROCESS TO SELL THE PROPERTY TO THE APPLICANT. A LETTER OF CONSENT IS ATTACHED TO THIS DOCUMENT AS APPENDIX C. Letters of consent from all landowners or a detailed explanation by the applicant explaining why such letters of consent are not furnished must be attached to the application form. .

2. APPLICATION HISTORY

(Cross out the appropriate box "☒" and provide a description where required).

Has any national, provincial or local authority considered any development applications on the property previously?		NO

If so, please give a brief description of the type and/or nature of the application/s: (In instances where there were more than one application, please attach a list of these applications)

NOTE: NO APPLICATION ON THE DEVELOPMENT PROPERTY WAS SUBMITTED TO ANY

NATIONAL / PROVINCIAL OR LOCAL AUTORITY FOR CONDERDATION TO DATE.

- HOWEVER, THE APPLICANT (MANGAUNG METROPOLITAN MUNICIPALITY) RECEIVED AN ENVIRONMENTAL AUTHORISATION FOR THE CONSTRUCTION OF A CEMETERY ON AN ADJACENT PROPERTY (PORTION 5 OF THE FARM NALISVIEW 1835).

Which authority considered the application(s):

N/A

Has any one of the previous application/s on the property been approved or rejected? If so provide a list of the successful and unsuccessful application/s and the reasons for decision/s.	N/A	

Provide detail on the period of validity of decision(s) and expiry dates of the above applications/ permits etc.

N/A

NOTE: THE EA FOR THE CONSTRUCTION OF A CEMETERY ON ADJACENT PROPERTY (PORTION 5 OF THE FARM NALISVIEW 1835) EXPIRED ON 28 FEBRUARY 2020, SHOULD NO CONSTRUCTION ACTIVITIES BE UNDERTAKEN BEFORE THE MENTIONED DATE. PLEASE NOTE THAT GRADING OF THE INTERNAL ROADS AS WELL AS FENCING OF THE SITE WAS ALREADY UNDERTAKEN AND THEREFORE CONSTRUCTION ACTIVITIES HAS COMMENCED ON SITE WITHIN THE ABOVE MENTIONED TIMEFRAME.

I hereby apply in terms of Section 24 G of the National Environmental Management Act (Act no 107 of 1998 as amended) for the rectification of the unlawful commencement or continuation of the listed activity(ies) in Section B of the application form:

Applicant (Full names) MG Nkungwana
Signature:
Place: Bloemfontein
Date: 12/06/2020

EAP (Full names) Neil Devenish
Signature:
Place: Bloemfontein
Date: 17/06/2020

SECTION B: ACTIVITY INFORMATION

1. ACTIVITIES APPLIED FOR:

Separate rectification applications are required for one development site where more than one listed activity has commenced and where these unlawfully commenced activities constitute offences in terms of different EIA regulations (refer to Table 1 & 2 of the S24G guideline).

Applicants and EAPS are strongly advised to discuss the merits of a combined application *(if deemed applicable)* with the relevant competent authority prior to the completion of this application form and submission thereof.

The relevant competent authority will use its discretion in deciding to allow one rectification application for more than 1 Section 24F(2(a) contravention on one development site.

All potential listed activities associated with the development must be indicated below. (See Annexures B, C, D and E). Only those activities for which the applicant applies will be considered.

The onus is on the applicant to ensure that all the applicable listed activities are included in the application.

Listed activities applied for. Identify the relevant listed activities applied for below:

ECA EIA Contraventions : Between 08 September 1997 end of day 09 May 2002	
Activities unlawfully commenced with on or after 08 September 1997 and before end 09 May 2002: EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989, as amended	
Listed Activity(ies)	Details of Activity(ies)
N/A	N/A

ECA EIA Contraventions : Between 10 May 2002 and before end of day 02 July 2006	
Activities unlawfully commenced with on or after 10 May 2002 and before end 02 July 2006: EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989, as amended	
Listed Activity(ies)	Details of Activity(ies)
N/A	N/A

NEMA EIA Contraventions : Between 03 July 2006 and before end of day 01 August 2010	
Activities unlawfully commenced with in terms of the EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998, as amended on or after 03 July 2006 and before end of day 01 August 2010	
Government Notice No. R386 Activity No(s):	Details of Activity(ies) requiring Basic Assessment
N/A	N/A
Government Notice No. R387 Activity No(s):	Details of Activity(ies) requiring a Scoping Report and EIA
N/A	N/A

NEMA EIA Contraventions : On or after 02 August 2010	
Activities unlawfully commenced with in terms of the EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998, as amended on or after 02 August 2010	
Government Notice No. R544 Activity No(s):	Details of Activity(ies) requiring Basic Assessment
N/A	N/A
Government Notice No. R545 Activity No(s):	Details of Activity(ies) requiring a Scoping Report and EIA
N/A	N/A
Government Notice No.	Details of Activity(ies) requiring S&EIr

R546 Activity No(s):	
N/A	N/A

NEMA EIA Contraventions : On or after 08 December 2014	
Activities unlawfully commenced with in terms of the EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998, as amended on or after 08 December 2014 as amended on 07 April 2017.	
Government Notice No. R983 Activity No(s):	Details of Activity(ies) requiring Basic Assessment
ACTIVITY 44: THE EXPANSION OF CEMETERIES BY 2 500 SQUARE METRES OR MORE	THE DEVELOPMENT OF A CEMETERY ON PORTION 5 OF THE FARM NALISVIEW 2835 WAS ALREADY APPROVED BY DESTEA. THE CURRENT PROPOSED PROJECT ENTAILS THE FURTHER DEVELOPMENT OF THE CEMETERY ON THE REMAINDER OF THE FARM NALISVIEW 2835 AS WELL AS ON PORTION 1 OF THE FARM NALISVIEW 1060, BLOEMFONTEIN.
ACTIVITY 12: THE DEVELOPMENT OF (II) INFRASTRUCTURE OR STRUCTURES WITH A PHYSICAL FOOTPRINT OF 100 SQUARE METRES OR MORE WHERE SUCH DEVELOPMENT OCCURS (a) WITHIN A WATERCOURSE (c) IF NO DEVELOPMENT SETBACK EXITS, WITHIN 32 M OF A WATERCOURSE, MEASURED FROM THE EDGE OF A WATERCOURSE EXCLUDING (dd) WHERE SUCH DEVELOPMENT OCCURS WITHIN AN URBAN AREA	CONSTRUCTION ACTIVITIES WITHIN 32 M OF THE IDENTIFIED WETLAND. PLEASE NOTE THAT THE SPECIALIST RECOMMENDED THAT A BUFFER AREA OF 15 M SHOULD BE IMPLEMENTED AT THE WETLAND.
ACTIVITY 19: THE INFILLING OR DEPOSITING OF ANY MATERIAL OF MORE THAN 10 M^3 INTO, OR THE DREDGING, EXCAVATION, REMOVAL OR MOVING OF SOIL, SAND, SHELLS, SHELL GRIT, PEBBLES OR ROCK OF MORE THAN 10 M^3 FROM A WATERCOURSE	CONSTRUCTION ACTIVITIES WITHIN 32 M OF THE IDENTIFIED WETLAND. PLEASE NOTE THAT THE SPECIALIST INDICATED THAT A BUFFER AREA OF 15 M SHOULD BE IMPLEMENTED AT THE WETLAND.
Government Notice No. R984 Activity No(s):	Details of Activity(ies) requiring a Scoping Report and EIA
N/A	N/A
Government Notice No. R985 Activity No(s):	Details of Activity(ies) requiring S&EIr
N/A	N/A

2. ACTIVITY DESCRIPTION

(Cross out the appropriate box “☒” and provide a description where required).

(a) Is/was the project a new development or an upgrade of an existing development?		UPGRADE (EXPANSION OF AN AUTHORISED CEMETERY)

(b) Clearly describe the activity and associated infrastructure commenced with, indicating what has been completed, what still has to be completed and applicable commencement dates.

ACTIVITIES UNDERTAKEN TO DATE:

- CONSTRUCTION OF INTERNAL ROADS WAS UNDERTAKEN ON A PORTION OF THE REMAINDER OF THE FARM NALISVIEW 1835.
- FENCING

ACTIVITIES STILL TO BE COMPLETED AND APPLICABLE COMMENCEMENT DATES:

- CONSTRUCTION OF ADDITIONAL INTERNAL ROADS – 2020.08.01
- CONSTRUCTION OF CHAPEL, ABLUTION FACILITIES, MORTUARY, OFFICE BUILDING, ETC. – 2020.08.01
- CONSTRUCTION OF GRAVES – 2020.08.01 – AND CONTINUOUS DURING THE OPERATIONAL PHASE
- ELECTRICITY SUPPLY– 2020.08.01
- WATER SUPPLY– 2020.08.01
- FENCING– 2020.08.01
- CONSTRUCTION OF ACCESS ROUTE– 2020.08.01
- CONSTRUCTION ACTIVITIES NEAR THE WETLAND-AREA (LISTED ACTIVITIES 12 AND 19 OFGOVERNMENT NOTICE NO. R983) WILL ALSO BE UNDERTAKEN AS PART OF THE PROJECT – 2020.08.01
- THE OLD FARM HOUSE WILL EITHER BE INCORPORATED INTO THE CEMETERY INFRASTRUCTURE (TO BE USED AS THE ADMINISTRATIVE BUILDING) OR BE DEMOLISHED. THE APPLICANT WILL APPLY FOR A PERMIT REGARDING THE ABOVE IN TERMS OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999).

NOTE THAT NO CONSTRUCTION ACTIVITIES WILL BE UNDERTAKEN WITHIN 15 M OF THE IDENTIFIED WETLAND.

(c) Provide details of all components of the activity and attach diagrams (e.g. architectural drawings or perspectives, engineering drawings, process flow charts etc.).

Buildings		NO

Provide brief description:

NO BUILDINGS WERE CONSTRUCTED TO DATE.
SEE APPENDIX B FOR MORE INFORMATION ON THE PLANNED BUILDINGS TO BE CONSTRUCTED AS PART OF THE PROJECT.

Infrastructure (e.g. roads, power and water supply/ storage)	YES	
Provide brief description:		
COMMENCED ACTIVITIES: • THE CONSTRUCTION OF INTERNAL ROADS COMMENCED. • FENCING COMMENCED. • REFER TO APPENDIX A FOR MORE INFORMATION ON THE AREA WHERE THE ROADS WERE ALREADY CONSTRUCTED. ACTIVITIES TO BE UNDERTAKEN: • ADDITIONAL ROADS WILL BE CONSTRUCTED. • TESTING OF EXISTING BOREHOLES • DRILLING OF NEW BOREHOLES • BOREHOLES WILL BE EQUIPPED AND USED DURING THE OPERATIONAL PHASE OF THE PROJECT • THE CONSTRUCTION OF INFRASTRUCTURE ASSOCIATED WITH ELECTRICITY AND WATER SUPPLY WILL BE UNDERTAKEN. • CONSTRUCTION OF CHAPELS, OFFICE BUILDING, ABLUTION FACILITIES AND ADDITIONAL INFRASTRUCTURE WILL BE CONSTRUCTED. • STORMWATER MITIGATION MEASURES WILL BE IMPLEMENTED. • REFER TO ANNEXURE A, B AND D FOR MORE INFORMATION		
Processing activities (e.g. manufacturing, storage, distribution)		NO
Provide brief description:		
N/A AS THE PROJECT ENTAILS THE CONSTRUCTION OF A CEMETERY AND ASSOCIATED INFRASTRUCTURE.		
Storage facilities for raw materials and products (e.g. volume and substances to be stored)		
Provide brief description		NO
N/A AS THE PROJECT ENTAILS THE CONSTRUCTION OF A CEMETERY AND ASSOCIATED INFRASTRUCTURE.		
Storage and treatment facilities for solid waste and effluent generated by the project		NO
Provide brief description		
IT IS NOT FORESEEN THAT ANY CONSTRUCTION WASTE WILL BE DISPOSED OF DURING THE CONSTRUCTION PHASE, DUE TO THE FACT THAT CONSTRUCTION SOLID WASTE ASSOCIATED WITH THE PROPOSED PROJECT REFERS TO SOIL, WEATHERED GRANITE AND INTERMEDIATE MATERIAL OR HARD ROCK. AN EARTH EMBANKMENT MAY BE CONSTRUCTED FROM SOME OF THE CONSTRUCTION SOLID WASTE AS DESCRIBED ABOVE TO PREVENT STORM WATER FROM FLOWING INTO THE CEMETERY AND TO DRAIN ANY RUN-OFF THAT ORIGINATES FROM THE PROPOSED CEMETERY SITE. OTHER SOIL COLLECTED DURING THE LEVELLING PROCESS WILL BE USED TO BACKFILL LOWER LAYING AREAS. SOIL COLLECTED DURING THE DIGGING OF GRAVES WILL BE USED TO BACKFILL THE GRAVES. LEFT-OVER MATERIAL MAY BE USED BY THE MUNICIPALITY (I.E. THE APPLICANT) FOR GENERAL MAINTENANCE ON SITE. HOWEVER, SHOULD ANY SOLID WASTE BE GENERATED BY THE PROPOSED PROJECT, THE WASTE WILL BE CLASSIFIED AND DISPOSED OF AT THE NEAREST AUTHORIZED LANDFILL SITE. IF ANY, IT WILL BE DISPOSED OF AT AN AUTHORISED LANDFILL SITE IN BLOEMFONTEIN.		

GENERAL WASTE COLLECTED ON SITE DURING THE CONSTRUCTION AND / OR OPERATIONAL PHASE WILL BE COLLECTED IN WASTE BINS SITUATED ON VARIOUS POSITIONS ON SITE. THESE BINS WILL BE EMPTIED REGULARLY / WHEN NECESSARY AND DISPOSED OF AT AN AUTHORISED LANDFILL SITE IN BLOEMFONTEIN.

THE PROPOSED ACTIVITY ITSELF WILL NOT PRODUCE ANY EFFLUENT THAT WILL BE TREATED AND / OR DISPOSED OF. HOWEVER, SEWAGE WILL BE HANDLED AS FOLLOWS:

- NEITHER THE REMAINDER OF THE FARM NALISVIEW 2835 NOR PORTION 1 OF THE FARM NALISVIEW 1060 HAS ANY EXISTING SEWER RETICULATION OR SEWER SERVICES.
- NO SEWER RETICULATION OR SEWER SERVICES ARE AVAILABLE NEAR THE DEVELOPMENT AREA.
- CURRENTLY THE FARM HOUSE AT THE REMAINDER OF THE FARM NALISVIEW 2835 IS SERVICED BY A SEPTIC TANK.
- HOWEVER THE FARM HOUSE WAS SEVERELY VANDALIZED AND WILL NOT BE UTILIZED AS ORIGINALLY INTENDED.
- IT IS PROPOSED THAT ALL SEWAGE EFFLUENT BE COLLECTED BY SEPARATE SEPTIC TANKS LOCATED AT EACH ABLUTION FACILITY, CHAPEL AND THE GENERAL OFFICE BUILDINGS.
- A GRAVITATIONAL COLLECTION NETWORK WILL BE CONSTRUCTED TO CONVEY SEWAGE EFFLUENT FROM THE VARIOUS ABLUTION FACILITIES, CONVEY IT TO A CENTRAL POSITION WHERE A MAIN CONSERVANCY TANK WILL BE CONSTRUCTED.
- THE CONSERVANCY TANK WILL BE MAINTAINED AND CLEANED OUT ON A WEEKLY BASIS TO ENSURE THAT NO EFFLUENT OVERFLOWS AND POLLUTE THE UNDERGROUND WATER SOURCE.
- THE SEWAGE EFFLUENT WILL BE COLLECTED FROM THE CONSERVANCY TANK AND BE DISPOSED OF AT THE BLOEMSPRUIT WASTE WATER TREATMENT WORKS.

THE ABOVE DOES NOT TRIGGER A LISTED ACTIVITY, AND THEREFORE THERE IS NO NEED TO CHANGE THE APPLICATION TO AN APPLICATION FOR SCOPING AND EIA.

Other activities (e.g. water abstraction activities, crop planting activities)	YES	

Provide brief description

- SUFFICIENT SITE DRAINAGE SHOULD BE ESTABLISHED AS THE AREA MAY BE SUBJECT TO FLOODING DURING NORMAL TO HEAVY RAINFALL.
- THE SITE WILL BE CLEARED OF VEGETATION AND LAID OUT SO AS TO PROVIDE BURIAL SITES FOR THE LOCAL COMMUNITY.
- THE EMISSIONS ASSOCIATED WITH THE PROPOSED ACTIVITY CAN BE DESCRIBED AS GENERAL VEHICLE EMISSIONS. HOWEVER, THESE EMISSIONS ARE NOT CONTROLLED BY ANY LEGISLATION.
- IN ADDITION, DUST CAN ALSO BE SEEN AS A POTENTIAL ISSUE DURING THE DEVELOPMENT AS WELL AS OPERATIONAL PHASE. THE FORMATION OF DUST WILL BE CONTROLLED BY DUST SUPPRESSION METHODS, WHEN REQUIRED. IN ADDITION, CONSTRUCTION ACTIVITIES WILL BE LIMITED TO DAY TIME HOURS.

3. ACTIVITY NEED AND DESIRABILITY

Describe the need and desirability of the activity:
CEMETERIES IN THE NEARBY AREA ALMOST REACHED THEIR CAPACITY. THE EXISTING FACILITIES, INCLUDING THE NEW CEMETERY ON PORTION 5 OF THE FARM NALISVIEW 2835 IS INADEQUATE FOR THE NEED OF THE COMMUNITY, ESPECIALLY WHEN THE POPULATION GROWTH IN THE AREA IS TAKEN INTO ACCOUNT. THEREFORE, THE EXPANSION OF THE CEMETERY IS REQUIRED TO MEET THE NEEDS OF THE COMMUNITY. THE PORTION OF LAND IDENTIFIED FOR THE EXPANSION OF THE PROPOSED CEMETERY (INCLUDING THE PROVISION OF RUNNING WATER, SANITATION FACILITIES, AND SECURITY FENCING) WILL PROVIDE NEW BURIAL SITES IN CLOSE PROXIMITY TO THE PEOPLE IT WILL BE SERVING.
Indicate the benefits that the activity has/had for society in general and also indicate what benefits the activity has/had for the local communities where it is located:
THE PORTION OF LAND IDENTIFIED FOR THE EXPANSION OF THE PROPOSED CEMETERY (INCLUDING THE PROVISION OF RUNNING WATER, SANITATION FACILITIES, AS WELL AS SECURITY FENCING) WILL PROVIDE NEW BURIAL SITES IN CLOSE PROXIMITY TO THE PEOPLE IT WILL BE SERVING.

4. PHYSICAL SIZE OF THE ACTIVITY

Indicate the physical spatial size of the activity as well as associated infrastructure (footprints):	1 710 000M^2
Indicate the area that has been transformed / cleared to allow for the activity as well as associated infrastructure	133 288M^2
Total area (sum of the footprint area and transformed area)	1 790 973M^2

5. SITE ACCESS

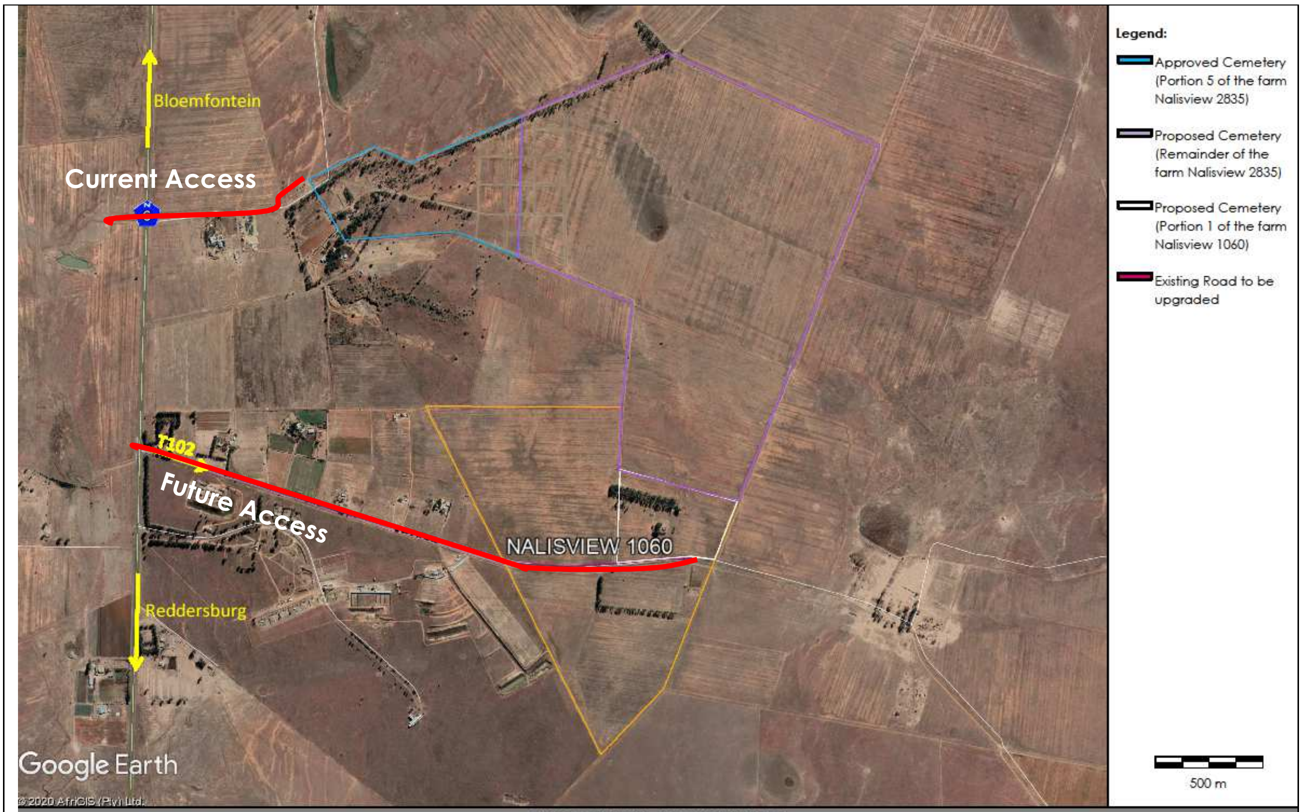
Was there an existing access road?	YES	
If no, what was the distance over which the new access road was built?	ACCESS TO THE SITE IS CURRENTLY OBTAINED VIA THE N6 ROAD.	
Describe the type of access road constructed: [indicate the position of the access road on the site plan]		

AN EXISTING ROAD IS CURRENTLY USED TO GAIN ACCESS TO THE SITE.

THE INTERNAL ROADS OF THE CEMETERY WILL BE PAVED IN CERTAIN AREAS WHERE HIGH TRAFFIC VOLUMES WILL BE PRESENT AND SMALLER DIRT ROADS WILL BE CONSTRUCTED BETWEEN BLOCKS (LESS TRAFFIC ANTICIPATED IN THESE SECTIONS).

AMPLE PARKING WILL BE ALLOWED FOR, WITH PARKING BAYS.

PLEASE SEE THE FOLLOWING MAP FOR MORE IN FORMATION ON THE CURRENT ROUTE USED TO GAIN ACCESS TO THE SITE AS WELL AS THE PROPOSED ALTERNATIVE ROUTE TO BE USED IN FUTURE (ACCESS FROM THE T102).



TYPE OF PLAN: LOCALITY PLAN

mda Town & Regional Planners, Environmental & Development Consultants
T: 051 447 1583 | P.O. Box 20298, Willows, Bloemfontein, 9320
F: 086 455 2568 | 9 Barnes Street, Westdene, Bloemfontein, 9301

PROJECT:
THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY

PROJECT BY:
MANGAUNG METROPOLITAN MUNICIPALITY

DRAWN BY:
HS

THE FOLLOWING ACTIVITIES WILL BE UNDERTAKEN TO ENSURE SAFE ENTRANCE TO THE CEMETERY:

- A SLIP-OFF WILL BE CONSTRUCTED ON THE N6.
- THE PROPOSED SLIP LANE WHEN APPROACHING FROM BLOEMFONTEIN INTO THE T102 IS 120M IN LENGTH, AND THE SECOND SLIP LANE OUT OF T102 ONTO THE N6 TOWARDS REDDERSBURG IS 60M IN LENGTH.
- THE WIDTH OF THE SLIP-OFF IS AN AVERAGE 4.2M.
- ALL ACTIVITIES ASSOCIATED WITH THE N6 AS WELL AS THE T102 WILL BE UNDERTAKEN WITHIN THE EXISTING ROAD SERVITUDES.
- NO WIDENING OF THE T102 WILL BE UNDERTAKEN. IT WILL HOWEVER RECEIVE EITHER ASPHALT AND / OR PAVING.

WITH THE ABOVE IN MIND, THE UPGRADING OF THE N6 AS WELL AS THE T102 WILL NOT REQUIRE ENVIRONMENTAL AUTHORISATION AS NO LISTED ACTIVITIES ARE TRIGGERED, SHOULD BE ABOVE BE ADHERED TO.

6. SITE PHOTOGRAPHS

Colour photographs of the site and its surroundings (taken of the site and from the site), both before (if available) and after the activity commenced, with a description of each photograph must be attached to this application. The vantage points from which the photographs were taken must be indicated on the site plan, or locality plan as applicable. If available, please also provide past and recent aerial photographs. It should be supplemented with additional photographs of relevant features on the site. Date of photographs must be included. Photographs must be attached under Appendix D to this form.

7. APPLICABLE LEGISLATION, POLICIES AND/OR GUIDELINES

Please list all legislation, policies and/or guidelines that were or are relevant to this activity.

LEGISLATION	ADMINISTERING AUTHORITY	TYPE Permit/ license/ authorization/comment	DATE (if already obtained):
NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT 107 OF 1998)	DESTEA	AUTHORISATION: EXPANSION OF A CEMETERY	CURRENT APPLICATION
NATIONAL WATER ACT, 1998 (ACT 36 OF 1998)	DWS	AUTHORISATION: CONSTRUCTION ACTIVITIES NEAR A WATERCOURSE	WILL BE SUBMITTED BY THE APPLICANT IN DUE COURSE
NATIONAL HERITAGE RESOURCES ACT (ACT NO 25 OF 1999)	SAHRA	AUTHORISATION: ALTERNATION / DEMOLITION OF A STRUCTURE 60 YEARS OR OLDER.	WAS NOTIFIED OF THE PROJECT AS PART OF THE CURRENT APPLICATION. AN APPLICATION FOR THE ALTERNATION / DEMOLITION OF A STRUCTURE 60 YEARS OR OLDER WILL BE SUBMITTED TO THE FREE STATE HERITAGE AUTHORITY.

POLICY/ GUIDELINES	ADMINISTERING AUTHORITY
MANGAUNG METROPOLITAN MUNICIPAL BYLAWS	MANGAUNG METROPOLITAN MUNICIPALITY

SECTION C: DESCRIPTION OF RECEIVING ENVIRONMENT

Site/Area Description

For linear activities (pipelines etc) as well as activities that cover very large sites, it may be necessary to complete copies of this Section for each part of the site that has a significantly different environment. In such cases please complete copies of Section C and indicate the area which is covered by each copy No. on the Site Plan.

Section C Copy No. (e.g. 1, 2, or 3):	

1. GRADIENT OF THE SITE

Indicate the general gradient of the site(s) (cross out the appropriate box).

Flat	FLATTER THAN 1:10 SITE ELEVATION VARIES BETWEEN 1406 AND 1417 M ABOVE SEA LEVEL (WITHIN A 1.7KM DISTANCE)	1:10 – 1:5	Steeper than 1:5

2. LOCATION IN LANDSCAPE

Indicate the landform(s) that best describes the site (cross out ("☒") the appropriate box (es).

Ridgeline	Plateau	Side slope of hill/mountain	Closed valley	Open valley	PLAIN	Undulating plain/low hills	Dune	Sea-front	Other

3. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Is the site(s) located on or near any of the following [cross out ("☒") the appropriate boxes]?

Shallow water table (less than 1.5m deep)		NO	
Seasonally wet soils (often close to water bodies)	YES (AT THE WETLAND)		
Unstable rocky slopes or steep slopes with loose soil		NO	
Dispersive soils (soils that dissolve in water)		NO	
Soils with high clay content		NO	
Any other unstable soil or geological feature		NO	
An area sensitive to erosion	YES (AT THE WETLAND)		
If any of the answers to the above are "YES" or "UNSURE", specialist input may be requested by the Department. Information in respect of the above will often be available at the planning Sections of local authorities. Where it exists, the 1:50 000 scale Regional Geotechnical Maps prepared by Geological Survey may also be used.			

4. SURFACE WATER

Indicate the surface water present on and or adjacent to the site and alternative sites (cross out ("☒") the appropriate boxes)?

Perennial River		NO	
Non-Perennial River		NO	
Permanent Wetland		NO	
Seasonal Wetland	YES		
Artificial Wetland		NO	
Estuarine / Lagoonal wetland		NO	

5. VEGETATION AND GROUNDCOVER

5.1 VEGETATION / GROUNDCOVER (PRE-COMMENCEMENT)

Cross out ("☒") the block or describe (where required) the vegetation types / groundcover present on the site before commencement of the activity.

Indigenous Vegetation - good condition		Indigenous Vegetation with scattered aliens		Indigenous Vegetation with heavy alien infestation	
Describe the vegetation type above:		Describe the vegetation type above:		Describe the vegetation type above:	
Provide ecosystem status for above:		Provide ecosystem status for above:		Provide Ecosystem status for above:	
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface		Veld dominated by alien species		Distinctive soil conditions (e.g. Sand over shale, quartz patches, limestone, alluvial deposits, termitaria etc.) – describe	
Bare soil		Building or other structure		Sport field	
OTHER (DESCRIBE BELOW)		Cultivated land		Paved surface	

THE SITE CONSISTS OF OLD PLOUGHED FIELDS UTILISED FOR DRYLAND CROP CULTIVATION BUT HAS HOWEVER REHABILITATED THROUGH TIME TO A DEGRADED GRASSLAND. A LARGE DEPRESSION WETLAND (PAN) IS SITUATED WITHIN THE SITE.

ACCORDING TO MUCINA & RUTHERFORD (2006) THE AREA CONSISTS OF BLOEMFONTEIN DRY GRASSLAND (GH 5). THIS VEGETATION TYPE IS CURRENTLY LISTED AS BEING VULNERABLE (VU) AND THEREFORE A THREATENED ECOSYSTEM [NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)]. LARGE PORTIONS OF THIS GRASSLAND HAVE BEEN TRANSFORMED BY DRYLAND CROP CULTIVATION AND URBANISATION. THIS IS ALSO THE CASE ON THE SITE WHICH CONSISTS OF OLD PLOUGHED FIELDS AND ALTHOUGH THE VEGETATION HAS REHABILITATED ITSELF THE GRASSLAND IS NOT CONSIDERED REPRESENTATIVE OF THIS VEGETATION TYPE AND IN A DEGRADED CONDITION.

THE SITE ITSELF CONSISTS OF OLD PLOUGHED FIELDS AND HISTORICAL FURROWS ARE STILL VISIBLE IN MANY AREAS. AS A CONSEQUENCE THE GRASSLAND IS OF SECONDARY ESTABLISHMENT AND DEGRADED. SEVERAL WINDROWS OF THE EXOTIC BLUEGUM TREE (*EUCALYPTUS CAMALDULENSIS*) OCCUR TO THE WEST AND SOUTH OF

THE SITE.

THE SITE WAS UTILISED FOR COMMUNAL GRAZING AND CONSEQUENTLY IS SUBJECTED TO HEAVY OVERGRAZING. DUE TO THE CURRENT DROUGHT, OVERGRAZING AND THE SITE CONSISTING OF OLD PLOUGHED FIELDS THE GRASS LAYER IS HEAVILY DEGRADED AND CLIMAX SPECIES ARE LARGELY ABSENT. EXOTIC WEEDS ARE COMMON AND ALSO INDICATIVE OF THE DEGRADED CONDITION OF THE GRASSLAND.

EXOTIC WEEDS ARE COMMON ON THE SITE AND CONSIST OF *Argemone Ochroleuca, Alternanthera Nodiflora, Polygonum Aviculare, Plantago Major* AND *Phyla Nodiflora*. THESE ALSO INDICATE THE DISTURBED NATURE OF THE SITE.

THE VEGETATION AND GENERAL ECOLOGY OF THE SITE INDICATES THE TRANSFORMED AND HIGHLY DEGRADED CONDITION OF THE SITE. PREVIOUS PLOUGHING OF THE AREA HAS IRREVERSIBLY TRANSFORMED THE NATURAL VEGETATION TYPE AND DUE TO THE DISTURBANCE OF THE SOIL PROFILE AND HISTORICAL PLOUGH FURROWS IT IS HIGHLY UNLIKELY THAT REHABILITATION OF THE VEGETATION TO THE NATURAL CONDITION WILL BE FEASIBLE. CURRENT HIGH LEVELS OF GRAZING AND TRAMPLING BY DOMESTIC STOCK HAS ALSO CONTRIBUTED TO THE DISTURBANCE OF THE SITE AND ALTERATION OF THE SPECIES COMPOSITION.

5.2. VEGETATION / GROUNDCOVER (POST-COMMENCEMENT)
Cross out ("☒") the block or describe (where required) the vegetation types / groundcover present on the site after commencement of the activity.

Indigenous Vegetation - good condition		Indigenous Vegetation with scattered aliens		Indigenous Vegetation with heavy alien infestation	
Describe the vegetation type above:		Describe the vegetation type above:		Describe the vegetation type above:	
Provide ecosystem status for above:		Provide ecosystem status for above:		Provide Ecosystem status for above:	
Indigenous Vegetation in an ecological corridor or along a soil boundary / interface		Veld dominated by alien species		Distinctive soil conditions (e.g. Sand over shale, quartz patches, limestone, alluvial deposits, termitaria etc.) – describe	
Bare soil		Building or other structure		Sport field	
OTHER (DESCRIBE BELOW)		Cultivated land		Paved surface	
Please note: The Department may request specialist input/studies depending on the nature of the vegetation type / groundcover and impact(s) of the activity/ies. To assist with the identification of the vegetation type and ecosystem status consult http://bgis.sanbi.org or BGIShelp@sanbi.org. Information is also available on compact disc (cd) from the Biodiversity-GIS Unit, Ph (021) 799 8698. This information may be updated from time to time and it is the applicant/ EAP's responsibility to ensure that the latest version is used.					

NOTE:
THE CONSTRUCTION OF INTERNAL ROADS WAS UNDERTAKEN ON A PORTION OF THE SITE. THE SITE CONSISTS OF OLD PLOUGHED FIELDS UTILISED FOR DRYLAND CROP

CULTIVATION BUT HAS HOWEVER REHABILITATED THROUGH TIME TO A DEGRADED GRASSLAND. A LARGE DEPRESSION WETLAND (PAN) IS SITUATED WITHIN THE SITE.

THE SITE WILL BE TRANSFORMED TO A CEMETERY, SHOULD APPROVAL BE OBTAINED. THUS, THE VEGETATION ON SITE WILL BE REMOVED TO MAKE PLACE FOR THE CHAPEL, OFFICE BUILDING, ABLUTION FACILITIES, BURIAL SITES, INTERNAL ROADS, AS WELL AS ASSOCIATED INFRASTRUCTURES. THUS, THE GROUNDCOVER ON SITE (AFTER THE CONSTRUCTION ACTIVITIES HAVE CEASED, AS WELL AS DURING THE OPERATIONAL PHASE) CAN BE DESCRIBED AS GRAVES, BUILDINGS, ROADS, AS WELL AS GARDENS. NOTE THAT CERTAIN TREES ON SITE WILL NOT BE REMOVED DUE TO THEIR AESTHETIC VALUE.

5.3 VEGETATION / GROUNDCOVER MANAGEMENT

Describe any mitigation/management measures that were adopted and the adequacy of these:

STORMWATER CONTROL MEASURES WERE IMPLEMENTED, WHERE NECESSARY. ADDITIONAL STORMWATER CONTROL MEASURES WILL BE IMPLEMENTED DURING THE FUTHER DEVELOPMENT OF THE SITE, SHOULD THE PROJECT BE APPROVED BY DESTEA.

THE REMOVAL OF VEGETATION WAS KEPT TO THE DEVELOPMENT SITE IN ORDER TO LIMIT THE UNNECESSARILY REMOVAL OF VEGETATION.

WHERE POSSIBLE, TREES WERE NOT REMOVED FROM SITE, DUE TO THEIR AESTHETIC VALUE.

6. LAND USE CHARACTER OF SURROUNDING AREA (PRE-COMMENCEMENT)

Cross out ("☒") the block that reflects the past land uses and/or prominent features that occur/red within +/- 500m radius of the site and neighbouring properties if these are located beyond 500m of the site. Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and impact(s) of the activity/ies.

Untransformed area	Low density residential	Medium density residential	High density residential	Informal residential
Retail	Commercial & warehousing	Light industrial	Medium industrial	Heavy industrial
Power station	Office/consulting room	Military or police base/station/compound	Casino/entertainment complex	Tourism & Hospitality facility
Open cast mine	Underground mine	Spoil heap or slimes dam	Quarry, sand or borrow pit	Dam or reservoir
Hospital/medical center	School	Tertiary education facility	Church	Old age home
Sewage treatment plant	Train station or shunting yard	Railway line	Major road (4 lanes or more)	Airport
Harbour	Sport facilities	Golf course	Polo fields	Filling station
Landfill or waste treatment site	Plantation	AGRICULTURE	RIVER, STREAM OR WETLAND	Nature conservation area
Mountain, koppie or ridge	Museum	HISTORICAL BUILDING	GRAVEYARD	Archaeological site
Other land uses (describe):				

NOTE:

1. RIVER, STREAM OR WETLAND: WETLAND ON THE REMAINDER OF THE FARM NALISVIEW 2835

THE PROPOSED CEMETERY AROUND THE SEASONAL PAN HAS BEEN RATED AS BEING PREFERRED FOR THE DEVELOPMENT. ACCORDING TO MUCINA & RUTHERFORD (2006) THE AREA CONSISTS OF BLOEMFONTEIN DRY GRASSLAND (GH 5). THIS VEGETATION TYPE IS CURRENTLY LISTED AS BEING VULNERABLE (VU) AND THEREFORE A THREATENED ECOSYSTEM (NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)). LARGE PORTIONS OF THIS GRASSLAND HAVE BEEN TRANSFORMED BY DRYLAND CROP CULTIVATION AND URBANISATION. THIS IS ALSO THE CASE ON THE SITE WHICH CONSISTS OF OLD PLOUGHED FIELDS AND ALTHOUGH THE VEGETATION HAS REHABILITATED ITSELF THE GRASSLAND IS NOT CONSIDERED REPRESENTATIVE OF THIS VEGETATION TYPE AND IN A DEGRADED CONDITION. THE CONSERVATION VALUE OF THE VEGETATION ON THE SITE IS THEREFORE CONSIDERED RELATIVELY LOW.

PLEASE NOTE THAT THE SPECIALIST INDICATED THAT A BUFFER AREA OF 15 M SHOULD BE IMPLEMENTED AT THE WETLAND.

2. GRAVEYARD: PORTION 5 OF THE FARM NALISVIEW 2835

THE PROPOSED PROJECT ENTAILS THE EXPANSION OF THE APPROVED NALISVIEW CEMETERY (PORTION 5 OF THE FARM NALISVIEW 2835).

THE PROPOSED PROJECT WILL THUS FORM PART OF THE CEMETERY LOCATED ON PORTION 5 OF THE FARM NALISVIEW 2835.

3. HISTORICAL BUILDING: PORTION 1 OF THE FARM NALISVIEW 1060

THE MAIN HOUSE RECORDED AS THE OLD TOEKOMS HOMESTEAD IS POSSIBLY AROUND 60 YEARS OLD OR MAYBE MID-20TH CENTURY IN ORIGIN, BUT ITS ORIGINAL CHARACTER WAS ALTERED BY SUBSEQUENT RENOVATIONS. ALL STRUCTURES HAVE BEEN SEVERELY DAMAGED BY NEGLECT AND VANDALISM. THESE RUINS ARE NOT HISTORICALLY SIGNIFICANT ENOUGH TO REQUIRE PRESERVATION. IT IS ASSIGNED A SITE RATING OF GENERALLY PROTECTED B. THE APPLICANT WILL APPLY FOR A PERMIT IN TERMS OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999) SHOULD IT BE DECIDED TO UTILISE THE OLD FARM HOUSE AS PART OF THE INFRASTRUCTURE OF THE CEMETERY (FOR EXAMPLE OFFICES OR THE ADMINISTRATION BUILDING) OR BE DEMOLISHED,

THE EUCALYPTUS GROVE IS ASSIGNED A SITE RATING OF LOCAL SIGNIFICANCE, GRADE 3B. TREES ASSOCIATED WITH HISTORICAL SETTLEMENTS OR FARMSTEADS THAT ARE OLDER THAN 60 YEARS OLD, ARE GENERALLY PROTECTED AS HERITAGE SITES

WITH CULTURAL SIGNIFICANCE. THEIR REMOVAL OR DESTRUCTION WILL REQUIRE THE APPROPRIATE CONSENT AND A DESTRUCTION PERMIT FROM SAHRA. WHILE MANY OF THE TREES APPEAR TO BE YOUNGER THAN 60 YEARS OLD, THE AGE OF SEVERAL SPECIMENS MAY WELL BE OLDER. SHOULD IT BE NECESSARY TO REMOVE THE TREES, THE APPLICANT WILL APPLY FOR A PERMIT IN TERMS OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999).

4. AGRICULTURE: REMAINDER OF THE FARM NALISVIEW 2035

THE PROPOSED CEMETERY AROUND THE SEASONAL PAN HAS BEEN RATED AS BEING PREFERRED FOR THE DEVELOPMENT. ACCORDING TO MUCINA & RUTHERFORD (2006) THE AREA CONSISTS OF BLOEMFONTEIN DRY GRASSLAND (GH 5). THIS VEGETATION TYPE IS CURRENTLY LISTED AS BEING VULNERABLE (VU) AND THEREFORE A THREATENED ECOSYSTEM (NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT, 2004 (ACT NO. 10 OF 2004)). LARGE PORTIONS OF THIS GRASSLAND HAVE BEEN TRANSFORMED BY DRYLAND CROP CULTIVATION AND URBANISATION. THIS IS ALSO THE CASE ON THE SITE WHICH CONSISTS OF OLD PLOUGHED FIELDS AND ALTHOUGH THE VEGETATION HAS REHABILITATED ITSELF THE GRASSLAND IS NOT CONSIDERED REPRESENTATIVE OF THIS VEGETATION TYPE AND IN A DEGRADED CONDITION. THE CONSERVATION VALUE OF THE VEGETATION ON THE SITE IS THEREFORE CONSIDERED RELATIVELY LOW.

THE TOPOGRAPHY OF THE SITE IS RELATIVELY FLAT WITH A SLIGHT INCREASE IN SLOPE TO THE SOUTH. THE SITE ITSELF CONSISTS OF OLD PLOUGHED FIELDS AND HISTORICAL FURROWS ARE STILL VISIBLE IN MANY AREAS. AS A CONSEQUENCE THE GRASSLAND IS OF SECONDARY ESTABLISHMENT AND DEGRADED. SEVERAL WINDROWS OF THE EXOTIC BLUEGUM TREE (*EUCALYPTUS CAMALDULENSIS*) OCCUR TO THE WEST AND SOUTH OF THE SITE. RESIDENTIAL AREAS OCCUR IN CLOSE PROXIMITY TO THE NORTH OF THE SITE (APPROXIMATELY 2 KM). SMALL DEMOLISHED STRUCTURES ARE ALSO EVIDENT AROUND THE DEPRESSION WETLAND ON THE SITE, MOST LIKELY WATERING OR FEEDING TROUGHS, WINDMILL, DAM OR SIMILAR ASSOCIATED STRUCTURES.

THE SITE CONTAINS A LARGE DEPRESSION OR PAN IN THE CENTRE/WESTERN PORTION OF THE SITE. THIS SEEMS TO BE A NATURAL SYSTEM BUT HAS HOWEVER ALSO BEEN DEGRADED THROUGH PLOUGHING AND RETENTION BERMS TO CONTAIN SURFACE WATER. IN ADDITION, TWO ARTIFICIAL BERMS/DAMS OCCUR TO THE NORTH WEST OF THE SITE (APPROXIMATELY 200 M). NONE OF THESE WATERBODIES ARE FED BY A DEFINED WATERCOURSE AND THEREFORE HAVE NO INLET. THEY ALSO DO NOT CONTAIN A DEFINED OUTLET. THEY ARE ALL FED BY SURFACE INFLOW FROM THE SURROUNDINGS AND FUNCTION AS GROUNDWATER RECHARGE SYSTEMS.

THE VEGETATION AND GENERAL ECOLOGY OF THE SITE INDICATES THE TRANSFORMED AND HIGHLY DEGRADED CONDITION OF THE SITE. PREVIOUS PLOUGHING OF THE AREA HAS IRREVERSIBLY TRANSFORMED THE NATURAL VEGETATION TYPE AND DUE TO THE DISTURBANCE OF THE SOIL PROFILE AND

HISTORICAL PLOUGH FURROWS IT IS HIGHLY UNLIKELY THAT REHABILITATION OF THE VEGETATION TO THE NATURAL CONDITION WILL BE FEASIBLE. HIGH LEVELS OF GRAZING AND TRAMPLING BY DOMESTIC STOCK HAS ALSO CONTRIBUTED TO THE DISTURBANCE OF THE SITE AND ALTERATION OF THE SPECIES COMPOSITION.

OBLIGATE WETLAND VEGETATION WAS UTILISED TO DETERMINE THE PRESENCE AND BORDER OF WETLANDS. SOIL SAMPLES WERE USED TO DETERMINE THE BORDER AND ALSO TO CONFIRM THE PRESENCE OF WETLAND SOILS WHERE OBLIGATE WETLAND VEGETATION INDICATED WETLAND CONDITIONS. THE SOIL SAMPLES TAKEN WITHIN THE PAN ON THE SITE CLEARLY INDICATE THAT WETLAND CONDITIONS ARE PRESENT WITHIN THE PAN. DUE TO PREVIOUS PLOUGHING OF THE PAN AND THE DISTURBANCE ON THE SITE THE PAN AND ITS BORDER IS NOT READILY DISTINGUISHABLE FROM THE SURROUNDINGS. THE PAN DOES FORM A SHALLOW DEPRESSION WHICH ENABLES IT TO BE IDENTIFIED TO SOME DEGREE. THE OBLIGATE WETLAND SPECIES AND SOIL CHARACTERISTICS CLEARLY INDICATE DEFINITE WETLAND CONDITIONS WITHIN THE PAN. THE GRASS, *Leptochloa Fusca*, IS ABUNDANT WITHIN THE PAN AND IS LISTED AS AN OBLIGATE WETLAND SPECIES. THE PAN SYSTEM IS SEASONAL IN NATURE AND WILL ONLY CONTAIN WATER AFTER RAINFALL EVENTS. THE PAN DOES NOT HAVE ANY DEFINED IN- OR OUTFLOW. IT IS FED BY SURFACE RUNOFF FROM THE SURROUNDING AREA AND FUNCTIONS AS A GROUNDWATER RECHARGE.

THE PAN SYSTEM ON THE SITE HAS BEEN DEGRADED BY SEVERAL IMPACTS. MOST NOTABLY THE PREVIOUS PLOUGHING OF THE PAN HAS DISTURBED THE SOIL PROFILE AND FORMED PLOUGH FURROWS WHICH ARE STILL VISIBLE. THIS CAUSES A DISRUPTION OF THE PAN SURFACE AND WILL ALTER INFILTRATION AND INFLOW INTO THE PAN AS THE FURROWS ACTS AS CHANNELS AND BERMS. LOW BERMS HAVE ALSO BEEN ERECTED IN THE EASTERN PORTION OF THE PAN WHICH ALSO CAUSES ALTERATION OF WATER FLOW WITHIN THE PAN. THE HEAVY AND SUSTAINED GRAZING OF THE SITE LEADS TO DECREASED VEGETATION COVER WHICH INCREASES EROSION AND RUNOFF AND WILL CONTRIBUTE TO SEDIMENTATION OF THE PAN. COUPLED WITH GRAZING IS A HIGH AMOUNT OF TRAMPLING WHICH DISTURBS THE FLOOR OF THE PAN, DESTROYS VEGETATION AND WILL IMPACT NEGATIVELY ON THE PAN. THIS WILL ALTER THE INFILTRATION OF THE PAN. TOGETHER WITH THE HIGH GRAZING IS AN INCREASE IN MANURE WHICH WILL ALTER THE NUTRIENT LEVELS OF THE PAN.

THE PAN FUNCTIONS IN THE FORM OF GROUNDWATER RECHARGE. IT THEREFORE STILL PERFORMS AN IMPORTANT ECOSYSTEM FUNCTION ALTHOUGH HIGHLY DEGRADED. IT WILL ALSO BE UNFEASIBLE TO INCLUDE THE PAN WITHIN THE CEMETERY LAYOUT AS GRAVES WILL BE SUBJECTED TO ANNUAL FLOODING. IT IS THEREFORE RECOMMENDED THAT THE PAN BE EXCLUDED FROM THE CEMETERY LAYOUT. THE CONDITION OF THE PAN CAN BE IMPROVED AND IT CAN BE INCORPORATED INTO THE LAYOUT TO IMPROVE THE AESTHETIC FEEL OF THE CEMETERY.

IN ORDER TO ESTABLISH A SUITABLE BUFFER FOR THE PAN THE BUFFER ZONE TOOL FOR THE DETERMINATION OF AQUATIC IMPACT BUFFERS AND ADDITIONAL SETBACK REQUIREMENTS FOR WETLAND ECOSYSTEMS (2014) WERE UTILISED. THIS DETERMINATION WAS ALSO DONE IN CONJUNCTION WITH MACFARLANE *ET AL*

(2014). IT SHOULD BE NOTED THAT THE BUFFERS DETERMINED BY THIS MODEL ONLY CATERS FOR IMPACTS ASSOCIATED WITH DIFFUSE-SOURCE SURFACE RUNOFF. BY USING THE ABOVE TOOLS A SUITABLE BUFFER AROUND THE PAN WAS DETERMINED AT 15 METERS.

ADJACENT TO THE SITE TWO ARTIFICIAL DAMS OR BERMS ARE SITUATED WHICH FORMS ARTIFICIAL IMPOUNDMENTS WITH WETLAND CONDITIONS. THESE ARE ALSO LISTED WITHIN THE NATIONAL FRESHWATER ECOSYSTEMS PRIORITY AREAS (NFEPA) AS ARTIFICIAL SYSTEMS AND CONFIRMED DURING THE SITE SURVEY. THEY ARE THEREFORE OF LOW SENSITIVITY ALTHOUGH THEY STILL FORM PART OF THE NATURAL DRAINAGE PATTERN.

THE PAN ON THE SITE IS HOWEVER NATURAL AND CONFIRMED DURING THE SITE SURVEY AS WELL AS BY THE NFEPA. THE IMPACTS ON THE PAN SHOULD BE KEPT TO A MINIMUM DESPITE THE HIGHLY DEGRADED NATURE OF THE PAN. THE RECOMMENDED BUFFER OF 15 METERS SHOULD BE KEPT AROUND THE PAN. THE LAYOUT OF GRAVE SITES WITHIN THE PAN IS NOT FEASIBLE AS THEY WILL BE FLOODED ANNUALLY.

5. AGRICULTURE: PORTION 1 OF THE FARM NALISVIEW 1060

THE SITE CONSISTS OF GRASSLAND, THOUGH IT IS CLEAR THAT THE NATURAL VEGETATION HAS BEEN TRANSFORMED BY PREVIOUS PLOUGHING AND CROP CULTIVATION. THE SITE CONSISTS OF OLD PLOUGHED FIELDS AND ALTHOUGH THE VEGETATION HAS REHABILITATED ITSELF, THE SPECIES COMPOSITION IS NOT CONSIDERED REPRESENTATIVE OF THIS VEGETATION TYPE AND IN A DEGRADED CONDITION. AS A RESULT, THE CONSERVATION VALUE OF THE SITE IS CONSIDERED TO BE RELATIVELY LOW. THE NATURAL VEGETATION ON THE SITE HAS BEEN COMPLETELY TRANSFORMED BY PREVIOUS PLOUGHING. WHEN LOOKING AT AVAILABLE AERIAL IMAGERY IT IS CLEAR THAT THE SITE HAD BEEN PLOUGHED AS EARLY AS 2000 AND HAS SUBSEQUENTLY BEEN ALLOWED TO RE-VEGETATE ITSELF. HOWEVER, PLOUGH FURROWS REMAIN HIGHLY VISIBLE ON RECENT IMAGERY AND SUBSTANTIATE THE TRANSFORMED NATURE OF THE SITE. THE ON-SITE SURVEY HAS ALSO CONFIRMED THAT REMNANTS OF PLOUGH FURROWS REMAIN VISIBLE.

6. AGRICULTURE: ADJACENT PROPERTIES

THE SITE CONSISTS OF GRASSLAND, THOUGH IT IS CLEAR THAT THE NATURAL VEGETATION HAS BEEN TRANSFORMED BY PREVIOUS PLOUGHING AND CROP CULTIVATION. THE ADJACENT PROPERTIES CONSISTS MAINLY OF OLD PLOUGHED FIELDS AND ARE POSSIBLY BE USED FOR FEEDING OF LIVESTOCK.

IT IS NOT ANTICIPATED THAT THE CURRENT AGRICULTURAL ACTIVITIES WILL HAVE A SIGNIFICANT IMPACT ON THE PROPOSED PROJECT, AND VICE VERSA.

7. REGIONAL PLANNING CONTEXT

Is/was the activity permitted in terms of the property's existing land use rights? Please explain

THE SITE IS CURRENTLY ZONED AS AGRICULTURE. THE REMAINDER OF THE FARM NALISVIEW 2835 IS INDICATED AS A FUTURE CEMETERY SITE ON THE MUNICIPALITY'S SDF. AN APPLICATION FOR SUBDIVISION AND REZONING IN TERMS OF THE TOWNSHIP ESTABLISHMENT IN TERMS OF SPLUMA AS WELL AS THE MUNICIPAL LAND USE MANAGEMENT SCHEME WILL ALSO BE SUBMITTED AS PART OF THIS PROJECT.			
Is/was the activity in line with the following?			
○ Provincial Spatial Development Framework (PSDF)	YES		
THE PROPOSED PROJECT IS A PROJECT BY MMM AND IS REQUIRED IN ORDER TO IMPROVE SERVICE DELIVERY TO THE AREA. THE PROPOSED PROJECT IS IN LINE WITH THE PROVINCIAL SPATIAL DEVELOPMENT PLANS.			
○ Urban edge / Edge of Built Environment for the area	YES		
THE PROJECT ENTAILS THE EXPANSION OF AN APPROVED CEMETERY.			
○ Integrated Development Plan of the Local Municipality	YES		
THE PROPOSED PROEJCT IS A PROJECT BY THE METROPOLITAN MUNICIPALITY			
○ Spatial Development Framework of the Local Municipality	YES		
THE REMAINDER OF THE FARM NALISVIEW 2835` IS INDICATED AS A FUTURE CEMETERY ON THE LATEST SDF OF THE MANGAUNG METROPOLITAN MUNICIPALITY.			
○ Approved Structure Plan of the Municipality	YES		
THE PROPOSED PROJECT IS IN LINE WITH THE VISION OF MMM, AS IT IS A PROJECT BY MMM.			
○ Any other Plans	YES		
THE PROPOSED PROJECT WILL NOT COMPROMISE THE INTEGRITY OF THE EXISTING ENVIRONMENTAL MANAGEMENT PRIORITIES FOR THE AREA, SHOULD THE CONTRACTORS ADHERE TO THE CONDITIONS STIPULATED IN THIS REPORT, ADDITIONAL SPECIFICATIONS TO BE PROVIDED, THE EMPR AS WELL AS BEST PRACTICES. • SPECIFIC MEASURES TO BE IMPLEMENTED WILL INCLUDE, BUT NOT LIMITED TO: • STORMWATER MEASURES • EROSION CONTROL			

- LIMITING THE REMOVAL OF VEGETATION
- LIMITING THE FORMATION OF DUST
- MONITORING GROUNDWATER AND SURFACE WATER FOR POSSIBLE CONTAMINATION THEREOF DUE TO OPERATIONAL ACTIVITIES AT THE CEMETERY
- ETC.

REFER TO THE EMPR FOR MORE INFORMATION ON MEASURES TO BE IMPLEMENTED.

NOTE THAT THE PROJECT IS A MMM INITIATIVE AND THEREFORE THE PROPOSED PROJECT WILL BE IN LINE WITH THE INTEGRITY OF THE EXISTING ENVIRONMENTAL MANAGEMENT PRIORITIES FOR THE AREA.

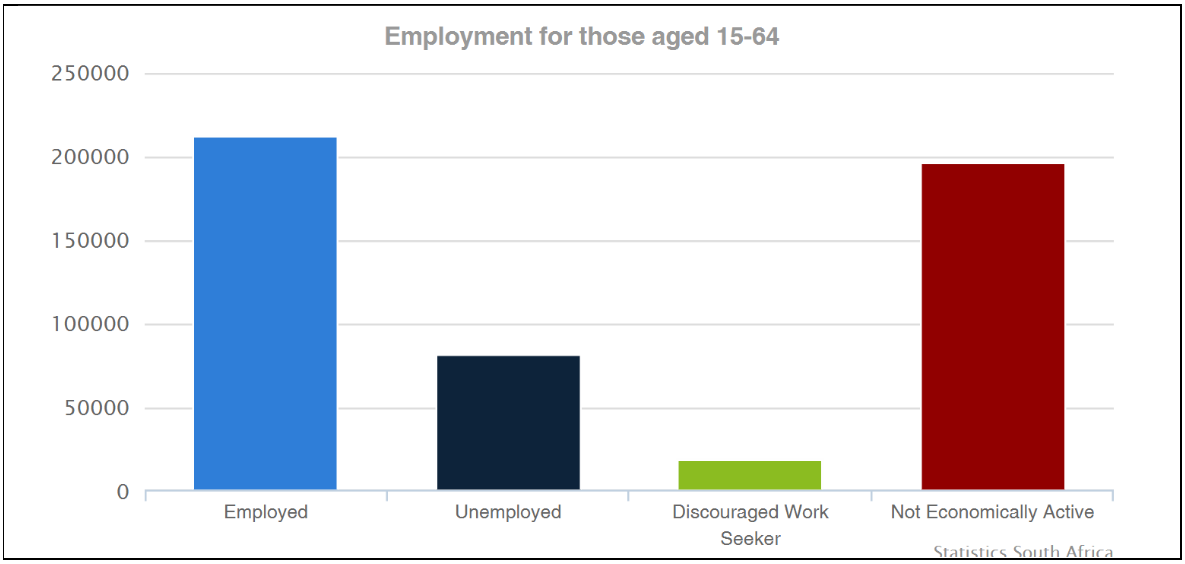
8 SOCIO-ECONOMIC CONTEXT

8.1 SOCIO-ECONOMIC CONTEXT (PRE-COMMENCEMENT)

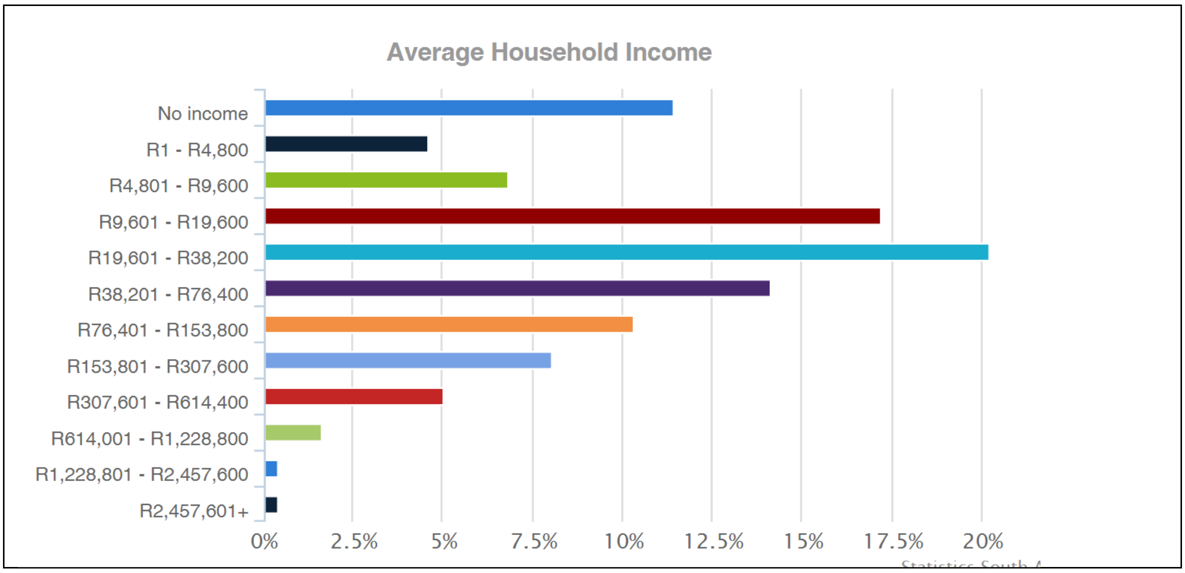
Describe the pre-commencement social and economic characteristics of the community in order to provide baseline information.

NOTE:
THE INFORMATION IN THIS SECTION WAS OBTAINED FROM THE FOLLOWING WEB ADDRESS: HTTP://WWW.STATSSA.GOV.ZA/?PAGE_ID=1021&ID=MANGAUNG-MUNICIPALITY

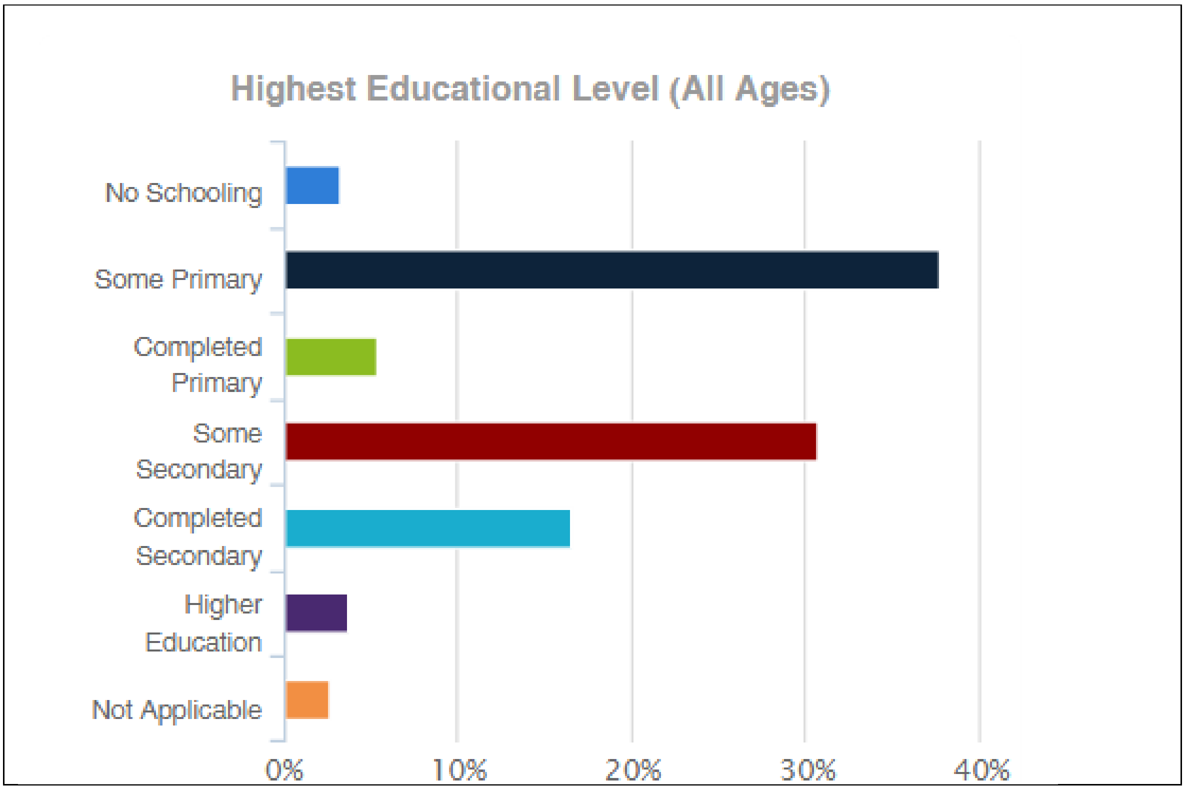
LEVEL OF UNEMPLOYMENT:



ECONOMIC PROFILE OF LOCAL MUNICIPALITY:



LEVEL OF EDUCATION:



8.2 SOCIO-ECONOMIC CONTEXT (POST-COMMENCEMENT)

Describe the post commencement social and economic characteristics of the community in order to determine any change.

THE CONSTRUCTION OF INTERNAL ROADS PROVIDED 6 EMPLOYMENT OPPORTUNITIES, FOR A PERIOD OF 12 WEEKS. THE CONTRACTOR EMPLOYED PEOPLE FROM THE LOCAL COMMUNITY. 24 PEOPLE, WHEN AN AVERAGE HOUSEHOLD OF 4 PERSONS IS TAKEN INTO CONSIDERATION, BENEFITTED BY THE CONSTRUCTION ACTIVITIES (ASSOCIATED WITH THE INTERNAL ROADS) THAT WAS UNDERTAKEN TO DATE. SHOULD THE CONSTRUCTION OF THE FENCE ALSO BE TAKEN INTO CONSIDERATION, TEMPORARY EMPLOYMENT OPPORTUNITIES WAS PROVIDED FOR A PERIOD OF ROUGHLY 78 (ON AND OFF BASIS) WEEKS FOR 20 EMPLOYEES.

HOWEVER, SHOULD THE CONSTRUCTION ACTIVITIES (INCLUDING THE CONSTRUCTION OF ADDITIONAL INTERNAL ROADS, DIGGING OF GRAVES, CONSTRUCTION OF CHAPELS AND ASSOCIATED INFRASTRUCTURE SUCH AS THE ABLUSION FACILITIES, OFFICE BUILDING ETC.) CONTINUE, MORE EMPLOYMENT OPPORTUNITIES WILL BE AVAILABLE, FOR A LONGER PERIOD OF TIME. THE EXPECTED VALUE OF THE EMPLOYMENT OPPORTUNITIES DURING THE DEVELOPMENT AND CONSTRUCTION PHASE IS UNKNOWN, AS IT DEPENDS ON THE CONTRACTOR THAT WILL BE APPOINTED. APPROXIMATELY 80% OF THE VALUE OF THE EMPLOYMENT OPPORTUNITIES WILL ACCRUE TO PREVIOUSLY DISADVANTAGED INDIVIDUALS.

CULTURAL/HISTORICAL FEATURES

Were there any signs or evidence (unearthed during construction) of culturally or historically significant elements including archaeological or palaeontological sites, on or in close proximity to the site?		YES	
If YES, explain:	**SUMMARY OF HERITAGE REPORT: PORTION 1 OF THE FARM NALISVIEW 1060** AN EXISTING TREE GUM GROVE MAY BE OF HISTORICAL INTEREST. TREES ASSOCIATED WITH HISTORICAL SETTLEMENTS OR FARMSTEADS THAT ARE OLDER THAN 60 YEARS, ARE GENERALLY PROTECTED AS HERITAGE SITES WITH CULTURAL SIGNIFICANCE. THEIR REMOVAL OR DESTRUCTION WILL REQUIRE THE APPROPRIATE CONSENT AND A DESTRUCTION PERMIT FROM SAHRA. WHILE MANY OF THE TREES APPEAR TO BE YOUNGER THAN 60 YEARS OLD, THE AGE OF SEVERAL SPECIMENS MAY WELL BE OLDER.		
If uncertain, the Department may request that specialist input be provided to establish whether such possibilities occurred on or close to the site.			
Briefly explain the findings of the specialist if one was already appointed:	**SUMMARY OF HERITAGE REPORT: REMAINDER OF THE FARM NALISVIEW 2835** A FOOT SURVEY OF THE TERRAIN REVEALED NO EVIDENCE FOR THE ACCUMULATION AND PRESERVATION OF INTACT FOSSIL MATERIAL WITHIN THESE SUPERFICIAL QUATERNARY SEDIMENTS. OUTCROP VISIBILITY IS GENERALLY POOR ALONG THE FOOTPRINT, BUT FINE- TO		

COARSE-GRAINED, SANDSTONE OUTCROP IS OCCASIONALLY EXPOSED. THE SURVEY ALSO REVEALED NO EVIDENCE OF *IN SITU* STONE AGE ARCHAEOLOGICAL MATERIAL, CAPPED OR DISTRIBUTED AS SURFACE SCATTERS ON THE LANDSCAPE. THERE ARE ALSO NO INDICATIONS OF ROCK ART (ENGRAVINGS ON DOLERITE OUTCROP), PREHISTORIC STRUCTURES, ANGLO BOER WAR SITES, GRAVES OR BUILDINGS WITH HISTORICAL SIGNIFICANCE OLDER THAN 60 YEARS WITHIN THE BOUNDARIES OF THE STUDY AREA. THERE ARE NO MAJOR ARCHAEOLOGICAL GROUNDS TO SUSPEND EXCAVATION ACTIVITIES WITHIN THE PROPOSED DEVELOPMENT FOOTPRINT. THE PROPOSED DEVELOPMENT FOOTPRINT IS ASSIGNED A SITE RATING OF GENERALLY PROTECTED C (GP.C). EXCAVATIONS RELATED TO THE DIGGING OF GRAVES MAY HAVE AN ADVERSE AFFECT ON SUBSURFACE BEDROCK SEDIMENTS THAT MAY WELL BE OF PALAEONTOLOGICAL INTEREST. EVEN SO, THE LIKELIHOOD OF PALAEONTOLOGICAL IMPACT IS CONSIDERED LOW, BECAUSE OF THE LOW RELIEF TERRAIN. THERE ARE NO MAJOR PALAEONTOLOGICAL GROUNDS TO SUSPEND THE PROPOSED DEVELOPMENT, BUT IN THE UNLIKELY EVENT THAT FOSSILS ARE ENCOUNTERED DURING SUCH EXCAVATIONS, IT MUST BE PROTECTED AND THEIR LOCALITY MARKED. THE SOUTH AFRICAN HERITAGE RESOURCES AGENCY OR NATIONAL MUSEUM IN BLOEMFONTEIN SHOULD THEN BE NOTIFIED IMMEDIATELY SO THAT THE APPROPRIATE STEPS CAN BE TAKEN TO COLLECT AND REMOVE THE MATERIAL. THE ACCESS ROAD FOOTPRINT FORMS PART OF AN EXISTING ROAD AND WILL NOT AFFECT PALAEONTOLOGICAL OR ARCHAEOLOGICAL HERITAGE, BUT AN EXISTING TREE GUM GROVE MAY BE OF HISTORICAL INTEREST. TREES ASSOCIATED WITH HISTORICAL SETTLEMENTS OR FARMSTEADS, THAT ARE OLDER THAN 60 YEARS OLD, ARE GENERALLY PROTECTED AS HERITAGE SITES WITH CULTURAL SIGNIFICANCE. THEIR REMOVAL OR DESTRUCTION WILL REQUIRE THE APPROPRIATE CONSENT AND A DESTRUCTION PERMIT FROM SAHRA. WHILE MANY OF THE TREES APPEAR TO BE YOUNGER THAN 60 YEARS OLD, THE AGE OF SEVERAL SPECIMENS MAY WELL BE OLDER. IT IS ADVISED THAT, AS A PREREQUISITE, SPECIALIST INPUT IS OBTAINED FROM A BOTANIST IN ORDER TO ASCERTAIN THE AGE OF THE TREES LOCATED WITHIN THE PROPOSED IMPACT ZONE.

SUMMARY OF HERITAGE REPORT: PORTION 1 OF THE FARM NALISVIEW 1060

A FOOT SURVEY OF THE TERRAIN REVEALED NO EVIDENCE FOR THE ACCUMULATION AND PRESERVATION OF INTACT FOSSIL MATERIAL WITHIN THESE SUPERFICIAL QUATERNARY SEDIMENTS. OUTCROP VISIBILITY IS GENERALLY POOR ALONG THE FOOTPRINT, AND SANDSTONE OUTCROP IS RARELY EXPOSED. THE LIKELIHOOD OF PALAEONTOLOGICAL IMPACT IS CONSIDERED LOW, BECAUSE OF THE

	LOW RELIEF TERRAIN. THE SURVEY ALSO REVEALED NO EVIDENCE OF *IN SITU* STONE AGE ARCHAEOLOGICAL MATERIAL, CAPPED OR DISTRIBUTED AS SURFACE SCATTERS ON THE LANDSCAPE. THERE ARE ALSO NO INDICATIONS OF ROCK ART, PREHISTORIC STRUCTURES, GRAVES OR WELL-PRESERVED BUILDING STRUCTURES WITH HISTORICAL SIGNIFICANCE OLDER THAN 60 YEARS WITHIN THE BOUNDARIES OF THE STUDY AREA. THE RUINS OF AN OLD HOMESTEAD MARKED AS *TOEKOMS* ON THE 1:50 000 TOPOGRAPHICAL MAP IS CLEARLY VISIBLE AT THE SITE (GPS COORDINATES 29°15'27.15"S 26°14'7.03"E). MAP EVIDENCE INDICATES THAT THE *TOEKOMS* HOMESTEAD EXISTED AT LEAST AS FAR BACK AS 1962, ALONG WITH A FORERUNNER OF AN EXISTING EUCALYPTUS GROVE THAT IS LOCATED NEAR THE RUINS. IT IS THE OPINION OF THIS AUTHOR THAT THE RUINS OF THE HOMESTEAD ARE ASSIGNED A SITE RATING OF *GENERALLY PROTECTED B (GP.B*). THE EUCALYPTUS GROVE IS ASSIGNED A SITE RATING OF *LOCAL SIGNIFICANCE, GRADE 3B*. THE REST OF THE REST OF THE STUDY AREA IS IS ASSIGNED A SITE RATING OF *GENERALLY PROTECTED C*. IT IS ADVISED THAT FOR THE HOMESTEAD, THE DEVELOPER FOLLOW PROPER PROCEDURES AS STIPULATED IN SECTION 34(1) OF THE NATIONAL HERITAGE RESOURCES ACT 25 OF 1999 [*"NO PERSON MAY ALTER OR DEMOLISH ANY STRUCTURE OR PART OF A STRUCTURE WHICH IS OLDER THAN 60 YEARS WITHOUT A PERMIT ISSUED BY THE RELEVANT PROVINCIAL HERITAGE RESOURCES AUTHORITY"*], BY APPLYING FOR A DESTRUCTION PERMIT FROM THE FREE STATE HERITAGE AUTHORITY; THE LAYOUT OF THE TOEKOMS HOMESTEAD IS PROPERLY MAPPED AND PHOTOGRAPHED BEFORE DESTRUCTION TAKES PLACE AND THAT THE EUCALYPTUS GROVE IS LEFT INTACT AND INCLUDED AS A FEATURE WITHIN THE PROPOSED DEVELOPMENT.	
Were any buildings or structures older than 60 years affected in any way?	YES	
Was it necessary to apply for a permit in terms of the National Heritage Resources Act, 1999 (Act 25 of 1999)?	YES	
If yes, please submit or, make sure that the applicant or a specialist submit the necessary application to SAHRA or the relevant provincial heritage agency and attach proof thereof to this application.		

NOTE:

THE FARM HOUSE RECORDED AS THE OLD TOEKOMS HOMESTEAD IS POSSIBLY AROUND 60 YEARS OLD OR MAYBE MID-20TH CENTURY IN ORIGIN, BUT ITS ORIGINAL CHARACTER WAS ALTERED BY SUBSEQUENT RENOVATIONS. ALL STRUCTURES HAVE BEEN SEVERELY DAMAGED BY NEGLECT AND VANDALISM. THESE RUINS ARE NOT HISTORICALLY SIGNIFICANT ENOUGH TO REQUIRE PRESERVATION. IT IS ASSIGNED A SITE RATING OF GENERALLY PROTECTED B. THE APPLICANT WILL APPLY FOR A PERMIT IN TERMS OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999) SHOULD IT BE DECIDED TO UTILISE THE OLD FARM HOUSE AS PART OF THE INFRASTRUCTURE OF THE CEMETERY (FOR EXAMPLE OFFICES OR THE ADMINISTRATION

BUILDING) OR BE DEMOLISHED,

THE EUCALYPTUS GROVE IS ASSIGNED A SITE RATING OF LOCAL SIGNIFICANCE, GRADE 3B. TREES ASSOCIATED WITH HISTORICAL SETTLEMENTS OR FARMSTEADS THAT ARE OLDER THAN 60 YEARS OLD, ARE GENERALLY PROTECTED AS HERITAGE SITES WITH CULTURAL SIGNIFICANCE. THEIR REMOVAL OR DESTRUCTION WILL REQUIRE THE APPROPRIATE CONSENT AND A DESTRUCTION PERMIT FROM SAHRA. WHILE MANY OF THE TREES APPEAR TO BE YOUNGER THAN 60 YEARS OLD, THE AGE OF SEVERAL SPECIMENS MAY WELL BE OLDER. SHOULD IT BE NECESSARY TO REMOVE THE TREES, THE APPLICANT WILL APPLY FOR A PERMIT IN TERMS OF THE NATIONAL HERITAGE RESOURCES ACT, 1999 (ACT 25 OF 1999).

SECTION D: PRELIMINARY IMPACT ASSESSMENT

Please note, the impacts identified below refer to general impacts commonly associated with development activities. The list below is not exhaustive and may need to be supplemented. Where required, please append the information on any additional impacts to this application.

1. WASTE, EFFLUENT AND EMISSION MANAGEMENT

(a) Solid waste management

Did/does the activity produce any general waste (e.g. domestic-, commercial-, certain industrial waste, including building rubble also known as solid waste) during the construction phase and/or the operational phase?		NO
If yes, briefly describe what type of waste was produced (i.e. green waste, building rubble, etc.) in which phase.		
PLEASE NOTE THAT ONLY THE CONSTRUCTION OF INTERNAL ROADS AND FENCING TOOK PLACE TO DATE. NO WASTE WAS PRODUCED DURING THE CONSTRUCTION OF THE SAID INTERNAL ROADS. IN ADDITION, NO WASTE WAS PRODUCED DURING THE FENCING OF THE SITE. IT IS NOT FORESEEN THAT ANY CONSTRUCTION WASTE WILL BE DISPOSED OF DURING THE CONSTRUCTION PHASE, DUE TO THE FACT THAT CONSTRUCTION SOLID WASTE ASSOCIATED WITH THE PROPOSED PROJECT REFERS TO SOIL, WEATHERED GRANITE AND INTERMEDIATE MATERIAL OR HARD ROCK. AN EARTH EMBANKMENT MAY BE CONSTRUCTED FROM SOME OF THE CONSTRUCTION SOLID WASTE AS DESCRIBED ABOVE TO PREVENT STORM WATER FROM FLOWING INTO THE CEMETERY AND TO DRAIN ANY RUN-OFF THAT ORIGINATES FROM THE PROPOSED CEMETERY SITE. OTHER SOIL COLLECTED DURING THE LEVELLING PROCESS WILL BE USED TO BACKFILL LOWER LAYING AREAS. SOIL COLLECTED DURING THE DIGGING OF GRAVES WILL BE USED TO BACKFILL THE GRAVES. LEFT-OVER MATERIAL MAY BE USED BY THE MUNICIPALITY (I.E. THE APPLICANT AND LANDOWNER) FOR GENERAL MAINTENANCE ON SITE. HOWEVER, SHOULD ANY SOLID WASTE BE GENERATED BY THE PROPOSED PROJECT, THE WASTE WILL BE CLASSIFIED AND DISPOSED OF AT THE NEAREST AUTHORIZED LANDFILL SITE.		
What quantity was/is produced during the construction period?	0	M^3
What was/is the estimated quantity that will be produced per month during the operational phase?	UNKNOWN	M^3

Did/does the activity produce any hazardous waste (e.g. chemical, medical waste, infectious, nuclear etc.) during the construction and/or the operational phase?		NO
If yes, briefly describe what type of waste was produced (i.e. infectious waste, medical waste, etc.) in which phase.		
What quantity was/is produced during the construction period?	0	M^3
What was/is the estimated quantity that will be produced per month during the operational phase?	0	M^3

Where and how was/is waste treated / disposed of (describe each waste stream)?
NOTE: GENERAL WASTE COLLECTED ON SITE DURING THE OPERATIONAL PHASE WILL BE COLLECTED IN WASTE BINS SITUATED ON VARIOUS POSITIONS ON SITE. THESE BINS WILL BE EMPTIED REGULARLY / WHEN NECESSARY AND DISPOSED OF AT AN AUTHORISED LANDFILL SITE IN BLOEMFONTEIN.

Has the municipality or relevant authority confirmed that sufficient capacity exist for treating / disposing of the solid waste to be generated by this activity(ies)? If yes, provide written confirmation from municipality or relevant authority	YES NOTE, THIS IS A PROJECT BY THE RELEVANT MUNICIPALITY	
Does/did the activity produce solid waste that was/will be treated and/or disposed of at another facility other than into a municipal waste stream?		NO
If yes, did/has this facility confirmed that sufficient capacity exist for treating / disposing of the solid waste to be generated by this activity(ies)? Provide written confirmation from the facility and provide the following particulars of the facility:	N/A	
Did/does the facility have an operating license? (If yes, please attach a copy of the license.)	N/A	

Facility name: N/A		
Contact person: N/A		
Postal address: N/A		
	Postal code: N/A	
Telephone: N/A	Cell: N/A	
E-mail: N/A	Fax: N/A	

(b) Effluent

Did/does the activity produce sewage and or any other effluent?	YES	
NOTE: FENCING AND THE CONSTRUCTION OF INTERNAL ROADS WAS UNDERTAKEN TO DATE. THE EMPLOYEES MADE USE OF TEMPORARY TOILETS AND THE CONTENTS THEREOF WAS REMOVED FROM SITE AND TREATED ACCORDING TO BEST PRACTICES. THE CONSTRUCTION OF ABLUTION FACILITIES WILL BE UNDERTAKEN IF AN AUTHORISATION IS ISSUED TO THE APPLICANT. SEWAGE WATER WILL BE MANAGED BY MEANS OF A SEPTIC TANK, ON SITE. HOWEVER, THIS IS NOT A LISTED ACTIVITY, AND THEREFORE THE APPLICATION SHOULD NOT CHANGE TO AN APPLICATION FOR SCOPING AND EIA.		
What was/is the estimated quantity produced per month?	UNKNOWN	m^3
Was/is the effluent treated and/or disposed of in a municipal system?		NO
If Yes, did/has the Municipality or relevant authority confirmed that sufficient unallocated capacity exist for treating / disposing of the sewage or any other effluent generated by this activity(ies)? Provide written confirmation from the Municipality or relevant authority.		
THE PROPOSED ACTIVITY ITSELF WILL NOT PRODUCE ANY EFFLUENT THAT WILL BE TREATED AND / OR DISPOSED OF. HOWEVER, SEWAGE WILL BE HANDLED AS FOLLOWS: • NEITHER THE REMAINDER OF THE FARM NALISVIEW 2835 NOR PORTION 1 OF THE		

FARM NALISVIEW 1060 HAS ANY EXISTING SEWER RETICULATION OR SEWER SERVICES.

- NO SEWER RETICULATION OR SEWER SERVICES ARE AVAILABLE NEAR THE DEVELOPMENT AREA.
- CURRENTLY THE FARM HOUSE AT THE REMAINDER OF THE FARM NALISVIEW 2835 (FUTURE ADMIN BUILDING) IS SERVICED BY A SEPTIC TANK.
- HOWEVER THE FARM HOUSE WAS SEVERELY VANDALIZED AND WILL NOT BE UTILIZED AS ORIGINALLY INTENDED.
- IT IS PROPOSED THAT ALL DOMESTIC SEWAGE / WATER FROM THE BASINS MAY BE DISPOSED OF IN SEPTIC TANKS / FRENCH DRAIN SYSTEMS (SEPARATE FOR EACH BUILDING / SEPTIC TANKS FROM EACH BUILDING CAN BE CONNECTED BY A SMALL RETICULATION NETWORK TO CONVEY GREY WATER TO ONE COMMUNAL TANK).
- SEWAGE WILL BE CONTROLLED AND COLLECTED WITHIN A CONSERVANCY TANK SYSTEM AND BE CLEANED ON A REGULAR BASIS (WEEKLY, DEPENDING ON USAGE/CAPACITY).

THE ABOVE DOES NOT TRIGGER A LISTED ACTIVITY, AND THEREFORE THERE IS NO NEED TO CHANGE THE APPLICATION TO AN APPLICATION FOR SCOPING AND EIA.

Was/is any effluent produced be treated and/or disposed of on site?		NO NO EFFLUENT WAS TREATTED OR DISPOSED OF ON SITE TO DATE.

If yes, briefly describe the nature of the effluent and how it was/will be disposed of:

THE EMPLOYEES MADE USE OF TEMPORARY TOILETS WHILE THE SITE WAS FENCED AND INTERNAL ROADS WERE CONSTRUCTED. THE CONTENTS THEREOF WAS REMOVED FROM SITE AND TREATED ACCORDING TO BEST PRACTICES.

THE PROPOSED ACTIVITY ITSELF WILL NOT PRODUCE ANY EFFLUENT THAT WILL BE TREATED AND / OR DISPOSED OF. HOWEVER, SEWAGE WILL BE HANDLED AS FOLLOWS:

- NEITHER THE REMAINDER OF THE FARM NALISVIEW 2835 NOR PORTION 1 OF THE FARM NALISVIEW 1060 HAS ANY EXISTING SEWER RETICULATION OR SEWER SERVICES.
- NO SEWER RETICULATION OR SEWER SERVICES ARE AVAILABLE NEAR THE DEVELOPMENT AREA.
- CURRENTLY THE FARM HOUSE AT THE REMAINDER OF THE FARM NALISVIEW 2835 (FUTURE ADMIN BUILDING) IS SERVICED BY A SEPTIC TANK.
- HOWEVER THE FARM HOUSE WAS SEVERELY VANDALIZED AND WILL NOT BE UTILIZED AS ORIGINALLY INTENDED.
- IT IS PROPOSED THAT ALL DOMESTIC SEWAGE / WATER FROM THE BASINS MAY BE DISPOSED OF IN SEPTIC TANKS / FRENCH DRAIN SYSTEMS (SEPARATE FOR EACH BUILDING / SEPTIC TANKS FROM EACH BUILDING CAN BE CONNECTED BY A SMALL RETICULATION NETWORK TO CONVEY GREY WATER TO ONE COMMUNAL TANK).

- SEWAGE WILL BE CONTROLLED AND COLLECTED WITHIN A CONSERVANCY TANK SYSTEM AND BE CLEANED ON A REGULAR BASIS (WEEKLY, DEPENDING ON USAGE/CAPACITY).

THE ABOVE DOES NOT TRIGGER A LISTED ACTIVITY, AND THEREFORE THERE IS NO NEED TO CHANGE THE APPLICATION TO AN APPLICATION FOR SCOPING AND EIA

Did/does the activity produce effluent that was/will be treated and/or disposed of at another facility?		NO NOTE: ONLY FENCING AND THE CONSTRUCTION OF INTERNAL ROADS WAS UNDERTAKEN TO DATE. THE EMPLOYEES MADE USE OF TEMPORARY TOILETS AND THE CONTENTS THEREOF WAS REMOVED FROM SITE AND TREATED ACCORDING TO BEST PRACTICES.
If yes, did/has this facility confirmed that sufficient capacity exist(ed) for treating / disposing of the liquid effluent generated by this activity(ies)? Provide written confirmation from the facility and provide the following particulars of the facility:	YES	
Does the facility have an operating license? (If yes, please attach a copy of the license.)	YES	

Facility name:	BLOEMSPRUIT WWTW		
Contact Person:	GENERAL MANAGER: WATER AND SANITATION: LUZUKO NTABEZO		
Postal address:	P.O. BOX 3704, BLOEMFONTEIN		
		Postal code:	9300
Telephone:	051 4058212	Cell:	
E-mail:	LUZUKO.NTLABEZO@MANGAUNG.CO.ZA	Fax:	0524058707

Describe the measures that was/will be taken to ensure the optimal reuse or recycling of waste water, if any:
N/A

(c) Emissions into the atmosphere

Did/does the activity produce emissions that will be disposed of into the atmosphere?		NO FENCING AND THE

		CONSTRUCTION OF INTERNAL ROADS WAS UNDERTAKEN TO DATE. THE EMISSIONS ASSOCIATED WITH THE ABOVE ACTIVITIES CAN BE DESCRIBED AS GENERAL VEHICLE EMISSIONS. IN ADDITION, DUST CAN ALSO BE SEEN AS A POTENTIAL ISSUE DURING THE DEVELOPMENT AS WELL AS OPERATIONAL PHASE. HOWEVER, THESE EMISSIONS ARE NOT CONTROLLED BY ANY LEGISLATION. THE FORMATION OF DUST WILL BE CONTROLLED BY DUST SUPPRESSION METHODS, WHEN REQUIRED. IN ADDITION, CONSTRUCTION ACTIVITIES

		WILL BE LIMITED TO DAY TIME HOURS.
If yes, did/does it require approval in terms of relevant legislation? If yes, attach a copy to this application		N/A

Describe the emissions in terms of type and concentration and how it was/will be treated/mitigated:

THE EMISSIONS ASSOCIATED WITH THE ACTIVITY CAN BE DESCRIBED AS GENERAL VEHICLE EMISSIONS. IN ADDITION, DUST CAN ALSO BE SEEN AS A POTENTIAL ISSUE DURING THE DEVELOPMENT AS WELL AS OPERATIONAL PHASE. HOWEVER, THESE EMISSIONS ARE NOT CONTROLLED BY ANY LEGISLATION. THE FORMATION OF DUST WAS CONTROLLED BY DUST SUPPRESSION METHODS DURING THE CONSTRUCTION OF INTERNAL ROADS AND FENCING, WHEN REQUIRED. IN ADDITION, CONSTRUCTION ACTIVITIES WERE LIMITED TO DAY TIME HOURS.

SHOULD AUTHORIZATION BE OBTAINED FOR THE EXPANSION OF A CEMETERY, THE FOLLOWING SHOULD BE TAKEN INTO CONSIDERATION:

- THE EMISSIONS ASSOCIATED WITH THE PROPOSED PROJECT CAN BE DESCRIBED AS GENERAL VEHICLE EMISSIONS. IN ADDITION, DUST CAN ALSO BE SEEN AS A POTENTIAL ISSUE DURING THE DEVELOPMENT AS WELL AS OPERATIONAL PHASE. HOWEVER, THESE EMISSIONS ARE NOT CONTROLLED BY ANY LEGISLATION. THE FORMATION OF DUST WILL BE CONTROLLED BY DUST SUPPRESSION METHODS, WHEN REQUIRED. IN ADDITION, CONSTRUCTION ACTIVITIES WILL BE LIMITED TO DAY TIME HOURS.

(d) Describe any mitigation/management measures that were adopted and the adequacy of these:

THE FORMATION OF DUST WAS CONTROLLED BY DUST SUPPRESSION METHODS DURING THE CONSTRUCTION OF INTERNAL ROADS AND FENCING, WHEN REQUIRED. IN ADDITION, CONSTRUCTION ACTIVITIES WERE LIMITED TO DAY TIME HOURS.

NO COMPLAINTS WERE RECEIVED FROM ADJACENT PROPERTY OWNERS, AND THEREFORE IT IS BELIEVED THAT THE MITIGATION / MANAGEMENT MEASURES WERE ADEQUATELY ADOPTED.

PROPER MITIGATION MEASURES WILL BE IMPLEMENTED SHOULD THE PROJECT BE APPROVED, IN ORDER TO LIMIT:

- DUST FORMATION
- EMISSIONS (GENERAL)
- NOISE

2. WATER USE

(a) Please indicate the source(s) of water for the activity by crossing out ("☒") the appropriate box(es)

MUNICIPAL	Water Board	Groundwater	River, Stream, Dam or Lake	Other	The activity did/does not use water

If water was/is extracted from a groundwater source, river, stream, dam, lake or any other natural feature, please indicate the volume that was/is extracted per month:	UNKNOWN m^3

NOTE:

POTABLE WATER WAS MADE AVAILABLE TO EMPLOYEES DURING THE CONSTRUCTION OF INTERNAL ROADS, AS WELL AS FENCING PROCESS.

IN ADDITION, WATER WAS USED FOR DUST SUPPRESSION MEASURES, WHEN NECESSARY.

THE ABOVE MENTIONED WATER WAS MADE AVAILABLE BY MEANS OF WATER TANKS, FILLED WITH WATER FROM A MUNICIPAL SOURCE.

HOWEVER, SHOULD ENVIRONMENTAL AUTHORISATION BE GRANTED, GROUNDWATER WILL BE UTILISED DURING THE CONSTRUCTION AND OPERATIONAL PHASE. THE APPLICANT WILL SUBMIT THE REQUIRED APPLICATION TO DWS IN DUE TIME. THE APPLICATION TO DWS WILL BE FOR THE ABSTACTION OF WATER IN ORDER TO

- PROVIDE DRINKING WATER TO EMPLOYEES DURING THE CONSTRUCTION PHASE
- PROVIDE WATER TO BE USED AS PART OF THE CONSTRUCTION ACTIVITIES
- PROVIDE DRINKING WATER TO PEOPLE VISITING THE CEMETERY
- WATERING THE GARDEN
- PROVIDE WATER FOR THE GENERAL OPERATION OF THE CEMETERY AND OFFICE BUILDING).
- SHOULD THE BOREHOLE YIELD BE INSUFFICIENT OR THE WATER QUALITY NOT BE ADEQUATE FOR HUMAN CONSUMPTION, A WATER TANK WILL TRANSPORT MUNICIPAL WATER FROM BLOEMFONTEIN TO THE SITE ON A REGULAR BASIS UNTIL A WATER SUPPLY PIPELINE IS CONSTRUCTED..

Please provide proof of assurance of water supply eg. letter of confirmation from Municipality/water user associations, yield of borehole etc.

THE APPLICANT WILL SUBMIT THE REQUIRED APPLICATION TO DWS IN DUE TIME.

THE TOTAL AVERAGE WTER DEMAND FOR THE DEVELOPMENT (PHASE 1 TO PHASE 5) IS 37.58 Kℓ/DAY, WITH A DAILY PEAK DEMAND OF 59.04 Kℓ/DAY. ACCORDING TO THE ABOVE CALCULATIONS A PEAK DEMAND OF 2.053 ℓ/S WAS DETERMINED.

IT IS PROPOSED THAT THE EXISTING BOREHOLES BE TESTED FRO WATER QUALITY AND YIELD. IF FOUND THAT THESE BOREHOLES ARE INSUFFICIENT, ADDITIONAL BOREHOLES WILL HAVE TO BE INVESTIGATED AND EQUIPPED.

IT IS PROPOSED THAT WATER FROM THE VARIOUS BOREHOLES BE RETICULATED TO A CENTRAL ELEVATED STORAGE TANK, FEEDING TO THE DIFFERENT AREAS AND SERVE

THE ABLUTION BLOCKS, CHAPEL, GUARDHOUSE, AND THE ADMINISTRATION (OFFICE) BUILDING.

WATER SUPPLY WILL BE PROVIDED TO THE CEMETERY VIA A BOREHOLE NETWORK ON SITE. SHOULD THE BOREHOLE YIELD BE INSUFFICIENT OR THE WATER QUALITY NOT BE ADEQUATE FOR HUMAN CONSUMPTION, A WATER TANK WILL TRANSPORT MUNICIPAL WATER FROM BLOEMFONTEIN TO THE SITE ON A REGULAR BASIS UNTIL A WATER SUPPLY PIPELINE IS CONSTRUCTED.

Did/does the activity require a water use permit / license from DWAF? If yes, attach a copy to this application	YES	

If yes, please submit the necessary application to Department of Water Affairs and Forestry and attach proof thereof to this application.

NOTE:
THE ACTIVITIES UNDERTAKEN TO DATE DID NOT REQUIRE A WATER USE AUTHORISATION. THE APPLICANT WILL SUBMIT THE REQUIRED APPLICATION TO DWS IN DUE TIME.

(b) Describe any mitigation/management measures that were adopted and the adequacy of these:

ACTIVITIES UNDERTAKEN TO DATE:

- POTABLE WATER WAS MADE AVAILABLE TO EMPLOYEES DURING THE CONSTRUCTION OF INTERNAL ROADS, AS WELL AS FENCING PROCESS.

ACTIVITIES TO BE UNDERTAKEN:

- IT IS PROPOSED THAT THE EXISTING BOREHOLES BE TESTED FRO WATER QUALITY AND YIELD.
- IF FOUND THAT THESE BOREHOLES ARE INSUFFICIENT, ADDITIONAL BOREHOLES WILL HAVE TO BE INVESTIGATED AND EQUIPPED.
- IF THE WATER QUALITY IS NOT ADEQUATE FOR HUMAN CONSUMPTION, ALTERNATIVES WILL BE INVESTIGATED BY THE CLIENT.
- SHOULD THE BOREHOLE YIELD BE INSUFFICIENT OR THE WATER QUALITY NOT BE ADEQUATE FOR HUMAN CONSUMPTION, A WATER TANK WILL TRANSPORT MUNICIPAL WATER FROM BLOEMFONTEIN TO THE SITE ON A REGULAR BASIS UNTIL A WATER SUPPLY PIPELINE IS CONSTRUCTED.

3. POWER SUPPLY

(a) Please indicate the source of power supply eg. Municipality / Eskom / Renewable energy source.

PORTION 5 HAS AN EXISTING 50KVA 22/0.38KV CONNECTION SUPPLIED BY ESKOM. THE REMAINDER OF THE SAID FARM DOES NOT HAVE ELECTRICAL CONNECTIONS. THE RELEVANT PORTION OF THE FARM NALISVIEW 1060 DOES NOT HAVE ELECTRICAL CONNECTIONS EITHER. THE ESTIMATED MAXIMUM DEMAND REQUIRED IS 150KVA. IT IS INTENDED TO UTILIZE A 3.3KV RETICULATION SYSTEM WITH UP AND DOWN STEP TRANSFORMER TO SUPPLY ELECTRICITY TO THE VARIOUS PHASES. SUFFICIENT ELECTRICITY WILL BE DISTRIBUTED FOR THE BUILDINGS AND PARKING AREA FOR LIGHTING, AS WELL AS FOR LIGHTING PURPOSES OF THE MAIN ARTERIAL ROUTES AND MEDIUM MAST LIGHTING ON ALL TRAFFIC CIRCLES. THE ABLUTION FACILITIES WILL EITHER BE SUPPLIED FROM THE LIGHTING ELECTRICAL NETWORKS OR A SOLAR INSTALLATION. THE PROPOSED LIGHTING WILL BE ENERGY EFFICIENT WITH LED LAMPS.

Has the Municipality or relevant service provider confirmed that sufficient electricity capacity (i.e. generation, supply and transmission) exist for activity(ies)? If yes, provide written confirmation from Municipality or relevant service provider. PLEASE SEE APPENDIX H8 FOR A COPY OF THE LETTER FROM ESKOM	YES	

If power supply was/is not available, where was/is it sourced from?

NO ELECTRICITY WAS REQUIRED FOR THE ACTIVITIES UNDERTAKEN TO DATE.

ELECTRICITY WILL BE OBTAINED FOR FUTURE ACTIVITIES AS FOLLOWS:
PORTION 5 HAS AN EXISTING 50KVA 22/0.38KV CONNECTION SUPPLIED BY ESKOM. THE REMAINDER OF THE SAID FARM DOES NOT HAVE ELECTRICAL CONNECTIONS. THE RELEVANT PORTION OF THE FARM NALISVIEW 1060 DOES NOT HAVE ELECTRICAL CONNECTIONS EITHER. THE ESTIMATED MAXIMUM DEMAND REQUIRED IS 150KVA. IT IS INTENDED TO UTILIZE A 3.3KV RETICULATION SYSTEM WITH UP AND DOWN STEP TRANSFORMER TO SUPPLY ELECTRICITY TO THE VARIOUS PHASES. SUFFICIENT ELECTRICITY WILL BE DISTRIBUTED FOR THE BUILDINGS AND PARKING AREA FOR LIGHTING, AS WELL AS FOR LIGHTING PURPOSES OF THE MAIN ARTERIAL ROUTES AND MEDIUM MAST LIGHTING ON ALL TRAFFIC CIRCLES. THE ABLUTION FACILITIES WILL EITHER BE SUPPLIED FROM THE LIGHTING ELECTRICAL NETWORKS OR A SOLAR INSTALLATION. THE PROPOSED LIGHTING WILL BE ENERGY EFFICIENT WITH LED LAMPS.

(b) Describe any mitigation/management measures that were adopted and the adequacy of these:

N/A

4. ENERGY EFFICIENCY

(a) Describe the design measures, if any, that have been taken to ensure that the activity is energy efficient:

THE ABLUTION FACILITIES WILL EITHER BE SUPPLIED FROM THE LIGHTING ELECTRICAL NETWORKS OR A SOLAR INSTALLATION. THE PROPOSED LIGHTING WILL BE ENERGY EFFICIENT WITH LED LAMPS.

(b) Describe how alternative energy sources have been taken into account or been built into the design of the activity, if any:

THE ABLUTION FACILITIES WILL EITHER BE SUPPLIED FROM THE LIGHTING ELECTRICAL NETWORKS OR A SOLAR INSTALLATION. THE PROPOSED LIGHTING WILL BE ENERGY EFFICIENT WITH LED LAMPS.

5. NOISE IMPACTS

(a) Did/does the activity result in any noise impacts?	YES	

If yes, please describe and indicate the measures implemented to mitigate and manage these impacts?

ACTIVITIES UNDERTAKEN TO DATE:

- NOISE ASSOCIATED WITH THE ACTIVITIES UNDERTAKEN TO DATE WAS FROM GENERAL VEHICLES THAT WAS USED DURING THE CONSTRUCTION OF INTERNAL ROADS / FENCING PROCESS.
- HEAVY VEHICLES WERE EQUIPPED WITH SILENCERS.
- IN ADDITION, CONSTRUCTION ACTIVITIES WERE LIMITED TO DAY TIME HOURS.

ACTIVITIES TO BE UNDERTAKEN:

- NOISE ASSOCIATED WITH THE DEVELOPMENT ACTIVITIES WILL BE FROM GENERAL

VEHICULAR ACTIVITIES AS WELL AS BUILDING ACTIVITIES.

- HEAVY VEHICLES WILL BE EQUIPPED WITH SILENCERS.
- IN ADDITION, CONSTRUCTION ACTIVITIES WILL BE LIMITED TO DAY TIME HOURS.
- DURING THE OPERATIONAL PHASE, NOISE MAY BE ASSOCIATED WITH GENERAL ACTIVITIES AS WELL AS VEHICULAR ACTIVITIES (DIGGING OF GRAVES, VEHICLES ENTERING THE SITE IN A CONVOY) AS WELL AS ACTIVITIES AT THE CHAPEL DURING SERVICES.
- THE REQUIREMENTS AS SET OUT IN THE OSH ACT WILL BE IMPLEMENTED TO ENSURE THAT THE PROPOSED ACTIVITIES WILL NOT HAVE AN UNFAVORABLE IMPACT ON NEIGHBOURING RESIDENTS.

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential noise impact(s) of the activity/ies.

6. VISUAL IMPACTS

(a) Did/does the activity result in any visual impacts?	YES	
If yes, please describe and indicate the measures implemented to mitigate and manage these impacts?		

THE CURRENT PROJECT ENTAILS THE EXPANSION OF AN EXISTING CEMETERY ON PROPERTY PREVIOUSLY UTILIZED FOR AGRICULTURAL ACTIVITIES.
THE ADJACENT PROPERTIES ARE CURRENTLY UTILIZED FOR AGRICULTURAL ACTIVITIES.
A MINE IS ALSO LOCATED IN CLOSE PROXIMITY OF THE SITE.

- BEST PRACTICES WILL BE IMPLEMENTED TO KEEP THE SITE CLEAN AND TIDY DURING THE CONSTRUCTION AND OPERATIONAL PHASE.
- WASTE WILL BE REMOVED FROM SITE ON A REGULAR BASIS / WHEN REQUIRED.
- EROSION CONTROL MEASURES WILL BE IMPLEMENTED.
- STORMWATER MEASURES WILL BE IMPLEMENTED.
- THE WETLAND AREA WILL BE KEPT CLEAN AND TIDY – NO CONSTRUCTION ACTIVITIES WILL BE UNDERTAKEN WITHIN THE BUFFER AREA ASSOCIATED WITH THE WETLAND.

(b) Did/does the activity result in potential lighting impacts at night?	YES	
If yes, please describe and indicate the measures implemented to mitigate and manage these impacts?		

ACTIVITIES UNDERTAKEN TO DATE:
THE ACTIVITIES UNDERTAKEN TO DATE CAN BE SUMMARIZED AS:

- THE CONSTRUCTION OF INTERNAL ROADS
- FENCING

THE CONSTRUCTION ACTIVITIES WERE UNDERTAKEN IN DAY TIME HOURS THEREFORE, NO LIGHTING IMPACTS ARE CURRENTLY ASSOCIATED WITH THE PROJECT.

ACTIVITIES TO BE UNDERTAKEN:

- THE INSTALLATION AND OPERATION OF LIGHTS (INCLUDING STREET LIGHTS).

(c) Were/are there any alternatives available to address this impact?	YES	
If yes, please describe these alternatives?		

SUFFICIENT ELECTRICITY WILL BE DISTRIBUTED FOR THE BUILDINGS AND PARKING AREA FOR LIGHTING, AS WELL AS FOR LIGHTING PURPOSES OF THE MAIN ARTERIAL ROUTES AND MEDIUM MAST LIGHTING ON ALL TRAFFIC CIRCLES. THE ABLUTION FACILITIES WILL EITHER BE SUPPLIED FROM THE LIGHTING ELECTRICAL NETWORKS OR A SOLAR

INSTALLATION. THE PROPOSED LIGHTING WILL BE ENERGY EFFICIENT WITH LED LAMPS.

LIGHTS WILL BE FIXED DOWNWARDS, IN ORDER TO LIMIT THE IMPACT THEREOF TO THE ADJACENT PROPERTY.

ALTERNATIVES INITIALLY INVESTIGATED, NOT TO BE IMPLEMENTED:

- THE INSTALLATION OF FLOOD LIGHTS THAT LIGHTS A LARGER AREA. THIS WILL HOWEVER HAVE A LARGER VISUAL IMPACT AND ELECTRICITY COST.

Please note: The Department may request specialist input/studies depending on the nature of the land use character of the area and potential visual impact(s) of the activity/ies.

7. SOCIO-ECONOMIC IMPLICATIONS OF THE ACTIVITY

(a) What was/is the expected capital value of the activity on completion?	UNKNOWN	
(b) What was/is the expected yearly income or contribution to the economy that will be generated by or as a result of the activity?	UNKNOWN, DEPENDING ON THE NUMBER OF BURIALS ON SITE	
(c) Did/does the activity contribute to service infrastructure?	YES	
(d) How many permanent new employment opportunities were created?	20-25, DURING THE OPERATIONAL PHASE	
(e) What was/is the expected current value of the employment opportunities to date?	UNKNOWN, DEPENDING ON CONTRACTOR.	
(f) What percentage of this accrued to previously disadvantaged individuals?	80%	

How was (is) this (to be) ensured and monitored (please explain):
THE ABOVE WAS RECEIVED FROM THE CONSULTING ENGINEERS

8. PRELIMINARY IMPACT ASSESSMENT

Briefly describe the impacts (as appropriate), significance rating of impacts and significance rating of impacts after mitigation. This must include an assessment of the significance of all impacts. Please note: This is a preliminary impact statement. The Department may request specialist input/studies depending on the type and nature of the impact(s) of the activity/ies.

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
PLANNING AND DESIGN PHASE	PLANNING AND DESIGN NOTE: SHOULD THE IMPACTS NOT BE TAKEN INTO CONSIDERATION DURING THE PLANNING AND DESIGN PHASE, THE ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE CONSTRUCTION AND OPERATION PHASE WILL BE OF HIGH SIGNIFICANCE AS THE ENVIRONMENT WILL BE NEGATIVELY AFFECTED.	**DIRECT IMPACTS:** • NONE	MEDIUM – HIGH NEGATIVE	• NO ENVIRONMENTAL MITIGATION MEASURES IS REQUIRED DURING THE PLANNING PHASE ON THE PROPOSED SITE, AS NO MITIGATION MEASURES ARE TO BE IMPLEMENTED ON SITE DURING THE PLANNING PHASE. • HOWEVER, THE ENGINEERS, SPECIALISTS AND ENVIRONMENTAL CONSULTANTS TOOK THE FOLLOWING INTO CONSIDERATION, TO BE IMPLEMENTED DURING THE CONSTRUCTION /	LOW NEGATIVE
		INDIRECT IMPACTS: • POTENTIAL SOIL AND SURFACE WATER POLLUTION	MEDIUM – HIGH NEGATIVE		LOW NEGATIVE
		CUMULATIVE IMPACTS: • POTENTIAL GROUNDWATER POLLUTION	MEDIUM – HIGH NEGATIVE		LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				OPERATIONAL PHASE: – EROSION CONTROL MEASURES – REMOVAL OF VEGETATION – PROTECTED VEGETATION – REMOVAL OF TOPSOIL – FLOODING – POLLUTION – ETC.	
CONSTRUCTION PHASE	GENERAL CONSTRUCTION ACTIVITIES	**DIRECT IMPACTS:** • VISUAL IMPACT OF ROCK AND SPOIL MATERIAL DUMPS FROM EXCAVATIONS • NOISE ELEVATION DUE TO CONSTRUCTION ACTIVITIES • NUISANCE DUST GENERATION	MEDIUM-HIGH NEGATIVE	• SITE WILL BE KEPT NEAT AND TIDY • APPROPRIATE AREA WILL BE IDENTIFIED AS A STOCKPILING AREA • SPEED LIMIT WILL BE ENFORCED ON THE CONSTRUCTION VEHICLES AND THESE VEHICLES WILL ONLY MAKE	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		• DETERIORATION OF THE ACCESS ROAD AS A RESULT OF AN INCREASE IN CONSTRUCTION VEHICLES TO THE SITE • INCREASE IN TRAFFIC IN THE AREA DURING THE CONSTRUCTION PHASE		USE OF DESIGNATED ROADS / PATHWAYS • DUST CONTROL MEASURES WILL BE IMPLEMENTED IF NUISANCE DUST GENERATION OCCURS DURING THE CONSTRUCTION PERIOD	
		INDIRECT IMPACTS • EROSION • ESTABLISHMENT OF ALIEN / INVADER VEGETATION SPECIES • POSSIBLE IMPACT ON HERITAGE ARTEFACTS • LOSS OF FAUNA ON SITE • POSSIBLE	MEDIUM-HIGH NEGATIVE	• STOCKPILED MATERIAL WILL BE STORED IN SUCH A MANNER TO LIMIT THE LOSS THEREOF. FOR EXAMPLE: – BRICKS MAY BE PLACED AROUND THE STOCKPILES, TO LIMIT THE LOSS THEREOF DUE TO RAINY	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		POLLUTION OF SURFACE WATER AND GROUNDWATER RESOURCES		EVENTS. – STOCKPILES WILL NOT BE HIGHER THAN 1.5 M – THE GRADIENT OF STOCKPILES WILL NOT BE GREATER THAN 1:1.5 • ESTABLISHMENT OF ALIEN / INVADER VEGETATION WILL BE MONITORED AND THESE SPECIES WILL BE REMOVED BY HAND OR BY AN APPROVED CHEMICAL BEFORE GESTATION THEREOF. • ALL ARCHAEOLOGICAL FINDINGS (IF	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				ANY) SHOULD BE RECORDED AND REPORTED TO SAHRA. NO CONSTRUCTION ACTIVITIES IN THE AREA MAY PROCEED WITHOUT THE AUTHORISATION FROM SAHRA. • STORM WATER MEASURES WILL BE IMPLEMENTED IN ORDER TO MANAGE STORM WATER AND THIS WILL ALSO PREVENT EROSION. • VISUAL INSPECTIONS FOR THE OCCURRENCE OF EROSION SHOULD BE UNDERTAKEN ON A WEEKLY BASIS.	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				• NO ANIMALS MAY BE CAPTURED / HARMED / KILLED ON SITE. SPECIALISTS SHOULD BE APPOINTED TO REMOVE / TRANSLOCATE SPECIES, IF REQUIRED. THE NECESSARY PERMITS SHOULD ALSO BE OBTAINED. • ANY OCCURRENCES OF HARMED ANIMALS SHOULD BE REPORTED TO THE ECO, THE REQUIRED STEPS BE TAKEN AND RECORDED AS SUCH. • NO ACTIVITIES MAY BE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				UNDERTAKEN WITHIN THE BUFFER ZONE ASSOCIATED WITH THE IDENTIFIED WETLAND / WITHIN 32 M OF THE WETLAND WITHOUT WRITTEN APPROVAL FROM DWS. • CARE SHOULD BE TAKEN THAT NO POLLUTION OF WATER (WITH SPECIAL REFERENCE TO THE WETLAND) IS UNDERTAKEN.	
		CUMULATIVE IMPACTS • EROSION • ESTABLISHMENT OF ALIEN VEGETATION SPECIES	MEDIUM-HIGH NEGATIVE	• STOCKPILED MATERIAL WILL BE STORED IN SUCH A MANNER TO LIMIT THE LOSS THEREOF. FOR EXAMPLE: – BRICKS MAY BE PLACED	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				AROUND THE STOCKPILES, TO LIMIT THE LOSS THEREOF DUE TO RAINY EVENTS. – STOCKPILES WILL NOT BE HIGHER THAN 1.5 M – THE GRADIENT OF STOCKPILES WILL NOT BE GREATER THAN 1:1.5 • ESTABLISHMENT OF ALIEN / INVADER VEGETATION WILL BE MONITORED AND THESE SPECIES WILL BE REMOVED BY HAND OR BY AN APPROVED CHEMICAL BEFORE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				GESTATION THEREOF. • ALL ARCHAEOLOGICAL FINDINGS (IF ANY) SHOULD BE RECORDED AND REPORTED TO SAHRA. NO CONSTRUCTION ACTIVITIES IN THE AREA MAY PROCEED WITHOUT THE AUTHORISATION FROM SAHRA. • STORM WATER MEASURES WILL BE IMPLEMENTED IN ORDER TO MANAGE STORM WATER AND THIS WILL ALSO PREVENT EROSION. • VISUAL INSPECTIONS FOR THE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				OCCURRENCE OF EROSION SHOULD BE UNDERTAKEN ON A WEEKLY BASIS. • NO ANIMALS MAY BE CAPTURED / HARMED / KILLED ON SITE. SPECIALISTS SHOULD BE APPOINTED TO REMOVE / TRANSLOCATE SPECIES, IF REQUIRED. THE NECESSARY PERMITS SHOULD ALSO BE OBTAINED. • ANY OCCURRENCES OF HARMED ANIMALS SHOULD BE REPORTED TO THE ECO, THE REQUIRED STEPS	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				TAKEN AND BE RECORDED AS SUCH.	
	REMOVAL OF VEGETATION AND TOPSOIL	**DIRECT IMPACTS:** • DESTRUCTION OF VEGETATION AND HABITAT FOR SMALL ANIMALS • LOSS OF TOPSOIL • POSSIBLE LOSS OF VEGETATIVE SPECIES OF CONSERVATIONAL CONCERN • NOISE ELEVATION DUE TO CONSTRUCTION ACTIVITIES • NUISANCE DUST GENERATION • VISUAL IMPACT OF ROCK AND SPOIL MATERIAL	MEDIUM NEGATIVE	• VEGETATION CLEARANCE WILL BE LIMITED TO THE REQUIRED AREA. • A PERMIT FOR THE REMOVAL OF PROTECTED PLANT SPECIES WILL BE OBTAINED BEFORE THE REMOVAL OF THESE SPECIES (IF ANY). • SPEED LIMIT WILL BE ENFORCED ON THE CONSTRUCTION VEHICLES AND THESE VEHICLES WILL ONLY MAKE USE OF DESIGNATED ROADS / PATHWAYS. • DUST CONTROL	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		DUMPS (IF ANY)		MEASURES WILL BE IMPLEMENTED IF NUISANCE DUST GENERATION OCCURS DURING THE CONSTRUCTION PERIOD. • STOCKPILED MATERIAL WILL BE STORED IN SUCH A WAY TO LIMIT THE LOSS THEREOF. FOR EXAMPLE: – BRICKS MAY BE PLACED AROUND THE STOCKPILES, TO LIMIT THE LOSS THEREOF DUE TO RAINY EVENTS. – STOCKPILES SHOULD NOT BE HIGHER THAN 1.5 M. – THE GRADIENT	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				OF STOCKPILES SHOULD NOT BE GREATER THAN 1:1.5. • SURFACE WILL BE LEVELLED TO ENSURE A FREE-DRAINING SURFACE TO PREVENT PONDING OF SURFACE WATER AS WELL AS TO LIMIT EROSION • STORMWATER MEASURES SUCH AS CHANNELS, DIVERSION BERMS, ETC. WILL BE CONSTRUCTED WHERE NECESSARY TO LIMIT AND / OR PREVENT EROSION AND SEPARATE CLEAN	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				AND DIRTY RUNOFF • SPEED LIMIT WILL BE ENFORCE ON CONSTRUCTION VEHICLES • CONSTRUCTION ACTIVITIES WILL BE LIMITED TO DAYTIME TO LIMIT DISTURBANCE TO NEIGHBOURING LANDOWNERS • DUST CONTROL MEASURES WILL BE IMPLEMENTED IF NUISANCE DUST GENERATION PROVES TO BE PROBLEMATIC • SAHRA WILL BE NOTIFIED SHOULD TRACES OF ANY PALEONTOLOGICAL OR ARCHAEOLOGICAL RESOURCES BE FOUND DURING	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				THE CONSTRUCTION PHASE • NO WASTE MAY BE DUMPED ON SITE OR IN THE VELD • ALL SPILLS SHOULD BE CLEANED IMMEDIATELY AND HANDLED ACCORDING TO BEST PRACTICES • RECEPTACLES SHOULD BE PLACED ON SITE FOR THE COLLECTION OF GENERAL WASTE • WASTE RECEPTACLES SHOULD BE EMPTIED ON A REGULAR BASIS AND THE WASTE DISPOSED OF AT AN AUTHORISED	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				LANDFILL SITE • TEMPORARY TOILETS SHOULD BE MADE AVAILABLE FOR USE BY THE EMPLOYEES AND THE SEWAGE FROM THESE TOILETS SHOULD BE MANAGED PROPERLY – NO DISPOSAL ON SITE OR THE SURROUNDING ENVIRONMENT WILL BE ALLOWED • ALTERNATIVELY, A SEPTIC TANK SHOULD BE UTILISED • NO OPEN FIRES ALLOWED • NO COLLECTION OF FIRE WOOD, WITHOUT WRITTEN CONSENT FROM THE LANDOWNER	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				MAY BE UNDERTAKEN • NO COLLECTION OF PLANTS OR ANIMALS ARE ALLOWED • ACCESS ROADS SHOULD BE MAINTAINED • A PERMIT SHOULD BE OBTAINED PRIOR TO THE REMOVAL OR PROTECTED PLANT SPECIES, SHOULD ANY PROTECTED PLANTS BE REMOVED.	
		INDIRECT IMPACTS: • EROSION • ESTABLISHMENT OF ALIEN / INVADER VEGETATION SPECIES	MEDIUM NEGATIVE	• ESTABLISHMENT OF ALIEN / INVADER VEGETATION WILL BE MONITORED AND THESE SPECIES WILL BE REMOVED BY HAND OR BY AN	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		• POSSIBLE IMPACT ON HERITAGE ARTEFACTS • LOSS OF FAUNA ON SITE • POSSIBLE CHANGE IN NATURAL STORMWATER DRAINAGE PATTERN		APPROVED CHEMICAL BEFORE GESTATION THEREOF. • ALL ARCHAEOLOGICAL FINDINGS (IF ANY) SHOULD BE RECORDED AND REPORTED TO SAHRA. NO CONSTRUCTION ACTIVITIES IN THE AREA MAY PROCEED WITHOUT THE AUTHORISATION FROM SAHRA. • STORM WATER MEASURES WILL BE IMPLEMENTED IN ORDER TO MANAGE STORM WATER AND THIS WILL ALSO PREVENT EROSION.	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				• A STORM WATER MANAGEMENT PLAN WILL BE COMPILED AND DESIGNED TO: – REDUCE AND / OR PREVENT SILTATION, EROSION AND WATER POLLUTION. – IMPROVE THE SURFACE AND GROUND WATER QUALITY OF THE AREA AND THE LOWER LYING AREAS WITHIN THE CATCHMENT. – ENSURE THAT NO PONDING AND CONCENTRATED INGRESS OF WATER	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				TAKES PLACE. • VISUAL INSPECTIONS FOR THE OCCURRENCE OF EROSION SHOULD BE UNDERTAKEN ON A WEEKLY BASIS. • NO ANIMALS MAY BE CAPTURED / HARMED / KILLED ON SITE. • ANY OCCURRENCES OF HARMED ANIMALS SHOULD BE REPORTED TO THE ECO AND RECORDED AS SUCH.	
		CUMULATIVE IMPACTS: • EROSION • ESTABLISHMENT OF ALIEN	MEDIUM NEGATIVE	• ESTABLISHMENT OF ALIEN / INVADER VEGETATION WILL BE MONITORED AND THESE	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		VEGETATION SPECIES - POSSIBLE IMPACT ON HERITAGE ARTEFACTS - LOSS OF FAUNA ON SITE		SPECIES WILL BE REMOVED BY HAND OR BY AN APPROVED CHEMICAL BEFORE GESTATION THEREOF. - ALL ARCHAEOLOGICAL FINDINGS (IF ANY) SHOULD BE RECORDED AND REPORTED TO SAHRA. NO CONSTRUCTION ACTIVITIES IN THE AREA MAY PROCEED WITHOUT THE AUTHORISATION FROM SAHRA. - STORM WATER MEASURES WILL BE IMPLEMENTED IN ORDER TO MANAGE STORM WATER AND THIS	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				WILL ALSO PREVENT EROSION. • VISUAL INSPECTIONS FOR THE OCCURRENCE OF EROSION SHOULD BE UNDERTAKEN ON A WEEKLY BASIS. • NO ANIMALS MAY BE CAPTURED / HARMED / KILLED ON SITE. • ANY OCCURRENCES OF HARMED ANIMALS SHOULD BE REPORTED TO THE ECO AND RECORDED AS SUCH.	
	HANDLING OF WASTE	**DIRECT IMPACTS:** • SPILLAGE OF MATERIAL TO BE	MEDIUM – HIGH NEGATIVE	• NO WASTE (GENERAL / CONSTRUCTION / POTENTIAL	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		UTILISED DURING THE CONSTRUCTION PHASE AS WELL AS UNTREATED SEWAGE TO THE SURROUNDING ENVIRONMENT • DUMPING OF CONSTRUCTION RUBBLE AND GENERAL WASTE ON SITE • POSSIBLE SPILLAGE OF PETROCHEMICALS AND OTHER HAZARDOUS MATERIALS		HAZARDOUS / ETC.) MAY BE DUMPED IN THE VELD / WATER FEATURES. • WASTE CLASSIFICATION SHOULD BE UNDERTAKEN. • SUITABLE WASTE BINS ETC. WILL BE AVAILABLE ON SITE FOR THE TEMPORARY DISPOSAL OF WASTE. • WASTE WILL BE REMOVED FROM SITE AND DISPOSED OF AT AN AUTHORISED LANDFILL SITE. • VISUAL INSPECTIONS FOR THE OCCURRENCE OF POLLUTION SHOULD BE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				UNDERTAKEN DAILY.	
		INDIRECT IMPACTS: • SURFACE AND GROUNDWATER POLLUTION DUE TO SPILLAGE OF POTENTIAL HAZARDOUS SUBSTANCES SUCH AS HYDRAULIC MATERIAL AND UNTREATED SEWAGE. • IMPACT ON WATERWAYS (INCLUDING THE NATURAL HABITAT OF THE AREA), INCLUDING POLLUTION.	MEDIUM – HIGH NEGATIVE	• SPILLS SHOULD BE CLEANED UP IMMEDIATELY ACCORDING TO BEST PRACTICES • DWS SHOULD BE NOTIFIED OF ANY SPILLAGE / POLLUTION WITHIN WATER RESOURCES WITHIN 24 HOURS OF OCCURRENCE • RECORD SHOULD BE KEPT ON SITE TO INDICATE DATE OF VISUAL INSPECTION, ANY SPILLAGES OBSERVED, AND MANNER IN WHICH SPILL WAS TREATED.	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		CUMULATIVE IMPACTS: • POSSIBLE POLLUTION OF DOWNSTREAM WATERCOURSES	MEDIUM – HIGH NEGATIVE	• SPILLS SHOULD BE CLEANED UP IMMEDIATELY ACCORDING TO BEST PRACTICES • DWS SHOULD BE NOTIFIED OF ANY SPILLAGE / POLLUTION WITHIN WATER RESOURCES WITHIN 24 HOURS OF OCCURRENCE • RECORD SHOULD BE KEPT ON SITE TO INDICATE DATE OF VISUAL INSPECTION, ANY SPILLAGES OBSERVED, AND MANNER IN WHICH SPILL WAS TREATED.	LOW NEGATIVE
	HEALTH AND SAFETY	**DIRECT IMPACTS:** • ROAD SAFETY, ESPECIALLY AT	MEDIUM NEGATIVE	• THE NECESSARY PRECAUTIONS WITH REGARD TO ROAD SAFETY	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		ROAD CROSSINGS / WORKINGS NEAR ROADS • NOISE ELEVATION DUE TO THE OPERATION OF CONSTRUCTION VEHICLES • DUST GENERATION • WATER QUALITY AND QUANTITY MAY NOT BE SUITABLE FOR HUMAN CONSUMPTION		WILL BE IMPLEMENTED FOR CONSTRUCTION WORK WITHIN ROAD CROSSINGS. • SPEED LIMIT WILL BE ENFORCED ON THE CONSTRUCTION VEHICLES AND THESE VEHICLES WILL ONLY MAKE USE OF DESIGNATED ROADS / PATHWAYS. • THE QUANTITY AND QUALITY OF THE WATER IN THE BOREHOLES TO BE UTILISED, SHOULD BE TESTED ON A REGULAR BASIS, FOR AVAILABILITY AS WELL AS SUITABILITY FOR	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				HUMAN CONSUMPTION	
		INDIRECT IMPACTS: • POSSIBLE FIRE OUTBREAKS • INJURIES ON SITE	MEDIUM NEGATIVE	• FIRE EXTINGUISHERS WILL BE AVAILABLE, WHERE REQUIRED. • THE CORRECT PPE WILL BE WORN BY ALL EMPLOYEES AT ALL TIMES.	LOW NEGATIVE
		CUMULATIVE IMPACTS: • POSSIBLE FIRE OUTBREAKS • INJURIES ON SITE	MEDIUM NEGATIVE	• FIRE EXTINGUISHERS WILL BE AVAILABLE, WHERE REQUIRED. • THE CORRECT PPE WILL BE WORN BY ALL EMPLOYEES AT ALL TIMES.	LOW NEGATIVE
OPERATIONAL PHASE	THIS PHASE CONSISTS OF THE USE OF THE CEMETERY AND ASSOCIATED INFRASTRUCTURE ON COMPLETION	**DIRECT IMPACTS:** • POSSIBLE CHANGE IN NATURAL STORM WATER DRAINAGE	MEDIUM - LOW NEGATIVE	• MAINTENANCE AND REPAIR WILL BE UNDERTAKEN WHEN NECESSARY. • NO WASTE WILL BE DUMPED IN	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
	THEREOF. MAINTENANCE AND REPAIR WILL BE UNDERTAKEN WHEN NECESSARY.	PATTERN • POTENTIAL POLLUTION TO STORMWATER & SURFACE WATER • POTENTIAL POLLUTION OF GROUNDWATER DUE TO THE POSSIBLE SEEPAGE OF UNTREATED SEWAGE TO THE AQUIFER FROM THE ABLUTION FACILITIES AS WELL AS FROM THE BURIED HUMAN REMAINS • INCREASE IN TRAFFIC IN THE AREA, AT CERTAIN INTERVALS • THE SITE MAY IN THE FUTURE		THE AREA • THE AREA SHOULD BE INVESTIGATED FOR EROSION ON A REGULAR BASIS • ERODED AREAS SHOULD BE REHABILITATED AS SOON AS POSSIBLE • THE ACCESS ROAD SHOULD BE MAINTAINED BY THE MUNICIPALITY (I.E. THE APPLICANT) • STORMWATER MITIGATION MEASURES CONSTRUCTED DURING THE CONSTRUCTION PHASE, SUCH AS THE LEVELLING OF THE AREA AND THE CONSTRUCTION	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		BECOME FULL WHICH WILL NECESSITATE A SEARCH FOR A NEW CEMETERY SITE. • WATER QUALITY AND QUANTITY MAY NOT BE SUITABLE FOR HUMAN CONSUMPTION		OF CHANNELS / DIVERSION BERMS, ETC. SHOULD BE INSPECTED ON A REGULAR BASIS TO DETERMINE IF IT IS SUFFICIENT TO LIMIT ANY POTENTIAL POLLUTION TO STORMWATER, SURFACE WATER OR GROUNDWATER RESOURCES. IF NOT, ALTERNATIVE MEASURES SHOULD BE IMPLEMENTED AS SOON AS POSSIBLE. • THE QUANTITY AND QUALITY OF THE WATER IN THE BOREHOLES TO BE UTILISED, SHOULD	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				BE TESTED ON A REGULAR BASIS, FOR AVAILABILITY AS WELL AS SUITABILITY FOR HUMAN CONSUMPTION • SEPTIC TANK SYSTEM SHOULD BE MAINTAINED PROPERLY AND INSPECTED ON A REGULAR BASIS TO ENSURE THAT NO LEAKAGE OF THE SEWAGE IS OCCURRING • MONITORING OF BOREHOLES IN THE DIRECT VICINITY SHOULD BE UNDERTAKEN REGULARLY TO DETERMINE ANY GROUNDWATER POLLUTION IN THE AREA • MONITORING OF	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				THE WATER QUALITY WITHIN THE PAN SHOULD BE UNDERTAKEN REGULARLY TO DETERMINE ANY POLLUTION THEREOF	
		INDIRECT IMPACTS: • ESTABLISHMENT OF ALIEN / INVADER SPECIES DUE TO PREVIOUS DISTURBANCE WILL ALSO BE ASSOCIATED WITH THIS PHASE • INCREASE IN NOISE LEVELS IS POSSIBLE • EROSION • DETERIORATION OF THE ACCESS	MEDIUM – LOW NEGATIVE	• ESTABLISHMENT OF ALIEN VEGETATION WILL BE MONITORED AND ALIEN SPECIES WILL BE REMOVED BY HAND OR BY AN APPROVED CHEMICAL BEFORE GESTATION THEREOF. • MAINTENANCE AND REPAIR WILL BE UNDERTAKEN WHEN NECESSARY. • NO WASTE WILL	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		ROAD • DUMPING OF GENERAL WASTE • POLLUTION OF GROUNDWATER RESOURCES • PERMANENT CHANGE IN LAND USE FROM AGRICULTURE TO MUNICIPAL PURPOSES (TOWNSHIP ESTABLISHMENT)		BE DUMPED IN THE AREA • THE AREA SHOULD BE INVESTIGATED FOR EROSION ON A REGULAR BASIS • ERODED AREAS SHOULD BE REHABILITATED AS SOON AS POSSIBLE • THE ACCESS ROAD SHOULD BE MAINTAINED BY THE MUNICIPALITY (I.E. THE APPLICANT) • STORMWATER MITIGATION MEASURES CONSTRUCTED DURING THE CONSTRUCTION PHASE, SUCH AS THE LEVELLING OF THE AREA AND THE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				CONSTRUCTION OF CHANNELS / DIVERSION BERMS, ETC. SHOULD BE INSPECTED ON A REGULAR BASIS TO DETERMINE IF IT IS SUFFICIENT TO LIMIT ANY POTENTIAL POLLUTION TO STORMWATER, SURFACE WATER OR GROUNDWATER RESOURCES. IF NOT, ALTERNATIVE MEASURES SHOULD BE IMPLEMENTED AS SOON AS POSSIBLE. • THE QUANTITY AND QUALITY OF THE WATER IN THE BOREHOLES TO BE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				UTILISED, SHOULD BE TESTED ON A REGULAR BASIS, FOR AVAILABILITY AS WELL AS SUITABILITY FOR HUMAN CONSUMPTION • SEPTIC TANK SYSTEM SHOULD BE MAINTAINED PROPERLY AND INSPECTED ON A REGULAR BASIS TO ENSURE THAT NO LEAKAGE OF THE SEWAGE IS OCCURRING • MONITORING OF BOREHOLES IN THE DIRECT VICINITY SHOULD BE UNDERTAKEN REGULARLY TO DETERMINE ANY GROUNDWATER POLLUTION IN THE AREA	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				• MONITORING OF THE WATER QUALITY WITHIN THE PAN SHOULD BE UNDERTAKEN REGULARLY TO DETERMINE ANY POLLUTION THEREOF	
		CUMULATIVE IMPACTS: • ESTABLISHMENT OF ALIEN / INVADER SPECIES DUE TO PREVIOUS DISTURBANCE WILL ALSO BE ASSOCIATED WITH THIS PHASE • INCREASE IN NOISE LEVELS IS POSSIBLE • EROSION • POSSIBLE POLLUTION OF	MEDIUM – LOW NEGATIVE	• ESTABLISHMENT OF ALIEN VEGETATION WILL BE MONITORED AND ALIEN SPECIES WILL BE REMOVED BY HAND OR BY AN APPROVED CHEMICAL BEFORE GESTATION THEREOF. • MAINTENANCE AND REPAIR WILL BE UNDERTAKEN WHEN NECESSARY. • NO WASTE WILL	LOW NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		GROUNDWATER RESOURCES		BE DUMPED IN THE AREA • THE AREA SHOULD BE INVESTIGATED FOR EROSION ON A REGULAR BASIS • ERODED AREAS SHOULD BE REHABILITATED AS SOON AS POSSIBLE • THE ACCESS ROAD SHOULD BE MAINTAINED BY THE MUNICIPALITY (I.E. THE APPLICANT) • STORMWATER MITIGATION MEASURES CONSTRUCTED DURING THE CONSTRUCTION PHASE, SUCH AS THE LEVELLING OF THE AREA AND THE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				CONSTRUCTION OF CHANNELS / DIVERSION BERMS, ETC. SHOULD BE INSPECTED ON A REGULAR BASIS TO DETERMINE IF IT IS SUFFICIENT TO LIMIT ANY POTENTIAL POLLUTION TO STORMWATER, SURFACE WATER OR GROUNDWATER RESOURCES. IF NOT, ALTERNATIVE MEASURES SHOULD BE IMPLEMENTED AS SOON AS POSSIBLE. • THE QUANTITY AND QUALITY OF THE WATER IN THE BOREHOLES TO BE	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				UTILISED, SHOULD BE TESTED ON A REGULAR BASIS, FOR AVAILABILITY AS WELL AS SUITABILITY FOR HUMAN CONSUMPTION • SEPTIC TANK SYSTEM SHOULD BE MAINTAINED PROPERLY AND INSPECTED ON A REGULAR BASIS TO ENSURE THAT NO LEAKAGE OF THE SEWAGE IS OCCURRING • MONITORING OF BOREHOLES IN THE DIRECT VICINITY SHOULD BE UNDERTAKEN REGULARLY TO DETERMINE ANY GROUNDWATER POLLUTION IN THE AREA	

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				• MONITORING OF THE WATER QUALITY WITHIN THE PAN SHOULD BE UNDERTAKEN REGULARLY TO DETERMINE ANY POLLUTION THEREOF	
DECOMMISSIONING AND CLOSURE	AS THE PROPOSED PROJECT ENTAILS THE CONSTRUCTION OF A CEMETERY, IT IS NOT ANTICIPATED THAT THE PROPOSED PROJECT WILL COME TO AN END IN THE NEARBY FUTURE. HOWEVER, IF DECOMMISSIONING IS DECIDED UPON, A REHABILITATION PLAN WILL BE DEVELOPED AND	**DIRECT IMPACTS:** • REHABILITATION OF DISTURBED AREA • RE-VEGETATION • LIMIT OCCURRENCE OF EROSION • PROPER STORM WATER CONTROL • NO UNNATURAL PONDING ON SITE • LIMIT VISUAL IMPACT	MEDIUM POSITIVE	• ALL TEMPORARY INFRASTRUCTURE RELATED TO THE CONSTRUCTION PHASE WILL BE REMOVED FROM SITE. • TEMPORARY CONCRETE SURFACES (IF ANY) WILL BE REMOVED AND COMPACTED AREAS RIPPED. • THE ESTABLISHMENT OF NATURAL OCCURRING VEGETATION WILL	HIGH POSITIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
	SUBMITTED FOR APPROVAL. THE END-USE OF THE AREA WILL BE KEPT IN MIND DURING THE COMPILATION OF THE REHABILITATION PLAN.			BE ENCOURAGED. • NO WASTE WILL BE DUMPED ON SITE AND ANY WASTE OCCURRING ON SITE WILL BE REMOVED AND DISPOSED OF ACCORDING TO BEST PRACTICES. • ESTABLISHMENT OF EXTENSIVE ALIEN SPECIES WILL BE MONITORED.	
		INDIRECT IMPACTS: • REHABILITATION OF DISTURBED AREA	MEDIUM POSITIVE	• TEMPORARY INFRASTRUCTURE RELATED TO THE CONSTRUCTION PHASE WILL BE REMOVED FROM SITE. • TEMPORARY CONCRETE SURFACES (IF ANY) WILL BE	HIGH POSITIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
				REMOVED AND COMPACTED AREAS RIPPED. - THE ESTABLISHMENT OF NATURAL OCCURRING VEGETATION WILL BE ENCOURAGED. - NO WASTE WILL BE DUMPED ON SITE AND ANY WASTE OCCURRING ON SITE WILL BE REMOVED AND DISPOSED OF ACCORDING TO BEST PRACTICES. - ESTABLISHMENT OF EXTENSIVE ALIEN SPECIES WILL BE MONITORED.	
		CUMULATIVE IMPACTS:	MEDIUM POSITIVE	- THE DISTURBED AREA WILL BE HYDRO SEEDED	HIGH POSITIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		• REHABILITATION OF DISTURBED AREA		TO REINSTATE VEGETATION GROWTH, WHERE REQUIRED. • ESTABLISHMENT OF ALIEN VEGETATION WILL BE MONITORED AND ALIEN SPECIES WILL BE REMOVED BY HAND OR BY AN APPROVED CHEMICAL BEFORE GESTATION THEREOF.	
NO-GO	KEEPING THE STATUS QUO	**DIRECT IMPACTS:** • NO DIRECT ENVIRONMENTAL IMPACTS	POSITIVE	• NO CONSTRUCTION ACTIVITIES TO BE UDNERTAKEN ON THE SITE	POSITIVE
		INDIRECT IMPACTS: • MMM WILL NOT BE ABLE TO	HIGH NEGATIVE	• NO DIRECT ENVIRONMENTAL IMPACTS ARE FORESEEN IF THE NO-GO	MEDIUM – HIGH NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		PROVIDE RESIDENTS WITH SUFFICIENT AND SAFE BURIAL SPACE		ALTERNATIVE IS DECIDED UPON. • HOWEVER, NO APPROVED BURIAL SITES WILL BE AVAILABLE. • POSSIBLE HEALTH AND SAFETY ISSUES, AS BODIES WILL BE BURIED IN SHALLOW, HAND DIG GRAVES IN UNSUITABLE AREAS.	
		CUMULATIVE IMPACTS: • AS THE PROJECT IS DESCRIBED AS A BASIC SERVICE, THE LACK THEREOF WILL LEAD TO MAJOR SOCIAL AND ECONOMIC IMPACTS THAT	HIGH NEGATIVE	• NO DIRECT ENVIRONMENTAL IMPACTS ARE FORESEEN IF THE NO-GO ALTERNATIVE IS DECIDED UPON. • HOWEVER, NO APPROVED BURIAL SITES WILL BE AVAILABLE. • POSSIBLE HEALTH AND SAFETY ISSUES, AS BODIES	MEDIUM – HIGH NEGATIVE

PHASE	ACTIVITY	IMPACT SUMMARY	SIGNIFICANCE WITHOUT MITIGATION	PROPOSED MITIGATION	SIGNIFICANCE WITH MITIGATION
		WILL INDIRECTLY CAUSE SEVERE ENVIRONMENTAL CONCERNS.		WILL BE BURIED IN SHALLOW, HAND DIG GRAVES IN UNSUITABLE AREAS.	

SECTION E: ALTERNATIVES

As part of this report, consideration must be given to alternatives that are/may have been possible had an environmental impact assessment been undertaken prior to the commencement of the activity. Please provide a detailed description of the alternatives (whether location, technology or environmental) that were/are possible in terms of this application.

THE PROPOSED EXPANSION OF A CEMETERY AND ASSOCIATED INFRASTRUCTURE, INCLUDING THE PROVISION OF RUNNING WATER AND SANITATION FACILITIES ON SITE. THE PROPOSED CONSTRUCTION ACTIVITIES WILL TAKE PLACE ON THE REMAINDER OF THE FARM NALISVIEW 2835 AS WELL AS PORTION 1 OF THE FARM NALISVIEW 1060, BLOEMFONTEIN, FREE STATE PROVINCE.

ASSOCIATED ACTIVITIES TO BE UNDERTAKEN ON SITE INCLUDES BUT IS NOT LIMITED TO THE FOLLOWING:

- THE SITE WILL BE CLEARED OF VEGETATION AND LAID OUT SO AS TO PROVIDE BURIAL SITES FOR THE LOCAL COMMUNITY.
- GRAVES WILL BE EXCAVATED MECHANICALLY BY USE OF EXCAVATORS (TLB‘S).
- GRAVES WILL BE DUG ACCORDING TO BOOKINGS RECEIVED FROM UNDERTAKERS. IN OTHER WORDS PROVISION WILL BE MADE ONLY FOR GRAVES THAT ARE GOING TO BE USED IN A WEEKS’ TIME AND GRAVES ARE NOT DUG IN ADVANCE FOR FUTURE USE.
- FOR THIS PARTICULAR CEMETERY AN AVERAGE OF 50 BURIALS WILL TAKE PLACE PER WEEK (TOTAL OF BLOEMFONTEIN BURIALS PER WEEK ALL CEMETERIES IS 80).
- ALIEN VEGETATION (EXCEPT LARGE TREES THAT EXISTS ON SITE) SHOULD BE REMOVED FROM THE SITE.
- WATER SUPPLY TO THE SITE.
- SANITATION WILL BE PROVIDED BY MEANS OF A SEPTIC TANK.
- AN ABLUTION FACILITY (MALE / FEMALE).
- A CHAPEL, ADMINISTRATION (OFFICE) BUILDING AND SECURITY BUILDING WILL BE CONSTRUCTED.
- A FENCE ON THE PERIMETER OF THE SITE.
- CONSTRUCTION OF INTERNAL ROADS WITHIN THE CEMETERY AREA.
- SUFFICIENT SITE DRAINAGE SHOULD BE ESTABLISHED AS THE AREA MAY BE SUBJECT TO FLOODING DURING NORMAL TO HEAVY RAINFALL.

FOUR MAIN OPTIONS WERE INVESTIGATED:

ALTERNATIVE 1 PREFERRED

EXPANSION OF AN ALREADY APPROVED CEMETERY. IT WAS DETERMINED THAT THE EXISTING GRAVEYARDS IN THE NEARBY AREA ALMOST REACHED ITS CAPACITY AND THAT ADDITIONAL BURIAL SITES ARE REQUIRED. DESTEA APPROVED THE CONSTRUCTION OF A NEW CEMETERY ON NALISVIEW 5/2835 (ADJACENT TO THE PROPOSED NEW SITE). HOWEVER, IT WAS DETERMINED THAT THE SIZE OF THE PROPOSED CEMETERY ON NALISVIEW 5/2835 WILL BE INSUFFICIENT AND THEREFORE THE APPLICANT DECIDED TO APPLY FOR THE EXPANSION OF THE APPROVED CEMETERY. THUS THIS APPLICATION. PLEASE REFER TO APPENDIX A FOR MORE INFORMATION ON THE LOCALITY OF THE PROPOSED PROJECT.

ALTERNATIVE 2SITE ALTERNATIVE - NEW CEMETERY

THE CONSTRUCTION OF A NEW CEMETERY WAS ALSO STUDIED. HOWEVER, THIS OPTION IS NOT FEASIBLE AND / OR REASONABLE AS THE APPLICANT (I.E. MANGAUNG METROPOLITAN MUNICIPALITY) IS THE LANDOWNER OF BOTH PROPERTIES INVOLVED IN THIS APPLICATION (IN PROCESS TO BUY A PORTION OF PORTION 1 OF THE FARM NALISVIEW 1060). ADDITIONAL LAND SHOULD BE BOUGHT BY THE MUNICIPALITY TO ENABLE THEM TO CONSTRUCT A NEW CEMETERY. THIS WILL BE A COSTLY PROCESS. IN ADDITION, THE INCORPORATION OF THE PROPOSED NEW BURIAL SITES WITH THE ALREADY APPROVED CEMETERY ON NALISVIEW 5/2835 WILL LESSEN THE COSTS EVEN FURTHER AS THE ASSOCIATED INFRASTRUCTURES [CHAPELS, OFFICE (ADMINISTRATION) BUILDING AND ABLUTION FACILITIES] CAN BE SHARED.

ALTERNATIVE 3DESIGN & LAYOUT

INCLUSION OF A CREMATORIUM. HOWEVER, THE INCORPORATION OF A CREMATORIUM AND A COLUMBARIUM NICHE IN THE FORM OF A BUILDING OR WALL IS COSTLY AND WILL NOT FORM PART OF THE CURRENT PROJECT. THEREFORE, THIS OPTION IS NOT SEEN AS A FEASIBLE AND / OR REASONABLE ALTERNATIVE AT THIS STAGE AND WILL THEREFORE NOT BE DISCUSSED THROUGHOUT THE CURRENT DOCUMENT.

ALTERNATIVE 4TECHNOLOGY

AS AN ALTERNATIVE, THE PRE-EXCAVATION OF GRAVES AND RE-FILLING OF GRAVES (HARD MATERIAL REMOVED AT EACH OF THE NEW GRAVES AND FILLED WITH THE REMOVED MATERIAL UNTIL THE SPECIFIC GRAVE IS REQUIRED) WERE INVESTIGATED. AS PART OF THIS OPTION, THE CONSTRUCTION OF GRAVES IS TO BE DONE BY HAND DURING THE OPERATIONAL PHASE.

HOWEVER, THIS OPTION IS NOT RECOMMENDED DUE TO THE:

- TYPE OF SOIL (HARD) ENCOUNTERED ON SITE - THE COMMUNITY MEMBERS WILL NOT BE ABLE TO DIG THE GRAVES TO THE ACCEPTABLE DEPTHS.
- HIGH NUMBER OF BURIALS PER WEEK.

THIS OPTION WILL THUS NOT BE DISCUSSED THROUGHOUT THE CURRENT DOCUMENT.

NO-GO OPTION

UTILISING THE EXISTING CEMETERIES IN THE REGION. THE EXISTING CEMETERIES IN THE REGION ALMOST REACHED ITS CAPACITY AND THE SECTION APPROVED FOR NALISVIEW 5/2835 IS NOT LARGE ENOUGH TO SERVICE THE AREA. THE EXISTING FACILITIES ARE THEREFORE INADEQUATE FOR THE NEED OF THE COMMUNITY AND THIS OPTION IS THUS NOT SEEN AS A FEASIBLE / REASONABLE ALTERNATIVE.

a) Site alternatives

ALTERNATIVE 1 **PREFERRED**		
Description	Lat (DDMMSS)	Long (DDMMSS)
THE PREFERRED PROJECT ENTAILS THE EXPANSION OF A CEMETERY, BY MEANS OF CONSTRUCTION OF NEW BURIAL SITES ADJACENT TO AN ALREADY APPROVED CEMETERY. IT WAS DETERMINED THAT THE EXISTING GRAVEYARDS IN THE NEARBY AREA ALMOST REACHED ITS CAPACITY AND THAT ADDITIONAL BURIAL SITES ARE REQUIRED. DESTEA APPROVED THE CONSTRUCTION OF A NEW CEMETERY ON NALISVIEW 5/2835 (ADJACENT TO THE PROPOSED NEW SITE). HOWEVER, IT WAS DETERMINED THAT THE SIZE OF THE PROPOSED CEMETERY ON NALISVIEW 5/2835 WILL BE INSUFFICIENT AND THEREFORE THE APPLICANT DECIDED TO APPLY FOR THE EXPANSION OF THE APPROVED CEMETERY. THUS THIS APPLICATION. PLEASE REFER TO APPENDIX A FOR MORE INFORMATION ON THE LOCALITY OF THE PROPOSED PROJECT.	29°14'43.56"S	26°13'52.61"E
ALTERNATIVE 2 **SITE ALTERNATIVE**		
THE CONSTRUCTION OF A NEW CEMETERY WAS ALSO STUDIED. HOWEVER, THIS OPTION IS NOT FEASIBLE AND / OR REASONABLE AS THE APPLICANT (I.E. MANGAUNG METROPOLITAN MUNICIPALITY) IS THE LANDOWNER OF BOTH PROPERTIES INVOLVED IN THIS APPLICATION (IN PROCESS TO BUY A PORTION OF PORTION 1 OF THE FARM NALISVIEW 1060). ADDITIONAL LAND SHOULD BE BOUGHT BY THE MUNICIPALITY TO ENABLE THEM TO CONSTRUCT A NEW CEMETERY. THIS WILL BE A COSTLY PROCESS. IN ADDITION, THE INCORPORATION OF THE PROPOSED NEW BURIAL SITES WITH THE ALREADY APPROVED CEMETERY ON NALISVIEW 5/2835 WILL LESSEN THE COSTS EVEN FURTHER AS THE ASSOCIATED INFRASTRUCTURES (CHAPEL, ADMINISTRATION BUILDING AND ABLUTION FACILITIES) CAN BE SHARED. THEREFORE THIS OPTION (CONSTRUCTION OF A NEW CEMETERY ON A DIFFERENT SITE) WILL NOT BE DISCUSSED FURTHER AS PART OF THIS APPLICATION.		

In the case of an area being under application, please provide the co-ordinates of the corners of the site as indicated on the lay-out map provided in Appendix A of this form.

b) Lay-out alternatives

ALTERNATIVE 1 PREFERRED
Description
THE DESIGN AND LAYOUT OF THE PROPOSED EXPANSION OF THE CEMETERY IS DETERMINED BY THE APPROVED PLANS FOR THE CEMETERY TO BE CONSTRUCTED ON PORTION 5 OF THE FARM NALISVIEW 2835, AS THE PROPOSED NEW PROJECT WILL BE INCORPORATED TO THE ALREADY APPROVED APPLICATION (I.E. NALISVIEW 5/2835). THE PROPOSED DESIGN AND LAYOUT IS AN ENVIRONMENTALLY COST EFFECTIVE SOLUTION AS ALREADY APPROVED INFRASTRUCTURES WILL BE INCORPORATED.
ALTERNATIVE 3DESIGN & LAYOUT
INCLUSION OF A CREMATORIUM. HOWEVER, THE INCORPORATION OF A CREMATORIUM AND A COLUMBARIUM NICHE IN THE FORM OF A BUILDING OR WALL WILL BE COSTLY. THEREFORE, THIS OPTION IS NOT SEEN AS A FEASIBLE AND / OR REASONABLE ALTERNATIVE AT THIS STAGE AND WILL THEREFORE NOT BE DISCUSSED THROUGHOUT THE CURRENT DOCUMENT.

c) Technology alternatives

ALTERNATIVE 1 PREFERRED
GRAVES WILL BE EXCAVATED MECHANICALLY BY USE OF EXCAVATORS (TLB'S). GRAVES WILL BE DUG ACCORDING TO BOOKINGS RECEIVED FROM UNDERTAKERS. IN OTHER WORDS PROVISION WILL BE MADE ONLY FOR GRAVES THAT ARE GOING TO BE USED IN A WEEKS' TIME AND GRAVES ARE NOT DUG IN ADVANCE FOR FUTURE USE. FOR THIS PARTICULAR CEMETERY AN AVERAGE OF 50 BURIALS WILL TAKE PLACE PER WEEK (TOTAL OF BLOEMFONTEIN BURIALS PER WEEK (ALL CEMETERIES) IS 80).
ALTERNATIVE 4TECHNOLOGY
AS AN ALTERNATIVE, THE PRE-EXCAVATION OF GRAVES AND RE-FILLING OF GRAVES (HARD MATERIAL REMOVED AT EACH OF THE NEW GRAVES AND FILLED WITH THE REMOVED MATERIAL UNTIL THE SPECIFIC GRAVE IS REQUIRED) WERE INVESTIGATED. AS PART OF THIS OPTION, THE CONSTRUCTION OF GRAVES IS TO BE DONE BY HAND DURING THE OPERATIONAL PHASE. HOWEVER, THIS OPTION IS NOT RECOMMENDED DUE TO THE: • TYPE OF SOIL (HARD) ENCOUNTERED ON SITE - THE COMMUNITY MEMBERS WILL NOT BE ABLE TO DIG THE GRAVES TO THE ACCEPTABLE DEPTHS. • HIGH NUMBER OF BURIALS PER WEEK. THIS OPTION WILL THUS NOT BE DISCUSSED THROUGHOUT THE CURRENT DOCUMENT.

d) No-go alternative

THE NO-GO OPTION MEANS RETAINING THE *STATUS QUO*, I.E. NOT CONSTRUCTING ADDITIONAL GRAVES IN THE AREA. THIS OPTION IS NOT RECOMMENDED, AS ADDITIONAL BURIAL SPACE IS REQUIRED, AS EXPLAINED

ABOVE.

SECTION F: APPENDICES

The following appendices must be attached where appropriate:

Appendix	Cross out ("☒") the box if Appendix is attached
Appendix A: Location map	X
Appendix B: Site plan(s)	X
Appendix C: Owner(s) consent(s)	X
Appendix D: Photographs	X
Appendix E: Permit(s) / license(s) from any other organ of state including service letters from the municipality	NOT SUBMITTED TO DATE
Appendix F: Additional Impact Assessment Information	X
Appendix G: Report on alternatives	X
Appendix H: Any Other (describe)	X

Appendix H_1: Property Description, including WinDeed
Appendix H_2: Public Participation
Appendix H_3: Project Motivation
Appendix H_4: Specialist Reports
Appendix H_5: EMPr
Appendix H_6: Specialist Declaration
Appendix H_7: EAP Declaration
Appendix H8: Eskom Confirmation

SECTION G: DECLARATIONS

G1: Declarations of the EAP

1. The Independent Environmental Assessment Practitioner

I, NEIL DEVENISH declare under oath that I –

a. act as the independent environmental assessment practitioner in this application ;
b. do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the S24G of the National Environmental Management Act, read together with the relevant Environmental Impact Assessment Regulations;
c. do not have and will not have a vested interest in the proposed activity proceeding;
d. have no, and will not engage in, conflicting interests in the undertaking of the activity;
e. undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the S24G of the National Environmental Management Act, read together with the Environmental Impact Assessment Regulations, 2014 as amended on 07 April 2017;
f. will ensure that all documents will contain all relevant facts in respect of the application & that all documentation is distributed or made available to interested and affected parties. I will ensure that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced for th rectification application.
g. will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
h. will keep a register of all interested and affected parties that participated in a public participation process; and
i. will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not.

Signature of the environmental assessment practitioner:

MDA
Name of company:

18/06/2020
Date:

Signature of the Commissioner of Oaths:

18/06/2020
Date:

Designation:

Official stamp (below)

COMMISSIONER OF OATHS
LIZANNE WESSELS
ATTORNEY ADMITTED
I.T.O. ACT 53/1979 R.S.A.
12 BARNES STREET, BLOEMFONTEIN

G2: Declarations of the Applicant

The Applicant

2.

I, MG Mzingizi Nkungwana ,declare under oath that I -

a. am the applicant in this application;
b. appointed the environmental assessment practitioner as indicated under G1 above to act as the independent environmental assessment practitioner for this application;
c. will provide the environmental assessment practitioner and the competent authority with access to all information at my disposal that is relevant to the application;
d. am responsible for complying with the directive or conditions of any environmental authorisation issued by the competent authority;
e. understand that I will be required to pay an administration fine in terms of S24G(2) of the Act and that a decision in this regard will only be forthcoming after payment of such a fine; and
f. hereby indemnify, the government of the Republic, the competent authority and all its officers, agents and employees, from any liability arising out of the content of any report, any procedure or any action for which the applicant or environmental assessment practitioner is responsible in terms of the Act.

Signature of the applicant:

Mangaung Metropolitan Municipality

Name of company:

12 June 2020

Date:

Signature of the Commissioner of Oaths:

17/06/2020

Date:

SAGC GISc

Designation:

Official stamp (below):

"Certified a true copy of the original"
Commissioner of Oath
Herman Jacobus Booysen
135 President Reitz Ave
Westdene, Bloemfontein
Registration Number: PGP0100

HERMAN JACOBUS BOOYSEN
Commissioner of Oaths / Kommissaris van Ede
Ex Officio
Professional GISc Practitioner
The South African Council for Professional
and Technical Surveyors
Registration Number: PGP 0100

Appendix A:
Locality map

TYPE OF PLAN: LOCALITY PLAN

mda
Town & Regional Planners,
Environmental &
Development Consultants

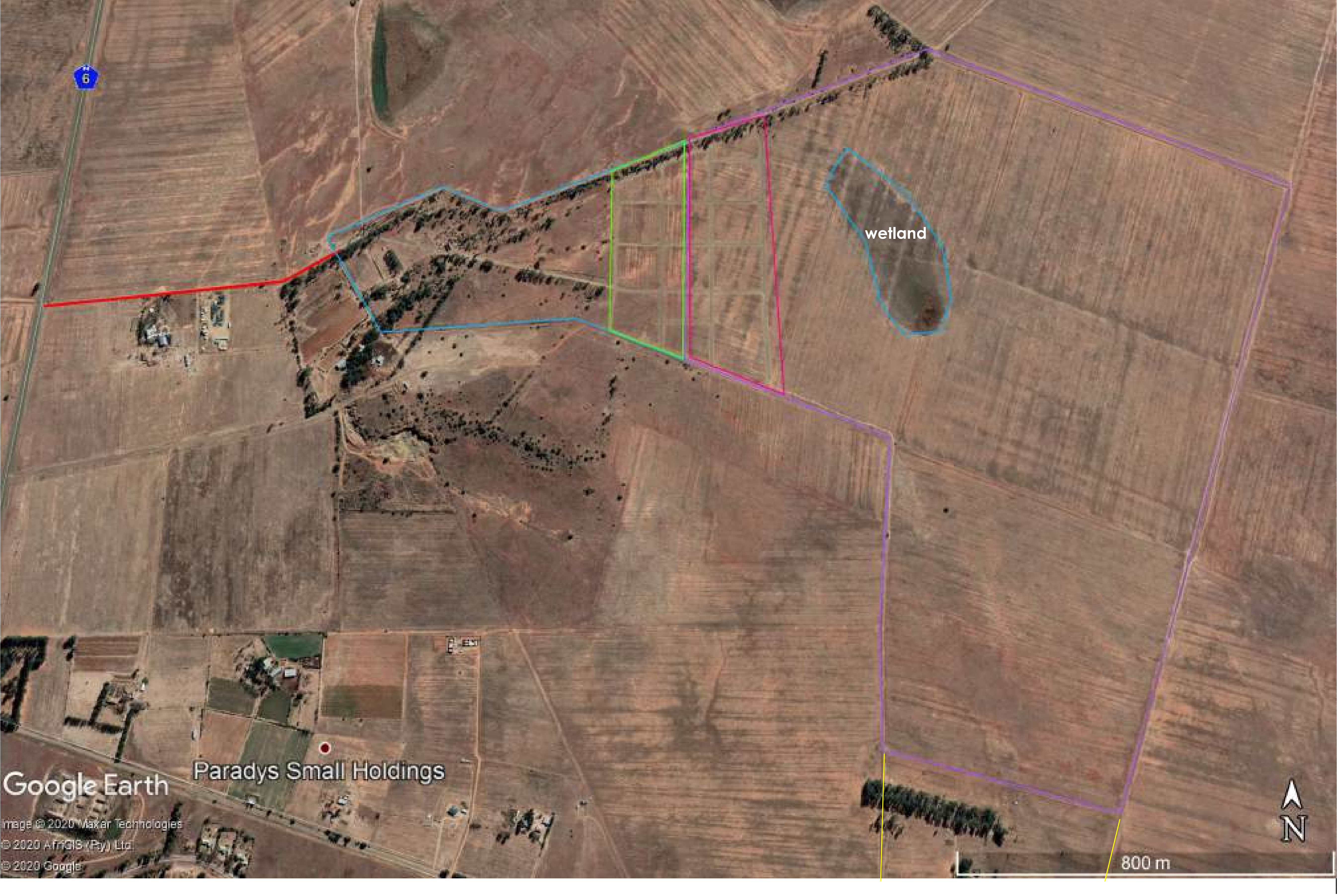
T: 051 447 1583
F: 086 455 2568

P.O. Box 20298, Willows, Bloemfontein, 9320
9 Barnes Street, Westdene, Bloemfontein, 9301

PROJECT:
THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY

PROJECT BY:
MANGAUNG METROPOLITAN MUNICIPALITY

DRAWN BY:
HS



Legend:

🟥 Existing access road

🟪 Proposed expansion of a Cemetery (current project; Remainder of the farm Nalisview 2835)

🟨 Proposed expansion of a Cemetery (current project; Portion 1 of the farm Nalisview 1060))

🟦 Approved Cemetery (Portion 5 of the farm Nalisview 2835)

🟩 Construction activities commenced on Portion 5 of the farm Nalisview 2835

■ Construction activities commenced on the Remainder of the farm Nalisview 2835 (without the necessary approval)

NOTE: no construction activities were undertaken near the identified wetland

400 m

TYPE OF PLAN: LOCALITY PLAN

mda

Town & Regional Planners,
Environmental &

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THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY

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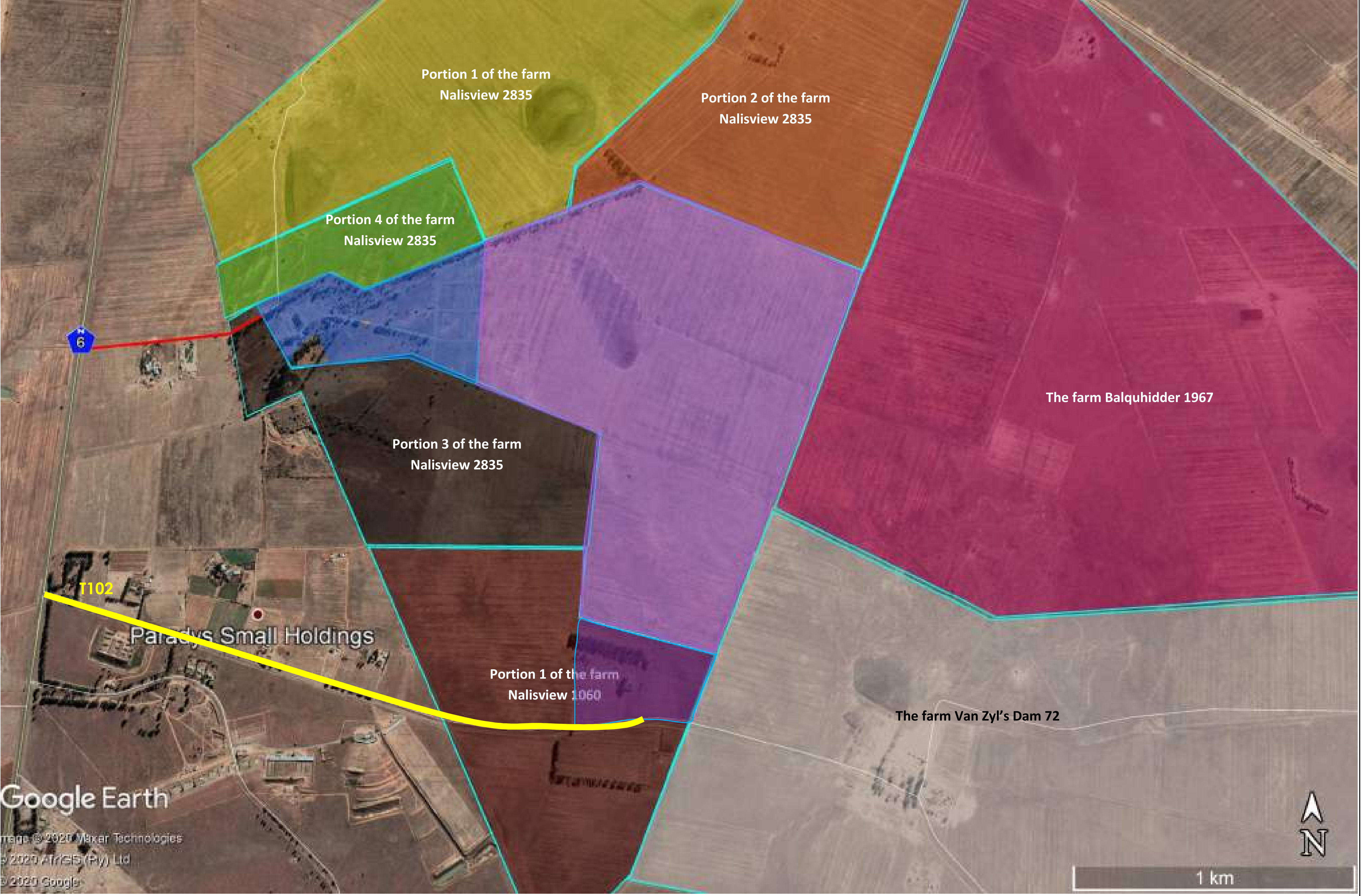

Legend:

🟥 Existing access road

🟪 Proposed expansion of a Cemetery (current project; Remainder of the farm Nalisview 2835; Portion 1 of the farm Nalisview 1060)

🟦 Approved Cemetery (Portion 5 of the farm Nalisview 2835)

🟨 Existing road to be upgraded and utilised as access road to the cemetery

500 m

TYPE OF PLAN: LOCALITY PLAN

mda Town & Regional Planners,
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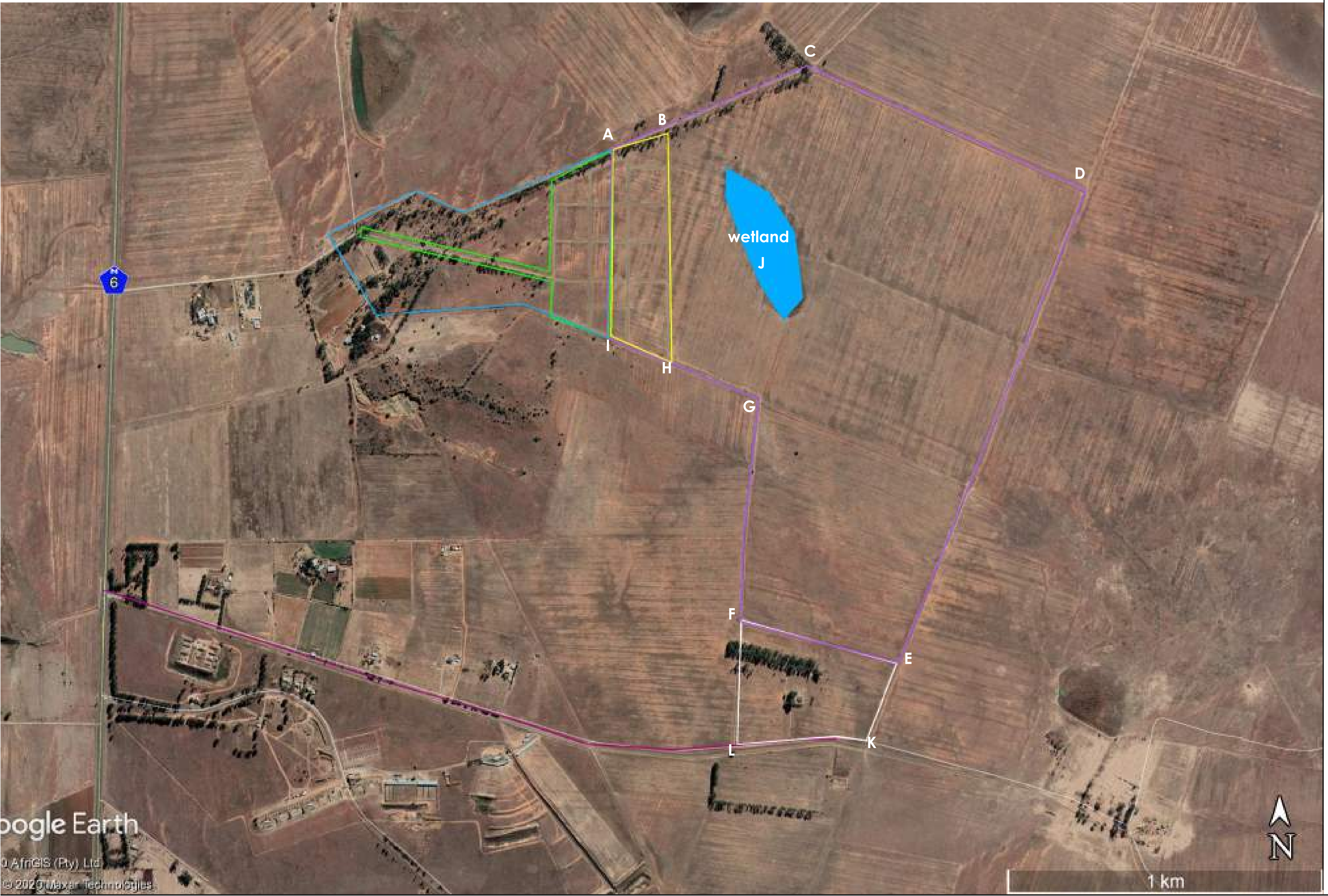

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Coordinates:

A: 29° 14.519’S; 26 ° 13.747’E

B: 29° 14.474’S; 26 ° 13.853’E

C: 29° 14.368’S; 26 ° 13.140’E

D: 29° 14.595’S; 26 ° 14.685’E

E: 29° 15.390’S; 26 ° 14.317’E

F: 29° 15.321’S; 26 ° 14.008’E

G: 29° 14.943’S; 26 ° 14.028’E

H: 29° 14.883’S; 26 ° 13.864’E

I: 29° 14.837’S; 26 ° 13.747’E

J: 29° 14.724’S; 26 ° 14.080’E

K: 29°15'31.16"S; 26°14'15.25"E

L: 29°15'31.95"S; 26°14'0.14"E

TYPE OF PLAN: LOCALITY PLAN

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Environmental &

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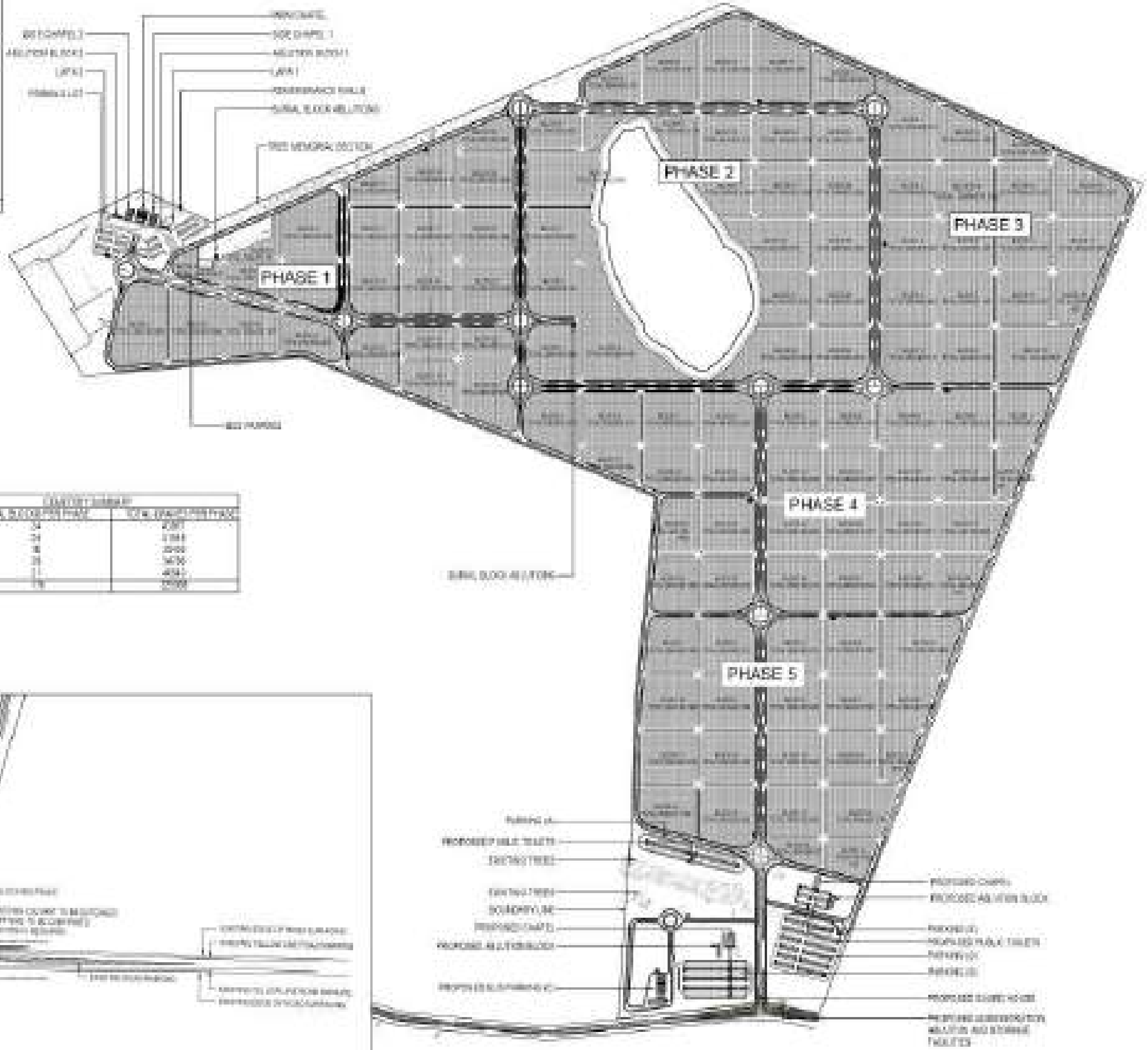
PROJECT:
THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY

PROJECT BY:
MANGAUNG METROPOLITAN MUNICIPALITY

DRAWN BY:
HS

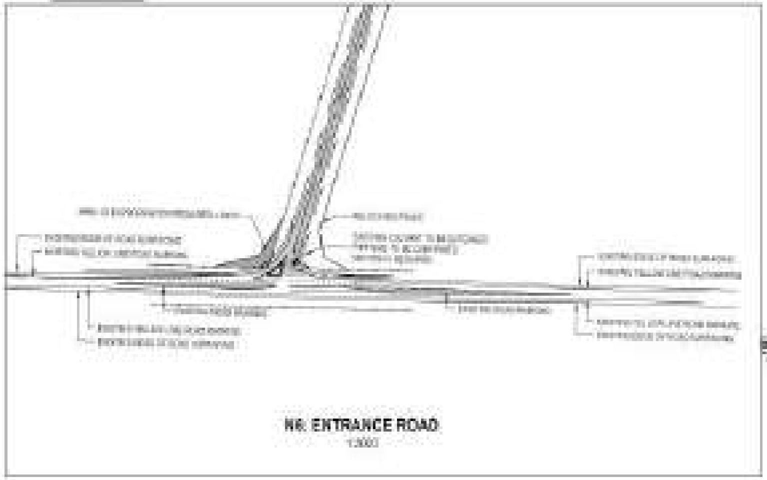
Appendix B:

Site plan(s)



SITE PLAN LAYOUT

1:5000



N6: ENTRANCE ROAD

1:5000

aurecon

www.aurecongroup.com

PRELIMINARY
NOT FOR CONSTRUCTION

AS SHOWN A1

PROJECT

MANGAUNG METROPOLITAN
MUNICIPALITY
NEW CEMETERY

TITLE

SITE LAYOUT PLAN

112385 - 0000 - DRG - AA - 0001 - B

Appendix C:
Owner(s) consent(s)

Remainder of the farm Nalisview 2035:

N/A, as the landowner is the applicant

Consent / Resolution Letter:

To whom it may concern:

It is hereby certified that:

1. I, Andreas Wesselius [illegible] [illegible] (ID Nr: 3406305125084) is the legal owner of the remainder of the farm [illegible]. Bloemfontein.

2. As the landowner, I have permission to sign any documentation regarding the proposed applications regarding the proposed fencing access road to be submitted to DESTEA.

3. Mangaung Metropolitan Municipality is also given permission to undertake any study on the above mentioned property as required by DESTEA in this regard, with all costs to Mangaung Metropolitan Municipality.

4. Permission is hereby automatically given to the Mangaung Metropolitan Municipality to construct the fencing, the road and associated infrastructure on the above mentioned property. It is hereby confirmed that I, the landowner, are willing to discuss compensation / registration of a servitude / other arrangement with Mangaung Metropolitan Municipality in this regard.

Signed on 11 th day of January 2019 at Bloemfontein.

Signed by the landowner:

Contact information of the landowner:

Tel: 0514438680

Fax:

Cell: 0767448934

E-mail:

Postal Address: PO Box
34369 Faunasig
Bloemfontein
9325

Appendix D:
Photographs

Wetland / Seasonal Pan:

Figure 1: Panorama of the seasonal pan seen from the north east toward the south west. This is seen from the northern boundary of the pan.

Figure 2: Panorama of the seasonal pan. The grass tufts in the foreground (red) is the obligate wetland species, *Leptochloa fusca.*

Figure 3: Panorama of the seasonal pan from the south western border. Note grazing by cattle within the pan.

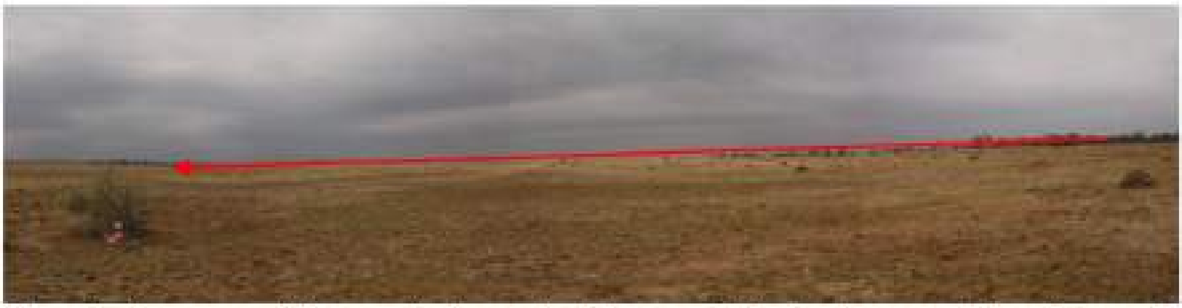


Figure 4: Panorama of the area to the south of the pan. Note the decrease of termite mounds nearer to the pan (red arrow).

Figure 5: The tufts of the obligate wetland species, *Leptochloa fusca*, which can be reliably used to indicate the seasonal pan on the site.

Figure 6: View of the site with historical plough furrows still visible (red lines).

Figure 7: View of the seasonal pan at the south western end. Note grazing by cattle.

General view of site:

General view of the study area

General view of the study area looking East

General view of the study area looking NorthEast

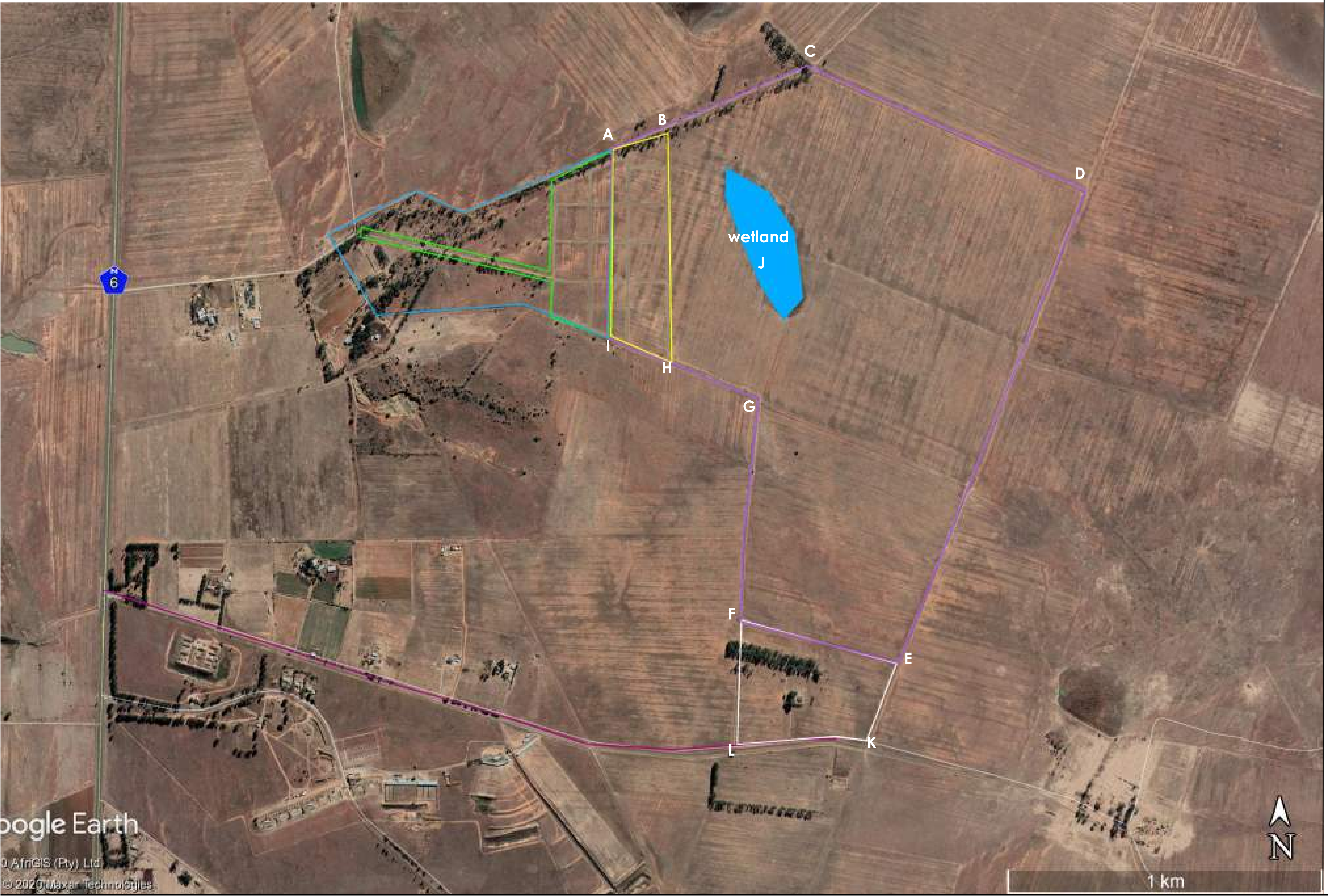
Existing access road

Tree gum grove

Appendix D$_2$:

Internal Road Construction & Map indicating the area where construction activities have commenced

Construction of internal roads was undertaken.



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TYPE OF PLAN: LOCALITY PLAN

mda

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PROJECT:
THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY

PROJECT BY:
MANGAUNG METROPOLITAN MUNICIPALITY

DRAWN BY:
HS

Appendix E:

Permit(s) / license(s) from any other organ of state including service letters from the municipality

Applications for the following will be submitted to the relevant authorities in due course:

Nr	Authority	Type of Application
1	Department of Water and Sanitation	Impeding and / or Alteration of the beds / banks of a water resource (wetland on site)
2	Mangaung Metropolitan Municipality	Application for Change in Land-Use
3	Free State Heritage	Alteration / destruction of the old farm house: To destroy, damage, excavate, alter, remove from its original position, subdivide or change the planning status of a Provincial Heritage Site or a Provisionally Protected Place, *or* to alter or demolish a Structure 60 years older, as protected in terms of the National Heritage Resources Act (Act No. 25 of 1999)

Appendix F:
Additional Impact Assessment Information

IMPACT ASSESSMENT

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060 Bloemfontein, Free State Province

Proponent: Mangaung Metropolitan Municipality
MDA Ref No: 40727
Date: April 2020

Town & Regional Planners,
Environmental & Development
Consultants

Physical Address: 9 Barnes Street,
Westdene, Bloemfontein, 9301
Postal Address: PO Box 100982,
Brandhof, 9324
Tel: 051 4471583, Fax: 051 448 9839
E-mail: admin@mdagroup.co.za

1. METHODOLOGY

1.1. Impact assessment must take into account the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the project stages from planning, through construction and operation to the decommissioning phase. Where necessary, the proposal for mitigation or optimization of an impact is noted. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

1.2. A rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table: Criteria for the classification of an impact		
Nature	A brief description of the environmental aspect being impacted upon by a particular action or activity is presented.	
Extent (Scale)	Considering the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.	
	Site	Within the construction site
	Local	Within a radius of 2 km of the construction site
	Regional	Provincial (and parts of neighbouring provinces)
	National	The whole of South Africa
Duration	Indicates what the lifetime of the impact will be.	
	Short-term	The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
	Medium-term	The impact will last for the period of the construction phase, where after it will be entirely negated
	Long-term	The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter
	Permanent	The only class of impact which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient
Intensity	Describes whether an impact is destructive or benign.	

Table: Criteria for the classification of an impact		
	Low	Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.
		It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.
	Medium	Effected environment is altered, but natural and social functions and processes continue albeit in a modified way, cultural
	High	Natural, cultural and social functions and processes are altered to extent that they temporarily cease
	Very high	Natural, cultural and social functions and processes are altered to extent that they permanently cease
Probability	Describes the likelihood of an impact actually occurring.	
	Improbable	Likelihood of the impact materializing is very low
	Possible	The impact may occur
	Highly probable	Most likely that the impact will occur
	Definite	Impact will certainly occur
Significance	Significance is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	
	Low impact	No permanent impact of significance. Mitigatory measures are feasible and are readily instituted as part of a standing design, construction or operating procedure
	Medium impact	Mitigation is possible with additional design and construction inputs
	High impact	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment
	Very high impact	The design of the site may be affected. Intensive remediation as needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw
Status	Denotes the perceived effect of the impact on the affected area.	
	Positive	Beneficial impact

Table: Criteria for the classification of an impact		
	Negative	Deleterious or adverse impact
	Neutral	Impact is neither beneficial nor adverse

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

DESCRIPTION AND ADDRESSING OF POSSIBLE IMPACTS, ISSUES AND CUMULATIVE IMPACTS

Developments such as these do have, like many other types of developments, various direct but also indirect impacts on the environment. These impacts have to be managed in order to have the minimum environmental impact and the maximum benefit to man.

Issues identified during the Basic Assessment process are discussed and assessed below:

1. VEGETATION DESTRUCTION						
Assessment						
Mitigation Status	**Extent**	**Duration**	**Intensity**	**Probability**	**Significance**	**Status**
Without Mitigation	Local	Permanent	Very high	Definite	High	Negative
With Mitigation	Site	Long term	High	Definite	Medium	Negative

Recommendation	
Phase	**Description of recommendation**
General	• Please refer to the Specialist Reports in Appendix D for more recommendations
Planning Phase	• None
Construction phase and operational phase	• Establishment of alien / invader vegetation will be monitored and these species will be removed by hand or by an approved chemical before gestation thereof. • Vegetation clearance will be limited to the required area. • A permit for the removal of protected plant species will be obtained before the removal of these species (if any). • Care should be taken to limit unnecessary destruction of the natural vegetation. • All human movement and activities must be contained within designated construction areas and the access road in order to prevent peripheral impacts on surrounding natural habitat. • No fire-wood may be collected in the veld without written permission from the landowner. • Alien control and monitoring programme must be developed. • Visual inspections should be undertaken regularly to ensure environmental compliance. • If erosion is evident, proper erosion control measures should be implemented as soon as possible.
Post construction phase and rehabilitation phase	• The alien control and monitoring programme used during the construction and operational phase must be carried over into the post construction and rehabilitation phase. • Erosion should be prevented as far as possible and attended to, as serious erosion may occur at barren areas. • Return and spread topsoil cover (to original depth) over rehabilitated area. • Vegetation should be allowed to re-establish naturally over disturbed area to be rehabilitated. • Areas which show no vegetation growth nine months after completion of the rehabilitation work, must be ripped, additional topsoil spread and seeded with indigenous grass species.

1. VEGETATION DESTRUCTION	
	• Species, especially grasses, trees and shrubs occurring in the region must be used to rehabilitate disturbed areas.

2. LOSS OF SOIL

Assessment

Mitigation Status	Extent	Duration	Intensity	Probability	Significance	Status
Without Mitigation	Regional	Permanent	Medium	Definite	High	Negative
With Mitigation	Local	Long-term	Medium	Definite	Medium	Negative

Recommendation

Phase	Description of recommendation
General	• Please refer to the Specialist Reports in Appendix D for more recommendations
Planning Phase	• No environmental mitigation measures is required during the planning phase on the proposed site, as no mitigation measures are to be implemented on site during the planning phase. • However, the engineers, specialists and environmental consultants took various factors into consideration, to be implemented during the construction / operational phase.
Construction phase and operational phase	• Store stripped topsoil in an approved location and in an approved manner for later re-use in the rehabilitation process, for example: - Bricks may be placed around the stockpiles, to limit the loss thereof due to rainy events. - Stockpiles should not be higher than 1.5 m. - The gradient of stockpiles should not be greater than 1:1.5. • Speed limit will be enforced on the construction vehicles and these vehicles will only make use of designated roads / pathways. • Dust control measures will be implemented if nuisance dust generation occurs during the construction period. • All human movement and activities must be contained within designated construction areas and the access road in order to prevent peripheral impacts on surrounding natural habitat. • Visual inspections should be undertaken regularly to ensure environmental compliance. • Storm water measures will be implemented in order to manage storm water and this will also prevent erosion. • Visual inspections for the occurrence of erosion should be undertaken on a weekly basis during the construction phase. • If erosion is evident, proper erosion control measures should be implemented as soon as possible.

2. LOSS OF SOIL	
Post construction phase and rehabilitation phase	• Erosion should be prevented as far as possible and attended to, as serious erosion may occur at barren areas. • Return and spread topsoil cover (to original depth) over rehabilitated area. • Vegetation should be allowed to re-establish naturally over disturbed area to be rehabilitated. • Areas which show no vegetation growth nine months after completion of the rehabilitation work, must be ripped, additional topsoil spread and seeded with indigenous grass species.

3. POLLUTION CONTROL						
Assessment						
Mitigation Status	**Extent**	**Duration**	**Intensity**	**Probability**	**Significance**	**Status**
Without Mitigation	Regional	Permanent	High	Definite	High	Negative
With Mitigation	Local	Long-term	Medium	Definite	Medium	Negative

Recommendation	
Phase	**Description of recommendation**
General	• Please refer to the Specialist Reports in Appendix D for more recommendations
Planning Phase	• No environmental mitigation measures is required during the planning phase on the proposed site, as no mitigation measures are to be implemented on site during the planning phase. • However, the engineers, specialists and environmental consultants took various factors into consideration, to be implemented during the construction / operational phase.
Construction phase and operational phase	• Visual inspections for the occurrence of pollution should be undertaken daily during the operational phase. • Best practices should be implemented in the case of spillages / pollution / erosion. • No waste (general / construction / potential hazardous / etc.) may be dumped in the veld / water features. • Waste classification should be undertaken. • Suitable waste bins etc. will be available on site for the temporary disposal of waste. • Waste will be removed from site and disposed of at an authorised landfill site. • DWS should be notified of any spillage / pollution within 24 hours of occurrence within water resources. • Record should be kept on site to indicate date of visual inspection, any spillages observed, and manner in which the spill was treated. • Proper erosion mitigation measures should be implemented.
Post construction phase and rehabilitation phase	• Maintenance and repair will be undertaken when necessary. • All temporary infrastructure related to the construction phase will be removed from site. • Temporary concrete surfaces (if any) will be removed and compacted areas ripped. • No waste will be dumped on site and any waste occurring on site will be removed and disposed

3. POLLUTION CONTROL	
	of according to best practices.

4. LOSS OF ANIMAL LIFE						
Assessment						
Mitigation Status	**Extent**	**Duration**	**Intensity**	**Probability**	**Significance**	**Status**
Without Mitigation	Local	Permanent	Medium	Definite	High	Negative
With Mitigation	Local	Long-term	Medium	Definite	Medium	Neutral
Recommendation						
Phase	**Description of recommendation**					
General	• Please refer to the Specialist Reports in Appendix D for more recommendations					
Planning Phase	• No environmental mitigation measures is required during the planning phase on the proposed site, as no mitigation measures are to be implemented on site during the planning phase. • However, the engineers, specialists and environmental consultants took various factors into consideration, to be implemented during the construction / operational phase.					
Construction phase and operational phase	• No animals may be captured / harmed / killed on site. • Specialists should be appointed to remove / translocate species, if required. The necessary permits should also be obtained. • Any occurrences of harmed animals should be reported to the ECO, the required steps should be taken and should be recorded as such.					
Post construction phase and rehabilitation phase	• No animals may be captured / harmed / killed on site. • Specialists should be appointed to remove / translocate species, if required. The necessary permits should also be obtained. • Any occurrences of harmed animals should be reported to the ECO, the required steps should be taken and should be recorded as such.					

5. Surface Water						
Assessment						
Mitigation Status	**Extent**	**Duration**	**Intensity**	**Probability**	**Significance**	**Status**
Without Mitigation	Regional	Permanent	Medium	Definite	High	Negative
With Mitigation	Local	Long-term	Medium	Definite	Medium	Neutral

Recommendation	
Phase	**Description of recommendation**
General	• Please refer to the Specialist Reports in Appendix D for more recommendations
Planning Phase	• No environmental mitigation measures is required during the planning phase on the proposed site, as no mitigation measures are to be implemented on site during the planning phase. • However, the engineers, specialists and environmental consultants took various factors into consideration, to be implemented during the construction / operational phase.
Construction phase and operational phase	• Storm water measures will be implemented in order to manage storm water and this will also prevent erosion. • No activities may be undertaken within the wetland buffer area as recommended by the Ecological Specialist. • No water may be re-directed to the wetland. • The necessary authorisations (altering and impeding of beds / banks of water sources / storing of water) should be obtained from DWS if the applicant decides to undertake any activities within the said buffer area. • Daily inspections for the occurrence of surface water and soil pollution are to be undertaken during the construction phase. • Best practices should be implemented in the case of spillages / pollution / erosion at the waterways.
Post construction phase and rehabilitation phase	• Disturbed waterways (if any) should be rehabilitated according to best practices. • All polluted areas should be cleaned as soon as possible. • Waste to be removed from site.

6. VISUAL IMPACT

The visual impact of the proposed development in the landscape is the function of several factors of which the viewing distance, visual absorption capacity and landform are measurable. Other factors are difficult to categorize because they are subjective viewpoints.

The visual impact for the proposed development is largely due to:
- The topography in terms of elevation and aspect;
- The vegetative cover in terms of its extent and height;
- The extent of the proposed development;
- Distance from point of origin; and
- The low visual absorption capacity of the surrounding landscape.

Factors of visual impact

Visual character:
The visual character of an area has different elements that provide an overall perceived ambience. In the consideration of the visual character of a site, it is important to include not only the internal land use but that of the surrounding land as well.

At this site, the topography is relatively flat with a slight increase in slope to the south. The site itself consists of old ploughed fields and historical furrows are still visible in many areas. As a consequence the grassland is of secondary establishment and degraded. Several windrows of the exotic Bluegum Tree (*Eucalyptus camaldulensis*) occurs to the west and south of the site. Residential areas occur in close proximity to the north of the site (approximately 2 km). Small demolished structures are also evident around the depression wetland on the site, most likely watering or feeding troughs, windmill, dam or similar associated structures.

Scale of landscape:
Visual scale is the apparent size relationships between landscape components and their surroundings (Smardon, et al. 1986).

Visual analysis:
In this section the intensity of the visual impact of the development on the surrounding area is described. Aspects such as viewshed, visual absorption capacity and the appearance of the development from critical viewpoints will be used to determine this impact.

The site contains a large depression or pan in the centre/western portion of the site. This seems to be a natural system but has however also been degraded through ploughing and retention berms to contain surface water. In addition, two artificial berms/dams occur to the north west of the site (approximately 200 m). None of these waterbodies are fed by a defined watercourse and therefore have no inlet. They also do not contain a defined outlet. They are all fed by surface inflow from the surroundings and function as groundwater recharge systems.

The site is currently utilised for communal grazing and consequently is subjected to heavy overgrazing. Due to the current drought, overgrazing and the site consisting of old ploughed fields the grass layer is heavily degraded and climax species are largely absent. Exotic weeds are common and also indicative of the degraded condition of the grassland.

The grass layer is dominated by several grass species and dwarf shrubs. Grass species include *Arsitida congesta, Chloris virgata, Eragrostis lehmanniana, Eragrostis gummiflua* and *Themeda triandra*. Dwarf shrubs include *Solanum incanum, Lycium horridumHelichrysum zeyheri, Ruschia hamata, Hertia pallens, Berkheya macrocephala* and *Rosenia humilis*. Several of these species are indicators of disturbance and overgrazing. Other herbs common on the site include *Sutera caerulea, Osteospermum scariosum, Wahlenbergia androsaceae, Vahlia capensis, Gazania krebsiana, Geigeria filifolia* and *Selago densiflorus*. Two identified bulb species, *Moraea pallida* and *Colchicum longipes*, are both widespread, common and ot protected. They are therefore of low conservation importance. Trees and shrubs are scarce on the site and limited to *Ziziphus mucronata* and *Asparagus larcinus*.

Exotic weeds are common on the site and consists of *Argemone ochroleuca, Alternanthera nodiflora, Polygonum aviculare, Plantago major* and *Phyla nodiflora*. These also indicate the disturbed nature of the site.

The vegetation and general ecology of the site indicates the transformed and highly degraded condition of the site. Previous ploughing of the area has irreversibly transformed the natural vegetation type and due to the disturbance of the soil profile and historical plough furrows it is highly unlikely that rehabilitation of the vegetation to the natural condition will be feasible. Current high levels of grazing and trampling by domestic stock has also contributed to the disturbance of the site and alteration of the species composition.

Site evaluation in terms of visual impact

Visual assessment ratings rates each criterion listed in the table from, high, medium to low according to specific characteristics of those criteria.

Visual assessment criteria used to determine the degree of visual impact of the proposed activities on the environment (adapted from Klapwijk 1998)			
CRITERIA	**HIGH**	**MEDIUM**	**LOW**
Visibility	Very visible from many places beyond 1km	Visible from within 1km zone but partially obscured by intervening objects	Only partially visible within the 1km zone and beyond due to screening by intervening objects
Visual quality	A very attractive setting	A setting with some aesthetic and visual merit	A setting which has little aesthetic merit
Visible man-made structures	Buildings as a dominant visual element	Buildings as a partial visual element	Buildings as a minor visual element
Surrounding landscape compatibility	Cannot accommodate proposed development without appearing totally out of place.	Can accommodate the proposed development without appearing totally out of place	Usually suits or matches the proposed development
Character of site or surrounding area	Exhibits a definite character	Exhibits some character	Little or no character
Contrast between human scale and vertical & horizontal elements in the landscape	There is high contrast	Landscape with some contrast	Limited vertical variation. Most elements are related to human and horizontal scale
Visual absorption capacity (VAC)	Inability of landscape to visually absorb a development because of a limited vegetation cover, flat slope and uniform	The lower ability of the landscape to visually absorb the development due to less diverse landform, vegetation & texture	The ability of landscape to easily accept visually a particular development because of its diverse landform,

Visual assessment criteria used to determine the degree of visual impact of the proposed activities on the environment (adapted from Klapwijk 1998)			
CRITERIA	**HIGH**	**MEDIUM**	**LOW**
	texture		vegetation and texture
View distance (uninterrupted)	More than 5km	Between 5km & 1km	Between 1km & 500m
Critical views	Views of the development are to be seen by many people passing on road routes and from prominent areas	Some views of the development from surrounding routes and housing	Limited views to the development from roads and housing

Results and conclusions on visual impact of development assessment

Aspect	Result
Visibility	HIGH
Visual quality	MEDIUM
Visible man-made structures	MEDIUM
Surrounding landscape compatibility	MEDIUM
Character of site or surrounding area	MEDIUM
Contrast between human scale, vertical & horizontal elements in the landscape	MEDIUM
Visual absorption capacity (VAC)	MEDIUM
View distance (uninterrupted)	MEDIUM
Critical views	MEDIUM

The proposed development will have a medium visual impact. This is largely due to:

- The extent of the development
- The surrounding agricultural and residential areas as well as the locality of the already approved cemetery.

Appendix G:
Report on alternatives

ADDITIONAL ALTERNATIVES INVESTIGATED

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Proponent:	Mangaung Metropolitan Municipality
MDA Ref No:	40727
Date:	April 2020

mda

Town & Regional Planners,
Environmental & Development
Consultants

Physical Address: 9 Barnes Street,
Westdene, Bloemfontein, 9301
Postal Address: PO Box 100982,
Brandhof, 9324
Tel: 051 4471583, Fax: 051 448 9839
E-mail: admin@mdagroup.co.za

The proposed project entails the expansion of a cemetery and associated infrastructure, including the provision of running water and sanitation facilities on site. The proposed construction activities will take place on the remainder of the farm Nalisview 2935 and Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State province. Note that the construction of internal roads as well as fencing was undertaken to date.

Associated activities to be undertaken on site include but are not limited to the following:
- The site will be cleared of vegetation and laid out so as to provide burial sites for the local community.
- Graves will be excavated mechanically by use of excavators (TLB's).
- Graves will be dug according to bookings received from undertakers. In other words provision will be made only for graves that are going to be used in a weeks' time and graves are not dug in advance for future use.
- For this particular cemetery an average of 50 burials will take place per week (total of Bloemfontein burials per week all cemeteries is 80).
- Alien vegetation (except large trees that exists on site) should be removed from the site.
- Water supply to the site.
- Sanitation will be provided by means of a septic tank.
- An ablution facility (male / female).
- A fence on the perimeter of the site.
- Construction of internal roads within the cemetery area.
- Sufficient site drainage should be established as the area may be subject to flooding during normal to heavy rainfall.

Four main options were investigated:

A) Alternative 1 Preferred

The preferred project entails the expansion of an already approved cemetery. It was determined that the existing graveyards in the nearby area have almost reached their capacity and that additional burial sites are required. DESTEA approved the construction of a new cemetery on Nalisview 5/2835 (adjacent to the proposed new site). However, it was determined that the size of the proposed cemetery on Nalisview 5/2835 will be insufficient and therefore the applicant decided to apply for the expansion of the approved cemetery. Note that the construction of internal roads as well as fencing was undertaken to date; thus the current application. Please refer to appendix A for more information on the locality of the proposed project.

B) Alternative 2 site alternative - new cemetery

The construction of a new cemetery was also studied. However, this option is not feasible and / or reasonable as the applicant (i.e. Mangaung Metropolitan Municipality) is the landowner of both properties involved in this applicant. Additional land should be bought by the municipality to enable them to construct a new cemetery. This will be a costly process. In addition, the incorporation of the proposed new burial sites with the already approved cemetery on Nalisview 5/2835 will lessen the costs even further as the associated infrastructures (chapels, crematorium and ablution facilities) can be shared.

Alternative 3Design & Layout
Inclusion of a crematorium. However, the incorporation of a crematorium and a columbarium niche in the form of a building or wall is costly and will not form part of the current project. Therefore, this option is not seen as a feasible and / or reasonable alternative at this stage and will therefore not be discussed throughout the current document.

Alternative 4Technology
As an alternative, the pre-excavation of graves and re-filling of graves (hard material removed at each of the new graves and filled with the removed material until the specific grave is required) were investigated. As part of this option, the construction of graves is to be done by hand during the operational phase.
However, this option is not recommended due to the:

- Type of soil (hard) encountered on site - the community members will not be able to dig the graves to the acceptable depths.
- High number of burials per week.

This option will thus not be discussed throughout the current document.

No-go Option

Utilising the existing cemeteries in the region. The existing cemeteries in the region almost reached their capacity and the section approved for Nalisview 5/2835 is not large enough to service the area. The existing facilities are therefore inadequate for the need of the community and this option is thus not seen as a feasible / reasonable alternative.

A) Site alternatives

Alternative 1Preferred		
Description	Lat (ddmmss)	Long (ddmmss)
The preferred project entails the expansion of a cemetery, by means of construction of new burial sites adjacent to an already approved cemetery. It was determined that the existing graveyards in the nearby area have almost reached their capacity and that additional burial sites are required. DESTEA approved the construction of a new cemetery on Nalisview 5/2835 (adjacent to the proposed new site).	29°14'43.56"s	26°13'52.61"e

However, it was determined that the size of the proposed cemetery on Nalisview 5/2835 will be insufficient and therefore the applicant decided to apply for the expansion of the approved cemetery. Thus this application. Please refer to appendix a for more information on the locality of the proposed project.		
Alternative 2 Site Alternative		
The construction of a new cemetery was also studied. However, this option is not feasible and / or reasonable as the applicant (i.e. Mangaung Metropolitan Municipality) is the landowner of both properties involved in this applicant. Additional land should be bought by the municipality to enable them to construct a new cemetery. This will be a costly process. In addition, the incorporation of the proposed new burial sites with the already approved cemetery on Nalisview 5/2835 will lessen the costs even further as the associated infrastructures (chapels, crematorium and ablution facilities) can be shared. Therefore this option (construction of a new cemetery on a different site) will not be discussed further as part of the bar.		

Please refer to Appendix A for co-ordinates of the corners of the site.

B) Lay-out alternatives

Alternative 1 Preferred
Description
The design and layout of the proposed expansion of the cemetery is determined by the approved plans for the cemetery to be constructed on portion 5 of the farm Nalisview 2835, as the proposed new project will be incorporated to the already approved application (i.e. Nalisview 5/2835). The proposed design and layout is an environmentally cost effective solution as already approved infrastructures will be incorporated.
Alternative 3 Design & Layout
Inclusion of a crematorium. However, the incorporation of a crematorium and a columbarium niche in the form of a building or wall is costly and will not form part of the current project. Therefore, this option is not seen as a feasible and / or reasonable alternative at this stage and will therefore not be discussed throughout the current document.

C) Technology alternatives

Alternative 1 Preferred
Graves will be excavated mechanically by use of excavators (TLB's). Graves will be dug according to bookings received from undertakers. In other words provision will be made only for graves that are going to be used in a weeks' time and graves are not dug in advance for future use. For this

particular cemetery an average of 50 burials will take place per week (total of Bloemfontein burials per week all cemeteries is 80).

Alternative 4$_{\text{Technology}}$

As an alternative, the pre-excavation of graves and re-filling of graves (hard material removed at each of the new graves and filled with the removed material until the specific grave is required) were investigated. As part of this option, the construction of graves is to be done by hand during the operational phase.

However, this option is not recommended due to the:

- Type of soil (hard) encountered on site - the community members will not be able to dig the graves to the acceptable depths.
- High number of burials per week.

This option will thus not be discussed throughout the current document.

D) No-go alternative

The no-go option means retaining the *status quo*, i.e. Not constructing additional graves in the area. This option is not recommended, as additional burial space is required, as explained above.

Appendix H:
Additional Information

Appendix H_1:
Property Description

PROPERTY DESCRIPTION

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060 Bloemfontein, Free State Province

Proponent:	Mangaung Metropolitan Municipality
MDA Ref No:	40727
Date:	April 2020

mda
Town & Regional Planners,
Environmental & Development
Consultants

Physical Address: 9 Barnes Street,
Westdene, Bloemfontein, 9301
Postal Address: PO Box 100982,
Brandhof, 9324
Tel: 051 4471583, Fax: 051 448 9839
E-mail: admin@mdagroup.co.za

1. PROPERTY DESCRIPTION/PHYSICAL ADDRESS

Province	Free State
District Municipality	Motheo District Municipality
Local Municipality	Mangaung Metropolitan Municipality
Ward Number(s)	18
Farm name and number	The remainder of the farm Nalisview 2835
Portion number	Remainder
SG Code	F 003 000 000 002 835 000 00
Farm name and number	Portion 1 of the farm Nalisview 1060
Portion number	0
SG Code	F 003 000 000 001 060 000 01

Current land-use zoning as per local municipality IDP/records:
Agriculture

Note that a change of land-use / consent use application is required.

2. GRADIENT OF THE SITE

The general gradient of the site is indicated below.

Alternative 1 **Preferred:**

Flat	1:50 – 1:20	1:20 – 1:15	1:15 – 1:10	1:10 – 1:7,5	1:7,5 – 1:5	Steeper than 1:5

3. LOCATION IN LANDSCAPE

The landform(s) that best describes the site is indicated below:

2.1 Ridgeline		2.4 Closed valley		2.7 Undulating plain / low hills	
2.2 Plateau		2.5 Open valley		2.8 Dune	
2.3 Side slope of hill/mountain		2.6 Plain	X	2.9 Seafront	
2.10 At sea					

4. GROUNDWATER, SOIL AND GEOLOGICAL STABILITY OF THE SITE

Indication on the groundwater, soil and geological stability of the site is indicated below:

Alternative 1 Preferred:

Shallow water table (less than 1.5m deep)		NO
Dolomite, sinkhole or doline areas		NO
Seasonally wet soils (often close to water bodies)	YES	
Unstable rocky slopes or steep slopes with loose soil		NO
Dispersive soils (soils that dissolve in water)		NO
Soils with high clay content (clay fraction more than 40%)		NO
Any other unstable soil or geological feature		NO
An area sensitive to erosion	YES	

5. SUMMARY OF THE GEOTECHNICAL REPORT

- No unstable natural slopes were observed during the investigation.
- Due to the nature of the materials, erodibility is a concern, especially during high rainfall as the materials have the possibility to be washed away. Surface drainage control will therefore need to be implemented during the development of the site. Caution should be exerted when introducing mudstone (if found on site) to water, sunlight and air, as this will speed up the weathering process of Mudstone.
- The majority of the site consists of fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays) with an estimated total heave of less than 7.5 mm to 30mm.
- The potential expansiveness is low to medium for the majority of the site.
- Materials tested for compactability returned the following values: Maximum compactability ration: 0.63, Average compactability ration: 0.43 and Minimum compactability: 0.36.
- Grave selection is dependent on the Depth of Excavation of the in situ materials, the depth ranges from 2m over the majority of the area to 0.2m around the fringes of the site.
- Grave selection is also dependent on Permeability: Material suitability ranges from unsuitable to ideal.
- The natural slope of the investigated area may not be steep enough to drain away the rainwater. Some rainwater may collect and form ponds until it has seeped into the in situ materials. These ponds may subject the area to surface flooding during abnormal rainfall. Therefore the surface drainage of the site should be improved. Provision should be made for drainage structures underground or at the surface, where applicable. Drainage canals must be constructed to channel the water from structures after construction.
- It is of high priority to preserve and protect potable water resources from contamination by potentially harmful organisms originating from cemeteries.

- If possible, expansive materials / materials that exhibit collapse potential must be avoided or pre-collapsed before construction of the foundations.

6. SUMMARY OF GEOHYDROLOGICAL REPORT

- Data obtained during the hydrocensus indicates that the average groundwater level in the higher lying areas is 29mbgl and 13 m in the lower lying areas.
- The proposed site will be suitable for a cemetery development, from a geohydrological point of view. Boreholes that are located south of the proposed site are used for domestic and agricultural purposes, but no big scale abstraction occurs.
- It is recommended that a groundwater sample from at least two of the existing boreholes downstream of the proposed site is taken, before the proposed development takes place. The chlorine concentration value of the groundwater should also be determined, by means of sampling.
- No magnetic anomalies that could be associated with dolerite structures were identified on any of the seven traverses examined. Therefore, no significant anomalies were encountered that could be associated with dolerite structures that is underlying the proposed site.
- Some of the existing boreholes can be utilised to monitor the groundwater quality. In order to establish an early detection system, one monitoring borehole can be drilled adjacent to the proposed site. The monitoring boreholes should be yield tested in order to obtain the necessary aquifer parameters like transmissivity and hydraulic conductivity for input in the numerical groundwater flow and transport model, if needed.
- A water monitoring plan should be established and it should be revised on a regular basis to incorporate the changes in the water flow regime.
- Laboratory analysis techniques will comply with SABS guidelines. Laboratories must be accredited. Data must be stored electronically. It is suggested that a well-known database such as WISH, Aquabase or Access be used. A backup of the data base must be stored in a safe place. Backups should be made every time the database is updated. On the completion of every sampling run a monitoring report must be written. Included in the report must be time series trends, Piper and Durov diagrams. These will be used to determine if there are any changes in the system. These changes must be flagged and explained in the report.

Appendix H2:

Public Participation

PUBLIC PARTICIPATION PROCESS

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060 Bloemfontein, Free State Province

Proponent:	Mangaung Metropolitan Municipality
MDA Ref No:	40727
Date:	April 2020

mda

Town & Regional Planners,
Environmental & Development
Consultants

Physical Address: 9 Barnes Street,
Westdene, Bloemfontein, 9301
Postal Address: PO Box 100982,
Brandhof, 9324
Tel: 051 4471583, Fax: 051 448 9839
E-mail: admin@mdagroup.co.za

Please note that a public participation process commenced in 2017. However, the scope of the project changed and the project was put on hold by the applicant. See Annexure H_2A for more information on the public participation process undertaken as part of the above mentioned process.

As the scope of the project changed since the commencement of the initial public participation process, a new public participation process was undertaken in 2020. See Annexure H_2B for more information on the public participation process undertaken as part of the above mentioned process.

APPENDIX H$_2$A

Public Participation Process undertaken in 2017

ANNEXURE 1

List of possible IAPs

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties

Authorities & Stakeholders	
Organization	**Contact person and contact detail**
The Municipal Ward Councillor: Ward 18	David Mark Campbell Mckay 082 414 7491 macdesigns@worldonline.co.za Ward Councillor, Ward 18
Mangaung Metro Municipality City Manager	The City Manager P.O. Box 3704 Bloemfontein 9300
Mangaung Metro Municipality: Enviornmental Division	Me. Mpolokeng Kolobe P.O. Box 3704 Bloemfontein 9300
Mangaung Metro Municipality: Planning Division	Collin Dihemo P.O. Box 3704 Bloemfontein 9300
Department of Agriculture	The Assistant Director P.O. Box 34521 Faunasig Bloemfontein 9325
SAHRA	South African Heritage Resources Agency (SAHRA) Head Office 111 Harrington Street CAPE TOWN 8001
FSHRA	Ntando PZ Mbatha Heritage Coordinator Corner Henry and East Burger Street Department of Sport Arts Culture and Recreation Office 204 Bloemfontein 9301
Department of Water and Sanitation	Mr Masia Mgwambani The Director: Water Regulation in the Free State Mr. W Grobler Private Bag X528 Bloemfontein 9300 mgwambanim@dwaf.gov.za

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835, Bloemfontein, Free State Province							
Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners							
Farm	**Number**	**Portion**	**F Number**	**Landowner**	**Contact Person**	**Tel**	**Address**
Paradys	2832	RE	F 003 000 000 002 83 2 000 00	Seventh-day Adventists	Finance Director: E Bhebhe	051 430 4069 051 430 1502	Adra South Africa P.O. Box 468 Bloemfontein 9300 2 Link Road Bloemfontein 9300
Paradys	2832	7	F 003 000 000 002 83 2 000 07	UFS	Albie Louw	051 401 9207	Assistant Director: Facilities Planning University of the Free State P.O. Box 339 Bloemfontein 9300
Paradys	2832	6	F 003 000 000 002 83 2 000 06	George Nicolas Trust		T: 051 406 4950 F: 051 433 1245	96 Andries Pretorius Street Noordhoek Bloemfontein 9301
Paradys	2832	5	F 003 000 000 002 83 2 000 05	Johannes Hilgard de Wet	Johannes Hilgard de Wet	082 922 5672 051 447 1787	104 Nicolene Court Bloemfontein 9301
Paradys	2832	3	F	Botes Groewe	Willie Botha	T: 082 433 6852	botesgroewe@g

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners

Farm	Number	Portion	F Number	Landowner	Contact Person	Tel	Address
			003 000 000 002 83 2 000 03	Besigheidstrust		/ 083 300 2858 F: 086 525 1459	mail.com P.O. Box 11544 Universitas Bloemfontein 9301
Nalisview	2835	4 (unregistered portion of Portion 1)	F 003 000 000 002 83 5 000 04	Cordial Genus Bricks CC		051 436 6448	3 Versailles Street Bloemfontein 9301
Nalisview	2835	5	F 003 000 000 002 83 5 000 05	Mangaung Metropolitan Municipality	Applicant		
Nalisview	2835	1	F 003 000 000 002 83 5 000 01	Cordial Genus Bricks CC		051 436 6448	3 Versailles Street Bloemfontein 9301
Nalisview	2835	RE	F 003 000 000 002 83 5 000 00	Mangaung Metropolitan Municipality	Applicant		
Nalisview	2835	3	F 003 000 000 002 83	Botes Groewe Besigheidstrust	Willie Botha	botesgroewe@gmail.com	P.O. Box 11544 Universitas

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners

Farm	Number	Portion	F Number	Landowner	Contact Person	Tel	Address
			5 000 03			T: 082 433 6852 / 083 300 2858 F: 086 525 1459	Bloemfontein 9301
Nalisview	1060	1	F 003 000 000 001 060 000 01	Elaine Elizabeth Labuschagne	Elaine Elizabeth Labuschagne	083 347 2833	P.O. Box 34369 Faunasig 9325
Van Zyl's Dam	72	RE	F 003 000 000 000 072 000 00	Hong Kuo-Tsai	Hong Kuo-Tsai	083 275 4118	41 Eeufees Road Bayswater 9301
Balquhidder	1967	RE	F 003 000 000 001 967 000 00	Thusanong Agricultural Enterprise Trust	VG Jason	079 386 8635	2 Swizz Street Oranjesig Bloemfontein 9300 Erf 34782 Chris Hani Bloemfontein 9300

ANNEXURE 2

Proof of initial notification

Site Notices:


STOP

Advert:

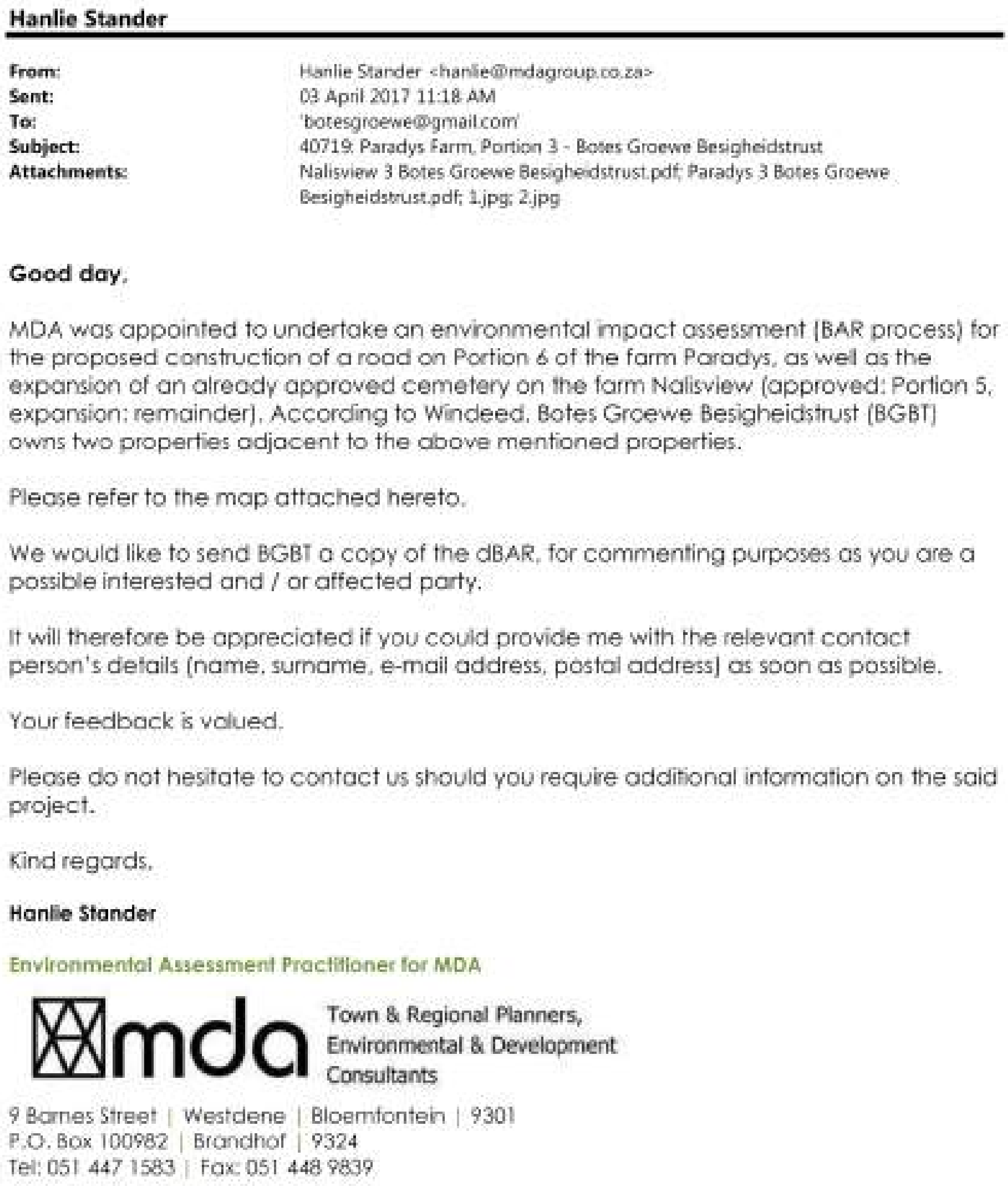
Volksblad Woensdag 5 April 2017

OIS
OMGEWINGSIMPAKSTUDIE

NOTICE:
Notice is given in terms of Regulation 41(2)(c) of the Environmental Impact Assessment Regulations of 204 No. R. 982 published in the Government Notice No. 38282 of 4 December 2014 of the National Environmental Management Act (Act No. 107 of 1998) that an application for environmental authorization will be submitted to the Free State Department of Economic Development, Small Business, Tourism and Environmental Affairs (DESTEA) for the proposed construction of a road on Portions 5 & 6 of the farm Paradys 2832 as well as the proposed expansion of an approved cemetery on the farm Nalisview 2835, Bloemfontein. Proponent: Mangaung Metropolitan Municipality. If you have any information or comments regarding the environmental impact of the proposed development or need additional information regarding the proposed development, please submit your name, contact information and interest to Hanlie Stander at MDA (PO Box 100982, Brandhof, Bloemfontein 9324; T: 051 447 1583; F: 051 448 9839; hanlie@mdagroup.co.za) within 30 days of this notice.

NOTE:
Adjacent landowners were notified by means of one of the following methods:

- Hand delivery
- E-mail



Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 03 April 2017 11:18 AM
To: 'botesgroewe@gmail.com'
Subject: 40719: Paradys Farm, Portion 3 - Botes Groewe Besigheidstrust
Attachments: Nalisview 3 Botes Groewe Besigheidstrust.pdf; Paradys 3 Botes Groewe Besigheidstrust.pdf; 1.jpg; 2.jpg

Good day,

MDA was appointed to undertake an environmental impact assessment (BAR process) for the proposed construction of a road on Portion 6 of the farm Paradys, as well as the expansion of an already approved cemetery on the farm Nalisview (approved: Portion 5, expansion: remainder). According to Windeed, Botes Groewe Besigheidstrust (BGBT) owns two properties adjacent to the above mentioned properties.

Please refer to the map attached hereto.

We would like to send BGBT a copy of the dBAR, for commenting purposes as you are a possible interested and / or affected party.

It will therefore be appreciated if you could provide me with the relevant contact person's details (name, surname, e-mail address, postal address) as soon as possible.

Your feedback is valued.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Effort Bhebhe <ebhebhe@adra-sa.org>
Sent: 04 April 2017 06:07 AM
To: Hanlie Stander
Subject: Re: 40719: Nalisview Project

Dear Hanlie

Thank you for the email, I am the correct person as per your enquiry below with regards to Farm correspondence.

Kind Regards,

Effort Bhebhe

Financial Director

051 430 4078 - Office

051 430 1502 - Fax

073 262 0012 - Cell

Meals on Wheels Community Services South Africa

2 Link Road, PO Box 468, Bloemfontein, 9300

Meals on Wheels
Community Services

From: Hanlie Stander <hanlie@mdagroup.co.za>
Date: Monday 03 April 2017 at 10:52 AM
To: Effort Bhebhe <ebhebhe@adra-sa.org>
Subject: 40719: Nalisview Project

Good day,

MDA was appointed to undertake a Basic Assessment Report Process for the proposed development of a cemetery on a portion of the farm Nalisview, Bloemfontein.

According to Windeed, SEVENTH-DAY ADVENTIST WELFARE SERVICE INCORPORATED (SDAWSI) is an adjacent landowner. Please refer to the attached PDF.

Could you please indicate if you are the correct contact person for SDAWSI. If not, it will be appreciated if you could provide the correct person's contact details to us as soon as possible.

Your assistance is valued.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Albie Louw <LouwA1@ufs.ac.za>
Sent: 06 April 2017 12:37 PM
To: hanlie@mdagroup.co.za
Subject: RE: 40719: Paradys Farm - Ms Ria (MC) Deysel - 051 401 2132

Good day Hanlie

My contact details below, as request.

Kind regards

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA

Albie Louw *Pr. Pln A1117/1999*
Assistant Director: Facilities Planning
Assistent Direkteur: Fasiliteite Beplanning
PO Box / Posbus 339, Bloemfontein 9300, Republic of South Africa / Republiek van Suid-Afrika
☎051 4019207
✉LouwA1@ufs.ac.za

Inspiring excellence
Transforming lives

Inspireer uitnemendheid
Verander lewens

From: Nico Janse Van Rensburg
Sent: 06 April 2017 11:47 AM
To: hanlie@mdagroup.co.za
Cc: Albie Louw <LouwA1@ufs.ac.za>; Ria Deysel <DeyselMC@ufs.ac.za>
Subject: FW: 40719: Paradys Farm - Ms Ria (MC) Deysel - 051 401 2132

Hallo Hanlie

Your contact person will be Albie Louw – included in this Email

Regards

Nico

UNIVERSITY OF THE
FREE STATE
UNIVERSITEIT VAN DIE
VRYSTAAT
YUNIVESITHI YA
FREISTATA

Nico Janse van Rensburg
Senior Director: University Estates
Senior Direkteur: Universiteits Eiendomme
PO Box / Posbus 339, Bloemfontein 9300, Republic of South Africa / Republiek van Suid-Afrika
☎051 4019309
📱27836483814
✉JVRensNJ@ufs.ac.za

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Verander lewens

From: Ria Deysel
Sent: Monday, 03 April 2017 10:19 AM
To: George Smit <SmitGF@ufs.ac.za>
Cc: Lebohang Ramahlele <RamahleleLS@ufs.ac.za>; Chantelle Loubser <LoubserC@ufs.ac.za>
Subject: RE: 40719: Paradys Farm - Ms Ria (MC) Deysel - 051 401 2132

From: Hanlie Stander [mailto:hanlie@mdagroup.co.za]
Sent: 03 April 2017 10:13 AM
To: Ria Deysel <DeyselMC@ufs.ac.za>
Subject: 40719: Paradys Farm - Ms Ria (MC) Deysel - 051 401 2132

Good day,

MDA was appointed to undertake an environmental impact assessment (BAR process) for the proposed construction of a road on Portion 6 of the farm Paradys, adjacent to a portion of land that belongs to the UFS (Portion 7 of the farm Paradys)

Please refer to the map attached hereto.

As the UFS is the landowner of the Experimental Farm, we would like to send a copy of the dBAR to the UFS, for commenting purposes.

It will therefore be appreciated if you could provide me with the relevant contact person's details (name, surname, e-mail address, postal address) as soon as possible.

Your feedback is valued.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

ANNEXURE 3

List of registered parties

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835		
Authorities & Stakeholders		
Organization	**Contact person and contact detail**	**Comments and Response**
The Municipal Ward Councillor: Ward 18	The Municipal Ward Councillor: Ward 18 Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** **Response:**
Mangaung Metro Municipality City Manager	The City Manager Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** None to date. Note that the scope of the project changed and therefore the public participation process for the mentioned project was halted.
Mangaung Metro Municipality: Enviornmental Division	Me. Mpolokeng Kolobe Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** Copies of the dBAR was forwarded to all registered IAPs.
Mangaung Metro Municipality: Planning Division	Mr. Collin Dihemo Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** Copies of the dBAR was forwarded to all registered IAPs.
Department of Agriculture	The Assistant Director Department of Agriculture P.O. Box 34521 Faunasig Bloemfontein 9325	**Comment:** None to date **Response:** Copies of the dBAR was forwarded to all registered IAPs.
FSHRA	Ntando PZ Mbatha Heritage Coordinator Corner Henry and East Burger Street	**Comment:** None to date **Response:** Copies of the dBAR was forwarded to all registered IAPs.

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835		
	Department of Sport Arts Culture and Recreation Office 204 Bloemfontein 9301	
SAHRA	South African Heritage Resources Agency (SAHRA) Head Office 111 Harrington Street CAPE TOWN 8001	**Comment:** None to date **Response:** Copies of the dBAR was forwarded to all registered IAPs.
Department of Water and Sanitation	Mr Masia Mgwambani The Director: Water Regulation in the Free State Mr. W Grobler Private Bag X528 Bloemfontein 9300	**Comment:** None to date **Response:** Copies of the dBAR was forwarded to all registered IAPs.

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835				
Nr	**IAP**	**Address**	**Cell Number**	**E-mail**
1	N Tsikoane	Plot 9 Paradys Small Holdings	0827579116	Ntsikoane2@gmail.com
2	K Thekiso	Plot 9 Paradys Small Holdings	0834534250	kuleilet@gmail.com
3	JHM Lourens	Ventersville Kaalspruit	0848538956	Hester.lourens@yahoo.com
4	HS Lourens	Ventersville Kaalspruit	0846252557	Hester.lourens@yahoo.com
5	JHM Lourens Sr	Langverwacht Paradys	0836236638	Hester.lourens@yahoo.com
6	HW Lourens	Langverwacht Paradys	0832975882	Hester.lourens@yahoo.com
7	E Labuschagne	Plot 4 Paradys	0835742833	Elabuschagne@justice.gov.za
8	D Labuschagne	Plot 4 Paradys	0767448934	Elabuschagne@justice.gov.za
9	Ina de Wet	Plot 5 Paradys	0845106305	Elabuschagne@justice.gov.za
10	Willie de Wet	Plot 5 Paradys	0826922333	Elabuschagne@justice.gov.za
11	Leon Richter	Nooitgedacht Bloemfontein	0824107530	rutlandbdy@gmail.com
12	A Botha	Nooitgedacht Bloemfontein	0824154917	anmelizebt@gmail.com
13	Konet van Willing	Onze Rust Plaas 15	0780190531	koppieskraalveiligheid@gmail.com
14	J Barnard	Paradys Proefplaas	0826992235	barnardj@ufs.ac.za
15	E Barnard	Paradys Proefplaas	0828963076	elzaanlynch@icloud.com
16	Q van Willing	Onze Rust	0728784836	koppieskraalveiligheid@gmail.com
17	AS von Gericke	Mearsgeluk	0824942262	straussvg@gmail.com
18	Jeanette	Mearsgeluk	0833253343	jvangericke@gmail.com
19	GR Lombaard	Mearsgeluk	0823942856	jvangericke@gmail.com
2	E	Marlien	0824000619	lappies@iterele.co.za

0	Labuschagne	Onze Rust		
21	L Labuschagne	The Meadows	0828693334	nanrass@gmail.com
22	LS Labuschagne	The Meadows	0827886699	leonlab@gmail.com
23	G Kruger	Ventersville	0825610929	Irrigation.gertkruger@gmail.com
24	MC Kruger	Ventersville	0825610929	Mgjkruger@gmail.com
25	CJ Loots	Onze Rust	0827893750	cjloots@gmail.com
26	IP van Greunen	Onze Rust	0827893750	cjloots@gmail.com
27	M van Rooyen	Blydskap 504	0781094656	Madace01@hotmail.com
28	A van Rooyen	Blydskap 504	0731505466	Madace01@hotmail.com
29	HJ Badenhorst	Rietspruit 2251	0832276387	henniebad@mweb.co.za
30	F Badenhorst	Rietspruit 2251	0832276392	henniebad@mweb.co.za
31	W Mackenzie	Brakspruit	0832932911	winett@willowbend.co.za
32	A Gravett	Brakspruit	0835902888	Antongravett13@gmail.com
33	W Mackenzie	Brakspruit	0788036703	winett@yahoo.com
34	JP van Tonder	Welgevonden	0839737731	vtondejp@eskom.co.za
35	Councillor, Ward 44: Dave Mc Kay	7 Borkenhagen Crescent Westdene Bloemfontein 9300	0824147491	macdesigns@worldonline.co.za PO Box 12565 Brandhof 9324

APPENDIX E4

List of comments received

Hanlie Stander

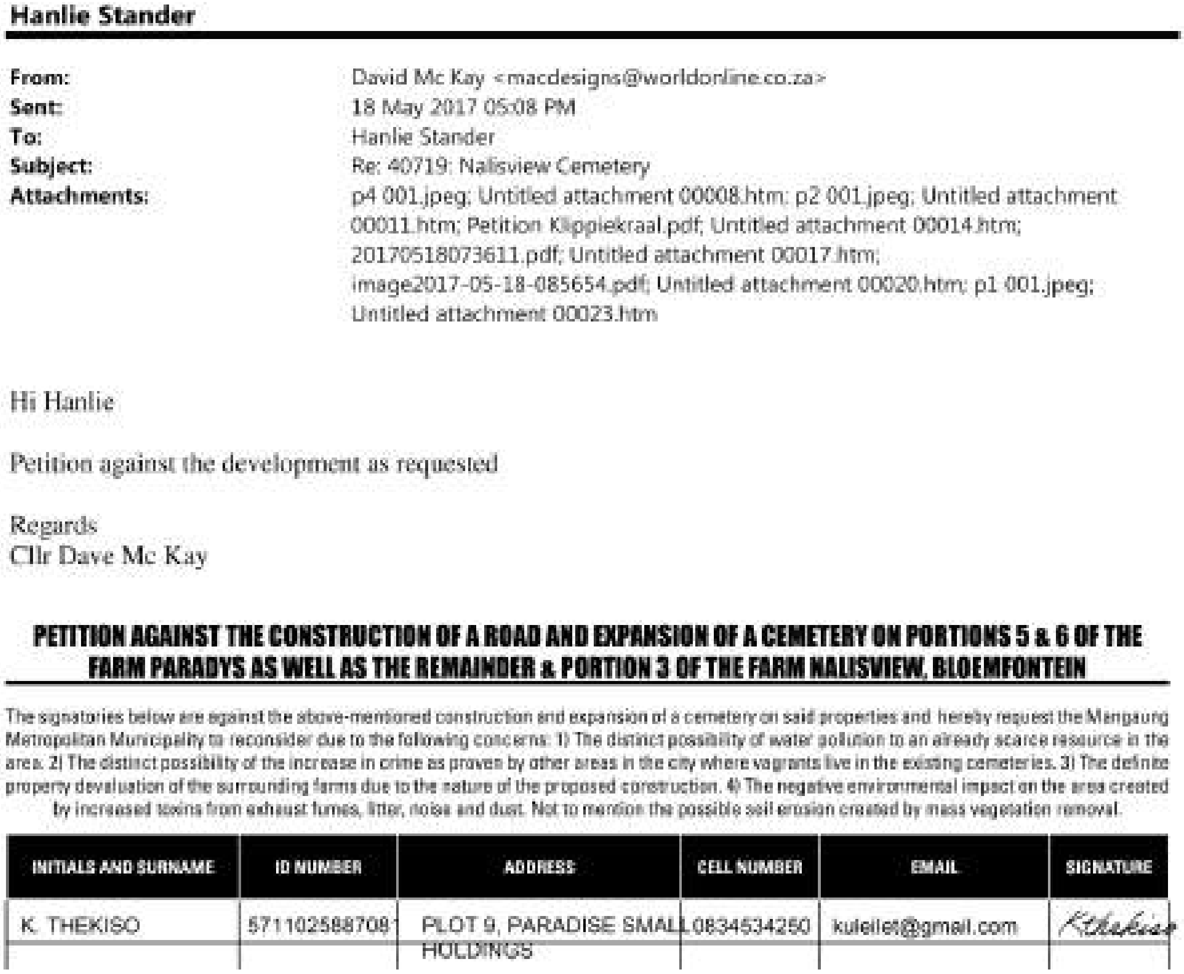
From:	Botes Groewe <botesgroewe@gmail.com>
Sent:	15 May 2017 06:15 PM
To:	Hanlie Stander
Subject:	Re: 40719: Paradys Farm, Portion 3 - Botes Groewe Besigheidstrust

Goeiedag Hanlie,

Hiermee plaas ek op rekord dat ek NIE my goedkeuring of toestemming gee vir die beoogde begraafplaas wat agter my eiendom beplan word nie.

Groete
Willie Botha

The following information was received from the associated Ward Councillor:



Hanlie Stander

From: David Mc Kay <macdesigns@worldonline.co.za>
Sent: 18 May 2017 05:08 PM
To: Hanlie Stander
Subject: Re: 40719: Nalisview Cemetery
Attachments: p4 001.jpeg; Untitled attachment 00008.htm; p2 001.jpeg; Untitled attachment 00011.htm; Petition Klippiekraal.pdf; Untitled attachment 00014.htm; 20170518073611.pdf; Untitled attachment 00017.htm; image2017-05-18-085654.pdf; Untitled attachment 00020.htm; p1 001.jpeg; Untitled attachment 00023.htm

Hi Hanlie

Petition against the development as requested

Regards
Cllr Dave Mc Kay

PETITION AGAINST THE CONSTRUCTION OF A ROAD AND EXPANSION OF A CEMETERY ON PORTIONS 5 & 6 OF THE FARM PARADYS AS WELL AS THE REMAINDER & PORTION 3 OF THE FARM NALISVIEW, BLOEMFONTEIN

The signatories below are against the above-mentioned construction and expansion of a cemetery on said properties and hereby request the Mangaung Metropolitan Municipality to reconsider due to the following concerns: 1) The distinct possibility of water pollution to an already scarce resource in the area. 2) The distinct possibility of the increase in crime as proven by other areas in the city where vagrants live in the existing cemeteries. 3) The definite property devaluation of the surrounding farms due to the nature of the proposed construction. 4) The negative environmental impact on the area created by increased toxins from exhaust fumes, litter, noise and dust. Not to mention the possible soil erosion created by mass vegetation removal.

INITIALS AND SURNAME	ID NUMBER	ADDRESS	CELL NUMBER	EMAIL	SIGNATURE
K. THEKISO	5711025887081	PLOT 9, PARADISE SMALL HOLDINGS	0834534250	kuleilet@gmail.com	KThekiso

PETITION AGAINST THE CONSTRUCTION OF A ROAD AND EXPANSION OF A CEMETERY ON PORTIONS
FARM PARADYS AS WELL AS THE REMAINDER & PORTION 3 OF THE FARM NALISVIEW, BLOEMF

The signatories below are against the above-mentioned construction and expansion of a cemetery on said properties and hereby req
Metropolitan Municipality to reconsider due to the following concerns: 1) The distinct possibility of water pollution to an already sca
area. 2) The distinct possibility of the increase in crime as proven by other areas in the city where vagrants live in the existing cemete
property devaluation of the surrounding farms due to the nature of the proposed construction. 4) The negative environmental impact
by increased toxins from exhaust fumes, litter, noise and dust. Not to mention the possible soil erosion created by mass vegeta

INITIALS AND SURNAME	ID NUMBER	ADDRESS	CELL NUMBER	EMAIL
N. TSIKOANE	7510031055081	PLOT 9 PARADISE SMALL HOLDINGS	0827579116	ntsikoane20gmail

PETITION AGAINST THE CONSTRUCTION OF A ROAD AND EXPANSION OF A CEMETERY ON PORTIONS 5 & 6 OF THE FARM PARADYS AS WELL AS THE REMAINDER & PORTION 3 OF THE FARM NALISVIEW, BLOEMFONTEIN

The signatories below are against the above-mentioned construction and expansion of a cemetery on said properties and hereby request the Mangaung Metropolitan Municipality to reconsider due to the following concerns: 1) The distinct possibility of water pollution to an already scarce resource in the area. 2) The distinct possibility of the increase in crime as proven by other areas in the city where vagrants live in the existing cemeteries. 3) The definite property devaluation of the surrounding farms due to the nature of the proposed construction. 4) The negative environmental impact on the area created by increased toxins from exhaust fumes, litter, noise and dust. Not to mention the possible soil erosion created by mass vegetation removal.

INITIALS AND SURNAME	ID NUMBER	ADDRESS	CELL NUMBER	EMAIL	SIGNATURE
M van Rooyen	7407265194084	Farm Blydskap 504	0781094656	MAJAKI@hotmail.com	
A van Rooyen	7803130092084	Farm Blydskap 504	0731505466	"	
H.J. Badenhorst	5703115032085	Rietspruit 2251	0832276387	henniebade Mweb .co.za	
F. Badenhorst	5811080110083	Rietspruit 2251	0832276357	henniebade@mweb.co.za	
W. MACKENZIE	7010055065085	BRAKSPRUIT	0512433911	[illegible]	
A Gravett	7907015336084	BRAKSPRUIT	0833902888	antongravett13@gmail.com	
W Mackenzie	9902045118088	Brakspruit	0788036703	w.ndt@yahoo.com	
J.P. v Tonder	6707315121081	Welgewonden	0839737731	vtondejp@eskom.co.za	

PETITION AGAINST THE CONSTRUCTION OF A ROAD AND EXPANSION OF A CEMETERY ON PORTIONS 5 & 6 OF THE FARM PARADYS AS WELL AS THE REMAINDER & PORTION 3 OF THE FARM NALISVIEW, BLOEMFONTEIN

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INITIALS AND SURNAME	ID NUMBER	ADDRESS	CELL NUMBER	EMAIL	SIGNATURE
JHM Lourens	5706065044080	Ventersville, Koalspruit	0848538956	hester.lourens@yahoo.com	
HS Lourens	6205710007084	Ventersville, Koalspruit	0846252557	hester.lourens@yahoo.com	
JHM Lourens	3405085025	Langewacht, Paradys	0836236638		
HW Lourens	481229[illegible]	Langewacht, Paradys 5	0832975882	HW Lourens	
C Labuschagne	580121009008	Plot 4 Parady Bfn	0835742634	Elobuschag@yahoo.[illegible]	
D Labuschagne	5125 5406300 ~~[illegible]~~ 084	Plot 4 Paradys	0767468939	" " "	
Ina de Wet	530229007908	Paradys 5 Bfn	510 084 ~~306~~ 6305	" " "	
Willie de Wet	4710125092080	Paradys 5 Bfn	0826922151	" " "	
Leon Richter	8005175068086	Nooitgedacht 4, Bfn	0826107530	[illegible]@gmail.com	
A. Botha	8104150008086	"	0824156917	[illegible]@gmail.com	
Konet van Willing	8508310089085	Onze Rust Plaas 16	0780190531		E Willing

PETITION AGAINST THE CONSTRUCTION OF A ROAD AND EXPANSION OF A CEMETERY ON PORTIONS 5 & 6 OF THE FARM PARADYS AS WELL AS THE REMAINDER & PORTION 3 OF THE FARM NALISVIEW, BLOEMFONTEIN

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INITIALS AND SURNAME	ID NUMBER	ADDRESS	CELL NUMBER	EMAIL	SIGNATURE
J. Barnard	8901205136085	[illegible]	0826992235	[illegible]@[illegible].co.za	
E. Barnard	9110190014084	Paradys [illegible]	082 896 5676	[illegible]@icloud.com	
Q van Willing	81 05 22 5015 089	Onze Rust	072 8784836	[illegible]@gmail.com	
AS von Gericke	490702-5056 084	Meersgeluk	082 494 2262	[illegible]@gmail.com	
Jeannette von Gericke	5709170064085	Meersgeluk	083 3255 348	jvongericke@gmail.com	
C.R. [illegible]	3004290054088	Meersgeluk	082 3747856	jvongericke@gmail.com	
E. Labuschagne	7601185027088	Marlien, Onze Rust	0824000619	happies@itenda.co.za	
L. Labuschagne	7809225173080	The Meadows BF	0828693336	[illegible]@gmail.com	
LS [illegible]	4502125055088	Meadows Bf	0827986697	[illegible]@[illegible].com	
G Kruger	8112215153086	PLAAS VENTERSVILLE	0825610927	[illegible]	
M E Kruger	8301100051089	Plaas Ventersville	0825610???	mjkruger@gmail.com	

PETITION AGAINST THE CONSTRUCTION OF A ROAD AND EXPANSION OF A CEMETERY ON PORTIONS 5 & 6 OF THE FARM PARADYS AS WELL AS THE REMAINDER & PORTION 3 OF THE FARM NALISVIEW, BLOEMFONTEIN

The signatories below are against the above-mentioned construction and expansion of a cemetery on said properties and hereby request the Mangaung Metropolitan Municipality to reconsider due to the following concerns: 1) The distinct possibility of water pollution to an already scarce resource in the area. 2) The distinct possibility of the increase in crime as proven by other areas in the city where vagrants live in the existing cemeteries. 3) The definite property devaluation of the surrounding farms due to the nature of the proposed construction. 4) The negative environmental impact on the area created by increased toxins from exhaust fumes, litter, noise and dust. Not to mention the possible soil erosion created by mass vegetation removal.

INITIALS AND SURNAME	ID NUMBER	ADDRESS	CELL NUMBER	EMAIL	SIGNATURE
CJ Loots	[illegible]	Plaas Gree Rust	082 784 3730	cjlots@gmail.com	
IP Van Greunen	[illegible]	Plaas Gree Rust	082 784 3730	ijlots@gmail.com	

Hanlie Stander

From: David Mc Kay <macdesigns@worldonline.co.za>
Sent: 23 May 2017 09:50 AM
To: Hanlie Stander
Subject: Re: 40719: Nalisview Cemetery
Attachments: 40719 Nalisview IAPs to WC44.docx

Hi Hanlie

Attached please find corrections as requested

Regards
Dave Mc Kay

INTERESTED AND / OR AFFECTED PARTIES AS RECEIVED FROM MR D MC KAY					
NR	**IAP**	**ADDRESS**	**CELL NUMBER**	**E-MAIL**	**POSTAL ADDRESS**
1	N TSIKOANE	PLOT 9 PARADYS SMALL HOLDINGS	0827579116	NTSIKOANE2@GMAIL.COM	
2	K THEKISO	PLOT 9 PARADYS SMALL HOLDINGS	0834534250	KULEILET@GMAIL.COM	
3	JHM LOURENS	VENTERSVILLE KAALSPRUIT	0848538956	HESTER.LOURENS@YAHOO.COM	
4	HS LOURENS	VENTERSVILLE KAALSPRUIT	0846252557	HESTER.LOURENS@YAHOO.COM	
5	JHM LOURENS SR	LANGVERWACHT PARADYS	0836236638	HESTER.LOURENS@YAHOO.COM	
6	HW LOURENS	LANGVERWACHT PARADYS	0832975882	HESTER.LOURENS@YAHOO.COM	
7	E LABUSCHAGNE	PLOT 4 PARADYS	0835742833	ELABUSCHAGNE@JUSTICE.GOV.ZA	
8	D LABUSCHAGNE	PLOT 4 PARADYS	0767448934	ELABUSCHAGNE@JUSTICE.GOV.ZA	
9	INA DE WET	PLOT 5 PARADYS	0845106305	ELABUSCHAGNE@JUSTICE.GOV.ZA	

INTERESTED AND / OR AFFECTED PARTIES AS RECEIVED FROM MR D MC KAY

NR	IAP	ADDRESS	CELL NUMBER	E-MAIL	POSTAL ADDRESS
10	WILLIE DE WET	PLOT 5 PARADYS	0826922333	ELABUSCHAGNE@JUSTICE.GOV.ZA	
11	LEON RICHTER	NOOITGEDACHT BLOEMFONTEIN	0824107530	RUTLANDBDY@GMAIL.COM	
12	A BOTHA	NOOITGEDACHT BLOEMFONTEIN	0824154917	ANMELIZEBT@GMAIL.COM	
13	KONET VAN WILLING	ONZE RUST PLAAS 15	0780190531	KOPPIESKRAALVEILIGHEID@GMAIL.COM	
14	J BARNARD	PARADYS PROEFPLAAS	0826992235	BARNARDJ@UFS.AC.ZA	
15	E BARNARD	PARADYS PROEFPLAAS	0828963076	ELZAANLYNCH@ICLOUD.COM	
16	Q VAN WILLING	ONZE RUST	0728784836	KOPPIESKRAALVEILIGHEID@GMAIL.COM	
17	AS VON GERICKE	MEARSGELUK	0824942262	STRAUSSVG@GMAIL.COM	
18	JEANETTE	MEARSGELUK	0833253343	JVANGERICKE@GMAIL.COM	
19	GR LOMBAARD	MEARSGELUK	0823942856	JVANGERICKE@GMAIL.COM	
20	E LABUSCHAGNE	MARLIEN ONZE RUST	0824000619	LAPPIES@ITERELE.CO.ZA	
21	L LABUSCHAGNE	THE MEADOWS	0828693334	NANRASS@GMAIL.COM	
22	LS LABUSCHAGNE	THE MEADOWS	0827886699	LEONLAB@GMAIL.COM	
23	G KRUGER	VENTERSVILLE	0825610929	IRRIGATION.GERTKRUGER@GMAIL.COM	
24	MC KRUGER	VENTERSVILLE	0825610929	MGJKRUGER@GMAIL.COM	
2	CJ LOOTS	ONZE RUST	0827893	CJLOOTS@GMAIL.COM	

INTERESTED AND / OR AFFECTED PARTIES AS RECEIVED FROM MR D MC KAY					
NR	**IAP**	**ADDRESS**	**CELL NUMBER**	**E-MAIL**	**POSTAL ADDRESS**
5			750		
26	IP VAN GREUNEN	ONZE RUST	0827893750	CJLOOTS@GMAIL.COM	
27	M VAN ROOYEN	BLYDSKAP 504	0781094656	MADACE01@HOTMAIL.COM	
28	A VAN ROOYEN	BLYDSKAP 504	0731505466	MADACE01@HOTMAIL.COM	
29	HJ BADENHORST	RIETSPRUIT 2251	0832276387	HENNIEBAD@MWEB.CO.ZA	
30	F BADENHORST	RIETSPRUIT 2251	0832276392	HENNIEBAD@MWEB.CO.ZA	
31	W MACKENZIE	BRAKSPRUIT	0832932911	WINETT@WILLOWBEND.CO.ZA	
32	A GRAVETT	BRAKSPRUIT	0835902888	ANTONGRAVETT13@GMAIL.COM	
33	W MACKENZIE	BRAKSPRUIT	0788036703	WINETT@YAHOO.COM	
34	JP VAN TONDER	WELGEVONDEN	0839737731	VTONDEJP@ESKOM.CO.ZA	
35	COUNCILLOR, WARD 44: DAVE MC KAY	7 BORKENHAGEN CRESCENT WESTDENE BLOEMFONTEIN 9300	0824147491	MACDESIGNS@WORLDONLINE.CO.ZA	PO BOX 12565 BRANDHOF 9324

ANNEXURE 5

Response to comments received

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 16 May 2017 10:35 AM
To: 'Botes Groewe'
Subject: 40719: Paradys Farm, Portion 3 - Botes Groewe Besigheidstrust

Mnr Botha,

Dankie vir u skrywe.

Ons neem kennis hiervan, en sal u kommentaar in die BAR dokument aanspreek.

U is ook geregistreer as 'n IAP (geinteresseerde en / of geaffekteerde party) en sal 'n afskrif van die BAR ontvang sodra dit beskikbaar is.

Ons vertrou dat u bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende hierdie projek verlang.

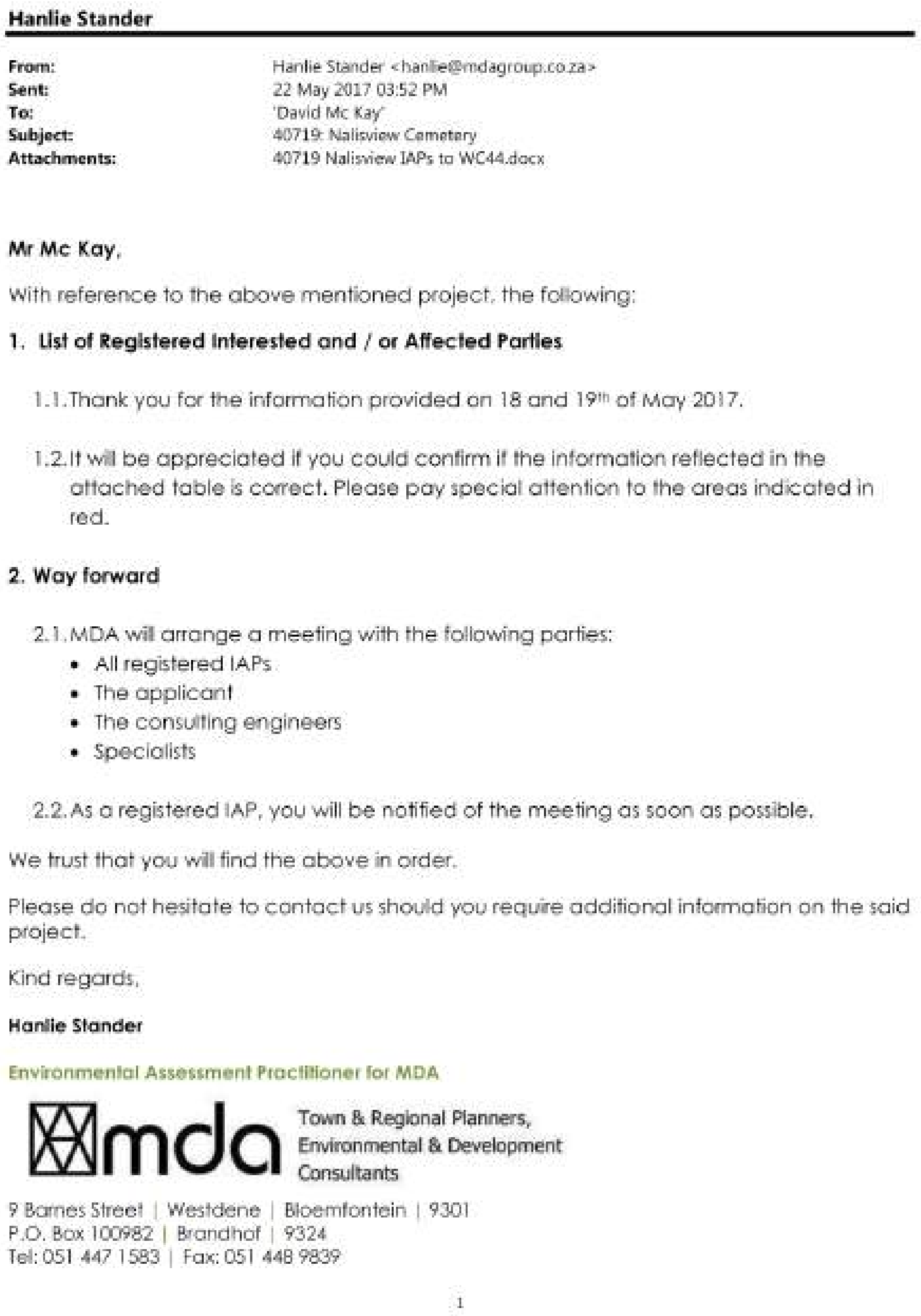
Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839



Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 22 May 2017 03:52 PM
To: 'David Mc Kay'
Subject: 40719: Nalisview Cemetery
Attachments: 40719 Nalisview IAPs to WC44.docx

Mr Mc Kay,

With reference to the above mentioned project, the following:

1. List of Registered Interested and / or Affected Parties

1.1. Thank you for the information provided on 18 and 19th of May 2017.

1.2. It will be appreciated if you could confirm if the information reflected in the attached table is correct. Please pay special attention to the areas indicated in red.

2. Way forward

2.1. MDA will arrange a meeting with the following parties:

- All registered IAPs
- The applicant
- The consulting engineers
- Specialists

2.2. As a registered IAP, you will be notified of the meeting as soon as possible.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

1

(Note: the project was halted by the applicant after this e-mail was sent to Mr Mc Kay)

APPENDIX H_2B

Public Participation Process undertaken in 2020

ANNEXURE 1

List of possible IAPs

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties

Authorities & Stakeholders

Organization	Contact person and contact detail
The Municipal Ward Councillor: Ward 18	David Mark Campbell Mckay 082 414 7491 macdesigns@worldonline.co.za Ward Councillor, Ward 18
Mangaung Metro Municipality City Manager	The City Manager P.O. Box 3704 Bloemfontein 9300
Mangaung Metro Municipality: Enviornmental Division	Me. Mpolokeng Kolobe P.O. Box 3704 Bloemfontein 9300
Mangaung Metro Municipality: Planning Division	Collin Dihemo P.O. Box 3704 Bloemfontein 9300
Department of Agriculture	The Assistant Director P.O. Box 34521 Faunasig Bloemfontein 9325
SAHRA	South African Heritage Resources Agency (SAHRA) Head Office 111 Harrington Street CAPE TOWN 8001
FSHRA	Ntando PZ Mbatha Heritage Coordinator Corner Henry and East Burger Street Department of Sport Arts Culture and Recreation Office 204 Bloemfontein 9301
Department of Water and Sanitation	Mr Masia Mgwambani The Director: Water Regulation in the Free State Mr. W Grobler Private Bag X528 Bloemfontein 9300 mgwambanim@dwaf.gov.za

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province							
Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners							
Farm	**Number**	**Portion**	**F Number**	**Landowner**	**Contact Person**	**Tel**	**Address**
Paradys	2832	RE	F 003 000 000 002 83 2 000 00	Seventh-day Adventists	Finance Director: E Bhebhe	051 430 4069 051 430 1502	Adra South Africa P.O. Box 468 Bloemfontein 9300 2 Link Road Bloemfontein 9300
Paradys	2832	7	F 003 000 000 002 83 2 000 07	UFS	Albie Louw	051 401 9207	Assistant Director: Facilities Planning University of the Free State P.O. Box 339 Bloemfontein 9300
Paradys	2832	6	F 003 000 000 002 83 2 000 06	George Nicolas Trust		T: 051 406 4950 F: 051 433 1245	96 Andries Pretorius Street Noordhoek Bloemfontein 9301
Paradys	2832	5	F 003 000 000 002 83 2 000 05	Johannes Hilgard de Wet	Johannes Hilgard de Wet	082 922 5672 051 447 1787	104 Nicolene Court Bloemfontein 9301

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners

Farm	Number	Portion	F Number	Landowner	Contact Person	Tel	Address
Paradys	2832	3	F 003 000 000 002 83 2 000 03	Botes Groewe Besigheidstrust	Willie Botha	T: 082 433 6852 / 083 300 2858 F: 086 525 1459	botesgroewe@gmail.com P.O. Box 11544 Universitas Bloemfontein 9301
Nalisview	2835	4 (unregistered portion of Portion 1)	F 003 000 000 002 83 5 000 04	Cordial Genus Bricks CC		051 436 6448	3 Versailles Street Bloemfontein 9301
Nalisview	2835	5	F 003 000 000 002 83 5 000 05	Mangaung Metropolitan Municipality	Applicant		
Nalisview	2835	RE	F 003 000 000 002 83 5 000 00	Mangaung Metropolitan Municipality	Applicant		
Nalisview	2835	1	F 003 000 000 002 83 5 000 01	Cordial Genus Bricks CC		051 436 6448	3 Versailles Street Bloemfontein 9301

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners

Farm	Number	Portion	F Number	Landowner	Contact Person	Tel	Address
Nalisview	2835	2	F 003 000 000 002 83 5 000 02	Motsweneng Simon Gopane		0795154017	17324 KOPANONG KOPANONG MANGAUNG 9323
Nalisview	2835	3	F 003 000 000 002 83 5 000 03	Botes Groewe Besigheidstrust	Willie Botha	botesgroewe@gmail.com T: 082 433 6852 / 083 300 2858 F: 086 525 1459	P.O. Box 11544 Universitas Bloemfontein 9301
Nalisview	1060	1	F 003 000 000 001 060 000 01	Elaine Elizabeth Labuschagne	Elaine Elizabeth Labuschagne	083 347 2833	P.O. Box 34369 Faunasig 9325
Van Zyl's Dam	72	RE	F 003 000 000 000 072 000 00	Hong Kuo-Tsai	Hong Kuo-Tsai	083 275 4118	41 Eeufees Road Bayswater 9301
Balquhidder	1967	RE	F 003 000 000 001 967 000 00	Thusanong Agricultural Enterprise Trust	VG Jason	079 386 8635	2 Swizz Street Oranjesig Bloemfontein 9300 Erf 34782 Chris Hani Bloemfontein 9300

List of identified possible interested and / or affected parties: Additional parties notified / registered as an IAP during a previous Public Participation Process (2017)				
IAP	**Address**	**Cell Number**	**E-mail**	**Postal Address**
N Tsikoane	Plot 9 Paradys Small Holdings	0827579116	Ntsikoane2@gmail.com	
K Thekiso	Plot 9 Paradys Small Holdings	0834534250	kuleilet@gmail.com	
JHM Lourens	Ventersville Kaalspruit	0848538956	Hester.lourens@yahoo.com	
HS Lourens	Ventersville Kaalspruit	0846252557	Hester.lourens@yahoo.com	
JHM Lourens Sr	Langverwacht Paradys	0836236638	Hester.lourens@yahoo.com	
HW Lourens	Langverwacht Paradys	0832975882	Hester.lourens@yahoo.com	
E Labuschagne	Plot 4 Paradys	0835742833	Elabuschagne@justice.gov.za	
D Labuschagne	Plot 4 Paradys	0767448934	Elabuschagne@justice.gov.za	
Ina de Wet	Plot 5 Paradys	0845106305	Elabuschagne@justice.gov.za	
Willie de Wet	Plot 5 Paradys	0826922333	Elabuschagne@justice.gov.za	
Leon Richter	Nooitgedacht Bloemfontein	0824107530	rutlandbdy@gmail.com	
A Botha	Nooitgedacht Bloemfontein	0824154917	anmelizebt@gmail.com	
Konet van Willing	Onze Rust Plaas 15	0780190531	koppieskraalveiligheid@gmail.com	
J Barnard	Paradys Proefplaas	0826992235	barnardj@ufs.ac.za	

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners

Farm	Number	Portion	F Number	Landowner	Contact Person	Tel	Address

E Barnard	Paradys Proefplaas	0828963076	elzaanlynch@icloud.com	
Q van Willing	Onze Rust	0728784836	koppieskraalveiligheid@gmail.com	
AS von Gericke	Mearsgeluk	0824942262	straussvg@gmail.com	
Jeanette	Mearsgeluk	0833253343	jvangericke@gmail.com	
GR Lombaard	Mearsgeluk	0823942856	jvangericke@gmail.com	
E Labuschagne	Marlien Onze Rust	0824000619	lappies@iterele.co.za	
L Labuschagne	The Meadows	0828693334	nanrass@gmail.com	
LS Labuschagne	The Meadows	0827886699	leonlab@gmail.com	
G Kruger	Ventersville	0825610929	Irrigation.gertkruger@gmail.com	
MC Kruger	Ventersville	0825610929	Mgjkruger@gmail.com	
CJ Loots	Onze Rust	0827893750	cjloots@gmail.com	
IP van Greunen	Onze Rust	0827893750	cjloots@gmail.com	
M van Rooyen	Blydskap 504	0781094656	Madace01@hotmail.com	
A van Rooyen	Blydskap 504	0731505466	Madace01@hotmail.com	
HJ Badenhorst	Rietspruit 2251	0832276387	henniebad@mweb.co.za	
F Badenhorst	Rietspruit 2251	0832276392	henniebad@mweb.co.za	
W Mackenzie	Brakspruit	0832932911	winett@willowbend.co.za	
A Gravett	Brakspruit	0835902888	Antongravett13@gmail.com	
W Mackenzie	Brakspruit	0788036703	winett@yahoo.com	
JP van Tonder	Welgevonden	0839737731	vtondejp@eskom.co.za	
Councillor, Ward 18: Dave Mc Kay	7 Borkenhagen Crescent Westdene Bloemfontein	0824147491	macdesigns@worldonline.co.za	PO Box 12565 Brandhof

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province							
Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners							
Farm	**Number**	**Portion**	**F Number**	**Landowner**	**Contact Person**	**Tel**	**Address**
					9300		9324
				Seventh-day Adventists	Finance Director: E Bhebhe Adra South Africa P.O. Box 468 Bloemfontein 9300 2 Link Road Bloemfontein 9300	051 430 4069 051 430 1502	
				UFS	Albie Louw	051 401 9207	Assistant Director: Facilities Planning University of the Free State P.O. Box 339 Bloemfontein 9300
				George Nicolas Trust	Portion 6 of the farm Paradys 2832	T: 051 406 4950	96 Andries Pretorius

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province

Table 1: List of identified possible interested and / or affected parties: Landowners / Adjacent Landowners

Farm	Number	Portion	F Number	Landowner	Contact Person	Tel	Address

		F: 051 433 1245		Street Noordhoek Bloemfontein 9301
Johannes Hilgard de Wet	Portion 5 of the farm Paradys 2832	082 922 5672 051 447 1787		104 Nicolene Court Bloemfontein 9301

ANNEXURE 2

Proof of initial notification

Site Notices:

Application to Department of Water and Sanitation,
Application for Basic Assessment Process &
Application for Rectification in terms of Section 24G) of
NEMA

Advert:

NETADS 24 .com
BOEK, KOOP, VERKOOP

Volksblad
www.netads24.com
Vir alle geklassifiseerde advertensies

051 404 7757
051 447 2940
267, Bloemfontein, 9300
79 Nelson Mandelarylaan, Bfn, 9301

VOLKSBLAD
Afdeling van/Division of Media24 Bpk/Ltd
Reg.: 1950/038385/06
BTW/VAT: 4150 102 22 8

KWOTASIE / QUOTATIO

To/Aan	N/DH.
From/Van	
Tel	
Faks/Fax	
Datum/Date	20/02/2020

From/Van	LUCIELLE KRELING
Tel	051 404 7824
Faks/Fax Fax to Mail:	051- 447 2940 086 544 7133
E-pos/E-mail	lucielle.kreling@volksblad.com
Bladsye/Pages	1

Tipe advert: Type of advert:	GEKLASSIFISEERD CLASSIFIED (1)	GEKLASSIFISEERD CLASSIFIED (2)	BLOCK BLOK
Grootte Size	Smalls		
Aantal plasings No. of placements	1		
BTW Uitgesluit VAT excluded	R3580-66		
BTW VAT			
BTW Ingesluit VAT included	R4117-76		
Plasingsdatums Placement date			
Spertyd Deadline	10:00 die dag voor publikasiedatum. 10:00 the day prior to publication date.	10:00 2 dae voor publikasiedatum. 10:00 2 days prior to publication date.	

BANKBESONDERHEDE/BANKINGDETAILS

Instansie/Institution:	ABSA
Rek. Naam/Acct Name:	MEDIA24 Advertensies
Rek. Nr./ Acct. No:	55 000 00 59
Takkode/Branch code:	632005

Verwysing: 293398.

VOORWAARDES/ TERMS AND CONDITIONS:
Advertensies sal nie gepubliseer word indien:
1. Die betalingsbewys nie die kantoor teen betrokke spertyd bereik nie

FOUTE/KORREKSIES/KANSELLASIES - ERRORS/CORRECTIONS/ CANCELLATIONS:
Die verantwoordelikheid berus by die adverteerder om seker te maak dat sy advertensie reg verskyn en om foute vóór 10:00 op die dag van publikasie onder die aandag van Netads24 te bring. Netads24 aanvaar nie verantwoordelikheid vir meer as een foutiewe plasing nie. Krediet en gratis plasings sal nie gegee word vir tipografiese foute wat nie die impak van die advertensie beinvloed nie. In die geval van 'n kansellasie moet u op 'n stakingsnommer as bewys aandring.
It is the responsibility of the advertiser to ensure that the advertisement appears correctly and to report incorrect adverts to Netads24 before 10:00 the day of publication. Netads24 accepts no responsibility for multiple incorrect publications. No credit or free adverts will be given for typographical mistakes that do not influence the impact of the advert. Insist on a cancellation number as proof when cancelling adverts.

Application to Department of Water and Sanitation, Application for Basic Assessment Process and Application for Rectification in terms of Section 24(G) of NEMA

Notice is given in terms of:
·Regulation 41(2)(b) of the Environmental Impact Assessment Regulations of 2017, No. 326 published in Government Notice No. 40772 under the National Environmental Management Act, 1998 (Act No. 107 of 1998) that an application for environmental authorization and an application for Rectification in terms of Section 24(G) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) shall be submitted to the Free State Department of Economic Development, Small Businesses, Tourism and Environmental Affairs (DESTEA); and
·Regulation 17(3)(c) of the Regulations Regarding The Procedural Requirements for Water Use License Applications and Appeals of 2017 No. R. 267 published in Government Notice No. 40713 of 24 March 2017 under the National Water Act (Act 36 of 1998) Section 21 as amended, that an application for a Water Use License will be submitted to the Department of Water and Sanitation (DWS); for the following:

Project:
Proposed expansion of an existing cemetery as well as the proposed construction of an access route to the above mentioned cemetery.

Locality:
The remainder of the farm Nalisview 2835 and Nalisview 1080, Bloemfontein.

Proponent:
Mangaung Metropolitan Municipality.

If you have any information or comments regarding the environmental impact of the proposed development or need additional information regarding the proposed development, please submit your name, contact information and interest to **Hanlie Stander at MDA**

hanlie@mdagroup.co.za
P.O. Box 20298,
Willows,
Bloemfontein, 9320,
Tel: 051 447 1583,
Fax: 051 448 9839
within 30 days of this notice.

NOTE:
Adjacent landowners were notified by means of one of the following methods:

- Hand delivery
- E-mail
- Registered Post

mda

Proof of initial notification
40727
Nalisview Cemetery

Organization	Contact person and contact detail	Proof of Hand Delivery
Department of Water and Sanitation	Mr. W Grobler Private Bag X528 Bloemfontein 9300	Received by: Rose Date: 2/03/2020 Signature:
	Mangaung Metropolitan Municipality The City Manager	Received by: Vivian Date: 02/03/2020 Signature: VF
	Mangaung Metropolitan Municipality Environmental Division Mpolokeng Kolobe	Received by: Mpolokeng Date: 02/03/2020 Signature:
	Mangaung Metropolitan Municipality Planning Division Collin Dihemo	Received by: Mpolokeng Date: 02/03/2020 Signature:
SAHRA	Head Office 111 Harrington Street CAPE TOWN 8001	Online notification was submitted on ______

mda

Proof of initial notification
40727
Nalisview Cemetery

Contact person and contact detail	Proof of Postage
Landowner of Portion 2 of the farm Nalisview 2835 17324 HILLSIDE VIEW BLOEMFONTEIN 9301	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 636 ZA CUSTOMER COPY 301016
CHAKA TSHIDISO ISHMAEL PRIVATE BAG X66 BENONI 1500	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 738 ZA CUSTOMER COPY 301016
E LABUSCHAGNE & AWG LABUSCHAGNE P O BOX 34369 FAUNASIG 9325	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 060 016 ZA CUSTOMER COPY 301016
HONG KUO-TSAI 41 EEUFEES ROAD BAYSWATER 9301	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 755 ZA CUSTOMER COPY 301016
THUSANONG AGRICULTURAL ENTERPRISE TRUS VG JASON 2 SWIZZ STREET ORANJESIG BLOEMFONTEIN 9300	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 874 ZA CUSTOMER COPY 301016
ERASMUS ISTELLE 24 STALSWEG WILGEHOF BLOEMFONTEIN 9300	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 494 ZA CUSTOMER COPY 301016
RHO DE WITT P O BOX 66523 RIEBEECKSTAD 9469	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 517 ZA CUSTOMER COPY 301016
CORDIAL GENUS BRICKS CC 3 VERSAILLES STREET BLOEMFONTEIN 9301	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 976 ZA CUSTOMER COPY 301016
George Nicolas Trust 96 Andries Pretorius Street Noordhoek Bloemfontein 9301	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 857 ZA CUSTOMER COPY 301016

SAPOST OFFICE
2020 -02- 27
No. 3
BRA[illegible]HOF - 9321

mda

Proof of initial notification

40727

Nalisview Cemetery

Contact person and contact detail	Proof of Postage
Johannes Hilgard de Wet 104 Nicolene Court 94 Charles Street Bloemfontein 9301	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 619 ZA CUSTOMER COPY [illegible]
Department Of Land Affairs Director Property Management Of The Provincial Department Of Public Works & Infrastructure Ms Agnes Ntilane 136 Charlotte Mareka Street Bloemfontein 9300	ORDINARY PARCEL ShareCall 0860 111 502 www.sapo.co.za PE 863 059 914 ZA CUSTOMER COPY [illegible]

SA POST OFFICE
2020-02-27
No. 3
[illegible] -9321

mda
Town & Regional Planners,
Environmental & Development
Consultants

Makecha Development Associates trading as MDA, CC 1995/030752/23

PO Box 100982 Brandhof 9324
Tel: 051 447 1583
Fax: 051 448 9838
e-mail: admin@mdagroup.co.za
9 Barnes Street, Westdene
BLOEMFONTEIN

Aansoek vir Omgewingsmagtiging & Regstelling asook 'n Aansoek na Departement van Water en Sanitasie

Agtergrondinligtingsdokument
27 Februarie 2020

1. Inleiding

Hiermee word kennis gegee in terme van:

a) Regulasie 41(2)(b) van die Omgewingspimakassesseringsregulasies van 2017, No. 326, gepubliseer in Staatskoerant No. 40772 onder die Nasionale Omgewingsbestuurswet, 1998 (Wet No. 107 van 1998) dat 'n aansoek vir omgewingsmagtiging en ook 'n aansoek vir Regstelling in terme van Seksie 24(G) van die Nasionale Omgewingsbestuurswet, 1998 (Wet No. 107 van 1998) by die Vrystaatse Departement van Ekonomiese Ontwikkeling, Klein Besighede, Toerisme en Omgewingsake (DESTEA) ingedien sal word; en
b) Regulasie 17(3)(c) van die Regulasies met verwysing na die Prosedurele Vereistes vir 'n Watergebruikslisensie Aansoeke en Appèl van 2017 No. R267, soos gepubliseer in Staatskoerant No. 40713 van 24 Maart 2017, onder die Nasionale Water Wet (Wet 36 van 1998), Seksie 21, soos gewysig, dat 'n aansoek vir 'n watergebruikslisensie by die Departement van Water en Sanitasie (DWS) ingedien sal word;

vir die volgende:

Projek: Voorgestelde uitbreiding van 'n bestaande begrafplaas sowel as die voorgestelde konstruksie van 'n toegangspad na die genoemde begrafplaas.
Lokaliteit: Sien die kaart hierby aangeheg
Proponent: Mangaung Metropolitaanse Munisipaliteit

MDA is as 'n onafhanklike assesseringspraktisyn (OAP) aangestel om 'n omgewingsmagtiging (OM) aansoek kragtens die Wet op Nasional Omgewingsbestuur (WNOB, Wet 107 van 1998), wat die voorlegging van 'n Basiese Assesseringsverslag (BAV), Aanstelling vir Regstelling en ‘n omgewingsbestuursprogram (OBPR) behels, by die relevante Departement in te dien.

Die huidige dokument bied aan die leser die geleentheid om inligting in te win, kommentaar te lewer, kwessies op te haal en met die ontwikkeling van die proses saam te werk.

2. Agtergrond

Die bestaande begrafplase in die omgewing is reeds meer as 90% vol en is dus onvoldoende om aan die behoefte van die gemeenskap te voldoen. Die proponent van die huidige projek het reeds Omgwingsmagtiging vir die oprigting van ‘n begrafplaas op Gedeelte 5 van die plaas Nalisview 2835, Bloemfontein bekom. Hierdie gedeelte is te klein om die area te bedien en daarom is daar voorgestel om die Nalisview Begrafplaas uit te brei.

Die bou van ‘n toegangspad vorm ook deel van die aansoek.

Aktiwiteite wat sal plaasvind as deel van die voorgestelde projek sluit onder andere die volgende in:

- Konstruksie van ‘n toegangspad sowel as interne paaie
- Verwydering van plante en uitlê van grafte
- Grafte sal meganies gegrou word tydens die operasionele fase
- Al die grafte sal nie op een slag gegrou word nie - grafte sal weekliks gegrou word om sodoende net genoeg grafte wat die volgende week benodig sal word, voor te berei.
- Daar word voorspel dat ‘n gemiddeld van 50 grafte per week benodig sal word.
- Uitheemse plantegrou (behalwe groot bome) sal van die studie-area verwyder word
- Watervoorsieining sal plaasvind
- Sanitasie-geriewe sal deur middel van ‘n septiese tank gediens word
- Ablusiegeriewe sal voorsien word
- ‘n Grens-heining sal opgerig word
- Genoegsame dreinering sal plaasvind, sodat vloeding tydens reënbuie beperk sal word.

Verwys asseblief na die kaart hierby aangeheg vir meer inligting rakende die ligging van die voorgestelde projek.

3. Gelyste aktiwiteite geassosieer met die projek

3.1. Basiese Assesseringsproses (BAP)

‘n Aansoek vir die volgende gelyste aktiwiteite sal by DESTEA ingedien word:

Wetgewing en Gelyste Aktiwiteit	Beskrywing van Aktiwiteit	Tipe goedkeuringsproses	Departement
Staatskoerant Nr. R983, Aktiwiteit 12: Die ontwikkeling van (ii) Infrastruktuur of strukture met ‘n fisiese ontwikkelingsarea van 100 kubieke meters of meer waar die ontwikkeling (a) Binne ‘n waterbron plaasvind (b) Indien geen ontwikkelingslyn daargestel is nie, binne 32 m van ‘n waterbron, gemeet vanaf die rand van die waterbron uitsluitend: (dd) waar die ontwikkeling binne ‘n stedelike gebied plaasvind.	Die uitbreiding van ‘n begrafplaas. Konstruksie aktiwiteite sal binne 32m van ‘n geidentifiseerde vleiland plaasvind. Neem asseblief kennis dat die vleiland spesialis aangedui het dat ‘n buffer van 15m rondom die vleiland geimplementeer moet word	BAP	DESTEA
Staatskoerant Nr. R983, Aktiwiteit 19: Die invulling of storting van enige materiaal van meer as 10 kubieke meter in ‘n waterbron, of	Konstruksie akwitiwiteite sal binne 32m van ‘n vleiland plaasvind. Neem asseblief kennis dat die vleiland spesialis aangedui het dat ‘n buffer van 15m rondom	BAP	DESTEA

baggerwerk, uitgrawing, verwydering of verskuiwing van grond, sand, skulpe, skulp lae, klippies of klip materiaal van meer as 10 kubieke meter vanuit 'n waterbron.	die vleiland geimplementeer moet word		
Staatskoerant Nr. R983, Aktiwiteit 24: Die ontwikkeling van 'n pad (ii) met 'n reserwe wyer as 13.5m, of waar geen reserwe bestaan nie, waar die pad wyer as 8m is.	Die konstruksie van 'n toegangspad met 'n reserwe van 30m of minder sal plaasvind. Neem kennis dat die pad vir verkeer in beide rigtings voorsiening sal maak (enkel baan per rigting).	BAP	DESTEA

3.2. Aansoek vir Regstelling

Die konstruksie van 'n gedeelte van die interne paaie het reeds plaasgevind, sonder dat die nodige goedkeuring verkry is.

Seksie 24G van NEMA verleen aan aansoekers die geleentheid om 'n aansoek vir die regstelling van gelyste aktiwiteite wat onwettig plaasgevind het / plaasvind, in te dien.

'n Aansoek vir die regstelling sal vir die volgende gelyste aktiwiteite ingedien word:

Wetgewing en Gelyste Aktiwiteit	Beskrywing van Aktiwiteit	Tipe goedkeurings proses	Departe ment
Staatskoerant Nr. R983, Aktiwiteit 44: Die uitbreiding van begrafplase met 2 500 vierkante meter of meer	Die ontwikkeling van 'n begrafplaas op Gedeelte 5 van die plaas Nalisview 2835 wat reeds deur DESTEA goedgekeur. Die voorgestelde projek behels die verdere uitbreiding van die bogenoemde begrafplaas, op die Restant van die plaas Nalisview 2835.	BAP	DESTEA

3.3. DWS

'n Aansoek vir die volgende aktiwiteite sal by die Department van Water en Sanitasie ingedien word:

Seksie 21(c) & Seksie 21(i): Belemmering en verandering van 'n waterbedding / oewer

4. Omgewings Assessering en Bestuursprogram

MDA is aangestel om die Omgewingsassessering van aktiwiteite wat gepaargaan met die gelyste aktiwiteite soos hierbo genoem, te onderneem. Die assessering sal die aard, uitbreiding en duur van die gevolge van, of impakte op die omgewing van die aktiwiteite, asook die kumulatiwe effekte, soos voorgeskryf deur Seksie 24(G)(1)(a) van NEMA, in ag neem. Spesialiste sal ook die studie area assesseer en hul bevindings sal ingesluit word by die verslag wat deur MDA saamgestel sal word. Kewssies soos uitgewys deur geregistreerde partye, sal ook in die verslag aangespreek word.

'n Beskrywing van maatreëls wat geimplimenteer moet word om sodoende die moontlike negatiewe impakte van die voorgestelde projek te verminder, sal ook voorsien word deur middel van ‘n Omgewingsberstuursprogram.

5. Publieke Deelname Proses

Openbare deelname vorm ‘n integrale deel van die omgewingsmagtigingsproses.

Indien u enige kwessies rakende die bogenoemde projek onder ons aandag wil bring, registreer asseblief as ‘n Geinteresseerde / of Geaffekteerde Party.

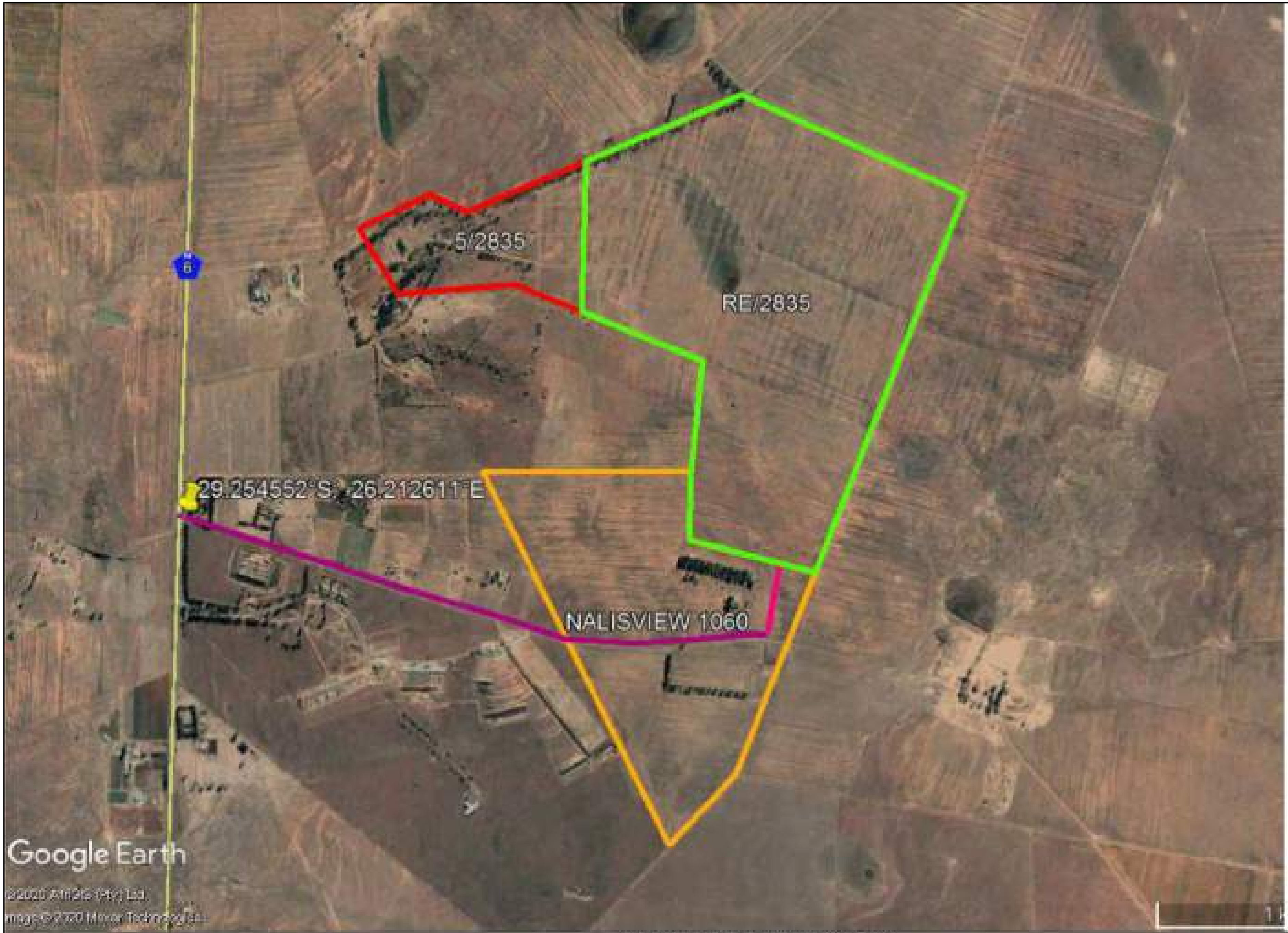
Alle relevante beswaar en omgewingskwessies wat deur geregistreerde partye geopper word, sal gedokumenteer word.

Alle geregistreerde partye sal in kennis gestel word van die vordering / ontwikkelling van die projek en sal ook die geleentheid verkry om kommentaar op enige verslae te lewer.

Stuur u kontakbesonderhede en kommentaar rakende die bogenoemde projek binne 30 dae van die kennisgewing aan MDA (Hanlie Stander | hanlie@mdagroup.co.za | Posbus 100982 | Brandhof | Bloemfontein | 9324 | Tel: 051 447 1583 | Faks: 051 448 1893) om sodoende as ‘n Geinteresseerde / of Geaffekteerde Party te registreer.

Voorgestelde uitbreiding van die Nalisview Begrafplaas asook die voorgestelde konstruksie van 'n toegangspad vir die bogenoemde begrafplaas

Naam en Van	
Belang in die projek (bv. Aangrensende grondeienaar, ens)	
Kontakbesonderhede	**Tel:**
	E-pos:
	Faks:
	Fisiese adres:
	Posadres:
Kommentaar	
Handtekening en datum	



Legende:

🟥 Goedgekeurde begrafplaas (Gedeelte 5 van die plaas Nalisview 2835)

🟩 Voorgestelde begrafplaas (Restant van die plaas Nalisview 2835)

🟪 Bestaande pad wat opgegradeer sal word

▬ Voorgestelde toegangspad

500 m

TIPE PLAN: LOKALITEITSPLAN

mda
Town & Regional Planners, Environmental & Development Consultants

T: 051 447 1583 | P.O. Box 20298, Willows, Bloemfontein, 9320
F: 086 455 2568 | 9 Barnes Street, Westdene, Bloemfontein, 9301

PROJEK:
DIE VOORGESTELDE UITBREIDING VAN DIE NALISVIEW BEGRAFPLAAS EN DIE VOORGESTELDE KONSTRUKSIE VAN 'N TOEGANGSPAD VIR DIE GENOEMDE BEGRAFPLAAS

PROJEK DEUR:
MANGAUNG METROPOLITAANSE MUNISIPALITEIT

GETEKEN DEUR:
HS

mda
Town & Regional Planners,
Environmental & Development
Consultants

Makecha Development Associates trading as MDA, CC 1995/030752/23

PO Box 100982 Brandhof 9324
Tel: 051 447 1583
Fax: 051 448 9838
e-mail: admin@mdagroup.co.za
9 Barnes Street, Westdene
BLOEMFONTEIN

Application to Department of Water and Sanitation, Application for Basic Assessment Process & Application for Rectification in terms of Section 24(G) of NEMA

Background Information Document
27 February 2020

1. Introduction

Notice is given in terms of:

- Regulation 41(2)(b) of the Environmental Impact Assessment Regulations of 2017, No. 326 published in Government Notice No. 40772 under the National Environmental Management Act, 1998 (Act No. 107 of 1998) that an application for environmental authorization and an application for Rectification in terms of Section 24(G) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) shall be submitted to the Free State Department of Economic Development, Small Businesses, Tourism and Environmental Affairs (DESTEA); and

- Regulation 17(3)(c) of the Regulations Regarding The Procedural Requirements for Water Use License Applications and Appeals of 2017 No. R. 267 published in Government Notice No. 40713 of 24 March 2017 under the National Water Act (Act 36 of 1998) Section 21 as amended, that an application for a Water Use License will be submitted to the Department of Water and Sanitation (DWS);

for the following:

Project: Proposed expansion of an existing cemetery as well as the proposed construction of an access route to the above mentioned cemetery
Locality: Please refer to attached map
Proponent: Mangaung Metropolitan Municipality

MDA was appointed as independent Environmental Assessment Practitioner responsible for managing the Public Participation Process as well as the Environmental Assessment Process in support of the above mentioned applications.

This document forms part of the Public Participation Process, and aims to elicit comments, questions and responses from possible Interested and / or Affected Parties with regards to the above mentioned project.

2. Background

The existing cemeteries in the region are already more than 90% full and are inadequate for the need of the community. Mangaung Metropolitan Municipality received Environmental Authorisation for the Proposed Construction of a Cemetery on Portion 5 of the farm Nalisview 2835, Bloemfontein. The section approved for the Nalisview Cemetery is too small to service the area and therefore it is proposed to expand the Nalisview Cemetery.

The proposed construction of an access road to the cemetery will also be undertaken as part of the said project.

A seasonal wetland is located on site, and therefore an application to DWS is required.

Associated activities to be undertaken on site will include but will not be limited to the following:

- Construction of access road.
- The site will be cleared of vegetation and laid out so as to provide burial sites for the local community.
- Graves will be excavated mechanically by use of excavators (TLB‘s).
- Graves will be dug according to bookings received from undertakers. In other words provision will be made only for graves that are going to be used in a weeks’ time and graves are not dug in advance for future use.
- For this particular cemetery an average of 50 burials will take place per week (total of Bloemfontein burials per week all cemeteries is 80).
- Alien vegetation (except large trees that exists on site) should be removed from the site.
- Water supply to the site.
- Sanitation will be provided by means of a septic tank.
- An ablution facility (male / female).
- A fence on the perimeter of the site.
- Construction of roads within the cemetery area.
- Sufficient site drainage should be established as the area may be subject to flooding during normal to heavy rainfall.

Please refer to the map attached hereto for more information on the locality of the proposed project.

3. Listed Activities Applicable to the project

3.1. BAR Process

An application for the proposed commencement of the following listed activities will be submitted to DESTEA:

Legislation and Listed Activities	Details of Activities	Requirements	Authority
GOVERNMENT NOTICE NO. R983, ACTIVITY 12: THE DEVELOPMENT OF (ii) INFRASTRUCTURE OR STRUCTURES WITH A PHYSICAL FOOTPRINT OF 100 SQUARE METRES OR MORE WHERE SUCH DEVELOPMENT OCCURS *(a)* WITHIN A WATERCOURSE *(c)* IF NO DEVELOPMENT SETBACK EXITS, WITHIN 32 M OF A WATERCOURSE, MEASURED FROM THE EDGE OF A WATERCOURSE EXCLUDING (DD) WHERE SUCH DEVELOPMENT OCCURS WITHIN AN URBAN AREA	Expansion of cemetery CONSTRUCTION ACTIVITIES WITHIN 32 M OF THE IDENTIFIED WETLAND. PLEASE NOTE THAT THE SPECIALIST INDICATED THAT A BUFFER AREA OF 15 M SHOULD BE IMPLEMENTED AT THE WETLAND.	BAR	DESTEA
GOVERNMENT NOTICE	CONSTRUCTION	BAR	DESTEA

NO. R983, ACTIVITY 19: THE INFILLING OR DEPOSITING OF ANY MATERIAL OF MORE THAN 10 M^3 INTO, OR THE DREDGING, EXCAVATION, REMOVAL OR MOVING OF SOIL, SAND, SHELLS, SHELL GRIT, PEBBLES OR ROCK OF MORE THAN 10 M^3 FROM A WATERCOURSE	ACTIVITIES WITHIN 32 M OF THE IDENTIFIED WETLAND. PLEASE NOTE THAT THE SPECIALIST INDICATED THAT A BUFFER AREA OF 15 M SHOULD BE IMPLEMENTED AT THE WETLAND.		
GOVERNMENT NOTICE NO. R983, ACTIVITY 24: THE DEVELOPMENT OF A ROAD (ii) WITH A RESERVE WIDER THAN 13.5 M, OR WHERE NO RESERVE EXISTS WHERE THE ROAD IS WIDER THAN 8 M	THE CONSTRUCTION OF AN ACCESS ROAD WITH A RESERVE OF 30M OR LESS. NOTE THAT THE ROAD WILL MAKE PROVISION FOR SINGLE LANE TRAFFIC IN BOTH DIRECTIONS.	BAR	DESTEA

3.2. Rectification of unlawful commencement of listed activities

The construction of internal roads was undertaken to date on the Remainder of the farm Nalisview 2835, without the required authorisation.

Section 24G of the NEMA provides proponent with the opportunity to apply for the rectification of the unlawful commencement and / or continuation of listed activities.

An application for the rectification of the unlawful commencement of the following listed activities will be undertaken:

Listed Activities	Details of Activities	Requirements	Authority
GOVERNMENT NOTICE NO. R983, ACTIVITY 44: THE EXPANSION OF	THE DEVELOPMENT OF A CEMETERY ON PORTION 5 OF THE FARM	BAR	DESTEA

CEMETERIES BY 2 500 SQUARE METRES OR MORE	NALISVIEW 2835 WAS ALREADY APPROVED BY DESTEA. THE CURRENT PROPOSED PROJECT ENTAILS THE FURTHER DEVELOPMENT OF THE CEMETERY ON THE REMAINDER OF THE FARM NALISVIEW 2835.		

3.3. Water Use Application

An application for the following activities will be submitted to DWS:

Section 21(c) & Section 21(i): Impeding and alteration of the beds / banks

4. Environmental Assessment and Management Programme

MDA will undertake an Environmental Assessment of activities associated with the above mentioned project. The assessment will consider the nature, extent, duration and significance of the consequences for, or impacts on, the environmental of the activity, including the cumulative effects as required by Section24(G)(1)(a) of NEMA. Specialist will also assess the site and the findings by the specialists will be included in the reports by MDA. Consideration will be given to the issues identified by the Registered Interested and / or Affected Parties.

A description of mitigation measures to be undertaken in respect of the environmental impacts of the activity will also be provided. These actions are required to minimise negative impacts and enhance positive impacts associated with the activities triggered by the said project.

An Environmental Management Programme (EMP) will detail the actions and responsibilities required to effectively implement the mitigation measures and / or remediation measures required.

5. Public Participation Process

If you have any comments or would raise any issues of environmental concern regarding the above mentioned project, please register as an Interested and / or Affected Party (IAP).

All relevant objections and environmental issues raised by the Registered IAPs will be documented.

All registered IAPs will be notified of any developments of the project and provided the opportunity to comment on reports.

In order to register for the said project, please submit your name, contact information and interest to MDA (Hanlie Stander| hanlie@mdagroup.co.za | P.O. Box 100982 | Brandhof | Bloemfontein | 9324 | **Tel:** 051 447 1583 | **Fax:** 051 448 1839) within 30 days of this notice.

mda
Town & Regional Planners,
Environmental & Development
Consultants

Makecha Development Associates trading as MDA, CC 1995/030752/23

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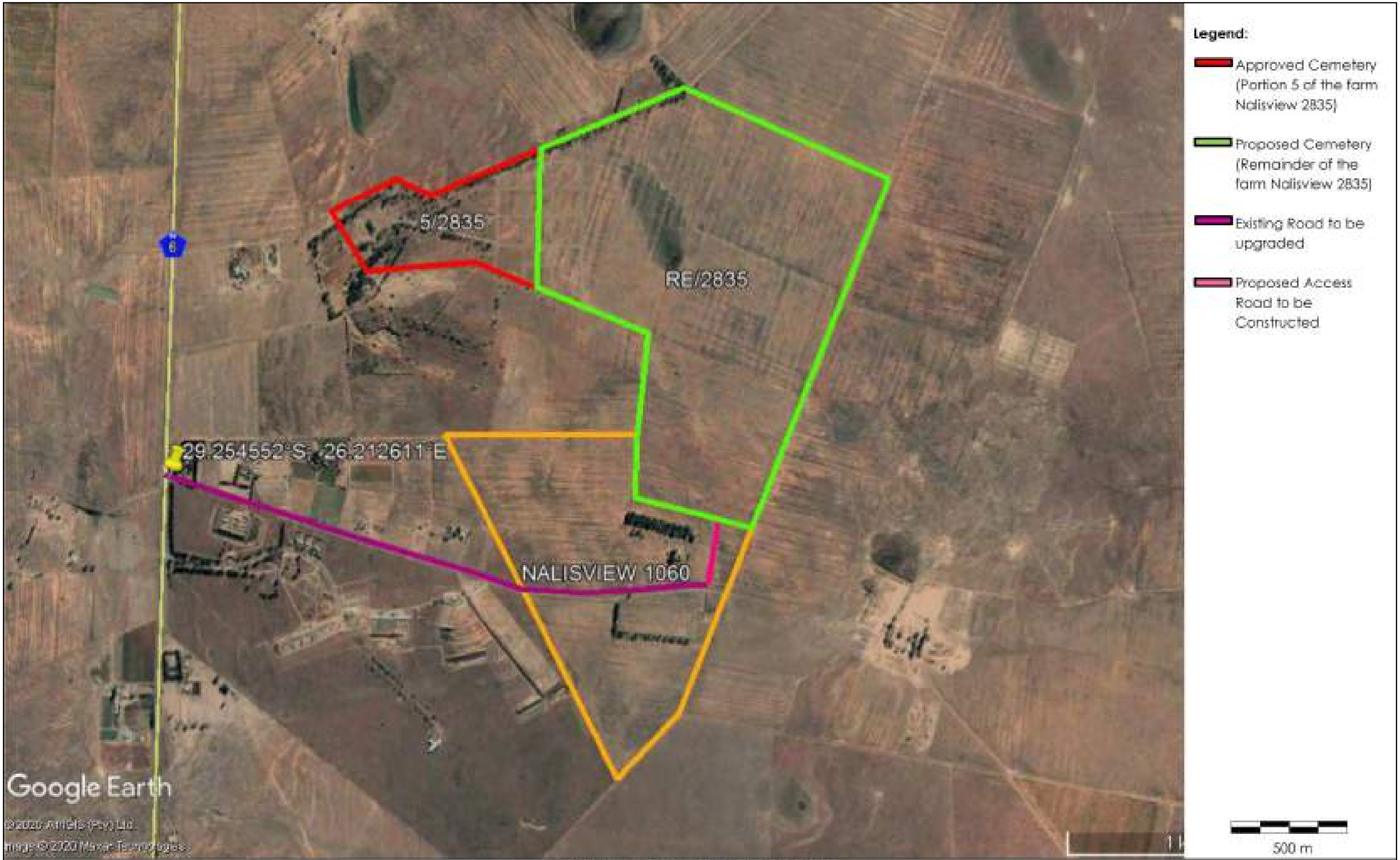
Tel: 051 447 1583
Fax: 051 448 9838
e-mail: admin@mdagroup.co.za
9 Barnes Street, Westdene
BLOEMFONTEIN

Proposed expansion of an existing Nalisview Cemetery as well as the proposed construction of an access route to the above mentioned cemetery

Name and Surname	
Interest in the project (ex. Adjacent landowner, authority, etc.)	
Contact details	**Tel:**
	E-mail:
	Fax:
	Physical address:
	Postal address:
Comment or any concerns:	
Signature and date	



TYPE OF PLAN: LOCALITY PLAN

mda
Town & Regional Planners, Environmental & Development Consultants

T: 051 447 1583 | P.O. Box 20298, Willows, Bloemfontein, 9320
F: 086 456 2568 | 9 Barnes Street, Westdene, Bloemfontein, 9301

PROJECT:
THE PROPOSED EXPANSION OF THE NALISVIEW CEMETERY AS WELL AS THE PROPOSED CONSTRUCTION OF AN ACCESS ROAD TO THE SAID CEMETERY

PROJECT BY:
MANGAUNG METROPOLITAN MUNICIPALITY

DRAWN BY:
HS

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:30 AM
To:	'kuleilet@gmail.com'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

K Thekiso, Paradys Small Holdings Nr 9

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

Please refer to the attached Background Information Document for additional information on the said project.

Note that you are still registered as an Interested and / or Affected Party and that we will provide you with a copy of all the documentation to be submitted to DESTEA in order to provide you with the opportunity to comment on the said reports. All comments received during the initial public participation process will be included in the documents to be submitted to DESTEA.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

U het as ‘n Geïnteresseerde en / of Geaffekteerde Party geregistreer tydens ‘n Publieke Deelname Proses (2017) aangaande die voorgestelde begrafplaas op die Restant van die Plaas Nalisview 2835.

As gevolg van voorgestelde veranderinge in die bogenoemde projek word die Publieke Deelname Proses vir die bogenoemde projek herhaal.

Sien asseblief die Agtergrondinligtingsdokument hierby aangeheg vir verdere inligting rakendei die voorgestelde projek.

Neem asseblief kennis dat u steeds as 'n Geïnteresseerde en / of Geaffekteerde Party vir die bogenoemde projek geregistreer is. MDA sal alle dokumente wat by DESTEA ingedien sal word, aan u stuur om sodoende vir u die geleentheid te bied om kommentaar op die verslae te lewer. Alle kommentaar wat MDA gedurende die aanvanklike Publieke Deelname Proses ontvang het, sal ingesluit word by die dokumente wat by DESTEA ingedien sal word.

Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

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____
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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:56 AM
To: 'ebhebhe@adra-sa.org'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Seventh-Day Adventists
Finance Director
E Bhebhe,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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U het as ‘n Geïnteresseerde en / of Geaffekteerde Party geregistreer tydens ‘n Publieke Deelname Proses (2017) aangaande die voorgestelde begrafplaas op die Restant van die Plaas Nalisview 2835.

As gevolg van voorgestelde veranderinge in die bogenoemde projek word die Publieke Deelname Proses vir die bogenoemde projek herhaal.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 12:03 PM
To:	'srmzizi@ruraldevelopment.gov.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Provincial Government of the Free State: Department of Rural Development,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:33 AM
To:	'rutlandbdy@gmail.com'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

L Richter

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:37 AM
To: koppieskraalveiligheid@gmail.com
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Q van Willing

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

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P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:35 AM
To:	'koppieskraalveiligheid@gmail.com'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Konet van Willing

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

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Town & Regional Planners,
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P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:45 AM
To: 'madace01@hotmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

M van Rooyen & A van Rooyen,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

Please refer to the attached Background Information Document for additional information on the said project.

Note that you are still registered as an Interested and / or Affected Party and that we will provide you with a copy of all the documentation to be submitted to DESTEA in order to provide you with the opportunity to comment on the said reports. All comments received during the initial public participation process will be included in the documents to be submitted to DESTEA.

We trust that you will find the above in order.

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U het as ‘n Geïnteresseerde en / of Geaffekteerde Party geregistreer tydens ‘n Publieke Deelname Proses (2017) aangaande die voorgestelde begrafplaas op die Restant van die Plaas Nalisview 2835.

As gevolg van voorgestelde veranderinge in die bogenoemde projek word die Publieke Deelname Proses vir die bogenoemde projek herhaal.

Sien asseblief die Agtergrondinligtingsdokument hierby aangeheg vir verdere inligting rakendei die voorgestelde projek.

Neem asseblief kennis dat u steeds as ‘n Geïnteresseerde en / of Geaffekteerde Party vir die bogenoemde projek geregistreer is. MDA sal alle dokumente wat by DESTEA ingedien sal word, aan u stuur om sodoende vir u die geleentheid te bied om kommentaar op die verslae te lewer. Alle kommentaar wat MDA gedurende die aanvanklike Publieke Deelname Proses ontvang het, sal ingesluit word by die dokumente wat by DESTEA ingedien sal word.

Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 12:09 PM
To: 'louwA1@ufs.ac.za'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Assistant Director: Facilities Planning, UFS
Albie Louw,

A Public Participation Process for the above mentioned project was undertaken in 2017.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

Please refer to the attached Background Information Document for additional information on the said project.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

‘n Publieke Deelname Proses vir die bogenoemde projek was in 2017 geloots.

As gevolg van voorgestelde veranderinge in die bogenoemde projek word die Publieke Deelname Proses vir die bogenoemde projek herhaal.

Sien asseblief die Agtergrondinligtingsdokument hierby aangeheg vir verdere inligting rakendei die voorgestelde projek.

Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:29 AM
To: 'ntsikoane2@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

N Tsikoane, Paradys Small Holdings Nr 9

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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U het as ‘n Geïnteresseerde en / of Geaffekteerde Party geregistreer tydens ‘n Publieke Deelname Proses (2017) aangaande die voorgestelde begrafplaas op die Restant van die Plaas Nalisview 2835.

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Kind regards / Groete,

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mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:47 AM
To:	'henniebad@mweb.co.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

HJ Badenhorst & F Badenhorst,

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____
____
______

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:24 AM
To: 'elabuschagne@justice.gov.za'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Mr AWG Labuschagne & Mrs EE Labuschagne,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

____

____

______

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 12:11 PM
To: jack@fs.agric.za
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Tracking:

Recipient	**Read**
jack@fs.agric.za	Read: 2020/02/27 12:06 PM

Good day,

Please see the attached notification regarding the above mentioned project.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:55 AM
To:	'macdesigns@worldonline.co.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Dave Mc Kay (WC18),

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 12:11 PM
To:	'mbatha.npz@sacr.fs.gov.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Good day,

Please see the attached notification regarding the above mentioned project.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:49 AM
To:	'winett@yahoo.com'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

W Mackenzie,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:48 AM
To:	'winett@willowbend.co.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

W Mackenzie,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:32 AM
To:	'hester.lourens@yahoo.com''
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

JHM Lourens & HW Lourens

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:31 AM
To: 'hester.lourens@yahoo.com'
Subject: 40727: Nalisview Cemetery
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Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:45 AM
To:	'cjloots@gmail.com'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Tracking:	**Recipient**	**Read**
	'cjloots@gmail.com'	Read: 2020/02/27 12:47 PM

CJ Loots & IP van Greunen,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:39 AM
To: 'jvangericke@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Jeanette & GR Lombaard,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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U het as 'n Geïnteresseerde en / of Geaffekteerde Party geregistreer tydens 'n Publieke Deelname Proses (2017) aangaande die voorgestelde begrafplaas op die Restant van die Plaas Nalisview 2835.

As gevolg van voorgestelde veranderinge in die bogenoemde projek word die Publieke Deelname Proses vir die bogenoemde projek herhaal.

Sien asseblief die Agtergrondinligtingsdokument hierby aangeheg vir verdere inligting rakendei die voorgestelde projek.

Neem asseblief kennis dat u steeds as 'n Geïnteresseerde en / of Geaffekteerde Party vir die bogenoemde projek geregistreer is. MDA sal alle dokumente wat by DESTEA ingedien sal word, aan u stuur om sodoende vir u die geleentheid te bied om kommentaar op die verslae te lewer. Alle kommentaar wat MDA gedurende die aanvanklike Publieke Deelname Proses ontvang het, sal ingesluit word by die dokumente wat by DESTEA ingedien sal word.

Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:41 AM
To:	'nanrass@gmail.com'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

L Labuschagne,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

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____
____
______

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:24 AM
To:	'elabuschagne@justice.gov.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Mr AWG Labuschagne & Mrs EE Labuschagne,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:40 AM
To: 'lappies@iterele.co.za'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

E Labuschagne,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

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mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:42 AM
To: 'leonlab@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

LS Labuschagne,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 12:06 PM
To: 'kuleilet.thekiso@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Thekiso Kuleile,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:44 AM
To: 'mgjkruger@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

M Kruger,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:43 AM
To: 'irrigation.gertkruger@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

G Kruger,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 11:54 AM
To:	'vtondejp@eskom.co.za'; 'vtonderjp@eskom.co.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

JP van Tonder,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 12:41 PM
To:	'barnardj@ufs.ac.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

J Barnard

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
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9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:48 AM
To: 'antongravett13@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

A Gravett,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:38 AM
To: 'straussvg@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

AS van Gericke,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

Please refer to the attached Background Information Document for additional information on the said project.

Note that you are still registered as an Interested and / or Affected Party and that we will provide you with a copy of all the documentation to be submitted to DESTEA in order to provide you with the opportunity to comment on the said reports. All comments received during the initial public participation process will be included in the documents to be submitted to DESTEA.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

U het as ‘n Geïnteresseerde en / of Geaffekteerde Party geregistreer tydens ‘n Publieke Deelname Proses (2017) aangaande die voorgestelde begrafplaas op die Restant van die Plaas Nalisview 2835.

As gevolg van voorgestelde veranderinge in die bogenoemde projek word die Publieke Deelname Proses vir die bogenoemde projek herhaal.

Sien asseblief die Agtergrondinligtingsdokument hierby aangeheg vir verdere inligting rakendei die voorgestelde projek.

Neem asseblief kennis dat u steeds as ‘n Geïnteresseerde en / of Geaffekteerde Party vir die bogenoemde projek geregistreer is. MDA sal alle dokumente wat by DESTEA ingedien sal word, aan u stuur om sodoende vir u die geleentheid te bied om kommentaar op die verslae te lewer. Alle kommentaar wat MDA gedurende die aanvanklike Publieke Deelname Proses ontvang het, sal ingesluit word by die dokumente wat by DESTEA ingedien sal word.

Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:28 AM
To: elabuschagne@justice.gov.za
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Willie de Wet & Ina de Wet – Paradys Klein Hoewe Nr 5

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

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______

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 12:04 PM
To:	'boykies@webmail.co.za'
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Setouta Moiloa,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

The Public Participation Process for the above mentioned project is currently being repeated due to the changes to the initial scope of the proposed project, therefore the current notification.

Please refer to the attached Background Information Document for additional information on the said project.

Note that you are still registered as an Interested and / or Affected Party and that we will provide you with a copy of all the documentation to be submitted to DESTEA in order to provide you with the opportunity to comment on the said reports. All comments received during the initial public participation process will be included in the documents to be submitted to DESTEA.

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Ons vertrou dat u die bogenoemde in orde sal vind.

Kontak ons gerus indien u verdere inligting rakende die projek verlang.

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____
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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	27 February 2020 12:01 PM
To:	botesgroewe@gmail.com
Subject:	40727: Nalisview Cemetery
Attachments:	40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

Willie Botha, Botes Groewe Besigheidstrust,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:34 AM
To: 'anmelizebt@gmail.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

A Botha

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda Town & Regional Planners, Environmental & Development Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:36 AM
To: 'elzaanlynch@icloud.com'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

E Barnard,

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Ons vertrou dat u die bogenoemde in orde sal vind.

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Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Hanlie Stander

From: Hanlie Stander <hanlie@mdagroup.co.za>
Sent: 27 February 2020 11:36 AM
To: 'bardardj@ufs.ac.za'
Subject: 40727: Nalisview Cemetery
Attachments: 40727 Nalisview Agtergrondinligtingsdokument.pdf; 40727 Nalisview Background Information Document.pdf

J Barnard

You have registered as an Interested and / or Affected Party (IAP) during a Public Participation Process (2017) regarding the proposed cemetery on the Remainder of the farm Nalisview 2835.

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Neem asseblief kennis dat u steeds as 'n Geïnteresseerde en / of Geaffekteerde Party vir die bogenoemde projek geregistreer is. MDA sal alle dokumente wat by DESTEA ingedien sal word, aan u stuur om sodoende vir u die geleentheid te bied om kommentaar op die verslae te lewer. Alle kommentaar wat MDA gedurende die aanvanklike Publieke Deelname Proses ontvang het, sal ingesluit word by die dokumente wat by DESTEA ingedien sal word.

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Kontak ons gerus indien u verdere inligting rakende die projek verlang.

Kind regards / Groete,

Hanlie Stander

Environmental Assessment Practitioner for MDA

Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

ANNEXURE 3

List of registered parties

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein		
Authorities & Stakeholders		
Organization	Contact person and contact detail	Comments and Response
The Municipal Ward Councillor: Ward 18	The Municipal Ward Councillor: Ward 18 Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** N/A, as no comments were received.
Mangaung Metro Municipality City Manager	The City Manager Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** N/A, as no comments were received.
Mangaung Metro Municipality: Enviornmental Division	Me. Mpolokeng Kolobe Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** N/A, as no comments were received.
Mangaung Metro Municipality: Planning Division	Mr. Collin Dihemo Mangaung Metro Municipality P.O. Box 3704 Bloemfontein 9300	**Comment:** None to date **Response:** N/A, as no comments were received.
Department of Agriculture	The Assistant Director Department of Agriculture P.O. Box 34521 Faunasig Bloemfontein 9325	**Comment:** None to date **Response:** N/A, as no comments were received.
FSHRA	Ntando PZ Mbatha Heritage Coordinator Corner Henry and East Burger Street Department of	**Comment:** None to date **Response:** N/A, as no comments were received.

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060, Bloemfontein		
Authorities & Stakeholders		
Organization	**Contact person and contact detail**	**Comments and Response**
	Sport Arts Culture and Recreation Office 204 Bloemfontein 9301	
SAHRA	South African Heritage Resources Agency (SAHRA) Head Office 111 Harrington Street CAPE TOWN 8001	**Comment:** None to date **Response:** A copy of the Current Document was uploaded to the SAHRIS website
Department of Water and Sanitation	Mr. W Grobler Private Bag X528 Bloemfontein 9300	**Comment:** None to date **Response:** N/A, as no comments were received.

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 (NOTE: THE FOLLOWING PARTIES REGISTERED AS PART OF THE 2017 PUBLIC PARTICIPATION PROCESS)				
Nr	**IAP**	**Address**	**Contact Information**	**Comments and Response**
1	N Tsikoane *Also registered as part of the 2020 PPP process	Plot 9 Paradys Small Holdings	0827579116 Ntsikoane2@gmail.com	**Comment:** Requested additional information on access road to be upgraded. **Response:** 1. The proposed construction activities will commence as soon as all the required approvals (from DESTEA, MMM) is obtained. 2. The process may take another 18 months. 3. However, this depends on the available budget that may be sourced from grants as well as the possibility that the Covid19 Pandemic may add severe pressure to an otherwise already pressured availability of graves due to the space restrictions at SuidPark. 4. With the above in mind, the construction of the said road may be prioritised. 5. The general construction

				activities will take approximately 18 months to complete. 6. The municipality already started with the construction of internal roads & fencing at the cemetery. All construction activities ceased and will continue after the necessary approvals are obtained. 7. Graves will be constructed throughout the operational phase of the said project.
2	K Thekiso	Plot 9 Paradys Small Holdings	0834534250 kuleilet@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
3	JHM Lourens	Ventersville Kaalspruit	0848538956 Hester.lourens@yahoo.com	**Comment:** None to date **Response:** N/A, as no comments were received.
4	HS Lourens	Ventersville Kaalspruit	0846252557 Hester.lourens@yahoo.com	**Comment:** None to date **Response:** N/A, as no comments were received.
5	JHM Lourens Sr	Langverwacht Paradys	0836236638 Hester.lourens@yahoo.com	**Comment:** None to date **Response:** N/A, as no comments were received.
6	HW Lourens	Langverwacht Paradys	0832975882 Hester.lourens@yahoo.com	**Comment:** None to date **Response:** N/A, as no comments were received.

7	E Labuschagne	Plot 4 Paradys	0835742833 Elabuschagne@justice.gov.za	**Comment:** None to date **Response:** N/A, as no comments were received.
8	D Labuschagne	Plot 4 Paradys	0767448934 Elabuschagne@justice.gov.za	**Comment:** None to date **Response:** N/A, as no comments were received.
9	Ina de Wet	Plot 5 Paradys	0845106305 Elabuschagne@justice.gov.za	**Comment:** None to date **Response:** N/A, as no comments were received.
10	Willie de Wet	Plot 5 Paradys	0826922333 Elabuschagne@justice.gov.za	**Comment:** None to date **Response:** N/A, as no comments were received.
11	Leon Richter	Nooitgedacht Bloemfontein	0824107530 rutlandbdy@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
12	A Botha	Nooitgedacht Bloemfontein	0824154917 anmelizebt@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
13	Konet van Willing	Onze Rust Plaas 15	0780190531 koppieskraalveiligheid@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
14	J Barnard	Paradys Proefplaas	0826992235 barnardj@ufs.ac.za	**Comment:** None to date **Response:** N/A, as no comments were received.
15	E Barnard	Paradys Proefplaas	elzaanlynch@icloud.com	**Comment:** None to date **Response:** N/A, as no comments were received.
16	Q van Willing	Onze Rust	0728784836 koppieskraalve	**Comment:** None to date

			iligheid@gmail.com	**Response:** N/A, as no comments were received.
17	AS von Gericke	Mearsgeluk	0824942262 straussvg@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
18	Jeanette	Mearsgeluk	0833253343 jvangericke@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
19	GR Lombaard	Mearsgeluk	0823942856 jvangericke@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
20	E Labuschagne	Marlien Onze Rust	0824000619 lappies@iterele.co.za	**Comment:** None to date **Response:** N/A, as no comments were received.
21	L Labuschagne	The Meadows	0828693334 nanrass@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
22	LS Labuschagne	The Meadows	0827886699 leonlab@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
23	G Kruger	Ventersville	0825610929 Irrigation.gertkruger@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received..
24	MC Kruger	Ventersville	0825610929 Mgjkruger@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
25	CJ Loots	Onze Rust	0827893750 cjloots@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were

				received.
26	IP van Greunen	Onze Rust	0827893750 cjloots@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
27	M van Rooyen	Blydskap 504	0781094656 Madace01@hotmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
28	A van Rooyen	Blydskap 504	0731505466 Madace01@hotmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
29	HJ Badenhorst	Rietspruit 2251	0832276387 henniebad@mweb.co.za	**Comment:** None to date **Response:** N/A, as no comments were received.
30	F Badenhorst	Rietspruit 2251	0832276392 henniebad@mweb.co.za	**Comment:** None to date **Response:** N/A, as no comments were received.
31	W Mackenzie	Brakspruit	0832932911 winett@willowbend.co.za	**Comment:** None to date **Response:** N/A, as no comments were received.
32	A Gravett	Brakspruit	0835902888 Antongravett13@gmail.com	**Comment:** None to date **Response:** N/A, as no comments were received.
33	W Mackenzie	Brakspruit	0788036703 winett@yahoo.com	**Comment:** None to date **Response:** N/A, as no comments were received.
34	JP van Tonder	Welgevonden	0839737731 vtondejp@eskom.co.za	**Comment:** None to date **Response:** N/A, as no comments were received.
3	Councillor,	7 Borkenhagen	0824147491	**Comment:** None to date

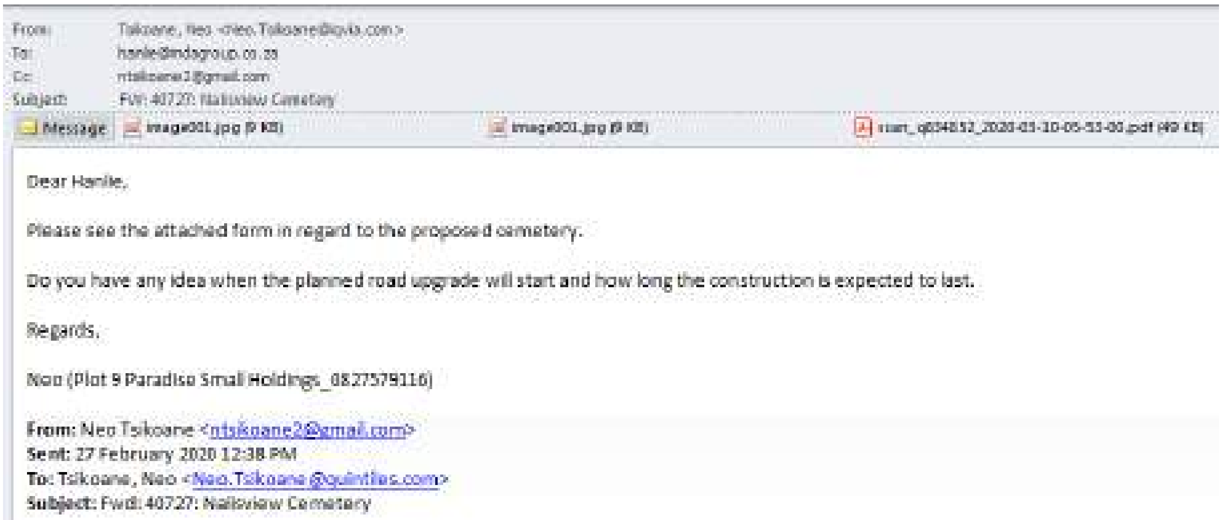
5	Ward 44: Dave Mc Kay	Crescent Westdene Bloemfontein 9300	macdesigns@worldonline.co.za PO Box 12565 Brandhof 9324	**Response:** N/A, as no comments were received.

APPENDIX 4

List of comments received

IAPS REGISTERED AS PART OF THE 2020 PPP PROCESS (NOTE: PARTIES THAT REGISTERED IN 2017 WAS NOTIFIED THAT THEY ARE STILL REGISTERED AS IAPS FOR THE PROJECT)

NR	IAP	ADDRESS	CELL NUMBER	E-MAIL	POSTAL ADDRESS
1	N TSIKOANE *Registered in 2017 as well	PLOT 9 PARADYS SMALL HOLDINGS	0827579116	NTSIKOANE2@GMAIL.COM	P.O. box 1630 Ladybrand



From: Tsikoane, Neo <Neo.Tsikoane@iqvia.com>
To: hanlie@mdagroup.co.za
Cc: ntsikoane2@gmail.com
Subject: FW: 40727: Nalisview Cemetery

Dear Hanlie,

Please see the attached form in regard to the proposed cemetery.

Do you have any idea when the planned road upgrade will start and how long the construction is expected to last.

Regards,

Neo (Plot 9 Paradise Small Holdings_0827579116)

From: Neo Tsikoane <ntsikoane2@gmail.com>
Sent: 27 February 2020 12:38 PM
To: Tsikoane, Neo <Neo.Tsikoane@quintiles.com>
Subject: Fwd: 40727: Nalisview Cemetery

mda Town & Regional Planners, Environmental & Development Consultants
Makedsa Development Associates trading as MDA, CC 1995/030752/23

PO Box 100982 Brandhof 9324
Tel: 051 447 1583
Fax: 051 448 9839
e-mail: admin@mdagroup.co.za
8 Barnes Street, Westdene
BLOEMFONTEIN

Proposed expansion of an existing Nallsview Cemetery as well as the proposed construction of an access route to the above mentioned cemetery

Name and Surname	KULEILE & NEO THEKISO
Interest in the project (ex. Adjacent landowner, authority, etc.)	ADJACENT
Contact details	**Tel:** 0834534250 / 0827579116
	E-mail: KULEILET@GMAIL.COM / NTSIKOANEZ@GMAIL.COM
	Fax:
	Physical address: PLOT 9, PARADISE SMALL HOLDINGS BLOEMFONTEIN
	Postal address: P.O. BOX 1630 LADYBRAND
Comment or any concerns:	
Signature and date	N. Tsikoane 09 Mar 2020 9/03/2020

ANNEXURE 5

Response to comments received

Hanlie Stander

From:	Hanlie Stander <hanlie@mdagroup.co.za>
Sent:	28 May 2020 01:44 PM
To:	'Tsikoane, Neo'
Cc:	'ntsikoane2@gmail.com'
Subject:	40727: Nalisview Cemetery

Neo,

With reference to your e-mail below, the following:

1. The proposed construction activities will commence as soon as all the required approvals (from DESTEA, MMM) is obtained.
2. The process may take another 18 months.
3. However, this depends on the available budget that may be sourced from grants as well as the possibility that the Covid19 Pandemic may add severe pressure to an otherwise already pressured availability of graves due to the space restrictions at SuidPark.
4. With the above in mind, the construction of the said road may be prioritised.
5. The general construction activities will take approximately 18 months to complete.
6. The municipality already started with the construction of internal roads & fencing at the cemetery. All construction activities ceased and will continue after the necessary approvals are obtained.
7. Graves will be constructed throughout the operational phase of the said project.

We trust that you will find the above in order.

Please do not hesitate to contact us should you require additional information on the said project.

Kind regards,

Hanlie Stander

Environmental Assessment Practitioner for MDA

mda
Town & Regional Planners,
Environmental & Development
Consultants

9 Barnes Street | Westdene | Bloemfontein | 9301
P.O. Box 100982 | Brandhof | 9324
Tel: 051 447 1583 | Fax: 051 448 9839

Appendix H_3:
Project Motivation

PROJECT MOTIVATION

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060 Bloemfontein, Free State Province

Proponent:	Mangaung Metropolitan Municipality
MDA Ref No:	40727
Date:	April 2020

---

mda

Town & Regional Planners,
Environmental & Development
Consultants

Physical Address: 9 Barnes Street,
Westdene, Bloemfontein, 9301
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Brandhof, 9324
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ACTIVITY MOTIVATION

The motivation and explanation of the need and desirability of the activity, including the demand for the activity, is summarised below.

Nr	Aspect to consider	Yes / No	Description
1.	Is the activity permitted in terms of the property's existing land use rights?	NO	An application for subdivision and rezoning in terms of the Township Establishment in terms of SPLUMA as well as the municipal land use management scheme was also submitted as part of this project.
2.	Will the activity be in line with the following?		
2.1.	Provincial Spatial Development Framework (PSDF)	YES	The proposed project is a project by MMM and is required in order to improve service delivery to the area. The proposed project is in line with the Provincial Spatial Development Plans.
2.2.	Urban edge / Edge of Built environment for the area	YES	The project entails the expansion of an approved cemetery.
2.3.	Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).	YES	The proposed project is in line with the vision of MMM (IDP and SDF), as it is a project by MMM.
2.4.	Approved Structure Plan of the Municipality	YES	The proposed project is in line with the vision of MMM, as it is a project by MMM.

Nr	Aspect to consider	Yes / No	Description
2.5.	An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES	The proposed project will not compromise the integrity of the existing environmental management priorities for the area, should the contractors adhere to the conditions stipulated in this report, additional specifications to be provided, the EMPr as well as best practices. Specific measures to be implemented will include, but not limited to: - Stormwater measures - Erosion control - Limiting the removal of vegetation - Limiting the formation of dust - Monitoring groundwater and surface water for possible contamination thereof due to operational activities at the cemetery - Etc. Refer to the EMPr for more information on measures to be implemented. Note that the project is a MMM initiative and therefore the proposed project will be in line with the integrity of the existing environmental management priorities for the area.
2.6.	Any other Plans (e.g. Guide Plan)	N/A	N/A
3.	Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed	NO	An application for subdivision and rezoning in terms of the Township Establishment in terms of SPLUMA as well as the municipal land use management scheme was also submitted as part of this project. Note that the area is already included in the SDF.

Nr	Aspect to consider	Yes / No	Description
	development in line with the projects and programmes identified as priorities within the credible IDP)?		
4.	How does the project fit into the National Development Plan for 2030?	Please Explain	The proposed project will provide the much needed burial sites during the operational phase thereof. This will have a positive impact on the socio-economics of the area.
5.	Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level (e.g. development is a national priority, but within a specific local context it could be inappropriate.)	YES	Cemeteries in the nearby area are almost reached their capacity, therefore reaching its capacity. The existing facilities, including the proposed new cemetery on Portion 5 of the farm Nalisview 2835 is inadequate for the need of the community, especially when the population growth in the area is taken into account. Therefore, the expansion of the cemetery is required to meet the needs of the community. The portion of land identified for the expansion of the proposed cemetery (including the provision of running water, sanitation facilities, internal roads as well as security fencing) will provide new burial sites in close proximity to the people it will be serving.
6.	Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?	NO	**Electricity:** Portion 5 has an existing 50kVA 22/0.38kV connection supplied by ESKOM. The Remainder of the said farm does not have electrical connections. The estimated maximum demand required is 150kVA. It is intended to utilize a 3.3kV reticulation system with up and down step transformer to supply power to the various phases. Sufficient power will be distributed for the buildings and parking area for lighting, as well as for lighting purposes of the main arterial routes and medium mast lighting on all traffic circles. The ablution facilities

Nr	Aspect to consider	Yes / No	Description
			will either be supplied from the lighting electrical networks or a solar installation. The proposed lighting will be energy efficient with LED lamps. **Stormwater:** No existing stormwater infrastructure exists on site. Due to the extremely flat terrain, the Stormwater will be accommodated for next to the roads. The roads vertical alignment, minimum gradient requirement, governs the final road levels and the roads will be designed to allow for maximum drainage off of the block paving roads as quickly as possible. To allow for the minimum gradient requirements, the roads will be constructed higher than that of the surrounding natural ground levels. Stormwater surface runoff will be accommodated for next to the road with dedicated thoroughfare drainage structures where possible. Retention ponds may also be implemented, where required. Parking areas can also be designed to act as stormwater retention areas if required. NOTE: No water will be directed to the existing wetland on site. **Drinking water:** No municipal water supply is currently servicing the Farm. Existing boreholes will be tested for water quality and yield. Additional boreholes will be constructed if necessary. Should the borehole yield be insufficient or the water quality not be adequate for human consumption, a water tank will transport municipal water from Bloemfontein to the site on a regular basis until a water supply pipeline is constructed.

Nr	Aspect to consider	Yes / No	Description
			Sewer: Neither the remainder of the farm Nalisview 2835 nor Portion 1 of the farm Nalisview 1060 has any existing sewer reticulation or sewer services. No sewer reticulation or sewer services are available near the development area. Currently the farm house at the remainder of the farm Nalisview 2835 (future admin building) is serviced by a septic tank. However the farm house was severely vandalized and will not be utilized as originally intended. It is proposed that all domestic sewage / water from the basins may be disposed of in septic tanks. Sewage will be controlled and collected within a conservancy tank system and be cleaned on a regular basis (weekly, depending on usage/capacity). **Roads:** An existing road is currently used to gain access to the site. The internal roads of the cemetery will be paved in certain areas where high traffic volumes will be present and smaller dirt roads will be constructed between blocks (less traffic anticipated in these sections). Ample parking will be allowed for, with parking bays. The following activities will be undertaken to ensure safe entrance to the cemetery: • A slip-off will be constructed on the N6. • The proposed slip lane when approaching from Bloemfontein into the T102 is 120m in length, and the second slip lane out of T102 onto the n6 towards Reddersburg is 60m in length. • The width of the slip-off is an average 4.2m. • All activities associated with the n6 as well as the T102 will be undertaken

Nr	Aspect to consider	Yes / No	Description
			within the existing road servitudes. • No widening of the T102 will be undertaken. It will however receive either asphalt and / or paving. With the above in mind, the upgrading of the N6 as well as the T102 will not require environmental authorisation as no listed activities are triggered, should be above be adhered to.

Nr	Aspect to consider	Yes / No	Description
7.	Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?	YES	The applicant for the proposed of the cemetery is MMM itself. The proposed project is provided for in the infrastructure planning of the said municipality.
8.	Is this project part of a national programme to address an issue of national concern or importance?	YES	The provision of basic services is part of a national programme. The proposed project entails the expansion of a cemetery in order to deliver on the MMM mandate to deliver basic services to the residents.
9.	Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)	YES	The proposed project entails the expansion of a cemetery. Approval was received from DESTEA to construct a cemetery on Nalisview 5/2835 (adjacent to the proposed project). Therefore, location factors favour the proposed land use.
10.	Is the development the best practicable environmental option for this land/site?	YES	The site is currently zoned as agriculture. However, no formal agricultural activities take place on the areas to be developed (site is used for communal grazing and are consequently subjected to heavy overgrazing). As the proposed project

Nr	Aspect to consider	Yes / No	Description
			entails the expansion of a cemetery, it is clear that a site adjacent to the proposed construction site will already be utilised as a cemetery. In addition, the ecologist examined the site and indicated that the vegetation on the portion of land associated with the proposed project is heavily degraded and climax species are largely absent. Exotic weeds are common and also indicative of the degraded condition of the grassland. As an alternative, a new cemetery can be constructed at another site. However, this option may be costly (financially, agriculturally as well as environmentally) as: • A new portion of land will have to be bought by the Municipality (note that the property under assessment is owned by the applicant) • It is possible that the new site will be used for formal agricultural purposes and therefore a loss of active agricultural land will be expected. As the proposed site is in a degraded state (see the ecological report), the site is suitable for the proposed project.

Nr	Aspect to consider	Yes / No	Description
11.	Will the benefits of the proposed land use/development outweigh the negative impacts of it?	YES	Negative impacts: • Previous disturbed areas, as well as area currently utilised for communal agricultural activities will be disturbed during the construction phase • Erosion may occur during the construction phase • Formation of dust may take place during the construction phase Positive impacts: • The proposed project is considered essential to enable the municipality to provide basic services to residents in the area • This in turn will have a positive impact on the social, economic as well as environmental impacts of the area The negative impacts expected during the construction phase of the proposed project can be minimised through the recommended mitigation measures as stipulated in this report, the EMPr as well as best practices.
12.	Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?	YES	It is suggested that future cemetery projects would also consider the expansion of existing cemeteries where possible, rather than the construction of new cemeteries as this will limit the impact on the environment and will be less costly than the construction of a new cemeteries and associated infrastructure. The proposed project may result in the development of further cemeteries / expansion of the proposed project in this area over the long term. This precedent is not necessarily negative or undesirable.

Nr	Aspect to consider	Yes / No	Description
13.	Will any person's rights be negatively affected by the proposed activity/ies?	NO	Community members will be positively affected as the proposed project will enable the municipality with the opportunity to provide basic cemetery services to the area. Although a portion of the area to be incorporated into a cemetery are currently used as communal agricultural land by local community members (as feeding grounds for their livestock), the property belongs to the applicant (MMM). The cemetery will be fenced off and therefore the proposed activities will not have a noteworthy negative effect on the community members that utilise the open veld for livestock farming activities.
14.	Will the proposed activity/ies compromise the "urban edge" as defined by the local municipality?	NO	It is not anticipated that the proposed activity itself will have an effect on the 'urban edge'.
15.	Will the proposed activity/ies contribute to any of the 17 Strategic Integrated Projects (SIPS)?	YES	The proposed project contributes to SIPS 6: Integrated Municipal Infrastructure Project.
16.	What will the benefits be to society in general and to the local communities?	Please Explain	The proposed development of a cemetery will provide new burial sites for the society in general. • Employment opportunities during the construction phase. • Employment opportunities during the operational phase. The availability of adequate burial sites for members from the local community.
17.	Any other need	Please	The site contains a large depression or pan

Nr	Aspect to consider	Yes / No	Description
	and desirability considerations related to the proposed activity?	Explain	in the centre/western portion of the site. The pan functions in the form of groundwater recharge. It therefore still performs an important ecosystem function although highly degraded. It will also be unfeasible to include the pan within the cemetery layout as graves will be subjected to annual flooding. The condition of the pan can be improved and it can be incorporated into the layout to improve the aesthetic feel of the cemetery. A need therefore exists to exclude the pan as well as a 15 m buffer around the pan from the cemetery layout and rather incorporate the pan as part of the aesthetic feel of the cemetery.

18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been taken into account.

Section 23 of NEMA (Act 107, 27 November 1998) reads as follows:

‘23.

(1) The purpose of this Chapter is to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities,

(2) The general objective of integrated environmental management is to -

(a) promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment:

(b) identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimizing negative impacts, maximizing benefits and promoting compliance with the principles of environmental management set out in section 2;

(c) ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;

(d) ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;
(e) ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and
(f) identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 2.

(3) The Director-General must coordinate the activities of organs of state referred to in section 24(1) and assist them in giving effect to the objectives of this section and such assistance may include training, the publication of manuals and guidelines and the co-ordination of procedures.'

With the above in mind, the following objectives were taken into consideration:

1. An application for environmental authorisation was submitted to DESTEA
2. Integration of various principles of environmental management were implemented in order to make decisions regarding the significant effect of the proposed project on the environment

Identified, predicted and evaluated the actual potential impact of the proposed project on the environment, the socio-economic conditions and heritage, as well as the consequences and alternatives and options for mitigation of activities. This was done to minimize the possible negative impacts on the environment and maximizing benefits to mankind.

3. Taken the effects of activities on the environment into consideration before actions are to be taken in connection with them.
4. A public participation process was followed.
5. Considered the environmental attributes in management and decision-making with reference to the environment.
6. Mitigation and management activities best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management were investigated.
7. The report follows the laws to identify, predict and evaluate the actual and potential impacts associated with the development.
8. Specialists investigated the site to determine baseline and to predict the impacts associated with the proposed project. The preferred alternative has been identified as the one that will have the least negative impact on the environment, as sensitive areas will be avoided as far as possible. In addition, already disturbed areas will be utilized as far as possible.

9. A public participation process was followed. Consideration of the 2014 EIA Regulations has been applied in this regards.
10. An EMPr is included, with mitigation measures that should be implemented during the planning, construction, operation and possible decommissioning of the proposed project. These mitigation measures are in line with the environmental requirements and Best Practise Principles.
11. Relevant guidelines and procedures were used to produce this document. Therefore, relevant information is reflected, for sufficient co-governance to be implemented.
12. The proposed project provides for the needs of the applicant while ensure compliance with environmental management principles.

19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been taken into account.

Section 2 of NEMA (Act 107, 27 November 1998) reads as follows:

(1) The principles set out in this section apply throughout the Republic to the actions of all organs of state that may significantly affect the environment and—

(a) shall apply alongside all other appropriate and relevant considerations, including the State's responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;
(b) serve as the general framework within which environmental management and implementation plans must be formulated:
(c) serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;
(d) serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and
(e) guide the interpretation, administration and implementation of this Act, and any other law concerned with the protection or management of the environment.

(2) Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.

(3) Development must be socially, environmentally and economically sustainable.

(4) *(a)* Sustainable development requires the consideration of all relevant factors including the following:

- (i) That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied:
- (ii) into account the limits of current knowledge about the consequences of decisions and actions; and
- (iii) that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.
- (iv) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- (v) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- (vi) that waste is avoided. or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- (vii) that the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;
- (viii) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;

(IX) that a risk-averse and cautious approach is applied,

(4) (b) Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option.

(4) (c) Environmental justice must be pursued so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.

(4) (d) Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being must be pursued and special measures may be taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination.

(4) (e) Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.

(4) (f) The participation of all interested and affected parties in environmental governance must be promoted, and all people must have the opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, and participation by vulnerable and disadvantaged persons must be ensured.

(4) (g) Decisions must take into account the interest, needs and values of all the interested and affected parties, and this includes recognizing all forms of knowledge, including traditional and ordinary knowledge.

(4) (h) Community wellbeing and empowerment must be promoted through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means.

(4) (i) The social, economic and environmental impacts of activities, including disadvantages and benefits must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration and assessment.

(4) j) The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.

(4) (k) Decisions must be taken in an open and transparent manner, and access to information must be provided in accordance with the law.

(4) (l) There must be intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment.

(4) (m) Actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.

(4) (n) Global and international responsibilities relating to the environment must be discharged in the national interest.

(4) (o) The environment is held in public trust for the people. The beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.

(4) (p) The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.

(4) (q) The vital role of women and youth in environment management and development must be recognised and their full participation therein must be promoted.

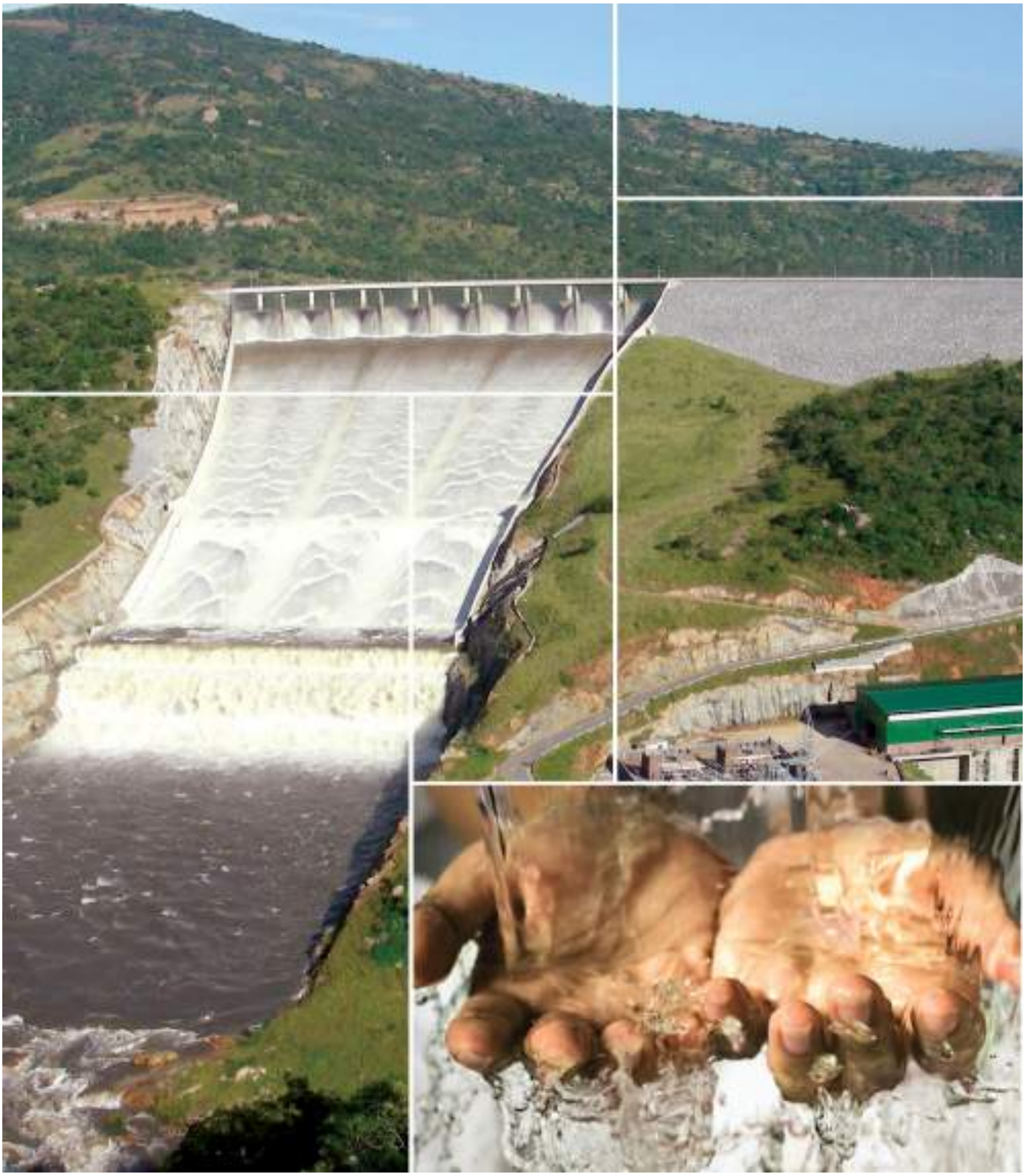
(4) (r) Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure.

The applicant of the proposed project took the following into consideration:

1. That the disturbance of ecosystems and loss of biological diversity are minimised and remedied by implementing the mitigation measures in this document, the EMPr as well as best practices.
2. Environmental management must be integrated
3. Adverse environmental impacts (if any) shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons.
4. The participation of all interested and affected parties in environmental governance must be promoted by means of the public participation process that forms part of the basic assessment process.
5. Community wellbeing and empowerment must be promoted by providing employment opportunities during the construction as well as operational phase.
6. The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers will be respected and protected.

Appendix H_4:

Specialist Reports



APPLICATION FOR THE AMENDMENT OF THE BLOEMFONTEIN TOWN PLANNING SCHEME

PROPOSED DEVELOPMENT OF THE NEW MANGAUNG CEMETERY AND THE AMENDMENT OF THE RESTRICTIVE CONDITIONS IN THE TITLE DEED, PORTION 6 OF PARADYS 2832, PORTION 5 AND REMAINDER OF NALISVIEW 2835.
(Bloemfontein, Free State)

MANGAUNG METRO MUNICIPALITY

20 May 2020
Revision: 1
Reference: 112385

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Document control record

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Document control

Report title		PROPOSED DEVELOPMENT OF THE NEW MANGAUNG CEMETERY AND THE AMENDMENT OF THE RESTRICTIVE CONDITIONS IN THE TITLE DEED, PORTION 6 OF PARADYS 2832, PORTION 5 AND REMAINDER OF NALISVIEW 2835. (Bloemfontein, Free State)				
Document ID			**Project number**		112385	
Client		MANGAUNG METRO MUNICIPALITY	**Client contact**			
Rev	**Date**	**Revision details/status**	**Prepared by**	**Author**	**Verifier**	**Approver**
0	20 October 2016	Draft	EP. Horn	EP. Horn	W. Barnard	J. Vermaak
1	20 May 2020	Water and sanitation phasing	H Meyer	H Meyer	EP. Horn	S. Buthelezi
		Revised access to site	H Meyer	H Meyer	D Jacobs	D Jacobs
		Electrical phasing	L Solundwana	L Solundwana	C Johnson	C Johnson
Current revision		**1**				

Approval

Author signature		Approver signature	
Name	H. Meyer	Name	S. Buthelezi
Title	Civil Engineer	Title	Technical Director

APPLICATION FOR THE AMENDMENT OF THE BLOEMFONTEIN TOWN PLANNING SCHEME

Date 20 May 2020
Reference 112385
Revision 1

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Contents

Tables

1 Introduction

1.1 Background

Aurecon was appointed by the Mangaung Metro Municipality to design the services for the new Mangaung Nalisview Cemetery. The new Mangaung Nalisview Cemetery will be situated to the south of Bloemfontein on the N6 (National road) towards Reddersburg. The project entails the design and construction of all civil services (Roads, water supply, sewerage reticulations etc.) and buildings (ablution facilities and Chapel) for the new proposed Cemetery. Part of the project entails the compilation of a civil services report to provide more details on the existing and proposed services in the area and to allow for the amendment of the restrictive conditions in the title deed of the proposed erven/farms. This report will focus on the existing and proposed services for the new proposed Cemetery.

The project will be implemented in phases, with phase 1 being implemented as soon as possible. Phase 2 up to phase 5 will then follow as budget becomes available. This will ensure that the initial implication of phase 1 as well as the implication of the entire project will be assessed.

A revised report was compiled to incorporate the changes made to the access into the Cemetery. The proposed access into the site was not approved from a traffic safety accepted. An alternative access was proposed and will be discussed within the sections to follow.

1.2 Property Locality Plan

The property is situated next to the N6 (National Road) between the city of Bloemfontein and the town of Reddersburg, to the South of Bloemfontein, in the Free State Province.

Please refer to the attached locality plan below:

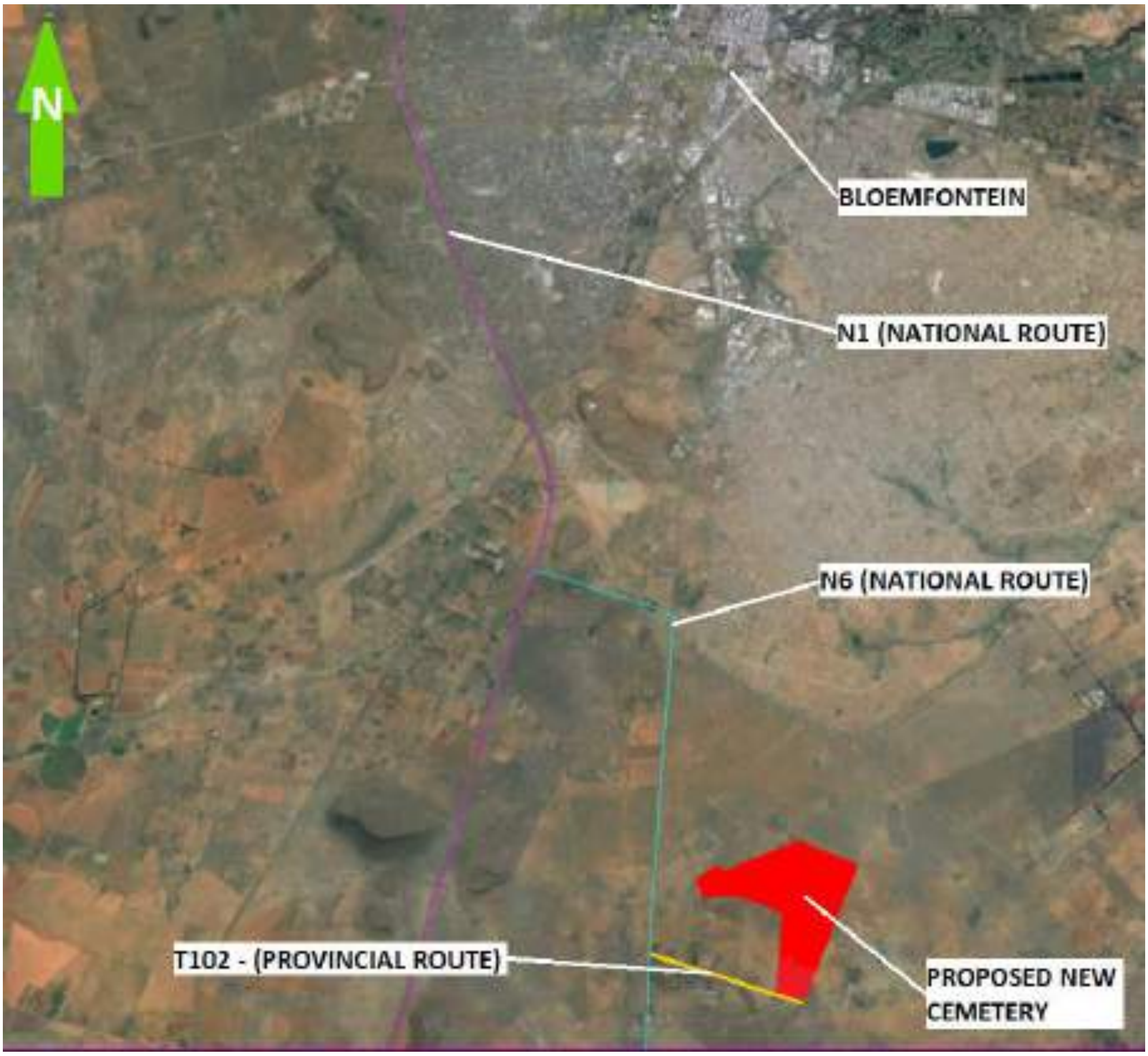

Image 1: Locality plan of proposed development

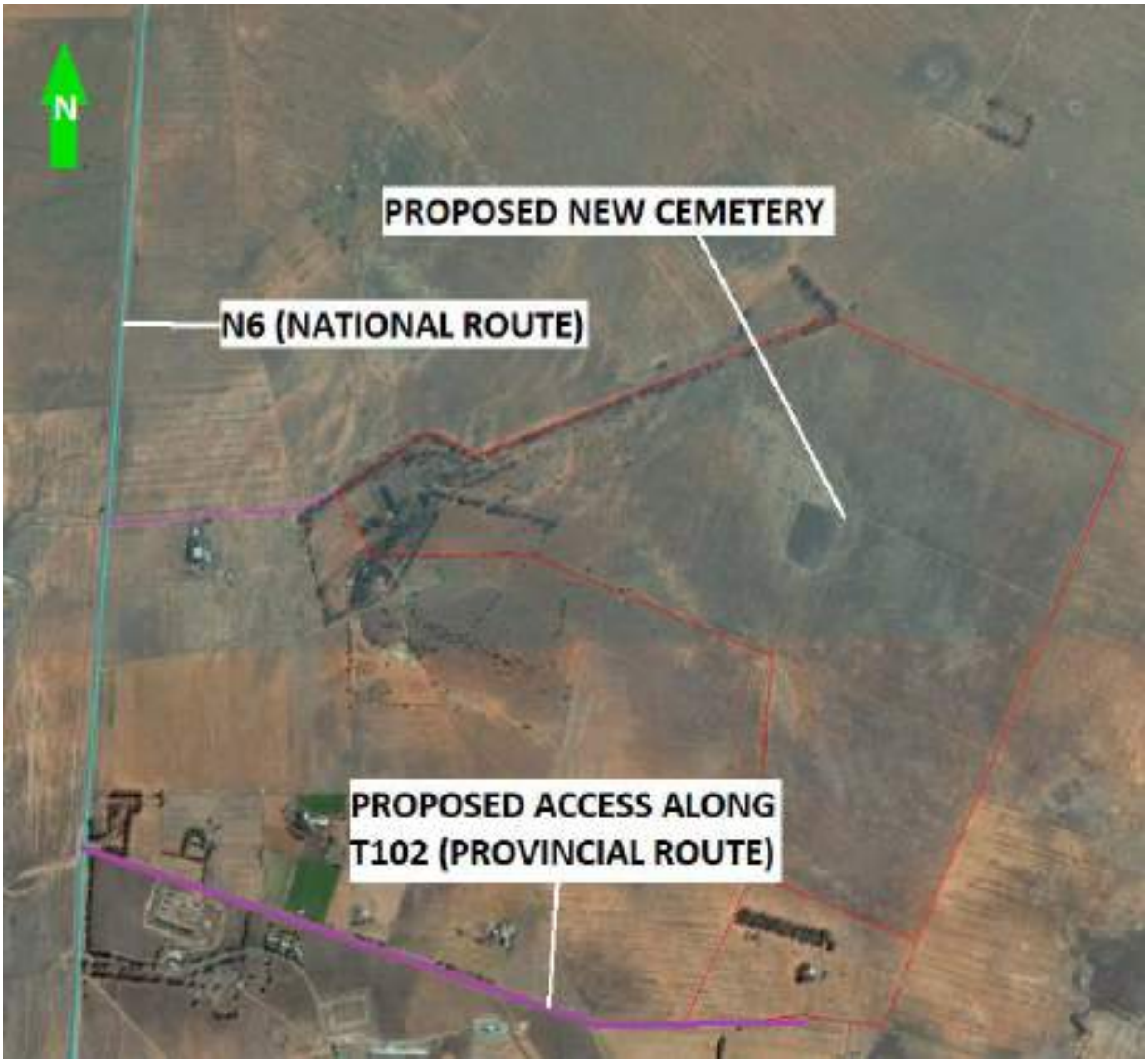

Image 2: Locality plan of proposed development

1.3 Services Investigated

Aurecon investigated the influence of the proposed development on the water supply, sanitation, roads and storm water in the proposed new Cemetery development. The new Mangaung Nalisview Cemetery will be a green field's project and is also located approximately 4km's out of town. This means that no existing infrastructure exists in the area. Due to the above mentioned, this services report will deal mainly with the proposed services for the new Mangaung Nalisview Cemetery and how these services will be implemented to ensure the restrictive conditions for the erven can be amended.

Due to the comments received from the various road authorities, the proposed access into the Cemetery has moved further south along the N6 national route. Access will be gained from the N6 national route, via the T102 provincial route, into the site.

2 Water Supply

2.1 Design Standard

The design standards used are according to the *"Guidelines for Human Settlement Planning and Design"* (the "Redbook").

2.2 Water Demand

To estimate the water consumption of the proposed development, the following was taken into consideration:

- A peak factor of 4.0, Table 9.15: peak factors for developing areas
- Buildings can be classified as government and municipal (Table 9.14- "Redbook")
- Chapel can be classified as a Church (Table 9.14- "Redbook")

Assumption:

- Demand was calculated over a period of 8 hours as funerals will not be held during the evening
- No peak factor applicable on standpipes
- For the stand pipes a probability factor of 20% is assumed, meaning that it is assumed that 20% of the standpipes will be open at one time (5no of standpipes).

2.2.1 Phased Demand Calculations

Table 1 Water demand for phase 1 only

No	Description	Extent: Area (m^2)	Daily Demand (ℓ/day)	Peak Flow (ℓ/day)	Duration (hr/day)	Peak Demand (ℓ/s)
1	Chapel	5 no	2000	10000	8	0.35
2	Office	590	400 ℓ /100m²	2360	8	0.082
3	Guard house and ablution facilities	50 x 7no	400 ℓ /100m²	1400	8	0.049
4	Lapa	250 x 2no	400 ℓ /100m²	2000	8	0.069
5	Standpipes	5no	5760	28800	8 (0.2 probability)	0.2
TOTAL:						**0.75**

Table 2 Water demand for phase 2 to phase 5

No	Description	Extent: Area (m^2)	Daily Demand (ℓ/day)	Peak Flow (ℓ/day)	Duration (hr/day)	Peak Demand (ℓ/s)
1	Ablution facilities	50 x 10no	400 ℓ /100m²	2000	8	0.07
TOTAL:						**0.07**

The total average water demand for the development of phase 1 is 21 600 ℓ/day (21.6 Kℓ/day) with a daily peak demand of 86 400 ℓ/day (86.4 Kℓ/day). According to the above calculations a peak demand of 3.0 ℓ/s can be determined. This peak demand does not include fire water which will be discussed later in the report.

The total average water demand for the development of phase 1 to phase 5 (total development) is 23 616 ℓ/day (23.6 Kℓ/day) with a daily peak demand of 94 464 ℓ/day (94.5 Kℓ/day). According to the above calculations a peak demand of 3.28 ℓ/s can be determined. This peak demand does not include fire water which will be discussed later in the report.

2.3 Existing and Proposed Reticulation

There is currently no municipal water supply servicing the erven where the proposed new Mangaung Nalisview Cemetery will be constructed. Currently the farm of Nalisview (where the cemetery will be constructed) is serviced by means of boreholes. It is proposed that these boreholes be tested for water quality and yield. If found that these boreholes are not sufficient to supply the water demand as calculated in section 2.2 water demand, additional boreholes will have to be investigated and equipped. This can however only be determined after the testing of the existing boreholes has been done.

It is proposed that the water from the existing and proposed new boreholes (if required) be reticulated to a central elevated storage tank (Panel type Abeco or similar approved), from this elevated storage tank water will reticulate by means of a proposed 75mm Ø u-PVC ring feed to the different area's and serve the ablution blocks, a Chapel, guardhouse and caretakers offices. This existing farm house was badly vandalized and cannot be utilized as originally intended. Each of these buildings will also be supplied with a standpipe for general water use. Water will be reticulated from the ring feed to the buildings by means of HDPE pipes.

For Phase 1 a portion of the ring feed will be constructed after which the rest of the ring feed can either be phased in according to the need and available budget, or be constructed during the construction of Phase 3 or Phase 4.

Due to the remote location and size of the proposed development it is proposed that leak detection be implemented on the water network. The leak detection will ensure that leakage is minimized. It is very important to monitor leakage since water is obtained from boreholes. The leakage detection will automatically shut off the water network once a leak is detected.

According to the Mangaung Municipal standards a minimum water pressure of 24m (2.4 bar) is required. The implementation of a 25m elevated storage tank will ensure that this minimum water pressure is supplied. The final elevation level of the proposed tank will be finalised during the detail design stage to accommodate any secondly losses within the network.

The use of HDPE pipes for the reticulation network and ring feed can also be investigated during the prelim and detail design stages to introduce cost savings.

2.4 Boreholes yield and water quality assessment

The required assessment and detailed investigation was undertaken into the yield and quality of the existing boreholes located on site. The findings of these investigations indicated that the two existing boreholes are inaccessible due to blockage within the borehole shaft.

A third borehole was drilled with yield and quality testing undertaken on this borehole. The findings on the water quality indicates that the water is safe for human consumption. It is recommended that regular tests be done on the water quality, with the addition of chlorination should it be found that high levels of E. Coli and total coliforms are present.

The yield testing indicates that an average yield of 4500 l/hr (1.25l/s) can be delivered from the borehole. This yield was achieved for tests that were done every half an hour for a period of 3 hours (6 tests). The report however suggests that a total/maximum of 0.78l/s be abstracted from the borehole.

Based on the findings and recommendations of the borehole yield report, the single borehole cannot meet the demand of 3.68l/s as discussed above. It is proposed to locate alternative sites within the proposed development for four additional boreholes. These additional boreholes could increase the existing 0.78l/s yield to a possible 3.90l/s (5 x yield). Further investigations are needed into whether the yield of 0.78l/s will be constant throughout the site and other boreholes.

2.5 Firefighting Requirements

Due to the development being in a rural area with no significant structures in the near vicinity and a low fire risk being assumed, a proper consultation session with the fire department of the Mangaung Metro Municipality is proposed. During this session all the fire department's requirements can be discussed. This will include fire water demand, spacing and positioning of fire hydrants (if required), water pressure/head required at fire hydrants and retention time for fire water in the central elevated storage tank. Aurecon however only proposes firefighting in the Chapel areas.

Due to the type and location of the development a fire risk category cannot be specified using *"Guidelines for Human Settlement Planning and Design"* (the "Redbook"). It is therefore proposed that a consultation meeting be held with the fire department of the Mangaung Metro Municipality as mentioned above.

It is anticipated that the proposed water supply, through on-site boreholes, will not be adequate should the department indicate the need to supply firefighting water as well. Alternative and additional water supply sources will have to be identified and discussed.

3 Sewerage

3.1 Estimated Flow

To estimate the sewerage effluent generated by the development the following figures are assumed:

- An additional 15% to allow for rainwater infiltration.
- The sewerage effluent is taken as 80% of the water demand.
- A peak factor of 3.5

Assumption:

- Demand was calculated over a period of 8 hours as funerals will not be held during the evening
- Water from standpipes will not be drained into the sewer system.

3.2 Phase 1 Only Demand Calculations

Table 3 Estimated sewerage flow phase 1 only

No	Description	Water Demand (ℓ/s)	Effluent volume (80% of water demand) (ℓ/s)	Storm water infiltration (ℓ/s)	Average Wet Weather Flow (ℓ/s)	Peak Wet Weather Flow (ℓ/s)
1	Chapel	0.35	0.28	0.042	0.322	1.127
2	Office	0.082	0.0656	0.00984	0.0754	0.264
3	Guard house and ablution facilities	0.049	0.0392	0.00588	0.0451	0.158
4	Lapa	0.069	0.0552	0.00828	0.0635	0.222
TOTAL:		**0.55**	**0.44**	**0.066**	**0.506**	**1.771**

The total average wet weather flow for the phase 1 development is estimated as 0.506 ℓ/sec with a peak wet weather flow of 1.771 ℓ/s.

3.3 Phase 2 to Phase 5 Demand Calculations

Table 4 estimated sewerage flow phase 2 to phase 5

No	Description	Water Demand (ℓ/s)	Effluent volume (80% of water demand) (ℓ/s)	Storm water infiltration (ℓ/s)	Average Wet Weather Flow (ℓ/s)	Peak Wet Weather Flow (ℓ/s)
1	Ablution facilities	0.07	0.056	0.0084	0.064	0.224
TOTAL:		**0.07**	**0.056**	**0.0084**	**0.064**	**0.224**

The total average wet weather flow for the development is estimated as 0.57 ℓ/sec with a peak wet weather flow of 1.995 ℓ/s.

3.4 Existing reticulation

The farm of Nalisview does not have any existing sewer reticulation or sewer services and there are also no services around Nalisview. Currently the farm house (future admin building) is serviced by a septic tank, however the farm house was severely vandalized and will not be utilized as originally intended. The building does not currently form part of the clients plans to the cemetery due to it being vandalised, it will also not be demolished as yet should the client wish to refurbish it and us it in future.

It is proposed that all sewage effluent be collected by separate septic tanks located at each ablution facility, chapel and the general office buildings. A gravitational collection network will be constructed to convey sewage effluent from the various ablution facilities, convey it to a central position where a main conservancy tank will be constructed. The conservancy tank will be maintained and cleaned out on a weekly basis to ensure that no effluent overflows and pollute the underground water source

It is proposed that should the conservancy tank system be implemented; sewage effluent will be transported from the Cemetery conservancy tanks and disposed of at the Bloemspruit Waste water treatment works. The following information is associated with the plant:

Table 5: Contact details for Mangaung Metro Municipality Water and Sanitation department

Description	Explanation
Facility name	Bloemspruit Waste Water Treatment Works
Contact person	General Manager; MMM Water and Sanitation
Postal address	PO Box 3704, Bloemfontein
Postal code	9300
Telephone	051 410 674
Fax	051 410 6771
Contact person	General Manager; L Ntabezo
Postal address	PO Box 3704, Bloemfontein
Postal code	9300
Telephone	051 405 8212
Fax	052 405 8707
Email	Luzuko.ntlabezo@mangaung.co.za
Contact person	General Manager; M Ndlovu
Physical address	Room S213 First Floor

	Lesley Monnanyane Building Regional Office Cnr Moshoeshoe & George Lubbe Streets Rocklands Bloemfontein
Postal code	9300
Telephone	051 410 6605
Cell	082 548 5196
Email	Mlondolozi.Ndlovu@mangaung.co.za

4 Roads and Storm water

4.1 Roads

Currently Nalisview is serviced from the N6 (National Road) via a gravel farm road. It is proposed that the gravel road be upgraded to a dual carriage way paved road to accommodate the increase in traffic volumes. This dual carriage way will be able to service the large amount of traffic generated by the cemetery during operation. Both light vehicles and busses will be utilizing this access road. A proper and safe intersection with the existing N6 (National Road) will have to be implemented. The governing entity of the N6 (National Road) (SANRAL) needs to be consulted to ensure that the intersection complies with all SANRAL's requirements and standards.

SANRAL indicated that the proposed entrance road, into the Nalisview Cemetery, cannot be approved from a traffic safety aspect. It is proposed that access to the proposed Cemetery be obtained from the existing T102 provincial road (refer to image 2). This road will provide access to the southern part of the Nalisview Cemetery.

The internal roads of the cemetery can be defined by dual carriage ways in certain areas where high traffic volumes will be present. Smaller dirt roads will provide access between the carriage ways and the various blocks where lower traffic volumes are anticipated.

Ample space for parking was allowed for with a parking area at the entrance to the cemetery and with parking bays next to the dual carriage ways where busses and other vehicles will be able to park. These parking bays, closer to the different cemetery blocks, will allow for easy access to grave sites.

It is also proposed that a proper TIA (Traffic Impact Assessment) be conducted by a traffic engineer to determine the effect that the increase in traffic will have on the N6 (National Road) as well as the specifications for the intersection with the N6 (National Road). This TIA will have to be revised to reflect the newly proposed access from the N6 national route, via the T102 provincial route, into the southern part of the Cemetery site.

No existing road infrastructure exists on the farm Nalisview expect for small jeep track roads used for farming vehicles.

4.2 Storm water

Currently no existing storm water infrastructure exists on the farm Nalisview. It is proposed that the constructed roads as discussed above, in section 4.1, be used for surface storm water drainage. Depending on the amount of storm water generated by the development retention ponds in certain strategic areas can also be implemented. Parking areas can also be designed to act as storm water retention areas where required

The roads infrastructure that will be constructed should allow for proper storm water drainage of the site.

5 General

5.1 Wetland

A wetland was identified on site. Wetland specialists will be brought on board to determine the extent of the wetland and to ensure that no construction is done within the wetland area or wetland area buffer zone. After the completion of the EIA it can also be determined whether storm water can be diverted to this wetland area to assist with retention of storm water. Proper investigations and licencing (if required) should be adhered to, to ensure that the wetland is properly conserved and protected.

Please refer to the EIA and Wetland Specialist reports should any further information be required.

5.2 Ant Hills

During the site visit vast amounts of ant hills situated all around the site were observed. Provision should be made to remove these ant hills during the earthworks of the project. This will ensure that there are no ant hills in the blocks where grave sites will be located.

6 Electricity

6.1 General

The design standards used are according SANS 10280 *“Code of Practise for Overhead Power Lines for Conditions Prevailing in South Africa”*.

This section covers the electrical services associated to the proposed development. Small power and lighting will be provided for all buildings. The analysis included the following:

- Supply Authorities of the area;
- Existing Electrical Services;
- Load Calculations per Phase;
- Programme.

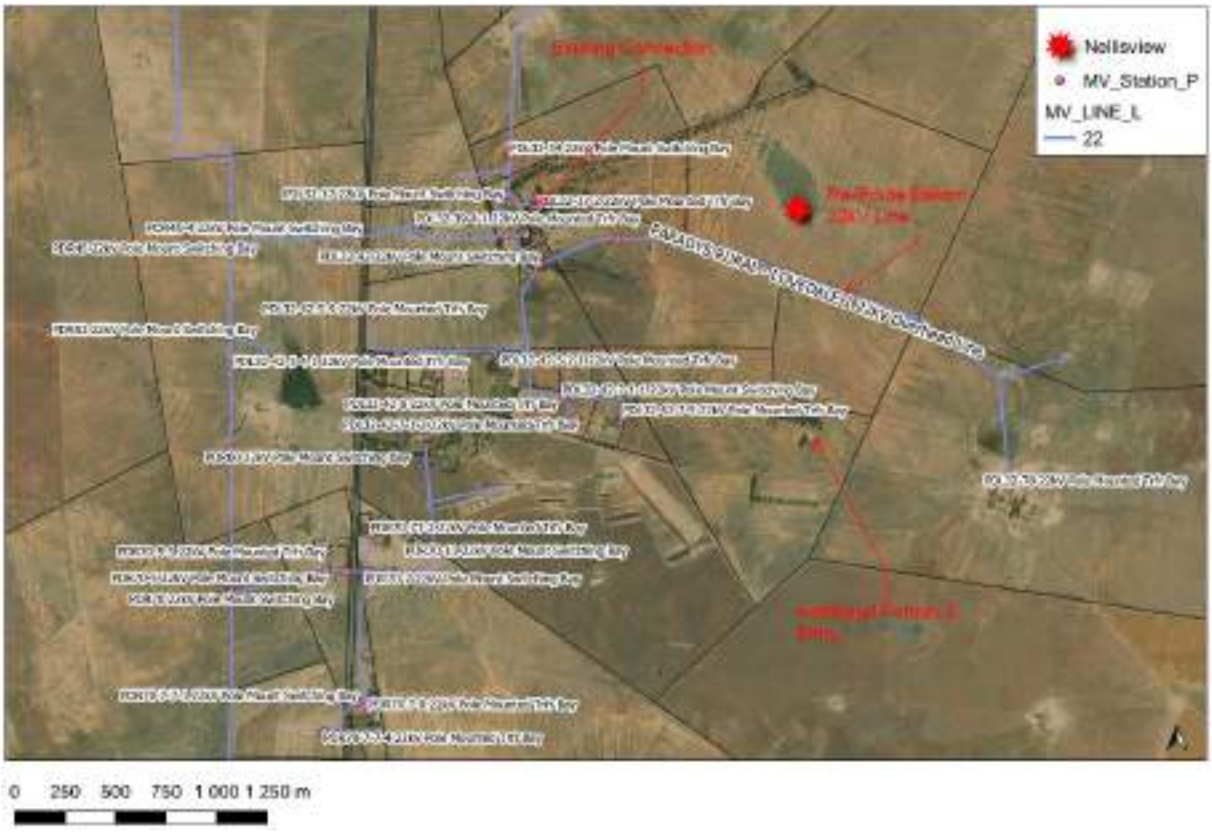

Image 3: Existing Eskom 22kV Power Lines and Pole Mounted Transformer Bays

6.2 Supply Authorities

Eskom is the power supply authority for the area. Image 3 indicate the “Existing Connection” to the Cemetery Development (Previous Farm House). This connection will only service Phase 1 of the Development with power.

Telecommunication and internet network capabilities will also be applied for, to Mangaung Metro Municipality’s requirements.

6.3 Existing Electrical Services

The portion 5 of Nalisview has an existing 50kVA 22/0.38/0.23kV connection supplied by Eskom. Unfortunately, the connection was vandalised. An application to restore the connection with a pole mounted low voltage connection kiosk was submitted to Eskom. The remainder portion of this development does not have any electrical connections.

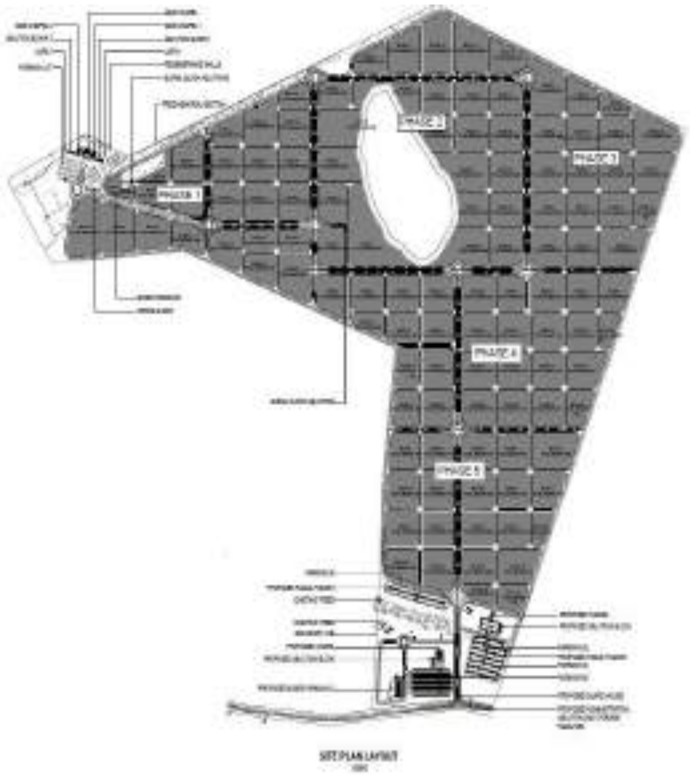

Image 4: Power Distribution Per Phases

From Image 3 it indicates that there is an existing 22kV Overhead Power Line “Paradys Rural – Lovedale Feeder 1 22kV Overhead Line” crossing diagonally through Phase 4. This line will have to be re-directed to run parallel with one of the streets in Phase 4 or 5 to supply power to farms on the eastern side of the development. A servitude will also have to be registered for this overhead line according Eskom’s requirements (Guideline 34-600). A formal application will be submitted to Eskom to re-direct the power line route.

6.4 Investigation Parameters

The following electrical design parameters (NRS 069) were used to establish the estimated electrical load per phase. Phase 1-5 will be serviced from the existing connection. The power required for phase 1 is calculated to be 50kVA. The current Eskom connection will be enough for phase 1. All other phases to be developed will require connection size upgrading. The intended phase 1 development is indicated in Table 9 and does not include any area lighting provisions. All building developed areas and parking bays will be equipped with post top LED luminaires.

Table 6: Phase 1 Load Calculation

No	Phase 1: Description	Extent: Area (m^2)	Watt/m²	Quantity	Load Factor	Power Demand (kVA)
1	Main Chapel	600	40	1	0.8	19.2
2	Side Chapel	350	40	2	0.8	22.4
3	Guard house	17	50	1	0.8	0.7
4	Ablution facilities	47	35	6	0.5	4.9
5	Boreholes	1	2500	1	1	2.5
6	**TOTAL DEMAND IN kVA:**					**49.7**

Phase 2 – 5 with the additional site on the southern side power requirements is indicated in Table 10. The power requirement within these phases will be split between phases 2-5 supplied from Phase 1 and an additional connection for the separate stand on the southern side. This southern side portion will be supplied from the re-directed Eskom Overhead 22kV line. The power required for phase 2-5 and the additional stand (Image 15) on the southern side is calculated to be 157kVA. The access road to the cemetery and the main internal road will be serviced with standard streetlight single side and median double outreach configuration lighting with LED luminaires. The secondary roads will have no street lights. The burial areas throughout all phase will be serviced with 20-30-meter-high masts lighting, each housing six LED luminaires.

Table 7: Phase 2-5 Load Calculation

No	Phase 2-5: Description	Extent: Area (m^2)	Watt/m²	Quantity	Load Factor	Power Demand (kVA)
1	Ablution Facility (Incl. Additional Area)	47	35	10	0.5	8.2
2	Internal Main Street Lighting	1	120	30	1	3.6
3	Area High Mast Lighting	1	5000	15	1	75.0
4	Boreholes	1	2500	5	1	12.5
5	Access Road Street Lighting	1	120	100	1	12.0
6	Electric Fence Phase 1-5	1	5000	1	1	5
7	Administration Building	590	60	1	0.6	21.2
8	Storage/Maintenance Building	Inc. in item 7				
9	Chapel Additional Area	350	40	2	0.8	22.4
10	Guard House Additional Area	17	50	1	0.8	0.7
11	Caretakers Resident	430	40	1	0.8	13.8
12	**TOTAL:**					160.6
13	**Estimated Load Complete Cemetery Development in kVA**					**210.36**
14	**Diversity Factor**					0.75
15	**TOTAL: Diversified Load Complete Cemetery Development**					**157.77**

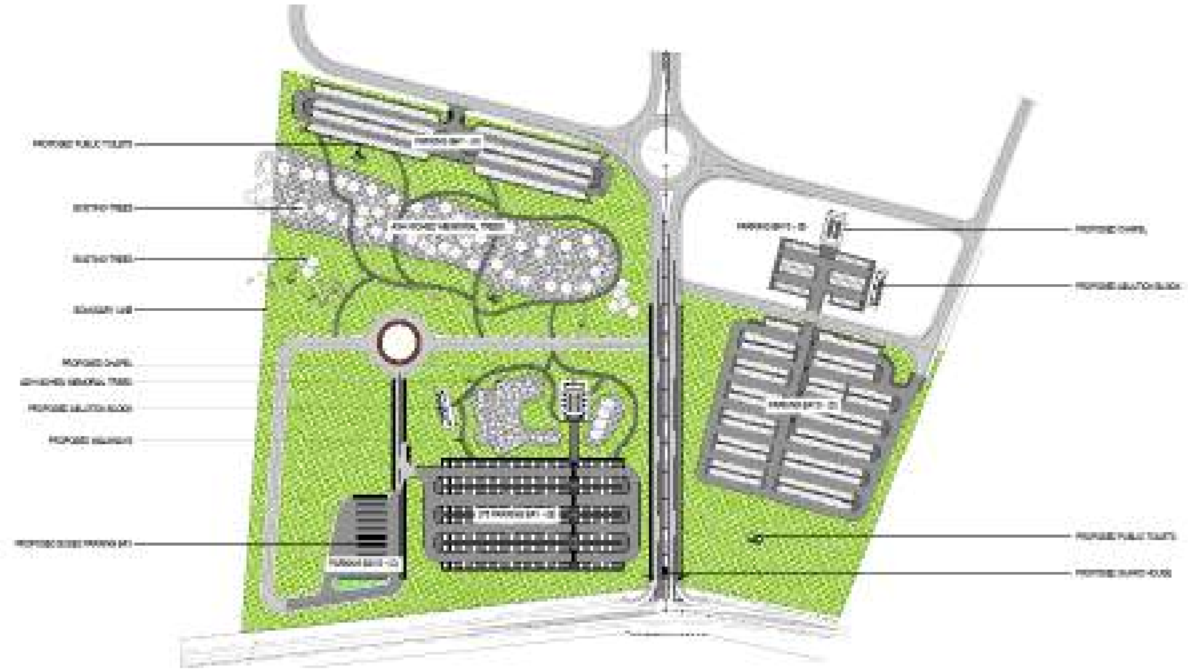

Image 15: Southern Side Additional Stand/Portion

It is intended to utilize a 3.3kV reticulation system with up and down step transformer substations to supply power to the various phases. The ablution facilities will either be supplied from the lighting electrical networks or a solar installation will be provided. All proposed lighting will be energy efficient with LED lamps. The low voltage distribution networks with kiosks will be supplied from the various substations in each phase. The low voltage kiosks will supply power to the various building distribution boards and parking/walkway lighting.

6.5 Programme

As the development period will be done in stages, the estimated time to provide an electrical supply to the area will be dependent on several factors, namely:

- Appointment of electrical contractor by Developer to sign off compliance certificates for the developments in Phase 1, once Eskom has switched on power;
- Supply and approval of electrical distribution substations, lighting for Phase 2-5. Apply to Eskom to upgrade existing 50kVA connection to be able to supply power to all Phases excluding the additional portion.
- Apply for additional connection point by Eskom to the southern side portion of development with no connection;

7 Conclusion

The site investigation showed the following:

I. Currently no formal existing civil infrastructure (Roads, Water, and Sanitation etc.) exists on or around the proposed farms Portion 6 of Paradys 2832, Portion 5 and Remainder of Nalisview 2835.

II. Existing boreholes will be implemented to supply the development with potable water. This is however subject to proper water quality and borehole yield testing. If the existing borehole yields and water quality are not sufficient, additional borehole sites should be investigated. An elevated storage tank (panel type tank) will be used to store water from which it will be reticulated through the proposed development using a ring feed.

III. The Fire Department of the Mangaung Metro Municipality needs to be consulted with regards to the fire water requirements as discussed under section 2.4 Firefighting Requirements.

IV. Septic tanks in the form of dual compartments (first compartment for solids, second compartment for grey water) is proposed. If the EIA allows for French drain/soakaway type septic tanks it is proposed that this option be implemented. However, this is not allowed by the EIA it is proposed that all the septic tanks be connected by a small reticulation network to allow pumping at one point only. This will minimize the maintenance as less pumping points will be required. Each building will be serviced by their own septic tank.

V. A TIA (Traffic Impact Assessment) by a qualified traffic engineer is proposed to determine what the extent of traffic increase on the existing N6 (National Road) will be as a result of the proposed development. This TIA will also determine the extent of the proposed intersection with the N6 (National Road) and the requirements that the intersection should adhere to. The governing body of the N6 (National Road) (SANRAL) should also be consulted to ensure their requirements are adhered to. Refer to section 4.1 for on-site road reticulation details

VI. The proposed roads for the development will be utilized for storm water surface drainage. Possible retention ponds and retention areas in the form of parking areas can be investigated.

VII. All costs related to the upgrading of external bulk services and on-site services will be the responsibility of the developer.

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Swaziland, Tanzania, Thailand, Uganda,
United Arab Emirates, Vietnam, Zimbabwe.

DPR
Ecologists & Environmental Services

Report on the ecological assessment of the proposed access road and parking area for the cemetery development on the Farm Nalisview 1060 and 2835 in the Paradys Small Holdings, Bloemfontein, Free State Province.

June 2020

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DECLARATION OF INDEPENDENCE

DPR Ecologists and Environmental Services is an independent company and has no financial, personal or other interest in the proposed project, apart from fair remuneration for work performed in the delivery of ecological services. There are no circumstances that compromise the objectivity of the study.

Report Version	**Final 1.0**		
Title	**Report on the ecological assessment of the proposed access road and parking area for the cemetery development on the Farm Nalisview 1060 and 2835 in the Paradys Small Holdings, Bloemfontein, Free State Province.**		
Author	**DP van Rensburg (Pr.Sci.Nat)**		**Jun'20**

Executive Summary

The proposed cemetery will be constructed on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings south of Bloemfontein (Map 1). A separate access road and parking area will have to be constructed for the cemetery. The access road and parking area will be situated on Portion 1 of the Farm Nalisview 1060, to the south of the cemetery. The total length of the road will be approximately 300 meters and the extent of the parking area will be 15 hectares. The site consists of grassland, though it is clear that the natural vegetation has been transformed by previous ploughing and crop cultivation.

According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 2). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation. This is also the case on the site which consists of old ploughed fields and although the vegetation has rehabilitated itself, the species composition is not considered representative of this vegetation type and in a degraded condition. As a result, the conservation value of the site is considered to be relatively low.

The natural vegetation on the site has been completely transformed by previous ploughing (Map 1). When looking at available aerial imagery it is clear that the site had been ploughed as early as 2000 and has subsequently been allowed to re-vegetate itself (Figure 1). However, plough furrows remain highly visible on recent imagery and substantiate the transformed nature of the site (Figure 2). The on-site survey has also confirmed that remnants of plough furrows remain visible.

The topography of the site consists of a relatively flat area, forming a plain without any discernible slope. Concentrated runoff patterns and watercourses are therefore also absent on the site (Map 1 & 2). However, roads and parking areas are impermeable surfaces which therefore causes increased runoff which in turn may cause significant erosion. The design of the road should therefore incorporate adequate storm water structures which may include v-drains, subsoil drains, culverts and mitre drains where applicable.

From the description of the vegetation on the site it is clear that it has largely been transformed or modified from the natural condition, mostly as a result of the previous ploughing of the grass layer (Map 1). Climax species are present which indicates some re-establishment of the natural vegetation. However, the site is dominated by pioneer species and it is considered highly unlikely that the grass layer will ever be able to re-establish to such an extent as to represent the natural vegetation type. The conservation value of the vegetation on the site can therefore not be regarded as high.

In conclusion, the site is considered largely modified from the natural condition. The natural vegetation type, Bloemfontein Dry Grassland (Gh 5), which is listed as Vulnerable (VU) and would normally be regarded as having a high conservation value, has been transformed by previous ploughing and is consequently not of high conservation value (Map 2). This has also been substantiated by the Free State Province Biodiversity Management Plan (2015) which regards the site as being only an Ecological Support Area 1 & 2 (Map 3). The site does not contain any rare, endangered or protected species and given the transformed condition of the vegetation it is considered highly unlikely that such a species would occur. Therefore, no elements of significant conservation value could be identified on the site.

Table of contents

Ecological assessment

1. INTRODUCTION

1.1 Background

Natural vegetation is an important component of ecosystems. Some of the vegetation units in a region can be more sensitive than others, usually as a result of a variety of environmental factors and species composition. These units are often associated with water bodies, water transferring bodies or moisture sinks. These systems are always connected to each other through a complex pattern. Degradation of a link in this larger system, e.g. tributary, pan, wetland, usually leads to the degradation of the larger system. Therefore, degradation of such a water related system should be prevented.

Though vegetation may seem to be uniform and low in diversity it may still contain species that are rare and endangered. The occurrence of such a species may render the development unviable. Should such a species be encountered the development should be moved to another location or cease altogether.

South Africa has a large amount of endemic species and in terms of plant diversity ranks third in the world. This has the result that many of the species are rare, highly localised and consequently endangered. It is our duty to protect our diverse natural resources.

Development around cities and towns are necessary to accommodate an ever-growing population. Areas along the boundaries of cities and towns are usually in a degraded state due to the impact of the large population these areas house. Though this may be the case in most situations there may still be areas that consist of sensitive habitats such as water courses, wetlands or rare vegetation types that need to be conserved. These areas may also contain endangered fauna and flora.

The proposed cemetery will be constructed on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings south of Bloemfontein (Map 1). A separate access road and parking area will have to be constructed for the cemetery. The access road and parking area will be situated on Portion 1 of the Farm Nalisview 1060, to the south of the cemetery. The total length of the road will be approximately 300 meters and the extent of the parking area will be 15 hectares. The site consists of grassland, though it is clear that the natural vegetation has been transformed by previous ploughing and crop cultivation.

A site visit was conducted on 13 February 2020. A large portion of the site was surveyed though was mainly focused on the access road footprint. The site survey was conducted during summer after sufficient rains and the plant identification on the site was considered optimal.

For the above reasons it is necessary to conduct an ecological assessment of an area proposed for development.

The report together with its recommendations and mitigation measures should be used to minimise the impact of the proposed development.

1.2 The value of biodiversity

The diversity of life forms and their interaction with each other and the environment has made Earth a uniquely habitable place for humans. Biodiversity sustains human livelihoods and life itself. Although our dependence on biodiversity has become less tangible and apparent, it remains critically important.

The balancing of atmospheric gases through photosynthesis and carbon sequestration is reliant on biodiversity, while an estimated 40% of the global economy is based on biological products and processes.

Biodiversity is the basis of innumerable environmental services that keep us and the natural environment alive. These services range from the provision of clean water and watershed services to the recycling of nutrients and pollution. These ecosystem services include:

- Soil formation and maintenance of soil fertility.
- Primary production through photosynthesis as the supportive foundation for all life.
- Provision of food, fuel and fibre.
- Provision of shelter and building materials.
- Regulation of water flows and the maintenance of water quality.
- Regulation and purification of atmospheric gases.
- Moderation of climate and weather.
- Detoxification and decomposition of wastes.
- Pollination of plants, including many crops.
- Control of pests and diseases.
- Maintenance of genetic resources.

2. SCOPE AND LIMITATIONS

- To evaluate the present state of the vegetation and ecological functioning of the area proposed for the development.
- To identify possible negative impacts that could be caused by the proposed development.

2.1 Vegetation

Aspects of the vegetation that will be assessed include:

- The vegetation types of the region with their relevance to the proposed site.
- The overall status of the vegetation on site.
- Species composition with the emphasis on dominant-, rare- and endangered species.

The amount of disturbance present on the site assessed according to:

- The amount of grazing impacts.
- Disturbance caused by human impacts.
- Other disturbances.

2.2 Fauna

Aspects of the fauna that will be assessed include:

- A basic survey of the fauna occurring in the region using visual observations of species as well as evidence of their occurrence in the region (burrows, excavations, animal tracks, etc.).
- The overall condition of the habitat.
- A list of species that may occur in the region (desktop study).

2.3 Limitations

Some geophytic or succulent species may have been overlooked due to a specific flowering time or cryptic nature.

Although a comprehensive survey of the site was done it is still likely that several species were overlooked.

Although a large portion of the site was surveyed it remains possible that sensitive species occur in the surrounding areas.

Some animal species may not have been observed as a result of their nocturnal and/or shy habits.

The assessment is based on the terrestrial ecology and while surface water features and wetlands were noted where present it may still be possible that obscure wetland areas or smaller drainage lines were overlooked.

3. METHODOLOGY

3.1 Several literature works were used for additional information.

Vegetation:
Red Data List (Raymondo *et al.* 2009)
Vegetation types (Mucina & Rutherford 2006)
Field guides used for species identification (Bromilow 1995, 2010, Coates-Palgrave 2002, Fish *et al* 2015, Gibbs-Russell *et al* 1990, Manning 2009, Retief & Meyer 2017, Van Oudtshoorn 2004, Van Wyk & Malan 1998, Van Wyk & Van Wyk 1997, Venter & Joubert 1985).

Terrestrial fauna:
Field guides for species identification (Smithers 1986a, Child *et al* 2016).

3.2 Survey

The site was assessed by means of transects and sample plots.

Noted species include rare and dominant species.
The broad vegetation types present on the site were determined.
The state of the environment was assessed in terms of condition, grazing impacts, disturbance by humans, erosion and presence of invader and exotic species.

Animal species were also noted as well as the probability of other species occurring on or near the site according to their distribution areas and habitat requirements.
The state of the habitat was also assessed.

3.3 Criteria used to assess sites

Several criteria were used to assess the site and determine the overall status of the environment.

Vegetation characteristics
Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Habitat diversity and species richness: normally a function of locality, habitat diversity and climatic conditions.
Scoring: Wide variety of species occupying a variety of niches – 1, Variety of species occupying a single nich – 2, Single species dominance over a large area containing a low diversity of species – 3.

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species can potentially be a fatal flaw.
Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely – 3.

Ecological function: All plant communities play a role in the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.
Scoring: Ecological function critical for greater system – 1, Ecological function of medium importance – 2, No special ecological function (system will not fail if absent) – 3.

Degree of rarity/conservation value:
Scoring: Very rare and/or in pristine condition – 1, Fair to good condition and/or relatively rare – 2, Not rare, degraded and/or poorly conserved – 3.

Vegetation condition
The sites are compared to a benchmark site in a good to excellent condition. Vegetation management practises (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of the vegetation.

Percentage ground cover: Ground cover is under normal and natural conditions a function of climate and biophysical characteristics. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.
Scoring: Good to excellent – 1, Fair – 2, Poor – 3.

Vegetation structure: This is the ratio between tree, shrub, sub-shrubs and grass layers. The ratio could be affected by grazing and browsing by animals.
Scoring: All layers still intact and showing specimens of all age classes – 1, Sub-shrubs and/or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) – 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) – 3.

Infestation with exotic weeds and invader plants or encroachers:
Scoring: No or very slight infestation levels by weeds and invaders – 1, Medium infestation by one or more species – 2, Several weed and invader species present and high occurrence of one or more species – 3.

Degree of grazing/browsing impact:
Scoring: No or very slight notable signs of browsing and/or grazing – 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact – 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent – 3.

Signs of erosion: The formation of erosion scars can often give an indication of the severity and/or duration of vegetation degradation.
Scoring: No or very little signs of soil erosion – 1, Small erosion gullies present and/or evidence of slight sheet erosion – 2, Gully erosion well developed (medium to large dongas) and/or sheet erosion removed the topsoil over large areas – 3.

Faunal characteristics
Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.
Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

3.4 Biodiversity sensitivity rating (BSR)

The total scores for the criteria above were used to determine the biodiversity sensitivity ranking for the sites. On a scale of 0 – 30, six different classes are described to assess the suitability of the sites to be developed. The different classes are described in the table below:

Table 1: Biodiversity sensitivity ranking

BSR	BSR general floral description	Floral score equating to BSR class
Ideal (5)	Vegetation is totally transformed or in a highly degraded state, generally has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area has lost its inherent ecological function. The area has no conservation value and potential for successful rehabilitation is very low. The site is ideal for the proposed development.	29 – 30
Preferred (4)	Vegetation is in an advanced state of degradation, has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area's ecological function is seriously hampered, has a very low conservation value and the potential for successful rehabilitation is low. The area is preferred for the proposed development.	26 – 28
Acceptable (3)	Vegetation is notably degraded, has a medium level of species diversity although no species of concern are present. Invasive plants are present but are still controllable. The area's ecological function is still intact but may be hampered by the current levels of degradation. Successful rehabilitation of the area is possible. The conservation value is regarded as low. The area is acceptable for the proposed development.	21 – 25
Not preferred (2)	The area is in a good condition although signs of disturbance are present. Species diversity is high and species of concern may be present. The ecological function is intact and very little rehabilitation is needed. The area is of medium conservation importance. The area is not preferred for the proposed development.	11 – 20
Sensitive (1)	The vegetation is in a pristine or near pristine condition. Very little signs of disturbance other than those needed for successful management are present. The species diversity is very high with several species of concern known to be present. Ecological functioning is intact and the conservation importance is high. The area is regarded as sensitive and not suitable for the proposed development.	0 - 10

4. ECOLOGICAL OVERVIEW OF THE SITE

4.1 Overview of ecology and vegetation types

Refer to the list of species encountered on the site in Appendix B.

According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 2). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation. This is also the case on the site which consists of old ploughed fields and although the vegetation has rehabilitated itself, the species composition is not considered representative of this vegetation type and in a degraded condition.

The Free State Province Biodiversity Management Plan (2015) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas (CBA). The site in question is however listed as being an Ecological Support Area 1 & 2 (Map 3). Therefore, although not regarded as a CBA it still functions in ecological support of surrounding areas.

The proposed cemetery will be constructed on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings south of Bloemfontein (Map 1). A separate access road and parking area will have to be constructed for the cemetery. The access road and parking area will be situated on Portion 1 of the Farm Nalisview 1060, to the south of the cemetery. The total length of the road will be approximately 300 meters and the extent of the parking area will be 15 hectares. The site consists of grassland, though it is clear that the natural vegetation has been transformed by previous ploughing and crop cultivation.

The natural vegetation on the site has been completely transformed by previous ploughing (Map 1). When looking at available aerial imagery it is clear that the site had been ploughed as early as 2000 and has subsequently been allowed to re-vegetate itself (Figure 1). However, plough furrows remain highly visible on recent imagery and substantiate the transformed nature of the site (Figure 2). The on-site survey has also confirmed that remnants of plough furrows remain visible. Natural vegetation is considered as primary vegetation, when this layer is removed as by ploughing it can no longer be considered as primary vegetation but should vegetation re-establish it will then be regarded as secondary vegetation. This is the case at the subject site. Ploughing transforms the soil profile and thereby altering the available habitat to such an extent that the natural vegetation composition will not be able to re-establish. This is also clearly evident on the site. A large woodlot of the exotic Bluegum Trees (*Eucalyptus camaldulensis*) is also present on the site and contributes to transformation of the natural vegetation.

Figure 1: Aerial view of the proposed access road and parking area (Google Earth 2000). Note that the site has clearly been ploughed at this time. Note also the woodlot of exotic *Eucalyptus camaldulensis*.

Figure 2: Recent aerial view of the proposed access road and parking area (Google Earth 2019). Plough furrows are still clearly visible indicating that though vegetation may been able to re-establish it will still be transformed from the natural condition.

The topography of the site consists of a relatively flat area, forming a plain without any discernible slope. The surroundings also do not contain any prominent topographical elements. The site has an elevation varying from 1404 m to 1405 m and should clearly indicate the relatively flat topography of the site. Concentrated runoff patterns and watercourses are therefore also absent on the site (Map 1 & 2).

The area has a mean average temperature of 16.2°C, with a maximum of 30.9°C in January and temperatures below zero common in winter (-1.6°C in July). Summer rainfall occurs mostly as thunderstorms with an average annual rainfall of 548 mm.

Geology in this area consists of sedimentary mudstones and layers of sandstone of the Beaufort Group but does not outcrop and is covered by deeper sands overlaying clay. This is also indicative of the natural grassland vegetation type occurring in this area.

As mentioned, the site has previously been transformed by ploughing (Map 1). A grass layer has been able to re-establish since then but is not a good representation of the natural grassland vegetation type. The grass layer is dominated by several pioneer species, especially *Eragrostis lehmanniana*, but also include *Aristida congesta, Cynodon dactylon, Tragus berteronianus, Chloris virgata* and *Eragrostis gummiflua*. These clearly indicate the transformed nature of the grass layer. Climax grass species are also present, though scattered, and include *Digitaria eriantha. Themeda triandra, Panicum coloratum* and *Sporobolus fimbritus*. This does indicate that a proportion of the original natural grassland has been able to re-establish but due to ploughing it is unlikely to ever be representative of the primary species composition. Another significant indicator of the transformed grass layer is the dominance of *Nidorella resedifolia* in many areas. This is a pioneer herb dominating in degraded areas. Several other pioneer herbaceous species also confirm the degraded condition of the grass layer and include *Arctotis venusta, Selago densiflora, Osteospermum scarriosum, Tribulus terrestris, Hibiscus trionum, Cyperus esculentus, Citrillus lanatus* and *Kyllinga alba*. However, a few remnants of the natural vegetation type is still present and include the geophyte, *Hypoxis angistifolia*, the succulent dwarf shrub, *Ruschia hamata* and the herb, *Hermannia coccocarpa*. Furthermore, exotic weeds are not prevalent on the site, although a few scattered weeds do occur, including *Argemone ochroleuca*. This therefore indicates a transformed grass layer though not heavily degraded. The site does not contain any rare, endangered or protected species and given the transformed condition of the vegetation it is considered highly unlikely that such a species would occur.

From the description of the vegetation on the site it is clear that it has largely been transformed or modified from the natural condition, mostly as a result of the previous ploughing of the grass layer (Map 1). Climax species are present which indicates some re-establishment of the natural vegetation. However, the site is dominated by pioneer species and it is considered highly unlikely that the grass layer will ever be able to re-establish to such an extent as to represent the natural vegetation type. The conservation value of the vegetation on the site can therefore not be regarded as high.

In conclusion, the site is considered largely modified from the natural condition. The natural vegetation type, Bloemfontein Dry Grassland (Gh 5), which is listed as Vulnerable (VU) and would normally be regarded as having a high conservation value, has been transformed by previous ploughing and is consequently not of high conservation value (Map 2). This has also been substantiated by the Free State Province Biodiversity Management Plan (2015) which regards the site as being only an Ecological Support Area 1 & 2 (Map 3). The site does not contain any rare, endangered or protected species and given the transformed condition of the vegetation it is considered highly unlikely that such a species would occur. Therefore, no elements of significant conservation value could be identified on the site.

4.2 Overview of terrestrial fauna (actual & possible)

No signs or tracks of mammals could be observed on the site. The transformed nature of the grass layer will contribute to a much decreased mammal population which will most likely consist of generalist species. Furthermore, the site is of small extent which will therefore further decrease the population size of any mammals on it. Rare or threatened species are often shy and only able to occur in natural areas in good condition and are therefore unlikely to occur on and around the site.

The impact that the proposed development will have is mainly concerned with the loss of habitat which will decrease the available habitat for faunal species. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, due to the already degraded and modified condition of the habitat on the site this is not regarded as a high impact.

In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of mammals on the site should be strictly prohibited during the construction and operational phases.

List of some Red Data terrestrial mammals that could occur in the region (Child *et al* 2016):

South African Hedgehog	*Atelerix frontalis*
Striped Weasel	*Poecilogale albinucha*
Small-Spotted Cat	*Felis nigripes*

It is considered unlikely that these species would occur on the site due to the transformed condition of the habitat on the site.

5. ANTICIPATED IMPACTS

Anticipated impacts that the development will have is primarily concerned with the loss of habitat and species diversity.

As previously discussed, the vegetation on the site has largely been modified by previous ploughing of the grass layer. The natural vegetation type, Bloemfontein Dry Grassland (Gh 5), is currently listed as Vulnerable (VU) and therefore has a relatively high conservation value (Map 2). However, on-site observations as well as the Free State Province Biodiversity Management Plan (2015) indicate that the vegetation has been modified to such a degree that it can no longer be considered as representative of this vegetation type (Map 3). The species diversity on the site was also noted to be quite low and dominated by pioneer species. As a result, the loss of the vegetation and species diversity cannot be regarded as a high impact.

Due to the largely modified and transformed nature of the vegetation on the site no rare, endangered or protected species were observed and it is also considered highly unlikely that any such species would occur. This impact would therefore be negligible.

The site does not contain any watercourses, including drainage lines or wetlands and the impact on these would therefore be negligible (Map 1 & 2). However, roads and parking areas are impermeable surfaces which therefore causes increased runoff which in turn may cause significant erosion. The design of the road and parking area should therefore incorporate adequate storm water structures which may include v-drains, subsoil drains, culverts and mitre drains where applicable.

The site does not contain an abundance of exotic weeds, however, construction of the road and parking area will disturb the area and promote the establishment of exotic weeds. Monitoring of weed establishment and eradication should form a prominent part of management of the development. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

The impact that the proposed development will have is mainly concerned with the loss of habitat which will decrease the available habitat for faunal species. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, due to the already degraded and modified condition of the habitat on the site this is not regarded as a high impact. In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of mammals on the site should be strictly prohibited during the construction and operational phases.

The impact significance has been determined and it is clear that most impacts before mitigation will be low-moderate requiring very little mitigation.

Please refer to Appendix C for the impact methodology.

Significance of the impact:

Impact	Severity	Duration	Extent	Consequence	Probability	Frequency	Likelihood	Significance
Before Mitigation								
Loss of vegetation type and clearing of vegetation	1	5	3	3	4	3	3.5	10.5
Loss of protected species	1	5	3	3	1	1	1	3
Impact on watercourses	1	5	3	3	1	1	1	3
Infestation with weeds and invaders	3	4	3	3.3	3	3	3	9.9
Impact on Terrestrial fauna	1	4	3	2.6	3	3	3	7.8
After Mitigation								
Loss of vegetation type and clearing of vegetation	1	5	3	3	4	3	3.5	10.5
Loss of protected species	1	5	3	3	1	1	1	3
Impact on watercourses	1	5	3	3	1	1	1	3
Infestation with weeds and invaders	2	4	3	3.3	2	3	2.5	9.9
Impact on Terrestrial fauna	1	4	3	2.6	3	3	3	7.8

6. SITE SPECIFIC RESULTS

Habitat diversity and species richness:
Due to the small extent of the site and the uniform topography the habitat diversity would also have been relatively low though species diversity may have been moderate. Under the current transformed conditions, the site has a relatively low habitat and species diversity.

Presence of rare and endangered species:
Due to the largely modified and transformed nature of the vegetation on the site no rare, endangered or protected species were observed and it is also considered highly unlikely that any such species would occur.

Ecological function:
The ecological functions of the site should naturally include; providing habitat for fauna, sustaining a specific vegetation type, i.e. Bloemfontein Dry Grassland and also forming part of the catchment of surrounding watercourses and wetlands (Map 1 & 2). The natural vegetation and vegetation type has been transformed by previous ploughing which therefore also transforms the habitat for fauna to a large degree. Furthermore, the function of the site is not paramount to the continued functioning of the surrounding natural areas. In other words, development of the site should not impair the functioning of the surrounding area to a large extent. The site does not contain any natural watercourses or wetlands but still functions as part of the catchment of such surrounding systems. This function would be intact to a large degree.

Degree of rarity/conservation value:
According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 2). As a result, where natural vegetation remains on the site, it must be considered as being of high conservation value. However, on-site observations indicate that the vegetation has been modified to such a degree that it can no longer be considered as representative of this vegetation type. This is also confirmed by the Free State Province Biodiversity Management Plan (2015) which indicates that the site is only an Ecological Support Area 1 & 2 (Map 3). As a result, the conservation value of the site is considered to be relatively low.

Percentage ground cover:
The percentage vegetation cover is moderate. Naturally the vegetation cover would have been relatively high but due to the previous ploughing and dominance of pioneer species this has been deceased significantly.

Vegetation structure:
The vegetation structure is dominated by a grass layer which is natural to this area. However, an abundance of pioneer herbs do cause at least a moderate modification of the vegetation structure.

Infestation with exotic weeds and invader plants:
Infestation by exotic weeds and invasive species is relatively low and indicates a transformed grass layer though not heavily degraded.

Degree of grazing/browsing impact:
The site is utilised for grazing by domestic stock though overgrazing is not evident but it is still considered as moderate.

Signs of erosion:
Although signs of erosion are not prominent, mostly due to the flat topography, the impacts as discussed above would cause at least a moderate level of sheet erosion.

Terrestrial animals:
No signs or tracks of mammals could be observed on the site. The transformed nature of the grass layer will contribute to a much decreased mammal population which will most likely consist of generalist species. Rare or threatened species are often shy and only able to occur in natural areas in good condition and are therefore unlikely to occur on and around the site.

Table 2: Biodiversity Sensitivity Rating for the proposed access road and parking area development.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness	3		
Presence of rare and endangered species	3		
Ecological function	3		
Uniqueness/conservation value	3		
Vegetation condition			
Percentage ground cover		2	
Vegetation structure		2	
Infestation with exotic weeds and invader plants or encroachers		2	
Degree of grazing/browsing impact		2	
Signs of erosion		2	
Terrestrial animal characteristics			
Presence of rare and endangered species	3		
Sub total	15	10	0
Total		25	

7. BIODIVERSITY SENSITIVITY RATING (BSR) INTERPRETATION

Table 3: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Cemetery access road and parking area	25	Acceptable	3

8. DISCUSSION AND CONCLUSION

The proposed development has been rated as being acceptable for the development. Though current levels of degradation are low the previous ploughing of the vegetation has significantly decreased its conservation value.

The proposed cemetery will be constructed on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings south of Bloemfontein (Map 1). A separate access road and parking area will have to be constructed for the cemetery. The access road and parking area will be situated on Portion 1 of the Farm Nalisview 1060, to the south of the cemetery. The total length of the road will be approximately 300 meters and the extent of the parking area will be 15 hectares. The site consists of grassland, though it is clear that the natural vegetation has been transformed by previous ploughing and crop cultivation.

According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 2). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation. This is also the case on the site which consists of old ploughed fields and although the vegetation has rehabilitated itself, the species composition is not considered representative of this vegetation type and in a degraded condition. As a result, the conservation value of the site is considered to be relatively low.

The Free State Province Biodiversity Management Plan (2015) has recently been published and has identified areas which are essential to meeting conservation targets for specific vegetation types, i.e. Critical Biodiversity Areas (CBA). The site in question is however listed as being an Ecological Support Area 1 & 2 (Map 3). Therefore, although not regarded as a CBA it still functions in ecological support of surrounding areas.

The natural vegetation on the site has been completely transformed by previous ploughing (Map 1). When looking at available aerial imagery it is clear that the site had been ploughed as early as 2000 and has subsequently been allowed to re-vegetate itself (Figure 1). However, plough furrows remain highly visible on recent imagery and substantiate the transformed nature of the site (Figure 2). The on-site survey has also confirmed that remnants of plough furrows remain visible. Natural vegetation is considered as primary vegetation, when this layer is removed as by ploughing it can no longer be considered as primary vegetation but should vegetation re-establish it will then be regarded as secondary vegetation. This is the case at the subject site. Ploughing transforms the soil profile and thereby altering the available habitat to such an extent that the natural vegetation composition will not be able to re-establish. This is also clearly evident on the site. A large woodlot of the exotic Bluegum Trees (*Eucalyptus camaldulensis*) is also present adjacent to the site and contributes to transformation of the natural vegetation.

The topography of the site consists of a relatively flat area, forming a plain without any discernible slope. Concentrated runoff patterns and watercourses are therefore also absent on the site (Map 1 & 2). However, roads and parking areas are impermeable surfaces which therefore causes increased runoff which in turn may cause significant erosion. The design of the road should therefore incorporate adequate storm water structures which may include v-drains, subsoil drains, culverts and mitre drains where applicable.

Due to the largely modified and transformed nature of the vegetation on the site no rare, endangered or protected species were observed and it is also considered highly unlikely that any such species would occur.

The site does not contain an abundance of exotic weeds, however, construction of the road and parking area will disturb the area and promote the establishment of exotic weeds. Monitoring of weed establishment and eradication should form a prominent part of management of the development. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.

The impact that the proposed development will have is mainly concerned with the loss of habitat which will decrease the available habitat for faunal species. The faunal population will vacate the site into adjacent natural areas which will put a strain on surrounding populations. However, due to the already degraded and modified condition of the habitat on the site this is not regarded as a high impact. In order to ensure no direct impact on the mammals on the site the hunting, capturing or trapping of mammals on the site should be strictly prohibited during the construction and operational phases.

From the description of the vegetation on the site it is clear that it has largely been transformed or modified from the natural condition, mostly as a result of the previous ploughing of the grass layer (Map 1). Climax species are present which indicates some re-establishment of the natural vegetation. However, the site is dominated by pioneer species and it is considered highly unlikely that the grass layer will ever be able to re-establish to such an extent as to represent the natural vegetation type. The conservation value of the vegetation on the site can therefore not be regarded as high.

In conclusion, the site is considered largely modified from the natural condition. The natural vegetation type, Bloemfontein Dry Grassland (Gh 5), which is listed as Vulnerable (VU) and would normally be regarded as having a high conservation value, has been transformed by previous ploughing and is consequently not of high conservation value (Map 2). This has also been substantiated by the Free State Province Biodiversity Management Plan (2015) which regards the site as being only an Ecological Support Area 1 & 2 (Map 3). The site does not contain any rare, endangered or protected species and given the transformed condition of the vegetation it is considered highly unlikely that such a species would occur. Therefore, no elements of significant conservation value could be identified on the site.

9. RECOMMENDATIONS

- The design of the road and parking area should incorporate adequate storm water structures which may include v-drains, subsoil drains, culverts and mitre drains where applicable.
- No littering must be allowed and all litter must be removed from the site.
- The hunting, capturing or trapping of fauna, including mammals, reptiles, birds and amphibians, on the site should be strictly prohibited during construction and operation.
- Adequate monitoring of weed establishment and their continued eradication must be maintained. Where category 1 and 2 weeds occur, they require removal by the property owner according to the Conservation of Agricultural Resources Act, No. 43 of 1983 and National Environmental Management: Biodiversity Act, No. 10 of 2004.
- After construction has ceased all construction waste should be removed from the area.
- Monitoring of construction including weed establishment and erosion should take place.

10. REFERENCES

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Annexure A: Maps and Site photos

Layout map for the proposed access road and parking area for the cemetery development on the Farm Nalisview 1060 and 2835 in the Paradys Small Holdings, Bloemfontein, Free State Province.

Map 1: Layout map of the proposed access road and parking area for the cemetery. The layout and extent of the proposed access road and parking area is indicated. Note the clearly ploughed and transformed grassland on the site and the woodlot of exotic *Eucalyptus camaldulensis* on the site also visible.

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Legend:
- **Road network**
- **Watercourses**
- **Property boundaries**

- **Site layout**
- **Wetlands and impoundments**

Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:5 000

DPR Ecologists
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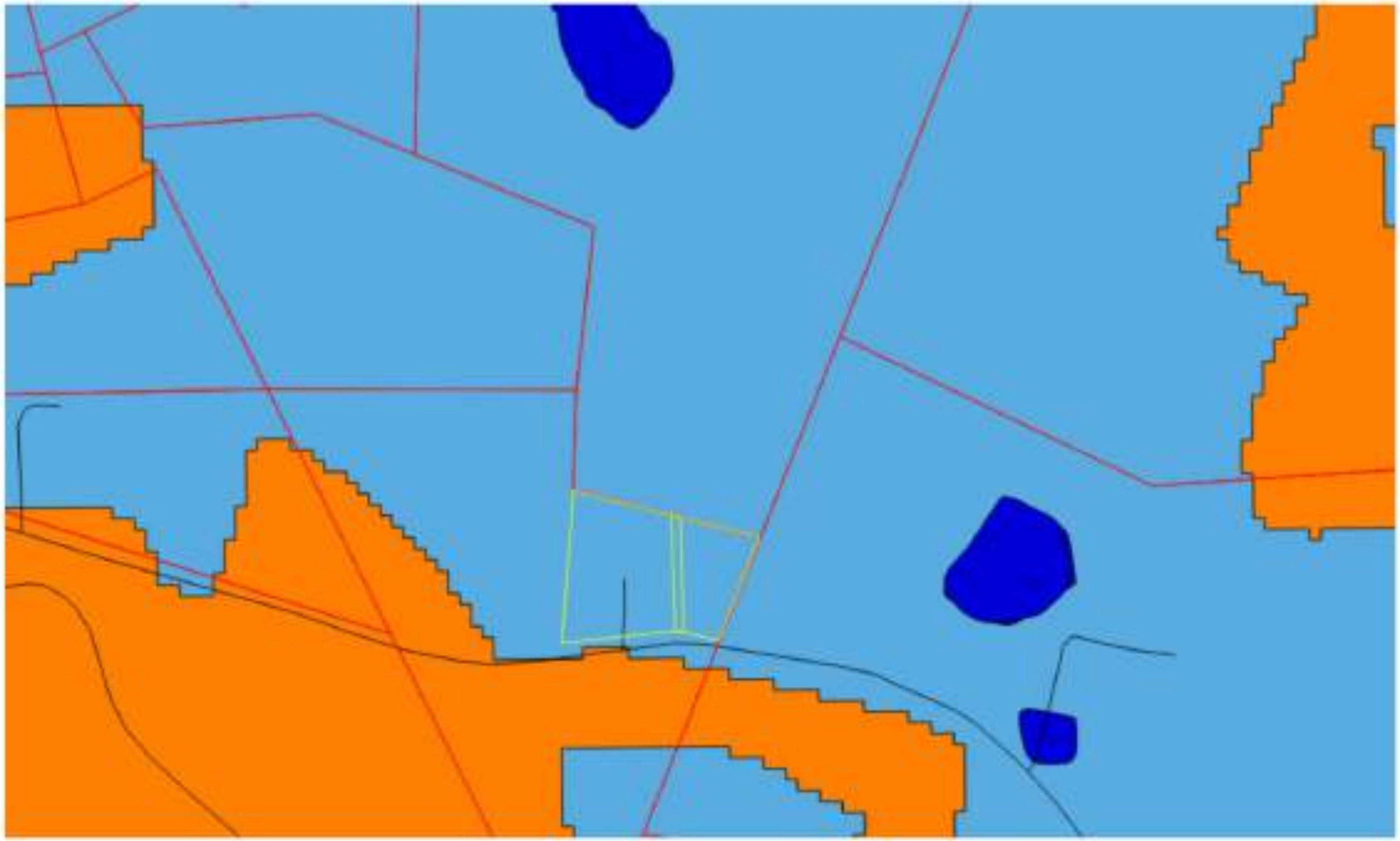
General ecology map for the proposed access road and parking area for the cemetery development Ino the Farm Nalisview 1060 and 2835 in the Paradys Small Holdings, Bloemfontein, Free State Province.



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9301

Legend:
- ━ Road network
- ━ Watercourses
- ━ Property boundaries
- ☐ Site layout
- ■ Wetlands and impoundments
- ■ Bloemfontein Dry Grassland
- ■ Remaining Threatened Ecosystems

Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:10 000

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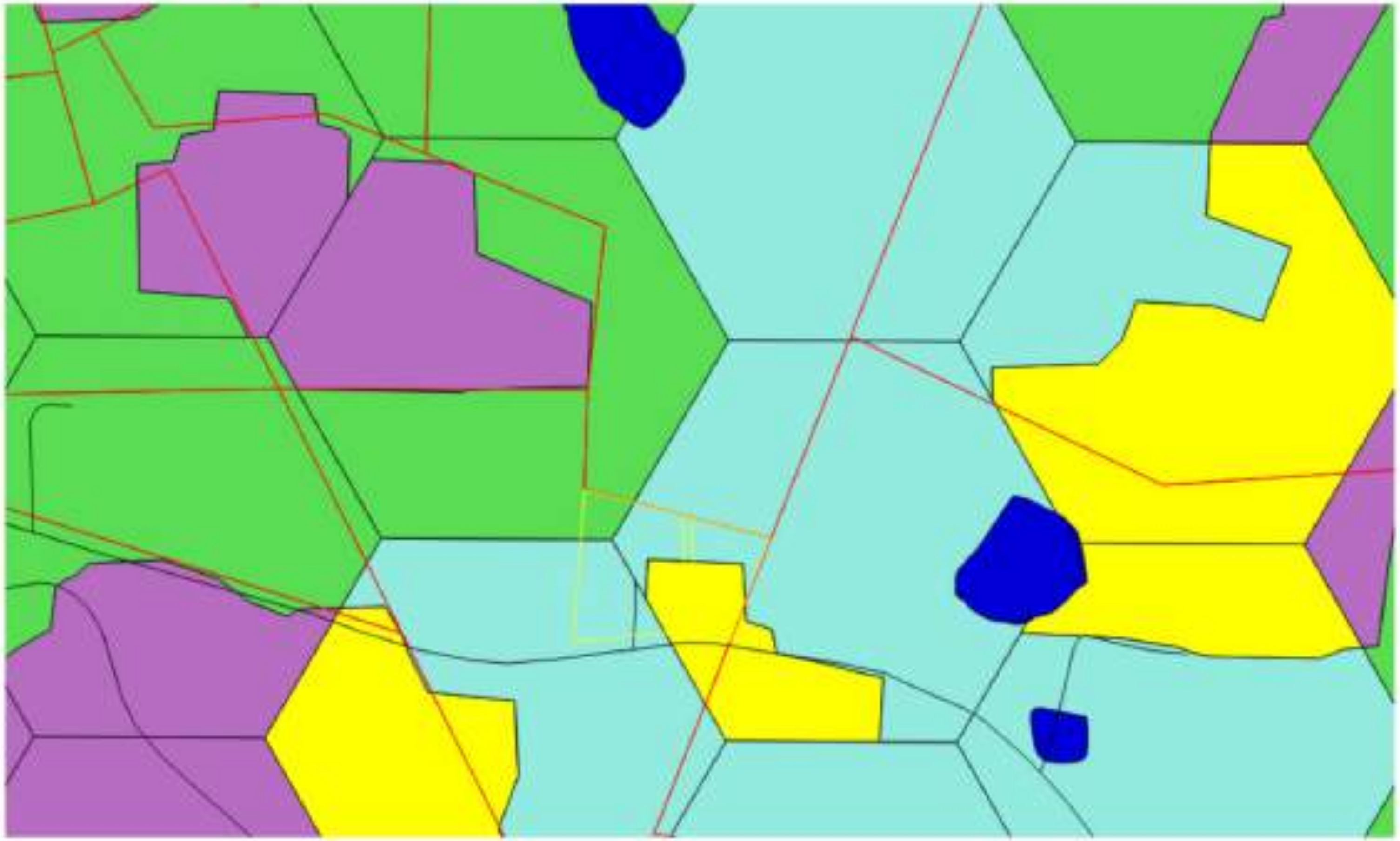
Map 2: General ecology map of the proposed access road and parking area for the cemetery. The vegetation type in the area is indicated as well as those portions of remaining Threatened Ecosystems. Note that the site is no longer considered as representative of the local threatened Bloemfontein Dry Grassland. No watercourses or wetland occurs near the site.

Free State Biodiversity Plan map for the proposed access road and parking area for the cemetery development on the Farm Nalisview 1060 and 2835 in the Paradys Small Holdings, Bloemfontein, Free State Province.



Map 3: Biodiversity Plan map of the proposed access road and parking area for the cemetery. The site is situated within an Ecological Support Area 1 and 2 categories.

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Legend:
— Road network
— Watercourses
— Property boundaries

▭ Site layout
■ Wetlands and impoundments
■ Critical Biodiversity Area 1
■ Critical Biodiversity Area 2
■ Ecological Support Area 1
■ Ecological Support Area 2
■ Degraded
■ Other

Map Information

Spheroid: WGS 84

Quantum GIS

Scale: 1:10 000

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Figure 1: Panorama of the access road (red). Note the abundance of small yellow flowers (*Nidorella resedifolia*) a clear indicator of a transformed grass layer.

Figure 2: View of the site which clearly indicates a transformed grass layer, dominated by pioneer grass species and an abundance of the pioneer herb, *Nidorella resedifolia*.

Figure 3: Plough furrows are still clearly visible on the site (red).

Figure 4: The natural percentage grass cover has been decreased significantly with bare patches also present.

Appendix B: Species list

Species indicated with an * are exotic.

Protected species are coloured orange and Red Listed species red.

Species	Growth form
**Argemone ochroleuca*	Herb
**Eucalyptus camaldulensis*	Tree
Arctotis venusta	Herb
Aristida congesta	Grass
Chloris virgata	Grass
Citrillus lanatus	Creeper
Cynodon dactylon	Grass
Cyperus esculentus	Sedge
Digitaria eriantha	Grass
Dipcadi viride	Geophyte
Eragrostis gummiflua	Grass
Eragrostis lehmanniana	Grass
Hermannia coccocarpa	Herb
Hibiscus trionum	Herb
Hypoxis angustifolia	Geophyte
Kyllinga alba	Sedge
Nidorella resediflia	Herb
Osteospermum scarriosum	Herb
Panicum coloratum	Grass
Rumex lanceolata	Grass
Ruschia hamata	Dwarf shrub
Selago densiflora	Herb
Sporobolus fimbriatus	Grass
Themeda triandra	Grass
Tragus berteronianus	Grass
Tribulus terrestris	Herb

Appendix C: Impact methodology

The environmental significance assessment methodology is based on the following determination:
Environmental Significance = Overall Consequence x Overall Likelihood

Determination of Consequence

Consequence analysis is a mixture of quantitative and qualitative information and the outcome can be positive or negative. Several factors can be used to determine consequence. For the purpose of determining the environmental significance in terms of consequence, the following factors were chosen: **Severity/Intensity, Duration and Extent/Spatial Scale.** Each factor is assigned a rating of 1 to 5, as described below and in tables 6, 7, 9 and 10.

Determination of Severity

Severity relates to the nature of the event, aspect or impact to the environment and describes how severe the aspects impact on the biophysical and socio-economic environment.
Table 7 will be used to obtain an overall rating for severity, taking into consideration the various criteria.

Table 7: Rating of severity

Type of criteria	**Rating**				
	1	**2**	**3**	**4**	**5**
Quantitative	0-20%	21-40%	41-60%	61-80%	81-100%
Qualitative	Insignificant / Non-harmful	Small / Potentially harmful	Significant / Harmful	Great / Very harmful	Disastrous Extremely harmful
Social/ Community response	Acceptable / I&AP satisfied	Slightly tolerable / Possible objections	Intolerable/ Sporadic complaints	Unacceptable / Widespread complaints	Totally unacceptable / Possible legal action
Irreversibility	Very low cost to mitigate/ High potential to mitigate impacts to level of insignificance / Easily reversible	Low cost to mitigate	Substantial cost to mitigate / Potential to mitigate impacts / Potential to reverse impact	High cost to mitigate	Prohibitive cost to mitigate / Little or no mechanism to mitigate impact Irreversible
Biophysical (Air quality, water quantity and quality, waste production, fauna and flora)	Insignificant change / deterioration or disturbance	Moderate change / deterioration or disturbance	Significant change / deterioration or disturbance	Very significant change / deterioration or disturbance	Disastrous change / deterioration or disturbance

Determination of Duration

Duration refers to the amount of time that the environment will be affected by the event, risk or impact, if no intervention e.g. remedial action takes place.

Table 8: Rating of Duration

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Determination of Extent/Spatial Scale

Extent refer to the spatial influence of an impact be local (extending only as far as the activity, or will be limited to the site and its immediate surroundings), regional (will have an impact on the region), national (will have an impact on a national scale) or international (impact across international borders).

Table 9: Rating of Extent / Spatial Scale

Rating	Description
1: Low	Immediate, fully contained area
2: Low-Medium	Surrounding area
3: Medium	Within Business Unit area of responsibility
4: Medium-High	Within Mining Boundary area
5: High	Regional, National, International

Determination of Overall Consequence

Overall consequence is determined by adding the factors determined above and summarised below, and then dividing the sum by 4.

Table 10: Example of calculating Overall Consequence

Consequence	Rating
Severity	Example 4
Duration	Example 2
Extent	Example 4
SUBTOTAL	10
TOTAL CONSEQUENCE:(Subtotal divided by 4)	3.3

Likelihood

The determination of likelihood is a combination of Frequency and Probability. Each factor is assigned a rating of 1 to 5, as described below and in Table 11 and Table 12.

Determination of Frequency

Frequency refers to how often the specific activity, related to the event, aspect or impact, is undertaken.

Table 11: Rating of frequency

Rating	Description
1: Low	Once a year or once/more during operation/LOM
2: Low-Medium	Once/more in 6 Months
3: Medium	Once/more a Month
4: Medium-High	Once/more a Week
5: High	Daily

Determination of Probability

Probability refers to how often the activity/even or aspect has an impact on the environment.

Table 12: Rating of probability

Rating	Description
1: Low	Almost never / almost impossible
2: Low-Medium	Very seldom / highly unlikely
3: Medium	Infrequent / unlikely / seldom
4: Medium-High	Often / regularly / likely / possible
5: High	Daily / highly likely / definitely

Overall Likelihood

Overall likelihood is calculated by adding the factors determined above and summarised below, and then dividing the sum by 2.

Table 13: Example of calculating the overall likelihood

Consequence	Rating
Frequency	Example 4
Probability	Example 2
SUBTOTAL	6
TOTAL LIKELIHOOD (Subtotal divided by 2)	3

Determination of Overall Environmental Significance

The multiplication of overall consequence with overall likelihood will provide the environmental significance, which is a number that will then fall into a range of LOW, LOW-MEDIUM, MEDIUM, MEDIUM, MEDIUM-HIGH or HIGH, as shown in the table below.

Table 14: Determination of overall environmental significance

Significance or Risk	Low	Low-Moderate	Moderate	Moderate-High	High
Overall Consequence X Overall Likelihood	1 - 4.9	5 - 9.9	10 - 14.9	15 – 19.9	20 - 25

Qualitative description or magnitude of Environmental Significance

This description is qualitative and is an indication of the nature or magnitude of the Environmental Significance. It also guides the prioritisations and decision making process associated with this event, aspect or impact.

Table 15: Description of the environmental significance and the related action required.

Significance	Low	Low-Moderate	Moderate	Moderate-High	High
Impact Magnitude	Impact is of very low order and therefore likely to have very little real effect. Acceptable.	Impact is of low order and therefore likely to have little real effect. Acceptable.	Impact is real, and potentially substantial in relation to other impacts. Can pose a risk to the company	Impact is real and substantial in relation to other impacts. Pose a risk to the company. Unacceptable	Impact is of the highest order possible. Unacceptable. Fatal flaw.
Action Required	Maintain current management measures. Where possible improve.	Maintain current management measures. Implement monitoring and evaluate to determine potential increase in risk. Where possible improve	Implement monitoring. Investigate mitigation measures and improve management measures to reduce risk, where possible.	Improve management measures to reduce risk.	Implement significant mitigation measures or implement alternatives.

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EKO•ENVIRONMENTAL

Report on the wetland assessment of the proposed construction of a cemetery on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings, Bloemfontein, Free State Province.

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Executive Summary

The site contains a large depression or pan in the centre/western portion of the site (Map 1 & 2). This seems to be a natural system but has however also been degraded through ploughing and retention berms to contain surface water. In addition, two artificial berms/dams occur to the north west of the site (approximately 200 m) (Map 3). None of these waterbodies are fed by a defined watercourse and therefore have no inlet. They also do not contain a defined outlet. They are all fed by surface inflow from the surroundings and function as groundwater recharge systems.

Obligate wetland vegetation was utilised to determine the presence and border of wetlands. Soil samples were used to determine the border and also to confirm the presence of wetland soils where obligate wetland vegetation indicated wetland conditions (Appendix B). The soil samples taken within the pan on the site clearly indicate that wetland conditions are present within the pan. The obligate wetland species and soil characteristics clearly indicate definite wetland conditions within the pan. The grass, *Leptochloa fusca*, is abundant within the pan and is listed as an obligate wetland species (DWAF 2008). The pan system is seasonal in nature and will only contain water after rainfall events. The pan does not have any defined in- or outflow. It is fed by surface runoff from the surrounding area and functions as a groundwater recharge.

The pan functions in the form of groundwater recharge. It therefore still performs an important ecosystem function although highly degraded. It will also be unfeasible to include the pan within the cemetery layout as graves will be subjected to annual flooding. It is therefore recommended that the pan be excluded from the cemetery layout. The condition of the pan can be improved and it can be incorporated into the layout to improve the aesthetic feel of the cemetery.

In order to establish a suitable buffer for the pan the Buffer Zone Tool for the Determination of Aquatic Impact Buffers and Additional Setback Requirements for Wetland Ecosystems (2014) was utilised (Appendix D). This determination was also done in conjunction with Macfarlane *et al* (2014). It should be noted that the buffers determined by this model only caters for impacts associated with diffuse-source surface runoff. By using the above tools a suitable buffer around the pan was determined at 15 meters (Map 2).

Adjacent to the site two artificial dams or berms are situated which forms artificial impoundments with wetland conditions (Map 3). These are also listed within the National Freshwater Ecosystems Priority Areas (NFEPA) as artificial systems and confirmed during the site survey. They are therefore of low sensitivity although they still form part of the natural drainage pattern.

The pan on the site is however natural and confirmed during the site survey as well as by the NFEPA (Map 3). The impacts on the pan should be kept to a minimum despite the highly degraded nature of the pan. The recommended buffer of 15 meters should be kept around the pan (Map 2). The layout of grave sites within the pan will not be feasible as they will be flooded annually.

Table of contents

Wetland assessment.

1. Introduction

1.1 Background

Natural vegetation is an important component of ecosystems. Some of the vegetation units in a region can be more sensitive than others, usually as a result of a variety of environmental factors and species composition. These units are often associated with water bodies, water transferring bodies or moisture sinks. These systems are always connected to each other through a complex pattern. Degradation of a link in this larger system, e.g. tributary, pan, wetland, usually leads to the degradation of the larger system. Therefore, degradation of such a water related system should be prevented.

Though vegetation may seem to be uniform and low in diversity it may still contain species that are rare and endangered. The occurrence of such a species may render the development unviable. Should such a species be encountered the development should be moved to another location or cease altogether.

South Africa's water resources have become a major concern in recent times. As a water scarce country, we need to manage our water resources sustainably in order to maintain a viable resource for the community as well as to preserve the biodiversity of the system. Thus, it should be clear that we need to protect our water resources so that we may be able to utilise this renewable resource sustainably. Areas that are regarded as crucial to maintain healthy water resources include wetlands, streams as well as the overall catchment of a river system.

Development around cities and towns are necessary to accommodate an ever-growing population. Areas along the boundaries of cities and towns are usually in a degraded state due to the impact of the large population these areas house. Though this may be the case in most situations there may still be areas that consist of sensitive habitats such as water courses, wetlands or rare vegetation types that need to be conserved. These areas may also contain endangered fauna and flora.

The proposed cemetery will be constructed on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings south of Bloemfontein (Map 1). The site almost borders the adjacent residential areas to the north (Map 3). Currently the site is utilised for communal grazing. The site consists of old ploughed fields utilised for dryland crop cultivation but has however rehabilitated through time to a degraded grassland. A large depression wetland (pan) is situated within the site.

A site visit was conducted on 20 October 2016. The depression wetland as well as adjacent wetland areas were sampled by means of transects.

For the above reasons it is necessary to conduct a wetland assessment of an area proposed for development.

The report together with its recommendations and mitigation measures should be used to minimise the impact of the proposed development.

1.2 The value of biodiversity

The diversity of life forms and their interaction with each other and the environment has made Earth a uniquely habitable place for humans. Biodiversity sustains human livelihoods and life itself. Although our dependence on biodiversity has become less tangible and apparent, it remains critically important.

The balancing of atmospheric gases through photosynthesis and carbon sequestration is reliant on biodiversity, while an estimated 40% of the global economy is based on biological products and processes.

Biodiversity is the basis of innumerable environmental services that keep us and the natural environment alive. These services range from the provision of clean water and watershed services to the recycling of nutrients and pollution. These ecosystem services include:

- Soil formation and maintenance of soil fertility.
- Primary production through photosynthesis as the supportive foundation for all life.
- Provision of food, fuel and fibre.
- Provision of shelter and building materials.
- Regulation of water flows and the maintenance of water quality.
- Regulation and purification of atmospheric gases.
- Moderation of climate and weather.
- Detoxification and decomposition of wastes.
- Pollination of plants, including many crops.
- Control of pests and diseases.
- Maintenance of genetic resources.

2. Scope and limitations

- To evaluate the present state of the vegetation and ecological functioning of the area proposed for the cemetery.
- To identify possible negative impacts that could be caused by the proposed cemetery with special relevance to the depression wetland.
- Identify and delineate the depression wetland including adjacent wetlands and ascertain condition and status therefore and recommend mitigation.

2.1 Vegetation

Aspects of the vegetation that will be assessed include:

- The vegetation types of the region with their relevance to the proposed site.
- The overall status of the vegetation on site.
- Species composition with the emphasis on dominant-, rare- and endangered species.

The amount of disturbance present on the site assessed according to:

- The amount of grazing impacts.
- Disturbance caused by human impacts.
- Other disturbances.

2.2 Wetlands

Aspects of the wetlands that will be assessed include:

- Identification and delineation of watercourses including rivers, streams, pans and wetlands.
- Describe condition and status of wetlands and importance relative to the larger system.
- Conduct habitat integrity assessment to inform the condition and status of wetlands.

2.3 Limitations

Due to the current drought and time of year several annual and bulbous species may not be present and may have been overlooked.

Due to high levels of overgrazing coupled with the current drought several grass species may have been overlooked as they would be unidentifiable without inflorescences.

3. Methodology

3.1 Several literature works were used for additional information.

Vegetation:
Red Data List (Raymondo *et al.* 2009)
Vegetation types (Mucina & Rutherford 2006)
Field guides used for species identification (Bromilow 1995, 2010, Coates-Palgrave 2002, Manning 2009, Moffett 1997, Van Oudtshoorn 2004, Van Wyk & Malan 1998, Van Wyk & Van Wyk 1997, Venter & Joubert 1985).

Wetland methodology, delineation and identification:
Department of Water Affairs and Forestry 2004, 2005, Collins 2006, Macfarlane *et al* 2014, Marnewecke & Kotze 1999, Nel *et al* 2011, SANBI 2009.

3.2 Survey

The site was assessed by means of transects.

Noted species include rare and dominant species.
The broad vegetation types present on the site were determined.
The state of the environment was assessed in terms of condition, grazing impacts, disturbance by humans, erosion and presence of invader and exotic species.

Animal species were also noted.
The state of the habitat was also assessed.

The depression wetland and adjacent wetlands were identified and surveyed where they were affected by the cemetery.
These systems were delineated by use of topography (land form and drainage pattern) and riparian vegetation.
The following were used to determine and delineate the rivers, streams, pans and wetlands:

- Department of Water Affairs and Forestry. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Edition 1. Department of Water Affairs and Forestry, Pretoria.
- Marnewecke, G. & Kotze, D. 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

The following were used to determine the sensitivity or importance of these identified watercourses:

- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.

- Government of South Africa. 2008. National Protected Area Expansion Strategy for South Africa 2008: Priorities for expanding the protected area network for ecological sustainability and climate change adaptation. Government of South Africa, Pretoria.

These guidelines provide the characteristics which can be utilised to determine if a wetland or watercourse is present and also aids in determining the boundary of these systems.

The following were utilised to inform the condition and status of watercourses:

- Kleynhans, C.J., Louw, M.D. & Graham, M. 2008. Module G: EcoClassification and EcoStatus determination in River EcoClassification: Index of Habitat Integrity. Joint Water Research Commission and Department of Water Affairs and Forestry report. WRC Report No. TT 377-08.

3.3 Criteria used to assess sites

Several criteria were used to assess the site and determine the overall status of the environment.

Vegetation characteristics
Characteristics of the vegetation in its current state. The diversity of species, sensitivity of habitats and importance of the ecology as a whole.

Habitat diversity and species richness: normally a function of locality, habitat diversity and climatic conditions.
Scoring: Wide variety of species occupying a variety of niches – 1, Variety of species occupying a single nich – 2, Single species dominance over a large area containing a low diversity of species – 3.

Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species can potentially be a fatal flaw.
Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely – 3.

Ecological function: All plant communities play a role in the ecosystem. The ecological importance of all areas though, can vary significantly e.g. wetlands, drainage lines, ecotones, etc.
Scoring: Ecological function critical for greater system – 1, Ecological function of medium importance – 2, No special ecological function (system will not fail if absent) – 3.

Degree of rarity/conservation value:
Scoring: Very rare and/or in pristine condition – 1, Fair to good condition and/or relatively rare – 2, Not rare, degraded and/or poorly conserved – 3.

Vegetation condition
The sites are compared to a benchmark site in a good to excellent condition. Vegetation management practises (e.g. grazing regime, fire, management, etc.) can have a marked impact on the condition of the vegetation.

Percentage ground cover: Ground cover is under normal and natural conditions a function of climate and biophysical characteristics. Under poor grazing management, ground cover is one of the first signs of vegetation degradation.
Scoring: Good to excellent – 1, Fair – 2, Poor – 3.

Vegetation structure: This is the ratio between tree, shrub, sub-shrubs and grass layers. The ratio could be affected by grazing and browsing by animals.
Scoring: All layers still intact and showing specimens of all age classes – 1, Sub-shrubs and/or grass layers highly grazed while tree layer still fairly intact (bush partly opened up) – 2, Mono-layered structure often dominated by a few unpalatable species (presence of barren patches notable) – 3.

Infestation with exotic weeds and invader plants or encroachers:
Scoring: No or very slight infestation levels by weeds and invaders – 1, Medium infestation by one or more species – 2, Several weed and invader species present and high occurrence of one or more species – 3.

Degree of grazing/browsing impact:
Scoring: No or very slight notable signs of browsing and/or grazing – 1, Some browse lines evident, shrubs shows signs of browsing, grass layer grazed though still intact – 2, Clear browse line on trees, shrubs heavily pruned and grass layer almost absent – 3.

Signs of erosion: The formation of erosion scars can often give an indication of the severity and/or duration of vegetation degradation.
Scoring: No or very little signs of soil erosion – 1, Small erosion gullies present and/or evidence of slight sheet erosion – 2, Gully erosion well developed (medium to large dongas) and/or sheet erosion removed the topsoil over large areas – 3.

Faunal characteristics
Presence of rare and endangered species: The actual occurrence or potential occurrence of rare or endangered species on a proposed site plays a large role on the feasibility of a development. Depending on the status and provincial conservation policy, presence of a Red Data species or very unique and sensitive habitats can potentially be a fatal flaw.
Scoring: Occurrence actual or highly likely – 1, Occurrence possible – 2, Occurrence highly unlikely.

3.4 Biodiversity sensitivity rating (BSR)

The total scores for the criteria above were used to determine the biodiversity sensitivity ranking for the sites. On a scale of 0 – 30, six different classes are described to assess the suitability of the sites to be developed. The different classes are described in the table below:

Table 1: Biodiversity sensitivity ranking

BSR	BSR general floral description	Floral score equating to BSR class
Ideal (5)	Vegetation is totally transformed or in a highly degraded state, generally has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area has lost its inherent ecological function. The area has no conservation value and potential for successful rehabilitation is very low. The site is ideal for the proposed development.	29 – 30
Preferred (4)	Vegetation is in an advanced state of degradation, has a low level of species diversity, no species of concern and/or has a high level of invasive plants. The area's ecological function is seriously hampered, has a very low conservation value and the potential for successful rehabilitation is low. The area is preferred for the proposed development.	26 – 28
Acceptable (3)	Vegetation is notably degraded, has a medium level of species diversity although no species of concern are present. Invasive plants are present but are still controllable. The area's ecological function is still intact but may be hampered by the current levels of degradation. Successful rehabilitation of the area is possible. The conservation value is regarded as low. The area is acceptable for the proposed development.	21 – 25
Not preferred (2)	The area is in a good condition although signs of disturbance are present. Species diversity is high and species of concern may be present. The ecological function is intact and very little rehabilitation is needed. The area is of medium conservation importance. The area is not preferred for the proposed development.	11 – 20
Sensitive (1)	The vegetation is in a pristine or near pristine condition. Very little signs of disturbance other than those needed for successful management are present. The species diversity is very high with several species of concern known to be present. Ecological functioning is intact and the conservation importance is high. The area is regarded as sensitive and not suitable for the proposed development.	0 - 10

4. Ecological overview of the site

4.1 Overview of ecology and vegetation types

According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 3). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation. This is also the case on the site which consists of old ploughed fields and although the vegetation has rehabilitated itself the grassland is not considered representative of this vegetation type and in a degraded condition.

The topography of the site is relatively flat with a slight increase in slope to the south. The site itself consists of old ploughed fields and historical furrows are still visible in many areas. As a consequence the grassland is of secondary establishment and degraded. Several windrows of the exotic Bluegum Tree (*Eucalyptus camaldulensis*) occurs to the west and south of the site. Residential areas occur in close proximity to the north of the site (approximately 2 km) (Map 3). Small demolished structures are also evident around the depression wetland on the site, most likely watering or feeding troughs, windmill, dam or similar associated structures.

The site contains a large depression or pan in the centre/western portion of the site (Map 1 & 2). This seems to be a natural system but has however also been degraded through ploughing and retention berms to contain surface water. In addition, two artificial berms/dams occur to the north west of the site (approximately 200 m) (Map 3). None of these waterbodies are fed by a defined watercourse and therefore have no inlet. They also do not contain a defined outlet. They are all fed by surface inflow from the surroundings and function as groundwater recharge systems.

The site is currently utilised for communal grazing and consequently is subjected to heavy overgrazing. Due to the current drought, overgrazing and the site consisting of old ploughed fields the grass layer is heavily degraded and climax species are largely absent. Exotic weeds are common and also indicative of the degraded condition of the grassland (Appendix C).

The grass layer is dominated by several grass species and dwarf shrubs. Grass species include *Arsitida congesta, Chloris virgata, Eragrostis lehmanniana, Eragrostis gummiflua* and *Themeda triandra*. Dwarf shrubs include *Solanum incanum, Lycium horridumHelichrysum zeyheri, Ruschia hamata, Hertia pallens, Berkheya macrocephala* and *Rosenia humilis*. Several of these species are indicators of disturbance and overgrazing. Other herbs common on the site include *Sutera caerulea, Osteospermum scariosum, Wahlenbergia androsaceae, Vahlia capensis, Gazania krebsiana, Geigeria filifolia* and *Selago densiflorus*. Two identified bulb species, *Moraea pallida* and *Colchicum longipes*, are both widespread, common and ot protected. They are therefore of low conservation importance.

Trees and shrubs are scarce on the site and limited to *Ziziphus mucronata* and *Asparagus larcinus*.

Exotic weeds are common on the site and consists of *Argemone ochroleuca, Alternanthera nodiflora, Polygonum aviculare, Plantago major* and *Phyla nodiflora*. These also indicate the disturbed nature of the site.

The vegetation and general ecology of the site indicates the transformed and highly degraded condition of the site. Previous ploughing of the area has irreversibly transformed the natural vegetation type and due to the disturbance of the soil profile and historical plough furrows it is highly unlikely that rehabilitation of the vegetation to the natural condition will be feasible. Current high levels of grazing and trampling by domestic stock has also contributed to the disturbance of the site and alteration of the species composition.

4.2 Wetland Delineation

The pan system which will be affected by the proposed cemetery will be discussed below.

The term watercourse refers to a river, stream, wetland or pan. The National Water Act (NWA, 1998) includes rivers, streams, pans and wetlands in the definition of the term watercourse. This definition follows:

Watercourse means:
- A river or spring.
- A natural channel in which water flows regularly or intermittently.
- A wetland, lake or dam into which water flows.
- Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

Riparian habitat is an accepted indicator of watercourses used to delineate the extent of wetlands, rivers, streams and pans (Department of Water Affairs and Forestry 2005).

Obligate wetland vegetation was utilised to determine the presence and border of wetlands. Soil samples were used to determine the border and also to confirm the presence of wetland soils where obligate wetland vegetation indicated wetland conditions (Appendix B). Soil samples were investigated for the presence of anaerobic evidence which characterises wetland soils. The soil samples taken within the pan on the site clearly indicate that wetland conditions are present within the pan. Due to previous ploughing of the pan and the disturbance on the site the pan and its border is not readily distinguishable from the surroundings. The pan does form a shallow depression which enables it to be identified to some degree. Another aspect which enables the identification of the pan system is the high abundance of termite mounds on the site but which are absent from the pan system. This most likely indicates unsuitable conditions for the termites within the pan where their nests will be subjected to periodic flooding. The obligate wetland species and soil characteristics clearly indicate definite wetland conditions within the pan. The grass, *Leptochloa fusca*, is abundant within the pan and is listed as an obligate wetland species (DWAF 2008). This means that the species is confined to wetlands and cannot occur in conditions outside of these systems. As a result, where it occurs, wetland conditions can be considered to occur. The pan system is seasonal in nature and will only contain water after rainfall events. The pan does not have any defined in- or outflow. It is fed by surface runoff from the surrounding area and functions as a groundwater recharge.

The seasonal pan system in the study area can be categorised as a depression wetland (SANBI 2009):

A depression wetland is a basin shaped area with a closed elevation contour with an increase in depth from the perimeter to the central areas that allows for the accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent. Dominant water sources are precipitation, ground water discharge, interflow and (diffuse or concentrated) overland flow. For 'depressions with channeled inflow', concentrated overland flow is typically a major source of water for the wetland, whereas this is not the case for 'depressions without channeled inflow'. Dominant hydrodynamics are (primarily seasonal) vertical fluctuations. Depressions may be flatbottomed (in which case they are often referred to as 'pans') or round-bottomed (in which case they are often referred to as 'basins'), and may have any combination of inlets and outlets or lack them completely. For 'exorheic depressions', water exits as concentrated surface flow while, for 'endorheic depressions', water exits by means of evaporation and infiltration.

This accurately describes the pan system on the site. The system on the site is flat bottomed and therefore a pan system, has no defined inflow and is endorheic. Th pan system is seasonal in nature and will only contain water after large rainfall events.

The pan was delineated by use of topography (land form and drainage pattern) and obligate wetland vegetation. The following guidelines and frameworks were used to determine and delineate the pan:

- Department of Water Affairs and Forestry. 2005. A practical field procedure for identification and delineation of wetlands and riparian areas. Edition 1. Department of Water Affairs and Forestry, Pretoria.
- Marnewecke & Kotze 1999. Appendix W6: Guidelines for delineation of wetland boundary and wetland zones. In: MacKay (Ed.), H. Resource directed measures for protection of water resources: wetland ecosystems. Department of Water Affairs and Forestry, Pretoria.

The pan system on the site has been degraded by several impacts. Most notably the previous ploughing of the pan has disturbed the soil profile and formed plough furrows which are still visible. This causes a disruption of the pan surface and will alter infiltration and inflow into the pan as the furrows acts as channels and berms. Low berms have also been erected in the eastern portion of the pan which also causes alteration of water flow within the pan. The heavy and sustained grazing of the site leads to decreased vegetation cover which increases erosion and runoff and will contribute to sedimentation of the pan. Coupled with grazing is a high amount of trampling which disturbs the floor of the pan, destroys vegetation and will impact negatively on the pan. This will alter the infiltration of the pan. Together with the high grazing is an increase in manure which will alter the nutrient levels of the pan.

The pan functions in the form of groundwater recharge. It therefore still performs an important ecosystem function although highly degraded. It will also be unfeasible to include the pan within the cemetery layout as graves will be subjected to annual flooding. It is therefore recommended that the pan be excluded from the cemetery layout. The condition of the pan can be improved and it can be incorporated into the layout to improve the aesthetic feel of the cemetery.

In order to establish a suitable buffer for the pan the Buffer Zone Tool for the Determination of Aquatic Impact Buffers and Additional Setback Requirements for Wetland Ecosystems (2014) was utilised (Appendix D). This determination was also done in conjunction with Macfarlane *et al* (2014). It should be noted that the buffers determined by this model only caters for impacts associated with diffuse-source surface runoff. By using the above tools a suitable buffer around the pan was determined at 15 meters (Map 2).

Adjacent to the site two artificial dams or berms are situated which forms artificial impoundments with wetland conditions (Map 3). These are also listed within the National Freshwater Ecosystems Priority Areas (NFEPA) as artificial systems and confirmed during the site survey. They are therefore of low sensitivity although they still form part of the natural drainage pattern.

The pan on the site is however natural and confirmed during the site survey as well as by the NFEPA (Map 3). The impacts on the pan should be kept to a minimum despite the highly degraded nature of the pan. The recommended buffer of 15 meters should be kept around the pan (Map 2). The layout of grave sites within the pan will not be feasible as they will be flooded annually.

5. Site specific results

Habitat diversity and species richness:

The habitat diversity within and surrounding the pan is exceedingly low and transformed from the natural condition. Previous ploughing has caused transformation of the surface topography which has then caused transformation of the habitat. As a result of the transformed nature of the habitat the species diversity is also low and exotic weeds are common.

Presence of rare and endangered species:

The site does not contain any protected, rare or endangered species and due to the transformed nature and degraded condition of the site it is considered highly unlikely that such species would occur. These species are often habitat specific and only occur in areas where the disturbance is still relatively low. Due to the previous ploughing of the site the habitat has been transformed and is considered unsuitable for rare or endangered species which require specific habitat conditions.

Ecological function:

The ecological function of the seasonal pan has undoubtedly been altered. Currently the pan still function as water sink whereby recharge of the groundwater takes place. The ability of the pan to perform bioremediation is considered decreased. The ecological function of the pan as habitat for wetland species is also low due to its degraded and transformed nature. The pans ability to hold water and rate of infiltration and other hydro dynamics will also be altered from the natural condition.

Degree of rarity/conservation value:

According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 3). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation. This is also the case on the site which consists of old ploughed fields and although the vegetation has rehabilitated itself the grassland is not considered representative of this vegetation type and in a degraded condition. The conservation value of the vegetation on the site is therefore considered relatively low.

The seasonal pan on the site does have a high conservation value as it still performs an important function in terms of groundwater recharge.

Percentage ground cover:

Percentage ground cover at the site is relatively low. This is due to the previous ploughing of the site and current overgrazing by domestic stock.

Vegetation structure:

The vegetation structure has been transformed to some degree. Degradation of the site through ploughing and overgrazing has caused a lowering of the vegetation structure height and has caused an increase in dwarf shrubs.

Infestation with exotic weeds and invader plants:

Exotic weeds are common on the site (Appendix C).

Degree of grazing/browsing impact:
Overgrazing on the site is exceptionally high due to the site as communal grazing by domestic stock.

Signs of erosion:
Erosion on the site is considered moderate. Previous ploughing and current overgrazing has cause plough furrows and decreased vegetation cover which increases erosion. The low slope of the site prevents extensive erosion.

Terrestrial animals:
Due to the degraded condition of the pan it is considered unlikely that the pan will support a significant mammal population.

Table 3: Biodiversity Sensitivity Rating for the proposed cemetery.

	Low (3)	Medium (2)	High (1)
Vegetation characteristics			
Habitat diversity & Species richness	3		
Presence of rare and endangered species	3		
Ecological function		2	
Uniqueness/conservation value		2	
Vegetation condition			
Percentage ground cover	3		
Vegetation structure		2	
Infestation with exotic weeds and invader plants or encroachers	3		
Degree of grazing/browsing impact	3		
Signs of erosion		2	
Terrestrial animal characteristics			
Presence of rare and endangered species	3		
Sub total	18	8	0
Total		26	

6. Biodiversity sensitivity rating (BSR) interpretation

Table 4: Interpretation of Biodiversity Sensitivity Rating.

Site	Score	Site Preference Rating	Value
Nalisview Cemetery	26	Preferred	4

7. Discussion and conclusions

The proposed cemetery around the seasonal pan has been rated as being preferred for the development.

According to Mucina & Rutherford (2006) the area consists of Bloemfontein Dry Grassland (Gh 5). This vegetation type is currently listed as being Vulnerable (VU) and therefore a Threatened Ecosystem (National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)) (Map 3). Large portions of this grassland has been transformed by dryland crop cultivation and urbanisation. This is also the case on the site which consists of old ploughed fields and although the vegetation has rehabilitated itself the grassland is not considered representative of this vegetation type and in a degraded condition. The conservation value of the vegetation on the site is therefore considered relatively low.

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The site contains a large depression or pan in the centre/western portion of the site (Map 1 & 2). This seems to be a natural system but has however also been degraded through ploughing and retention berms to contain surface water. In addition, two artificial berms/dams occur to the north west of the site (approximately 200 m) (Map 3). None of these waterbodies are fed by a defined watercourse and therefore have no inlet. They also do not contain a defined outlet. They are all fed by surface inflow from the surroundings and function as groundwater recharge systems.

The vegetation and general ecology of the site indicates the transformed and highly degraded condition of the site. Previous ploughing of the area has irreversibly transformed the natural vegetation type and due to the disturbance of the soil profile and historical plough furrows it is highly unlikely that rehabilitation of the vegetation to the natural condition will be feasible. Current high levels of grazing and trampling by domestic stock has also contributed to the disturbance of the site and alteration of the species composition.

Obligate wetland vegetation was utilised to determine the presence and border of wetlands. Soil samples were used to determine the border and also to confirm the presence of wetland soils where obligate wetland vegetation indicated wetland conditions (Appendix B). The soil samples taken within the pan on the site clearly indicate that wetland conditions are present within the pan. Due to previous ploughing of the pan and the disturbance on the site the pan and its border is not readily distinguishable from the surroundings. The pan does form a shallow depression which enables it to be identified to some degree. The obligate wetland species and soil characteristics clearly indicate definite wetland conditions within the pan. The grass, *Leptochloa fusca*, is abundant within the pan and is listed as an obligate wetland species (DWAF 2008). The pan system is seasonal in nature and will only contain water after rainfall events. The pan does not have any defined in- or outflow. It is fed by surface runoff from the surrounding area and functions as a groundwater recharge.

The pan system on the site has been degraded by several impacts. Most notably the previous ploughing of the pan has disturbed the soil profile and formed plough furrows which are still visible. This causes a disruption of the pan surface and will alter infiltration and inflow into the pan as the furrows acts as channels and berms. Low berms have also been erected in the eastern portion of the pan which also causes alteration of water flow within the pan. The heavy and sustained grazing of the site leads to decreased vegetation cover which increases erosion and runoff and will contribute to sedimentation of the pan. Coupled with grazing is a high amount of trampling which disturbs the floor of the pan, destroys vegetation and will impact negatively on the pan. This will alter the infiltration of the pan. Together with the high grazing is an increase in manure which will alter the nutrient levels of the pan.

The pan functions in the form of groundwater recharge. It therefore still performs an important ecosystem function although highly degraded. It will also be unfeasible to include the pan within the cemetery layout as graves will be subjected to annual flooding. It is therefore recommended that the pan be excluded from the cemetery layout. The condition of the pan can be improved and it can be incorporated into the layout to improve the aesthetic feel of the cemetery.

In order to establish a suitable buffer for the pan the Buffer Zone Tool for the Determination of Aquatic Impact Buffers and Additional Setback Requirements for Wetland Ecosystems (2014) was utilised (Appendix D). This determination was also done in conjunction with Macfarlane *et al* (2014). It should be noted that the buffers determined by this model only caters for impacts associated with diffuse-source surface runoff. By using the above tools a suitable buffer around the pan was determined at 15 meters (Map 2).

Adjacent to the site two artificial dams or berms are situated which forms artificial impoundments with wetland conditions (Map 3). These are also listed within the National Freshwater Ecosystems Priority Areas (NFEPA) as artificial systems and confirmed during the site survey. They are therefore of low sensitivity although they still form part of the natural drainage pattern.

The pan on the site is however natural and confirmed during the site survey as well as by the NFEPA (Map 3). The impacts on the pan should be kept to a minimum despite the highly degraded nature of the pan. The recommended buffer of 15 meters should be kept around the pan (Map 2). The layout of grave sites within the pan will not be feasible as they will be flooded annually.

8. Recommendations

- The recommended buffer zone of 15 meters around the pan, as determined by the Buffer Zone Tool for the Determination of Aquatic Impact Buffers and Additional Setback Requirements for Wetland Ecosystems (2014), should be maintained (Appendix D) (Map 2).

- Problematic weeds must be eradicated where these establish on the cemetery site (Appendix C). The pan especially should be monitored for establishment of weeds.

- The site should be regularly inspected for erosion and this remedied where required. Storm water management measures should also be implemented to prevent increased runoff velocity and erosion.

- The seasonal pan should be treated as a no-go area and no dumping of soil, material, waste or any other material associated with the construction phase should occur in the pan.

- No hunting, harming, capturing or trapping must be allowed and this must be strictly prohibited.

- Monitoring of construction including weed establishment and erosion should take place and should also specifically include any impacts or alterations to the pan.

- The necessary authorisations must be acquired from Department of Water Affairs (DWA) as well as the Department of Environmental Affairs (DEA) for the construction of the cemetery in close proximity to the seasonal pan and surrounding artificial impoundments.

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Annexure A: Maps and Site photos

Locality map for the proposed construction of a cemetery on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings , Bloemfontein, Free State Province.

Map 1: Location of the proposed construction of a cemetery on the Remainder of the Farm Nalisiew 2835. Note the seasonal pan is clearly visible in the centre of the site.

Preparred for:
MDA Consultants
9 Barnes Street
Westdene
9301

Legend:

- N6 National Road
- 🟥 Site boundary

Map Information

Spheroid: WGS 84

Scale:

0 250 500 750
Scale (m)

Environmental Consultant
EKO Environmental
Contact Darius van Rensburg at:
darius@ekogroup.co.za
Suite 158, P/Bag X01, Brandhof, 9324
Tel: 051 4444 700
Fax: 086 6976 132

Wetland delineation for the proposed construction of a cemetery on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings , Bloemfontein, Free State Province.

Map 2: Wetland delineation of the proposed construction of a cemetery on the Remainder of the Farm Nalisiew 2835. The seasonal pan and the recommended 15 meter buffer is indicated. Note that plough furrows are still visible on this aerial image.

Preparred for:
MDA Consultants
9 Barnes Street
Westdene
9301

Legend:

🟨 **Seasonal Pan**

🟥 **15 meter buffer**

Map Information

Spheroid: WGS 84

Scale: 1:4000

Quantum GIS

Environmental Consultant
EKO Environmental
Contact Darius van Rensburg at:
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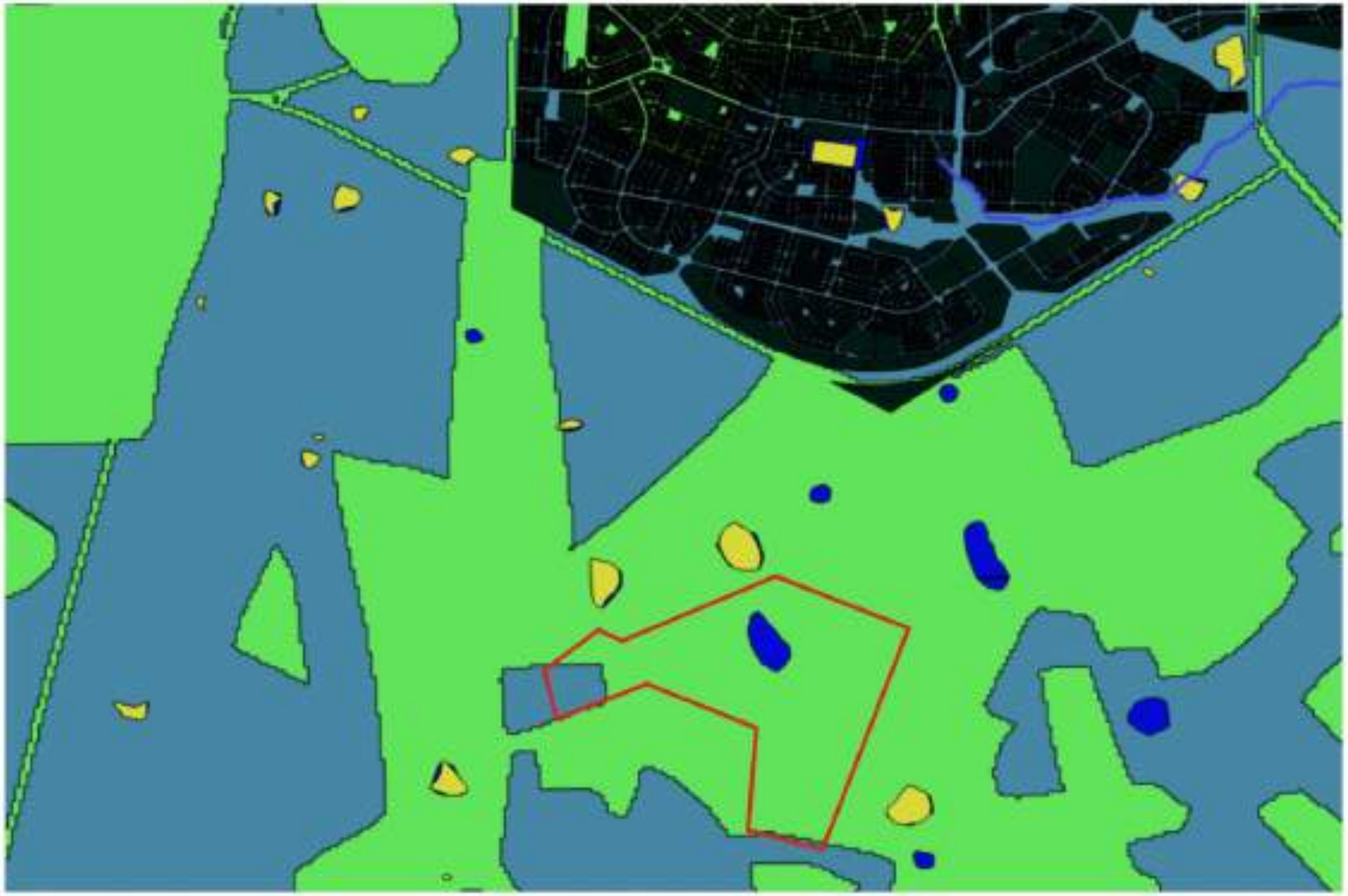
Tel: 051 4444 700
Fax: 086 6976 132

General ecology for the proposed construction of a cemetery on the Remainder of the Farm Nalisview 2835 in the Paradys Small Holdings , Bloemfontein, Free State Province.



Map 3: General ecology of the proposed construction of a cemetery on the Remainder of the Farm Nalisiew 2835. Note that the site is not included as part of the natural Threatened Ecosystems. Note also that the pan on the site indicated as a natural wetland while the two impoundments north of the site is indicated as artificial wetlands.

Preparred for:
MDA Consultants
9 Barnes Street
Westdene
9301

Legend:

- 🟥 Approximate site boundary
- 🟦 Natural wetlands
- 🟨 Artificial wetlands
- 🟦 Threatened Ecosystems
- ⬛ Urban areas

Map Information

Spheroid: WGS 84

Scale: 1:35 000

Quantum GIS

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Fax: 086 6976 132

Figure 1: Panorama of the seasonal pan seen from the north east toward the south west. This is seen from the northern boundary of the pan.

Figure 2: Panorama of the seasonal pan. The grass tufts in the foreground (red) is the obligate wetland species, *Leptochloa fusca*.

Figure 3: Panorama of the seasonal pan from the south western border. Note grazing by cattle within the pan.

Figure 4: Panorama of the area to the south of the pan. Note the decrease of termite mounds nearer to the pan (red arrow).

Figure 5: The tufts of the obligate wetland species, *Leptochloa fusca*, which can be reliably used to indicate the seasonal pan on the site.

Figure 6: View of the site with historical plough furrows still visible (red lines).

Figure 7: View of the seasonal pan at the south western end. Note grazing by cattle. The pan is over utilised as communal grazing for domestic stock.

Appendix B: Soil Samples

Obligate wetland vegetation was utilised to determine the presence and border of wetlands. Soil samples were used to confirm the wetland conditions in the seasonal pan. Soil samples were taken at approximately 10 meter intervals. Soil samples were investigated for the presence of anaerobic evidence which characterises wetland soils.

Within wetlands the hydrological regime differs due to the topography and landscape. For instance; a valley bottom wetland would have a main channel that is below the water table and consequently permanently saturated, i.e. permanent zone of wetness. As you move away from the main channel the wetland would become dependent on flooding in order to be saturated. As a result along this hydrological regime areas of permanent saturation, seasonal and temporary saturation would occur. At some point along this gradient the saturation of the soil would be insufficient to develop reduced soil conditions and therefore will not be considered as wetland.

Within wetland soils the pores between soil particles are filled with water instead of atmosphere. As a result available oxygen is consumed by microbes and plantroots and due to the slow rate of oxygen diffusion oxygen is depleted and biological activity continues in anaerobic conditions and this causes the soil to become reduced.

Reduction of wetland soils is a result of bacteria decomposing organic material. As bacteria in saturated soils deplete the dissolved oxygen they start to produce organic chemicals that reduce metals. In oxidised soils the metals in the soil give it a red, brown, yellow or orange colour. When these soils are saturated and metals reduced the soil attains a grey matrix characteristic of wetland soils.

Within this reduction taking place in the wetland soils there may be reduced matrix, redox depletions and redox concentrations. The reduced matrix is characterised by a low chroma and therefore a grey soil matrix. Redox depletions result in the grey bodies within the soil where metals have been stripped out. Redox concentrations result in mottles within the grey matrix with variable shape and are recognised as blotches or spots, red and yellow in colour.

Soil wetness indicator is used as the primary indicator of wetlands. The colour of various soil components are often the most diagnostic indicator of hydromorphic soils. Colours of these components are strongly influenced by the frequency and duration of soil saturation. Generally, the higher the duration and frequency of saturation in a soil profile, the more prominent grey colours become in the soil matrix.

Coloured mottles, another feature of hydromorphic soils, are usually absent in permanently saturated soils and are at their most prominent in seasonally saturated soils, becoming less abundant in temporarily saturated soils until they disappear altogether in dry soils (Collins 2005).

The following soil wetness indicators can be used to determine the permanent, seasonal and temporary wetness zones. The boundary of the wetland is defined as the outer edge of the temporary zone of wetness and is characterised by a minimal grey matrix (<10%), few high chroma mottles and short periods of saturation (less than three months per year). The seasonal zone of wetness is characterised by a grey matrix (>10%), many low chroma mottles and significant periods of wetness (at least three months per year). The permanent zone of wetness is characterised by a prominent grey matrix, few to high chroma mottles, wetness all year round and sulphuric odour (rotten egg smell).

According to convention hydromorphic soil must display signs of wetness within 50 cm of the soil surface (DWAF 2005).

Table 1: Soil samples taken within and adjacent to the seasonal pan.

	
Soil sample taken a considerable distance from the seasonal pan. Note the prominent red colouration of the soil, no mottling present and a grey matrix absent. This indicates no wetland conditions.	Soil sample taken outside the border of the seasonal pan. Note again the red colour, no mottling or grey matrix present. This therefore indicates no wetland conditions present.
	
Soil sample taken at the border of the seasonal pan. Note that the red colouration of the soil is much less. However, no mottling or grey matrix is present indicating no wetland conditions.	Soil sample taken within the seasonal pan. A low grey matrix (<10%) is present and clear mottling is also present (red). This is clearly indicative of seasonal wetland conditions.

	
Soil sample taken within the seasonal pan. Note prominent grey matrix (>10%) and clear mottling (red). This clearly indicates seasonal wetland conditions.	Soil sample taken within the seasonal pan. Note prominent grey matrix (>10%) and clear mottling (red). This clearly indicates seasonal wetland conditions.

Table 2: Soil sample taken within the artificial impoundments adjacent to the site.

	
Soil sample taken within the artificial impoundment north east of the site. A grey matrix (<10%) is present with distinct mottling. This indicates seasonal wetland conditions in this impoundment.	Soil sample taken within the artificial impoundment north west of the site. A grey matrix (<10%) is present with distinct mottling. This indicates seasonal wetland conditions in this impoundment.

Appendix C: Likely invader weed species

Invader weed species on the cemetery site may not be limited to these species but these are considered to be the most likely and significant invaders to occur. Additional sources should be consulted to confirm invader weed species as well as the best method to eradicate them.

According to the Conservation of Agricultural Resources Act, No. 43 of 1983 any Category 1 declared plants must be controlled by the land user on whose land such plants are growing.

Cirsium vulgare
Scotch Thistle/Skotse Dissel

Type: Weed
Category: 1

Mechanical removal is effective to control this weed. Cutting should be done below soil level and no leaves should remain.

Xanthium strumarium
Large cocklebur/Kankerroos

Type: Weed
Category: 1

Mechanical removal by hand is effective to control this weed. Cutting is not recommended as this leads to re-sprouting.

Several chemicals have also been registered for control: bromoxynil, metribuzin, cyanazine/atrazine, bendioxide, MCPB, MCPA-K and 2,4-D(A), (T), (I).

Argemone ochroleuca
Mexican Poppy

Type: Weed
Category: 1

Mechanical removal by hand is effective against this weed.

Several chemicals have also been registered for control: 2, 4-D, 2, 4-DB, dicamba, diuron, fluroxypyr, hexazinone, isoproturon, karbutilate, MCPA, picloram and terbutryn.

Solanum eleagnifolium
Silver-leaf Bitter Apple/Satansbos

Type: Wees
Category: 1

Chemical control is most effective for control of this weed. Garlon 4 (triclopyr) is the only registered herbicide for control.

Datura ferox
Large thorn-apple/Grootstinkblaar

Type: weed
Category: 1

Mechanical removal by hand is effective for this weed.

Opuntia spp.
Prickly Pear

Type: Weed
Category: 1

Mechanical control is effective for single specimens. All parts of the plant must be removed and burned.

Chemical is most effective control method. Monosodium methanearsonate (MSMA) and glyphostae must be injected into the stem as concentrated solutions.

Appendix D: Buffer Zone Tool for the Determination of Aquatic Impact Buffers and Additional Setback Requirements for Wetland Ecosystems (2014)

For the complete Buffer Report please contact the author of this report.

Name of Assessor	Darius	**Project Details**	Nalisview Cemetary	**Date of Assessment**	20-Oct-16

Step 1: Define objectives and scope of assessment and determine the most appropriate level of assessment

Level of assessment	Site-based

Step 2: Map and categorize water resources in the study area

Approach used to delineate the wetland boundary?	Site-based delineation	**Wetland type**	Depression

Step 3: Refer to the DWA management objectives for mapped water resources or develop surrogate objectives

Present Ecological State	E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
Ecological importance & sensitivity	Very Low	Features are not ecologically important and sensitive at any scale. The biodiversity of these areas is typically ubiquitous with low sensitivity to anthropogenic disturbances and play an insignificant role in providing ecological services.
Management Objective	Maintain	

Step 4: Assess the risks from proposed developments and define mitigation measures necessary for protecting mapped water resources in the study area

Assess threats of planned activities on water resources and determine desktop buffer requirements

Proposed development / activity	**Sector**	Civic and Social	This category includes buildings and land associated with public and private service providers and administrative or government functions including education, health, pension offices, museums, libraries, correctional facilities and community halls.
	Sub-Sector	Cemetery	Land used for public and private cemeteries, memorial parks, funeral chapel and crematoria.

Climatic factors	**MAP Class**	401 - 600mm	**Rainfall Intensity**	Zone 4

Overall size	**Size of the wetland relative to (as a percentage of) its catchment**	**Average slope of the wetland's catchment**	**The inherent runoff potential of the soil in the wetland's catchment**	**The extent to which the wetland (HGM) setting is generally characterized by sub-surface water input**
(51-300 ha)	Intermediate (6-10%)	3-5%	Moderately low	Moderately low
Perimeter to area ratio	**Vulnerability of the HGM type to sediment accumulation**	**Vulnerability of the site to erosion given the site's slope and size**	**Extent of open water, particularly water that is naturally clear**	**Sensitivity of the vegetation to burial under sediment**
Low (<500 m per ha)	Depression – endorheic, Flat	Moderately Low (Vulnerability score: 2-3)	Very low (<0.5%)	High (e.g. short growing & slow colonizing)
Peat versus mineral soils	**Inherent level of nutrients in the landscape: is the wetland and its catchment underlain by sandstone?**	**Sensitivity of the vegetation to increased availability of nutrients**	**Sensitivity of the vegetation to toxic inputs, changes in acidity & salinization**	**Natural wetness regimes**
Mineral	No	Intermediate (e.g. short vegetation with moderate natural plant diversity)	Low (e.g. low natural diversity)	Dominated by seasonally saturated soils
Natural salinity levels	**Level of domestic use**	**Mean Annual Temperature**	Note: See the guideline document for further information on the rationale for indicator selection and how these attributes affect the sensitivity of wetlands to lateral inputs.	
Naturally saline systems	Low	Zone 2 (15.5 - 16.9 Deg C)		

Buffer attributes	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Slope of the buffer	Very Gentle (0 - 2%)			
Vegetation characteristics (Construction phase)	Moderately low: Moderately low density with moderate basal cover (e.g. Forests, shrub dominated vegetation / heavily grazed grassland)			
Vegetation characteristics (Operational phase)	Moderately low: Moderately low density with moderate basal cover (e.g. Forests, shrub dominated vegetation / heavily grazed grassland)			
Soil permeability	Low : Fine textured soils with low permeability (e.g. clay loam and clay).			
Topography of the buffer zone	Uniform topography: Smooth topography with no concentrated flow paths anticipated.			
Site-based aquatic impact buffer requirements (without additional mitigation measures)				
Construction Phase	**15**	**Not Assessed**	**Not Assessed**	**Not Assessed**
Operational Phase	**15**	**Not Assessed**	**Not Assessed**	**Not Assessed**

	Buffer Segment 1	Buffer Segment 2	Buffer Segment 3	Buffer Segment 4
Final aquatic impact buffer requirements (including practical management considerations)				
Construction Phase	**15**	**Not Assessed**	**Not Assessed**	**Not Assessed**
Operational Phase	**15**	**Not Assessed**	**Not Assessed**	**Not Assessed**
Final aquatic impact buffer requirement	**15**	**Not Assessed**	**Not Assessed**	**Not Assessed**
Rationale for any increases in final buffer requirements				

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- Waste license applications
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EKO-ENVIRONMENTAL

Nalisview Cemetery

Geohydrological Report

Version1.1

May 2017

TUCANA SOLUTIONS
Groundwater & Alternative Energy

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GEOHYDROLOGICAL REPORT

MAY 2017

FOR

MDA

PREPARED BY : C. VERMAAK

MSC. GEOHYDROLOGY

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GLOSSARY GEOHYDROLOGICAL & GEOLOGICAL TERMS AND ACRONYMS

GEOHYDROLOGICAL TERMS	DEFINITIONS
Aquiclude	An aquiclude is an impermeable geological unit that does not transmit water at all. Dense unfractured igneous or metamorphic rocks are typical aquiclude.
Aquitard	An aquitard is a geological unit that is permeable enough to transmit water in significant quantities when viewed over large and long periods, but its permeability is not sufficient to justify production boreholes being placed in it. Clays, loams and shales are typical aquitards.
Confined Aquifer	A confined aquifer is bounded above and below by an aquiclude. In a confined aquifer, the pressure of the water is usually higher than that of the atmosphere, so that if a borehole taps the aquifer, the water in it stands above the top of the aquifer, or even above the ground surface. We then often speak of a free-flowing or artesian borehole.
Dolomite	Also called Dolomitic Limestone that consists of mineral dolomite, calcite and magnesite
Diffusivity (KD/S)	The hydraulic diffusitivity is the ratio of the transmissivity and the storativity of a saturated aquifer. It governs the propagation of chances a hydraulic head in the aquifer. Diffusivity has the dimension of Lenght^2/Time
Borehole/Hydro census	A field survey by which all relevant information regarding groundwater is gathered. This typically includes yields, borehole equipment, groundwater levels, casing height/diameter, co-ordinates, potential pollution risks, photos etc.
Hydraulic Conductivity (K)	The hydraulic conductivity is the constant of proportionality in Darcy’s Law. It is defined as the volume of water that will move through a porous medium in a unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow.

Leaky Aquifer	A leaky aquifer or semi-confined aquifer, is an aquifer whose upper and lower boundaries is aquitards, or one boundary is an aquitard and the other is an aquiclude. Water is free to move through the aquitards, either upwards or downwards. If a leaky aquifer is in hydrological equilibrium, the water level in a borehole tapping it may coincide with the water table.
Porosity	The porosity of a rock is its property of containing pores or voids. With consolidated rocks and hard rocks, a distinction is made between primary porosity, which is present when the rock is formed and secondary porosity, which develops later as a result of solution or fracturing.
Specific Yield (S_Y)	The specific yield is the volume of water that an unconfined aquifer releases from storage per unit surface area or aquifer per unit decline of the water table. The values of the specific yield range from 0.01 to 0.3 and are much higher that the storativities of confined aquifers.
Storativity (S)	The storativity of a saturated confined aquifer of thickness D is the volume of water released from storage per unit surface area of the aquifer per unit decline in the component of hydraulic head normal to that surface.
Storativity Ratio	The storativity ratio is a parameter that controls the flow from the aquifer matrix blocks into the fractures of a confined fractured aquifer of the double-porosity type.
Sustainable Yield	The yield calculated from aquifer test pumping by a professional geohydrologist. The yield refers to the recommended abstraction rate and pumping schedule for continues use.
Transmissivity (KD or T)	Transmissivity is the product of the average hydraulic conductivity K and the saturated thickness of the aquifer D. Consequently, transmissivity is the rate of flow under a unit hydraulic gradient through a cross-section of unit width over the whole saturated thickness of the aquifer.
Unconfined Aquifer	An unconfined aquifer, also known as a water table aquifer, is bounded below by an aquiclude, but is not restricted by any

	confining layer above it. Its upper boundary is the water table and is free to rise and fall.
Recharge	Groundwater recharge or deep drainage or deep percolation is a hydrologic process where water moves downward from surface water to groundwater. This process usually occurs in the vadose zone below plant roots and is often expressed as a flux to the water table surface. Recharge occurs both naturally and anthropologically, where rainwater and or reclaimed water is routed to the subsurface.
GEOLOGICAL TERMS	
Argillaceous rock	A type of sedimentary rock that contains a substantial amount of clay or clay-like compounds
Sedimentary rock	A type of rock that formed by sedimentation material on the earth surface or in water bodies
Intrusive rock	Rock that formed due to the cooling of magma that forced its way into fractures and cavities of other rock types without reaching the surface. (usually large crystal sizes)

Acronym/Abbreviation	**Definition**
CRD	Cumulative Rainfall departure
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
magl	Metres Above Ground Level
MAP	Mean Annual Precipitation
mbgl	Metres Below Ground Level
mamsl	Metres Above Mean Sea Level
NGA	National Groundwater Archive
TOR	Terms of Reference
WRC	Water Research Commission

1 Introduction

Tucana Solutions was appointed by ***MDA*** to perform a geohydrological assessment for the proposed Nalisview Cemetery in the vicinity of Bloemfontein. The area of study was pre-approved by MDA.

Appointment detail:

Reference Number: TucanaGW-17-02-CV436

Appointment Date: 2017/02/22

Submission Date: 2017/05/11

The preliminary geohydrological assessment will include the following scope of work:

- Desk study in order to obtain a good understanding of the area and the geohydrological setting.
- Site visit to confirm desk study information
- A hydrocensus which includes collecting the following information: borehole coordinates, water levels, purpose of borehole, abstraction volumes and borehole depth.
- An aquifer descriptions of the site.
- Conceptualization of the geohydrology on site.
- Preliminary Impact assessment of the proposed development on the geohydrological setting

This report aims to comprehensively address the above-mentioned items.

2 Limitations

The statements, opinions, and conclusions contained in this report are based solely upon the services rendered by Tucana Solutions as described in this report, the scope of work as established for the report, and in accordance with our proposal. In performing these services and preparing the report, Tucana Solutions relied upon the information provided by others, including public agencies, whose information is not guaranteed by Tucana Solutions. No indications were found during our investigations that information contained in this report as provided to Tucana Solutions, was false.

This report is based on conditions encountered and the information reviewed at the time of the site investigations. Tucana Solutions disclaims responsibility for any changes that may have occurred after this time or any error in the analytical results received from the laboratory. This report should be read in full. No responsibility is accepted for use of any part of this report in any other context or for any other purpose or by third parties. This report does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

3 Background Information

3.1 Location & Layout

The proposed site for the development of a Cemetery is situated approximately 12 kms south of Bloemfontein CBD, on the N6 towards Reddersburg. The location of the proposed area that will be used for a cemetery is indicated in Figure 2.

The layout of the proposed Nalisview Cemetery can be viewed in Figure 1

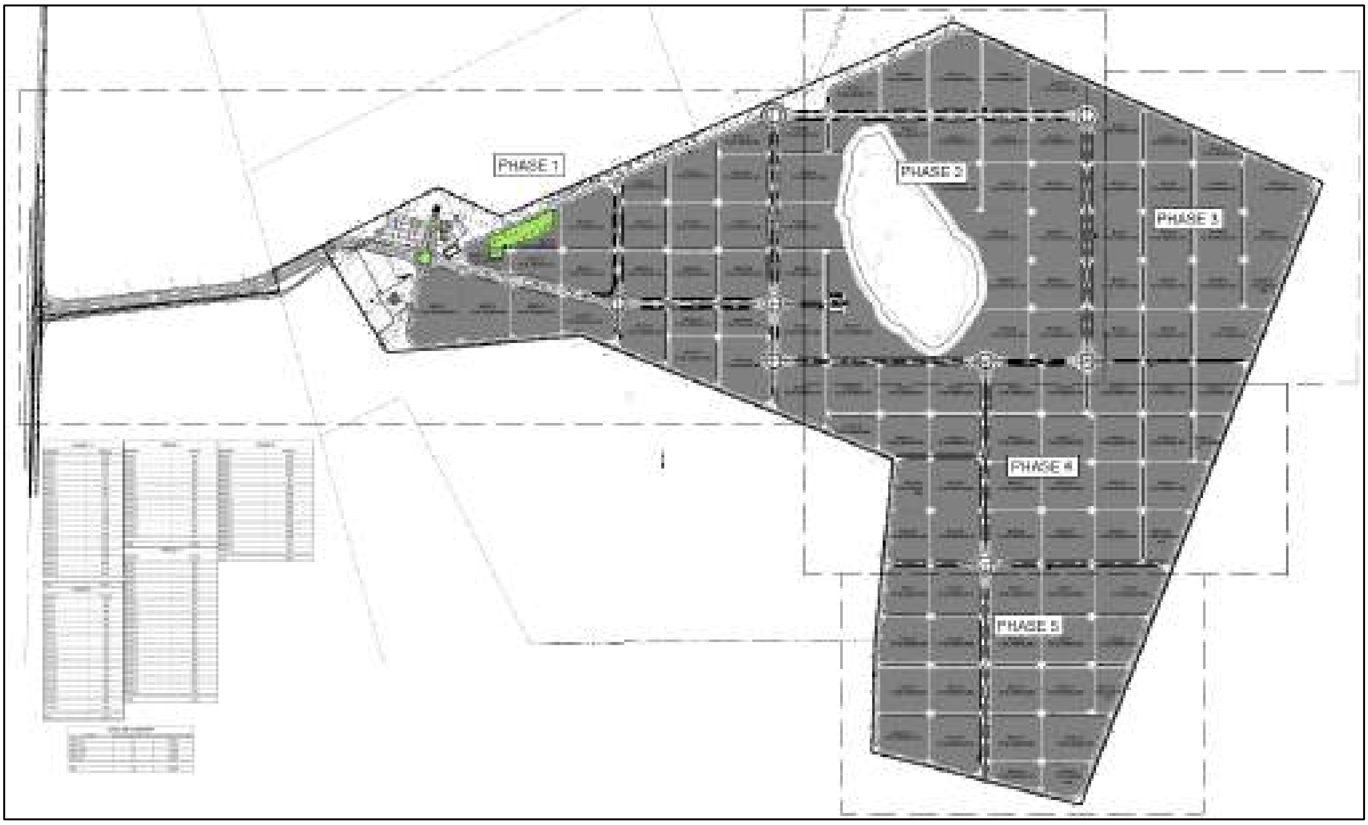

Figure 1: Proposed Layout Plan

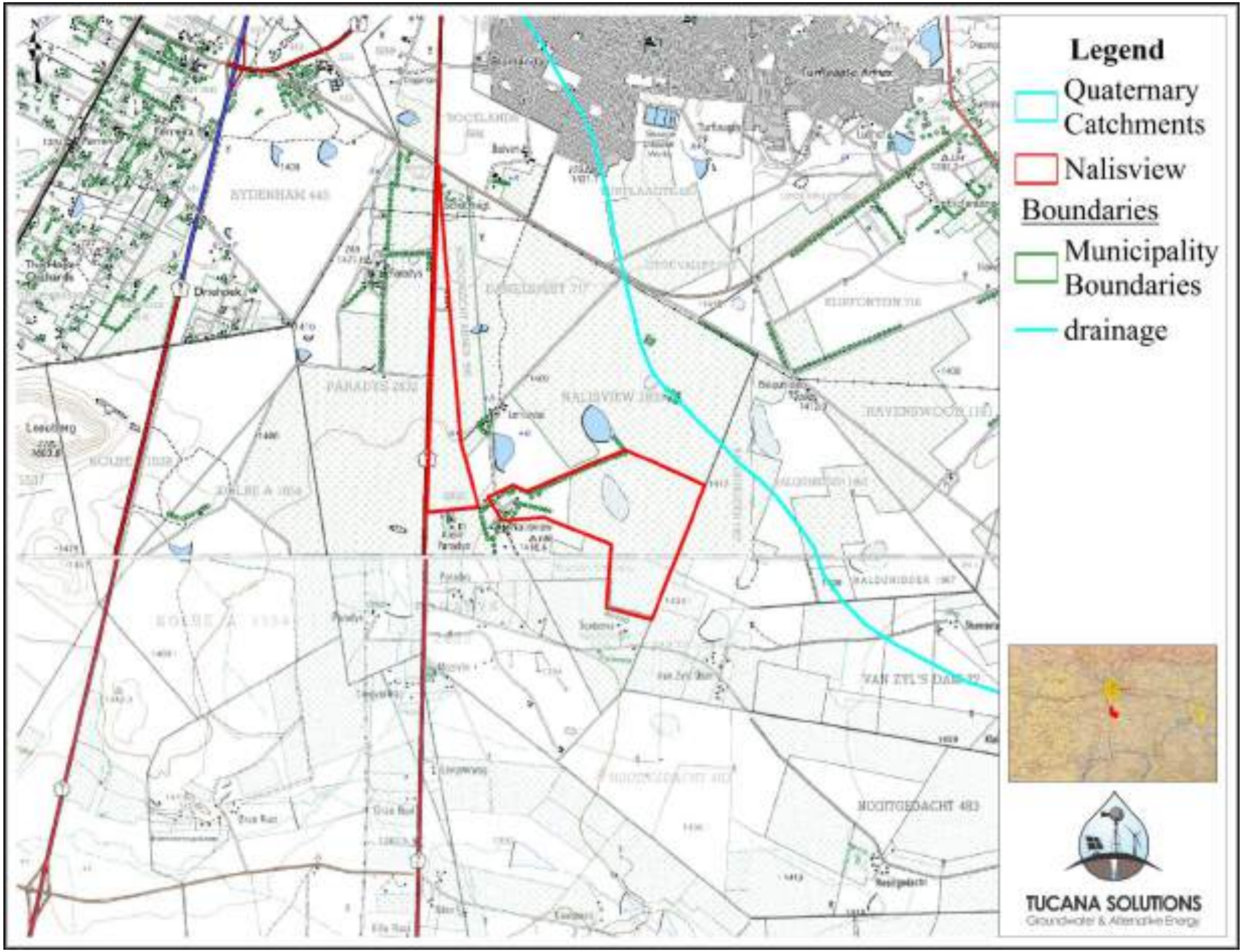

Figure 2: Locality map

3.2 Climate

Bloemfontein normally receives about 407 mm of rain per year, with most rainfall occurring mainly during summer. Figure 3 shows the average rainfall values for Bloemfontein per month. It receives the lowest rainfall in June/July/August and the highest in January - March.

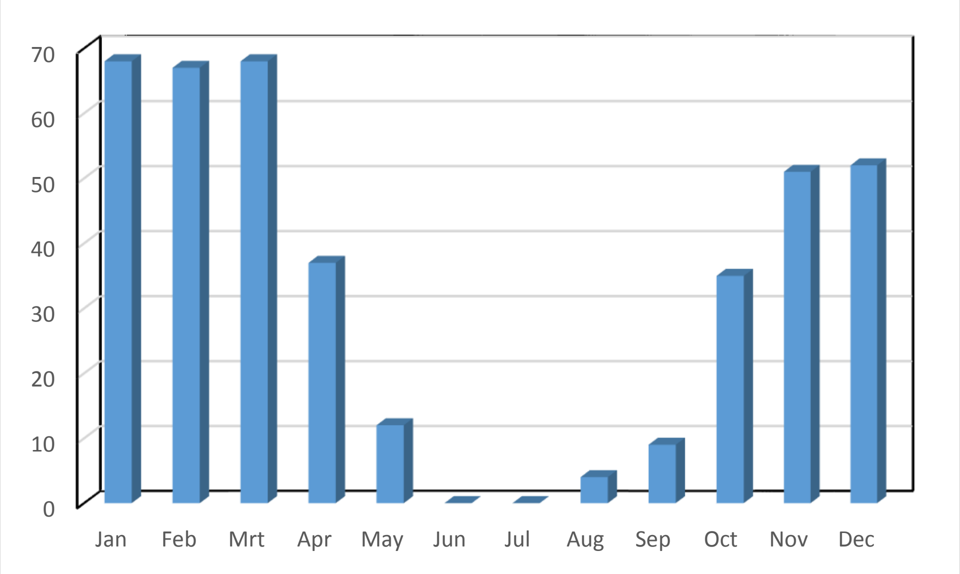

Figure 3: Average monthly rainfall

The monthly distribution of average daily maximum temperatures (Figure 4) shows that the average maximum temperatures for Bloemfontein range from 16°C in June/July to 29°C in December/January/February. The region is the coldest during Jun/July when the mercury drops to 0°C on average during the night.

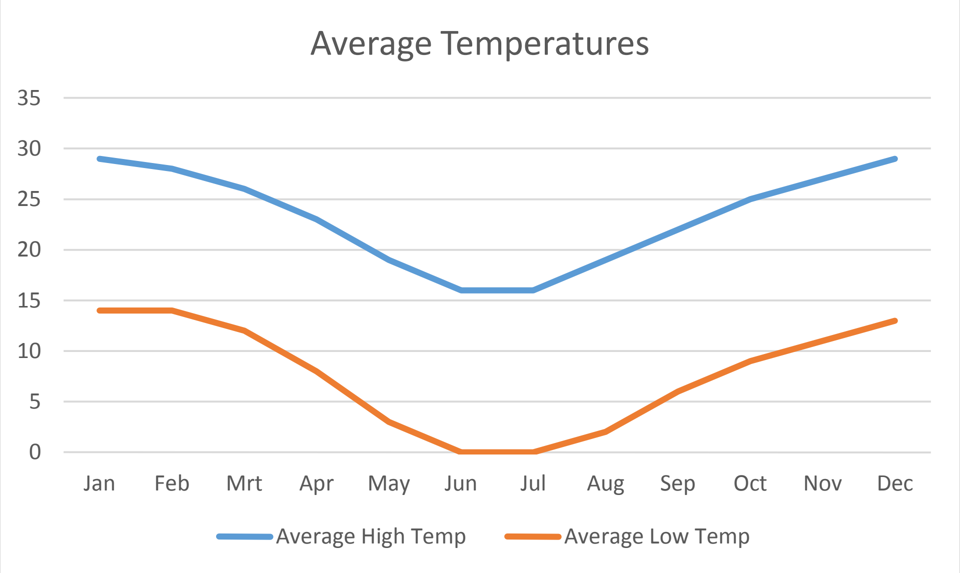

Figure 4: Average monthly mean temperatures - Bloemfontein

3.3 Topography and Drainage

The proposed Nalisview Cemetery is located in the upper part of the C52J quaternary catchment. In general, the water will drain in a western to south western direction towards the lower laying areas in the west. The drainage directions are indicated in blue, on the map below.

Table 1: Information concerning quaternary catchments

Catchment	C52J
Area (km^2)	1922
Present ecological status according to Chapter 3 of National Water Act (1998)[1]	
Mean annual runoff (mm/a)	1.98
Percentage noflow (%)	0.5

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[1] A: Unmodified, pristine conditions.

B: Localised low level impacts, but no negative effects apparent. No significant impacts observed.

C: Moderate levels of localised impacts – moderate or perceived impact on the environment

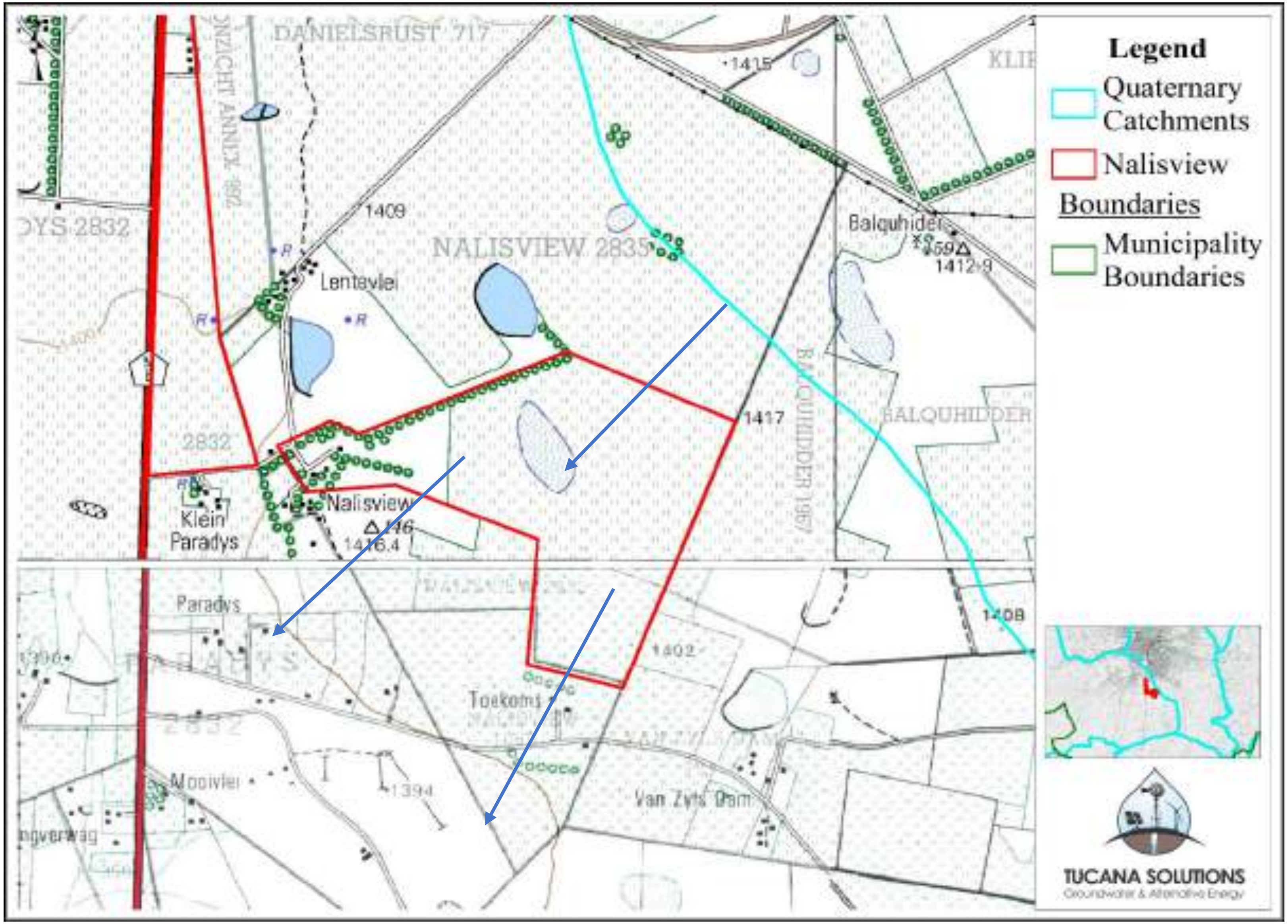


Figure 5: Proposed Nalisview Cemetery - topography and drainage

3.4 Geology

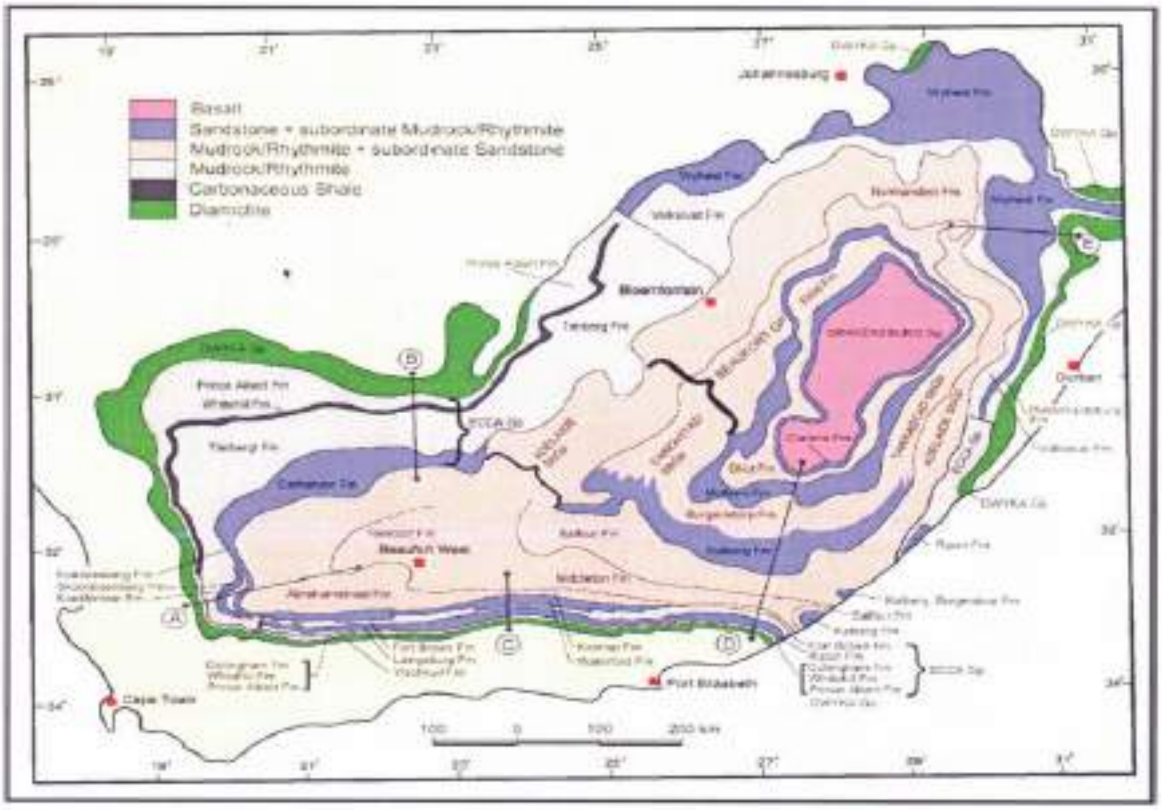
3.4.1 Lithostratigraphy

The lithostratigraphy consists mainly of the following as adapted from the Hydrogeology of the Main Karoo Basin, Water Research Commission Report number TT179/02:

Karoo Super group

Beaufort Group: Consists of the Adelaide and Tarkastad Subgroups. Bloemfontein is situated on the Adelaide Subgroup which consist of Blue-grey and purple mudstone interbedded with yellow sandstone and siltstone.

Figure 6: Schematic areal distribution of lithostratigraphic units in the Main Karoo Basin (Johnson et al, 1997)



3.4.1.1 Adelaide Subgroup

In the southeastern part of the basin, the late Permian Adelaide Subgroup comprises the Koonap, Middleton and Balfour Formations. In the west, the Abrahamskraal and Teekloof Formations are the approximate equivalents of the Koonap and Middleton Formations, respectively as indicated in Figure 3. The Middleton and Teekloof Formations are characterized by a greater relative abundance of red mudstone compared to the underlying and overlying units, in practice the boundaries are linked to specific sandstone-rich marker units, thus the arenaceous Poortjie and Oudeberg Members constitute the base of the Teekloof and Balfour Formations, respectively. In the northeastern region, the Normandien Formation is present.

The Adelaide Subgroup attains a maximum thickness of approximately 5000m in the southeast, which decreases rapidly to approximately 800m in the centre of the Basin and thereafter more gradually to 100-200m in the extreme north. The Koonap Formation attains a maximum thickness of approximately 1300m, the Middleton 1600m and the Balfour 2000m. In the west, the Abrahamskraal and Teekloof Formations are up to 2500m and 1400m thick, respectively.

In the southern and central parts of the Basin the Adelaide Subgroup consists of alternating bluish-grey, greenish-grey or grayish-red mud rock and grey, very fine to medium-grained, lithofeldspathic sandstone. In the northern part of the Basin, coarse to very coarse sandstone, or even granulestone, are common in the Normandien Formation. Sandstone constitutes 20% to 30% of the total thickness, but in certain areas may be as little as 10%, while some sandstone-rich intervals may in places contain up to 60% sandstone.

Individual sandstone units are thickest in the south (averaging 6m; maximum 60m) and become thinner northwards, except for the extreme northeast where thick, laterally extensive units are also present in the Normandien Formation. They generally extended laterally for a few hundred meters to a few kilometers, but many are markedly lenticular. Calcareous concentrations 20cm to 100cm in diameter are present in some sandstone layers.

In the Daggaboersnek Member, which occurs towards the middle of the Balfour Formation in the southeastern part of the Basin, the sandstones tend to be thin and tabular, possibly reflecting a lacustrine depositional environment.

Palaeocurrent data indicate that the bulk of the sediment was derived from a source area situated to the south and southeast of the Basin, with subordinate influxes from the southwest, west-northwest and northeast. The source area situated to the south, southeast and southwest of the Basin coincides with the second major tectonic paroxysm of the Cape Fold Belt, dated at approximately Ma (*Hälbich et al, 1983*). The margin of the Basin was probably close to the present South African coastline (*Cole, 1998*). Source areas to the west-northwest and northeast were sited on the continental regions of western Namaqualand/north-eastern Patagonia and the Mozambique Ridge/East Antarctica respectively (*Cole, 1998*).

Except in the lower part of the Narmandien Formation, where coarsening-upward cycles of sedimentation are present, the sandstone units normally form fining-upward cycles. The cycles vary from a few meters to a few tens of meters in thickness and were probably formed by the lateral migration of meandering rivers. The subordinate, horizontally bedded sandstone units that show no upward change in grain-size were deposited by ephemeral sheet-floods. The mudstone represents deposition in a flood plain and lacustrine environment.

3.4.2 Intrusive Karoo Dolerite

Towards the end of the Cape Orogeny thermal dome uplift developed beneath almost the entire South African continent. Dolerite represents the roots of the volcanic system and is presumed to be of the same age as the extrusive lavas (*Fitch and Miller, 1984*). Extensive magnetic activity lead to dolerite dykes, inclined sheets and sills to intrude the sedimentary rocks of the Karoo Super group during the Jurassic period to the north of the compressional sphere of the Cape Fold Belt. The level of erosion that affected the Main Karoo basin has revealed the deep portions of the intrusive system, which displays a high degree of tectonic complexity. The Karoo intrusive can either occur as dykes, sills, or ring-complexes. The Karoo dolerite, which includes a wide range of petrological facies, consists of an interconnected network of dykes and sills and it is nearly impossible to single out any particular intrusive or tectonic event. It would appear that a very large number of fractures were intruded simultaneously by magma and that the dolerite intrusive network acted as a shallow stockwork-like reservoir.

Early mapping of the dolerite intrusive was done by Rogers and Du Toit (1903) in the Western Cape and Du Toit (1905) in the Eastern Cape. Contributions to their tectonic and structural aspects include Du Toit (1920), Mask (1966) and Walker and Poldervaart (1949). More recently the Geological Survey has published most of the 1:250000 maps of the entire Karoo Basin. Detailed mapping of dolerite occurrences at specific localities in the southern Free State were done by Burger et al, (1981) and in the Western Karoo by Chevallier and Woodford (1999).

The proposed site is mainly situated on sedimentary rock from the Beaufort Group.

3.4.2.1 Geometry, Structure and Mechanism of Emplacement of Dolerite Dykes

Dolerite dykes are the primary targets for groundwater exploration and it is therefore important to understand the geometry, structure and mechanisms of emplacement.

Emplacement Mode: Dolerite dykes, like many other magmatic intrusions, develop by rapid hydraulic fracturing via the propagation of a fluid-filled open fissure, resulting in a massive magmatic intrusion with a neat and transgressive contact with country rock. This fracturing mechanism is in contrast to the slow mode of hydraulic fracturing responsible for breccias-intrusions such as kimberlite. For the intrusion to develop the magma pressure at the tip of the fissure must overcome the tensile strength of the surrounding rock. Dykes can development vertically upwards or lateral along-strike over very long distances, as long as the magma pressure at the tip of the fissure is maintained. The intrusion of dolerite and basaltic dykes are therefore never accompanied by brecciation, deformation or shearing of the host-rock, at least during their propagation.

Dyke Attitude: All the dykes are sub-vertical with a dip seldom below 70 degrees. Kruger and Kok (1976) reports dips of dykes in the north eastern Free State varying between 65 to 90 degrees. The attitude of dykes often changes with depth, as observed from many detailed borehole logs. This phenomenon can be attributed to vertical offsetting as a result of vertical en-échelon segmentation or due to interconnecting of dykes between sediment layers.

Dyke Width: The average thickness of Karoo dolerite dykes ranges between 2 and 10 meters. In general, the width of a dyke is a function of its length. No relationship has been found between trend and thickness (*Woodford and Chevallier, 2001*).

En-échelon Pattern: Dolerite dykes often exhibit an en-échelon pattern along strike, which are clearly detected by mapping. This is the case with the E-W shear dykes and their associated riedel-shears. Displacements in the vertical section also occur, often associated with horizontal, transgressive fracturing. These offsets are often observed.

Dyke Related Fracturing: The country rock is often fractured during and after dyke emplacement. These fractures from a set of master joints parallel to its strike over a distance that does not vary greatly with the thickness of the dyke (between 5m and 15m). The dolerite dykes are also affected by thermal- or columnar- jointing perpendicular to their margins. These thermal joints also extend into the host rock over a distance not exceeding 0.3m to 0.5m from the contact. Van Wyk (1963) observed two types of jointing associated with dyke intrusions in a number of coal mines in the Vryheid Dundee are, namely:

1 Three sets of pervasive-thermal, columnar joints that are approximately 120 degrees apart; and

2 Joints parallel to the contact, confined mainly to the host rock alongside the dyke.

Many cases of tectonic reactivation of the dolerite have been observed in the Loxton-Victoria West area (*Woodford and Chevallier, 2001*), especially on the N-S dykes that have been reactivated by cretaceous kimberlite activity or by more recent master jointing. Reactivation often results in sub-vertical fissures within the country rock and/or dyke itself, which are commonly highly weathered and filled with secondary calcite/calcrete (width of up to 150mm) uplifting or brecciation of the sediment along the dyke contact. Deformation and Contact Metamorphism of Host Rock: Localised up warping of the country rock is often observed adjacent to dipping dykes. Hydraulic fissure propagation, as mentioned above, cannot be responsible for this phenomena, as the magma would have to be cool and become viscous in order cause such deformation. This up warping of the country rock is commonly a near-surface phenomenon related to supergene formation of clays with a high expansion coefficient in the “swelling” rock mass. The dolerite magma shows marked chilling against the sediments into which it has been injected. The chill zone generally exhibits the effects of contact metamorphism, where argillites are altered to hornfels or lydianite and arenaceous units are crystallized to quartzite. Enslin (1951) and Van Wyk (1963) state that the jointed contact zone is less than 30cm wide, irrespectively of dyke thickness.

Petrography and dyke weathering: The effect of variable cooling of dykes following intrusion is also apparent in the way which dykes weather in the Western Karoo such as:

Thick dykes greater than 8m exhibit a prominent chill-margin containing a fine grained, porphyritic, melanocratic dolerite that weathers to produce well-rounded, small, white-speckled boulders. This zone is normally only 0.5m to 1.5m wide and exhibits well-developed thermal-shrinkage joints. The central portion of such dykes consist of medium to coarse grained, mesocratic and occasionally leucocratic dolerite that decomposes to a uniform 'gravely' material, which exhibits an exfoliation type o pattern. Sporadic fractures or meta-sedimentary veins are encountered in this zone and they often do not extend into the country rock. Magnetic traverses across these features normally produce two distinctive peaks. Thin dykes less than 3m commonly consist of fine-grained, porphyritic, melanocratic dolerite (Vandoolaeghe, 1979). These tend to be more resistant to weathering than the thicker dykes and in outcrop exhibit a uniform pattern of shrinkage-joints. The dyke weathers to produce small rounded, white-speckled boulders set in finer angular groundmass.

3.4.3 Local Geology – geological map

Figure 7 below indicates the geological map of the study area.

Figure 7: Geological Map Interpretation

From the geological map it is evident that the study area is underlain by sedimentary rock from the Beaufort Group. Although, dolerite intrusions are visible in the vicinity of the study area no outcrops appear on the proposed site.

4 Geohydrology and Conceptualization thereof

4.1 Borehole Yields in Relation to Geology

General geohydrological implications of Karoo geology in terms of the sedimentary rocks and the younger intrusive dolerites are described below.

4.1.1.1 Sediments

Van Wyk (1963) and Vegter (1992) state that the porosity and permeability of the Karoo sediments appears to be highest in the near-surface, which generally corresponds to the weathered zone. There is no clear relation, however between the occurrence of groundwater and the weathering of the different Karoo lithology, therefore the following are generalized:

Weathering of Karoo shale and mudstone produces clays, which often reduces the permeability of the sediments; and

Karoo sandstone is highly resistant to weathering and thus these processes are unlikely to directly affect the hydraulic properties of these rocks.

Composite alluvial-weathered bedrock aquifers are commonly developed along the major drainage systems. Low to medium yielding boreholes with yields between 0.5 and 2 Liters/second can be drilled in sedimentary rocks.

4.1.1.2 Dolerite Intrusions

Extensive weathered zones often develop in dolerite sills that are situated in low lying and well drained areas – ‘similar to weathered basins’ described in other crystalline basement rocks (*Enslin, 1943; Wright and Burgess, 1992*). These localized, shallow intergranular aquifers are capable of storing large volumes of groundwater. Although abstraction from these dense-massive structures are only possible where extensive weathering has occurred at depth below the water table.

Dolerite ring-dykes and inclined sheets seldom form negative features of the landscape, as they are more resistant to weathering. The hydrological properties of weathered dolerite ring structures and inclined sheets seem variable. Vegter (1995) mentioned that the upper or lower contact sills located within the weathered zone, for example 20 to 50 meters below ground level, are favourable zones for striking groundwater. Recent extensive exploration drilling along dolerite inclined sheets and ring dykes in the Victoria West area (*Chevallier et al, 2001*), indicated contact between the sediment and the dolerite within the first 50m below surface did not yield significant volumes of groundwater. The contact between dolerite dykes and the host rock, within the weathered zone, remains the most important target for groundwater exploration (*Vegter, 1995 & Smart, 1998*).

Sedimentary rocks usually have low permeabilities and storativity values. Boreholes drilled into sedimentary rock formations are usually low yielding with the exception where bedding plane fractures are encountered within the sedimentary rocks or fractured baked contacts zones between the sedimentary rocks and magnetic dolerite intrusions such as dykes and sills.

4.1.2 Hydrostratigraphy of the Beaufort group

The main sediment source area for the Beaufort rocks lay along the high-lying, southern margin of the Basin. The coarser grained rocks are, therefore, found near the Cape Fold Belt, while mudstone, shale, and fine-grained sandstones dominate the more distal central and northern portion of the Basin. The sedimentary units in the Group therefore usually have very low primary permeabilities. The geometry of these aquifers is complicated by the lateral migration of meandering streams over a floodplain. Aquifers in the Beaufort Group will thus not only be multi-layered, but also multi-porous with variable thicknesses.

The contact plane between two different sedimentary layers will cause a discontinuity in the hydraulic properties of the composite aquifer. The pumping of a multi-layered aquifer will thus cause the piezometric pressure in the more permeable layers to drop faster than in the less permeable layers. It is therefore possible to completely extract the more permeable layers of the multi-layered Beaufort aquifers, without materially affecting the piezometric pressure in the less permeable layers. This complex behavior of aquifers in the Beaufort Group is further complicated by the fact that many of the coarser and thus more permeable, sedimentary bodies are lens-shaped. The life-span of a high-yielding borehole in the Beaufort Group may therefore be limited, if the aquifer is not recharged frequently.

4.2 Borehole Census

A borehole census was conducted on 15 February and 24 April 2017. A total of 13 boreholes were visited and the details are listed in the table below.

Name	**Latitude(°)**	**Longitude(°)**	**WL (mbgl)**	**Comment**
NBH1	-29.246780	26.22182	N/A	Low yielding, drilled on a hill
NBH2	-29.25119	26.21319	N/A	Domestic use, submersible pump
NBH3	-29.25019	26.22224	29.84	Windpump, not in use
NBH4	-29.24561	26.21583	-	Submersible pump, general use
NBH5	-29.25426	26.21949	-	Submersible pump, Domestic & irrigation use

Name	Latitude(°)	Longitude(°)	WL (mbgl)	Comment
NBH6	-29.25369	26.21925	-	Submersible pump for Domestic use
NBH7	-29.25433	26.22062	13.69	Submersible pump for irrigation
NBH8	-29.2566	26.23596	-	Dry , not equipped
NBH9	-29.26003	26.23694	-	Blocked
NBH10	-29.23548	26.22116	-	Blocked
NBH11	-29.23548	26.22116	-	Blocked
NBH12	-29.23735	26.21657	-	Blocked @ 2mbgl
NBH13	-29.22541	26.21547	-	Blocked @ 1mbgl

Table 2: Borehole Details

It is evident that a significant amount of the boreholes is blocked and no water levels could be determined. Another restriction that was encountered during the borehole census is the fact that the boreholes that are equipped were not assessable enough to determine the water levels.

4.2.1 Groundwater levels

Data obtained during the hydrocensus indicates that the average groundwater level in the higher lying areas is 29mbgl and 13 m in the lower lying areas.

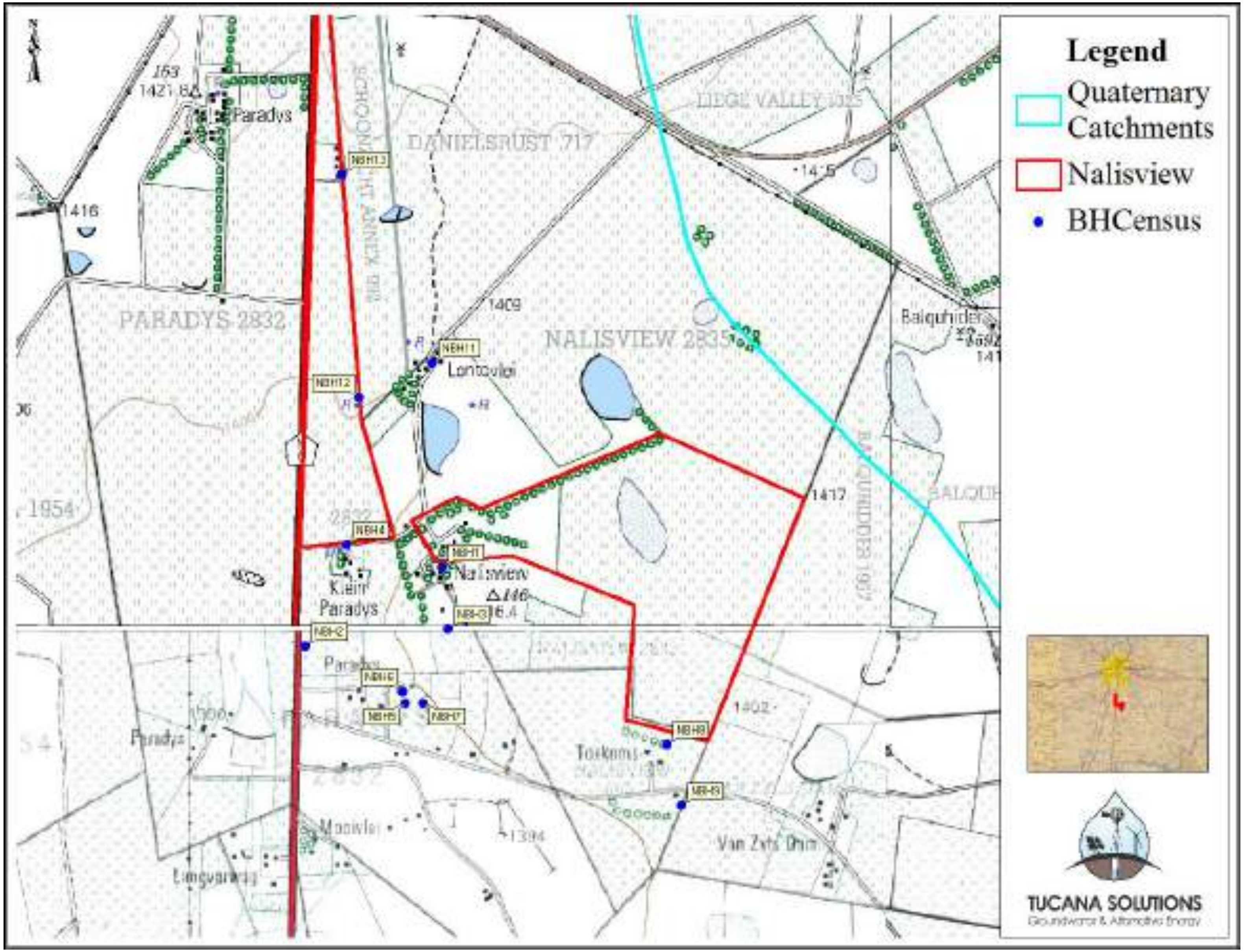


Figure 8: Borehole Census

4.3 Groundwater quality

4.3.1 Background

According to the groundwater quality map of South Africa the groundwater is typically of good quality, slightly hard, with an Electrical Conductivity of 70 -150 mS/m.

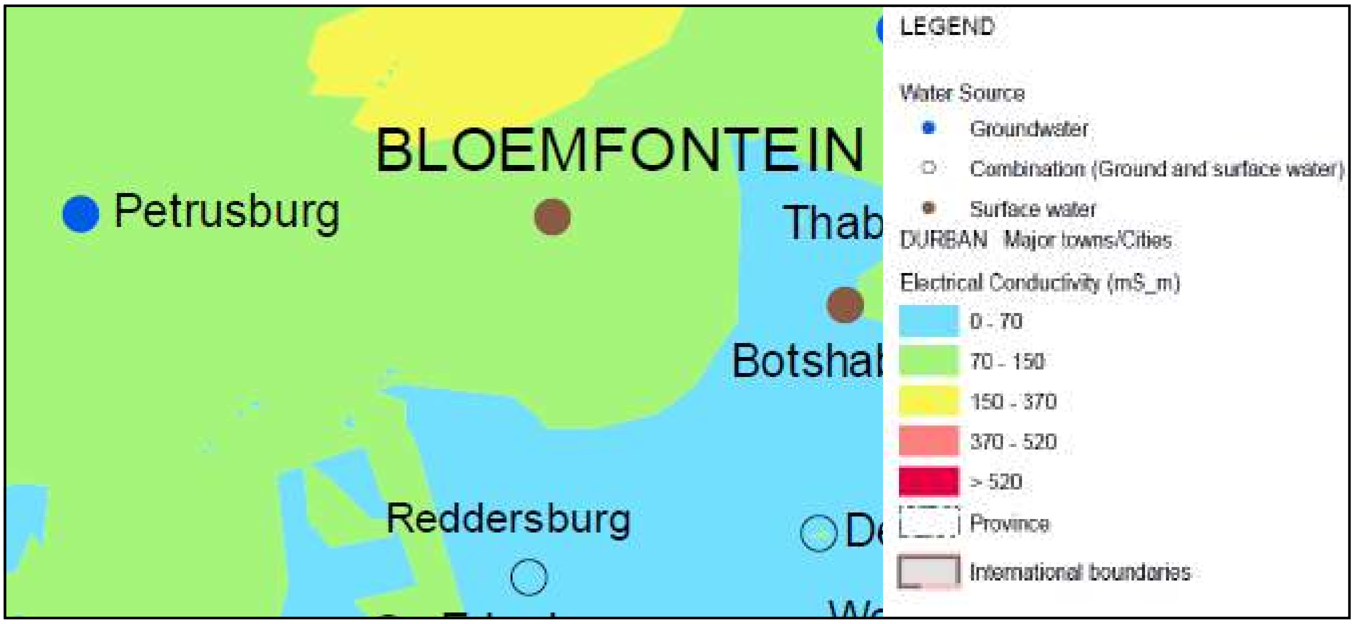


Figure 9: Groundwater Quality Map

4.3.2 Groundwater Sampling

A groundwater sample was taken from NBH4 on 12 May 2017. From the analytical report it is evident that the water from NBH4 is of good quality with the exception of the elevated coliform count of 85 cfu/100ml. The analytical report is attached in Appendix A.

4.4 Aquifer use and Groundwater Use

The classification scheme (Parsons, 1995) was created for strategic purposes as it allows the grouping of aquifer areas into types according to their associated supply potential, water quality and local importance as a resource. Parson's classification system together with the revised version produced by DWA in 1998 is shown in Table 2. The farmers in the area are dependent on groundwater. The water is used for domestic as well as agricultural purposes. The potentially low yielding fractured aquifer which occurs on site is classified as a ***minor aquifer system***.

Aquifer System	Defined by Parsons (1995)	Defined by DWAF Min Requirements (1998)
Sole Source Aquifer	An aquifer which is used to supply 50 % or more of domestic water for a given area, and for which there are no reasonably available alternative sources should the aquifer be impacted upon or depleted. Aquifer yields and natural water quality are immaterial.	An aquifer, which is used to supply 50% or more of urban domestic water for a given area for which there are no reasonably available alternative sources should this aquifer be impacted upon or depleted.
Major Aquifer	High permeable formations usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good (<150 mS/m).	High yielding aquifer (5-20 L/s) of acceptable water quality.
Minor Aquifer	These can be fractured or potentially fractured rocks, which do not have a high primary permeability or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although these aquifers seldom produce large quantities of water, they are important both for local supplies and in supplying baseflow for rivers.	Moderately yielding aquifer (1-5 L/s) of acceptable quality or high yielding aquifer (5-20 L/s) of poor quality water.
Non-Aquifer	These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer as unusable. However, groundwater flow through such rocks, although imperceptible, does take place, and need to be considered when assessing the risk associated with persistent pollutants.	Insignificantly yielding aquifer (< 1 L/s) of good quality water or moderately yielding aquifer (1-5 L/s) of poor quality or aquifer which will never be utilised for water supply and which will not contaminate other aquifers.
Special Aquifer	An aquifer designated as such by the Minister of Water Affairs, after due process.	An aquifer designated as such by the Minister of Water Affairs, after due process.

Table 3: Aquifer Classification System

4.5 Aquifer Vulnerability

Aquifer vulnerability refers to the tendency or likelihood for contamination to reach a specified position in the groundwater system after introduction at some location above the uppermost aquifer. According to the aquifer Vulnerability Map the proposed site is located on a least to moderately vulnerable aquifer.

4.6 Current Abstraction

Currently all the boreholes that were detected north of the proposed site during the borehole census were blocked and therefore no current abstraction takes place on the proposed site.

The boreholes that is located south of the proposed site are used for domestic and agricultural purposes but no big scale abstraction occurs.

4.7 Groundwater Recharge

Recharge is defined as the process by which water is added from outside to the zone of saturation of an aquifer, either directly into a formation, or indirectly by way of another formation.

The groundwater recharge (R) for the area was calculated using the chloride method (Bredenkamp *et al.*, 1995) and is expressed as a percentage of the Mean Annual Precipitation (MAP). The method is based on the following equation:

$$R = \frac{\text{Chloride concentration in rainfall}}{\text{Average Cl concentration in ground water}} \times 100$$

The average rainfall in the area is approximately 456 mm/a. The average chloride in rainfall for areas inland is approximately 1mg/l, therefore according to the equation:

$$R = \frac{1}{40} \times 100 = 2.5\%$$

where 40.1 mg/l is the chloride concentration value in groundwater in the area.

5 Geophysics

This section includes the geophysical information gathered during the study to detect potential geological features and structures, which may act as preferential pathways for groundwater flow.

5.1 Aerial photo interpretation

The aerial photo interpretation of the study area revealed no potential dolerite dyke and sill structures in the same area that can be verified by means of geophysical methods and percussion drilling.

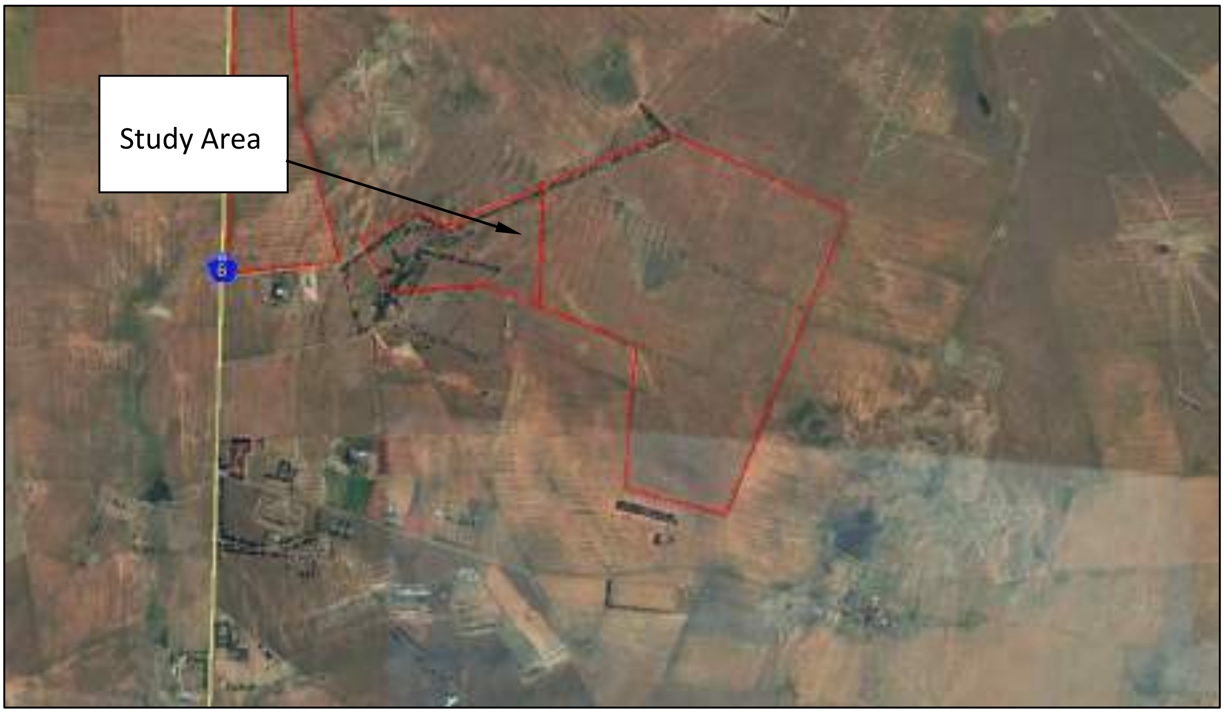


Figure 10:Satelite Image – Proposed Nalisview Cemetery

No dolerite structures or lineaments could be identified from the satellite image above.

5.2 Aerial magnetic data interpretations

5.2.1 The magnetic method

The magnetic geophysical method proved an effective method for the detection of dolerite structures, which includes dykes and sills. The normal magnetic field of the earth can be visualised as a field of a bar magnet placed at the centre of the earth. Any changes in this “normal” magnetic field superimposed by dykes, for example, can be measured by a magnetometer. These measurements in magnetism can then, through the process of modeling, be interpreted in terms of the dip, strike, depth and width of the body that causes the anomaly. By making certain reasonable assumptions regarding the geology, restrictions can be placed on some of the geological features of the body. The magnetic method is an extremely useful method to map dykes, which are good groundwater exploration targets.

5.2.2 The aerial magnetic method

Airborne magnetic surveys can encompass large areas in a relatively short period of time, using helicopters or low flying aircraft trailing a magnetometer. Although these surveys do not have the same spatial resolution of ground surveys, they are invaluable for tracing larger structural features, and especially major dyke intrusions into the Karoo sediments. The entire Karoo basin has been covered by aeromagnetic surveys, which were performed on behalf of the Council for Geoscience and are available in digital format.

Airborne magnetometers measure the total magnetic field and are two main types, fluxgate magnetometers and proton magnetometers. The fluxgate magnetometer which measures the field relative to a selected datum uses two systems of coils, one, much as in ground magnetometers, measures the relative field, while the second system of coils together with associate electronics and motor driven gimbals maintains the measuring coil in the direction of the total magnetic field irrespective of aircraft heading and attitude. The proton magnetometer measures the absolute value of the total field and needs no sophisticated orientation mechanism. Proton magnetometers as favored in most recent installations. There are other more sensitive magnetometers used in petroleum surveys.

The sensing head of the magnetometer is either carried in an extended stinger on the tail, mounted on the wingtip or is towed in a “bird” to keep the measuring elements away from the magnetic influence of the aircraft. Magnetic data is recorded continuously during flight on a paper recorder, magnetic tape or electronically. The flight path of the aircraft is recorded by photographing the ground traversed with a special 35mm camera. Numbered timing marks, known as fiducials, are recorded on both the film and on the paper record or magnetic tape on which the magnetic data appears. A radio altimeter records the aircraft height above ground and feeds height information to the pilot. The aircraft is navigated with the aid of existing aerial photographs, large scale maps or by using electronic navigational aids.

5.3 Magnetometer field survey

On Monday 24 April 2017 a geophysical survey was completed on the study area by means of a G5 Magnetometer. The following data were recorded during the surveys.

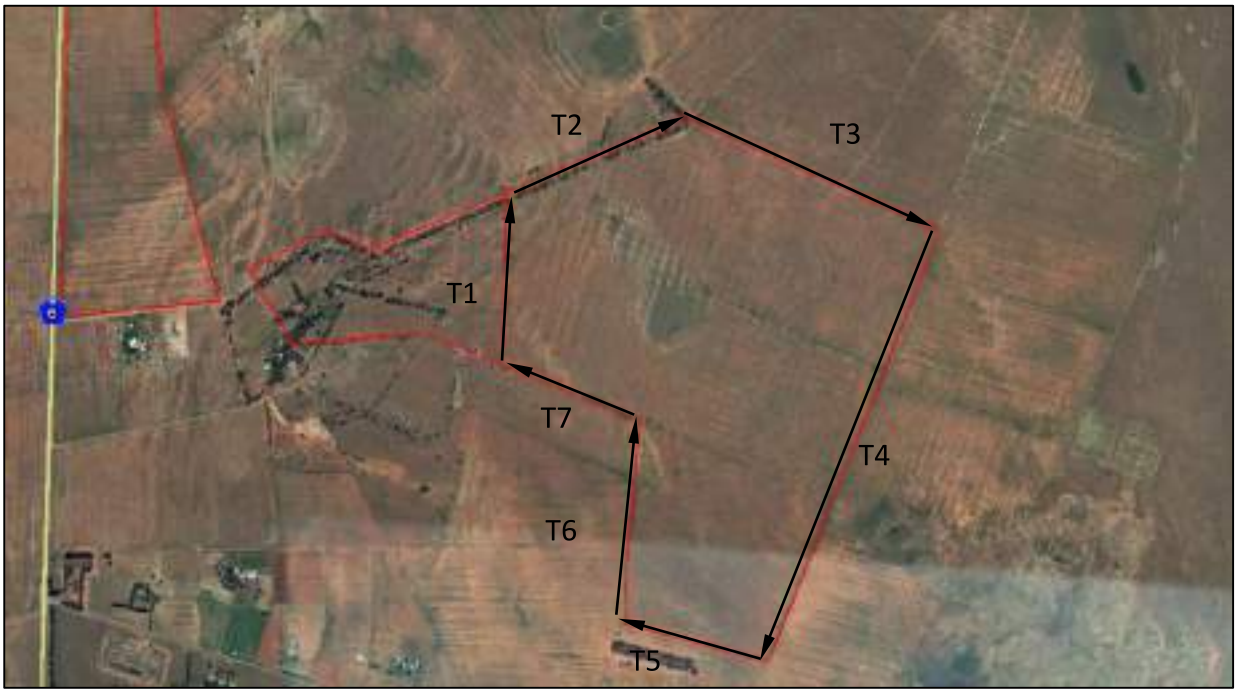


Figure 11: Magnetometer survey

A total of seven traverses were completed along the borders of the proposed site. The outcome of the magnetometer survey is portrayed in the figures below.

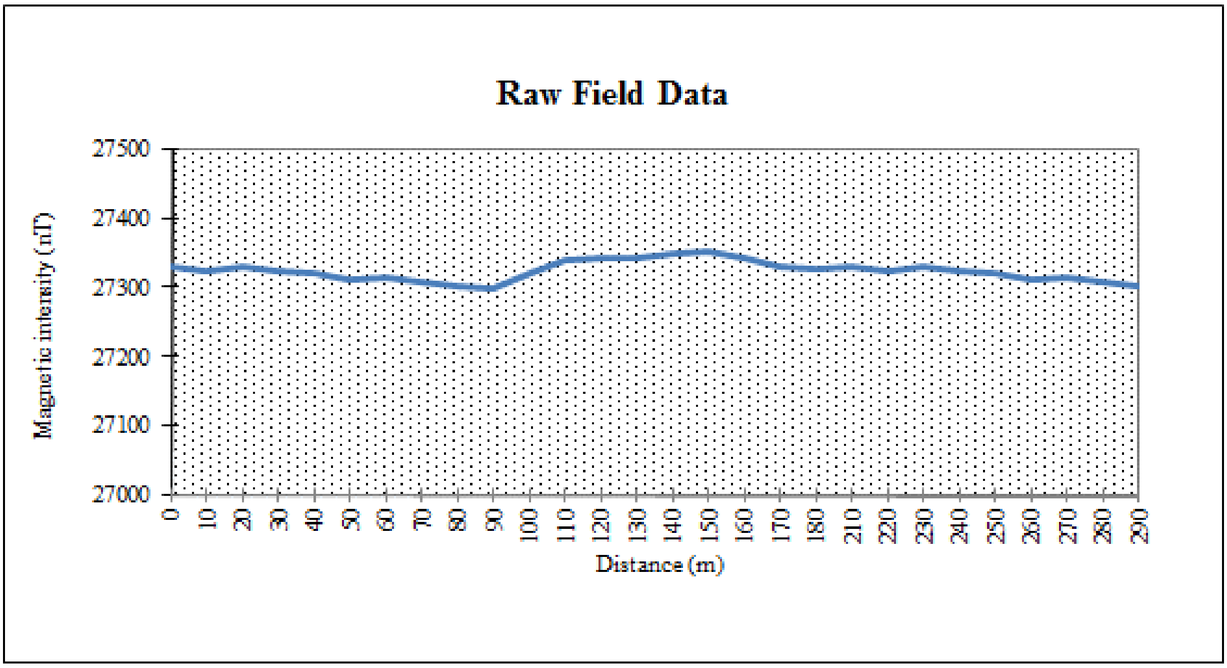


Figure 12: Traverse 1 from south to north

No magnetic anomalies that could be associated with dolerite structures were identified on the first traverse from south to north.

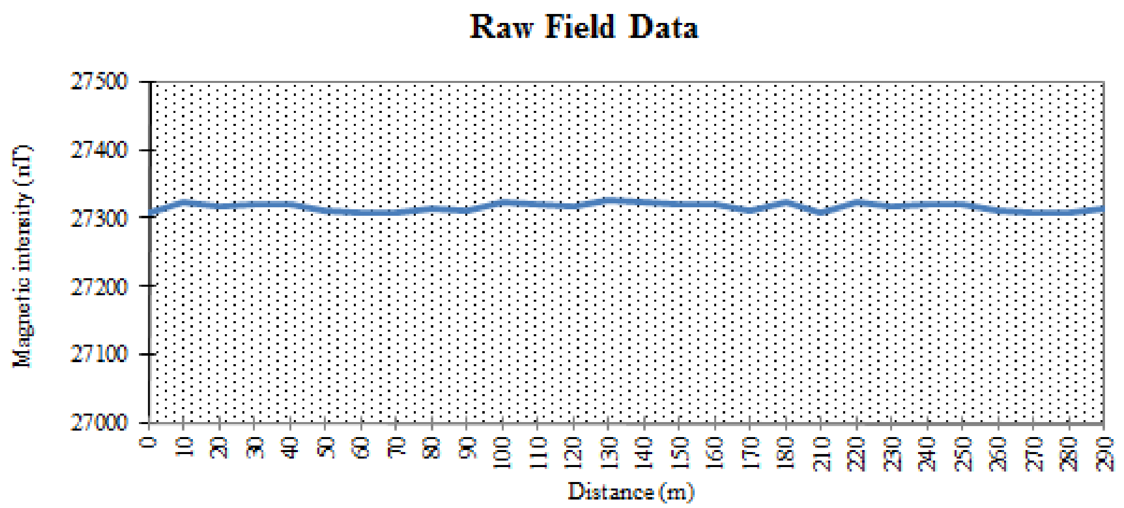


Figure 13: Traverse 2 from southwest to northeast

No magnetic anomalies that could be associated with dolerite structures were identified on the second traverse from southwest to northeast.

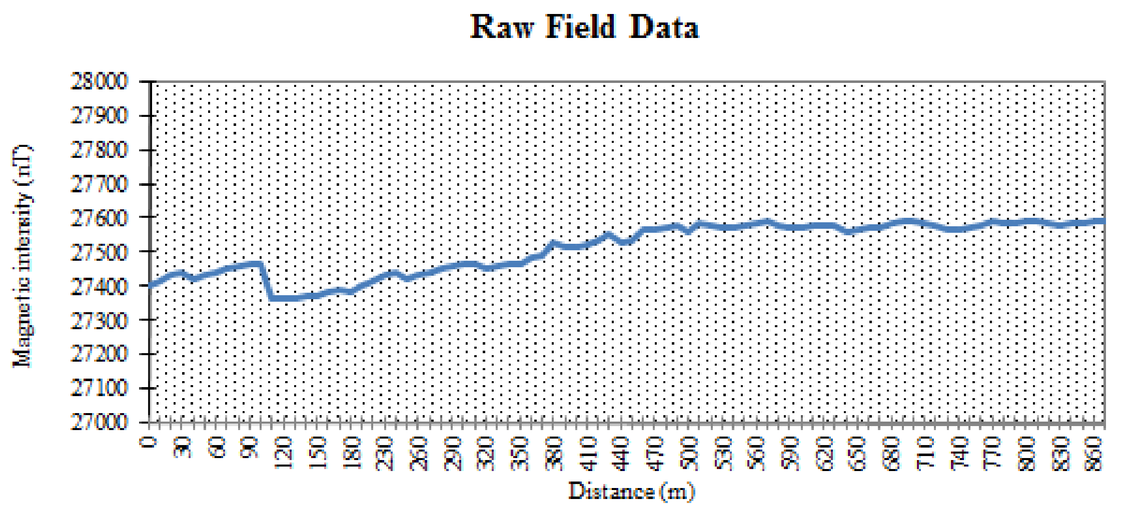


Figure 14: Traverse 3 from northwest to southeast

No magnetic anomalies that could be associated with dolerite structures were identified on the third traverse from northwest to southeast.

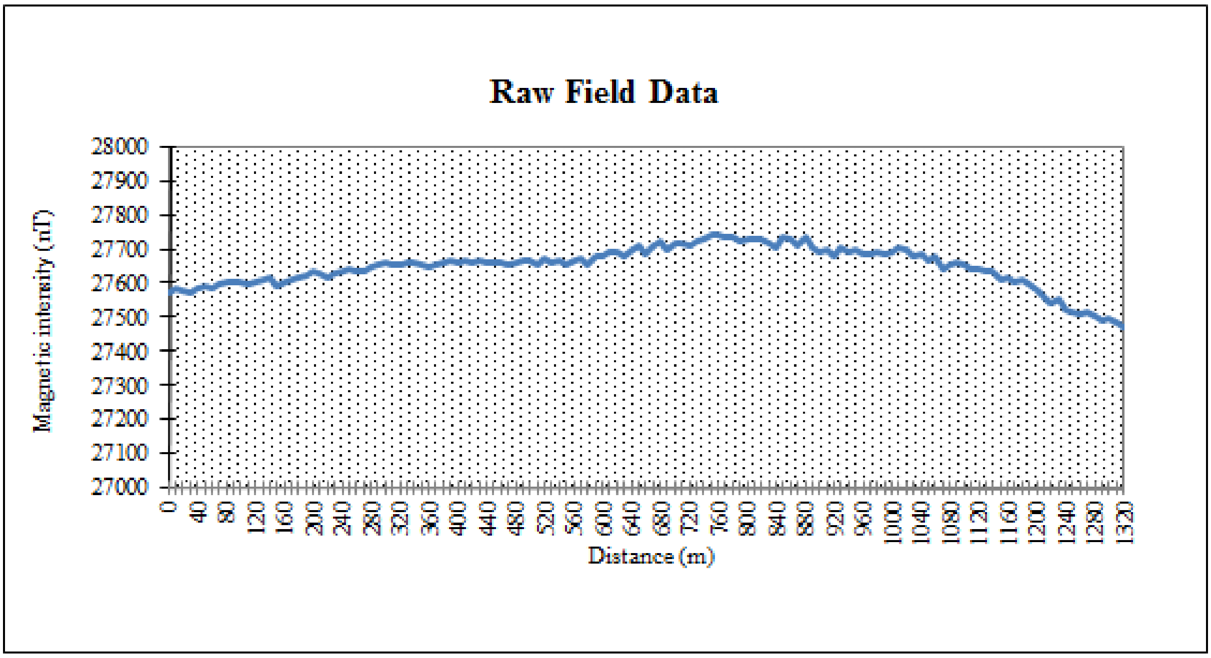


Figure 15: Traverse 4 from northeast to southwest

No magnetic anomalies that could be associated with dolerite structures were identified on the fourth traverse from northeast to southwest.

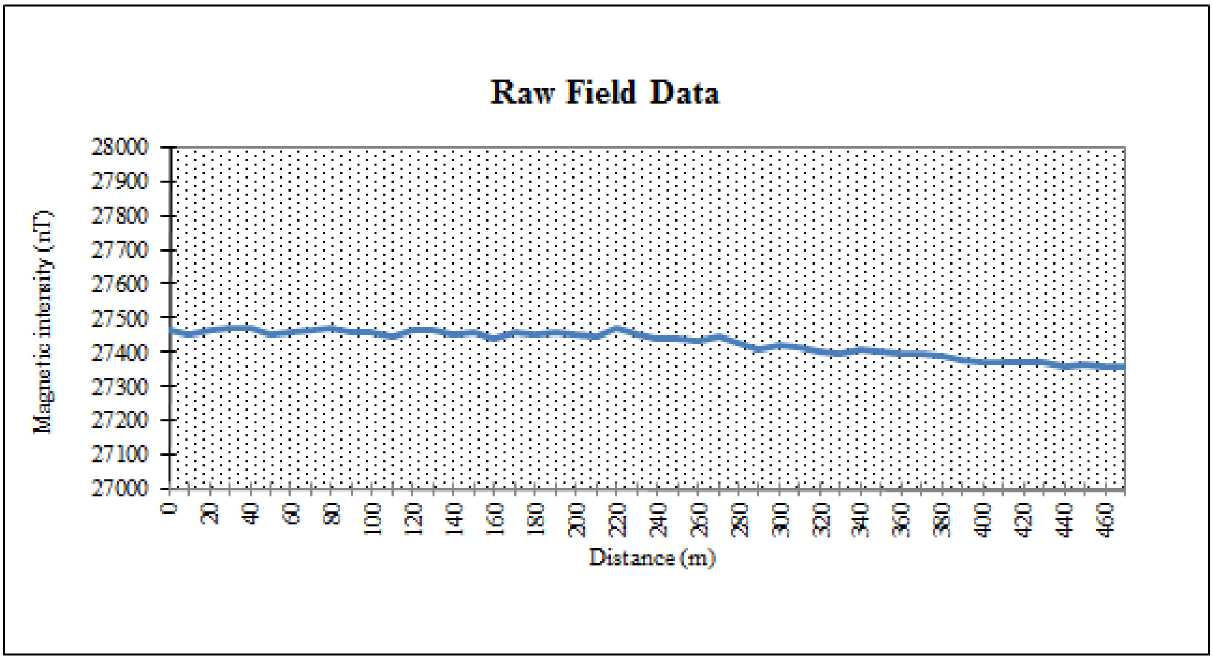


Figure 16: Traverse 5 from east to west

No magnetic anomalies that could be associated with dolerite structures were identified on the fifth traverse from east to west.

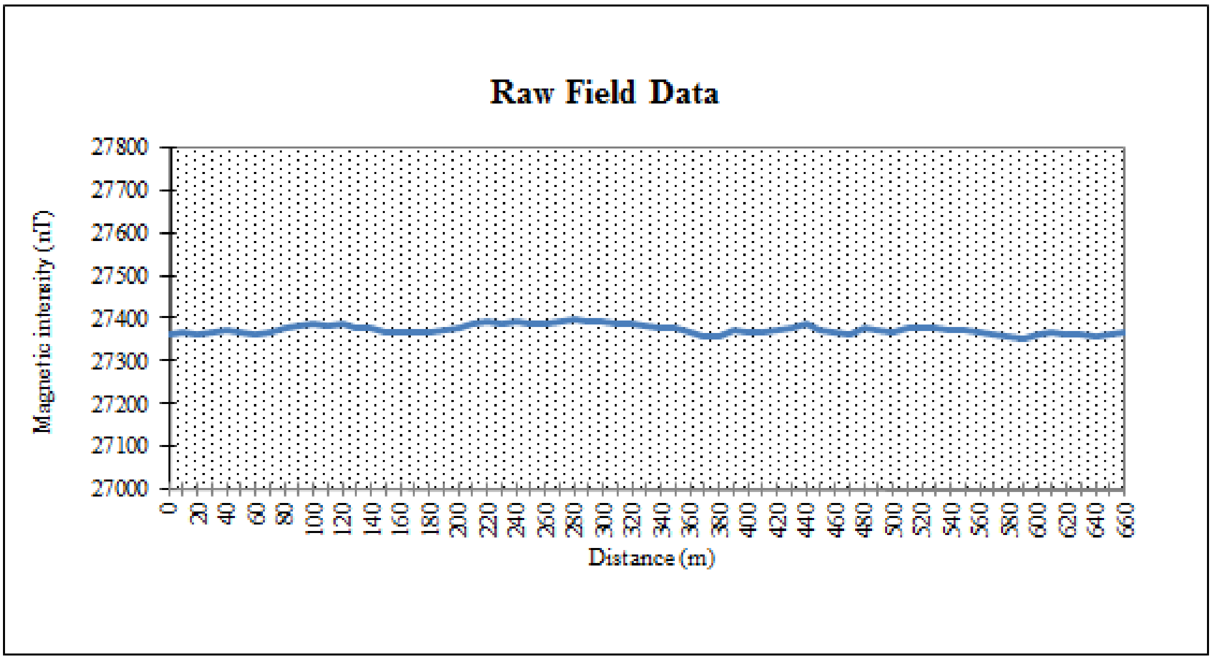


Figure 17: Traverse 6 from south to north

No magnetic anomalies that could be associated with dolerite structures were identified on the sixth traverse from south to north.

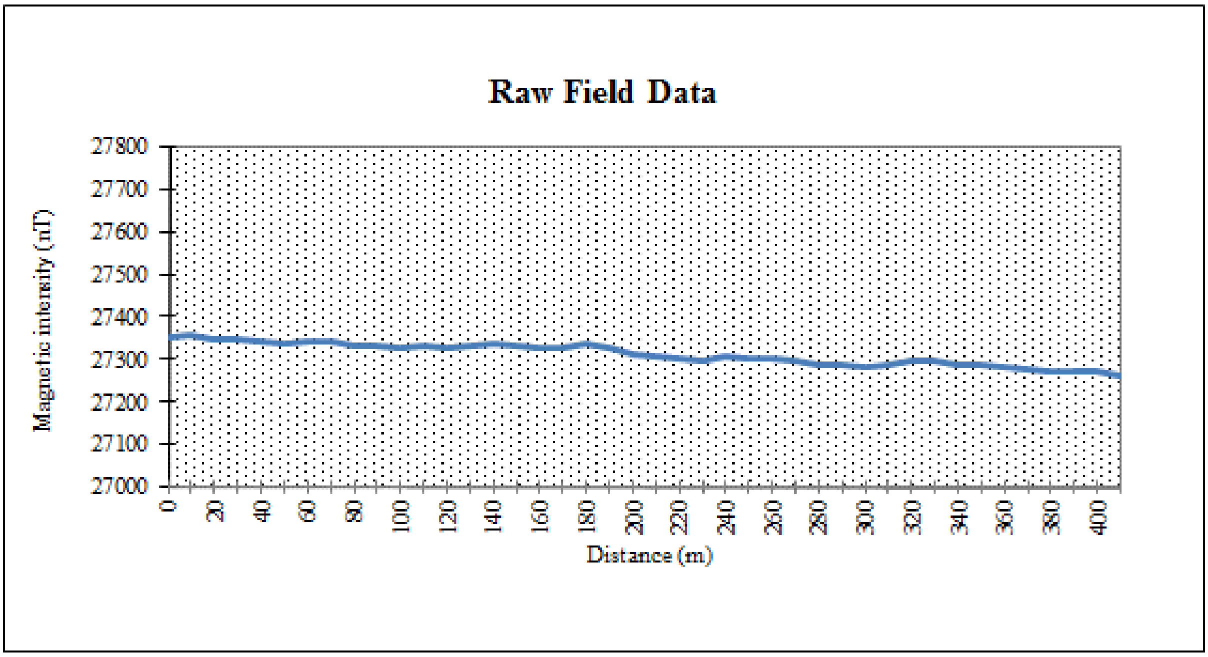


Figure 18: Traverse 7 from northeast to southwest

No magnetic anomalies that could be associated with dolerite structures were identified on the seventh traverse from northeast to southwest.

From the magnetometer data it is evident that no significant anomalies were encountered that could be associated with dolerite structures that is underlying the proposed site.

6 Recommendations

The following recommendations can be made:

- From the information that was collected during the preliminary geohydrological assessment and taking into account the limitations of this study, it is evident that the proposed site will be suitable for a cemetery development, from a geohydrological point of view.
- The groundwater quality is of good quality therefore all necessary precautions should be taken to prevent contamination of the aquifer.
- A groundwater monitoring plan should be drafted which include an early warning system to highlight contamination, should it occur.
- Some of the existing boreholes can be utelised to monitor the groundwater quality. In order to establish an early detection system, one monitoring borehole can be drilled adjacent to the proposed site.
- The monitoring boreholes should be yield tested in order to obtain the necessary aquifer parameters like transmissivity and hydraulic conductivity for input in the numerical groundwater flow and transport model, if needed.
- The water monitoring plan should be revised on a regular basis to incorporate the changes in the water flow regime.
- Laboratory analysis techniques will comply with SABS guidelines. Laboratories must be accredited.
- Data must be stored electronically. It is suggested that a well-known database such as WISH, Aquabase or Access be used. A backup of the data base must be stored in a safe place. Backups should be made every time the database is updated.
- On the completion of every sampling run a monitoring report must be completed. Included in the report must be time series trends, Piper and Durov diagrams. These will be used to determine if there are any changes in the system. These changes must be flagged and explained in the report.

7 References

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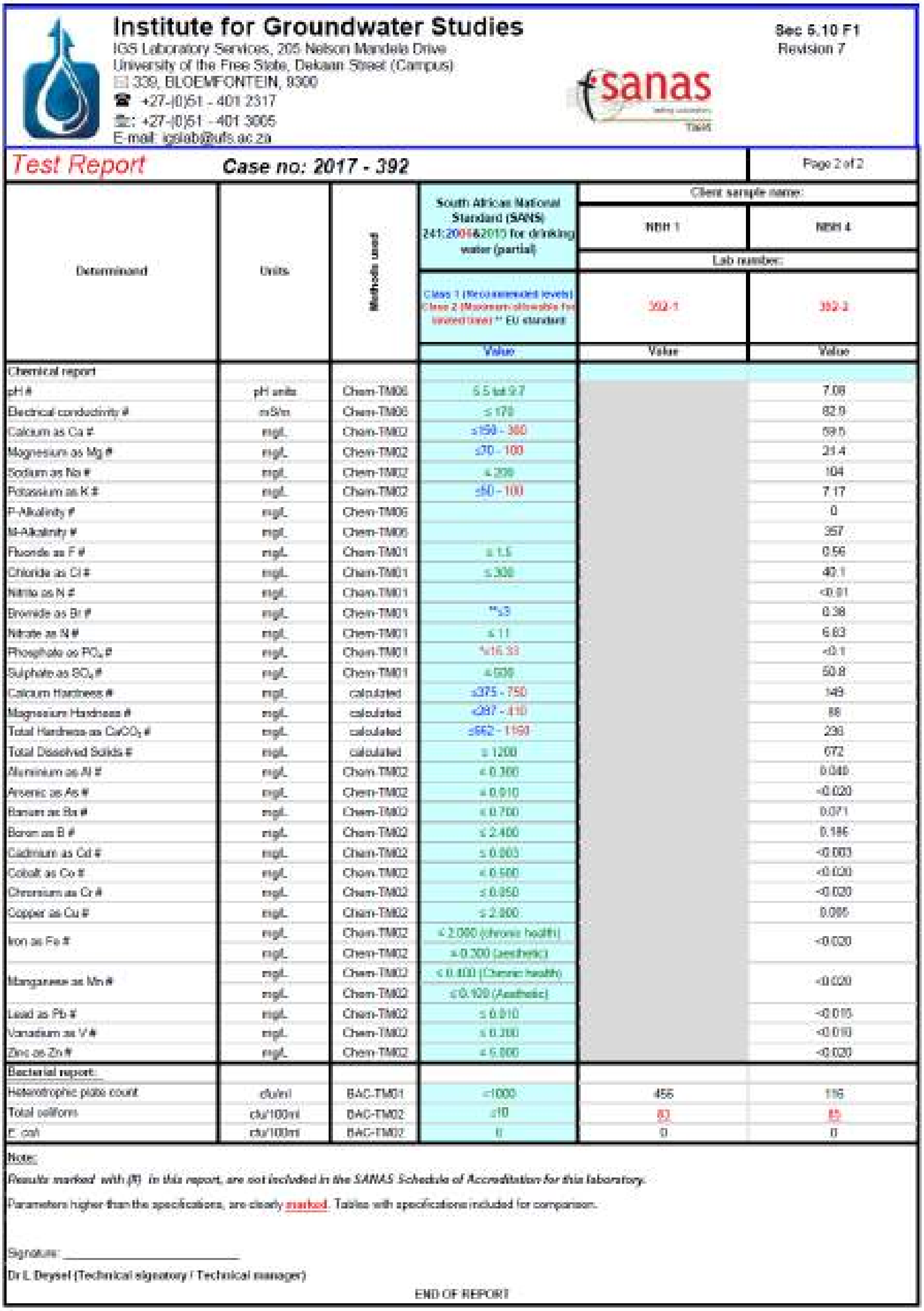
Google Earth Images, 2017 AfriGIS (Pty)Ltd, 2017 DigitalGlobe

Appendix A



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Sec 5.10 F1
Revision 7

Test Report

Case no: 2017 - 392

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Determinand	Units	Methods used	South African National Standard (SANS) 241:2006&2015 for drinking water (partial)	Client sample name:	
				NBH 1	NBH 4
			Class 1 (Recommended levels) Class 2 (Maximum allowable for limited time) ** EU standard	Lab number:	
				392-1	392-2
			Value	Value	Value
Chemical report					
pH #	pH units	Chem-TM06	5.5 tot 9.7		7.08
Electrical conductivity #	mS/m	Chem-TM06	≤ 170		82.9
Calcium as Ca #	mg/L	Chem-TM02	≤150 - 300		59.5
Magnesium as Mg #	mg/L	Chem-TM02	≤70 - 100		21.4
Sodium as Na #	mg/L	Chem-TM02	≤ 200		104
Potassium as K #	mg/L	Chem-TM02	≤50 - 100		7.17
P-Alkalinity #	mg/L	Chem-TM06			0
M-Alkalinity #	mg/L	Chem-TM06			357
Fluoride as F #	mg/L	Chem-TM01	≤ 1.5		0.56
Chloride as Cl #	mg/L	Chem-TM01	≤ 300		40.1
Nitrite as N #	mg/L	Chem-TM01			<0.01
Bromide as Br #	mg/L	Chem-TM01	**≤3		0.38
Nitrate as N #	mg/L	Chem-TM01	≤ 11		6.83
Phosphate as PO_4 #	mg/L	Chem-TM01	*≤16.33		<0.1
Sulphate as SO_4 #	mg/L	Chem-TM01	≤ 500		50.8
Calcium Hardness #	mg/L	calculated	≤375 - 750		149
Magnesium Hardness #	mg/L	calculated	≤287 - 410		88
Total Hardness as $CaCO_3$ #	mg/L	calculated	≤662 - 1160		236
Total Dissolved Solids #	mg/L	calculated	≤ 1200		672
Aluminium as Al #	mg/L	Chem-TM02	≤ 0.300		0.040
Arsenic as As #	mg/L	Chem-TM02	≤ 0.010		<0.020
Barium as Ba #	mg/L	Chem-TM02	≤ 0.700		0.071
Boron as B #	mg/L	Chem-TM02	≤ 2.400		0.186
Cadmium as Cd #	mg/L	Chem-TM02	≤ 0.003		<0.003
Cobalt as Co #	mg/L	Chem-TM02	≤ 0.500		<0.030
Chromium as Cr #	mg/L	Chem-TM02	≤ 0.050		<0.020
Copper as Cu #	mg/L	Chem-TM02	≤ 2.000		0.095
Iron as Fe #	mg/L	Chem-TM02	≤ 2.000 (chronic health)		<0.020
	mg/L	Chem-TM02	≤ 0.300 (aesthetic)		
Manganese as Mn #	mg/L	Chem-TM02	≤ 0.400 (Chronic health)		<0.020
	mg/L	Chem-TM02	≤0.100 (Aesthetic)		
Lead as Pb #	mg/L	Chem-TM02	≤ 0.010		<0.015
Vanadium as V #	mg/L	Chem-TM02	≤ 0.200		<0.010
Zinc as Zn #	mg/L	Chem-TM02	≤ 5.000		<0.020
Bacterial report:					
Heterotrophic plate count	cfu/ml	BAC-TM01	≤1000	456	116
Total coliform	cfu/100ml	BAC-TM02	≤10	83	85
E. coli	cfu/100ml	BAC-TM02	0	0	0

Note:

Results marked with (#) in this report, are not included in the SANAS Schedule of Accreditation for this laboratory.

Parameters higher than the specifications, are clearly marked. Tables with specifications included for comparison.

Signature: ____________________________

Dr L Deysel (Technical signatory / Technical manager)

END OF REPORT

AURECON SOUTH AFRICA (PTY) LTD

GEOTECHNICAL REPORT FOR THE PROPOSED NEW MANGAUNG CEMETARY, NALISVIEW, BLOEMFONTEIN FREE STATE PROVINCE.

GEOTECHNICAL INVESTIGATION

REFERENCE:SL / 1213 **Document No.: 2016/412/Doc.** **JANUARY 2017**

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(PTY) LIMITED GEOTECHNICAL SERVICES

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Document Number : 2016/412/Doc.
Date : JANUARY 2017

AURECON SOUTH AFRICA (PTY) LTD

GEOTECHNICAL REPORT FOR THE PROPOSED NEW MANGAUNG CEMETARY, NALISVIEW, BLOEMFONTEIN FREE STATE PROVINCE.

GEOTECHNICAL INVESTIGATION

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EXECUTIVE SUMMARY

- A geotechnical investigation was conducted on the 18th November 2016 – 23rd November 2016 For the Proposed New Mangaung Cemetery, Nalisview, Bloemfontein Free State Province, as per instruction received from the client, AURECON SOUTH AFRICA (PTY) LTD
- The approximate size of the investigated site is 203ha.
- The sampling of the materials was done in accordance to the TMH 5:1981 and as specified by the client. Hundred and three (103) test pits were excavated using an 8ton TLB (Bell, 315SG. Fifty one (51) foundation indicator samples, twenty two (22) Maximum Dry Density (MOD AASHTO) and California Bearing Ratio (CBR) samples and twenty three (23) permeabilities were sampled on site to determine the Engineering properties of the materials.
- The geology of the Bloemfontein area is underlain by the Lower Stage of the Beaufort Group which is part of the Karoo Super Group. The sedimentary rocks that are present in this group consist of fine-grained grey sandstone and coarse arkose alternating with green and maroon-coloured mudstone beds. The typical materials / rock type found in the area of Bloemfontein are Dolerite, (K3l) Sandstone / Shale / Mudstone and, (K2u) Mudstone / Shale. Table 3 summarise the Geology found in the area of Bloemfontein.
- Bloemfontein is in the semi-arid to sub-tropical climatic region with Weinert's N – value of between 2 and 4, where chemical disintegration is the predominant rock weathering mode.
- No ground-water seepage was encountered at the time of the investigation. A shallow water-table can be expected from time to time in the rainy season.
- Determining a flood line is not part of this report scope and thus, no flood line of any kind was determined. Provision should be made for drainage structures underground or at the surface where applicable.
- The materials occurring on site has a Progressively Less (Decreasingly) Corrosive Moderately corrosive. Full chemical testing for the presence of sulphates and chlorides has not been conducted.
- The predominant materials found on site are: SM: Silty sand, SC: Clayey sand / Clayey sand with Sandstone gravel and Calcrete, SC-SM: Silty, clayey sand, ML: Sandy silt, CL: Sandy lean clay, GP-GC: Poorly graded gravel with clay and sand, CL-ML: Silty clay with sand, SP-SC: Poorly graded sand with clay and gravel, SW-SM: Well-graded sand with silt and gravel
- Refusal layers / Bedrock were encountered during the investigation. According to the *NAVFAC the estimated bearing ratio of the expected bedrock (Intermediate rock, Mudstone) ranges between 1 500kPa to 2 500kPa when bedrock is still intact.
- The excavation class (excavatability) for the investigated area is soft to an average depth of 2.000m. The materials on selected portions on site could be efficiently removed with an 8ton TLB (Bell, 315SG) to an average depth of 2.000m.
- The Plasticity Index (PI) of the materials ranges from Slightly Plastic (SP) to 27%, the Linear Shrinkage (LS) ranges from 1.1% to 12.5% and the percentage of Clay Fraction in the soils sample (<0.002mm) ranges from 1% to 55%.
- The general materials on site have COLTO classification of G7 and No Classification.

- Typical foundation option: Lightly reinforced strip footings with articulated joints at all internal/external doors and openings with light reinforcement in masonry.. The Foundation bearing pressure at Site Class S may not exceed 50kPa. The founding depth can be raised by trench filling with competent materials to a required founding level of approximately 0.300m below surface.
- Grave selection dependent on Depth of Excavation of in situ materials, the depth ranges from 2.000m over the majority of area to 0.200m around the fringes of the site
- Grave selection dependent on Permeability: Material suitability ranges from unsuitable to ideal.

1. INTRODUCTION

1.1 Terms of reference

AURECON SOUTH AFRICA (PTY) LTD (Bloemfontein) appointed Simlab (Pty) Limited - Geotechnical Services (Bloemfontein) to conduct a geotechnical investigation and write a geotechnical report for the New Cemetery, Portion 5 of the Farm Nalisview 2835.

The scope of the investigation was to investigate the proposed area by excavating hundred and three (103) test pits covering the proposed development.

The purpose of the investigation was to determine the feasibility of the area for the proposed development as well as the founding conditions for these structures and to gain the following information:

- Determine the geological and geotechnical characteristics of the *in situ* soils / materials underlying the site.
- Determine the excavatability of the *in situ* soils / materials on site.
- Identify geotechnical constraints for the establishment of structures, services and roads.
- Determine the characteristics of the *in situ* soils / materials for the use in filling and the construction of roads.

This report contains the results and findings of the geotechnical investigation done by Simlab (Pty) Limited - Geotechnical Services (Bloemfontein) for the report for the New Cemetery, Portion 5 of the Farm Nalisview 2835. The investigation included hundred and three (103) test pits and laboratory testing results of the *in situ* soils / materials.

Recommendations are made with regard to founding conditions for the proposed establishment for buildings, roads, graves and other structures. Recommendations are based on the information gathered at the time of the investigation.

1.2 Location

The proposed site is located approximately 23km from the Bloemfontein City Centre in a southerly direction. The proposed area is located to the south of Bloemfontein along the National route 6. The centre co-ordinate of the investigated area is 27 Y0074455 X3236583. See Location Plan and Layout Plan in Appendices A & H for more detail.

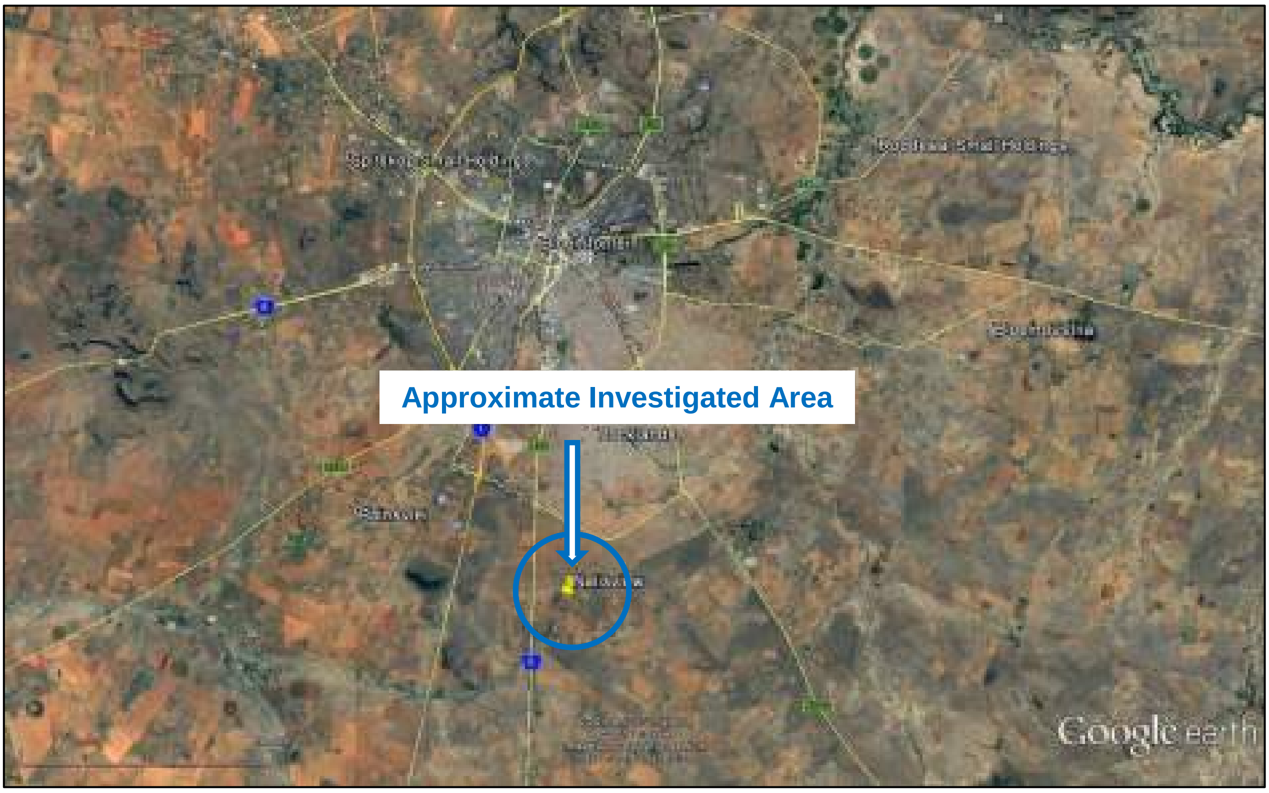

Figure 1 – Site Location (Google Earth)

1.3 Area

The approximate total size of the investigated area is 203ha.

1.4 Available Information

At the time of the investigation the following were available:

- 1 : 50 000 Topocadastral map (2926, Bloemfontein)
- 1 : 250 000 Geological map (2926, Bloemfontein)
- Google Photo of the area indicating the site boundary
- Site layout plan

2. INFORMATION USED IN THE STUDY

- ABA Brink & RMH Bruin (2002), Guidelines for Soil and Rock Logging in South Africa. South Africa: Association of Engineering Geologists - South Africa Section.
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- State-of-the-art review of Collapsible Soils, Department of Civil Engineering, College of Engineering, Sultan Qaboos, 2000.
- The vegetation of South Africa, Lesotho and Swaziland, Strelitzia 19, SANBI, 2006
- Climate: www.saexplorer.co.za
- Software: Google Earth® 6.2.2. 6613, Google Inc. 2013, Map Source® 6.16.3, Garmin™, 2010 and dotPLOT® 2.4.0, Software Africa©, 2010.

3. PROJECT DETAIL

3.1 Client

AURECON SOUTH AFRICA (PTY) LTD

3.2 Client Representative

Mr R. Du Plessis and Mr R. Odendaal

3.3 Client Contact Details

Table 1: Client Contact Details

Postal Address	Street Address
Private Bag X11 Suite 70 Brandhof 9324 South Africa	Hydro Park 135 President Reitz Avenue Westdene **BLOEMFONTEIN** 9301
Tel: 051 408 9600 / Fax: 051 447 9751	
rolf.duplessis@aurecongroup.com ; riaan.odendaal@outlook.com	

3.4 Project Name

Geotechnical Report For The Proposed New Mangaung Cemetery, Nalisview, Bloemfontein Free State Province.

3.5 Testing Laboratory

Simlab (Pty) Limited – Geotechnical Services (Bloemfontein)

3.6 Laboratory Contact Details

Table 2: Laboratory Contact Details

Postal Address	Street Address
PO Box 6249 **BLOEMFONTEIN** 9300	Corner of Lunn Road & Grey Street Hilton **BLOEMFONTEIN** 9301
Tel : 051 – 447 0224 / 5 ; Fax : 051 – 448 8329	
www.simlab.co.za ; simbfn@simlab.co.za	

3.7 Sample Details

Sampled by:	Mr PW van Heerden (Technician)
Date Sampled:	18th November 2016 – 23rd November 2016
Date Tested:	24th November 2016 – 26th January 2017
Report Date:	16th February 2017

3.8 Sampling and Testing

Sampled according to the TMH5: 1981, method MA2 and specifications of the client. Sampling was done by means of an 8ton TLB (Bell, 315SG). Tested according to the TMH1: 1986, specifications. The test methods used include the SANAS accredited methods:

- * SANS 3001 – GR1: 2011 – Wet preparation and particle size analysis.
- * SANS 3001 – GR10: 2011 – Determination of the one-point liquid limit, plastic limit, plasticity index and linear shrinkage.
- SANS 3001 – GR20: 2010 – Determination of the moisture content by oven-drying.
- * SANS 3001 – GR30: 2010 – Determination of the maximum dry density and optimum moisture content.
- * SANS 3001 – GR40: 2010 – Determination of the California Bearing Ratio.
- * SANS 3001 – PR5: 2011 – Computation of soil-mortar percentages and grading modulus.
- * TMH1: 1986, A6 – The determination of the grain size distribution in soils by means of a hydrometer.
- * TMH1: 1986, A20 – The electrometric determination of the pH-value of a soil suspension.
- * TMH1: 1986, A21T – Tentative method for the determination of the conductivity of a saturated soil paste and water.
- * SABS0120: Part 3 – The extent to which a particular material will compact.
- * TMH6: 1984, ST6 - Dynamic Cone Penetrometer (DCP) Test

- * COLTO Classification of Materials properties.
- * Potential Expansiveness of the Materials – Van Der Merwe's method.
- * Estimated Bearing Ratio of the Materials – Dr. B van Wyk's method.
- * Classification of Site – NHBRC Home Building Manual, Part1, Section2, Table: Residential Site Class Designations.

Tests marked - * / "Not SANAS Accredited" in this report are not in the SANAS Schedule of Accreditation for this laboratory" Opinions and interpretations expressed in the report are outside the scope of SANAS Accreditation of Simlab (Pty) Limited – Geotechnical Services.

3.9 Positions Sampled

Simlab (Pty) Limited – Geotechnical Services (Bloemfontein) sampled and tested at positions shown on the Layout Plan (Appendix H).

4. TOPOGRAPHY / LANDUSE / VEGETATION

The investigated area is situated on a relatively flat plane with little to no slope at the proposed site. Some large eucalyptus trees are found on the northern border the investigated area. The grasses found on site are short and stunted due to the drought at the time. The land used to be farmland used for grain farming as is evident in the furrows in the ground.

5. GEOLOGY

The geology of the Bloemfontein area is underlain by the Lower Stage of the Beaufort Group which is part of the Karoo Super Group. The sedimentary rocks that are present in this group consist of fine-grained grey sandstone and coarse arkose alternating with green and maroon-coloured mudstone beds. The typical materials / rock type found in the area of Bloemfontein are Dolerite, (K_3l) Sandstone / Shale / Mudstone and, (K_2u) Mudstone / Shale. Table 3 summarise the Geology found in the area of Bloemfontein.

Table 3: Geology Formation

Symbol	Typical Materials / Rock Type	Super Group	Group	Sub - Group	Formation
🟥	Dolerite	Intrusive Rock			
K_3l	Sandstone / Shale / Mudstone	Karoo	Beaufort	Lower	-
K_2u	Mudstone / Shale	Karoo	Ecca	Upper	-

Figure 2 is an extract of the 2926, Bloemfontein Geology map. For the regional geology, please refer to Appendix J.

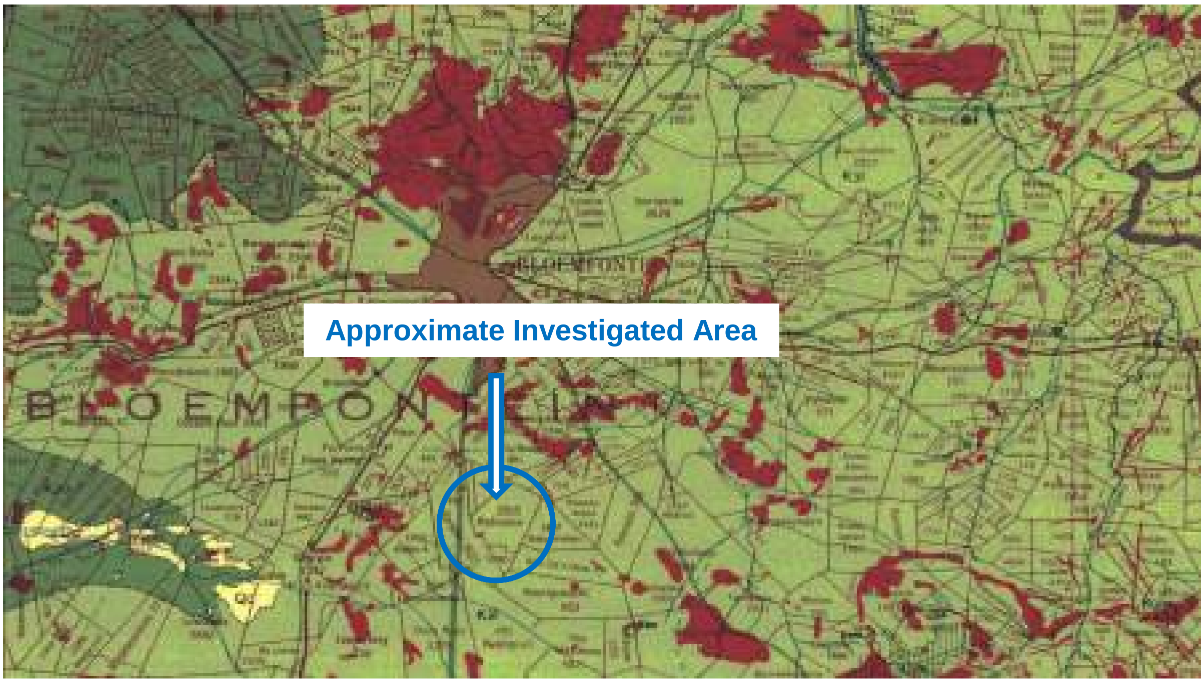


Figure 2 – Detail Geological Map (Department of Mines) Geological Detail Scale 1 : 250 000

6. CLIMATE

Bloemfontein normally receives about 407mm of rain per year, with most rainfall occurring mainly during summer. Bloemfontein receives the lowest rainfall (2mm) in June and the highest (68mm) in January.

The average daily maximum temperatures shows that the average midday temperatures for Bloemfontein ranges from 16°C in June to 29.2°C in January. The region is the coldest during July when the mercury drops to 0°C on average during the night. (SA Explorer ©, 2013)

The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Bloemfontein. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature. Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years. (Meteoblue, 2016)

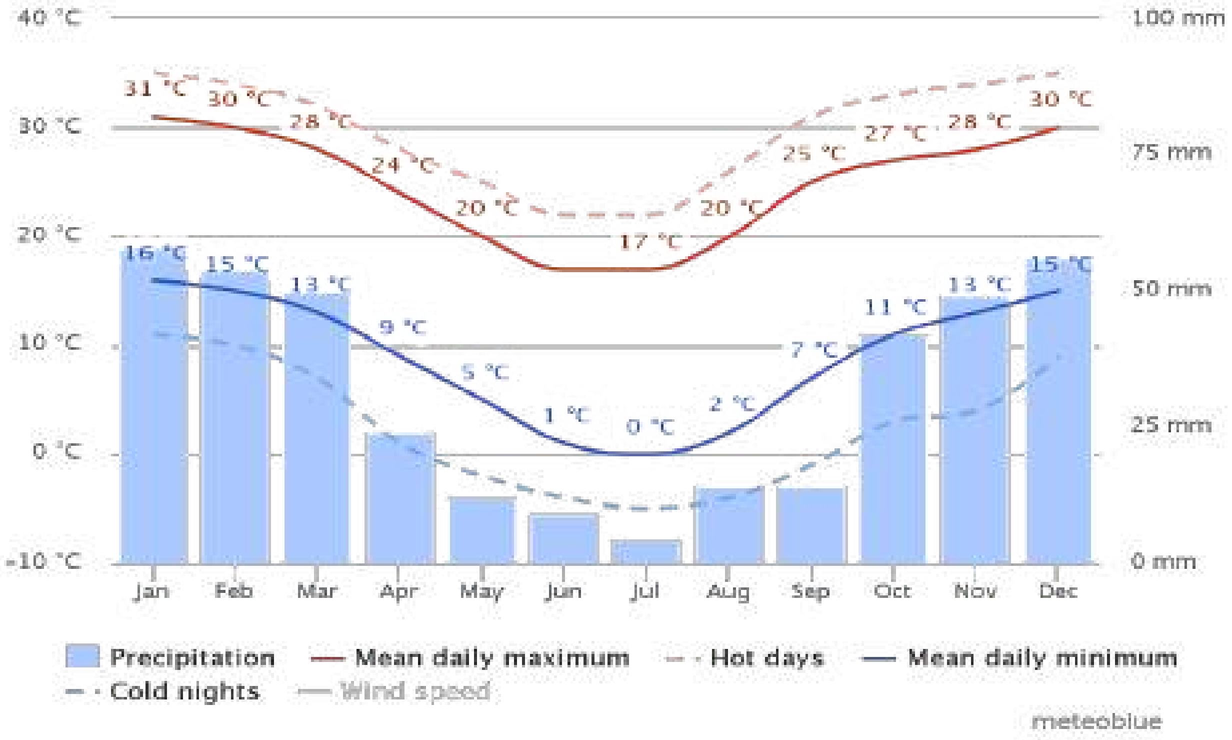


Figure 3 – Average temperatures and precipitation (www.meteoblue.com)

Bloemfontein is in the semi-arid to sub-tropical climatic region with Weinert's N – value of between 2 and 4. (Adapted from Weinert, 1980).

A climatic N-value of > 5 is associated with arid regions, where mechanical disintegration is the predominant rock weathering mode. A climatic N-value of < 5 is associated with the humid warm areas and a surplus of water, where chemical decomposition is the predominant rock weathering mode.

Environmental factors determine the mode of weathering and climate is the most important. Weathering products of rock depend mainly on the rock forming minerals (parent materials), the climatic conditions under which they had formed and the time of exposure to weathering processes. Climate does not only determine the mode of weathering which is likely to take place, but also the rate of weathering. The effect of climate on the weathering process (i.e. soils formation) is determined by the climatic N-value defined by Weinert.

7. SITE INVESTIGATION

Mr PW van Heerden (Technician) did the investigation on the 18th November 2016 to the 23rd November 2016, DCP Tests were done from the 23rd January to 26th January. Test pits were excavated with an 8ton TLB (Bell, 315SG) and profiled according to the methods stipulated in the Williams, Jennings & Brink, 1973. The profiles, laboratory test results and field test results are given in Appendices B, C, D and E.

Hundred and three (103) test pits were excavated at positions indicated on the Location Plan and Layout Plan (Appendices A & H). Fifty one (51) foundation indicator samples along with twenty nine (29) Maximum Dry Density (MOD AASHTO) and California Bearing Ratio (CBR) samples were sampled on site along with twenty three (23) permeability samples. The material properties were tested at Simlab (Pty) Limited – Geotechnical Services (Bloemfontein) a SANAS Accredited Testing Laboratory – T0455. Please visit the Simlab or SANAS website for more information regarding SANAS Accreditation. www.simlab.co.za or www.sanas.co.za

The purpose for testing the foundation indicators was to determine the basic physical characteristics of these disturbed samples, comprising the determination of Atterberg Limits and the Grain Size Distribution, including the Clay Fraction. This information will be used to determine the potential expansiveness of the materials.

The foundation indicators were tested according to the SANS 3001, Method GR1, Method GR10 and Method GR20 as well as the TMH1: 1986, Method A6. The potential expansiveness of the materials was determined according to Van der Merwe's method.

The Maximum Dry Density and California Bearing Ratio were tested according to the SANS 3001, Method GR30 and Method GR40. These test where conducted to determine the quality of the materials and to determine if the materials can be used for backfill and / or layer works. The classification of the materials tested, was done according to SANS 3001, Method GR1, Method GR10, Method GR30 and Method GR40.

Test Pit Co-ordinates are given in Table 5.

Table 4: Test Pits Co-ordinates

Test Pit No.	Co-ordinates	Test Pit No.	Co-ordinates
Test Pit 1	27 Y0076490 X3236739	Test Pit 75	27 Y0073638 X3236804
Test Pit 2	27 Y0076218 X3236725	Test Pit 76	27 Y0073798 X3236802
Test Pit 3	27 Y0075929 X3236661	Test Pit 77	27 Y0073931 X3236799
Test Pit 4	27 Y0075774 X3236583	Test Pit 78	27 Y0073922 X3236676
Test Pit 5	27 Y0075449 X3236659	Test Pit 79	27 Y0073920 X3236549
Test Pit 6	27 Y0075130 X3236735	Test Pit 80	27 Y0073926 X3236440
Test Pit 7	27 Y0074751 X3236736	Test Pit 81	27 Y0073798 X3236448
Test Pit 8	27 Y0074750 X3236491	Test Pit 82	27 Y0073669 X3236455
Test Pit 9	27 Y0074757 X3236265	Test Pit 83	27 Y0073672 X3236576
Test Pit 10	27 Y0075118 X3236442	Test Pit 84	27 Y0073676 X3236681
Test Pit 11	27 Y0075437 X3236578	Test Pit 85	27 Y0073794 X3236563
Test Pit 15	27 Y0075436 X3236755	Test Pit 86	27 Y0073798 X3236683
Test Pit 17	27 Y0075191 X3236776	Test Pit 89	27 Y0073707 X3237046
Test Pit 19	27 Y0074946 X3236801	Test Pit 91	27 Y0073821 X3237293
Test Pit 20	27 Y0074936 X3236889	Test Pit 92	27 Y0073922 X3237337
Test Pit 22	27 Y0074820 X3236805	Test Pit 93	27 Y0074051 X3237337
Test Pit 23	27 Y0074824 X3236667	Test Pit 94	27 Y0074200 X3237338

Test Pit No.	Co-ordinates	Test Pit No.	Co-ordinates
Test Pit 24	27 Y0074819 X3236551	Test Pit 95	27 Y0074179 X3237187
Test Pit 26	27 Y0074808 X3236344	Test Pit 96	27 Y0074049 X3237176
Test Pit 27	27 Y0074939 X3236437	Test Pit 97	27 Y0073921 X3237176
Test Pit 29	27 Y0074943 X3236672	Test Pit 98	27 Y0073805 X3237058
Test Pit 30	27 Y0075065 X3236668	Test Pit 99	27 Y0073920 X3237051
Test Pit 31	27 Y0075067 X3236549	Test Pit 100	27 Y0074051 X3237058
Test Pit 32	27 Y0075058 X3236453	Test Pit 101	27 Y0074163 X3237058
Test Pit 33	27 Y0075189 X3236542	Test Pit 102	27 Y0074168 X3236947
Test Pit 34	27 Y0075189 X3236657	Test Pit 103	27 Y0074030 X3236945
Test Pit 36	27 Y0075310 X3236644	Test Pit 104	27 Y0073916 X3236940
Test Pit 37	27 Y0075674 X3236575	Test Pit 105	27 Y0073809 X3236934
Test Pit 39	27 Y0075599 X3236511	Test Pit 109	27 Y0074315 X3237292
Test Pit 40	27 Y0075519 X3236551	Test Pit 110	27 Y0074317 X3237162
Test Pit 44	27 Y0074620 X3236266	Test Pit 111	27 Y0074315 X3237045
Test Pit 45	27 Y0074330 X3236263	Test Pit 112	27 Y0074313 X3236949
Test Pit 50	27 Y0074715 X3236874	Test Pit 113	27 Y0074448 X3236938
Test Pit 51	27 Y0074646 X3236789	Test Pit 114	27 Y0074421 X3237060
Test Pit 52	27 Y0074669 X3236663	Test Pit 116	27 Y0074437 X3237316
Test Pit 53	27 Y0074676 X3236514	Test Pit 117	27 Y0074556 X3236952
Test Pit 54	27 Y0074682 X3236392	Test Pit 118	27 Y0074668 X3236981
Test Pit 55	27 Y0074509 X3236338	Test Pit 120	27 Y0074307 X3237447
Test Pit 57	27 Y0074421 X3236163	Test Pit 121	27 Y0074175 X3237439
Test Pit 59	27 Y0074184 X3236143	Test Pit 122	27 Y0074037 X3237435
Test Pit 61	27 Y0074058 X3236344	Test Pit 124	27 Y0073918 X3237545
Test Pit 62	27 Y0074056 X3236464	Test Pit 126	27 Y0074022 X3237788
Test Pit 63	27 Y0074063 X3236575	Test Pit 128	27 Y0074169 X3237866
Test Pit 64	27 Y0074065 X3236701	Test Pit 129	27 Y0074169 X3237779
Test Pit 65	27 Y0074058 X3236805	Test Pit 130	27 Y0074044 X3237652
Test Pit 66	27 Y0074198 X3236683	Test Pit 131	27 Y0074041 X3237542
Test Pit 67	27 Y0074205 X3236444	Test Pit 132	27 Y0074173 X3237540
Test Pit 68	27 Y0074270 X3236333	Test Pit 133	27 Y0074175 X3237669
Test Pit 69	27 Y0073920 X3236263	Test Pit 135	27 Y0074313 X3237661
Test Pit 71	27 Y0073680 X3236364	Test Pit 136	27 Y0074302 X3237539
Test Pit 73	27 Y0073539 X3236569	Test Pit 137	27 Y0074438 X3237546
		Test Pit 139	27 Y0074428 X3237779

Co-ordinate system – WGS 84

The depth of the test pits and type of bedrock encountered in the investigation are summarised in Table 6.

Table 5: Depth of Test Pits

Test Pit No.	Depth of Test Pit (mm)	Depth to Refusal Layer (mm)	Materials Description at Bottom of Test Pit or at Refusal
Test Pit 1	0 - 2000	2000	Mudstone gravel
Test Pit 2	0 - 2000	2000	Mudstone gravel
Test Pit 3	0 - 2000	2000	Mudstone gravel
Test Pit 4	0 - 2000	2000	Mudstone gravel
Test Pit 5	0 - 1100	1100	Refusal - hard mudstone
Test Pit 6	0 - 600	600	Refusal - hard dolerite
Test Pit 7	0 - 1200	1200	Refusal - hard mudstone

Test Pit No.	Depth of Test Pit (mm)	Depth to Refusal Layer (mm)	Materials Description at Bottom of Test Pit or at Refusal
Test Pit 8	0 - 1800	1800	Refusal - hard mudstone
Test Pit 9	0 - 2000	2000	Mudstone gravel
Test Pit 10	0 - 2000	2000	Mudstone gravel
Test Pit 11	0 - 1400	1400	Refusal - hard sandstone
Test Pit 15	0 - 1200	1200	Refusal - hard weathered dolerite
Test Pit 17	0 - 200	200	Refusal - hard weathered dolerite
Test Pit 19	0 - 500	500	Refusal - hard mudstone
Test Pit 20	0 - 400	400	Refusal - hard mudstone
Test Pit 22	0 - 2000	2000	Mudstone gravel
Test Pit 23	0 - 1800	1800	Refusal - hard mudstone
Test Pit 24	0 - 1900	1900	Refusal - hard mudstone
Test Pit 26	0 - 2000	2000	Mudstone gravel
Test Pit 27	0 - 2000	2000	Mudstone and calcrete gravel
Test Pit 29	0 - 2000	2000	Mudstone gravel
Test Pit 30	0 - 1900	1900	Refusal - hard mudstone
Test Pit 31	0 - 2000	2000	Mudstone gravel
Test Pit 32	0 - 2000	2000	Mudstone gravel
Test Pit 33	0 - 1900	1900	Refusal - hard mudstone
Test Pit 34	0 - 1400	1400	Refusal - hard mudstone
Test Pit 36	0 - 1800	1800	Refusal - hard sandstone
Test Pit 37	0 - 2000	2000	Mudstone gravel
Test Pit 39	0 - 2000	2000	Weathered dolerite gravel
Test Pit 40	0 - 1600	1600	Refusal - hard sandstone
Test Pit 44	0 - 2000	2000	Mudstone gravel
Test Pit 45	0 - 2000	2000	Mudstone gravel
Test Pit 50	0 - 2000	2000	Mudstone gravel
Test Pit 51	0 - 2000	2000	Mudstone gravel
Test Pit 52	0 - 1900	1900	Refusal - hard mudstone
Test Pit 53	0 - 1500	1500	Refusal - hard mudstone
Test Pit 54	0 - 1900	1900	Refusal - hard mudstone
Test Pit 55	0 - 2000	2000	Mudstone gravel
Test Pit 57	0 - 2000	2000	Mudstone gravel
Test Pit 59	0 - 2000	2000	Mudstone gravel
Test Pit 61	0 - 2000	2000	Mudstone gravel
Test Pit 62	0 - 2000	2000	Mudstone gravel
Test Pit 63	0 - 1900	1900	Refusal - hard sandstone
Test Pit 64	0 - 2000	2000	Mudstone gravel
Test Pit 65	0 - 2000	2000	Mudstone gravel
Test Pit 66	0 - 2000	2000	Mudstone gravel
Test Pit 67	0 - 2000	2000	Mudstone gravel
Test Pit 68	0 - 2000	2000	Mudstone gravel
Test Pit 69	0 - 2000	2000	Mudstone gravel
Test Pit 71	0 - 2000	2000	Mudstone gravel
Test Pit 73	0 - 1600	1600	Refusal - hard mudstone
Test Pit 75	0 - 2000	2000	Mudstone gravel
Test Pit 76	0 - 2000	2000	Mudstone gravel
Test Pit 77	0 - 2000	2000	Mudstone gravel
Test Pit 78	0 - 2000	2000	Mudstone gravel
Test Pit 79	0 - 2000	2000	Mudstone gravel
Test Pit 80	0 - 2000	2000	Mudstone gravel
Test Pit 81	0 - 2000	2000	Sandstone gravel
Test Pit 82	0 - 2000	2000	Mudstone gravel

Test Pit No.	Depth of Test Pit (mm)	Depth to Refusal Layer (mm)	Materials Description at Bottom of Test Pit or at Refusal
Test Pit 83	0 - 2000	2000	Mudstone gravel
Test Pit 84	0 - 2000	2000	Clayey sand
Test Pit 85	0 - 2000	2000	Mudstone gravel
Test Pit 86	0 - 2000	2000	Mudstone gravel
Test Pit 89	0 - 2000	2000	Mudstone gravel
Test Pit 91	0 - 2000	2000	Mudstone gravel
Test Pit 92	0 - 1300	1300	Refusal - hard mudstone
Test Pit 93	0 - 1400	1400	Refusal - hard mudstone
Test Pit 94	0 - 1300	1300	Refusal - hard mudstone
Test Pit 95	0 - 2000	2000	Mudstone gravel
Test Pit 96	0 - 2000	2000	Mudstone gravel
Test Pit 97	0 - 2000	2000	Mudstone gravel
Test Pit 98	0 - 2000	2000	Mudstone gravel
Test Pit 99	0 - 2000	2000	Mudstone gravel
Test Pit 100	0 - 2000	2000	Mudstone gravel
Test Pit 101	0 - 2000	2000	Mudstone gravel
Test Pit 102	0 - 2000	2000	Mudstone gravel
Test Pit 103	0 - 2000	2000	Mudstone gravel
Test Pit 104	0 - 2000	2000	Sandy lean clay
Test Pit 105	0 - 2000	2000	Mudstone gravel
Test Pit 109	0 - 2000	2000	Mudstone gravel
Test Pit 110	0 - 1500	1500	Refusal - hard mudstone
Test Pit 111	0 - 1100	1100	Refusal - hard mudstone
Test Pit 112	0 - 1400	1400	Refusal - hard mudstone
Test Pit 113	0 - 1600	1600	Refusal - hard mudstone
Test Pit 114	0 - 1400	1400	Refusal - hard mudstone
Test Pit 116	0 - 2000	2000	Mudstone gravel
Test Pit 117	0 - 2000	2000	Mudstone gravel
Test Pit 118	0 - 2000	2000	Mudstone gravel
Test Pit 120	0 - 1700	1700	Refusal - hard mudstone
Test Pit 121	0 - 800	800	Refusal - hard mudstone
Test Pit 122	0 - 900	900	Refusal - hard mudstone
Test Pit 124	0 - 1800	1800	Refusal - hard mudstone
Test Pit 126	0 - 1400	1400	Refusal - hard mudstone
Test Pit 128	0 - 1500	1500	Refusal - hard mudstone
Test Pit 129	0 - 800	800	Refusal - hard weathered dolerite
Test Pit 130	0 - 1500	1500	Refusal - hard mudstone
Test Pit 131	0 - 800	800	Refusal - hard mudstone
Test Pit 132	0 - 1100	1100	Refusal - hard sandstone
Test Pit 133	0 - 2000	2000	Weathered dolerite gravel
Test Pit 135	0 - 400	400	Refusal - hard dolerite
Test Pit 136	0 - 1300	1300	Refusal - hard mudstone
Test Pit 137	0 - 2000	2000	Weathered dolerite gravel
Test Pit 139	0 - 1700	1700	Mudstone gravel

8. TEST RESULTS

The profiles, laboratory test results and field test results are given in Appendices B, C, D & E. The potential expansiveness of the materials was determined according to Van Der Merwe's method. Below is a summary of the test results in Table 7.

Table 6: Summary of test results

Test Pit No.	**Layer Thickness** (mm)	**Unified Soil Class** (USC)	**COLTO Class**	Clay (<0.002 mm)	**Potential Expansiveness (mm)**	**Atterberg Limits LL / PI / LS**	**Permea-bility m.s^{-1}**	**Site Class**
Test Pit 1	0 – 700 700 – 900 900 – 2000	SC SC SW - SM	N/C N/C N/C	33 17 4	Low Medium - 3.1mm Low	37 / 15 / 6.7 41 / 17 / 7.5 53 / 19 / 8.8		H/S
Test Pit 3	0 – 500 500 – 800 800 – 1700 1700 – 2000	SC SM CL SM	N/C N/C N/C N/C	29 17 26 18	Low Medium – 4.9mm Medium – 11.7mm Medium – 3.1	31 / 10 / 5.4 49 / 20 / 9.5 39 / 14 / 7 46 / 18 / 9.4		H2
Test Pit 24	0 – 400 400 – 800 800 – 1900	SM SC GP - GM	N/C N/C G6	16 36 1	Low Low Low	- / SP / 1.3 36 / 14 / 6.7 33 / 8 / 4.0	4.54 x 10^{-6} 3.52 x 10-^{8} 8.68 x 10^{-8}	H/S
Test Pit 32	0 – 400 400 – 800 800 – 1300 1300 – 2000	SM SC SC SC	- - - -	21 36 7 8	Low Low Low Low	- / SP / 1.1 35 / 16 / 7.7 37 / 12 / 6.4 38 / 16 / 8.2		H/S
Test Pit 45	0 – 300 300 – 800 800 – 900 900 – 2000	SC – SM SM - GP - GM	N/C N/C - N/C	19 31 - 1	Low Medium – 8.4mm - Low	18 / 5 / 2.3 45 / 17 / 7.7 - 51 / 18 / 9.0	3.46 x 10^{-6} 4.82 x 10^{-8} 1.27 x 10^{-8} 9.96 x 10^{-9}	H1/S
Test Pit 51	0 – 500 500 – 800 800 – 1100 1100 – 2000	SM SC - SW – SM	- - - -	16 20 - 3	Low Medium – 4.9 mm - Low	- / SP / 1.3 47 / 21 / 9.8 - 45 / 16 / 7.5		H/S
Test Pit 67	0 – 300 300 – 800 800 – 2000	SC - SM CL GP - GC	- - -	17 47 1	Low Low Low	19 / 7 / 2.5 44 / 19 / 8.7 39 / 14 / 6.6		H/S
Test Pit 77	0 – 400 400 – 800 800 – 2000	SC CL SC	- - -	26 55 16	Low Low Low	27 / 10 / 4.8 47 / 22 / 11.4 32 / 12 / 5.7		H/S
Test Pit 81	0 – 400 400 – 700 700 – 1500 1500 – 2000	SC CL SM GP - GM	N/C N/C G7 G7	22 53 4 2	Low Medium – 5.1mm Low Low	23 / 8 / 4.0 49 / 27 / 12.5 46 / 16 / 8.4 41 / 14 / 7.1	8.54 x 10^{-7} 1.27 x 10^{-9} 4.66 x 10^{-8} 7.73 x 10^{-8}	H/S
Test Pit 84	0 – 500 500 – 1400 1400 – 2000	ML CL SC	N/C N/C G8	13 39 15	Low Low Low	- / SP / 1.1 35 / 14 / 7.4 34 / 12 / 5.7	5.35 x 10^{-6} 7.84 x 10^{-8} 2.46 x 10^{-8}	H/S
Test Pit 94	0 – 400 600 – 1000 1000 – 1300	SM CL CL	- - -	25 20 10	Low Medium – 6.1mm Low	32 / 8 / 3.8 35 / 15 / 6.9 36 / 15 / 7.4		H/S
Test Pit 96	0 – 400 400 – 700 700 – 2000	SC CL SC	N/C N/C G7	24 40 4	Low Low Low	25 / 8 / 3.8 40 / 17 / 8.0 38 / 14 / 7.3	1.58 x 10^{-6} 4.73 x 10^{-8} 2.19 x 10^{-8}	H/S
Test Pit 98	0 – 500 500 – 800 800 – 2000	SC CL SP - SC	- - -	20 41 1	Low Low Low	29 / 8 / 4.0 38 / 16 / 7.8 - / SP / 1.3		H/S
Test Pit 112	0 – 600 600 – 800 800 – 1400	SC CL GP - GC	N/C N/C G6	17 35 2	Low Low Low	- / SP / 1.3 39 / 16 / 7.7 33 / 10 / 4.9	5.49 x 10^{-7} 6.93 x 10^{-8} 9.24 x 10^{-8}	H/S
Test Pit 132	0 – 200 200 – 700 700 – 1100	CL – ML CL GC	N/C N/C G9	21 33 1	Low Low Low	24 / 6 / 3.5 31 / 10 / 5.1 34 / 14 / 6.5	5.54 x 10^{-7} 9.36 x 10^{-8} 5.82 x 10^{-8}	H/S

Test Pit No.	Layer Thickness (mm)	Unified Soil Class (USC)	COLTO Class	Clay (<0.002 mm)	Potential Expansiveness (mm)	Atterberg Limits LL / PI / LS	Permea-bility $m.s^{-1}$	Site Class
Test Pit 139	0 – 500	SC – SM	-	23	Low	22 / 6 / 3.2		H/S
	500 – 1200	CL	-	37	Low	38 / 17 / 7.6		
	1200 – 1700	GP - GC	-	3	Low	38 / 16 / 7.2		

The materials description is done according to the Unified Soil Classification (USC) Criteria and refers to the following:

- SM: Silty sand
- SC: Clayey sand / Clayey sand with gravel
- SC-SM: Silty, clayey sand
- SW-SM: Well-graded sand with silt and gravel
- CL: Sandy lean clay
- GP-GC: Poorly graded gravel with clay and sand
- CL-ML: Silty clay with sand
- SP-SC: Poorly graded sand with clay and gravel
- ML: Sandy silt

According to Van Der Merwe's method, the potential expansiveness is Low to Medium - 8.4mm at the area investigated, with exception of Test Pit 3, which is on the proposed road with medium expansiveness and a potential total heave of 19.7mm.

The criteria used to classify the Residential Site Class Designations is summarised in Table 8 (NHBRC Home Building Manual, Part1, Section2, Table: Residential Site Class Designations).

Table 7: NHBRC Home Building Manual, Part1, Section2, Table: Residential Site Class Designations

Typical Founding Material	Character of Founding Material	Expected Range of Total Soil Movements (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 (clays, 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	<10 10 – 20 >20	50% 50% 50%	S S1 S2
Contaminated soils, Controlled fill, Dolomitic areas, Landslip, Landfill, Marshy areas, Mine waste fill, Mining subsidence, Reclaimed areas, Uncontrolled fill, Very soft silts / silty clays	Variable	Variable	-	P

According to the NHBRC's Site Class Designations, the different Site Classes (Table 7) can be combined to give a combined site class designation for the different areas within the investigated area.

Figure 5 is an illustration of the different site designations (Zoning) as per Table 7. The dominant site designation was determined with the amount of test pits given and the information gathered from the materials allowed for testing. Figure 5 is for illustration purposes only and thus the site designations may change if the site conditions vary. The site designations should be re-evaluated if this becomes apparent during excavation.

Figure 4 – Site Designation (Zoning)

H2	H1/S	H/S

H is for fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays) with an estimated total heave of less than 7.5mm. H1 is for fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays) with an estimated total heave of more than 7.5mm and less than 15mm. H2 is for fine grained soils with moderate to very high plasticity (clays, silty clays, clayey silts and sandy clays) with an estimated total heave of more than 15mm and less than 30mm. S is for fine grained soils (clayey silts and clayey sands) of low plasticity, sands, sandy and gravely soils with a compressibility of less than 10.0mm.

These site designations are to determine the different foundation options for each of the illustrated areas in Figure 5. Each colour represents the different site designations in accordance to Table 7. For more information regarding the different founding options for each designated area, please refer to Section 10 – Site Classification.

According to the *NAVFAC the estimated bearing ratio of the expected bedrock (Sandstone / Mudstone) ranges between 1 500kPa to 2 500kPa when bedrock is still intact.

Presumptive Values of Allowable Bearing Pressures for Spread Foundations as determined according to *NAVFAC using the Unified Soil Classification (USC) Criteria is summarised in Table 12.

Table 8: Allowable Bearing Ratio according to NAVFAC

Test Pit No.	**Layer Thickness** (mm)	**Unified Soil Classification** (USC)	**Consistency**	**Allowable Bearing Ratio Range** (kPa)
Test Pit 1	0 – 700 700 – 900 900 – 2000	SC SC SW - SM	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300
Test Pit 3	0 – 500 500 – 800 800 – 1700 1700 – 2000	SC SM CL SM	Medium Dense Dense Dense Dense	100 – 200 200 – 300 200 – 300 200 – 300
Test Pit 24	0 – 400 400 – 800 800 – 1900	SM SC GP - GM	Medium Dense Dense Dense	100 – 200 200 – 300 800 - 1200
Test Pit 32	0 – 400 400 – 800 800 – 1300 1300 – 2000	SM SC SC SC	Medium Dense Dense Dense Dense	100 – 200 200 – 300 200 – 300 200 – 300
Test Pit 45	0 – 300 300 – 800 800 – 900 900 – 2000	SC – SM SM - GP - GM	Medium Dense Dense Dense	100 – 200 200 – 300 800 - 1200
Test Pit 51	0 – 500 500 – 800 800 – 1100 1100 – 2000	SM SC - SW – SM	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300
Test Pit 67	0 – 300 300 – 800 800 – 2000	SC - SM CL GP - GC	Medium Dense Dense Dense	100 – 200 200 – 300 800 - 1200
Test Pit 77	0 – 400 400 – 800 800 – 2000	SC CL SC	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300
Test Pit 81	0 – 400 400 – 700 700 – 1500 1500 – 2000	SC CL SM GP - GM	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300 800 - 1200
Test Pit 84	0 – 500 500 – 1400 1400 – 2000	ML CL SC	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300
Test Pit 94	0 – 400 600 – 1000 1000 – 1300	SM CL CL	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300
Test Pit 96	0 – 400 400 – 700 700 – 2000	SC CL SC	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300
Test Pit 98	0 – 500 500 – 800 800 – 2000	SC CL SP - SC	Medium Dense Dense Dense	100 – 200 200 – 300 200 – 300

Test Pit No.	**Layer Thickness** (mm)	**Unified Soil Classification** (USC)	**Consistency**	**Allowable Bearing Ratio Range** (kPa)
Test Pit 112	0 – 600 600 – 800 800 – 1400	SC CL GP - GC	Medium Dense Dense Dense	100 – 200 200 – 300 800 - 1200
Test Pit 132	0 – 200 200 – 700 700 – 1100	CL – ML CL GC	Medium Dense Dense Dense	100 – 200 200 – 300 800 - 1200
Test Pit 139	0 – 500 500 – 1200 1200 – 1700	SC – SM CL GP - GC	Medium Dense Dense Dense	100 – 200 200 – 300 800 - 1200

Dynamic Cone Penetrometer (DCP's) tests were done between the test pits from the surface in order to estimate the bearing ratio of the unconsolidated materials according to *Dr. B van Wyk's method and to estimate the possible excavation depth of possible grave positions. The field test results are given in Appendix E.

9. GEOTECHNICAL EVALUATION

9.1 Potentially Collapsible Soils

Collapsible soils can be defined as soils with a high void ratio and with a low density that when subjected to a combination of direct actions (loads) and an increase in soils moisture content, experiences sudden or rapid settlements. With reference to the soil profiles in Appendix B and laboratory test results in Appendix C, the following can be determined:

Collapsibility according to the criteria by Priklonski (1952) with a KD value ranging from a maximum of 0.0 to a minimum of -2.4 classifies the site with a high probability of collapsing.

Collapsibility according to the Criteria by Handy (1973), the clay values on site per test pit ranges from a maximum of 25.8% and a minimum of 11.5%, indicates that the collapsibility on site will range from a high probability of collapse to less than 50% probability of collapse

Settlement according to the Criteria by Clevenger (1958) with values ranging from 18.7 kN/m^3 maximum to 15.1 kN/m^3 minimum indicates that the settlement will be small on the site.

9.2 Potentially Expansive Soils

Expansive soils are defined as fine-grained soils, the clay mineralogy of which is such that it changes in volume to varying degrees in response to change in moisture content. This is the soils increases (heaves or swells) upon wetting up and decreases in volume (shrinks) upon drying out. A summary of the potential expansiveness calculated according to Van Der Merwe's method is summarised in Table 7.

The potentially expansive soils found on site ranges from Low to Medium - 8.4mm with the exception of Test Pit 3 which is located on the prospective road with a Total Potential Heave of 19.7mm.

9.3 Potentially Compressible Soils

Compressible soils can be defined as materials that, when subjected to direct actions (loads), undergoes a gradual settlement as volume changes occur. Given ideal conditions such as saturated moisture content and applied load, the materials will be compressible to a certain degree. In general potentially compressible soils were encountered during the investigation.

The materials that was found on site was tested for compactability and the following information was determined: Maximum compactability ratio: 0.63, minimum compactability ratio: 0.36 and the average compactability ratio: 0.43

9.4 Shallow Seepage / Ground-Water Level / Area Subject to Flooding

No ground-water seepage was encountered at the time of the investigation. A shallow water-table can be expected from time to time in the rainy season.

The natural slope of the investigated area may not be steep enough to drain away the rainwater. Some of the rainwater may collect and form ponds until it has seeped into the *in situ* materials. These ponds may subject the area to surface flooding during abnormal rainfall. Therefore the surface drainage of the site should be improved.

Determining a flood line is not part of this report scope and thus, no flood line of any kind was determined. Provision should be made for drainage structures underground or at the surface where applicable.

9.5 Slope Stability (Steep Slopes & Unstable Natural Slopes)

The investigated area is situated on a relatively flat plane with little to no slope at the proposed site. No unstable natural slopes were observed during the investigation.

9.6 Erodibility of the Soils Profile

Due to the nature of the materials, erodibility is a concern. The materials have the potential to be erodible. This can occur during high rainfall. The materials have the possibility to be washed away during heavy rainstorms. Surface drainage control will therefore need to be implemented during development of the site.

Caution should be exerted when introducing Mudstone (if found on site) to water, sunlight and air as this will speed up the weathering process of Mudstone.

9.7 Excavatability

Excavation depth in the area investigated is in excess of 2.000m. Excavation in the area of the proposed site should generally be feasible with normal TLB (4x4, 8Ton) to large (Excavator) equipment, although shallow bedrock or boulders may occur. According to the SANS 634:2012 Edition 1, the restricted excavation class for the investigated area to a depth of 2.000m is: Soft Rock.

The expected bedrock to be found on site can be classified as Intermediate Rock, Mudstone / Sandstone. It might be possible do dig into the Mudstone / Sandstone with a 20ton tracked excavator, however the Intermediate Rock, Mudstone / Sandstone may become denser the deeper you dig into it, thus becoming Hard Rock that may require blasting or wedging according to SANS 634:2012 Edition 1. This will have an effect on the excavation of deep trenches for the installation of services as well as shallow trenches for foundations where shallow rock is expected.

Table 9: Classification of Materials for Machine Excavation (SANS 634:2012 Edition 1)

Excavation	Classification	Description
Restricted	Soft Rock	Materials can be efficiently removed by back-acting excavator (TLB) with flywheel power >0.10 kW for every tined bucket width
	Intermediate Rock	Materials can be removed by excavator with flywheel power >0.10 kW for every tined bucket width or with the use of pneumatic tools
	Hard Rock	Materials that cannot be removed without blasting or wedging and splitting

Figure 6 indicates the depth of excavation on site, a more detailed figure can be found in Appendix H

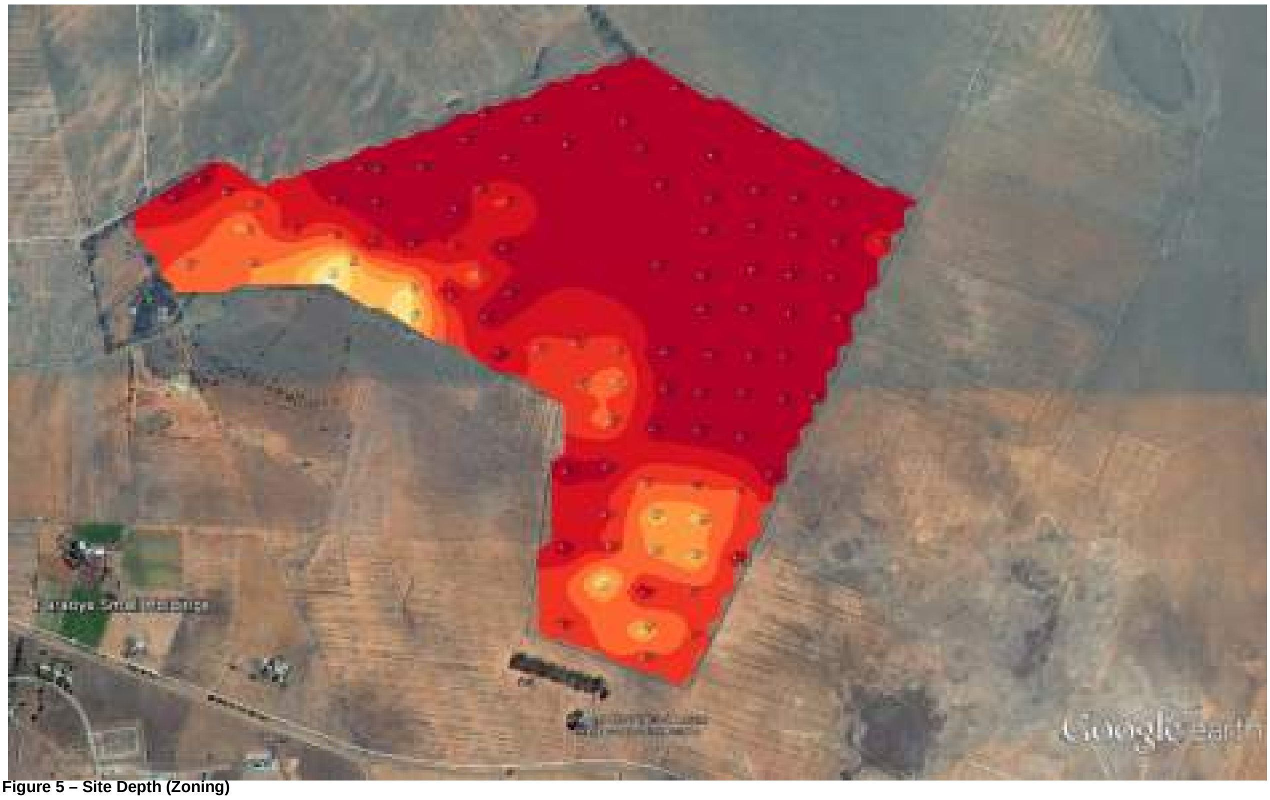


Figure 5 – Site Depth (Zoning)

🟨	🟨	🟨	🟧	🟧	🟧	🟥	🟥	🟥
0.2 – 0.4	0.4 – 0.6	0.6 – 0.8	0.8 – 1.0	1.0 – 1.2	1.2 – 1.4	1.4 – 1.6	1.6 – 1.8	1.6 – 1.8

9.8 Relationship between pH-Value, Conductivity and Corrosiveness of Soils

The soil samples on site that was tested for pH-value, conductivity and corrosiveness of soils yielded the following results:

Maximum pH: 6.86, Maximum conductivity: 0.0992 Sm^{-1}: Moderately corrosive

Minimum pH: 5.06, Minimum conductivity: 0.0054 Sm^{-1}: Progressively Less (Decreasingly)

Corrosive Average pH: 5.87 Average conductivity: 0.0265 Sm^{-1}: Moderately Corrosive

9.9 Permeability on Site

9.9.1 The Safe Distances to Domestic Water Sources

It is of high priority to preserve and protect potable water resources from contamination by potentially harmful organisms originating in cemeteries.

Table 10: *Safe Distance to Domestic Water Sources

Soil Permeability m/s	Safe Distance meters
1 x 10^{-6}	462
1 x 10^{-7}	182
1 x 10^{-8}	153
1 x 10^{-9}	150

9.9.2 Suitability of Permeability on Site

The suitability of material for cemeteries is dependent on the permeability of the material. The permeability results are displayed in table seven. Figure 7 indicates the permeability on site, a more detailed figure can be found in Appendix H. Table 20 shows the soil type and predicted permeability ranges

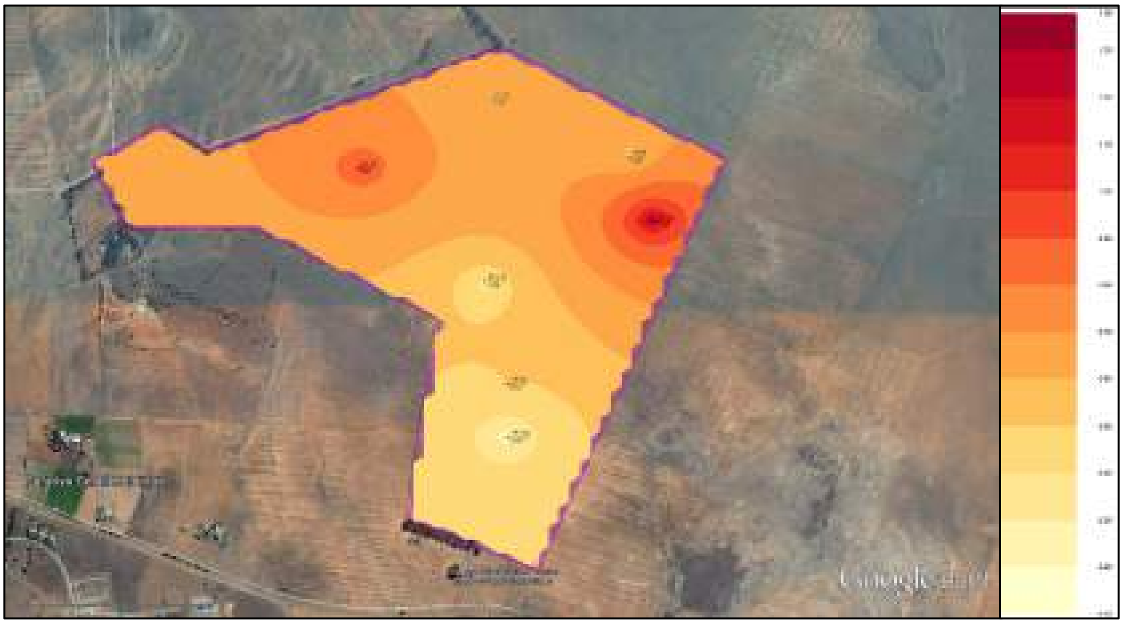


Figure 6 – Site Permeability (Zoning)

Table 11: Soil type and predicted permeability ranges

Soil Type	Permeability (m/s)	Cemetery Suitability
Well graded gravel	1 x 10^{-3} to 1 x 10^{-5}	Totally unsuitable
Poorly graded gravel	5 x 10^{-2} to 1 x 10^{-5}	Totally unsuitable
Silty gravel	1 x 10^{-6} to 1 x 10^{-9}	Partially suitable
Clayey gravel	1 x 10^{-7} to 1 x 10^{-10}	Suitable
Well graded sand	5 x 10^{-4} to 5 x 10^{-6}	Unsuitable
Poorly graded sand	5 x 10^{-3} to 5 x 10^{-7}	Unsuitable
Silty sand	5 x 10^{-6} to 1 x 10^{-9}	Ideal
Clayey sand	5 x 10-^{7} to 1 x 10^{-10}	Ideal
Lean clay	1 x 10^{-8} to 1 x 10^{-10}	Partially suitable
Silt	5 x 10^{-7} to1 x 10^{-10}	Suitable
Organic silt / clay	1 x 10^{-7} to 1 x 10^{-10}	Partially suitable
Fat clay	1 x 10-^{10} to 1 x 10^{-12}	Totally unsuitable
Elastic silt	1 x 10^{-9} to 1 x 10^{-11}	Unsuitable

10. SITE CLASSIFICATION

For urban planning purposes the site is classified according to the classification system described in the * NHBRC's Home Building Manual, Part 1 & 2 using Van Der Merwe's method and based on the SANS 634 : 2012 Ed1, Table 1 – Geotechnical constraints in urban development.

Site classification is based on the assumption that the site will mainly be utilised for single storey masonry structures. Based on the laboratory test results and observations the general soils conditions can be classified and summarised as follows

- Recommended Foundation Option for Site Class H1; S
  - Modified Normal Construction

A summary of the recommended foundation options can be found in Table 24.

Table 12: Residential Site Class Designations

Site Class	Expected Range of Total Soil Movements (mm)	Construction Type	Foundation Design and Building Procedures
S	<5.0mm	Normal	• Normal construction (strip footings or slab-on-the-ground) foundation. • The founding bearing pressure may not exceed 50kPa. • Site drainage and service/plumbing precautions recommended.
H	< 7.5mm	Normal	• Normal construction (strip footings or slab-on-the-ground) foundation. • Site drainage and service/plumbing precautions recommended.
H1	7.5 – 15.0mm	Modified Normal	• Lightly reinforced strip footings. • Articulation joints at all internal/external doors and openings. • Light reinforcement in masonry. • Site drainage and plumbing/service precautions.
		Soil Raft	• Remove all or necessary parts of contaminated soils to 1.0m beyond the perimeter of the building and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content. • Normal construction with lightly reinforced strip footings and light reinforcement in masonry if residual movements are <7.5mm, or construction type appropriate to residual movements. • Site drainage and plumbing/service precautions.
H2	15 - 30mm	Stiffened or cellular raft	• Stiffened or cellular raft of articulated lightly reinforced masonry. • Site drainage and plumbing/service precautions.
		Piled construction	• Piled foundations with suspended floor slabs with or without ground beams. • Site drainage and plumbing/service precautions.
		Split construction	• Combination of reinforced masonry and full movement joints. • Suspended floors or fabric reinforced ground slabs acting independently from the building. • Site drainage and plumbing/service precautions.

Site Class	Expected Range of Total Soil Movements (mm)	Construction Type	Foundation Design and Building Procedures
		Soil Raft	• Remove all or necessary parts of contaminated soils to 1.0m beyond the perimeter of the building and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content. • Normal construction with lightly reinforced strip footings and light reinforcement in masonry if residual movements are <7.5mm, or construction type appropriate to residual movements. • Site drainage and plumbing/service precautions.

11. RECOMMENDATIONS

11.1 In general, the materials which occur on site are Low to Medium (8.4mm) potentially expansive according to Van Der Merwe's method with a high probability of collapsing nature according to Handy (1973) and Priklonski (1952) criteria. If possible, expansive materials or materials that exhibit collapse potential must be avoided or pre-collapse before construction of the foundations.

11.2 The proposed foundation for modified normal construction is: Lightly reinforced strip footings with articulated joints at all internal/external doors and openings with light reinforcement in masonry.

The founding depth can be raised by trench filling with competent materials to a required founding level of approximately 0.300m below surface.

For Soil Raft - Remove all or necessary parts of expansive horizon to 1.000m beyond the perimeter of the building to an estimated depth of 1.000m (expansive horizon) and replace with inert backfill compacted to 93% MOD AASHTO density at -1% to +2% of optimum moisture content.

The materials to be used for the Soil Raft must classify as a G6/7 and be placed in layers not more than 150mm compacted to 93% / 95% MOD AASHTO compaction.

The excavation floor must be compacted before the construction of the Soil Raft. The in situ compaction must be 90% MOD AASHTO compaction.

The proposed foundation option for normal construction is Strip footings or slab on the ground foundation. The Foundation bearing pressure at Site Class S may not exceed 50kPa.

Note: The final decision on the type of foundation used for the applicable structure should be made and designed by a Structural Engineer.

11.3 It is recommended that the site drainage be improved for surface flooding. Drainage canals must be constructed to channel the water from structures after construction.

11.4 The general materials on site have COLTO classification of G7 and No Classification.

The materials with a G7 Classification can be improved by modification: By mixing the *in situ* materials with G6/7 materials (Weathered Dolerite). After modification of the materials it can be stabilised with lime or cement to improve the materials further.

If these materials are to be considered in backfilling, it should be stockpiled and sampled again to confirm its Classification.

The materials with No Classification cannot be used in backfill and/or road construction.

11.5 Grave selection dependent on Permeability: Material suitability ranges from unsuitable to ideal.

11.6 Grave selection dependent on Depth of Excavation of in situ materials, the depth ranges from 2.000m over the majority of area to 0.200m around the fringes of the site

11.7 Conditions can vary on site. Recommendations should be re-evaluated if this becomes apparent during the excavation.

PW VAN HEERDEN (Technician)
(ND Civil-General)

B gist / CEO)
(NI Sc Hons – Transport)

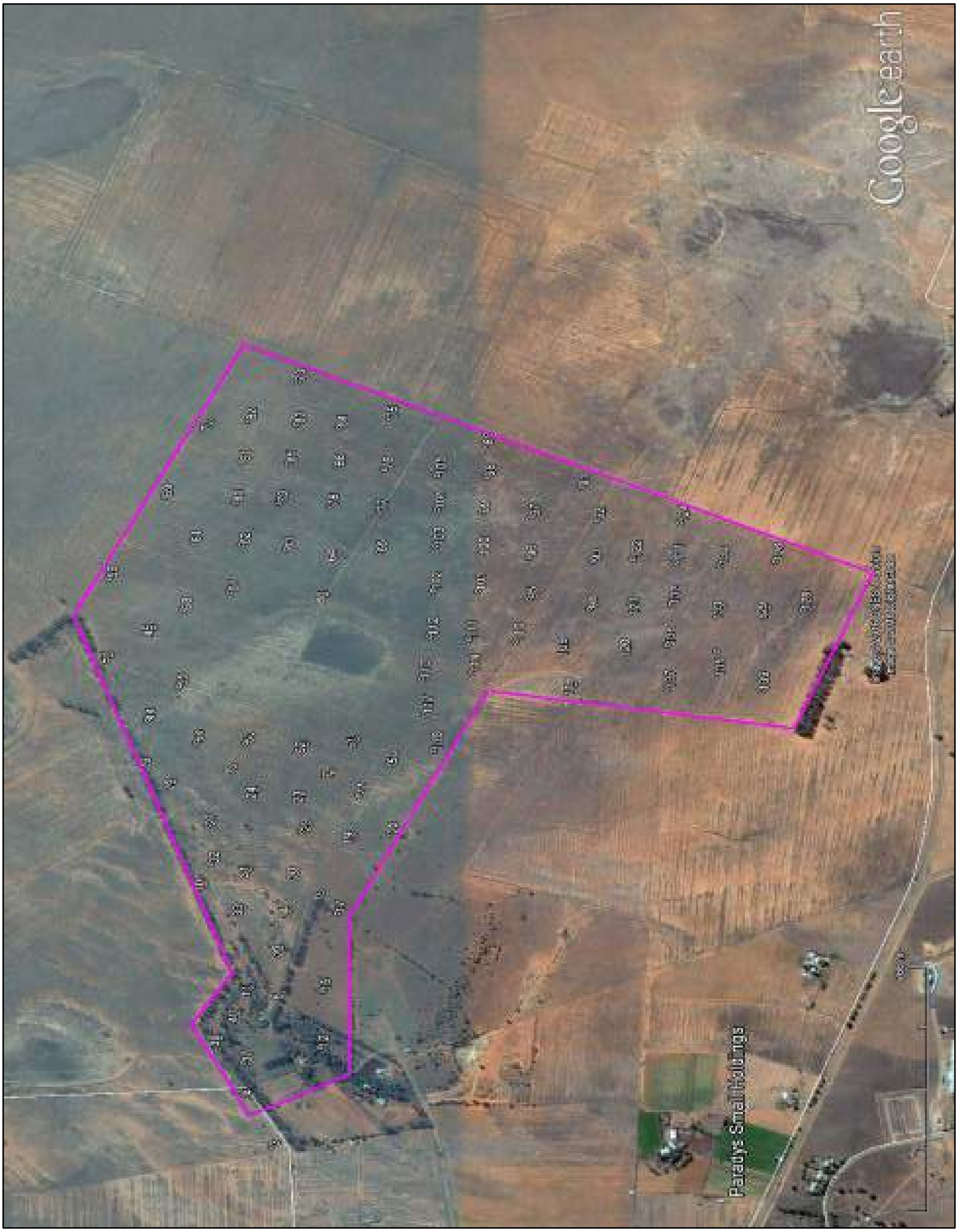
For: **SIMLAB (PTY) LIMITED – GEOTECHNICAL SERVICES**

APPENDIX A

LOCALITY PLAN

LOCALITY PLAN

LOCALITY PLAN



APPENDIX B

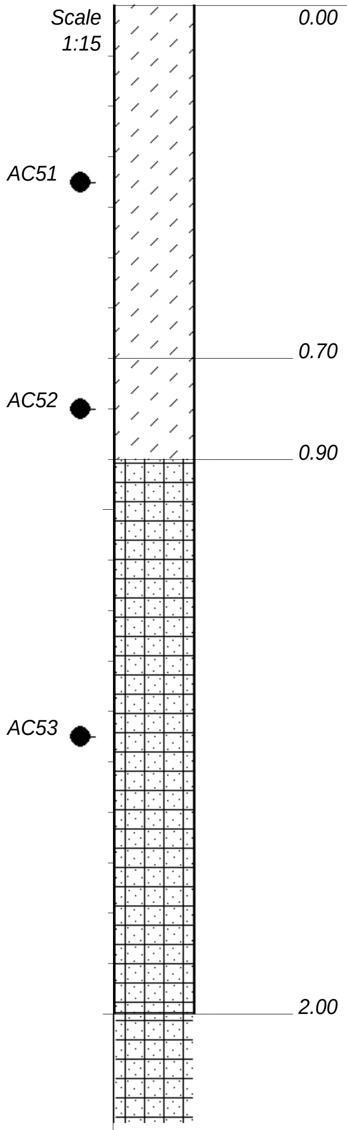
*IN SITU MATERIAL PROFILES

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 1
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Moist reddish brown medium dense clayey sand

Moist light brown dense clayey sand

Moist light grey brown dense well-graded sand with silt and mudstone gravel

2.000+ Moist light grey brown dense well-graded sand with silt and mudstone gravel

NOTES

1) Disturbed sample AC51 taken at 0.350m.

2) Disturbed sample AC52 taken at 0.800m.

3) Disturbed sample AC53 taken at 1.450m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236739
Y-COORD : 27 Y0076490

HOLE No: Test Pit 1

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

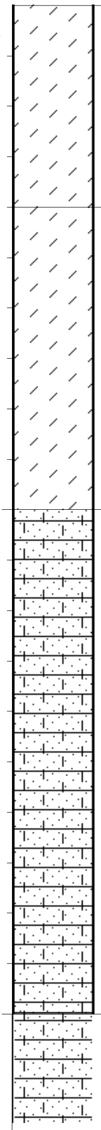
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 2
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense clayey sand

0.40 Moist reddish grey dense clayey sand

1.00 Slightly moist light brown dense silty sand with mudstone gravel

2.00 2.000+ Slightly moist light brown dense silty sand with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236725
Y-COORD : 27 Y0076218

HOLE No: Test Pit 2

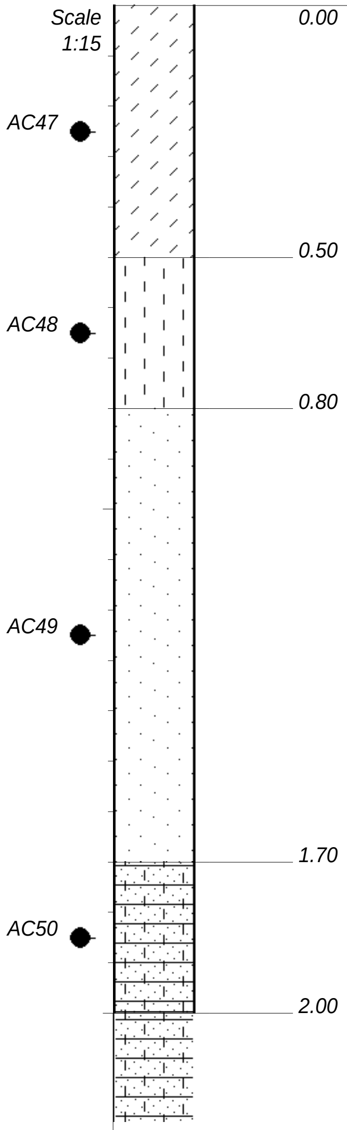
TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 3
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Depth	Description
0.00	Moist reddish brown medium dense clayey sand
0.50	Moist light brown dense silty sand
0.80	Moist light brown stiff sandy lean clay
1.70	Slightly moist grey dense silty sand with mudstone gravel
2.00	2.000+ Slightly moist grey dense silty sand with mudstone gravel

NOTES

1) Disturbed sample AC47 taken at 0.250m.

2) Disturbed sample AC48 taken at 0.650m.

3) Disturbed sample AC49 taken at 1.250m.

4) Disturbed sample AC50 taken at 1.850m.

5) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236661
Y-COORD : 27 Y0075929

HOLE No: Test Pit 3

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

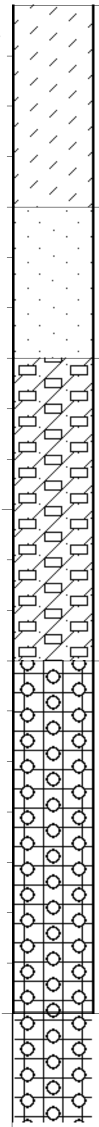
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 4
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense clayey sand
0.40	Moist light brown stiff sandy lean clay
0.70	Moist light brown stiff sandy lean clay with calcrete gravel
1.30	Slightly moist grey dense poorly graded mudstone gravel with silt and sand
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236583
Y-COORD : 27 Y0075774

HOLE No: Test Pit 4

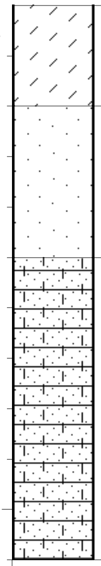
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 5
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense clayey sand
0.20	Moist reddish brown stiff sandy lean clay
0.50	Slightly moist light brown dense silty sand with mudstone gravel
1.10	1.100+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236659
Y-COORD : 27 Y0075449

HOLE No: Test Pit 5

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

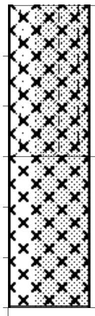
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 6
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand with weathered dolerite gravel
0.30	Slightly moist reddish brown dense weathered dolerite gravel
0.60	0.600+ Refuse - Hard dolerite

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236735
Y-COORD : 27 Y0075130

HOLE No: Test Pit 6

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

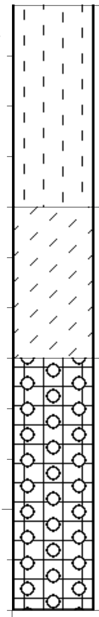
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 7
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey dense clayey sand
0.70	Slightly moist grey dense poorly graded mudstone gravel with silt and sand
1.20	1.200+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236736
Y-COORD : 27 Y0074751

HOLE No: Test Pit 7

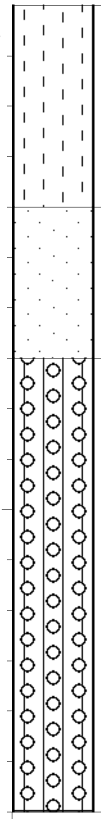
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 8
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.40 Moist reddish brown stiff sandy lean clay

0.70 Slightly moist grey dense poorly graded gravel with silt and sand

1.60 1.600+ Refuse - Hard Mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236491
Y-COORD : 27 Y0074750

HOLE No: Test Pit 8

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

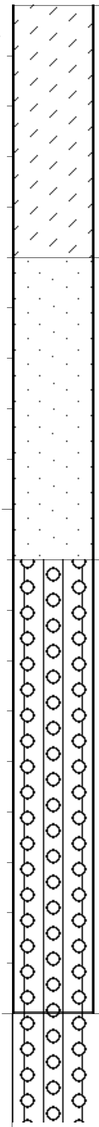
Simlab (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 9
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Moist light brown dense clayey sand
0.50	Moist light brown stiff sandy lean clay
1.10	Slightly moist grey dense poorly graded gravel with silt and sand
2.00	2.000+ Slightly moist grey dense poorly graded gravel with silt and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236265
Y-COORD : 27 Y0074757

HOLE No: Test Pit 9

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

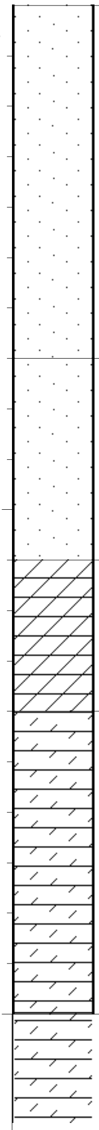
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 10
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish grey brown stiff sandy lean clay
0.70	Moist light brown stiff sandy lean clay
1.10	Moist purple brown stiff clay with mudstone gravel
1.40	Moist purple brown dense clayey mudstone gravel
2.00	2.000+ Moist purple brown dense clayey mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236442
Y-COORD : 27 Y0075118

HOLE No: Test Pit 10

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

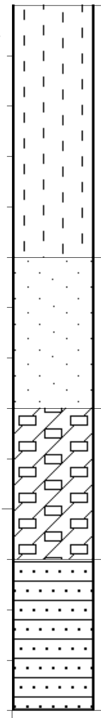
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 11
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown silty sand
0.50	Slightly moist grey brown firm sandy clay
0.80	Moist light grey brown firm clay with calcrete gravel
1.10	Moist light brown dense sandstone gravel
1.40	1.400+ Refuse - Hard sandstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236578
Y-COORD : 27 Y0075437

HOLE No: Test Pit 11

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

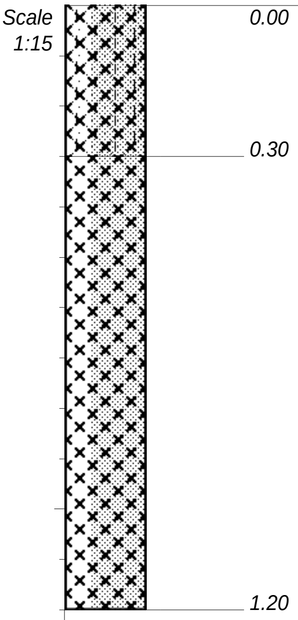
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

Simlab (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 15
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Slightly moist reddish brown dense silty sand with dolerite boulders

Slightly moist light brown dense weathered dolerite gravel

1.200+ Refuse - Hard weathered dolerite

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236755
Y-COORD : 27 Y0075436

HOLE No: Test Pit 15

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

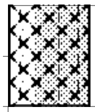
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 17
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00

Slightly moist reddish brown dense silty sand with dolerite boulders

0.20

0.200+ Refuse - Hard weathered dolerite

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236776
Y-COORD : 27 Y0075191

HOLE No: Test Pit 17

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

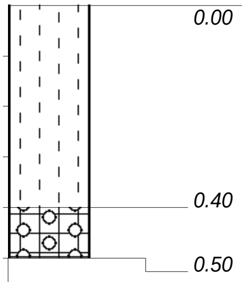
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 19
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Slightly moist reddish brown medium dense silty sand

Slightly moist grey dense poorly graded mudstone gravel with silt and sand

0.500+ Refuse - Hard Mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236801
Y-COORD : 27 Y0074946

HOLE No: Test Pit 19

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

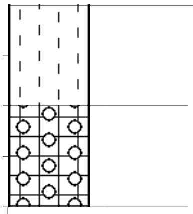
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 20
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Slightly moist reddish brown medium dense silty sand

Slightly moist grey dense poorly graded mudstone gravel with silt and sand

0.400+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236889
Y-COORD : 27 Y0074936

HOLE No: Test Pit 20

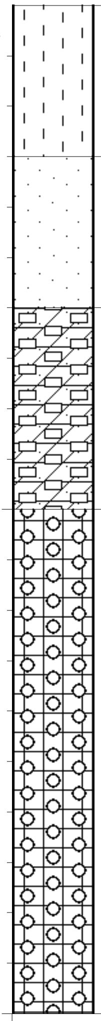
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 22
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale 1:15



Depth	Description
0.00	Slightly moist reddish brown dense silty sand
0.30	Moist reddish grey brown stiff sandy lean clay
0.60	Slightly moist light brown sandy clay with mudstone and calcrete gravel
1.00	Slightly moist grey dense poorly graded mudstone gravel with silt and sand
2.00	2.000+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR :	SIMLAB (PTY) LIMITED	*INCLINATION :*	VERTICAL	*ELEVATION :*	-
MACHINE :	TLB (Bell, 315SG)	*DIAM :*	600mm	*X-COORD :*	X3236805
DRILLED BY :	PW VAN HEERDEN	*DATE :*	18 NOVEMBER 2016	*Y-COORD :*	27 Y0074820
PROFILED BY :	SIMLAB (PTY) LIMITED	*DATE :*	31/01/2017		
TYPE SET BY :	*PW VAN HEERDEN*	*DATE :*	*06/02/17 14:00*		
SETUP FILE :	*STANDARD.SET*	*TEXT :*	*..\Desktop\INSITU~1.TXT*		

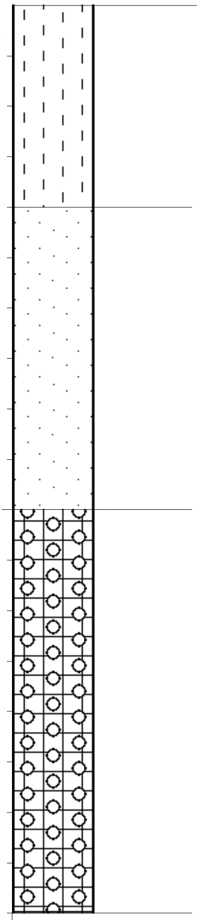
HOLE No: Test Pit 22

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 23
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown dense silty sand

0.40 Moist reddish grey brown stiff sandy lean clay

1.00 Slightly moist grey dense poorly graded mudstone gravel with silt and sand

1.80 1.800+ Refused - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236667
Y-COORD : 27 Y0074824

HOLE No: Test Pit 23

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

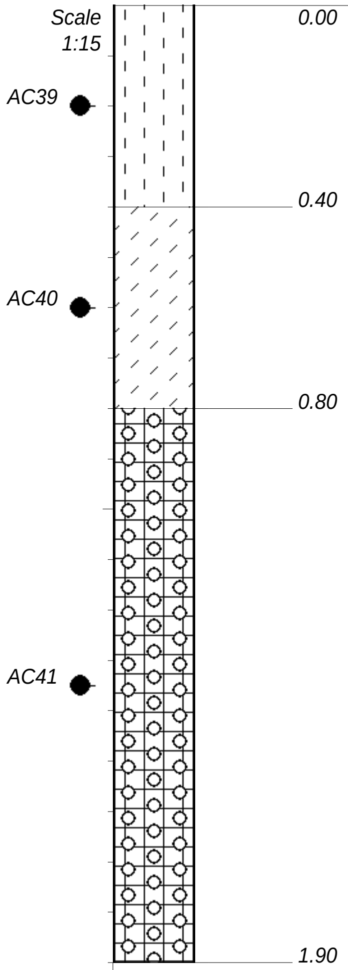
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 24
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Slightly moist reddish brown medium dense silty sand

Moist reddish grey dense clayey sand

Slightly moist grey dense poorly graded mudstone gravel with silt and sand

1.900+ Refuse - Hard mudstone

NOTES

1) Disturbed sample AC39 taken at 0.200m.

2) Disturbed sample AC40 taken at 0.600m.

3) Disturbed sample AC41 taken at 1.350m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236551
Y-COORD : 27 Y0074819

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

HOLE No: Test Pit 24

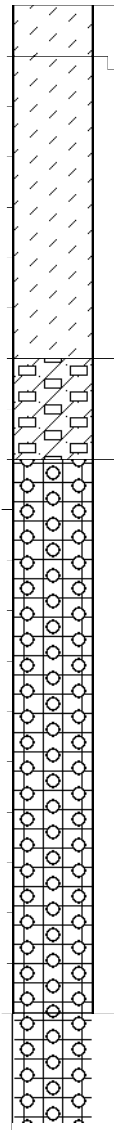
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 26
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Moist light brown medium dense clayey sand
0.10	Moist light brown medium dense clayey sand
0.70	Moist light brown stiff sandy lean clay with calcrete gravel
0.90	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236344
Y-COORD : 27 Y0074808

HOLE No: Test Pit 26

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

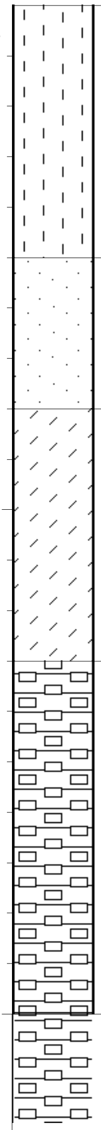
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 27
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown dense silty sand
0.50	Moist reddish grey brown stiff sandy lean clay
0.80	Moist light brown medium dense clayey sand
1.30	Slightly moist grey dense poorly graded mudstone and calcrete gravel
2.00	2.000+ Slightly moist grey dense poorly graded mudstone and calcrete gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236437
Y-COORD : 27 Y0074939

HOLE No: Test Pit 27

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

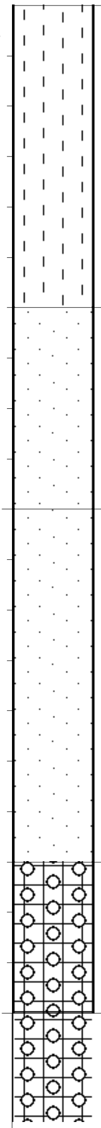
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 29
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown dense silty sand
0.60	Moist reddish grey brown stiff sandy lean clay
1.00	Moist light brown firm sandy clay
1.70	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236672
Y-COORD : 27 Y0074943

HOLE No: Test Pit 29

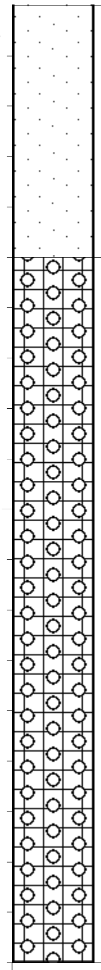
SIMLAB (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 30
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish grey brown stiff sandy lean clay
0.50	Slightly moist grey dense poorly graded mudstone gravel with silt and sand
1.90	1.900+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236668
Y-COORD : 27 Y0075065

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

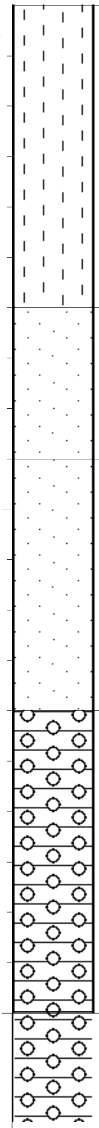
HOLE No: Test Pit 30

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 31
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown dense silty sand
0.60	Moist reddish grey brown stiff sandy lean clay
0.90	Moist light brown firm sandy clay
1.40	Slightly moist grey dense poorly graded mudstone gravel with clay
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with clay

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236549
Y-COORD : 27 Y0075067

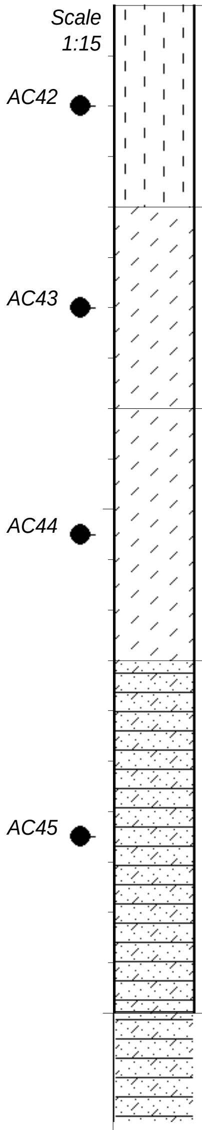
HOLE No: Test Pit 31

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 32
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Slightly moist reddish grey dense clayey sand
0.80	Moist light brown dense clayey sand
1.30	Slightly moist dense clayey sand with mudstone gravel
2.00	2.000+ Slightly moist dense clayey sand with mudstone gravel

NOTES

1) Disturbed sample AC42 taken at 0.200m.

2) Disturbed sample AC43 taken at 0.600m.

3) Disturbed sample AC44 taken at 1.050m.

4) Disturbed sample AC45 taken at 1.650m.

5) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236453
Y-COORD : 27 Y0075058

HOLE No: Test Pit 32

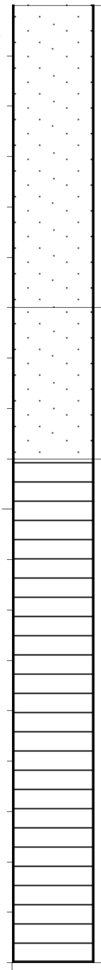
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 33
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Moist brown firm sandy clay

0.60 Moist light brown firm sandy clay

0.90 Slightly moist light grey brown dense poorly graded mudstone gravel

1.90 1.900+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236542
Y-COORD : 27 Y0075189

HOLE No: Test Pit 33

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

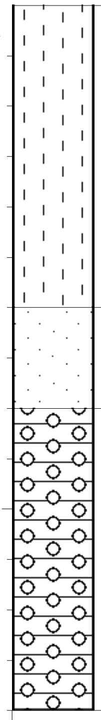
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 34
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale 1:15



0.00

Slightly moist reddish brown dense silty sand

0.60

Moist reddish grey brown stiff sandy lean clay

0.80

Slightly moist grey dense poorly graded mudstone gravel with boulders

1.40

1.400+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236657
Y-COORD : 27 Y0075189

HOLE No: Test Pit 34

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

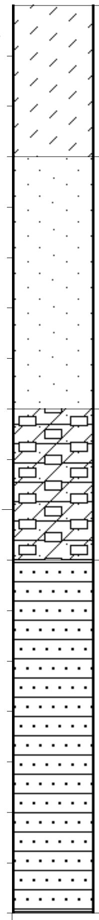
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 36
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown dense clayey sand
0.30	Moist reddish grey brown stiff sandy lean clay
0.80	Moist light brown firm sandy clay with calcrete and mudstone gravel
1.10	Slightly moist light brown dens sandstone gravel
1.80	1.800+ Refuse - Hard sandstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236644
Y-COORD : 27 Y0075310

HOLE No: Test Pit 36

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

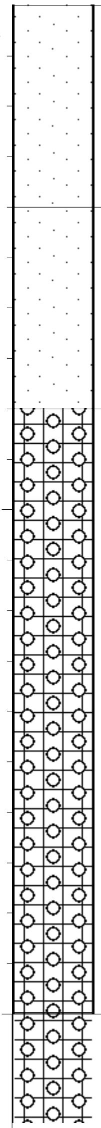
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 37
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish grey brown stiff sandy lean clay
0.40	Moist light brown firm sandy clay
0.80	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236575
Y-COORD : 27 Y0075674

HOLE No: Test Pit 37

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

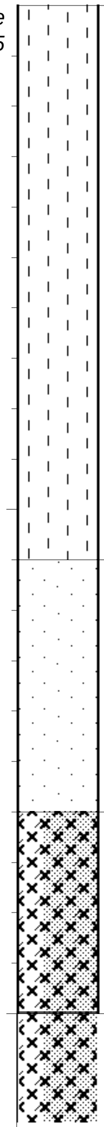
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 39
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown dense silty sand
1.10	Moist reddish grey brown stiff sandy lean clay
1.60	Moist light brown dense clayey weathered dolerite gravel
2.00	2.000+ Moist light brown dense clayey weathered dolerite gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236511
Y-COORD : 27 Y0075599

HOLE No: Test Pit 39

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

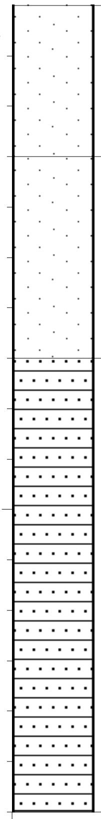
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 40
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown firm sandy lean clay
0.30	Moist light brown firm sandy lean clay
0.70	Slightly moist light grey brown dense sandstone gravel
1.60	1.600+ Refuse - Hard sandstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR :	SIMLAB (PTY) LIMITED	*INCLINATION :*	VERTICAL	*ELEVATION :*	-
MACHINE :	TLB (Bell, 315SG)	*DIAM :*	600mm	*X-COORD :*	X3236551
DRILLED BY :	PW VAN HEERDEN	*DATE :*	18 NOVEMBER 2016	*Y-COORD :*	27 Y0075519
PROFILED BY :	SIMLAB (PTY) LIMITED	*DATE :*	31/01/2017		
TYPE SET BY :	*PW VAN HEERDEN*	*DATE :*	*06/02/17 14:00*		
SETUP FILE :	*STANDARD.SET*	*TEXT :*	*..\Desktop\INSITU~1.TXT*		

HOLE No: Test Pit 40

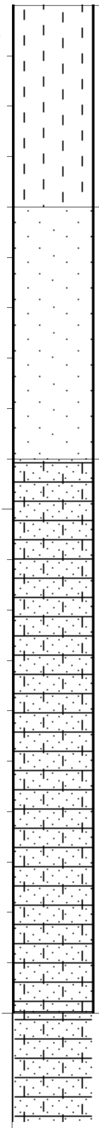
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 44
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.40 Moist reddish grey brown firm sandy lean clay

0.90 Slightly moist grey dense silty sand with mudstone gravel

2.00 2.000+ Slightly moist grey dense silty sand with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236266
Y-COORD : 27 Y0074620

HOLE No: Test Pit 44

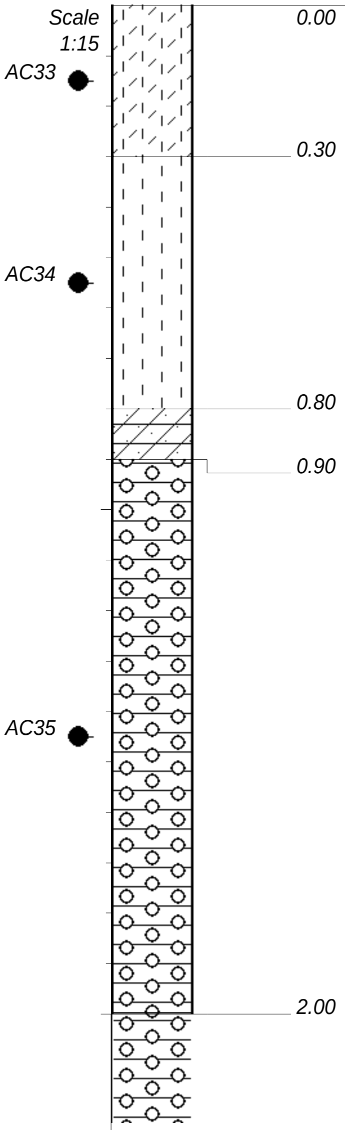
TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 45
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Depth	Description
0.00	Slightly moist reddish brown medium dense silty, clayey sand
0.30	Moist grey brown dense silty sand
0.80	Moist light brown firm sandy clay with mudstone gravel
0.90	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) Disturbed sample AC33 taken at 0.150m.

2) Disturbed sample AC34 taken at 0.550m.

3) Disturbed sample AC35 taken at 1.450m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236263
Y-COORD : 27 Y0074330

HOLE No: Test Pit 45

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

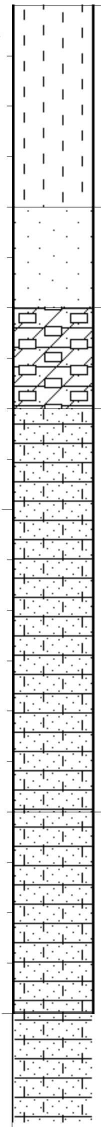
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 50
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.60	Moist light brown firm sandy clay with mudstone and calcrete gravel
0.80	Slightly moist grey dense silty sand with mudstone gravel
1.60	2.000+ Slightly moist grey dense silty sand with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236874
Y-COORD : 27 Y0074715

HOLE No: Test Pit 50

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 51
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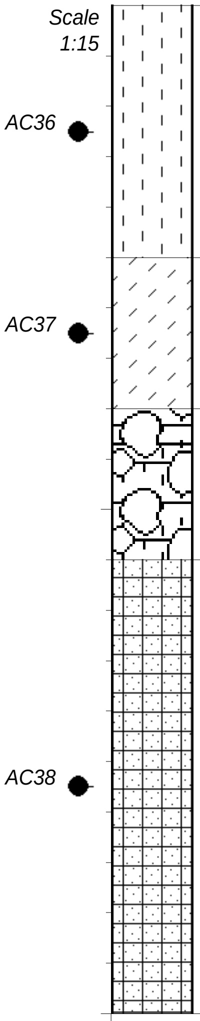
JOB NUMBER: 2016/412/Doc.



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey brown dense clayey sand
0.80	Slightly moist light grey brown mudstone boulders with silty sand
1.10	Slightly moist light grey brown dense well-graded sand with silt and mudstone gravel
2.00	2.000+

NOTES

1) Disturbed sample AC36 taken at 0.250m.

2) Disturbed sample AC37 taken at 0.650m.

3) Disturbed sample AC38 taken at 1.550m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236789
Y-COORD : 27 Y0074646

HOLE No: Test Pit 51

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

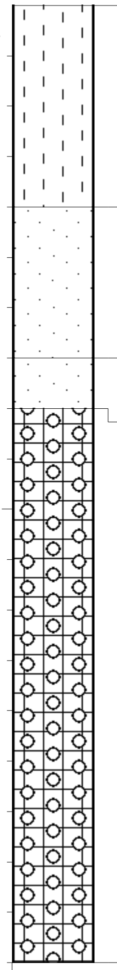
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 52
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.70	Moist light brown firm sandy clay
0.80	Slightly moist grey dense poorly graded mudstone gravel with silt and mudstone boulders
1.90	1.900+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236663
Y-COORD : 27 Y0074669

HOLE No: Test Pit 52

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

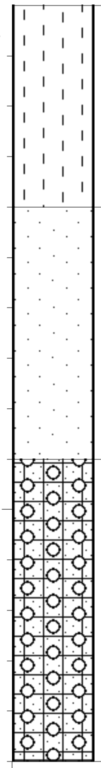
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 53
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.90	Slightly moist grey dense well-graded sand with silt and mudstone gravel with boulders
1.50	1.500+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236514
Y-COORD : 27 Y0074676

HOLE No: Test Pit 53

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

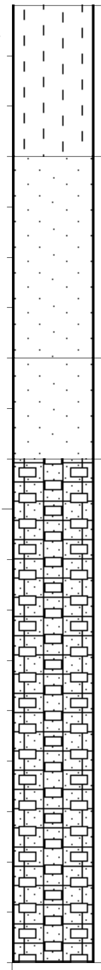
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 54
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish grey brown firm sandy lean clay
0.70	Moist light brown firm sandy clay
0.90	Slightly moist light grey brown dense well-graded sand with silt and mudstone and calcrete gravel
1.90	1.900+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236392
Y-COORD : 27 Y0074682

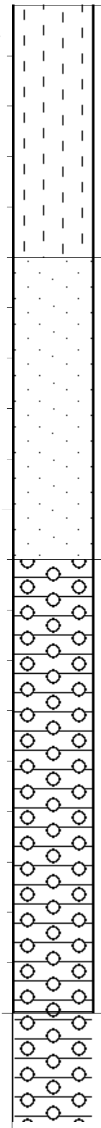
HOLE No: Test Pit 54

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 55
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey brown stiff sandy lean clay
1.10	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236338
Y-COORD : 27 Y0074509

HOLE No: Test Pit 55

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

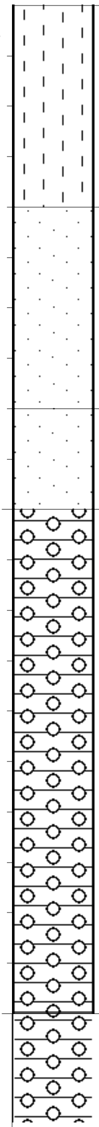
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 57
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.80	Moist light brown firm sandy clay
1.00	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236163
Y-COORD : 27 Y0074421

HOLE No: Test Pit 57

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

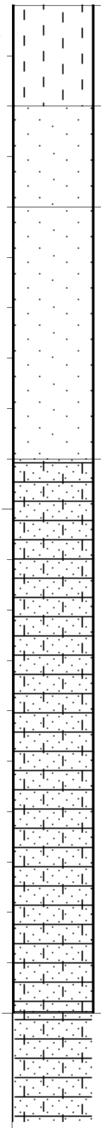
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 59
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.20	Moist reddish grey brown firm sandy lean clay
0.40	Moist light brown firm sandy clay
0.90	Slightly moist grey dense silty sand with mudstone gravel
2.00	2.000+ Slightly moist grey dense silty sand with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236143
Y-COORD : 27 Y0074184

HOLE No: Test Pit 59

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

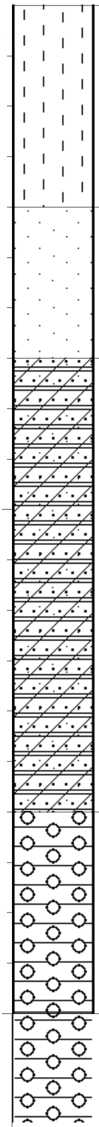
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 61
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00

Slightly moist reddish brown medium dense silty sand

0.40

Moist reddish grey brown firm sandy lean clay

0.70

Moist light brown firm sandy clay with mudstone and sandstone gravel

1.60

Slightly moist grey dense poorly graded mudstone gravel with silt

2.00

2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236344
Y-COORD : 27 Y0074058

HOLE No: Test Pit 61

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

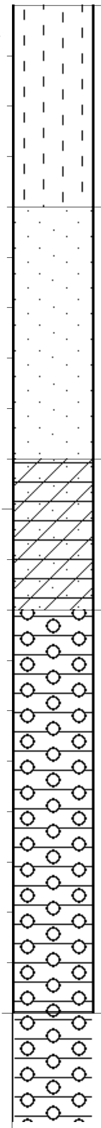
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 62
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.90	Moist light brown firm sandy clay with mudstone gravel
1.20	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236464
Y-COORD : 27 Y0074056

HOLE No: Test Pit 62

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

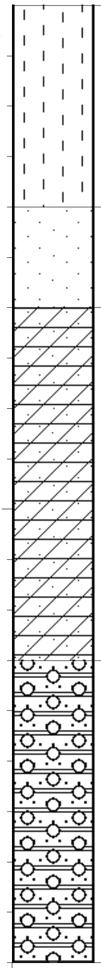
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 63
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.60	Moist light brown firm sandy clay with mudstone gravel
1.30	Slightly moist light brown dense poorly graded mudstone and sandstone gravel with silt
1.90	1.900+ Refuse - Hard sandstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236575
Y-COORD : 27 Y0074063

HOLE No: Test Pit 63

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

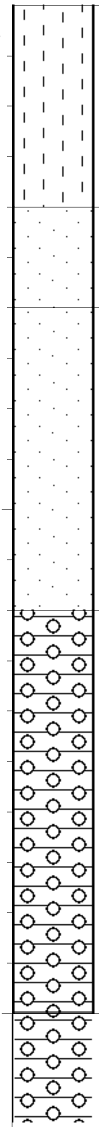
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 64
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.60	Moist light brown firm sandy clay
1.20	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236701
Y-COORD : 27 Y0074065

HOLE No: Test Pit 64

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

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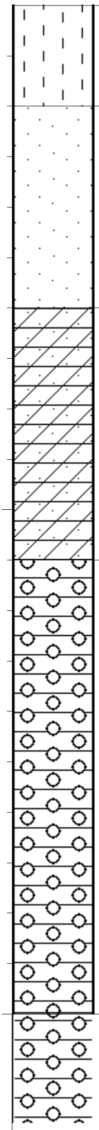
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 65
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale 1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.20	Moist reddish grey brown firm sandy lean clay
0.60	Moist light brown firm sandy clay with mudstone gravel
1.10	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236805
Y-COORD : 27 Y0074058

HOLE No: Test Pit 65

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

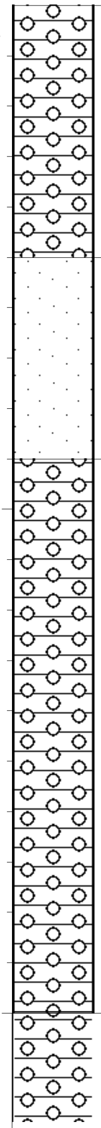
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 66
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist grey dense poorly graded mudstone gravel with silt
0.50	Moist reddish grey brown firm sandy lean clay
0.90	Slightly moist grey dense poorly graded mudstone gravel with silt
2.00	2.000+ Slightly moist grey dense poorly graded mudstone gravel with silt

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236683
Y-COORD : 27 Y0074198

HOLE No: Test Pit 66

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

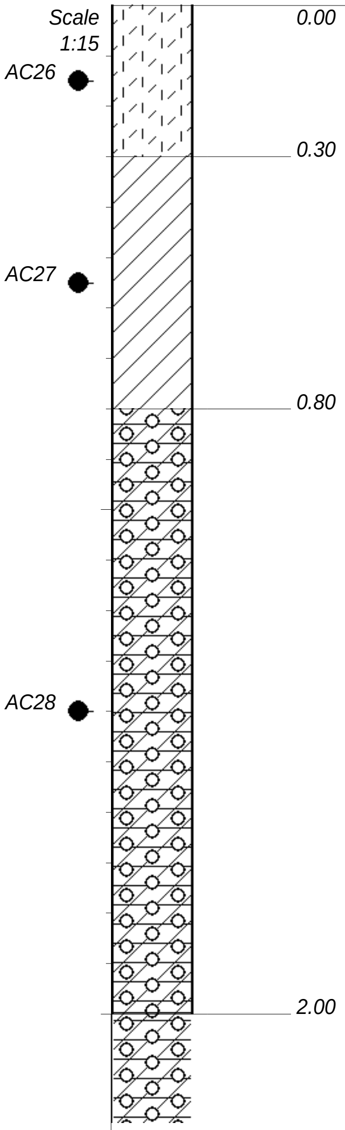
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 67
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Slightly moist reddish brown medium dense silty, clayey sand

Slightly moist reddish grey firm lean clay with sand

Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) Disturbed sample AC26 taken at 0.150m.

2) Disturbed sample AC27 taken at 0.550m.

3) Disturbed sample AC28 taken at 1.400m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236444
Y-COORD : 27 Y0074205

HOLE No: Test Pit 67

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

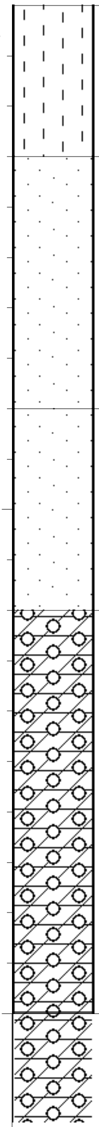
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 68
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish grey brown firm sandy lean clay
0.80	Moist light brown firm sandy clay
1.20	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236333
Y-COORD : 27 Y0074270

HOLE No: Test Pit 68

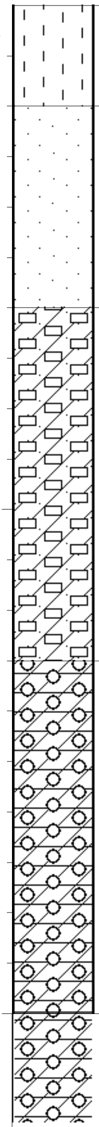
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 69
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.20	Moist reddish grey brown firm sandy lean clay
0.60	Moist light brown firm sandy clay with calcrete sediment
1.30	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

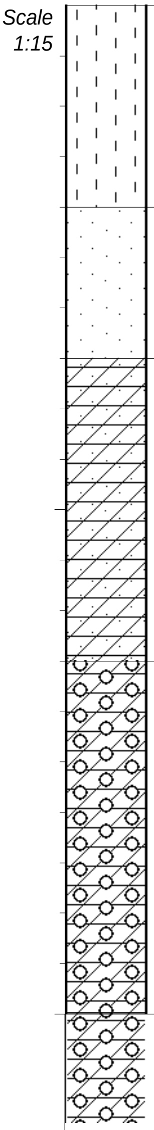
ELEVATION : -
X-COORD : X3236333
Y-COORD : 27 Y0074270

HOLE No: Test Pit 69

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 71
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.70	Moist light brown firm sandy clay with mudstone gravel
1.30	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236364
Y-COORD : 27 Y0073680

HOLE No: Test Pit 71

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

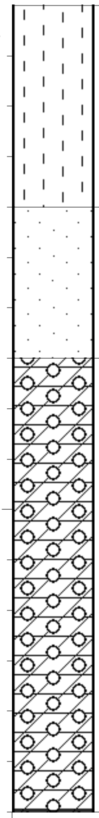
Simlab (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 73
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.70	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
1.60	1.600+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236569
Y-COORD : 27 Y0073539

HOLE No: Test Pit 73

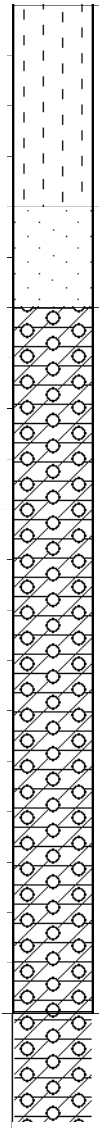
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 75
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.40 Moist reddish grey brown firm sandy lean clay

0.60 Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

2.00 2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236804
Y-COORD : 27 Y0073638

HOLE No: Test Pit 75

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

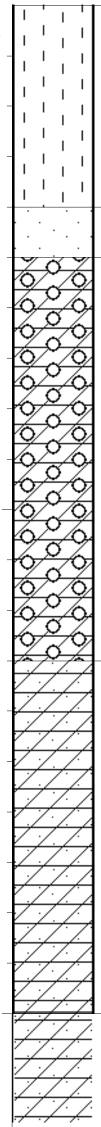
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 76
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.50	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
1.30	Moist light brown firm sandy clay with mudstone gravel
2.00	2.000+ Moist light brown firm sandy clay with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236802
Y-COORD : 27 Y0073798

HOLE No: Test Pit 76

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

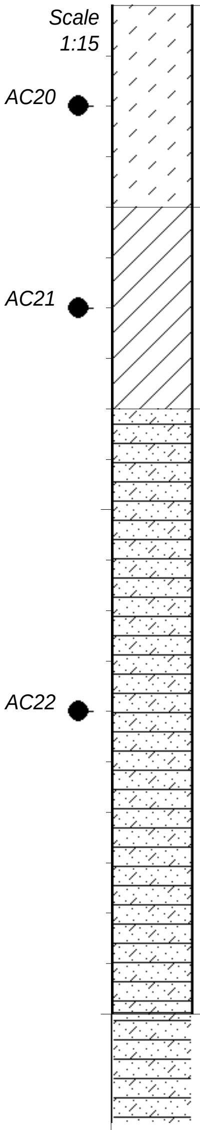
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 77
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense clayey sand
0.40	Very moist reddish grey stiff lean clay with sand
0.80	Slightly moist light grey brown dense clayey sand with mudstone gravel
2.00	2.000+ Slightly moist light grey brown dense clayey sand with mudstone gravel

NOTES

1) Disturbed sample AC20 taken at 0.200m.

2) Disturbed sample AC21 taken at 0.600m.

3) Disturbed sample AC22 taken at 1.400m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236799
Y-COORD : 27 Y0073931

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

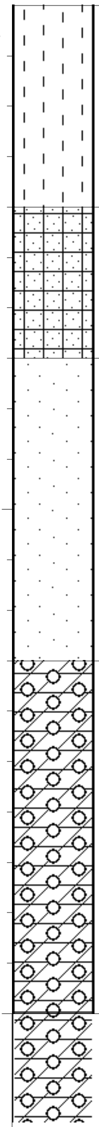
HOLE No: Test Pit 77

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 78
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist light grey brown dense well-graded sand with silt and mudstone gravel
0.70	Moist light brown firm sandy clay
1.30	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236676
Y-COORD : 27 Y0073922

HOLE No: Test Pit 78

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

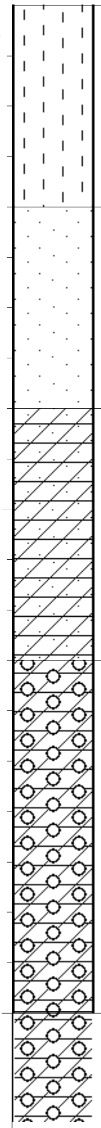
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 79
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.80	Moist light brown firm sandy clay with mudstone gravel
1.30	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236549
Y-COORD : 27 Y0073920

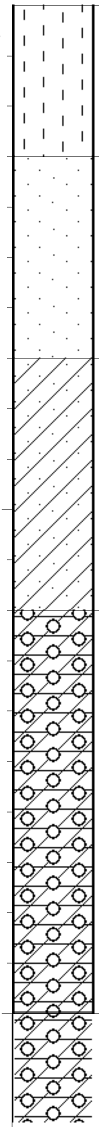
HOLE No: Test Pit 79

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 80
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish grey brown firm sandy lean clay
0.70	Moist light brown firm sandy clay with
1.20	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236440
Y-COORD : 27 Y0073926

HOLE No: Test Pit 80

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

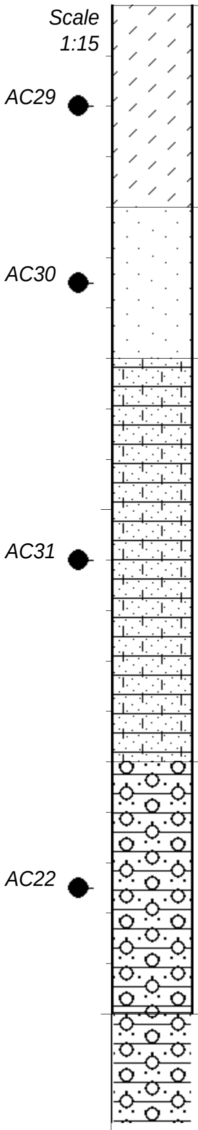
Simlab (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 81
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense clayey sand
0.40	Moist reddish grey firm sandy lean clay
0.70	Slightly moist light brown dense silty sand with mudstone gravel
1.50	Slightly moist light brown dense poorly graded sandstone gravel with silt
2.00	2.000+ Slightly moist light brown dense poorly graded sandstone gravel with silt

NOTES

1) Disturbed sample AC29 taken at 0.200m.

2) Disturbed sample AC30 taken at 0.550m.

3) Disturbed sample AC31 taken at 1.100m.

4) Disturbed sample AC22 taken at 1.750m.

5) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236448
Y-COORD : 27 Y0073798

HOLE No: Test Pit 81

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

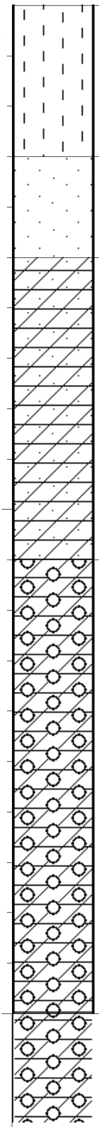
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 82
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish grey brown firm sandy lean clay
0.50	Moist light grey brown firm sandy clay with mudstone and gravel
1.10	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236455
Y-COORD : 27 Y0073669

HOLE No: Test Pit 82

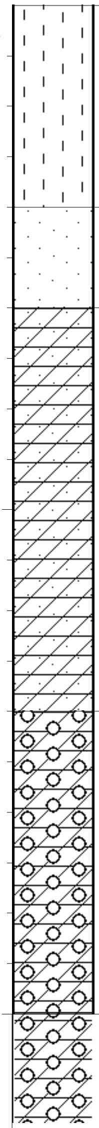
Aimlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AUREСON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 83
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.60	Moist light brown firm sandy clay with mudstone gravel
1.40	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236576
Y-COORD : 27 Y0073672

HOLE No: Test Pit 83

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

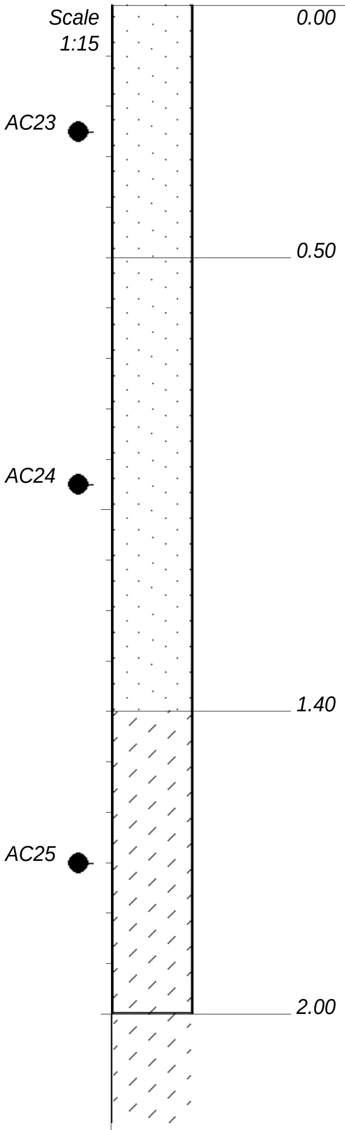
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 84
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00 Slightly moist reddish brown medium dense sandy silt

0.50 Slightly moist reddish grey firm sandy lean clay

1.40 Slightly moist light brown dense clayey sand

2.00 2.000+ Slightly moist light brown dense clayey sand

NOTES

1) Disturbed sample AC23 taken at 0.250m.

2) Disturbed sample AC24 taken at 0.950m.

3) Disturbed sample AC25 taken at 1.700m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236681
Y-COORD : 27 Y0073676

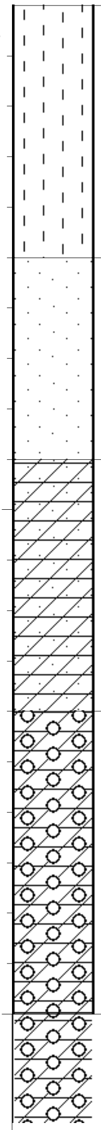
HOLE No: Test Pit 84

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 85
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.50 Moist reddish grey brown firm sandy lean clay

0.90 Moist light brown firm sandy clay with mudstone gravel

1.40 Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

2.00 2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236563
Y-COORD : 27 Y0073794

HOLE No: Test Pit 85

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

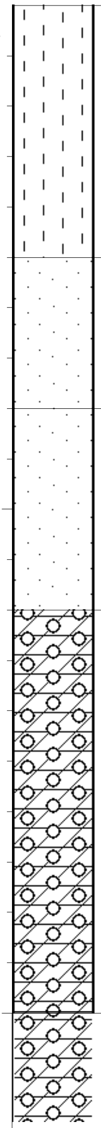
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 86
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.50 Moist reddish grey brown firm sandy lean clay

0.80 Moist light brown firm sandy clay

1.20 Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

2.00

2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236683
Y-COORD : 27 Y0073798

HOLE No: Test Pit 86

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

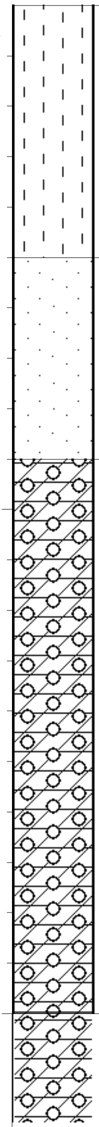
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 89
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale 1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey brown firm sandy lean clay
0.90	Slightly moist light brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR :	SIMLAB (PTY) LIMITED	*INCLINATION :*	VERTICAL	*ELEVATION :*	-
MACHINE :	TLB (Bell, 315SG)	*DIAM :*	600mm	*X-COORD :*	X3237046
DRILLED BY :	PW VAN HEERDEN	*DATE :*	18 NOVEMBER 2016	*Y-COORD :*	27 Y0073707
PROFILED BY :	SIMLAB (PTY) LIMITED	*DATE :*	31/01/2017		
TYPE SET BY :	*PW VAN HEERDEN*	*DATE :*	*06/02/17 14:01*		
SETUP FILE :	*STANDARD.SET*	*TEXT :*	*..\Desktop\INSITU~1.TXT*		

HOLE No: Test Pit 89

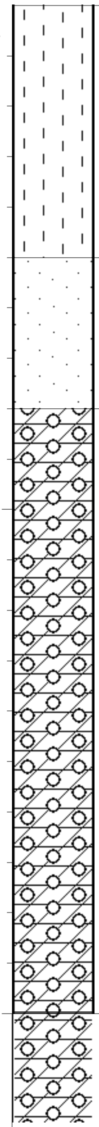
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 91
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale 1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey brown firm sandy lean clay
0.80	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237293
Y-COORD : 27 Y0073821

HOLE No: Test Pit 91

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

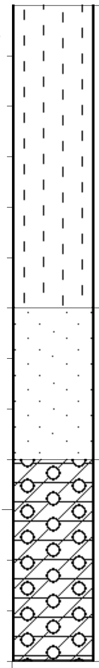
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 92
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.60	Moist reddish grey brown firm sandy lean clay
0.90	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
1.30	1.300+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237337
Y-COORD : 27 Y0073922

HOLE No: Test Pit 92

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

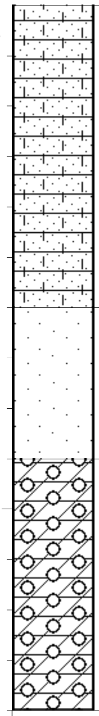
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 93
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale 1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand with mudstone gravel
0.60	Moist reddish grey brown firm sandy lean clay
0.90	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
1.40	1.400+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237337
Y-COORD : 27 Y0074051

HOLE No: Test Pit 93

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

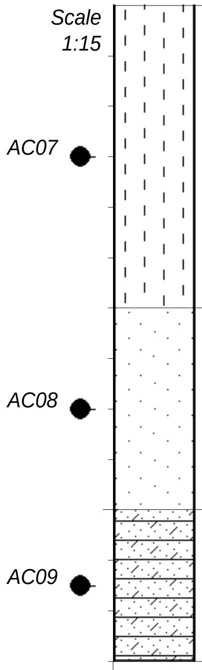
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 94
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00	Slightly moist reddish brown medium dense silty sand
0.60	Slightly moist reddish grey brown firm sandy lean clay
1.00	Slightly moist light brown dense clayey sand with mudstone gravel
1.30	1.300+ Refuse - Hard mudstone

NOTES

1) Disturbed sample AC07 taken at 0.300m.

2) Disturbed sample AC08 taken at 0.800m.

3) Disturbed sample AC09 taken at 1.150m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237338
Y-COORD : 27 Y0074200

HOLE No: Test Pit 94

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

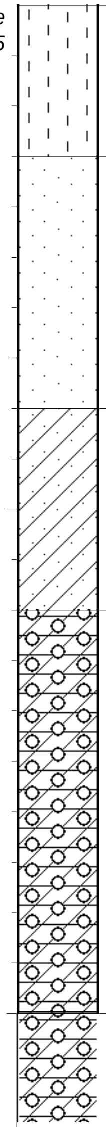
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 95
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish grey brown firm sandy lean clay
0.80	Moist light brown firm sandy clay with
1.20	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237187
Y-COORD : 27 Y0074179

HOLE No: Test Pit 95

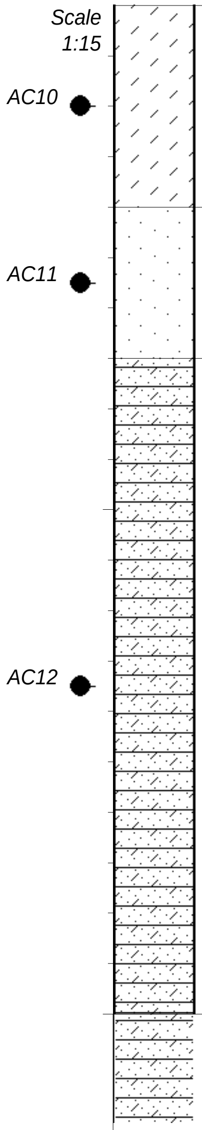
TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 96
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Depth	Description
0.00	Slightly moist reddish brown medium dense clayey sand
0.40	Moist reddish grey firm sandy lean clay
0.70	Slightly moist light grey brown dense clayey sand with mudstone gravel
2.00	2.000+ Slightly moist light grey brown dense clayey sand with mudstone gravel

NOTES

1) Disturbed sample AC10 taken at 0.200m.

2) Disturbed sample AC11 taken at 0.550m.

3) Disturbed sample AC12 taken at 1.350m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3237176
Y-COORD : 27 Y0074049

HOLE No: Test Pit 96

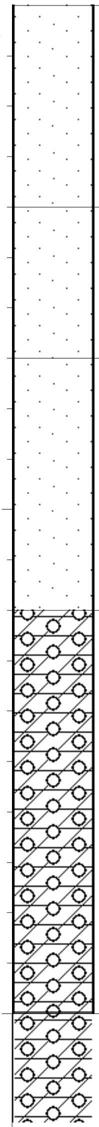
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 97
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Moist reddish grey brown firm sandy lean clay
0.40	Moist reddish grey brown firm sandy lean clay
0.70	Moist light brown firm sandy clay
1.20	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237176
Y-COORD : 27 Y0073921

HOLE No: Test Pit 97

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

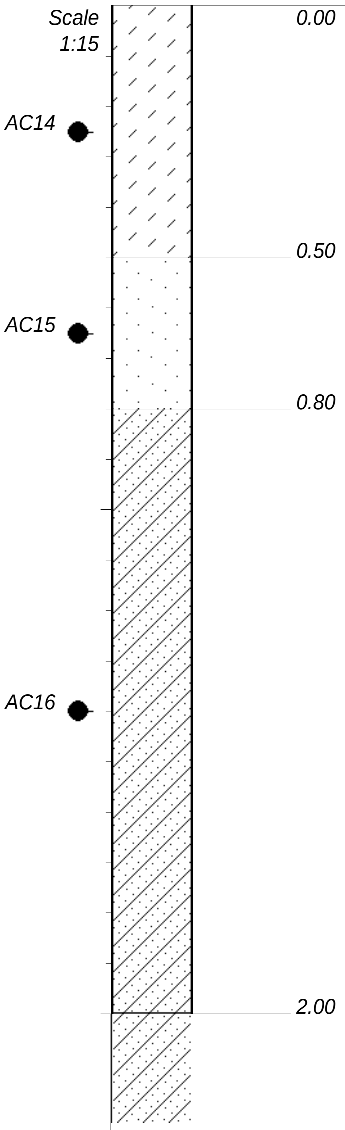
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 98
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00 Slightly moist reddish brown mediem dense clayey sand

0.50 Moist reddish brown firm sandy lean clay

0.80 Slightly moist light brown dense poorly graded sand with clay and gravel

2.00

2.000+ Slightly moist light brown dense poorly graded sand with clay and gravel

NOTES

1) Disturbed sample AC14 taken at 0.250m.

2) Disturbed sample AC15 taken at 0.650m.

3) Disturbed sample AC16 taken at 1.400m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237176
Y-COORD : 27 Y0074049

HOLE No: Test Pit 98

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

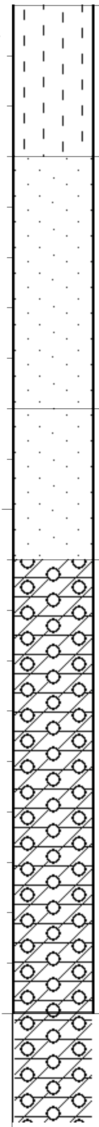
DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 99
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist dark red firm sandy lean clay
0.80	Moist light brown firm sandy clay
1.10	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237051
Y-COORD : 27 Y0073920

HOLE No: Test Pit 99

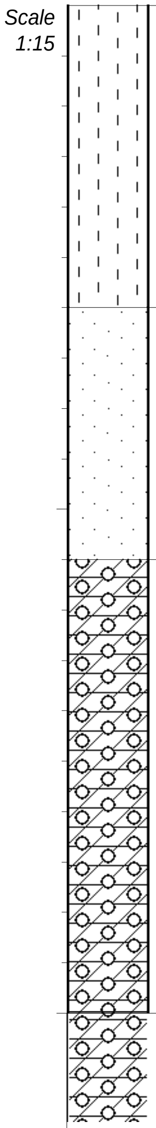
TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 100
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00

Slightly moist reddish brown medium dense silty sand

0.60

Moist reddish grey brown firm sandy lean clay

1.10

Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

2.00

2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237058
Y-COORD : 27 Y0074051

HOLE No: Test Pit 100

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

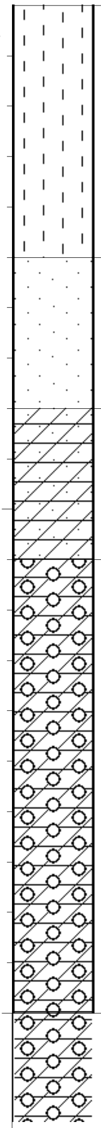
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 101
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey brown firm sandy lean clay
0.80	Moist light brown firm sandy clay with mudstone gravel
1.10	Slightly moist light brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237058
Y-COORD : 27 Y0074163

HOLE No: Test Pit 101

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

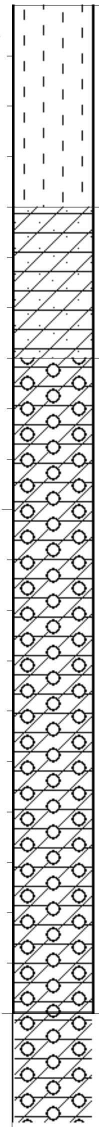
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 102
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist light brown firm sandy clay with mudstone gravel
0.70	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236947
Y-COORD : 27 Y0074168

HOLE No: Test Pit 102

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

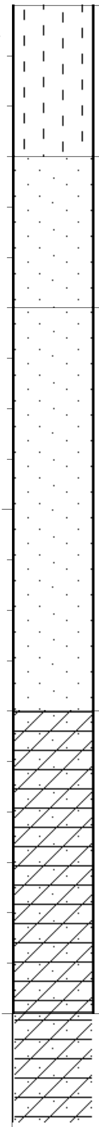
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 103
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist dark red brown firm sandy lean clay
0.60	Moist light brown firm sandy lean clay
1.40	Moist light brown firm sandy lean clay with mudstone gravel
2.00	2.000+ Moist light brown firm sandy lean clay with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236945
Y-COORD : 27 Y0074030

HOLE No: Test Pit 103

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

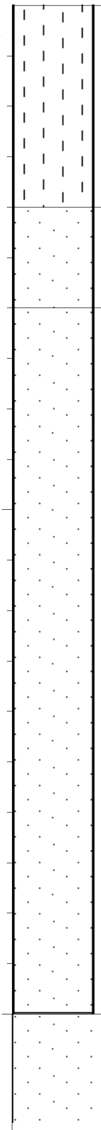
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 104
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.40 Moist reddish grey brown firm sandy lean clay

0.60 Moist light brown firm sandy lean clay

2.00 2.000+ Moist light brown firm sandy lean clay

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236940
Y-COORD : 27 Y0073916

HOLE No: Test Pit 104

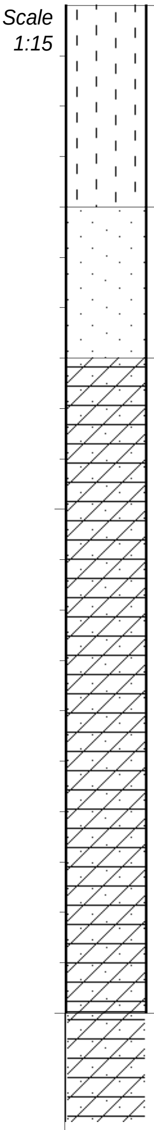
TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 105
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist dark red brown firm sandy lean clay
0.70	Moist light brown firm sandy lean clay with mudstone gravel
2.00	2.000+ Moist light brown firm sandy lean clay with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236934
Y-COORD : 27 Y0073809

HOLE No: Test Pit 105

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

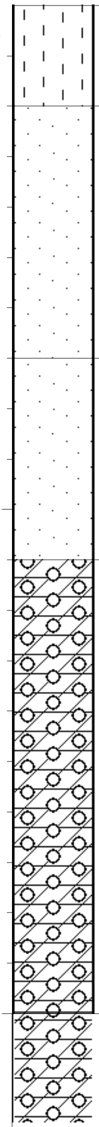
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 109
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.20	Moist reddish grey brown firm sandy lean clay
0.70	Moist light brown firm sandy lean clay
1.10	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237292
Y-COORD : 27 Y0074315

HOLE No: Test Pit 109

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

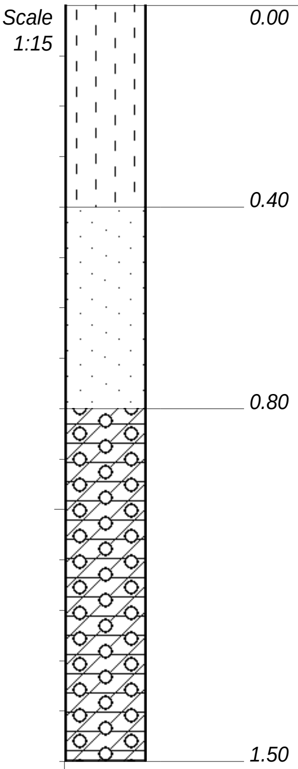
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 110
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish grey brown firm sandy lean clay
0.80	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
1.50	1.500+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237162
Y-COORD : 27 Y0074317

HOLE No: Test Pit 110

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

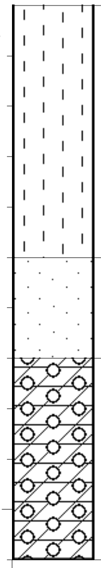
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 111
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey brown firm sandy lean clay
0.70	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
1.10	1.100+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237045
Y-COORD : 27 Y0074315

HOLE No: Test Pit 111

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

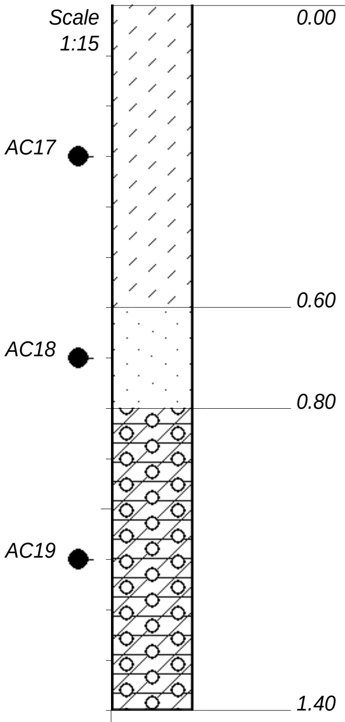
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 112
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Depth	Description
0.00	Slightly moist reddish brown medium dense clayey sand
0.60	Moist reddish grey firm sandy lean clay
0.80	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.40	1.400+ Refuse - Hard mudstone

NOTES

1) Disturbed sample AC17 taken at 0.300m.

2) Disturbed sample AC18 taken at 0.700m.

3) Disturbed sample AC19 taken at 1.100m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3236949
Y-COORD : 27 Y0074313

HOLE No: Test Pit 112

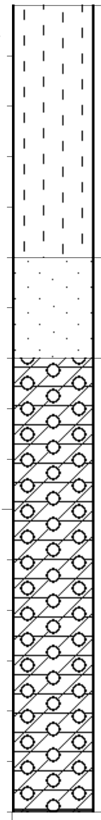
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 113
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish brown grey firm sandy lean clay
0.70	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.60	1.600+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236938
Y-COORD : 27 Y0074448

HOLE No: Test Pit 113

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

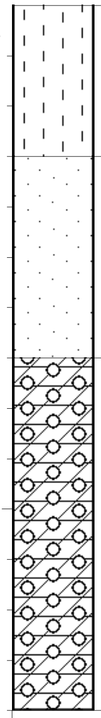
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 114
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish brown grey firm sandy lean clay
0.70	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.40	1.400+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3237060
Y-COORD : 27 Y0074421

HOLE No: Test Pit 114

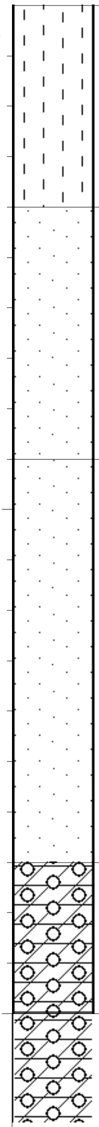
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 116
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist brown medium dense silty sand
0.40	Moist dark red firm sandy lean clay
0.90	Moist light brown firm sandy lean clay
1.70	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237316
Y-COORD : 27 Y0074437

HOLE No: Test Pit 116

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

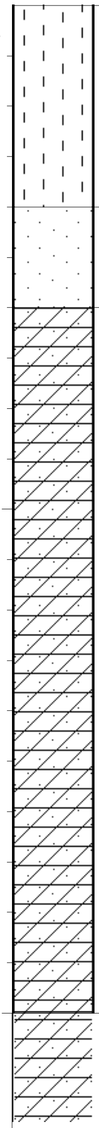
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 117
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist light brown firm sandy lean clay
0.60	Moist light brown firm sandy lean clay with mudstone gravel
2.00	2.000+ Moist light brown firm sandy lean clay with mudstone gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236952
Y-COORD : 27 Y0074556

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

HOLE No: Test Pit 117

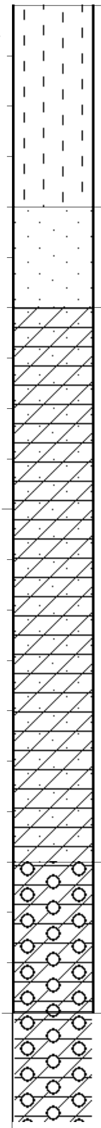
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 118
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish brown grey firm sandy lean clay
0.60	Moist light brown firm sandy lean clay with mudstone gravel
1.70	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
2.00	2.000+ Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3236981
Y-COORD : 27 Y0074668

HOLE No: Test Pit 118

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

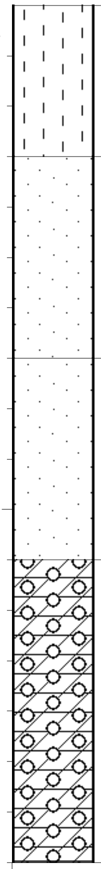
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 120
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish brown grey firm sandy lean clay
0.70	Moist brown grey firm sandy lean clay
1.10	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.70	1.700+ Reuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237447
Y-COORD : 27 Y0074307

HOLE No: Test Pit 120

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

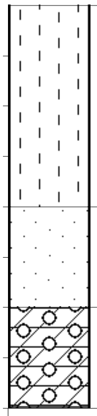
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 121
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.40 Moist reddish brown grey firm sandy lean clay

0.60 Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand

0.80 0.800+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3237439
Y-COORD : 27 Y0074175

HOLE No: Test Pit 121

Simlab (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 122
Sheet 1 of 1

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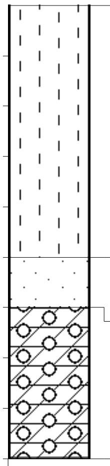
Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.50	Moist reddish grey firm sandy lean clay
0.60	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
0.90	0.900+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237435
Y-COORD : 27 Y0074037

HOLE No: Test Pit 122

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

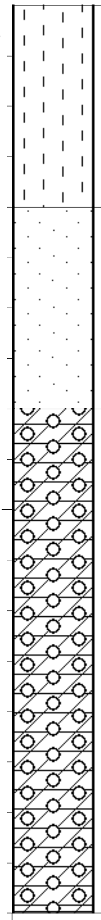
Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 124
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish brown grey firm sandy lean clay
0.80	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.80	1.800+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237545
Y-COORD : 27 Y0073918

HOLE No: Test Pit 124

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 126
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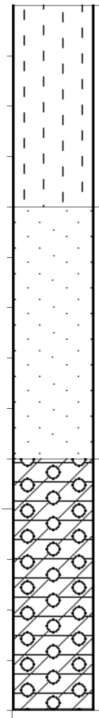
Scale
1:15



0.00 Slightly moist reddish brown medium dense silty sand

0.40 Moist reddish brown grey firm sandy lean clay

0.90 Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand

1.40

1.400+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237788
Y-COORD : 27 Y0074022

HOLE No: Test Pit 126

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 128
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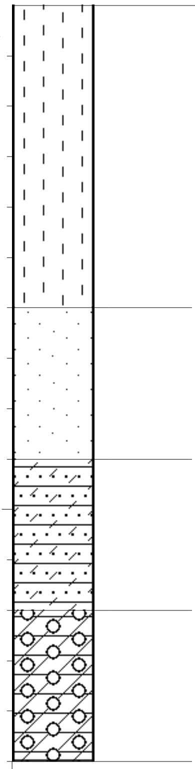
JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.60	Moist reddish brown grey firm sandy lean clay
0.90	Moist light brown clayey sandstone gravel
1.20	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.50	1.500+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR :	SIMLAB (PTY) LIMITED	*INCLINATION :*	VERTICAL	*ELEVATION :*	-
MACHINE :	TLB (Bell, 315SG)	*DIAM :*	600mm	*X-COORD :*	X3237866
DRILLED BY :	PW VAN HEERDEN	*DATE :*	18 NOVEMBER 2016	*Y-COORD :*	27 Y0074169
PROFILED BY :	SIMLAB (PTY) LIMITED	*DATE :*	31/01/2017		
TYPE SET BY :	*PW VAN HEERDEN*	*DATE :*	*06/02/17 14:00*		
SETUP FILE :	*STANDARD.SET*	*TEXT :*	*..\Desktop\INSITU~1.TXT*		

HOLE No: Test Pit 128

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 129
Sheet 1 of 1

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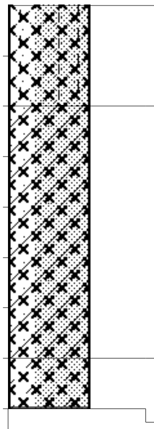
Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand with weathered dolerite gravel
0.20	Moist reddish grey firm sandy lean clay with weathered dolerite gravel
0.70	Slightly moist light brown dense clayey weathered dolerite gravel
0.80	0.800+ Refuse - Hard weathered dolerite

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR :	SIMLAB (PTY) LIMITED	*INCLINATION :*	VERTICAL	*ELEVATION :*	-
MACHINE :	TLB (Bell, 315SG)	*DIAM :*	600mm	*X-COORD :*	X3237779
DRILLED BY :	PW VAN HEERDEN	*DATE :*	18 NOVEMBER 2016	*Y-COORD :*	27 Y0074169
PROFILED BY :	SIMLAB (PTY) LIMITED	*DATE :*	31/01/2017		
TYPE SET BY :	*PW VAN HEERDEN*	*DATE :*	*06/02/17 14:00*		
SETUP FILE :	*STANDARD.SET*	*TEXT :*	*..\Desktop\INSITU~1.TXT*		

HOLE No: Test Pit 129

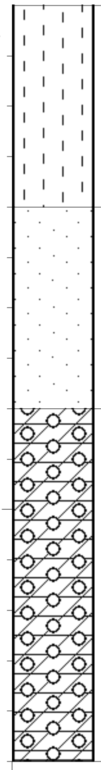
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 130
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish brown grey firm sandy lean clay
0.80	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.50	1.500+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237652
Y-COORD : 27 Y0074044

HOLE No: Test Pit 130

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

Simlab
(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 131
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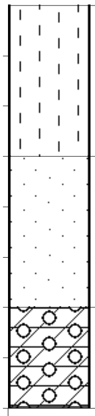
Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.30	Moist reddish brown grey firm sandy lean clay
0.60	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
0.80	0.800+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237542
Y-COORD : 27 Y0074041

HOLE No: Test Pit 131

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 132
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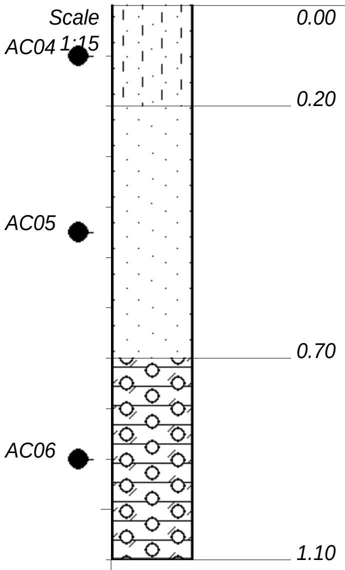
JOB NUMBER: 2016/412/Doc.



Depth (m)	
0.00 – 0.20	Slightly moist reddish brown medium dense sandy silty clay
0.20 – 0.70	Slightly moist reddish grey brown firm sandy lean clay
0.70 – 1.10	Slightly moist light brown dense clayey mudstone gravel with sand
	1.100+ Refuse - Hard sandstone

NOTES

1) Disturbed sample AC04 taken at 0.100m.

2) Disturbed sample AC05 taken at 0.450m.

3) Disturbed sample AC06 taken at 0.900m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

ELEVATION : -
X-COORD : X3237540
Y-COORD : 27 Y0074173

HOLE No: Test Pit 132

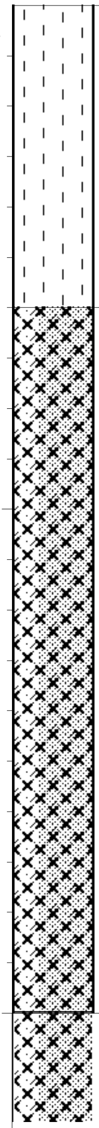
Simlab (PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 133
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00

Slightly moist reddish brown medium dense silty sand

0.60

Slightly moist reddish brown medium dense clayey sand with weathered dolerite gravel

2.00

2.000+ Slightly moist reddish brown medium dense clayey sand with weathered dolerite gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237669
Y-COORD : 27 Y0074175

HOLE No: Test Pit 133

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 135
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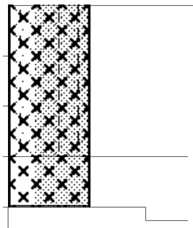
Scale
1:15



Depth	Description
0.00	Slightly moist reddish brown medium dense silty sand with weathered dolerite gravel
0.30	Slightly moist reddish brown dense weathered dolerite gravel
0.40	0.400+ Refuse - Hard dolerite

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237661
Y-COORD : 27 Y0074313

HOLE No: Test Pit 135

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 136
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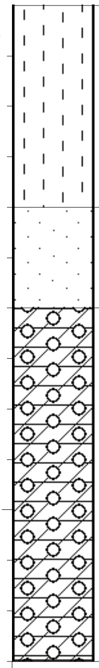
JOB NUMBER: 2016/412/Doc.

Scale
1:15



0.00	Slightly moist reddish brown medium dense silty sand
0.40	Moist reddish brown grey firm sandy lean clay
0.60	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
1.30	1.300+ Refuse - Hard mudstone

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237539
Y-COORD : 27 Y0074302

HOLE No: Test Pit 136

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 137
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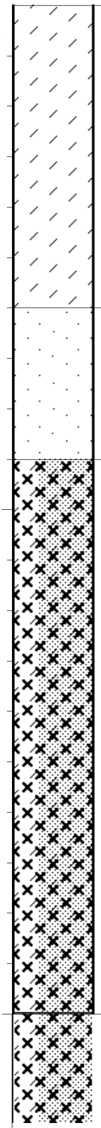
Scale 1:15



0.00	Slightly moist reddish brown medium dense clayey sand
0.60	Moist reddish brown grey firm sandy lean clay
0.90	Moist light brown dense clayey weathered dolerite gravel
2.00	2.000+ Moist light brown dense clayey weathered dolerite gravel

NOTES

1) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237546
Y-COORD : 27 Y0074438

HOLE No: Test Pit 137

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

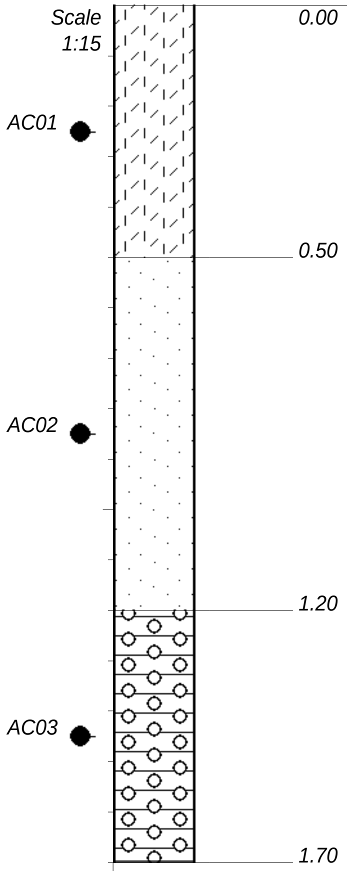
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

HOLE No: Test Pit 139
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



Slightly moist reddish brown medium dense silty, clayey sand

Slightly moist reddish grey brown firm sandy lean clay

Slightly moist grey dense poorly graded mudstone gravel with clay

1.700+ Refuse - Hard mudstone

NOTES

1) Disturbed sample AC01 taken at 0.250m.

2) Disturbed sample AC02 taken at 0.850m.

3) Disturbed sample AC03 taken at 1.450m.

4) SOUTH AFRICAN - WGS84 CO-ORDINATE SYSTEM USED.

CONTRACTOR : SIMLAB (PTY) LIMITED
MACHINE : TLB (Bell, 315SG)
DRILLED BY : PW VAN HEERDEN
PROFILED BY : SIMLAB (PTY) LIMITED

INCLINATION : VERTICAL
DIAM : 600mm
DATE : 18 NOVEMBER 2016
DATE : 31/01/2017

ELEVATION : -
X-COORD : X3237779
Y-COORD : 27 Y0074428

HOLE No: Test Pit 139

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

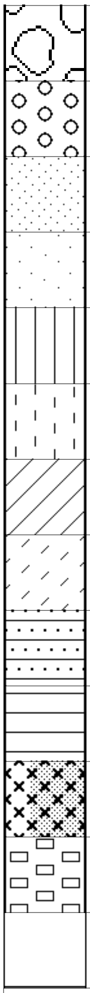
DATE : 06/02/17 14:00
TEXT : ..\Desktop\INSITU~1.TXT

(PTY) LIMITED - GEOTECHNICAL SERVICES

AURECON SOUTH AFRICA (PTY) ltd
New Mangaung Cemetery, Nalisview, Bloemfontein

LEGEND
Sheet 1 of 1

JOB NUMBER: 2016/412/Doc.



	BOULDERS	{SA01}
	GRAVEL	{SA02}
	SAND	{SA04}
	SANDY	{SA05}
	SILT	{SA06}
	SILTY	{SA07}
	CLAY	{SA08}
	CLAYEY	{SA09}
	SANDSTONE	{SA11}
	MUDSTONE	{SA12}
	DOLERITE	{SA18}{SA42}
	CALCRETE	{SA26}
Name ●	DISTURBED SAMPLE	{SA38}

CONTRACTOR :
MACHINE :
DRILLED BY :
PROFILED BY :

INCLINATION :
DIAM :
DATE :
DATE :

ELEVATION :
X-COORD :
Y-COORD :

TYPE SET BY : PW VAN HEERDEN
SETUP FILE : STANDARD.SET

DATE : 06/02/17 14:01
TEXT : ..\Desktop\INSITU~1.TXT

LEGEND
SUMMARY OF SYMBOLS

APPENDIX C

LABORATORY TEST RESULTS

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 1**			
MATERIAL DEPTH (mm)		0 - 700	700 - 900	900 - 2000	2000+
SAMPLE No. / LABORATORY No.		**AC51 / 016/3911**	**AC52 / 016/3912**	**AC53 / 016/3913**	
*** MATERIAL DESCRIPTION**		Moist reddish brown medium dense clayey sand	Moist light brown dense clayey sand	Moist light grey brown dense well-graded sand with silt and mudstone gravel	Moist light grey brown dense well-graded sand with silt and mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)		10.5	11.2	13.0	
*** UNIFIED SOIL CLASSIFICATION**		**SC**	**SC**	**SW-SM**	
*** COLTO CLASSIFICATION**		**N/C**	**N/C**	**N/C**	
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm			100	
	37,5 mm			97	
	28,0 mm			94	
	20,0 mm			87	
	14,0 mm			84	
	5,00 mm			63	
	2,00 mm	100	100	43	
	0,425 mm	98	96	25	
	0,075 mm	35	34	9	
	0,002 mm (A6)	33	17	4	
*** SOIL-MORTAR (%) (PR5)**	**COARSE SAND**	2	3	41	
	FINE SAND (Coarse / Medium / Fine)	3/23/38	4/21/38	3/15/20	
	SILT AND CLAY	35	34	21	
*** GRADING MODULUS** (GM)		0.67	0.70	2.23	
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)	37	41	53	
	P.I (%) **/ L.S** (%)	15 / 6.7	17 / 7.5	19 / 8.8	
*** POTENTIAL EXPANSIVENESS** (mm)		Low	Medium - 3.1mm	Low	
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)	1897	1902	1660	
	OPTIMUM MOISTURE (%)	10.3	12.8	12.6	
	COMPACTION MOISTURE (%)	10.5	12.9	12.7	
	DRY DENSITY (kg/m^3)	1797	1902	1660	
	CBR (%)	5	8	7	
	SWELL (%)	3.7	4.9	7.5	
NRB	**DRY DENSITY** (kg/m^3)	1629	1628	1465	
	CBR (%)	4	7	6	
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)	1528	1509	1344	
	OPTIMUM MOISTURE (%)	-	-	-	
	CBR (%)	3	6	5	
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**	5	8	7	
	98%	5	8	7	
	95%	5	8	6	
	93%	4	8	6	
	90%	4	7	6	
COMPACTABILITY (SABS 0120, P3) (Ratio)		0.39	0.41	0.43	

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 2**			
MATERIAL DEPTH (mm)			0 - 400	400 - 1000	1000 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense clayey sand	Moist reddish grey dense clayey sand	Slightly moist light brown dense silty sand with mudstone gravel	Slightly moist light brown dense silty sand with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 3			
MATERIAL DEPTH (mm)			0 - 500	500 - 800	800 - 1700	1700 - 2000
SAMPLE No. / LABORATORY No.			AC47 / 016/3907	AC48 / 016/3908	AC49 / 016/3909	AC50 / 016/3910
* MATERIAL DESCRIPTION			Moist reddish brown medium dense clayey sand	Moist light brown dense silty sand	Moist light brown stiff sandy lean clay	Slightly moist grey dense silty sand with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)			12.4	16.1	13.5	11.3
* UNIFIED SOIL CLASSIFICATION			SC	SM	CL	SM
* COLTO CLASSIFICATION			N/C	N/C	N/C	N/C
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				100
		28,0 mm				93
		20,0 mm				93
		14,0 mm	100	100	100	92
		5,00 mm	99	99	99	89
		2,00 mm	99	98	97	85
		0,425 mm	98	95	93	81
		0,075 mm	38	35	54	49
		0,002 mm (A6)	29	17	26	28
* SOIL-MORTAR (%) (PR5)		COARSE SAND	1	3	4	5
		FINE SAND (Coarse / Medium / Fine)	5/19/37	3/17/42	2/8/30	2/13/23
		SILT AND CLAY	38	36	56	57
* GRADING MODULUS (GM)			0.65	0.73	0.57	0.85
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)	31	49	39	46
		P.I (%) / L.S (%)	10 / 5.4	20 / 9.5	14 / 7.0	18 / 9.4
* POTENTIAL EXPANSIVENESS (mm)			Low	Medium - 4.9mm	Medium - 11.7mm	Medium - 3.1mm
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)	1909	1708	1887	1900
		OPTIMUM MOISTURE (%)	10.1	14.3	10.3	11.9
		COMPACTION MOISTURE (%)	10.2	14.5	10.4	12.0
		DRY DENSITY (kg/m³)	1909	1708	1887	1900
		CBR (%)	5	4	4	4
		SWELL (%)	4.8	6.9	4.3	4.8
	NRB	DRY DENSITY (kg/m³)	1770	1538	1676	1820
		CBR (%)	3	4	4	4
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)	1632	1434	1511	1655
		OPTIMUM MOISTURE (%)	-	-	-	-
		CBR (%)	2	4	3	4
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%	5	4	4	4
		98%	4	4	4	4
		95%	4	4	4	4
		93%	3	4	4	4
		90%	3	4	4	4
COMPACTABILITY (SABS 0120, P3) (Ratio)			0.51	0.39	0.43	0.35

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 3**	**Test Pit 4**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 700	700 - 1300
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense silty sand with mudstone gravel	Slightly moist reddish brown medium dense clayey sand	Moist light brown stiff sandy lean clay	Moist light brown stiff sandy lean clay with calcrete gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 4		Test Pit 5	
MATERIAL DEPTH (mm)			1300 - 2000	2000+	0 - 200	200 - 500
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Slightly moist reddish brown medium dense clayey sand	Moist reddish brown stiff sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m^3)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

			Test Pit 5		Test Pit 6	
TEST PIT No. / CHAINAGE			**Test Pit 5**		**Test Pit 6**	
MATERIAL DEPTH (mm)			500 - 1100	1100+	0 - 300	300 - 600
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light brown dense silty sand with mudstone gravel	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand with weathered dolerite gravel	Slightly moist reddish brown dense weathered dolerite gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 6**	**Test Pit 7**		
MATERIAL DEPTH (mm)			600+	0 - 400	400 - 700	700 - 1200
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Refuse - Hard dolerite	Slightly moist reddish brown medium dense silty sand	Moist reddish grey dense clayey sand	Slightly moist grey dense poorly graded mudstone gravel with silt and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE	**Test Pit 7**	**Test Pit 8**		
MATERIAL DEPTH (mm)	1200+	0 - 400	400 - 700	700 - 1600
SAMPLE No. / LABORATORY No.				
*** MATERIAL DESCRIPTION**	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown stiff sandy lean clay	Slightly moist grey dense poorly graded gravel with silt and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)				
*** IN SITU MOISTURE CONTENT (GR20)** (%)				
*** UNIFIED SOIL CLASSIFICATION**				
*** COLTO CLASSIFICATION**				
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**				
*** SIEVE ANALYSIS (GR1)** – **63,0 mm**				
50,0 mm				
37,5 mm				
28,0 mm				
20,0 mm				
14,0 mm				
5,00 mm				
2,00 mm				
0,425 mm				
0,075 mm				
0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)** – **COARSE SAND**				
FINE SAND (Coarse / Medium / Fine)				
SILT AND CLAY				
*** GRADING MODULUS** (GM)				
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**				
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm) – **L.L** (%)				
P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)				
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})				
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**				
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** – **MOD AASTHO** – **MAXIMUM DRY DENSITY** (kg/m³)				
OPTIMUM MOISTURE (%)				
COMPACTION MOISTURE (%)				
DRY DENSITY (kg/m³)				
CBR (%)				
SWELL (%)				
NRB – **DRY DENSITY** (kg/m³)				
CBR (%)				
PROCTOR – **MAXIMUM DRY DENSITY** (kg/m³)				
OPTIMUM MOISTURE (%)				
CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** – **CBR** – **100%**				
98%				
95%				
93%				
90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)				

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 8**	**Test Pit 9**		
MATERIAL DEPTH (mm)			1600+	0 - 500	500 - 1100	1100 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Refuse - Hard Mudstone	Moist light brown dense clayey sand	Moist light brown stiff sandy lean clay	Slightly moist grey dense poorly graded gravel with silt and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 9**	**Test Pit 10**		
MATERIAL DEPTH (mm)			2000+	0 - 700	700 - 1100	1100 - 1400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Slightly moist reddish grey brown stiff sandy lean clay	Moist light brown stiff sandy lean clay	Moist purple brown stiff clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**					
	50,0 mm					
	37,5 mm					
	28,0 mm					
	20,0 mm					
	14,0 mm					
	5,00 mm					
	2,00 mm					
	0,425 mm					
	0,075 mm					
	0,002 mm (A6)					
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**					
	FINE SAND (Coarse / Medium / Fine)					
	SILT AND CLAY					
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)					
	P.I (%) **/ L.S** (%)					
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 10		Test Pit 11	
MATERIAL DEPTH (mm)			1400 - 2000	2000+	0 - 500	500 - 800
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Moist purple brown dense clayey mudstone gravel	Moist purple brown dense clayey mudstone gravel	Slightly moist reddish brown silty sand	Slightly moist grey brown firm sandy clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 11**			**Test Pit 15**
MATERIAL DEPTH (mm)			800 - 1100	1100 - 1400	1400+	0 - 300
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light grey brown firm clay with calcrete gravel	Moist light brown dense sandstone gravel	Refuse - Hard sandstone	Slightly moist reddish brown dense silty sand with dolerite boulders
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**					
	50,0 mm					
	37,5 mm					
	28,0 mm					
	20,0 mm					
	14,0 mm					
	5,00 mm					
	2,00 mm					
	0,425 mm					
	0,075 mm					
	0,002 mm (A6)					
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**					
	FINE SAND (Coarse / Medium / Fine)					
	SILT AND CLAY					
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)					
	P.I (%) **/ L.S** (%)					
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE	**Test Pit 15**		**Test Pit 17**	
MATERIAL DEPTH (mm)	300 - 1200	1200+	0 - 200	200+
SAMPLE No. / LABORATORY No.				
*** MATERIAL DESCRIPTION**	Slightly moist light brown dense weathered dolerite gravel	Refuse - Hard weathered dolerite	Slightly moist reddish brown dense silty sand with dolerite boulders	Refuse - Hard weathered dolerite
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)				
*** IN SITU MOISTURE CONTENT (GR20)** (%)				
*** UNIFIED SOIL CLASSIFICATION**				
*** COLTO CLASSIFICATION**				
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**				
*** SIEVE ANALYSIS (GR1)** **63,0 mm**				
50,0 mm				
37,5 mm				
28,0 mm				
20,0 mm				
14,0 mm				
5,00 mm				
2,00 mm				
0,425 mm				
0,075 mm				
0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)** **COARSE SAND**				
FINE SAND (Coarse / Medium / Fine)				
SILT AND CLAY				
*** GRADING MODULUS** (GM)				
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**				
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm) **L.L** (%)				
P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)				
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})				
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**				
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** **MOD AASTHO** **MAXIMUM DRY DENSITY** (kg/m³)				
OPTIMUM MOISTURE (%)				
COMPACTION MOISTURE (%)				
DRY DENSITY (kg/m³)				
CBR (%)				
SWELL (%)				
NRB **DRY DENSITY** (kg/m³)				
CBR (%)				
PROCTOR **MAXIMUM DRY DENSITY** (kg/m³)				
OPTIMUM MOISTURE (%)				
CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** **CBR** **100%**				
98%				
95%				
93%				
90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)				

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 19**			**Test Pit 20**
MATERIAL DEPTH (mm)			0 - 400	400 - 500	500+	0 - 200
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Refuse - Hard Mudstone	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 20**		**Test Pit 22**	
MATERIAL DEPTH (mm)			200 - 400	400+	0 - 300	300 - 600
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Refuse - Hard mudstone	Slightly moist reddish brown dense silty sand	Moist reddish grey brown stiff sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 22**			**Test Pit 23**
MATERIAL DEPTH (mm)			600 - 1000	1000 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light brown sandy clay with mudstone and calcrete gravel	Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Refuse - Hard mudstone	Slightly moist reddish brown dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 23			Test Pit 24
MATERIAL DEPTH (mm)			400 - 1000	1000 - 1800	1800+	0 - 400
SAMPLE No. / LABORATORY No.						AC39 / 0163899
* MATERIAL DESCRIPTION			Moist reddish grey brown stiff sandy lean clay	Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Refused - Hard mudstone	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						4.2
* UNIFIED SOIL CLASSIFICATION						SM
* COLTO CLASSIFICATION						N/C
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				100
		14,0 mm				97
		5,00 mm				93
		2,00 mm				92
		0,425 mm				90
		0,075 mm				37
		0,002 mm (A6)				16
* SOIL-MORTAR (%) (PR5)		COARSE SAND				2
		FINE SAND (Coarse / Medium / Fine)				4/16/38
		SILT AND CLAY				41
* GRADING MODULUS (GM)						0.82
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				-
		P.I (%) / L.S (%)				SP / 1.3
* POTENTIAL EXPANSIVENESS (mm)						Low
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						5.06 / 0.0098
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				2006
		OPTIMUM MOISTURE (%)				9.5
		COMPACTION MOISTURE (%)				9.6
		DRY DENSITY (kg/m³)				2006
		CBR (%)				12
		SWELL (%)				1.1
	NRB	DRY DENSITY (kg/m³)				1982
		CBR (%)				10
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				1923
		OPTIMUM MOISTURE (%)				-
		CBR (%)				6
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				12
		98%				9
		95%				5
		93%				4
		90%				3
COMPACTABILITY (SABS 0120, P3) (Ratio)						0.63

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 24**			**Test Pit 26**
MATERIAL DEPTH (mm)			400 - 800	800 - 1900	1900+	0 - 100
SAMPLE No. / LABORATORY No.			**AC40 / 016/3900**	**AC41 / 016/3901**		
*** MATERIAL DESCRIPTION**			Moist reddish grey dense clayey sand	Slightly moist grey dense poorly graded mudstone gravel with silt and sand	Refuse - Hard mudstone	Moist light brown medium dense clayey sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)			16.2	5.6		
*** UNIFIED SOIL CLASSIFICATION**			**SC**	**GP-GM**		
*** COLTO CLASSIFICATION**			**N/C**	**G6**		
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**		100		
		50,0 mm		98		
		37,5 mm		94		
		28,0 mm		90		
		20,0 mm		84		
		14,0 mm		67		
		5,00 mm	100	37		
		2,00 mm	99	26		
		0,425 mm	96	16		
		0,075 mm	38	6		
		0,002 mm (A6)	36	1		
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**	3	38		
		FINE SAND (Coarse / Medium / Fine)	3/24/33	3/10/26		
		SILT AND CLAY	36	24		
*** GRADING MODULUS** (GM)			0.70	2.51		
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)	36	33		
		P.I (%) **/ L.S** (%)	14 / 6.7	8 / 4.0		
*** POTENTIAL EXPANSIVENESS** (mm)			Low	Low		
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})			5.46 / 0.0183	6.20 / 0.023		
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)	1881	2134		
		OPTIMUM MOISTURE (%)	9.6	7.2		
		COMPACTION MOISTURE (%)	9.6	7.4		
		DRY DENSITY (kg/m³)	1881	2134		
		CBR (%)	3	39		
		SWELL (%)	5.9	1.2		
	NRB	**DRY DENSITY** (kg/m³)	1683	2041		
		CBR (%)	3	35		
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)	1437	1955		
		OPTIMUM MOISTURE (%)	-	-		
		CBR (%)	0	31		
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**	3	39		
		98%	3	37		
		95%	3	34		
		93%	3	32		
		90%	3	29		
COMPACTABILITY (SABS 0120, P3) (Ratio)			0.49	0.35		

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 26			
MATERIAL DEPTH (mm)			100 - 700	700 - 900	900 - 2000	2000+
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Moist light brown stiff sandy lean clay	Moist light brown stiff sandy lean clay with calcrete gravel	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 27**			
MATERIAL DEPTH (mm)			0 - 500	500 - 800	800 - 1300	1300 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown dense silty sand	Moist reddish grey brown stiff sandy lean clay	Moist light brown medium dense clayey sand	Slightly moist grey dense poorly graded mudstone and calcrete gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 27**	**Test Pit 29**		
MATERIAL DEPTH (mm)			2000+	0 - 600	600 - 1000	1000 - 1700
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense poorly graded mudstone and calcrete gravel	Slightly moist reddish brown dense silty sand	Moist reddish grey brown stiff sandy lean clay	Moist light brown firm sandy clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 29**		**Test Pit 30**	
MATERIAL DEPTH (mm)			1700 - 2000	2000+	0 - 500	500 - 1900
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand	Slightly moist reddish grey brown stiff sandy lean clay	Slightly moist grey dense poorly graded mudstone gravel with silt and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 30	Test Pit 31		
MATERIAL DEPTH (mm)			1900+	0 - 600	600 - 900	900 - 1400
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Refuse - Hard mudstone	Slightly moist reddish brown dense silty sand	Moist reddish grey brown stiff sandy lean clay	Moist light brown firm sandy clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

		TEST PIT No. / CHAINAGE	Test Pit 31		Test Pit 32	
		MATERIAL DEPTH (mm)	1400 - 2000	2000+	0 - 400	400 - 800
		SAMPLE No. / LABORATORY No.			AC42 / 016/3902	AC43 / 016/3903
		* MATERIAL DESCRIPTION	Slightly moist grey dense poorly graded mudstone gravel with clay	Slightly moist grey dense poorly graded mudstone gravel with clay	Slightly moist reddish brown medium dense silty sand	Slightly moist reddish grey dense clayey sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
		* IN SITU MOISTURE CONTENT (GR20) (%)			5.6	3.9
		* UNIFIED SOIL CLASSIFICATION			SM	SC
		* COLTO CLASSIFICATION				
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm			100	
		2,00 mm			99	100
		0,425 mm			97	98
		0,075 mm			32	41
		0,002 mm (A6)			21	36
* SOIL-MORTAR (%) (PR5)		COARSE SAND			3	2
		FINE SAND (Coarse / Medium / Fine)			3/15/46	4/25/35
		SILT AND CLAY			32	36
		* GRADING MODULUS (GM)			0.72	0.67
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)			-	35
		P.I (%) / L.S (%)			SP / 1.1	16 / 7.6
		* POTENTIAL EXPANSIVENESS (mm)			Low	Low
		* pH (A20) (Value) / * EC (A21T) (S/m^{-1})				
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
		COMPACTABILITY (SABS 0120, P3) (Ratio)				

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 32**			**Test Pit 33**
MATERIAL DEPTH (mm)			800 - 1300	1300 - 2000	2000+	0 - 600
SAMPLE No. / LABORATORY No.			**AC44 / 016/3904**	**AC45 / 016/3905**		
*** MATERIAL DESCRIPTION**			Moist light brown dense clayey sand	Slightly moist dense clayey sand with mudstone gravel	Slightly moist dense clayey sand with mudstone gravel	Moist brown firm sandy clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)			15.2	10.5		
*** UNIFIED SOIL CLASSIFICATION**			**SC**	**SC**		
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm		100		
		37,5 mm		96		
		28,0 mm		90		
		20,0 mm	100	82		
		14,0 mm	98	80		
		5,00 mm	95	72		
		2,00 mm	93	53		
		0,425 mm	90	32		
		0,075 mm	35	13		
		0,002 mm (A6)	7	8		
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**	3	40		
		FINE SAND (Coarse / Medium / Fine)	3/16/40	2/10/24		
		SILT AND CLAY	38	24		
*** GRADING MODULUS** (GM)			0.83	2.03		
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)	37	38		
		P.I (%) **/ L.S** (%)	12 / 6.4	16 / 8.2		
*** POTENTIAL EXPANSIVENESS** (mm)			Low	Low		
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 33**			**Test Pit 34**
MATERIAL DEPTH (mm)			600 - 900	900 - 1900	1900+	0 - 600
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy clay	Slightly moist light grey brown dense poorly graded mudstone gravel	Refuse - Hard mudstone	Slightly moist reddish brown dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 34**			**Test Pit 36**
MATERIAL DEPTH (mm)			600 - 800	800 - 1400	1400+	0 - 300
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown stiff sandy lean clay	Slightly moist grey dense poorly graded mudstone gravel with boulders	Refuse - Hard mudstone	Slightly moist reddish brown dense clayey sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 36**			
MATERIAL DEPTH (mm)		300 - 800	800 - 1100	1100 - 1800	1800+
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Moist reddish grey brown stiff sandy lean clay	Moist light brown firm sandy clay with calcrete and mudstone gravel	Slightly moist light brown dens sandstone gravel	Refuse - Hard sandstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** – **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m^3)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m^3)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** – **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 37**			
MATERIAL DEPTH (mm)			0 - 400	400 - 800	800 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish grey brown stiff sandy lean clay	Moist light brown firm sandy clay	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with silt and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 39**			
MATERIAL DEPTH (mm)			0 - 1100	1100 - 1600	1600 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown dense silty sand	Moist reddish grey brown stiff sandy lean clay	Moist light brown dense clayey weathered dolerite gravel	Moist light brown dense clayey weathered dolerite gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 40**			
MATERIAL DEPTH (mm)			0 - 300	300 - 700	700 - 1600	1600+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown firm sandy lean clay	Moist light brown firm sandy lean clay	Slightly moist light grey brown dense sandstone gravel	Refuse - Hard sandstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 44			
MATERIAL DEPTH (mm)			0 - 400	400 - 900	900 - 2000	2000+
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Slightly moist grey dense silty sand with mudstone gravel	Slightly moist grey dense silty sand with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		Test Pit 45			
MATERIAL DEPTH (mm)		0 - 300	300 - 800	800 - 900	900 - 2000
SAMPLE No. / LABORATORY No.		AC33 / 016/3893	AC34 / 016/3894		AC35 / 016/3895
* MATERIAL DESCRIPTION		Slightly moist reddish brown medium dense silty, clayey sand	Moist grey brown dense silty sand	Moist light brown firm sandy clay with mudstone gravel	Slightly moist grey dense poorly graded mudstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
* IN SITU MOISTURE CONTENT (GR20) (%)		5.2	17.3		7.0
* UNIFIED SOIL CLASSIFICATION		SC-SM	SM		GP-GM
* COLTO CLASSIFICATION		N/C	N/C		N/C
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)					
* SIEVE ANALYSIS (GR1)	63,0 mm				
	50,0 mm				100
	37,5 mm				97
	28,0 mm				92
	20,0 mm				85
	14,0 mm	100			75
	5,00 mm	99	100		36
	2,00 mm	97	98		19
	0,425 mm	95	94		11
	0,075 mm	35	39		5
	0,002 mm (A6)	19	31		1
* SOIL-MORTAR (PR5) (%)	COARSE SAND	2	4		41
	FINE SAND (Coarse / Medium / Fine)	3/16/43	3/17/45		3/9/22
	SILT AND CLAY	37	32		25
* GRADING MODULUS (GM)		0.73	0.77		2.65
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)					
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)	L.L (%)	18	45		51
	P.I (%) / L.S (%)	5 / 2.3	17 / 7.7		18 / 9.0
* POTENTIAL EXPANSIVENESS (mm)		Low	Medium - 8.4mm		Low
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})		5.54 / 0.0100	5.72 / 0.0178		6.13 / 0.0263
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)					
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30) – MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)	1992	1778		2042
	OPTIMUM MOISTURE (%)	10.2	11.2		9.5
	COMPACTION MOISTURE (%)	10.2	11.3		9.5
	DRY DENSITY (kg/m³)	1992	1778		2042
	CBR (%)	19	3		42
	SWELL (%)	0.3	3.5		0.0
NRB	DRY DENSITY (kg/m³)	1897	1567		1915
	CBR (%)	17	3		28
PROCTOR	MAXIMUM DRY DENSITY (kg/m³)	1797	1418		1817
	OPTIMUM MOISTURE (%)		-		-
	CBR (%)	6	0		20
* CALIFORNIA BEARING RATIO (GR40) – CBR	100%	19	3		42
	98%	16	3		37
	95%	13	3		30
	93%	12	3		26
	90%	10	3		21
COMPACTABILITY (SABS 0120, P3) (Ratio)		0.41	0.47		0.43

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 45	Test Pit 50		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 600	600 - 1600
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone and calcrete gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 50**		**Test Pit 51**	
MATERIAL DEPTH (mm)			1600 - 2000	2000+	0 - 500	500 - 800
SAMPLE No. / LABORATORY No.					**AC36 / 016/3896**	**AC37 / 016/3897**
*** MATERIAL DESCRIPTION**			Slightly moist grey dense silty sand with mudstone gravel	Slightly moist grey dense silty sand with mudstone gravel	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown dense clayey sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)					3.9	15.4
*** UNIFIED SOIL CLASSIFICATION**					**SM**	**SC**
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				100
		5,00 mm			100	97
		2,00 mm			99	94
		0,425 mm			97	85
		0,075 mm			31	41
		0,002 mm (A6)			16	20
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**			2	9
		FINE SAND (Coarse / Medium / Fine)			7/28/31	9/23/36
		SILT AND CLAY			31	22
*** GRADING MODULUS** (GM)					0.73	1.01
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)			-	47
		P.I (%) **/ L.S** (%)			SP / 1.3	21 / 9.8
*** POTENTIAL EXPANSIVENESS** (mm)					Low	Medium - 4.9mm
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 51**			**Test Pit 52**
MATERIAL DEPTH (mm)			800 - 1100	1100 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.				**AC38 / 016/3898**		
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown mudstone boulders with silty sand	Slightly moist light grey brown dense well-graded sand with silt and mudstone gravel	Slightly moist light grey brown dense well-graded sand with silt and mudstone gravel	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)				9.4		
*** UNIFIED SOIL CLASSIFICATION**				**SW-SM**		
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm		100		
		37,5 mm		99		
		28,0 mm		96		
		20,0 mm		92		
		14,0 mm		89		
		5,00 mm		62		
		2,00 mm		40		
		0,425 mm		21		
		0,075 mm		7		
		0,002 mm (A6)		3		
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**		48		
		FINE SAND (Coarse / Medium / Fine)		3/13/19		
		SILT AND CLAY		17		
*** GRADING MODULUS** (GM)				2.33		
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)		45		
		P.I (%) **/ L.S** (%)		16 / 7.5		
*** POTENTIAL EXPANSIVENESS** (mm)				Low		
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 52			
MATERIAL DEPTH (mm)			400 - 700	700 - 800	800 - 1900	1900+
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay	Slightly moist grey dense poorly graded mudstone gravel with silt and mudstone boulders	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (PR5)	(%)	COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 53			
MATERIAL DEPTH (mm)			0 - 400	400 - 900	900 - 1500	1500+
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Slightly moist grey dense well-graded sand with silt and mudstone gravel with boulders	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 54**			
MATERIAL DEPTH (mm)			0 - 300	300 - 700	700 - 900	900 - 1900
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay	Slightly moist light grey brown dense well-graded sand with silt and mudstone and calcrete gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m⁻¹)						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 54**	**Test Pit 55**		
MATERIAL DEPTH (mm)		1900+	0 - 500	500 - 1100	1100 - 2000
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown stiff sandy lean clay	Slightly moist grey dense poorly graded mudstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 55**	**Test Pit 57**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 800	800 - 1000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 57**		**Test Pit 59**	
MATERIAL DEPTH (mm)			1000 - 2000	2000+	0 - 200	200 - 400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 59**			**Test Pit 61**
MATERIAL DEPTH (mm)		400 - 900	900 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Moist light brown firm sandy clay	Slightly moist grey dense silty sand with mudstone gravel	Slightly moist grey dense silty sand with mudstone gravel	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 61**			
MATERIAL DEPTH (mm)			400 - 700	700 - 1600	1600 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone and sandstone gravel	Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist grey dense poorly graded mudstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 62**			
MATERIAL DEPTH (mm)			0 - 400	400 - 900	900 - 1200	1200 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone gravel	Slightly moist grey dense poorly graded mudstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 62**	**Test Pit 63**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 600	600 - 1300
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 62**		**Test Pit 64**	
MATERIAL DEPTH (mm)			1300 - 1900	1900+	0 - 400	400 - 600
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light brown dense poorly graded mudstone and sandstone gravel with silt	Refuse - Hard sandstone	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**					
	50,0 mm					
	37,5 mm					
	28,0 mm					
	20,0 mm					
	14,0 mm					
	5,00 mm					
	2,00 mm					
	0,425 mm					
	0,075 mm					
	0,002 mm (A6)					
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**					
	FINE SAND (Coarse / Medium / Fine)					
	SILT AND CLAY					
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)					
	P.I (%) **/ L.S** (%)					
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 64**			**Test Pit 65**
MATERIAL DEPTH (mm)			600 - 1200	1200 - 2000	2000+	0 - 200
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy clay	Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 65**			
MATERIAL DEPTH (mm)			200 - 600	600 - 1100	1100 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone gravel	Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist grey dense poorly graded mudstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 66			
MATERIAL DEPTH (mm)			0 - 500	500 - 900	900 - 2000	2000+
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Slightly moist grey dense poorly graded mudstone gravel with silt	Slightly moist grey dense poorly graded mudstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE	**Test Pit 67**			
MATERIAL DEPTH (mm)	0 - 300	300 - 800	800 - 2000	2000+
SAMPLE No. / LABORATORY No.	**AC26 016/3799**	**AC27 / 016/3800**	**AC28 / 016/3801**	
*** MATERIAL DESCRIPTION**	Slightly moist reddish brown medium dense silty, clayey sand	Slightly moist reddish grey firm lean clay with sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)				
*** IN SITU MOISTURE CONTENT (GR20)** (%)	4.5	4.4	4.1	
*** UNIFIED SOIL CLASSIFICATION**	**SC-SM**	**CL**	**GP-GC**	
*** COLTO CLASSIFICATION**				
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**				
*** SIEVE ANALYSIS (GR1)** **63,0 mm**				
50,0 mm			100	
37,5 mm			97	
28,0 mm			93	
20,0 mm			79	
14,0 mm			77	
5,00 mm	100	100	47	
2,00 mm	96	99	26	
0,425 mm	93	98	14	
0,075 mm	39	75	8	
0,002 mm (A6)	17	47	1	
*** SOIL-MORTAR (PR5)** (%) **COARSE SAND**	3	1	46	
FINE SAND (Coarse / Medium / Fine)	3/17/36	5/7/11	8/7/8	
SILT AND CLAY	41	76	30	
*** GRADING MODULUS** (GM)	0.72	0.28	2.52	
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**				
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm) **L.L** (%)	19	44	39	
P.I (%) **/ L.S** (%)	7 / 2.5	19 / 8.7	14 / 6.6	
*** POTENTIAL EXPANSIVENESS** (mm)	Low	Low	Low	
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})				
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**				
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** **MOD AASTHO** **MAXIMUM DRY DENSITY** (kg/m^3)				
OPTIMUM MOISTURE (%)				
COMPACTION MOISTURE (%)				
DRY DENSITY (kg/m^3)				
CBR (%)				
SWELL (%)				
NRB **DRY DENSITY** (kg/m^3)				
CBR (%)				
PROCTOR **MAXIMUM DRY DENSITY** (kg/m^3)				
OPTIMUM MOISTURE (%)				
CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** **CBR** **100%**				
98%				
95%				
93%				
90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)				

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE	**Test Pit 68**			
MATERIAL DEPTH (mm)	0 - 300	300 - 800	800 - 1200	1200 - 2000
SAMPLE No. / LABORATORY No.				
*** MATERIAL DESCRIPTION**	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)				
*** IN SITU MOISTURE CONTENT (GR20)** (%)				
*** UNIFIED SOIL CLASSIFICATION**				
*** COLTO CLASSIFICATION**				

*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)**
*** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)**
*** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**

*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					

*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)**
*** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)**
*** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**

*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					

*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)**
*** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)**
*** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**

*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 68**	**Test Pit 69**		
MATERIAL DEPTH (mm)			2000+	0 - 200	200 - 600	600 - 1300
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with calcrete sediment
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**					
	50,0 mm					
	37,5 mm					
	28,0 mm					
	20,0 mm					
	14,0 mm					
	5,00 mm					
	2,00 mm					
	0,425 mm					
	0,075 mm					
	0,002 mm (A6)					
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**					
	FINE SAND (Coarse / Medium / Fine)					
	SILT AND CLAY					
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)					
	P.I (%) **/ L.S** (%)					
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 69**		**Test Pit 71**	
MATERIAL DEPTH (mm)			1300 - 2000	2000+	0 - 400	400 - 700
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 71**			**Test Pit 73**
MATERIAL DEPTH (mm)			700 - 1300	1300 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy clay with mudstone gravel	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 73**			**Test Pit 75**
MATERIAL DEPTH (mm)		400 - 700	700 - 1600	1600+	0 - 400
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m^3)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m^3)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 75**			**Test Pit 76**
MATERIAL DEPTH (mm)			400 - 600	600 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 76**			
MATERIAL DEPTH (mm)			400 - 500	500 - 1300	1300 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Moist light brown firm sandy clay with mudstone gravel	Moist light brown firm sandy clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 77			
MATERIAL DEPTH (mm)			0 - 400	400 - 800	800 - 2000	2000+
SAMPLE No. / LABORATORY No.			AC20 / 016/3793	AC21 / 016/3794	AC22 / 016/3795	
* MATERIAL DESCRIPTION			Slightly moist reddish brown medium dense clayey sand	Very moist reddish grey stiff lean clay with sand	Slightly moist light grey brown dense clayey sand with mudstone gravel	Slightly moist light grey brown dense clayey sand with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)			9	21.8	3.7	
* UNIFIED SOIL CLASSIFICATION			SC	CL	SC	
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm			100	
		20,0 mm			94	
		14,0 mm	100		92	
		5,00 mm	99		71	
		2,00 mm	97	100	57	
		0,425 mm	94	98	48	
		0,075 mm	42	79	30	
		0,002 mm (A6)	26	55	16	
* SOIL-MORTAR (%) (PR5)		COARSE SAND	3	1	16	
		FINE SAND (Coarse / Medium / Fine)	5/15/33	1/5/13	2/7/21	
		SILT AND CLAY	44	80	53	
* GRADING MODULUS (GM)			0.67	0.23	1.66	
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)	27	47	32	
		P.I (%) / L.S (%)	10 / 4.8	22 / 11.4	12 / 5.7	
* POTENTIAL EXPANSIVENESS (mm)			Low	Low	Low	
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 78**			
MATERIAL DEPTH (mm)			0 - 400	400 - 700	700 - 1300	1300 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist light grey brown dense well-graded sand with silt and mudstone gravel	Moist light brown firm sandy clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 78	Test Pit 79		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 800	800 - 1300
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 79**		**Test Pit 80**	
MATERIAL DEPTH (mm)			1300 - 2000	2000+	0 - 300	300 - 700
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 80**			**Test Pit 81**
MATERIAL DEPTH (mm)			700 - 1200	1200 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.						**AC29 / 016/3802**
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy clay with	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense clayey sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						4.6
*** UNIFIED SOIL CLASSIFICATION**						**SC**
*** COLTO CLASSIFICATION**						**N/C**
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				100
		5,00 mm				100
		2,00 mm				97
		0,425 mm				93
		0,075 mm				47
		0,002 mm (A6)				22
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				4
		FINE SAND (Coarse / Medium / Fine)				4/13/31
		SILT AND CLAY				49
*** GRADING MODULUS** (GM)						0.62
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				23
		P.I (%) **/ L.S** (%)				8 / 4.0
*** POTENTIAL EXPANSIVENESS** (mm)						Low
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						5.53 / 0.0092
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				1969
		OPTIMUM MOISTURE (%)				10.6
		COMPACTION MOISTURE (%)				10.7
		DRY DENSITY (kg/m³)				1957
		CBR (%)				17
		SWELL (%)				0.5
	NRB	**DRY DENSITY** (kg/m³)				1811
		CBR (%)				11
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				1721
		OPTIMUM MOISTURE (%)				-
		CBR (%)				7
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				19
		98%				16
		95%				13
		93%				11
		90%				9
COMPACTABILITY (SABS 0120, P3) (Ratio)						0.47

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 81**			
MATERIAL DEPTH (mm)			400 - 700	700 - 1500	1500 - 2000	2000+
SAMPLE No. / LABORATORY No.			**AC30 / 016/3803**	**AC31 / 016/3804**	**AC32 015/3805**	
* MATERIAL DESCRIPTION			Moist reddish grey firm sandy lean clay	Slightly moist light brown dense silty sand with mudstone gravel	Slightly moist light brown dense poorly graded sandstone gravel with silt	Slightly moist light brown dense poorly graded sandstone gravel with silt
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)			16.1	4.6	7.6	
* UNIFIED SOIL CLASSIFICATION			**CL**	**SM**	**GP - GM**	
* COLTO CLASSIFICATION			**N/C**	**G7**	**G7**	
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
* SIEVE ANALYSIS (GR1)		63,0 mm			96	
		50,0 mm		100	87	
		37,5 mm		99	80	
		28,0 mm		95	62	
		20,0 mm		87	49	
		14,0 mm		77	38	
		5,00 mm	100	55	19	
		2,00 mm	99	46	15	
		0,425 mm	98	35	12	
		0,075 mm	66	19	10	
		0,002 mm (A6)	53	4	2	
* SOIL-MORTAR (%) (PR5)		COARSE SAND	1	25	16	
		FINE SAND (Coarse / Medium / Fine)	5/9/19	6/9/18	1/4/12	
		SILT AND CLAY	66	41	69	
* GRADING MODULUS (GM)			0.36	2.00	2.63	
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)	49	46	41	
		P.I (%) / L.S (%)	27 / 12.5	16 / 8.4	14 / 7.1	
* POTENTIAL EXPANSIVENESS (mm)			Medium - 5.1mm	Low	Low	
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})			5.71 / 0.0256	6.37 / 0.0258	6.51 / 0.0190	
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)	1652	1840	1884	
		OPTIMUM MOISTURE (%)	13.8	14.9	16.8	
		COMPACTION MOISTURE (%)	14.3	14.7	16.7	
		DRY DENSITY (kg/m³)	1618	1840	1862	
		CBR (%)	3	33	47	
		SWELL (%)	9.3	0.2	0.2	
	NRB	DRY DENSITY (kg/m³)	1501	1771	1794	
		CBR (%)	3	27	27	
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)	1426	1664	1720	
		OPTIMUM MOISTURE (%)	-	-	-	
		CBR (%)	0	20	16	
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%	3	33	53	
		98%	3	30	41	
		95%	3	26	27	
		93%	3	24	21	
		90%	3	20	14	
COMPACTABILITY (SABS 0120, P3) (Ratio)			0.43	0.35	0.55	

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 82**			
MATERIAL DEPTH (mm)		0 - 300	300 - 500	500 - 1100	1100 - 2000
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light grey brown firm sandy clay with mudstone and gravel	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASHTO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 82**	**Test Pit 83**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 600	600 - 1400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 83		Test Pit 84	
MATERIAL DEPTH (mm)			1400 - 2000	2000+	0 - 500	500 - 1400
SAMPLE No. / LABORATORY No.					AC23 / 0136796	AC24 016/3797
* MATERIAL DESCRIPTION			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense sandy silt	Slightly moist reddish grey firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)					5.5	6.9
* UNIFIED SOIL CLASSIFICATION					ML	CL
* COLTO CLASSIFICATION					N/C	N/C
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm			100	
		5,00 mm			99	100
		2,00 mm			96	99
		0,425 mm			94	98
		0,075 mm			52	61
		0,002 mm (A6)			13	39
* SOIL-MORTAR (%) (PR5)		COARSE SAND			16	3
		FINE SAND (Coarse / Medium / Fine)			3/14/20	2/10/25
		SILT AND CLAY			47	61
* GRADING MODULUS (GM)					0.58	0.42
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)			-	35
		P.I (%) / L.S (%)			SP / 1.1	14 / 7.4
* POTENTIAL EXPANSIVENESS (mm)					Low	Low
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})					6.01 / 0.0093	5.76 / 0.0268
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)			1956	1701
		OPTIMUM MOISTURE (%)			12.7	18.4
		COMPACTION MOISTURE (%)			12.7	18.5
		DRY DENSITY (kg/m³)			1956	1701
		CBR (%)			10	4
		SWELL (%)			0.0	3.1
	NRB	DRY DENSITY (kg/m³)			1906	1604
		CBR (%)			8	3
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)			1857	1536
		OPTIMUM MOISTURE (%)			-	-
		CBR (%)			6	0
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%			10	4
		98%			8	3
		95%			6	3
		93%			5	3
		90%			4	3
COMPACTABILITY (SABS 0120, P3) (Ratio)					0.45	0.43

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 84		Test Pit 85	
MATERIAL DEPTH (mm)			1400 - 2000	2000+	0 - 500	500 - 900
SAMPLE No. / LABORATORY No.			AC25 / 016/3798			
* MATERIAL DESCRIPTION			Slightly moist light brown dense clayey sand	Slightly moist light brown dense clayey sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)			9.4			
* UNIFIED SOIL CLASSIFICATION			SC			
* COLTO CLASSIFICATION			G8			
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm	100			
		5,00 mm	99			
		2,00 mm	94			
		0,425 mm	83			
		0,075 mm	46			
		0,002 mm (A6)	15			
* SOIL-MORTAR (%) (PR5)		COARSE SAND	12			
		FINE SAND (Coarse / Medium / Fine)	5/10/25			
		SILT AND CLAY	49			
* GRADING MODULUS (GM)			0.77			
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)	34			
		P.I (%) / L.S (%)	12 / 5.7			
* POTENTIAL EXPANSIVENESS (mm)			Low			
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})			6.12 / 0.0217			
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)	1650			
		OPTIMUM MOISTURE (%)	21.3			
		COMPACTION MOISTURE (%)	21.1			
		DRY DENSITY (kg/m³)	1650			
		CBR (%)	11			
		SWELL (%)	0.2			
	NRB	DRY DENSITY (kg/m³)	1625			
		CBR (%)	11			
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)	1584			
		OPTIMUM MOISTURE (%)	-			
		CBR (%)	11			
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%	11			
		98%	11			
		95%	11			
		93%	11			
		90%	11			
COMPACTABILITY (SABS 0120, P3) (Ratio)			0.43			

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 85			Test Pit 86
MATERIAL DEPTH (mm)			900 - 1400	1400 - 2000	2000+	0 - 500
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Moist light brown firm sandy clay with mudstone gravel	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 86**			
MATERIAL DEPTH (mm)			500 - 800	800 - 1200	1200 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 89**			
MATERIAL DEPTH (mm)			0 - 500	500 - 900	900 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Slightly moist light brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR**	(%) **(PR5)**	**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 91**			
MATERIAL DEPTH (mm)			0 - 500	500 - 800	800 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 92			
MATERIAL DEPTH (mm)			0 - 600	600 - 900	900 - 1300	1300+
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m³)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 93**			
MATERIAL DEPTH (mm)			0 - 600	600 - 900	900 - 1400	1400+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand with mudstone gravel	Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 94**			
MATERIAL DEPTH (mm)		0 - 600	600 - 1000	1000 - 1300	1300+
SAMPLE No. / LABORATORY No.		**AC07 / 016/3779**	**AC08 / 016/3780**	**AC09 / 016/3781**	
*** MATERIAL DESCRIPTION**		Slightly moist reddish brown medium dense silty sand	Slightly moist reddish grey brown firm sandy lean clay	Slightly moist light brown dense clayey sand with mudstone gravel	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)		5.5	9.9	5.9	
*** UNIFIED SOIL CLASSIFICATION**		**SM**	**CL**	**CL**	
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**			92	
	50,0 mm			85	
	37,5 mm			81	
	28,0 mm			72	
	20,0 mm			64	
	14,0 mm		100	63	
	5,00 mm	100	98	51	
	2,00 mm	98	94	39	
	0,425 mm	96	92	32	
	0,075 mm	41	52	18	
	0,002 mm (A6)	25	20	10	
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**	2	3	19	
	FINE SAND (Coarse / Medium / Fine)	5/15/36	6/12/25	11/11/13	
	SILT AND CLAY	42	55	46	
*** GRADING MODULUS** (GM)		0.65	0.62	2.11	
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)	32	35	36	
	P.I (%) **/ L.S** (%)	8 / 3.8	15 / 6.9	15 / 7.4	
*** POTENTIAL EXPANSIVENESS** (mm)		Low	Medium - 6.1mm	Low	
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 95**			
MATERIAL DEPTH (mm)			0 - 300	300 - 800	800 - 1200	1200 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 95**	**Test Pit 96**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 700	700 - 2000
SAMPLE No. / LABORATORY No.				**AC10 / 016/3782**	**AC11 / 016/3783**	**AC12 / 016/3784**
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense clayey sand	Moist reddish grey firm sandy lean clay	Slightly moist light grey brown dense clayey sand with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)				7.8	14.3	10
*** UNIFIED SOIL CLASSIFICATION**				**SC**	**CL**	**SC**
*** COLTO CLASSIFICATION**				**N/C**	**N/C**	**G7**
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				100
		50,0 mm				99
		37,5 mm				98
		28,0 mm				95
		20,0 mm				91
		14,0 mm			100	90
		5,00 mm		100	99	83
		2,00 mm		96	96	41
		0,425 mm		94	95	31
		0,075 mm		49	66	21
		0,002 mm (A6)		24	40	4
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**		2	2	24
		FINE SAND (Coarse / Medium / Fine)		3/11/34	4/9/17	7/7/12
		SILT AND CLAY		51	68	50
*** GRADING MODULUS** (GM)				0.61	0.43	2.07
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)		25	40	38
		P.I (%) **/ L.S** (%)		8 / 3.8	17 / 8.0	14 / 7.3
*** POTENTIAL EXPANSIVENESS** (mm)				Low	Low	Low
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})				6.22 / 0.0115	5.15 / 0.0193	5.55 / 0.0210
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)		1831	1659	1909
		OPTIMUM MOISTURE (%)		14.5	18.6	15.1
		COMPACTION MOISTURE (%)		14.6	18.7	15.3
		DRY DENSITY (kg/m³)		1821	1606	1909
		CBR (%)		9	8	26
		SWELL (%)		1.8	2.2	0.1
	NRB	**DRY DENSITY** (kg/m³)		1723	1525	1797
		CBR (%)		6	4	22
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)		p	1438	1693
		OPTIMUM MOISTURE (%)		-	-	-
		CBR (%)		5	2	20
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**		9	12	26
		98%		8	9	24
		95%		6	6	23
		93%		5	4	22
		90%		5	3	21
COMPACTABILITY (SABS 0120, P3) (Ratio)				0.39	0.39	0.39

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 96**	**Test Pit 97**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 700	700 - 1200
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense clayey sand with mudstone gravel	Moist reddish grey brown firm sandy lean clay	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 97**		**Test Pit 98**	
MATERIAL DEPTH (mm)			1200 - 2000	2000+	0 - 500	500 - 800
SAMPLE No. / LABORATORY No.					**AC14 / 016/3786**	**AC15 / 016/3787**
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown mediem dense clayey sand	Moist reddish brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)					7.2	17.9
*** UNIFIED SOIL CLASSIFICATION**					**SC**	**CL**
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm			100	100
		5,00 mm			97	99
		2,00 mm			94	98
		0,425 mm			92	97
		0,075 mm			35	59
		0,002 mm (A6)			20	41
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**			3	1
		FINE SAND (Coarse / Medium / Fine)			6/18/37	6/13/20
		SILT AND CLAY			37	60
*** GRADING MODULUS** (GM)					0.79	0.47
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)			29	38
		P.I (%) **/ L.S** (%)			8 / 4.0	16 / 7.8
*** POTENTIAL EXPANSIVENESS** (mm)					Low	Low
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 98**		**Test Pit 99**	
MATERIAL DEPTH (mm)		800 - 2000	2000+	0 - 300	300 - 800
SAMPLE No. / LABORATORY No.		**AC16 / 016/3788**			
*** MATERIAL DESCRIPTION**		Slightly moist light brown dense poorly graded sand with clay and mudstone gravel	Slightly moist light brown dense poorly graded sand with clay and mudstone gravel	Slightly moist reddish brown medium dense silty sand	Moist dark red firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)		6.6			
*** UNIFIED SOIL CLASSIFICATION**		**SP-SC**			
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm	100			
	20,0 mm	99			
	14,0 mm	99			
	5,00 mm	76			
	2,00 mm	59			
	0,425 mm	36			
	0,075 mm	10			
	0,002 mm (A6)	1			
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**	39			
	FINE SAND (Coarse / Medium / Fine)	16/14/14			
	SILT AND CLAY	17			
*** GRADING MODULUS** (GM)		1.95			
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)	-			
	P.I (%) **/ L.S** (%)	SP / 1.3			
*** POTENTIAL EXPANSIVENESS** (mm)		Low			
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 99**			**Test Pit 100**
MATERIAL DEPTH (mm)		800 - 1100	1100 - 2000	2000+	0 - 600
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Moist light brown firm sandy clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** – **MOD AASHTO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** – **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 100			Test Pit 101
MATERIAL DEPTH (mm)			600 - 1100	1100 - 2000	2000+	0 - 500
SAMPLE No. / LABORATORY No.						
* MATERIAL DESCRIPTION			Moist reddish grey brown firm sandy lean clay	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)						
* UNIFIED SOIL CLASSIFICATION						
* COLTO CLASSIFICATION						
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)		COARSE SAND				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
* GRADING MODULUS (GM)						
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)				
		P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)						
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})						
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	DRY DENSITY (kg/m^3)				
		CBR (%)				
	PROCTOR	MAXIMUM DRY DENSITY (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 101**			
MATERIAL DEPTH (mm)			500 - 800	800 - 1100	1100 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy clay with mudstone gravel	Slightly moist light brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 102**			
MATERIAL DEPTH (mm)			0 - 400	400 - 700	700 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist light brown firm sandy clay with mudstone gravel	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	^Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m^3)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m^3)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 103**			
MATERIAL DEPTH (mm)			0 - 300	300 - 600	600 - 1400	1400 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist dark red brown firm sandy lean clay	Moist light brown firm sandy lean clay	Moist light brown firm sandy lean clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 103**	**Test Pit 104**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 600	600 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy lean clay with mudstone gravel	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 104**	**Test Pit 105**		
MATERIAL DEPTH (mm)			2000+	0 - 400	400 - 700	700 - 2000
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy lean clay	Slightly moist reddish brown medium dense silty sand	Moist dark red brown firm sandy lean clay	Moist light brown firm sandy lean clay with mudstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 105**	**Test Pit 109**		
MATERIAL DEPTH (mm)			2000+	0 - 200	200 - 700	700 - 1100
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy lean clay with mudstone gravel	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay	Moist light brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 109**		**Test Pit 110**	
MATERIAL DEPTH (mm)			1100 - 2000	2000+	0 - 400	400 - 800
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 110**		**Test Pit 111**	
MATERIAL DEPTH (mm)			800 - 1500	1500+	0 - 500	500 - 700
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 111**		**Test Pit 112**	
MATERIAL DEPTH (mm)			700 - 1100	1100+	0 - 600	600 - 800
SAMPLE No. / LABORATORY No.					**AC17 / 016/3790**	**AC18 / 016/3791**
*** MATERIAL DESCRIPTION**			Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense clayey sand	Moist reddish grey firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)					**4.8**	**15.7**
*** UNIFIED SOIL CLASSIFICATION**					**SC**	**CL**
*** COLTO CLASSIFICATION**					**N/C**	**N/C**
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				100
		5,00 mm			100	99
		2,00 mm			97	95
		0,425 mm			94	91
		0,075 mm			35	50
		0,002 mm (A6)			17	35
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**			3	5
		FINE SAND (Coarse / Medium / Fine)			5/16/40	14/14/15
		SILT AND CLAY			36	53
*** GRADING MODULUS** (GM)					0.74	0.64
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)			-	39
		P.I (%) **/ L.S** (%)			SP / 1.3	16 / 7.7
*** POTENTIAL EXPANSIVENESS** (mm)					Low	Low
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					5.51 / 0.0054	5.23 / 0.0308
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m^3)			2034	1731
		OPTIMUM MOISTURE (%)			11.7	18.4
		COMPACTION MOISTURE (%)			11.9	18.5
		DRY DENSITY (kg/m^3)			1957	1731
		CBR (%)			17	4
		SWELL (%)			1.0	5.1
	NRB	**DRY DENSITY** (kg/m^3)			1888	1466
		CBR (%)			11	3
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m^3)			1746	1309
		OPTIMUM MOISTURE (%)			-	-
		CBR (%)			8	0
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**			22	4
		98%			19	4
		95%			15	3
		93%			13	3
		90%			10	3
COMPACTABILITY (SABS 0120, P3) (Ratio)					0.39	0.4

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			Test Pit 112		Test Pit 113	
MATERIAL DEPTH (mm)			800 - 1400	1400+	0 - 500	500 - 700
SAMPLE No. / LABORATORY No.			AC19 / 016/3792			
* MATERIAL DESCRIPTION			Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
* IN SITU MOISTURE CONTENT (GR20) (%)			4.6			
* UNIFIED SOIL CLASSIFICATION			GP-GC			
* COLTO CLASSIFICATION			G6			
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)						
* SIEVE ANALYSIS (GR1)		63,0 mm	91			
		50,0 mm	86			
		37,5 mm	79			
		28,0 mm	71			
		20,0 mm	63			
		14,0 mm	61			
		5,00 mm	41			
		2,00 mm	30			
		0,425 mm	20			
		0,075 mm	12			
		0,002 mm (A6)	2			
* SOIL-MORTAR (%) (PR5)		COARSE SAND	35			
		FINE SAND (Coarse / Medium / Fine)	8/8/10			
		SILT AND CLAY	38			
* GRADING MODULUS (GM)			2.38			
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)						
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)		L.L (%)	33			
		P.I (%) / L.S (%)	10 / 4.9			
* POTENTIAL EXPANSIVENESS (mm)			Low			
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})			5.59 / 0.0247			
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)						
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)	MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)	2014			
		OPTIMUM MOISTURE (%)	10.8			
		COMPACTION MOISTURE (%)	10.8			
		DRY DENSITY (kg/m³)	1956			
		CBR (%)	71			
		SWELL (%)	0.1			
	NRB	DRY DENSITY (kg/m³)	1876			
		CBR (%)	52			
	PROCTOR	MAXIMUM DRY DENSITY (kg/m³)	1799			
		OPTIMUM MOISTURE (%)	-			
		CBR (%)	39			
* CALIFORNIA BEARING RATIO (GR40)	CBR	100%	89			
		98%	77			
		95%	61			
		93%	52			
		90%	42			
COMPACTABILITY (SABS 0120, P3) (Ratio)			0.51			

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 113**		**Test Pit 114**	
MATERIAL DEPTH (mm)			700 - 1600	1600+	0 - 300	300 - 700
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		Test Pit 114		Test Pit 116	
MATERIAL DEPTH (mm)		700 - 1400	1400+	0 - 400	400 - 900
SAMPLE No. / LABORATORY No.					
* MATERIAL DESCRIPTION		Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist brown medium dense silty sand	Moist dark red firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
* IN SITU MOISTURE CONTENT (GR20) (%)					
* UNIFIED SOIL CLASSIFICATION					
* COLTO CLASSIFICATION					
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)					
* SIEVE ANALYSIS (GR1)	63,0 mm				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)	COARSE SAND				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
* GRADING MODULUS (GM)					
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)					
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)	L.L (%)				
	P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)					
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})					
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)					
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30) — MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	DRY DENSITY (kg/m³)				
	CBR (%)				
PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
* CALIFORNIA BEARING RATIO (GR40) — CBR	100%				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 116**			**Test Pit 117**
MATERIAL DEPTH (mm)			900 - 1700	1700 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 117**			**Test Pit 118**
MATERIAL DEPTH (mm)			400 - 600	600 - 2000	2000+	0 - 400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist light brown firm sandy lean clay	Moist light brown firm sandy lean clay with mudstone gravel	Moist light brown firm sandy lean clay with mudstone gravel	Slightly moist reddish brown medium dense silty sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 118**			
MATERIAL DEPTH (mm)			400 - 600	600 - 1700	1700 - 2000	2000+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Moist reddish brown grey firm sandy lean clay	Moist light brown firm sandy lean clay with mudstone gravel	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 120**			
MATERIAL DEPTH (mm)			0 - 300	300 - 700	700 - 1100	1100 - 1700
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay	Moist brown grey firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE	**Test Pit 120**	**Test Pit 121**		
MATERIAL DEPTH (mm)	1700+	0 - 400	400 - 600	600 - 800
SAMPLE No. / LABORATORY No.				
*** MATERIAL DESCRIPTION**	Reuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)				
*** IN SITU MOISTURE CONTENT (GR20)** (%)				
*** UNIFIED SOIL CLASSIFICATION**				
*** COLTO CLASSIFICATION**				
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**				
*** SIEVE ANALYSIS (GR1)** **63,0 mm**				
50,0 mm				
37,5 mm				
28,0 mm				
20,0 mm				
14,0 mm				
5,00 mm				
2,00 mm				
0,425 mm				
0,075 mm				
0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)** **COARSE SAND**				
FINE SAND (Coarse / Medium / Fine)				
SILT AND CLAY				
*** GRADING MODULUS** (GM)				
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**				
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm) **L.L** (%)				
P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)				
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})				
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**				
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** **MOD AASTHO** **MAXIMUM DRY DENSITY** (kg/m³)				
OPTIMUM MOISTURE (%)				
COMPACTION MOISTURE (%)				
DRY DENSITY (kg/m³)				
CBR (%)				
SWELL (%)				
NRB **DRY DENSITY** (kg/m³)				
CBR (%)				
PROCTOR **MAXIMUM DRY DENSITY** (kg/m³)				
OPTIMUM MOISTURE (%)				
CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** **CBR** **100%**				
98%				
95%				
93%				
90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)				

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 121**	**Test Pit 122**		
MATERIAL DEPTH (mm)			800+	0 - 500	500 - 600	600 - 900
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish grey firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 122**	**Test Pit 124**		
MATERIAL DEPTH (mm)			900+	0 - 400	400 - 800	800 - 1800
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 124**	**Test Pit 126**		
MATERIAL DEPTH (mm)			1800+	0 - 400	400 - 900	900 - 1400
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 126**	**Test Pit 128**		
MATERIAL DEPTH (mm)		1400+	0 - 600	600 - 900	900 - 1200
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay	Moist light brown clayey sandstone gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		Test Pit 128		Test Pit 129	
MATERIAL DEPTH (mm)		1200 - 1500	1500+	0 - 200	200 - 700
SAMPLE No. / LABORATORY No.					
* MATERIAL DESCRIPTION		Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand with weathered dolerite gravel	Moist reddish grey firm sandy lean clay with weathered dolerite gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
* IN SITU MOISTURE CONTENT (GR20) (%)					
* UNIFIED SOIL CLASSIFICATION					
* COLTO CLASSIFICATION					
* WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011) * COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011) * THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)					
* SIEVE ANALYSIS (GR1)	63,0 mm				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
* SOIL-MORTAR (%) (PR5)	COARSE SAND				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
* GRADING MODULUS (GM)					
* DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011) * DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20) * TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)					
* ATTERBERG LIMITS (GR10) (Material Passing 0,425mm)	L.L (%)				
	P.I (%) / L.S (%)				
* POTENTIAL EXPANSIVENESS (mm)					
* pH (A20) (Value) / * EC (A21T) (S/m^{-1})					
* DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010) * DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010) * THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)					
* MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30) – MOD AASTHO	MAXIMUM DRY DENSITY (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	DRY DENSITY (kg/m³)				
	CBR (%)				
PROCTOR	MAXIMUM DRY DENSITY (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
* CALIFORNIA BEARING RATIO (GR40) – CBR	100%				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 129**		**Test Pit 130**	
MATERIAL DEPTH (mm)			700 - 800	800+	0 - 400	400 - 800
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist light brown dense clayey weathered dolerite gravel	Refuse - Hard weathered dolerite	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**					
	50,0 mm					
	37,5 mm					
	28,0 mm					
	20,0 mm					
	14,0 mm					
	5,00 mm					
	2,00 mm					
	0,425 mm					
	0,075 mm					
	0,002 mm (A6)					
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**					
	FINE SAND (Coarse / Medium / Fine)					
	SILT AND CLAY					
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)					
	P.I (%) **/ L.S** (%)					
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 130**		**Test Pit 131**	
MATERIAL DEPTH (mm)			800 - 1500	1500+	0 - 300	300 - 600
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**					
	50,0 mm					
	37,5 mm					
	28,0 mm					
	20,0 mm					
	14,0 mm					
	5,00 mm					
	2,00 mm					
	0,425 mm					
	0,075 mm					
	0,002 mm (A6)					
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**					
	FINE SAND (Coarse / Medium / Fine)					
	SILT AND CLAY					
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)					
	P.I (%) **/ L.S** (%)					
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 131**		**Test Pit 132**	
MATERIAL DEPTH (mm)			600 - 800	800+	0 - 200	200 - 700
SAMPLE No. / LABORATORY No.					**AC04 / 016/3776**	**AC05 / 016/3777**
*** MATERIAL DESCRIPTION**			Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone	Slightly moist reddish brown medium dense sandy silty clay	Slightly moist reddish grey brown firm sandy lean clay
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)					3.8	5.7
*** UNIFIED SOIL CLASSIFICATION**					**CL-ML**	**CL**
*** COLTO CLASSIFICATION**					**N/C**	**N/C**
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm			100	100
		2,00 mm			99	99
		0,425 mm			97	92
		0,075 mm			51	52
		0,002 mm (A6)			21	33
*** SOIL-MORTAR (PR5)** (%)		**COARSE SAND**			3	7
		FINE SAND (Coarse / Medium / Fine)			11/15/20	12/14/14
		SILT AND CLAY			52	53
*** GRADING MODULUS** (GM)					0.53	0.58
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)			24	31
		P.I (%) **/ L.S** (%)			6 / 3.5	10 / 5.1
*** POTENTIAL EXPANSIVENESS** (mm)					Low	Low
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					6.48 / 0.0508	6.32 / 0.778
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)			1838	1797
		OPTIMUM MOISTURE (%)			13.0	14.1
		COMPACTION MOISTURE (%)			13.0	14.3
		DRY DENSITY (kg/m³)			1838	1797
		CBR (%)			10	5
		SWELL (%)			3.6	3.5
	NRB	**DRY DENSITY** (kg/m³)			1683	1676
		CBR (%)			7	4
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)			1352	1574
		OPTIMUM MOISTURE (%)			-	-
		CBR (%)			5	3
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**			10	5
		98%			9	5
		95%			8	4
		93%			7	4
		90%			6	3
COMPACTABILITY (SABS 0120, P3) (Ratio)					0.4	0.4

MATERIALS ANALYSIS

		Test Pit 132		Test Pit 133	
TEST PIT No. / CHAINAGE		**Test Pit 132**		**Test Pit 133**	
MATERIAL DEPTH (mm)		700 - 1100	1100+	0 - 600	600 - 2000
SAMPLE No. / LABORATORY No.		**AC06 / 016/3778**			
*** MATERIAL DESCRIPTION**		Slightly moist light brown dense clayey mudstone gravel with sand	Refuse - Hard sandstone	Slightly moist reddish brown medium dense silty sand	Slightly moist reddish brown medium dense clayey sand with weathered dolerite gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)		5.2			
*** UNIFIED SOIL CLASSIFICATION**		**GC**			
*** COLTO CLASSIFICATION**		**G9**			
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**	73			
	50,0 mm	67			
	37,5 mm	58			
	28,0 mm	53			
	20,0 mm	46			
	14,0 mm	39			
	5,00 mm	32			
	2,00 mm	31			
	0,425 mm	26			
	0,075 mm	14			
	0,002 mm (A6)	1			
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**	15			
	FINE SAND (Coarse / Medium / Fine)	12/11/17			
	SILT AND CLAY	45			
*** GRADING MODULUS** (GM)		2.29			
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)	34			
	P.I (%) **/ L.S** (%)	14 / 6.5			
*** POTENTIAL EXPANSIVENESS** (mm)		Low			
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})		6.86 / 0.992			
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** – **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)	1945			
	OPTIMUM MOISTURE (%)	10.2			
	COMPACTION MOISTURE (%)	10.1			
	DRY DENSITY (kg/m³)	1945			
	CBR (%)	20			
	SWELL (%)	3.4			
NRB	**DRY DENSITY** (kg/m³)	1801			
	CBR (%)	8			
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)	1662			
	OPTIMUM MOISTURE (%)	-			
	CBR (%)	3			
*** CALIFORNIA BEARING RATIO (GR40)** – **CBR**	**100%**	20			
	98%	15			
	95%	10			
	93%	8			
	90%	6			
COMPACTABILITY (SABS 0120, P3) (Ratio)		0.42			

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 133**	**Test Pit 135**		
MATERIAL DEPTH (mm)			2000+	0 - 300	300 - 400	400+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense clayey sand with weathered dolerite gravel	Slightly moist reddish brown medium dense silty sand with weathered dolerite gravel	Slightly moist reddish brown dense weathered dolerite gravel	Refuse - Hard dolerite
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR (%) (PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE			**Test Pit 136**			
MATERIAL DEPTH (mm)			0 - 400	400 - 600	600 - 1300	1300+
SAMPLE No. / LABORATORY No.						
*** MATERIAL DESCRIPTION**			Slightly moist reddish brown medium dense silty sand	Moist reddish brown grey firm sandy lean clay	Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)						
*** IN SITU MOISTURE CONTENT (GR20)** (%)						
*** UNIFIED SOIL CLASSIFICATION**						
*** COLTO CLASSIFICATION**						
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**						
*** SIEVE ANALYSIS (GR1)**		**63,0 mm**				
		50,0 mm				
		37,5 mm				
		28,0 mm				
		20,0 mm				
		14,0 mm				
		5,00 mm				
		2,00 mm				
		0,425 mm				
		0,075 mm				
		0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**		**COARSE SAND**				
		FINE SAND (Coarse / Medium / Fine)				
		SILT AND CLAY				
*** GRADING MODULUS** (GM)						
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**						
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)		**L.L** (%)				
		P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)						
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})						
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**						
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)**	**MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		COMPACTION MOISTURE (%)				
		DRY DENSITY (kg/m³)				
		CBR (%)				
		SWELL (%)				
	NRB	**DRY DENSITY** (kg/m³)				
		CBR (%)				
	PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
		OPTIMUM MOISTURE (%)				
		CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)**	**CBR**	**100%**				
		98%				
		95%				
		93%				
		90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)						

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 137**			
MATERIAL DEPTH (mm)		0 - 600	600 - 900	900 - 2000	2000+
SAMPLE No. / LABORATORY No.					
*** MATERIAL DESCRIPTION**		Slightly moist reddish brown medium dense clayey sand	Moist reddish brown grey firm sandy lean clay	Moist light brown dense clayey weathered dolerite gravel	Moist light brown dense clayey weathered dolerite gravel
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)					
*** UNIFIED SOIL CLASSIFICATION**					
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**				
	50,0 mm				
	37,5 mm				
	28,0 mm				
	20,0 mm				
	14,0 mm				
	5,00 mm				
	2,00 mm				
	0,425 mm				
	0,075 mm				
	0,002 mm (A6)				
*** SOIL-MORTAR** (%) **(PR5)**	**COARSE SAND**				
	FINE SAND (Coarse / Medium / Fine)				
	SILT AND CLAY				
*** GRADING MODULUS** (GM)					
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)				
	P.I (%) **/ L.S** (%)				
*** POTENTIAL EXPANSIVENESS** (mm)					
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASTHO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

MATERIALS ANALYSIS

TEST PIT No. / CHAINAGE		**Test Pit 139**			
MATERIAL DEPTH (mm)		0 - 500	500 - 1200	1200 - 1700	1700+
SAMPLE No. / LABORATORY No.		**AC01 / 016/3773**	**AC02 / 016/3774**	**AC03 / 016/3775**	
*** MATERIAL DESCRIPTION**		Slightly moist reddish brown medium dense silty, clayey sand	Slightly moist reddish grey brown firm sandy lean clay	Slightly moist grey dense poorly graded mudstone gravel with clay	Refuse - Hard mudstone
DETERMINATION OF THE MOISTURE CONTENT BY OVEN-DRYING (SANS 3001-GR20:2010)					
*** IN SITU MOISTURE CONTENT (GR20)** (%)		5.1	7.1	5.2	
*** UNIFIED SOIL CLASSIFICATION**		**SC-SM**	**CL**	**GP-GC**	
*** COLTO CLASSIFICATION**					
*** WET PREPARATION AND PARTICLE SIZE ANALYSIS (SANS 3001-GR1:2011)** *** COMPUTATION OF SOIL-MORTAR PERCENTAGES & GRADING MODULUS (SANS 3001-PR5:2011)** *** THE DETERMINATION OF THE GRAIN SIZE DISTRIBUTION IN SOILS BY MEANS OF A HYDROMETER (TMH1:1986, Method A6)**					
*** SIEVE ANALYSIS (GR1)**	**63,0 mm**			94	
	50,0 mm			92	
	37,5 mm			87	
	28,0 mm			76	
	20,0 mm			62	
	14,0 mm			40	
	5,00 mm	100	100	18	
	2,00 mm	98	99	12	
	0,425 mm	96	97	9	
	0,075 mm	47	59	7	
	0,002 mm (A6)	23	37	3	
*** SOIL-MORTAR (PR5)** (%)	**COARSE SAND**	2	3	20	
	FINE SAND (Coarse / Medium / Fine)	4/13/33	4/10/29	3/6/15	
	SILT AND CLAY	48	59	56	
*** GRADING MODULUS** (GM)		0.59	0.46	2.72	
*** DETERMINATION OF THE ONE-POINT LIQUID LIMIT, PLASTIC LIMIT, PLASTICITY INDEX AND LINEAR SHRINKAGE (SANS 3001-GR10:2011)** *** DETERMINATION OF THE pH VALUE OF A SOIL SUSPENSION (TMH1:1986, Method A20)** *** TENTATIVE METHOD FOR THE DETERMINATION OF THE ELECTRICAL CONDUCTIVITY OF A SATURATED SOIL PASTE AND WATER (TMH1:1986, Method A21T)**					
*** ATTERBERG LIMITS (GR10)** (Material Passing 0,425mm)	**L.L** (%)	22	38	38	
	P.I (%) **/ L.S** (%)	6 / 3.2	17 / 7.6	16 / 7.2	
*** POTENTIAL EXPANSIVENESS** (mm)		Low	Low	Low	
*** pH (A20)** (Value) **/ * EC (A21T)** (S/m^{-1})					
*** DETERMINATION OF THE MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT (SANS 3001-GR30:2010)** *** DETERMINATION OF THE CALIFORNIA BEARING RATIO (SANS 3001-GR40:2010)** *** THE EXTENT TO WHICH A PARTICULAR MATERIAL WILL COMPACT (SABS 0120, Part 3)**					
*** MAXIMUM DRY DENSITY & OPTIMUM MOISTURE CONTENT (GR30)** — **MOD AASHTO**	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	COMPACTION MOISTURE (%)				
	DRY DENSITY (kg/m³)				
	CBR (%)				
	SWELL (%)				
NRB	**DRY DENSITY** (kg/m³)				
	CBR (%)				
PROCTOR	**MAXIMUM DRY DENSITY** (kg/m³)				
	OPTIMUM MOISTURE (%)				
	CBR (%)				
*** CALIFORNIA BEARING RATIO (GR40)** — **CBR**	**100%**				
	98%				
	95%				
	93%				
	90%				
COMPACTABILITY (SABS 0120, P3) (Ratio)					

APPENDIX D

*PARTICLE SIZE DISTRIBUTION

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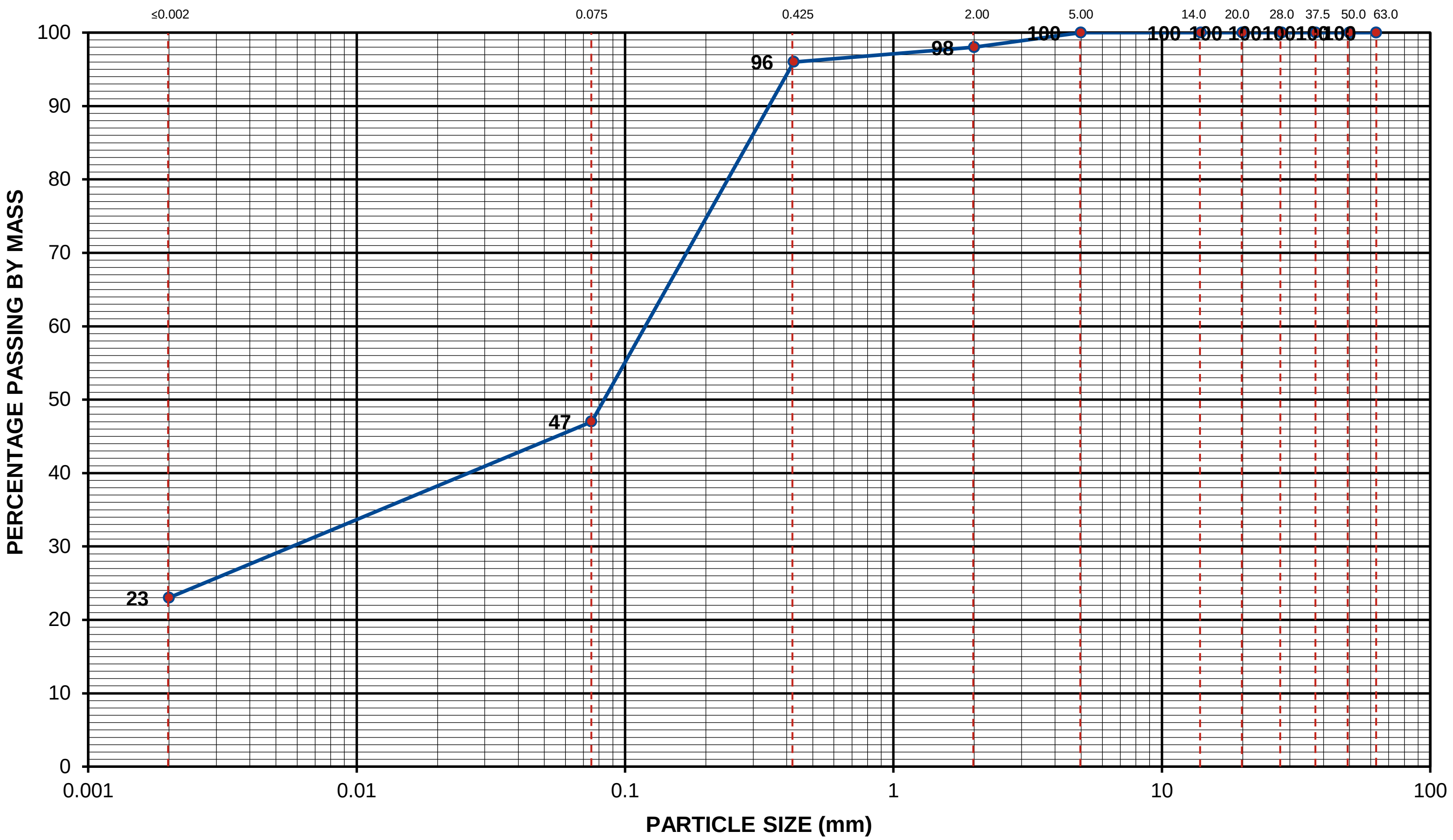

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
23%	24%			51%			2%			-

HOLE No. : Test Pit 139 **DEPTH :** 0 - 500mm **SAMPLE No. :** AC01

MATERIAL DESCRIPTION : (SC-SM) Slightly moist reddish brown medium dense silty, clayey sand

ATTERBERG LIMITS : 22 / 6 / 3.2 (GM: 0.59) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 1 of 51

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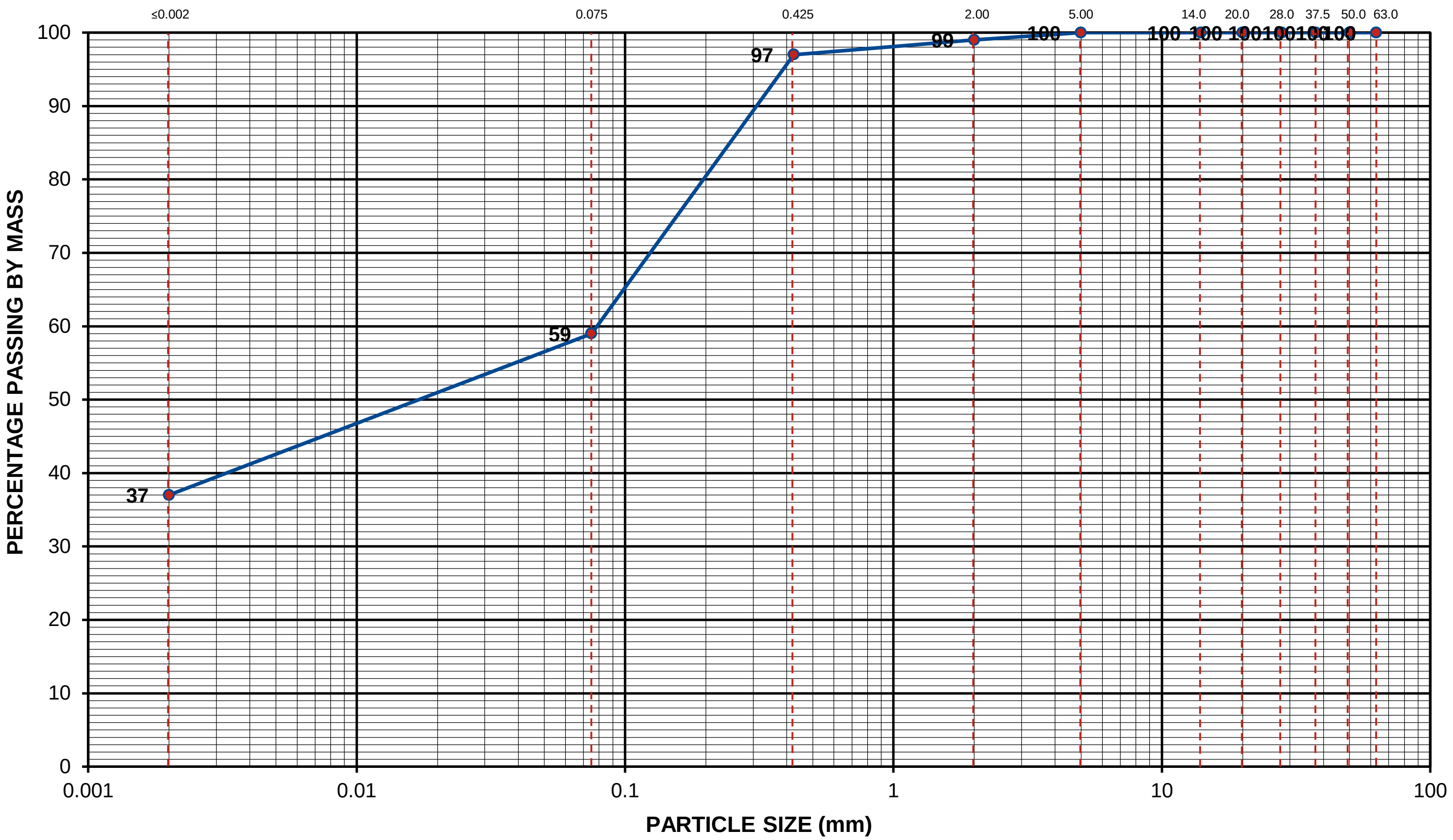

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
37%	22%			40%			1%			-

HOLE No. : Test Pit 139	**DEPTH :** 500 - 1200mm	**SAMPLE No. :** AC02

MATERIAL DESCRIPTION : (CL) Slightly moist reddish grey brown firm sandy lean clay

ATTERBERG LIMITS : 38 / 17 / 7.6 (GM: 0.46)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 2 of 51

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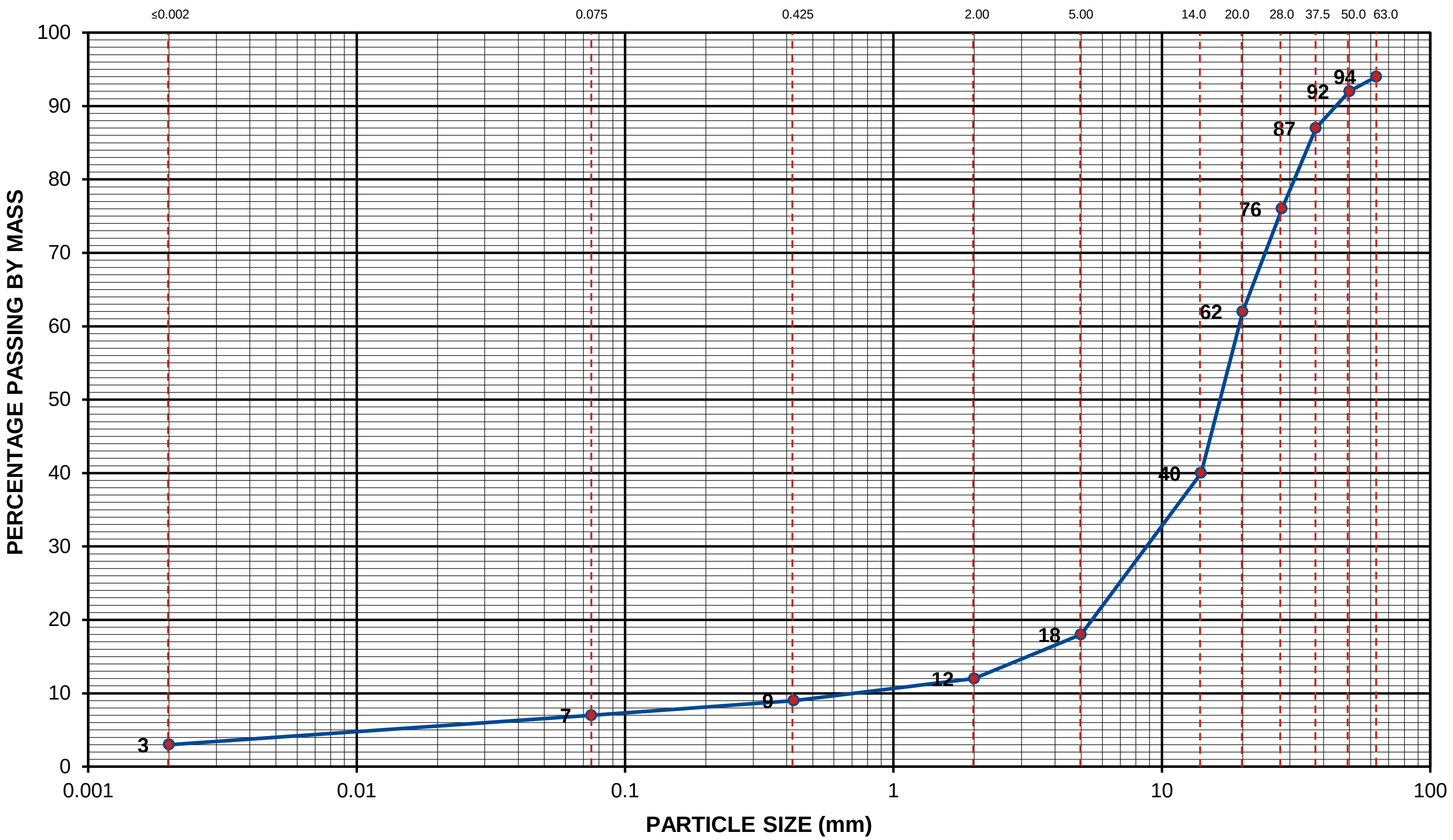

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
3%	4%			5%			82%			6%

HOLE No. : Test Pit 139 **DEPTH :** 1200 - 1700mm **SAMPLE No. :** AC03

MATERIAL DESCRIPTION : (GP-GC) Slightly moist grey dense poorly graded mudstone gravel with clay

ATTERBERG LIMITS : 38 / 16 / 7.2 (GM: 2.72) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 3 of 51

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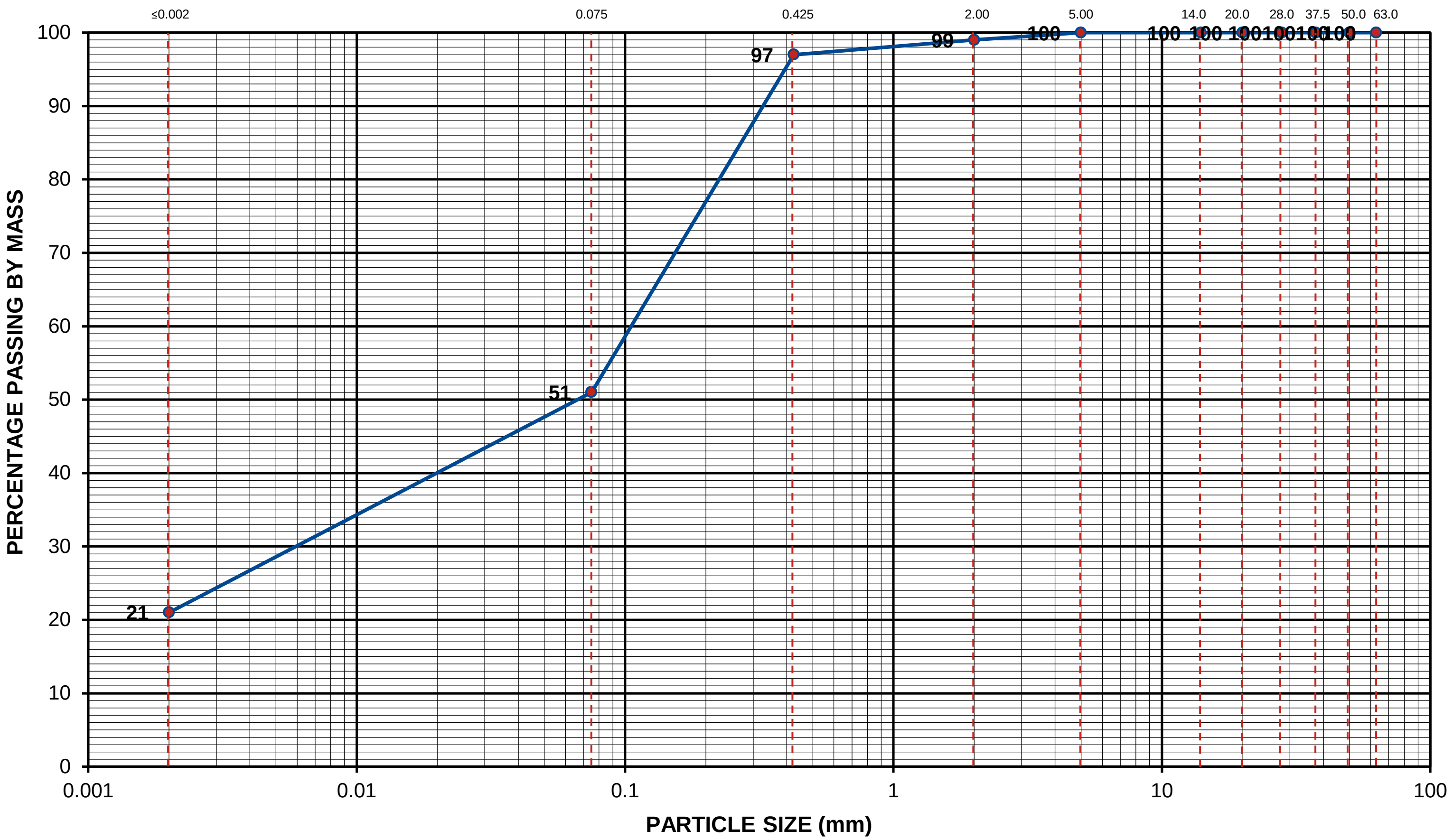

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
21%	30%			48%			1%			-

HOLE No. : Test Pit 132 **DEPTH :** 0 - 200mm **SAMPLE No. :** AC04

MATERIAL DESCRIPTION : (CL-ML) Slightly moist reddish brown medium dense sandy silty clay

ATTERBERG LIMITS : 24 / 6 / 3.5 (GM: 0.53) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 4 of 51

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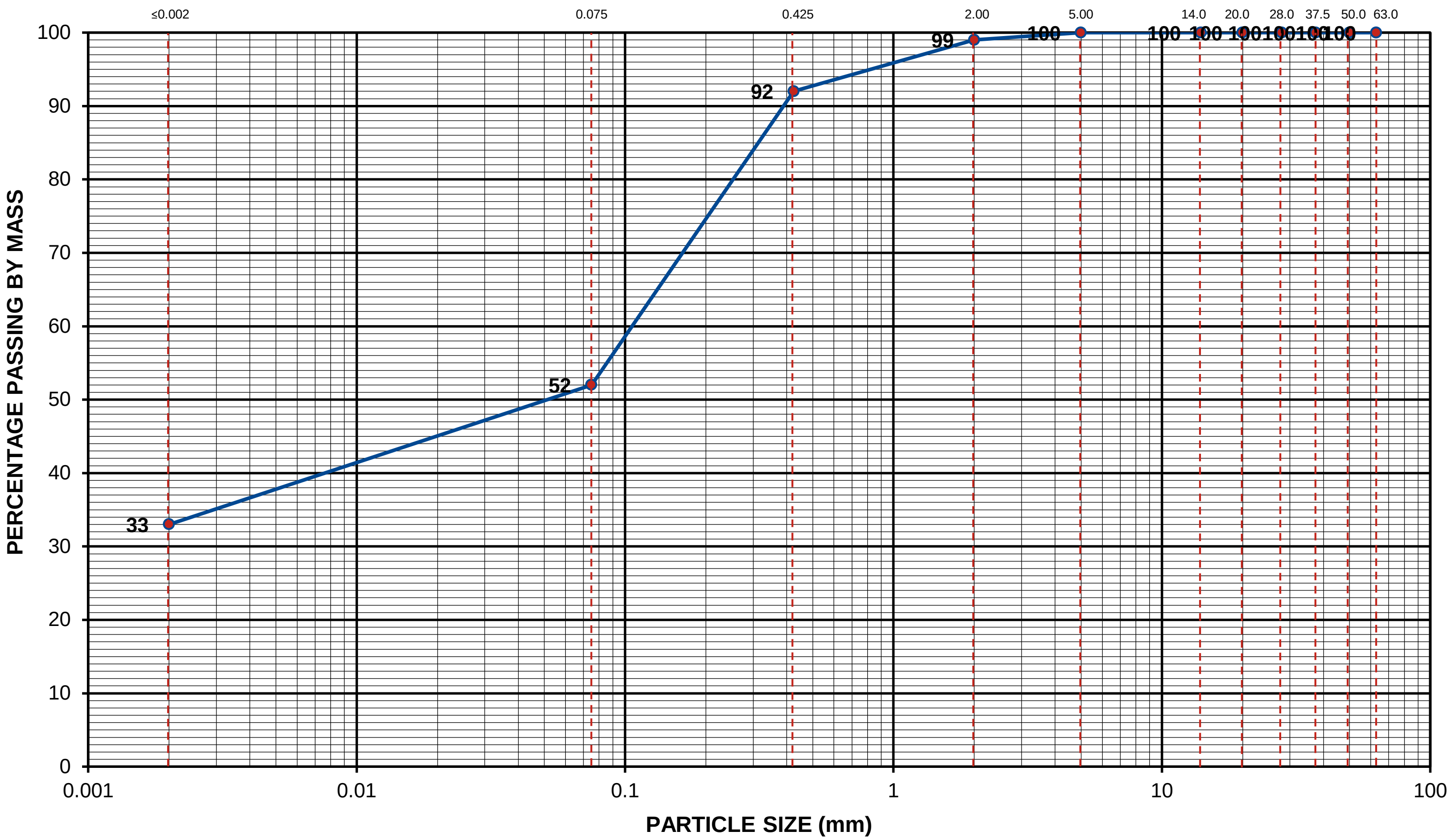

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
33%	19%			47%			1%			-

HOLE No. : Test Pit 132 **DEPTH :** 200 - 700mm **SAMPLE No. :** AC05

MATERIAL DESCRIPTION : (CL) Slightly moist reddish grey brown firm sandy lean clay

ATTERBERG LIMITS : 31 / 10 / 5.1 (GM: 0.58) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 5 of 51

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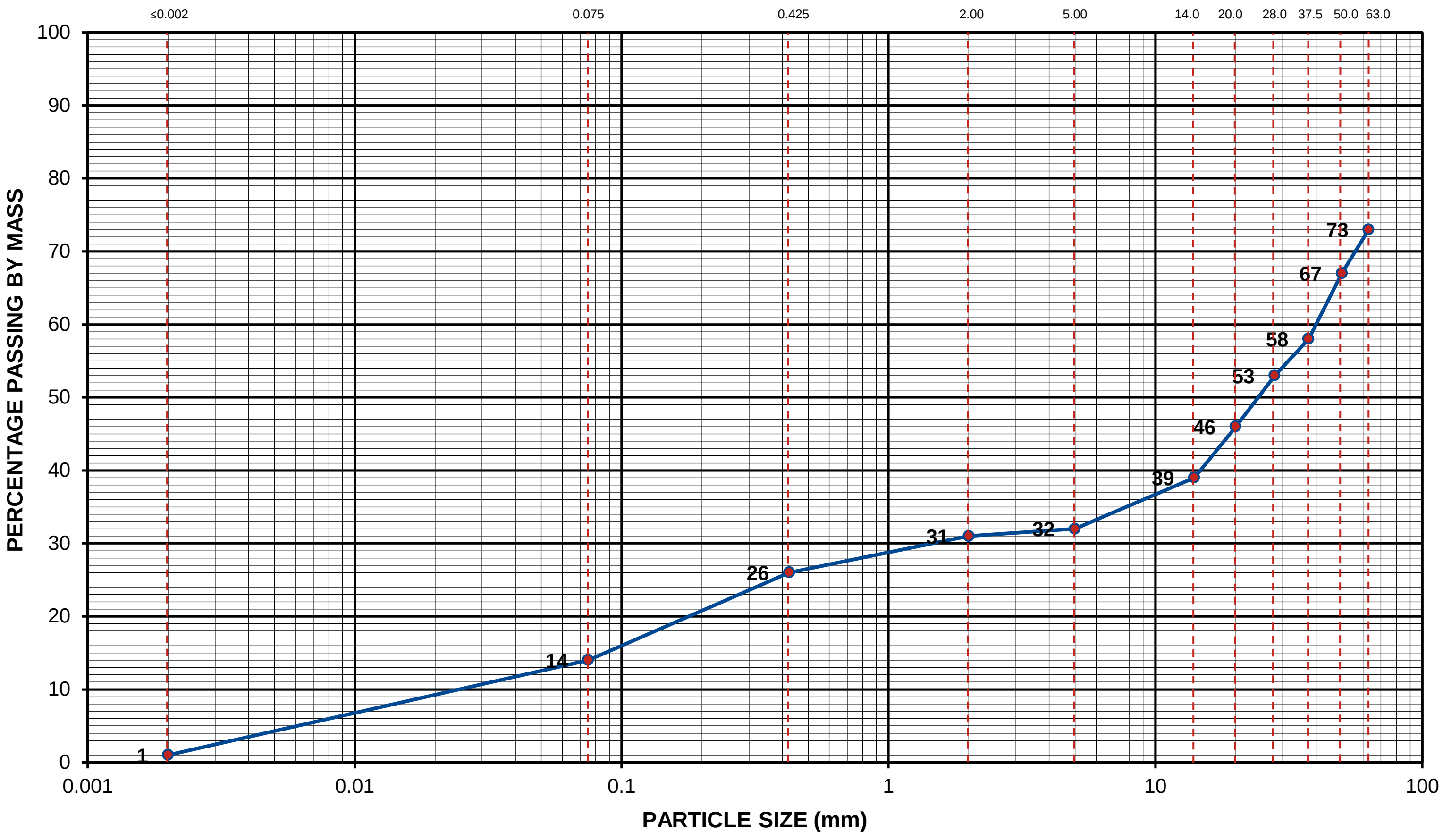

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
1%	13%			17%			42%			27%

HOLE No. : Test Pit 132 **DEPTH :** 700 - 1100mm **SAMPLE No. :** AC06

MATERIAL DESCRIPTION : (GC) Slightly moist light brown dense clayey mudstone gravel with sand

ATTERBERG LIMITS : 34 / 14 / 6.5 (GM: 2.29) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 6 of 51

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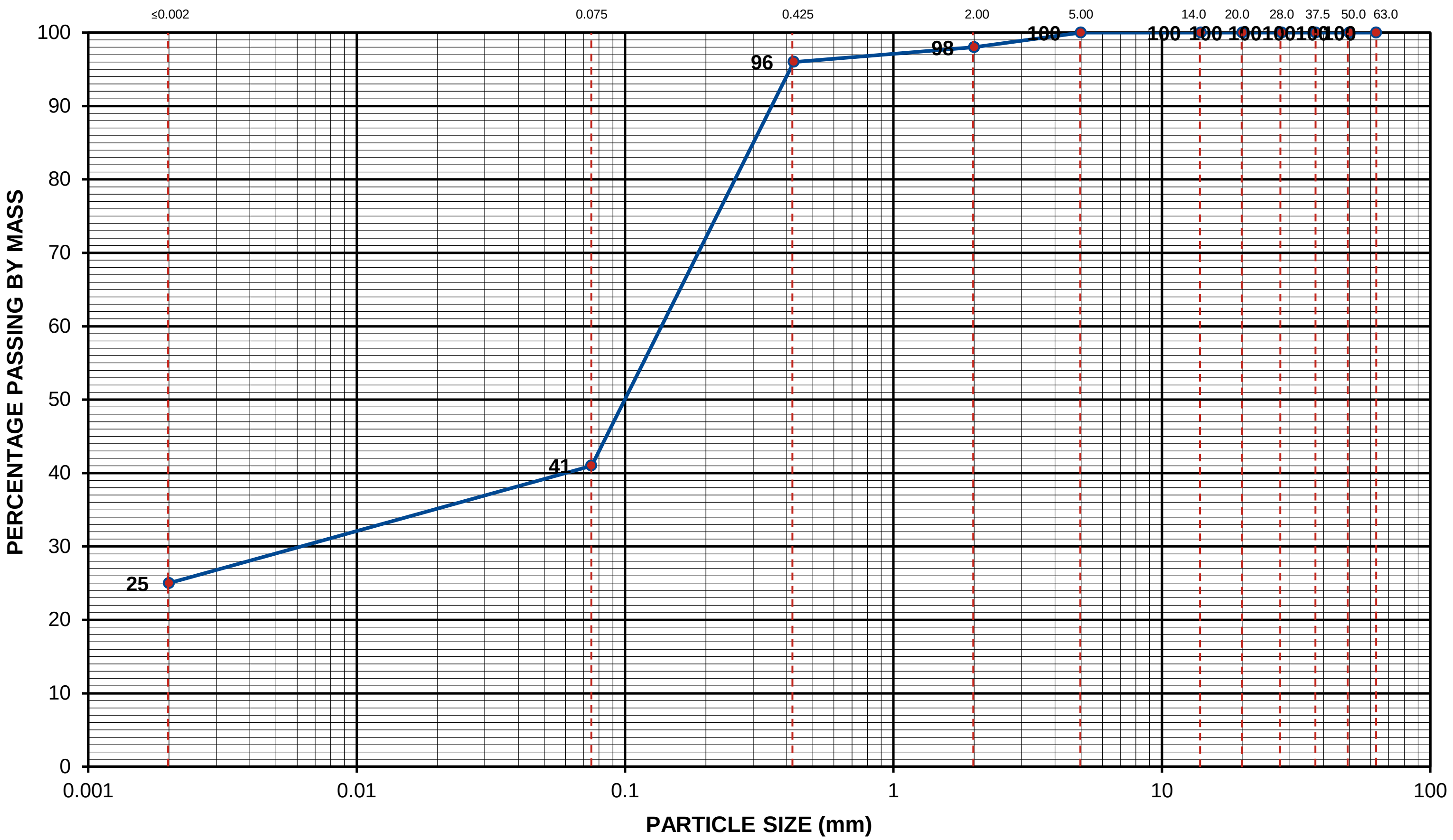

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
25%	16%			57%			2%			-

HOLE No. : Test Pit 94 **DEPTH :** 0 - 600mm **SAMPLE No. :** AC 07

MATERIAL DESCRIPTION : (SM) Slightly moist reddish brown medium dense silty sand

ATTERBERG LIMITS : 32 / 8 / 3.8 (GM: 0.65) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 7 of 51

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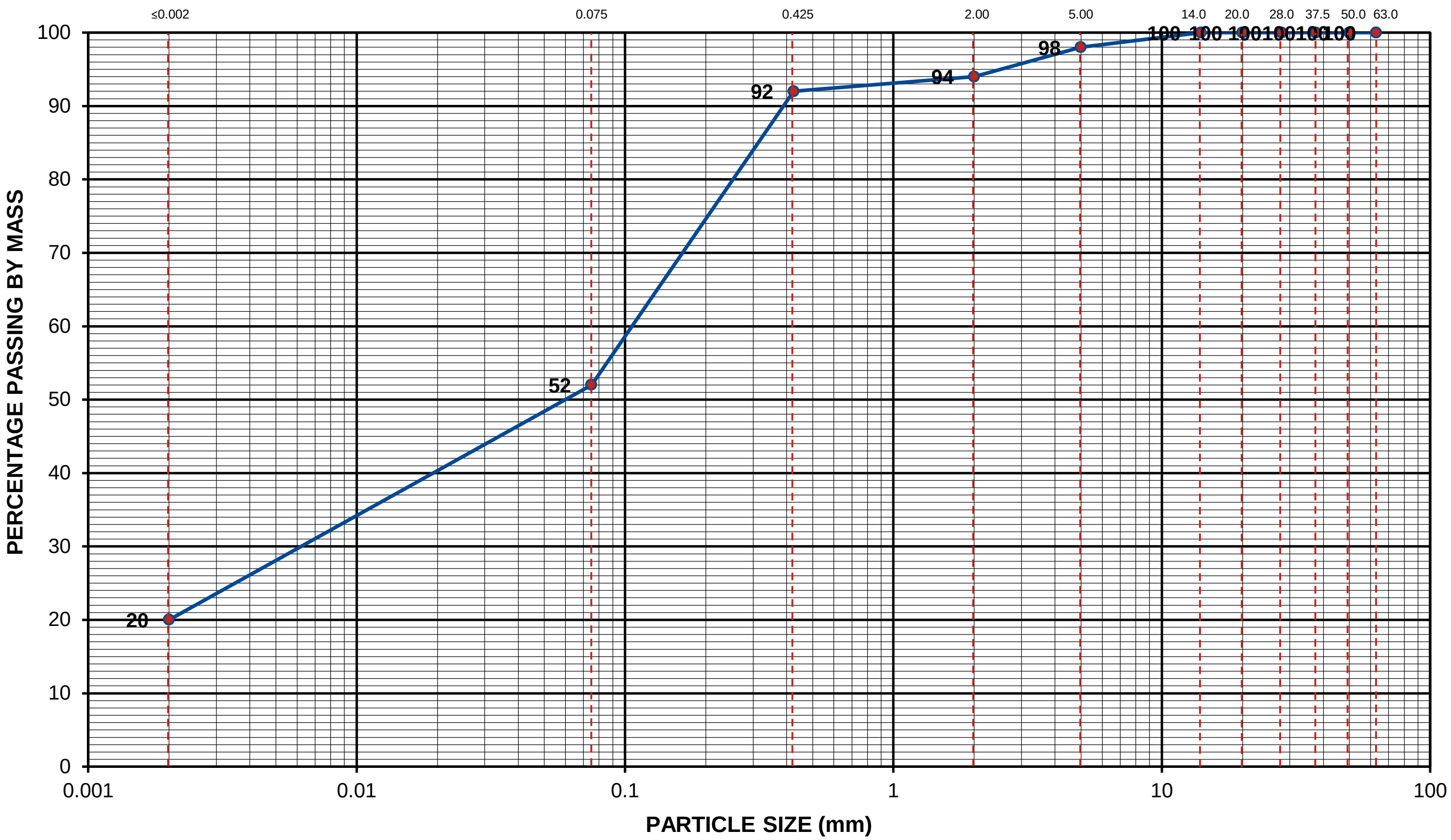

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY 20%	**SILT** 32%			**SAND** 42%			**GRAVEL** 6%			**COBBLE** -

HOLE No. : Test Pit 94	**DEPTH :** 600 - 1000mm	**SAMPLE No. :** AC08

MATERIAL DESCRIPTION : (CL) Slightly moist reddish grey brown firm sandy lean clay

ATTERBERG LIMITS : 35 / 15 / 6.9 (GM: 0.62)	**POTENTIAL EXPANSIVENESS :** Medium - 6.1mm	**PAGE No. :** 8 of 51

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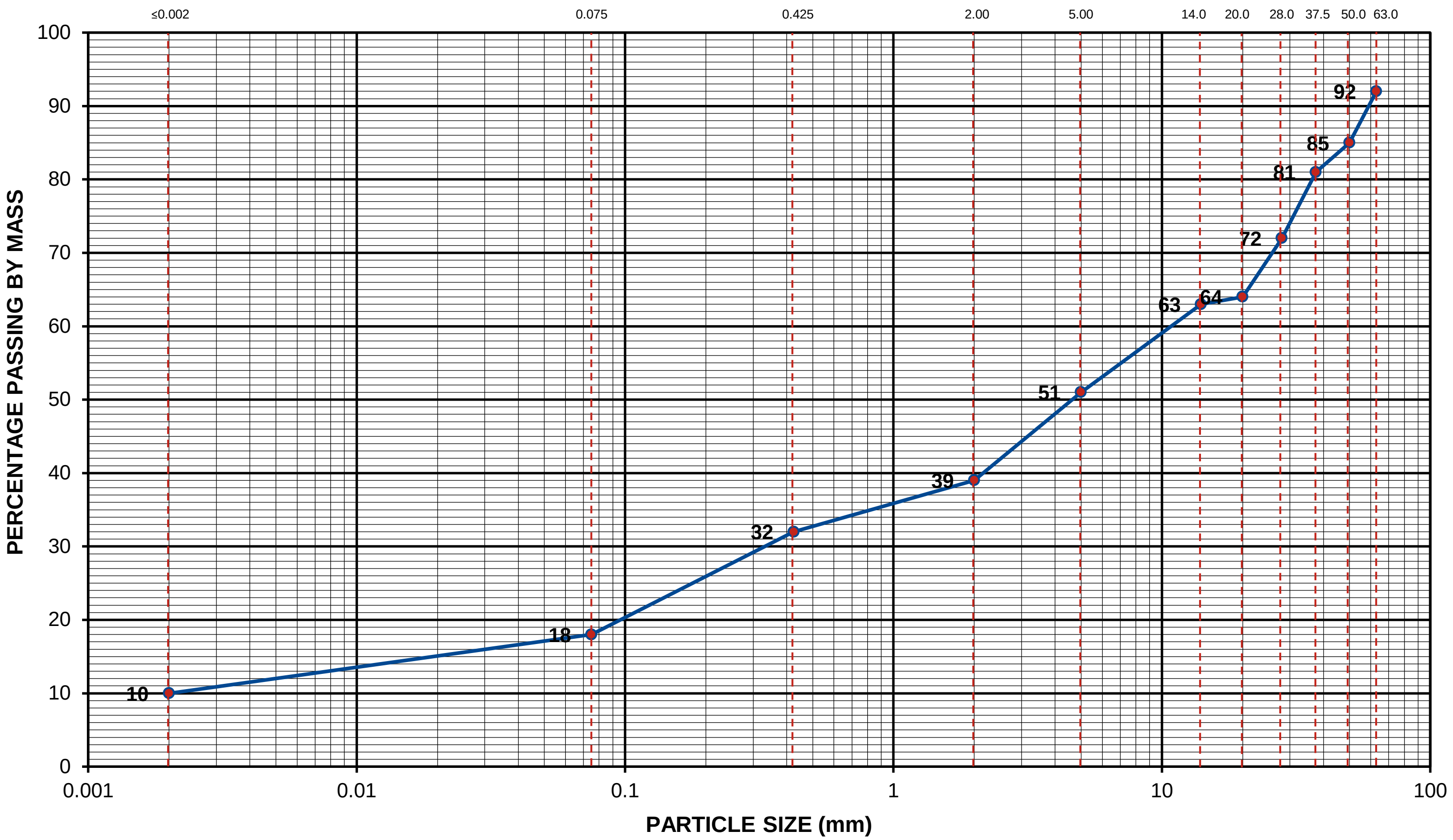

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
10%	8%			21%			53%			8%

HOLE No. : Test Pit 94 **DEPTH :** 1000 - 1300mm **SAMPLE No. :** AC09

MATERIAL DESCRIPTION : (CL) Slightly moist light brown dense clayey sand with mudstone gravel

ATTERBERG LIMITS : 36 / 15 / 7.4 (GM: 2.11) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 9 of 51

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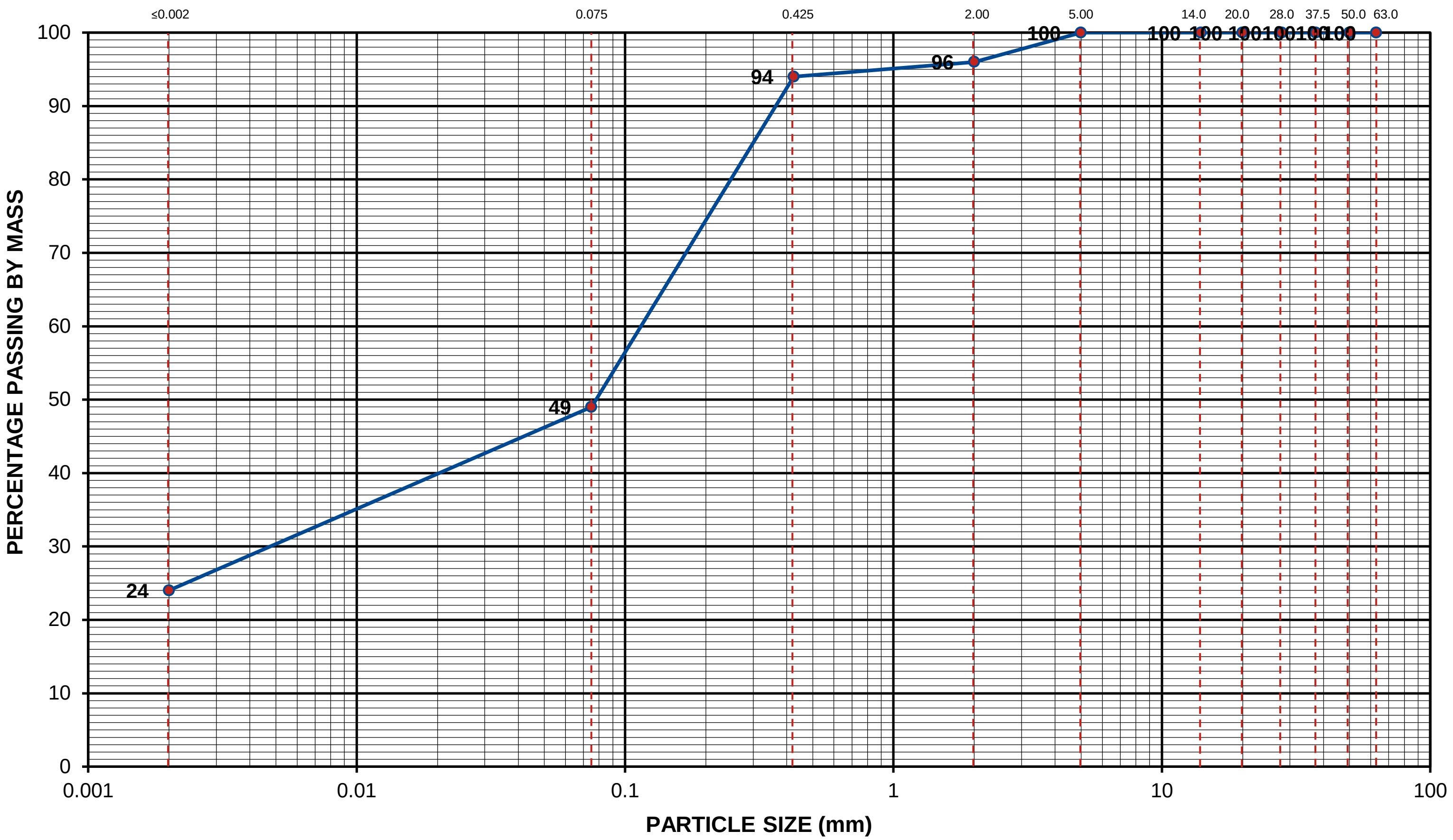

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
24%	25%			47%			4%			-

HOLE No. : Test Pit 96
DEPTH : 0 - 400mm
SAMPLE No. : AC10
MATERIAL DESCRIPTION : (SC) Slightly moist reddish brown medium dense clayey sand
ATTERBERG LIMITS : 25 / 8 / 3.8 (GM: 0.61)
POTENTIAL EXPANSIVENESS : Low
PAGE No. : 10 of 51

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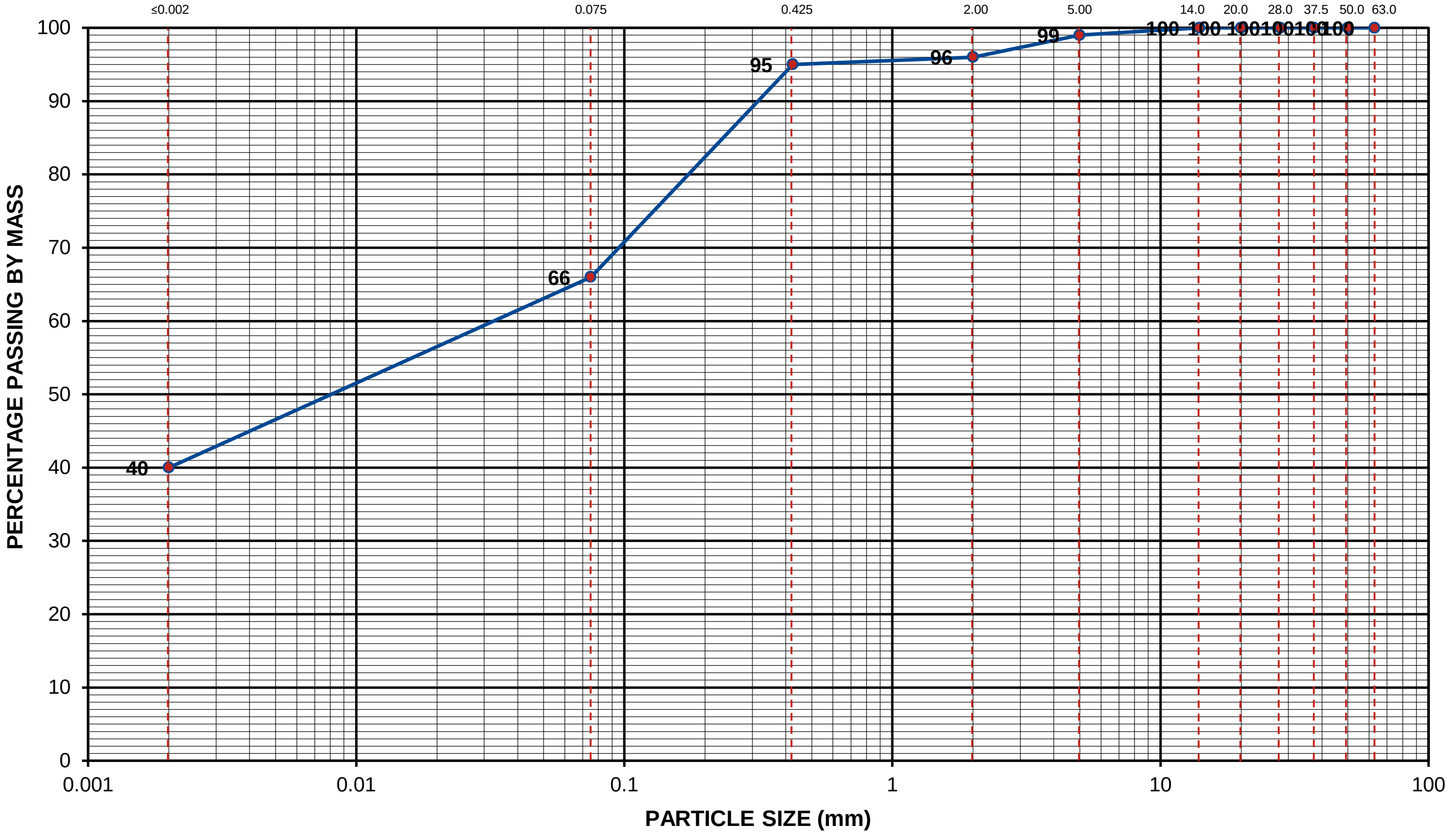

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
40%	26%			30%			4%			-

HOLE No. : Test Pit 96 **DEPTH :** 400 - 700mm **SAMPLE No. :** AC11

MATERIAL DESCRIPTION : (CL) Moist reddish grey firm sandy lean clay

ATTERBERG LIMITS : 40 / 17 / 8.0 (GM: 0.43) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 11 of 51

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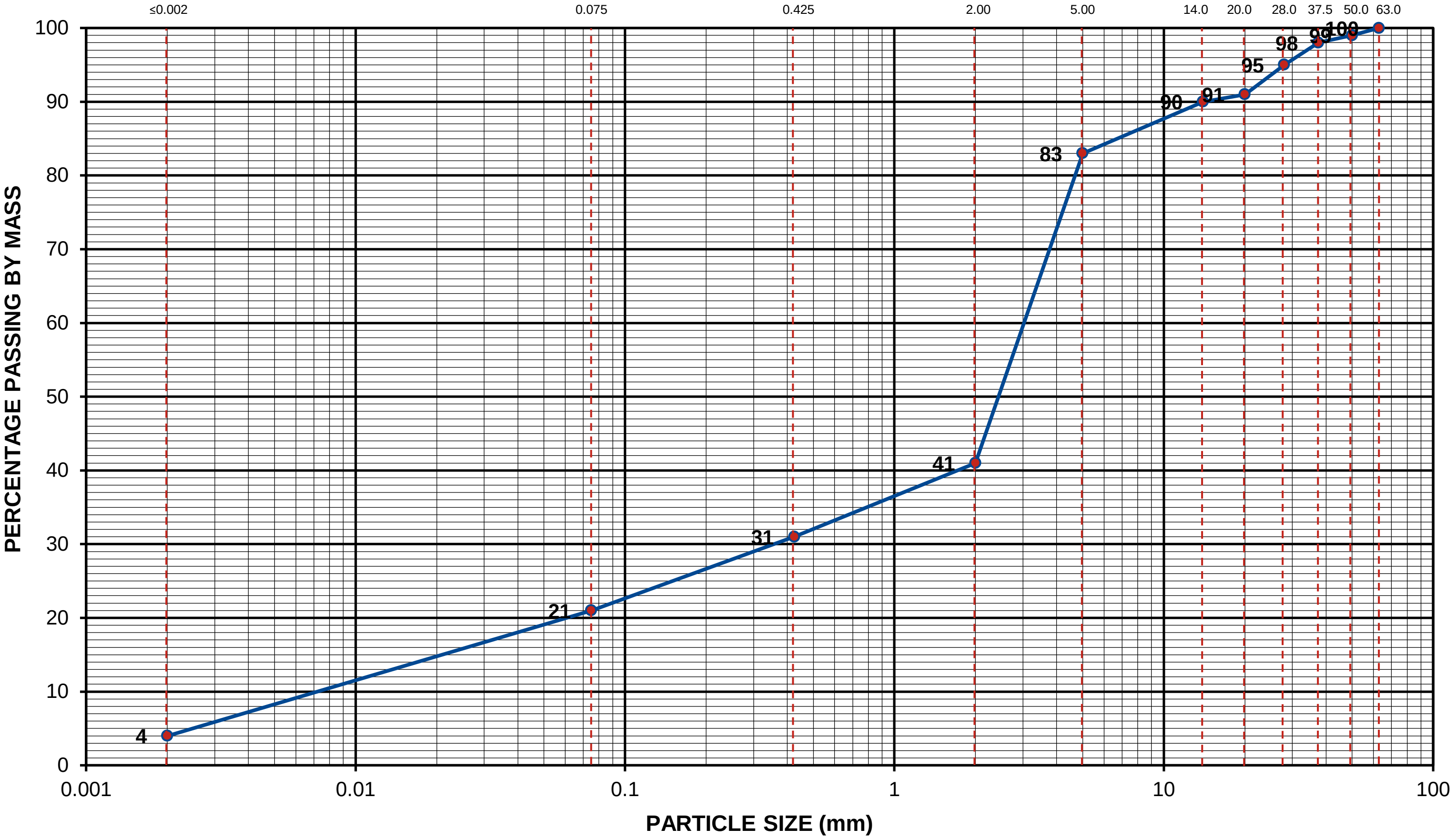

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY 4%	**SILT** 17%			**SAND** 20%			**GRAVEL** 59%			**COBBLE** -

HOLE No. : Test Pit 96

DEPTH : 700 - 2000mm

SAMPLE No. : AC12

MATERIAL DESCRIPTION : (CL) Moist reddish grey firm sandy lean clay

ATTERBERG LIMITS : 38 / 14 / 7.3 (GM: 2.07)

POTENTIAL EXPANSIVENESS : Low

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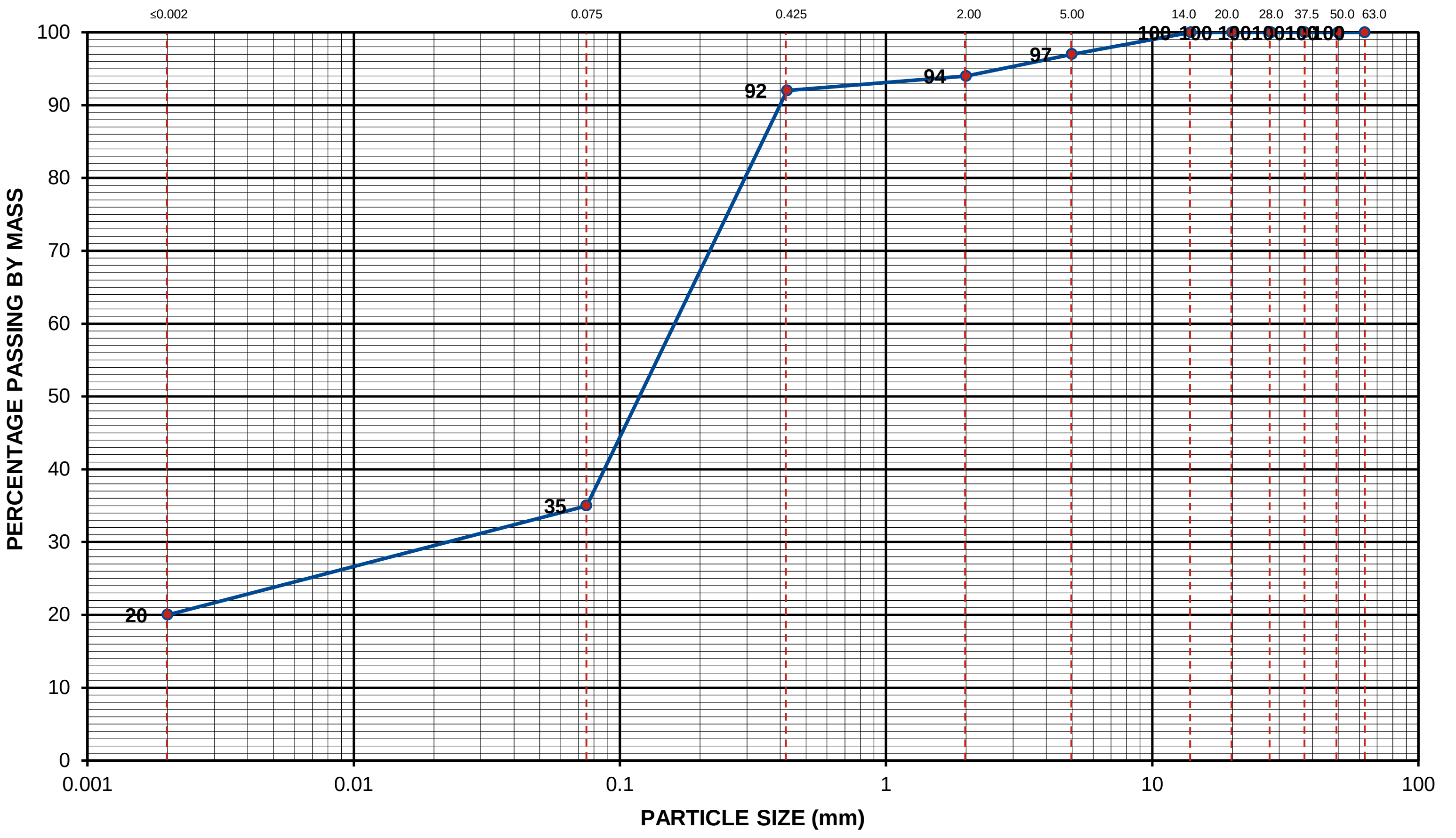

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
20%	15%			59%			6%			-

HOLE No. : Test Pit 98 **DEPTH :** 0 - 500mm **SAMPLE No. :** AC14

MATERIAL DESCRIPTION : (SC) Slightly moist reddish brown mediem dense clayey sand

ATTERBERG LIMITS : 29 / 8 / 4.0 (GM: 0.79) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 13 of 51

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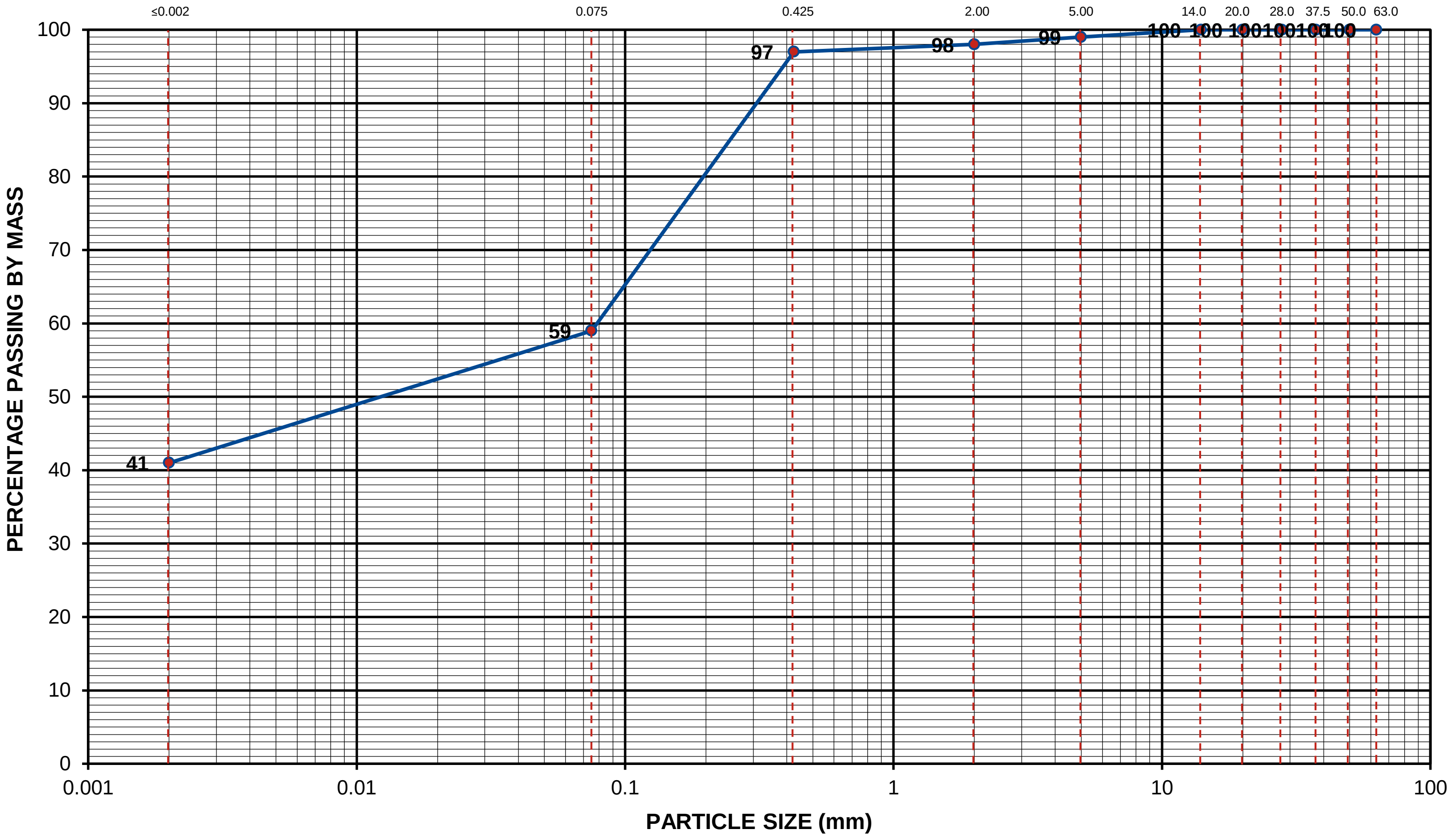

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
41%	18%			39%			2%			-

HOLE No. : Test Pit 98	**DEPTH :** 500 - 800mm	**SAMPLE No. :** AC15
MATERIAL DESCRIPTION : (CL) Moist reddish brown firm sandy lean clay		
ATTERBERG LIMITS : 38 / 16 / 7.8 (GM: 0.47)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 14 of 51

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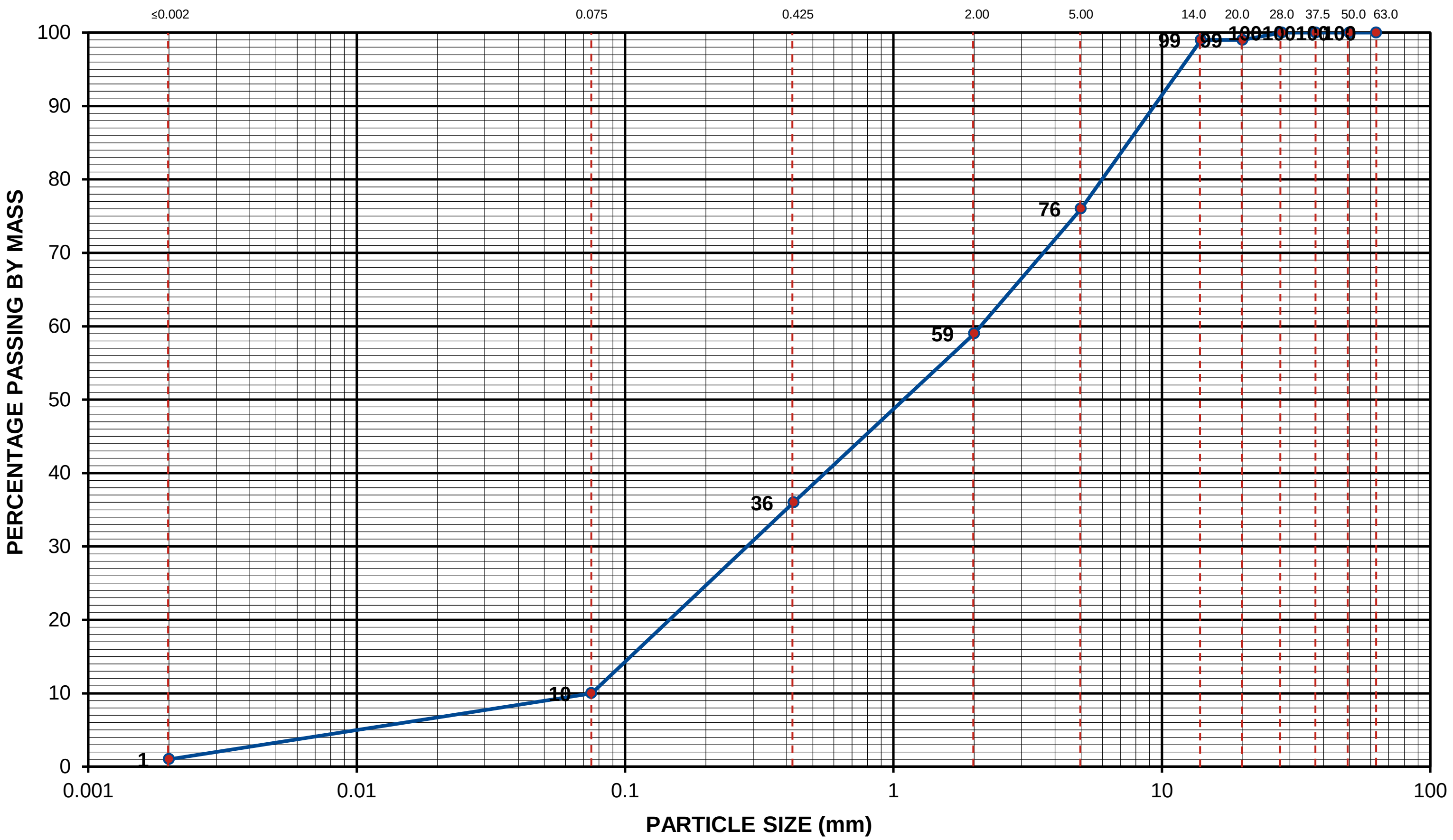

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY 1%	**SILT** 9%			**SAND** 49%			**GRAVEL** 41%			**COBBLE** -

HOLE No. : Test Pit 98 **DEPTH :** 800 - 2000mm **SAMPLE No. :** AC16

MATERIAL DESCRIPTION : (SP-SC) Slightly moist light brown dense poorly graded sand with clay and gravel

ATTERBERG LIMITS : 26 / 14 / 1.3 (GM: 1.95) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 15 of 51

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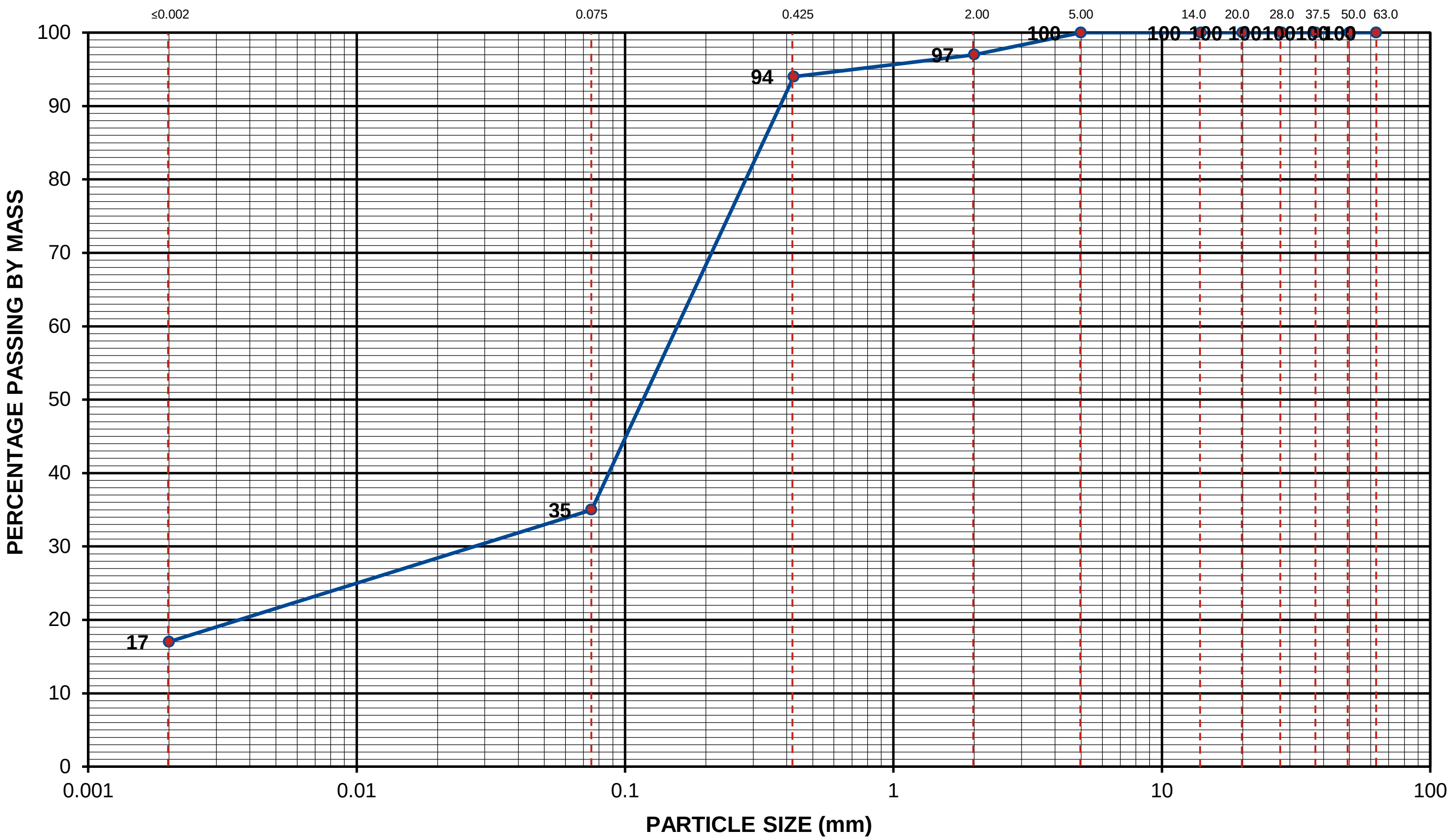

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
17%	18%			62%			3%			-

HOLE No. : Test Pit 112 **DEPTH :** 0 - 600mm **SAMPLE No. :** AC17

MATERIAL DESCRIPTION : (SC) Slightly moist reddish brown medium dense clayey sand

ATTERBERG LIMITS : - / SP / 1.3 (GM: 0.74) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 16 of 51

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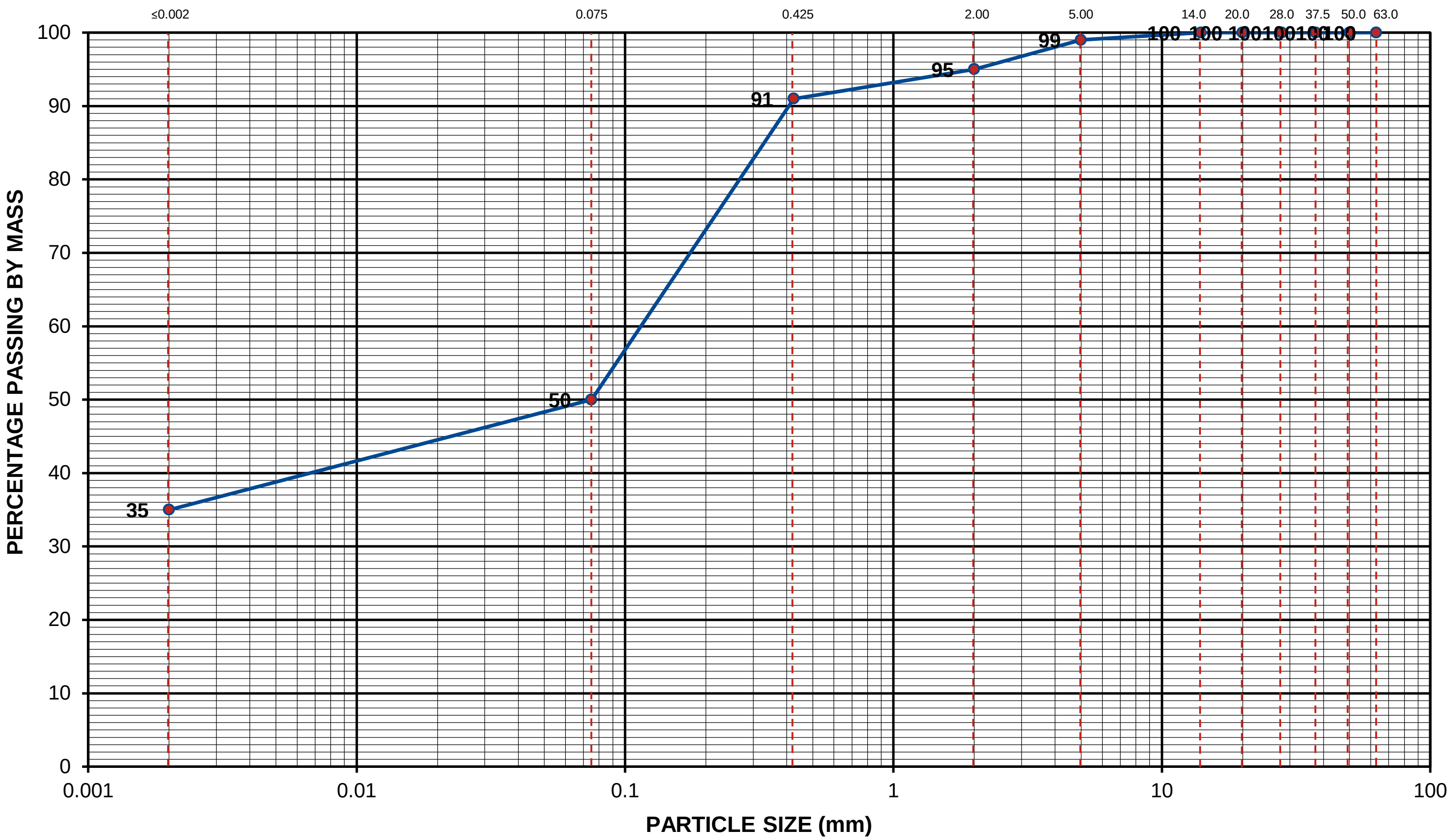

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY 35%	**SILT** 15%			**SAND** 45%			**GRAVEL** 5%			**COBBLE** -

HOLE No. : Test Pit 112 **DEPTH :** 600 - 800mm **SAMPLE No. :** AC18

MATERIAL DESCRIPTION : (CL) Moist reddish grey firm sandy lean clay

ATTERBERG LIMITS : 39 / 16 / 7.7 (GM: 0.64) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 17 of 51

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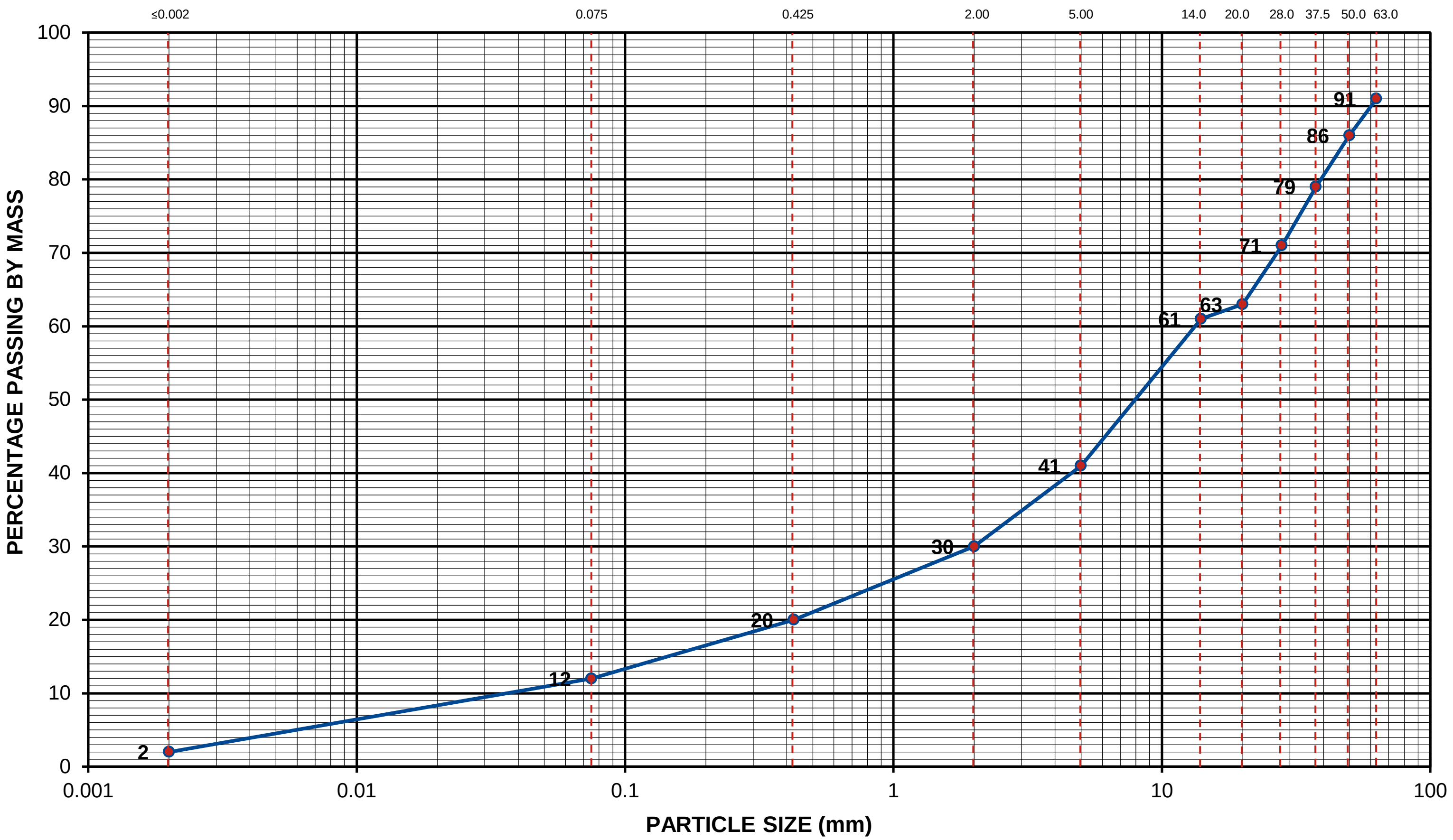

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
2%	10%			18%			61%			9%

HOLE No. : Test Pit 112 **DEPTH :** 800 - 1400mm **SAMPLE No. :** AC19

MATERIAL DESCRIPTION : (GP-GC) Slightly moist grey brown dense poorly graded mudstone gravel with clay and sand

ATTERBERG LIMITS : 33 / 10 / 4.9 (GM: 2.38) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 18 of 51

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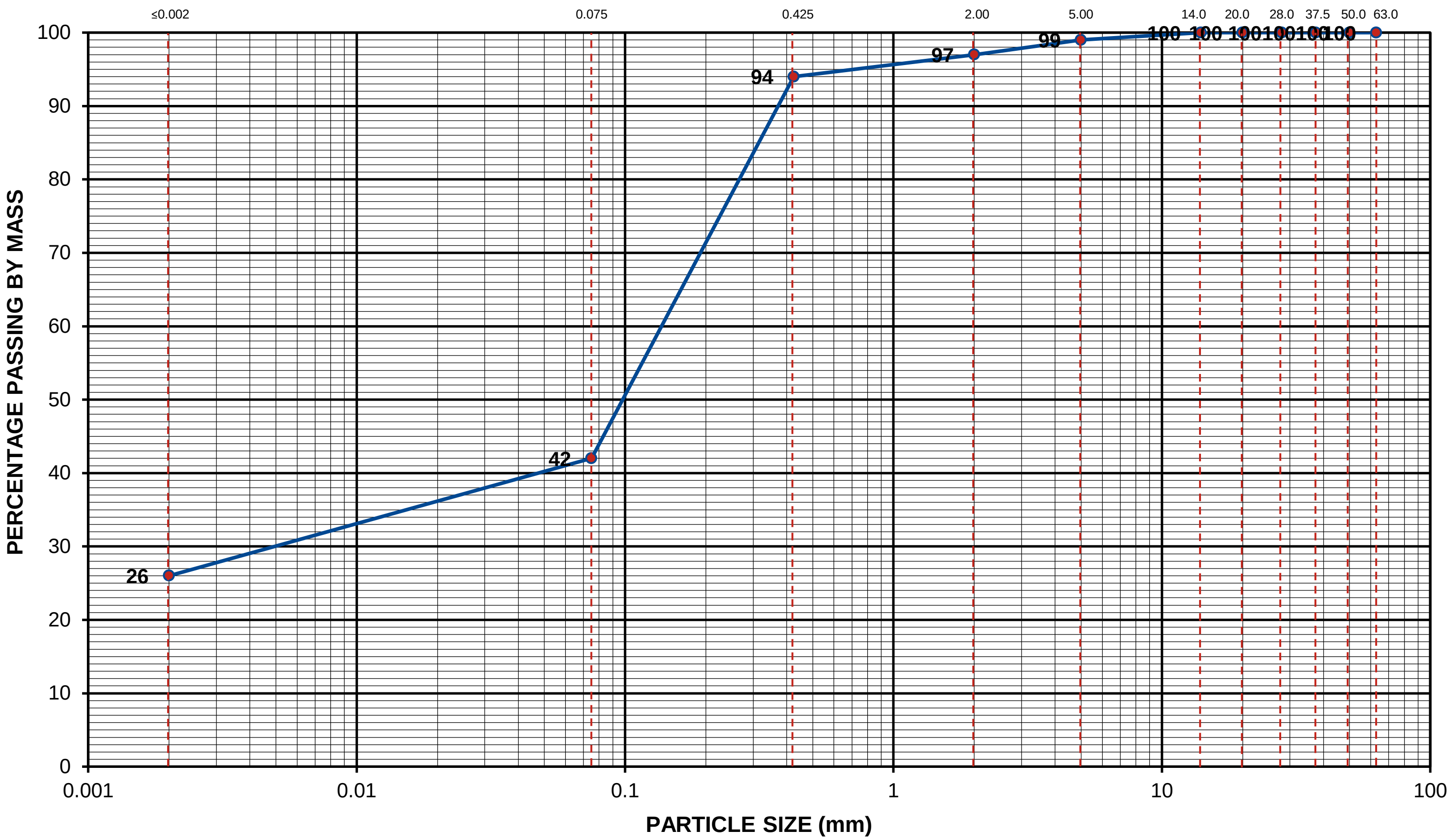

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
26%	16%			55%			3%			-

HOLE No. : Test Pit 77 **DEPTH :** 0 - 400mm **SAMPLE No. :** AC20

MATERIAL DESCRIPTION : (SC) Slightly moist reddish brown medium dense clayey sand

ATTERBERG LIMITS : 27 / 10 / 4.8 (GM: 0.67) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 19 of 51

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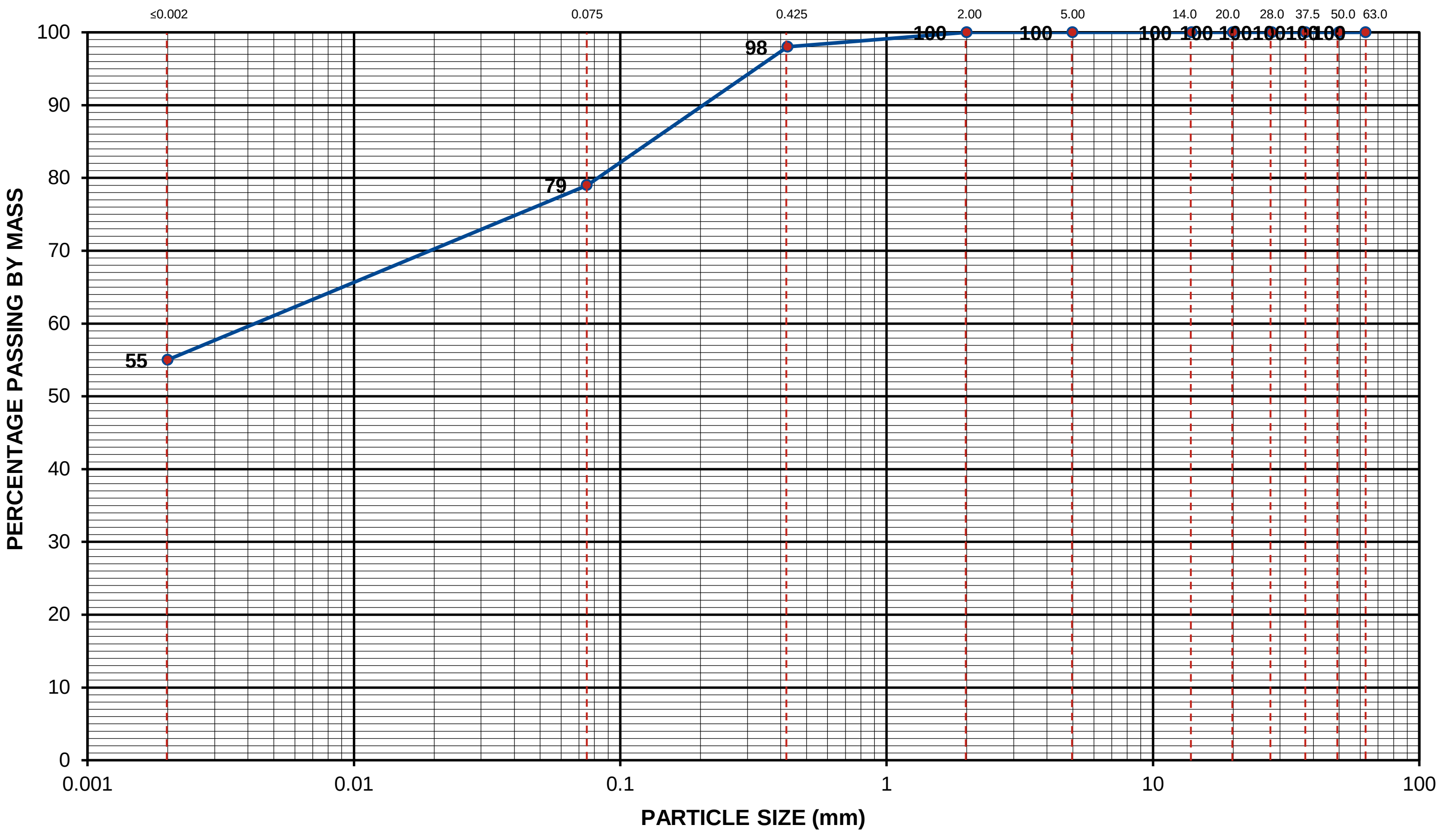

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
55%	24%			21%			-			-

HOLE No. : Test Pit 77 **DEPTH :** 400 - 800mm **SAMPLE No. :** AC21

MATERIAL DESCRIPTION : (CL) Very moist reddish grey stiff lean clay with sand

ATTERBERG LIMITS : 47 / 22 / 11.4 (GM: 0.23) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 20 of 51

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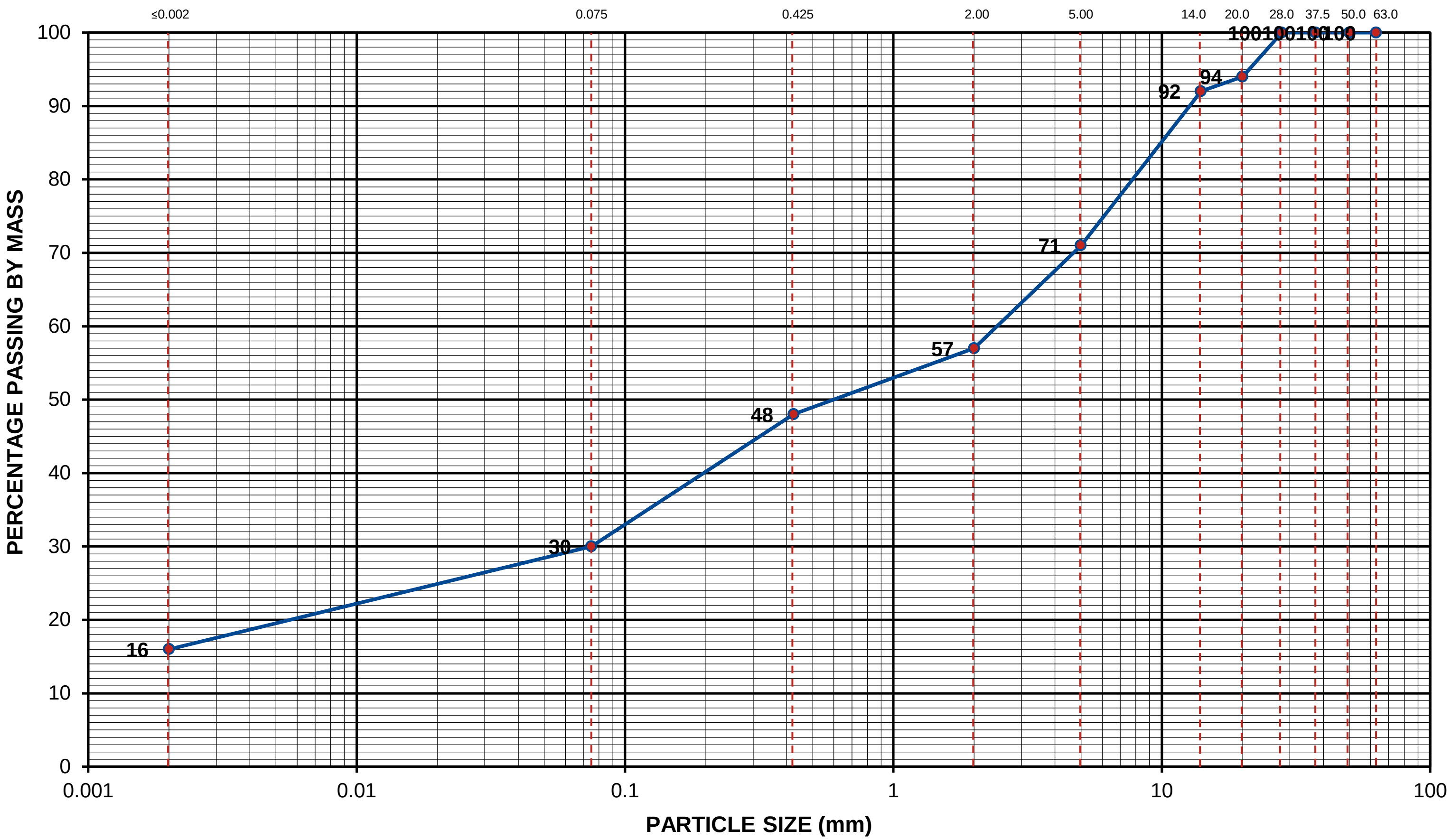

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
16%	14%			27%			43%			-

HOLE No. : Test Pit 77 **DEPTH :** 800 - 2000mm **SAMPLE No. :** AC22

MATERIAL DESCRIPTION : (SC) Slightly moist light grey brown dense clayey sand with mudstone gravel

ATTERBERG LIMITS : 32 / 12 / 5.7 (GM: 1.66) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 21 of 51

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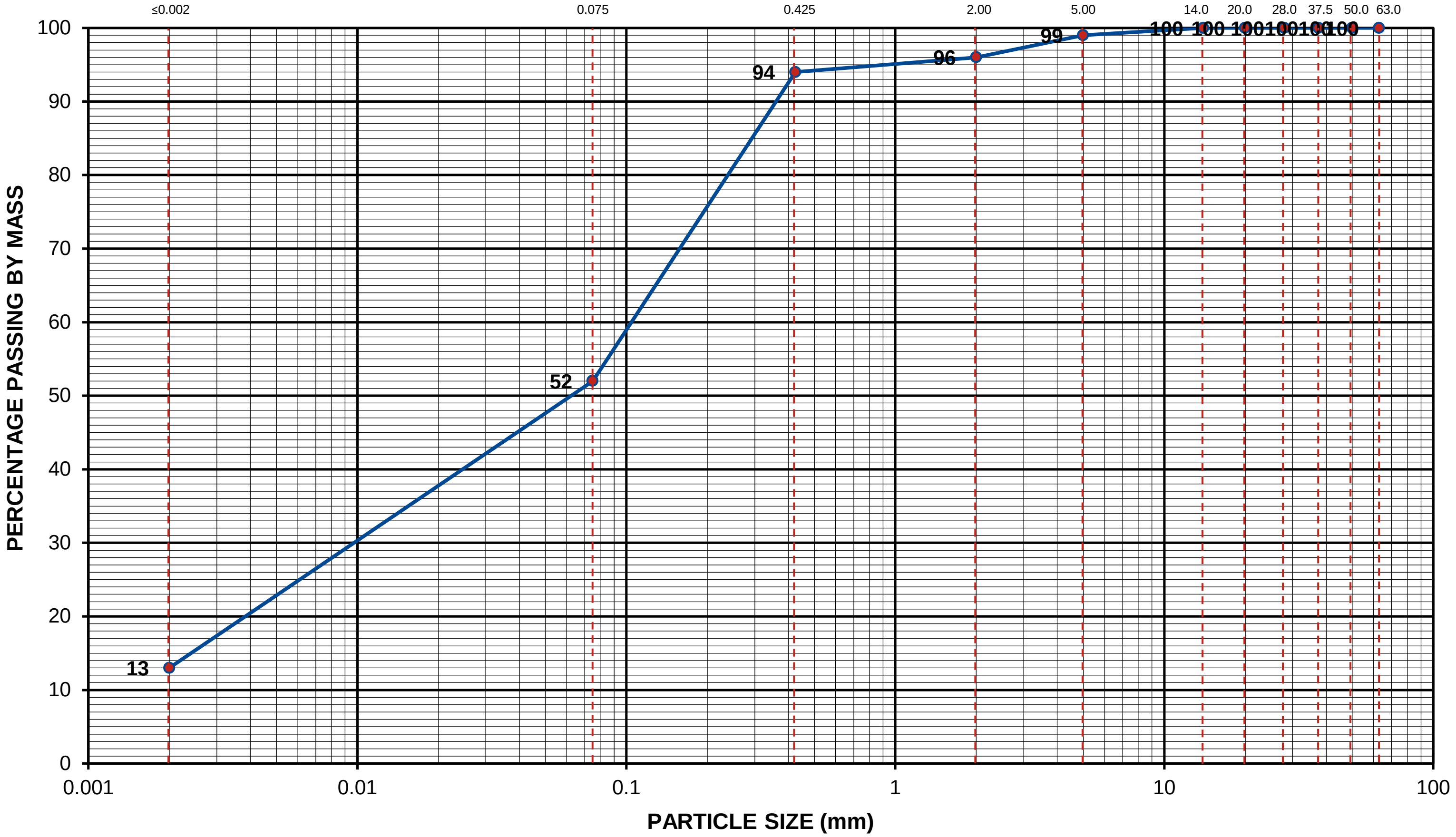

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
13%	39%			44%			4%			-

HOLE No. : Test Pit 84 **DEPTH :** 0 - 500mm **SAMPLE No. :** AC23

MATERIAL DESCRIPTION : (ML) Slightly moist reddish brown medium dense sandy silt

ATTERBERG LIMITS : - / SP / 1.1 (GM: 0.58) **POTENTIAL EXPANSIVENESS :** Low

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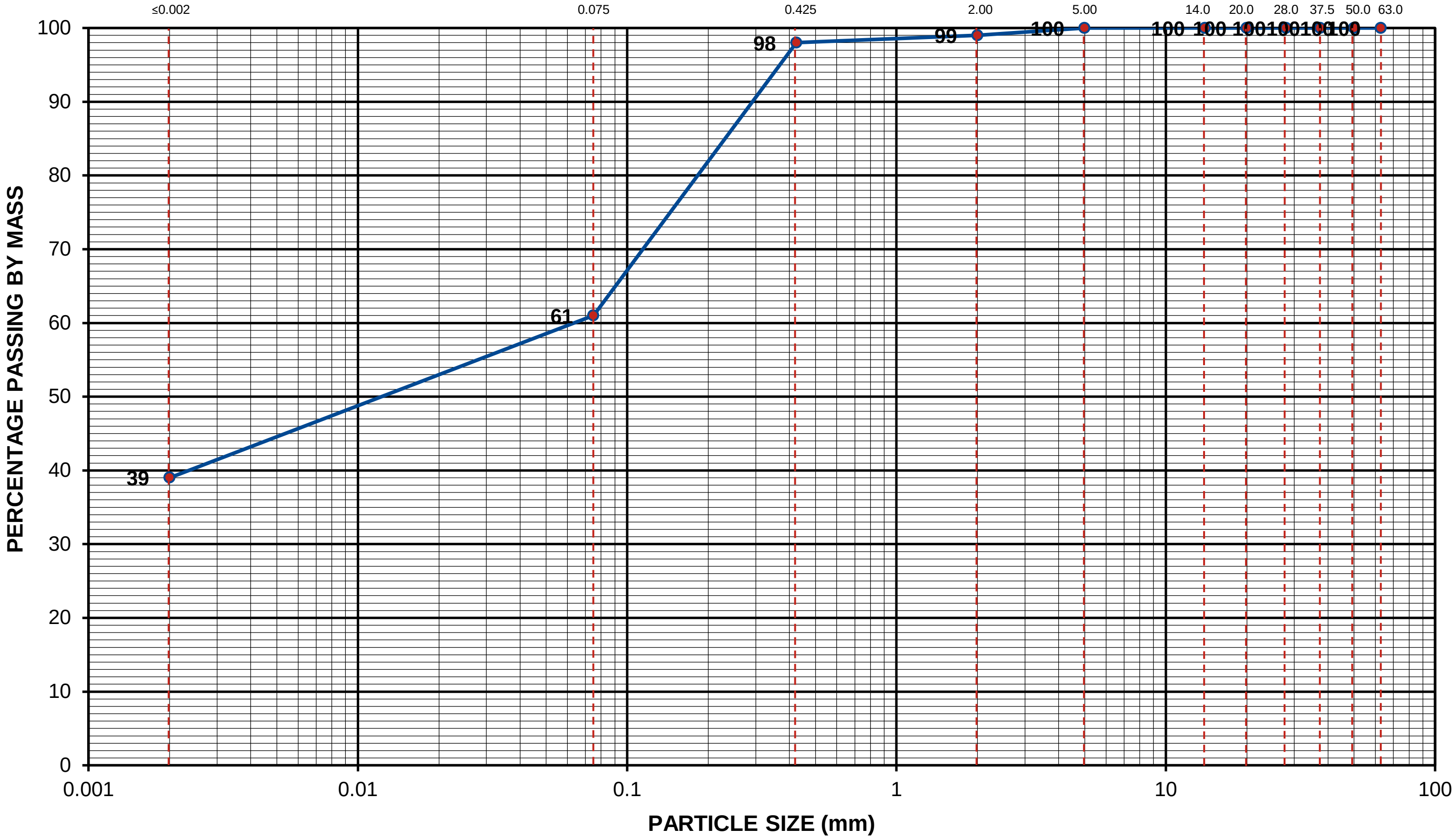

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
39%	22%			38%			1%			-

HOLE No. : Test Pit 84	**DEPTH :** 500 - 1400mm	**SAMPLE No. :** AC24
MATERIAL DESCRIPTION : (CL) Slightly moist reddish grey firm sandy lean clay		
ATTERBERG LIMITS : 35 / 14 / 7.4 (GM: 0.42)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 23 of 51

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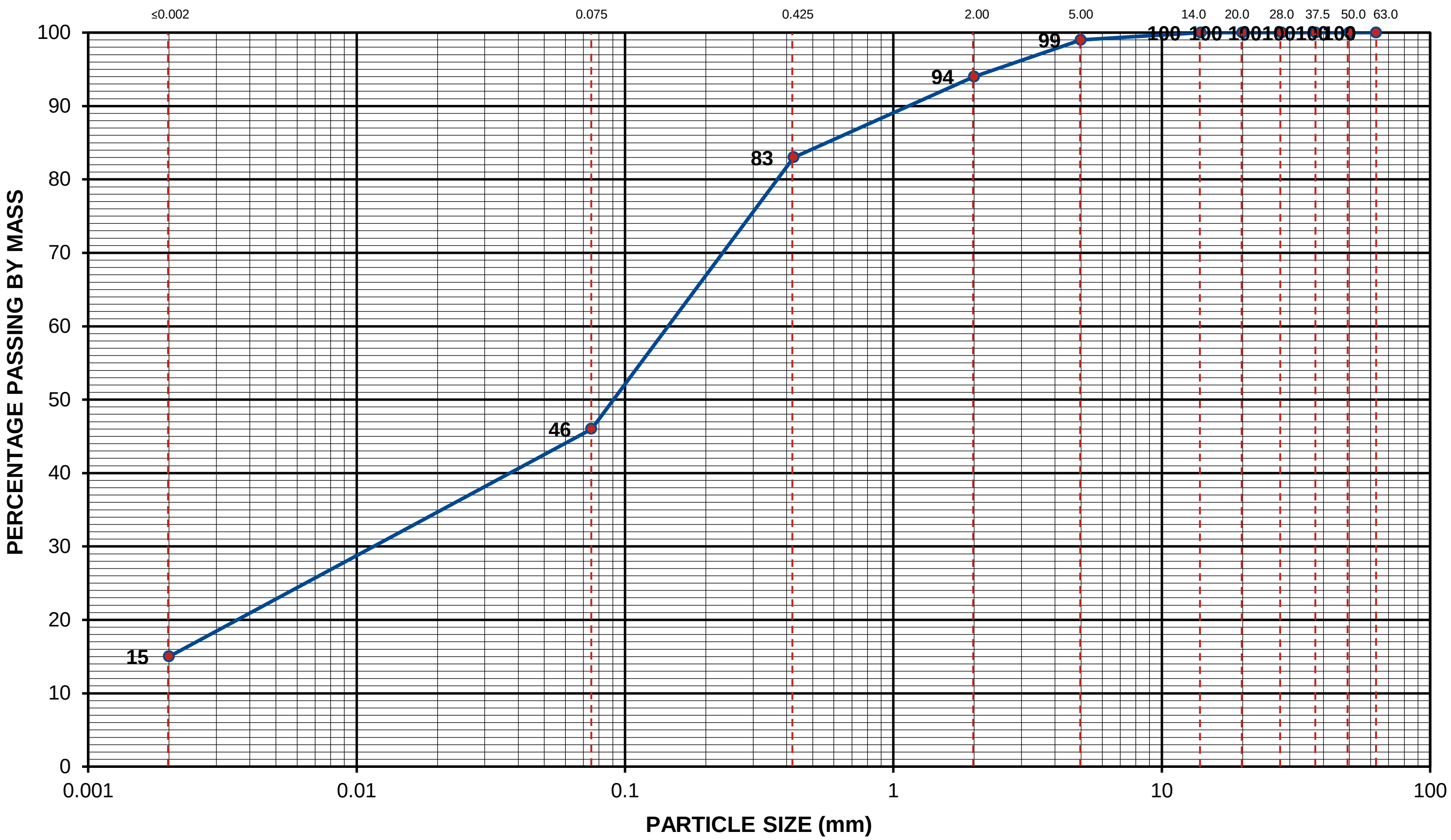

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
15%	31%			48%			6%			-

HOLE No. : Test Pit 84 **DEPTH :** 1400 - 2000mm **SAMPLE No. :** AC25

MATERIAL DESCRIPTION : (SC) Slightly moist light brown dense clayey sand

ATTERBERG LIMITS : 34 / 12 / 5.7 (GM: 0.77) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 24 of 51

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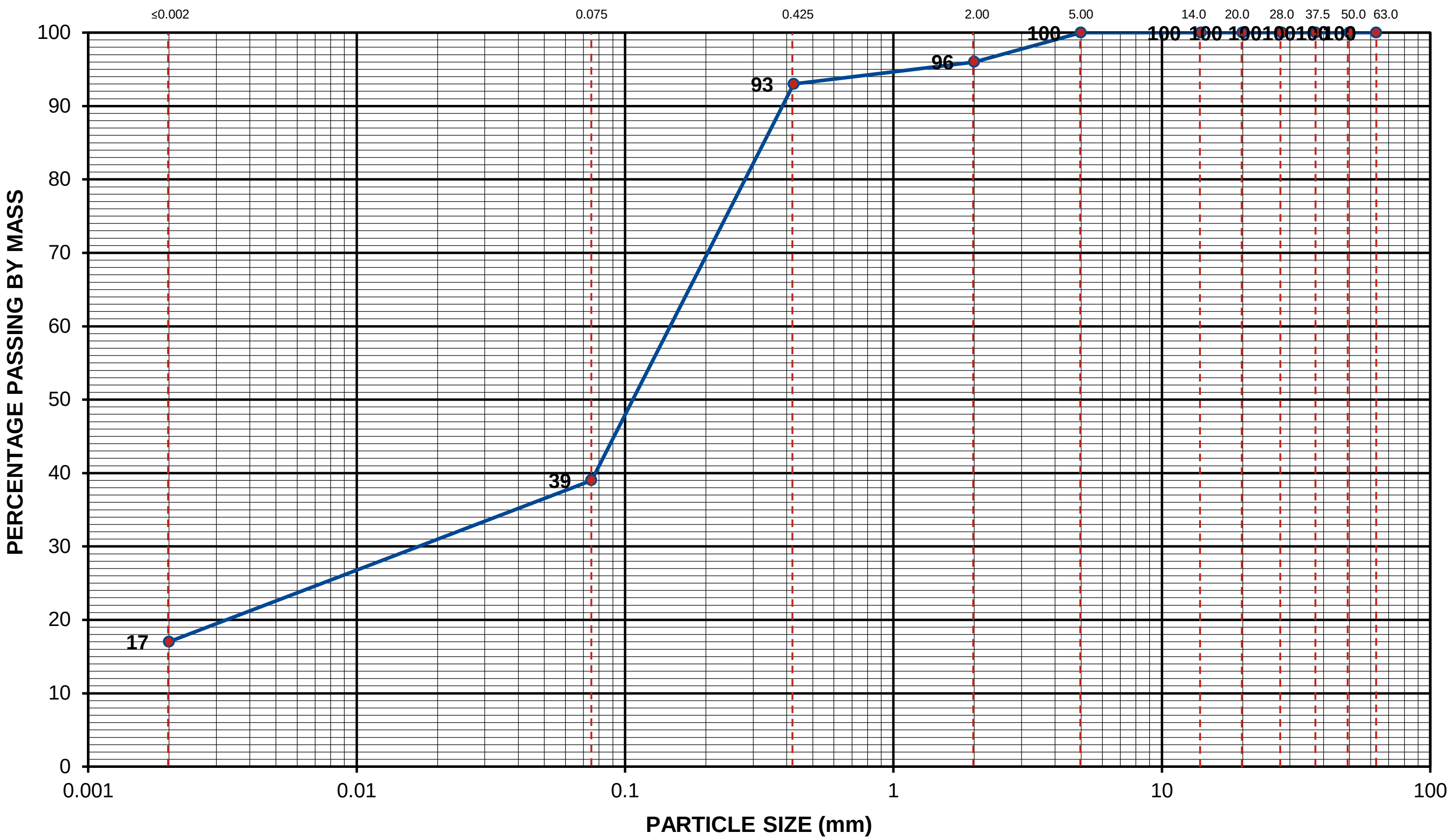

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
17%	22%			57%			4%			-

HOLE No. : Test Pit 67	**DEPTH :** 0 - 300mm	**SAMPLE No. :** AC26
MATERIAL DESCRIPTION : (SC-SM) Slightly moist reddish brown medium dense silty, clayey sand		
ATTERBERG LIMITS : 19 / 7 / 2.5 (GM: 0.72)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 25 of 51

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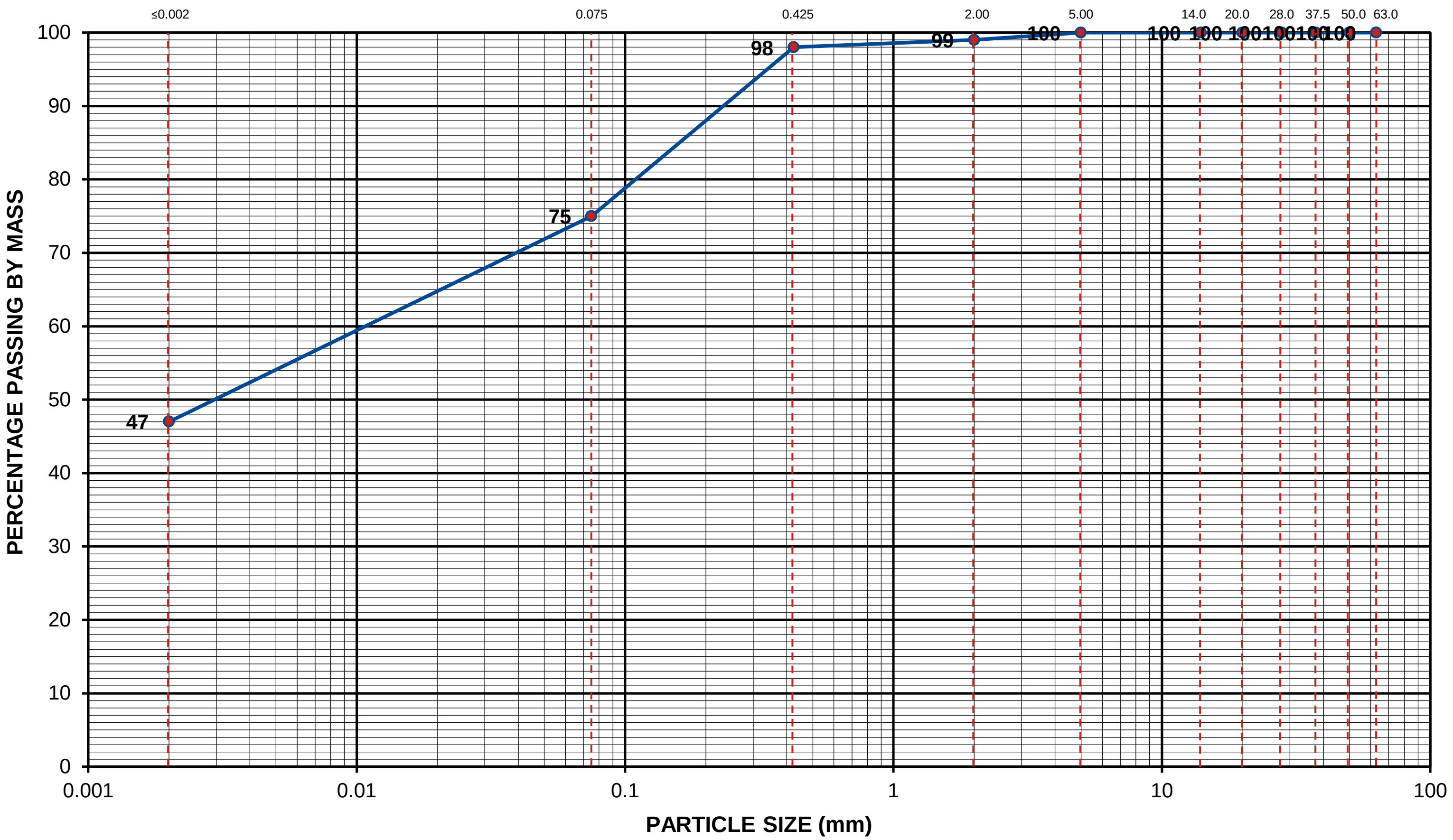

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
47%	28%			24%			1%			-

HOLE No. : Test Pit 67 **DEPTH :** 300 - 800mm **SAMPLE No. :** AC27

MATERIAL DESCRIPTION : (CL) Slightly moist reddish grey firm lean clay with sand

ATTERBERG LIMITS : 44 / 19 / 8.7 (GM: 0.28) **POTENTIAL EXPANSIVENESS :** Low

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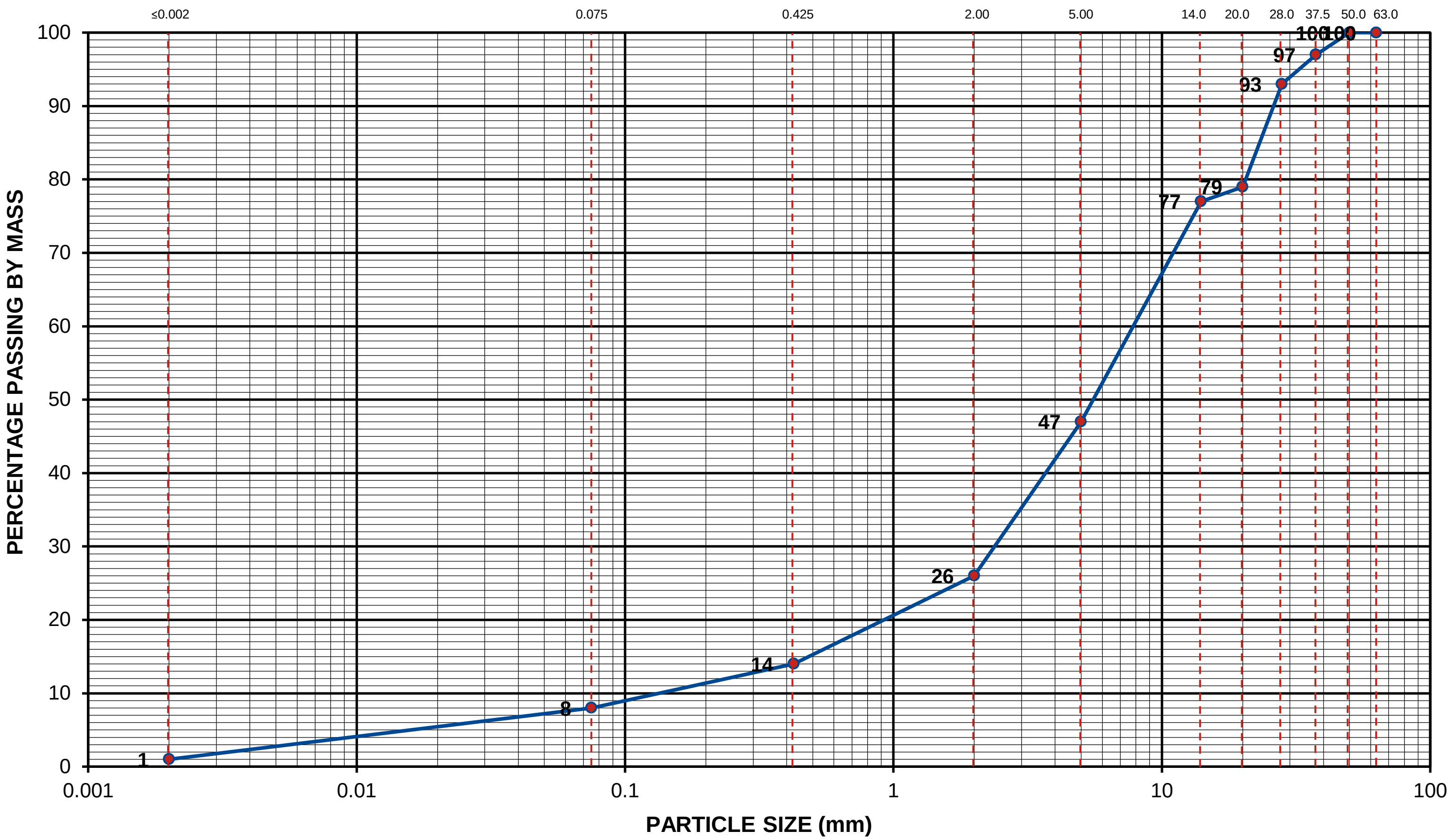

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
1%	7%			18%			74%			-

HOLE No. : Test Pit 67 **DEPTH :** 800 - 2000mm **SAMPLE No. :** AC28

MATERIAL DESCRIPTION : (GP-GC) Slightly moist light grey brown dense poorly graded mudstone gravel with clay and sand

ATTERBERG LIMITS : 39 / 14 / 6.6 (GM: 2.52) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 27 of 51

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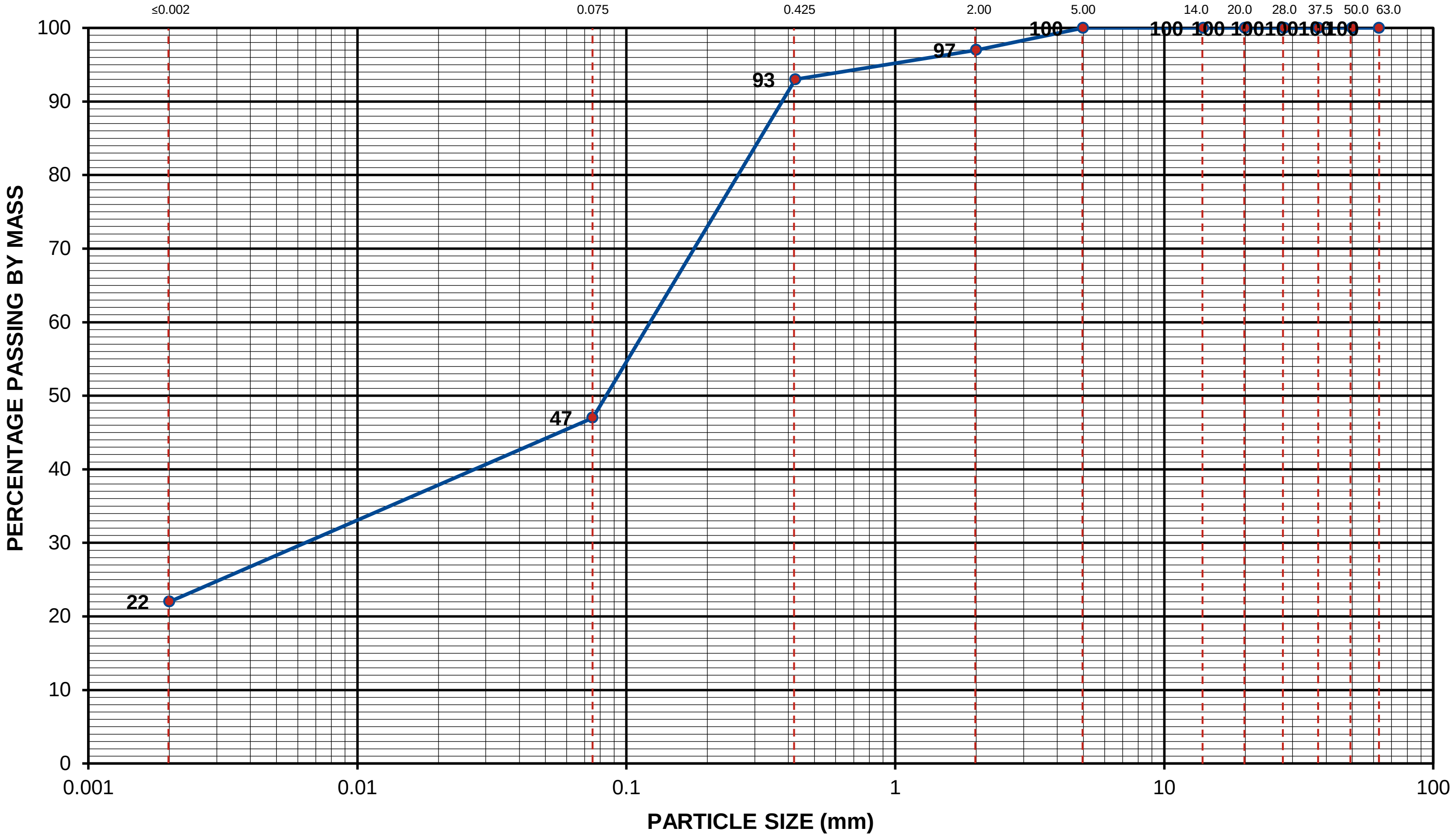

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
22%	25%			50%			3%			-

HOLE No. : Test Pit 81 **DEPTH :** 0 - 400mm **SAMPLE No. :** AC29

MATERIAL DESCRIPTION : (SC) Slightly moist reddish brown medium dense clayey sand

ATTERBERG LIMITS : 23 / 8 / 4.0 (GM: 0.62) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 28 of 51

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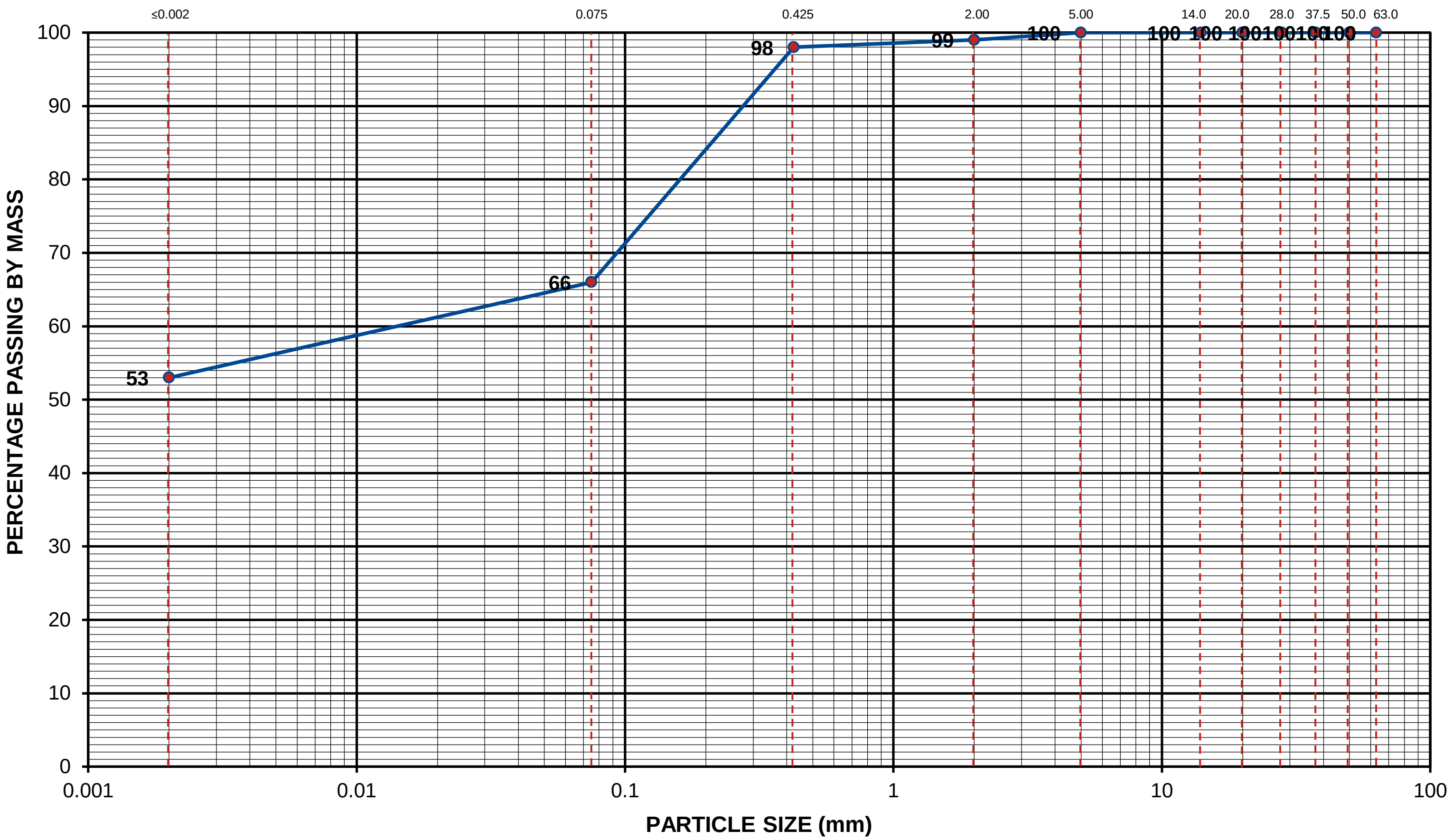

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
53%	13%			33%			1%			-

HOLE No. : Test Pit 81 **DEPTH :** 400 - 700mm **SAMPLE No. :** AC30

MATERIAL DESCRIPTION : (CL) Moist reddish grey firm sandy lean clay

ATTERBERG LIMITS : 49 / 27 / 12.5 (GM: 0.36) **POTENTIAL EXPANSIVENESS :** Medium - 5.1mm **PAGE No. :** 29 of 51

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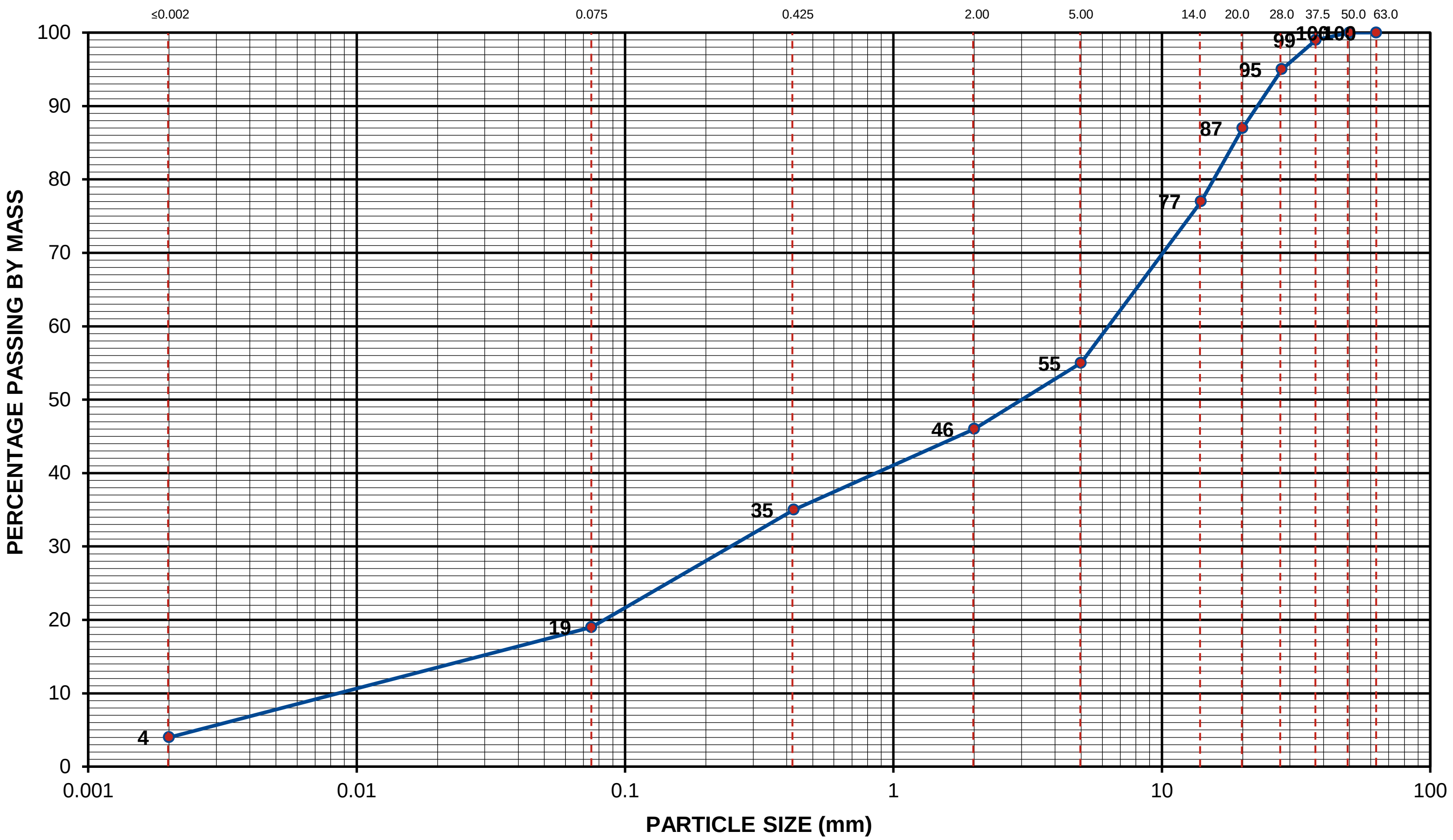

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
4%	15%			27%			54%			-

HOLE No. : Test Pit 81 **DEPTH :** 700 - 1500mm **SAMPLE No. :** AC31

MATERIAL DESCRIPTION : (SM) Slightly moist light brown dense silty sand with mudstone gravel

ATTERBERG LIMITS : 46 / 16 / 8.4 (GM: 2.00) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 30 of 51

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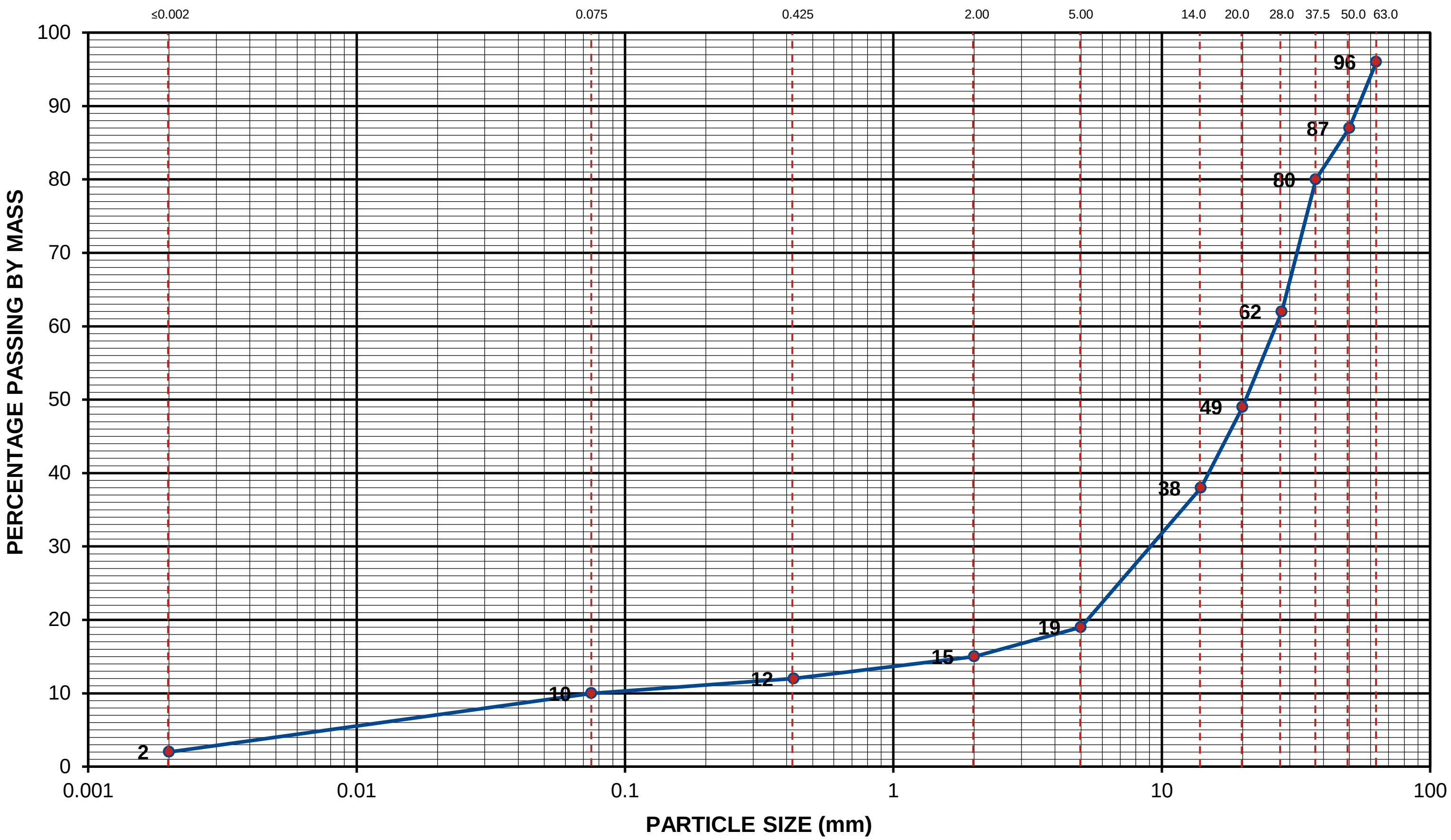

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
2%	8%			5%			81%			4%

HOLE No. : Test Pit 81 **DEPTH :** 1500 - 2000mm **SAMPLE No. :** AC32

MATERIAL DESCRIPTION : (GP-GM) Slightly moist light brown dense poorly graded sandstone gravel with silt

ATTERBERG LIMITS : 41 / 14 / 7.1 (GM: 2.63) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 31 of 51

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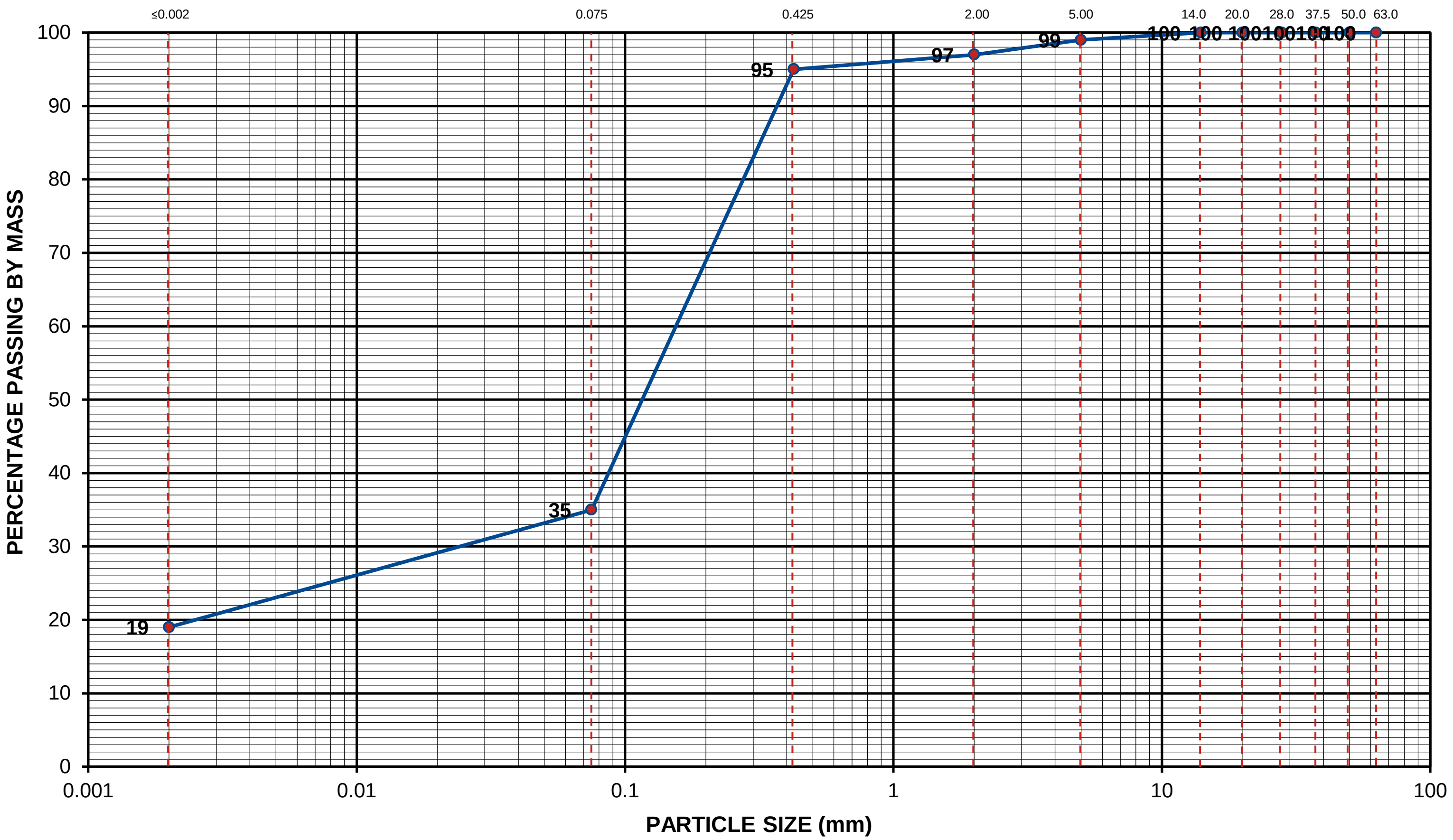

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY 19%	**SILT** 16%			**SAND** 62%			**GRAVEL** 3%			**COBBLE** -

HOLE No. : Test Pit 45	**DEPTH :** 0 - 300mm	**SAMPLE No. :** AC33
MATERIAL DESCRIPTION : (SC-SM) Slightly moist reddish brown medium dense silty, clayey sand		
ATTERBERG LIMITS : 18 / 5 / 2.3 (GM: 0.73)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 32 of 51

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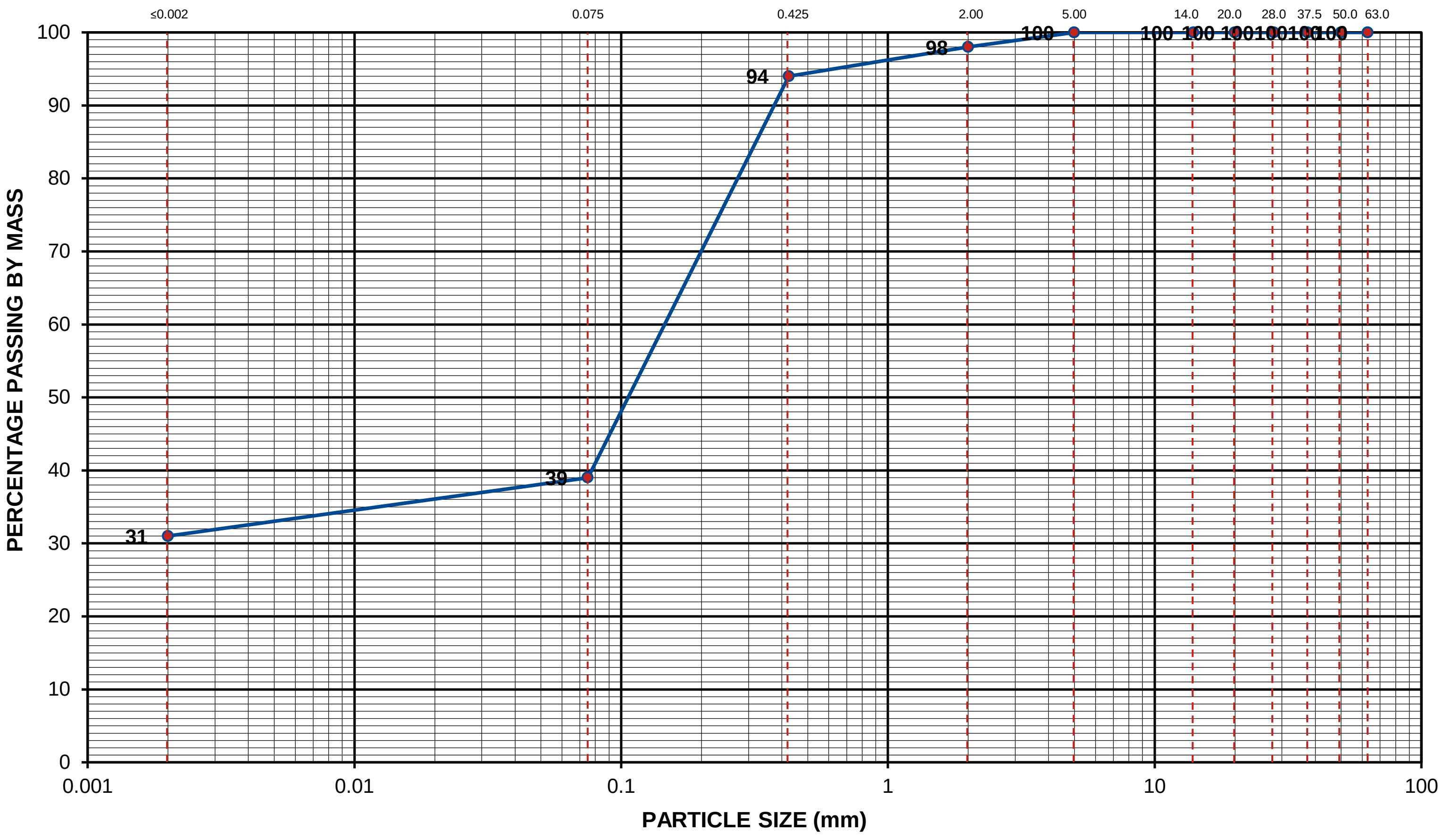

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY 31%	**SILT** 8%			**SAND** 59%			**GRAVEL** 2%			**COBBLE** -

HOLE No. : Test Pit 45 **DEPTH :** 300 - 800mm **SAMPLE No. :** AC34

MATERIAL DESCRIPTION : (SM) Moist grey brown dense silty sand

ATTERBERG LIMITS : 45 / 17 / 7.7 (GM: 0.77) **POTENTIAL EXPANSIVENESS :** Medium - 8.4mm **PAGE No. :** 33 of 51

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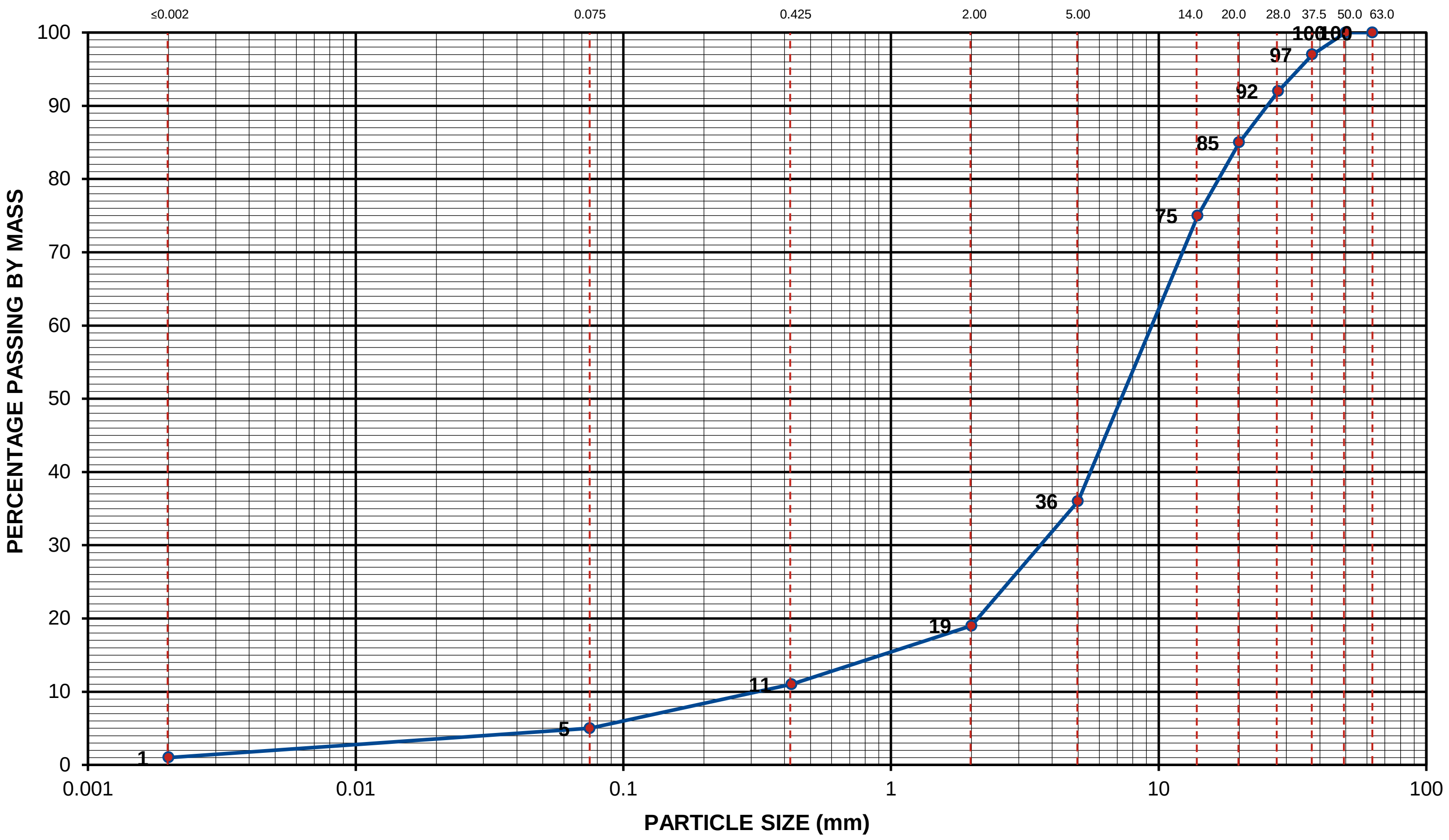

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
1%	4%			14%			81%			-

HOLE No. : Test Pit 45 **DEPTH :** 900 - 2000mm **SAMPLE No. :** AC35

MATERIAL DESCRIPTION : (GP-GM) Slightly moist grey dense poorly graded mudstone gravel with silt

ATTERBERG LIMITS : 51 / 18 / 9.0 (GM: 2.65) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 34 of 51

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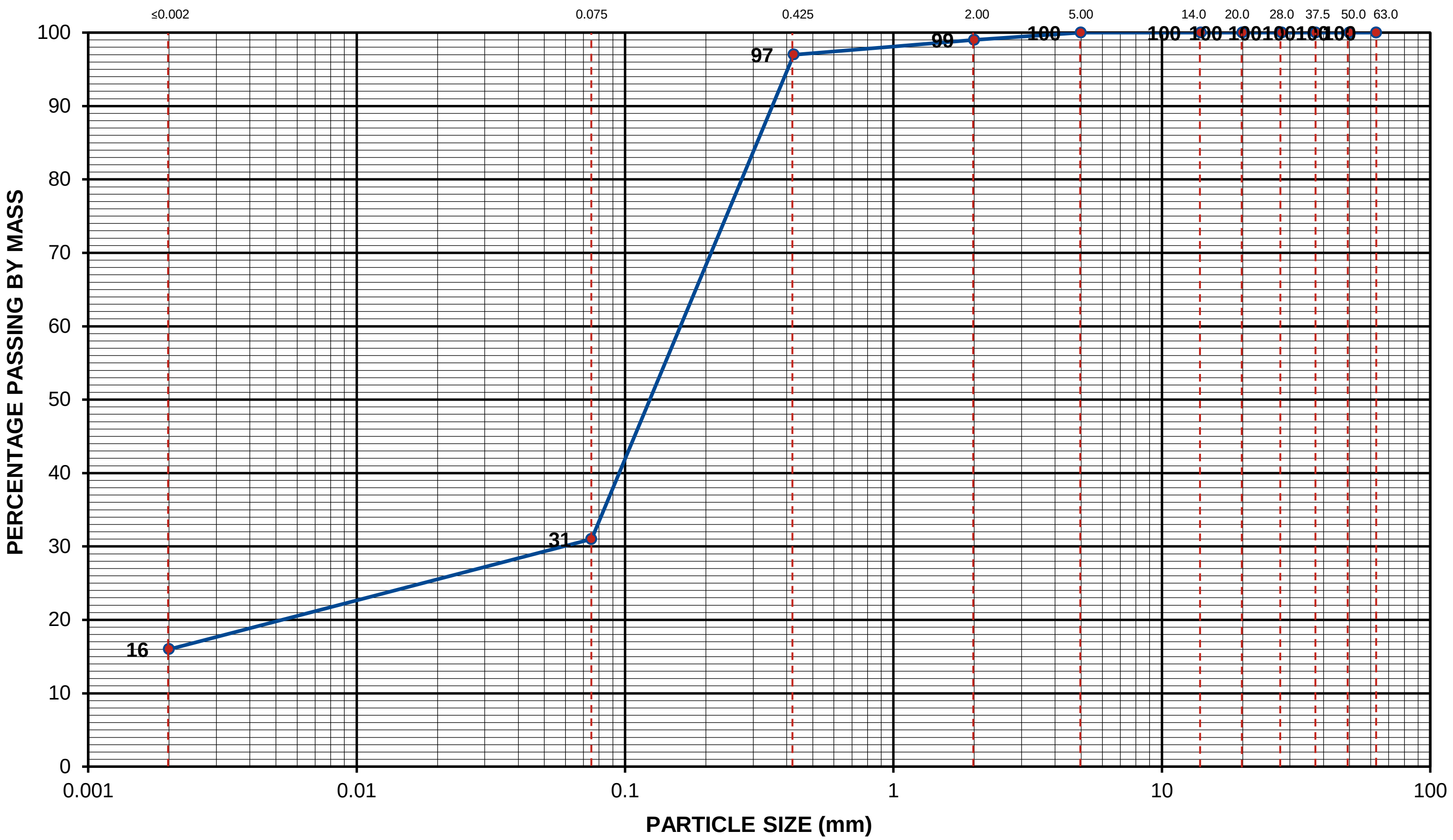

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
16%	15%			68%			1%			-

HOLE No. : Test Pit 51 **DEPTH :** 0 - 500mm **SAMPLE No. :** AC36

MATERIAL DESCRIPTION : (SM) Slightly moist reddish brown medium dense silty sand

ATTERBERG LIMITS : - / SP / 1.3 (GM: 0.73) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 35 of 51

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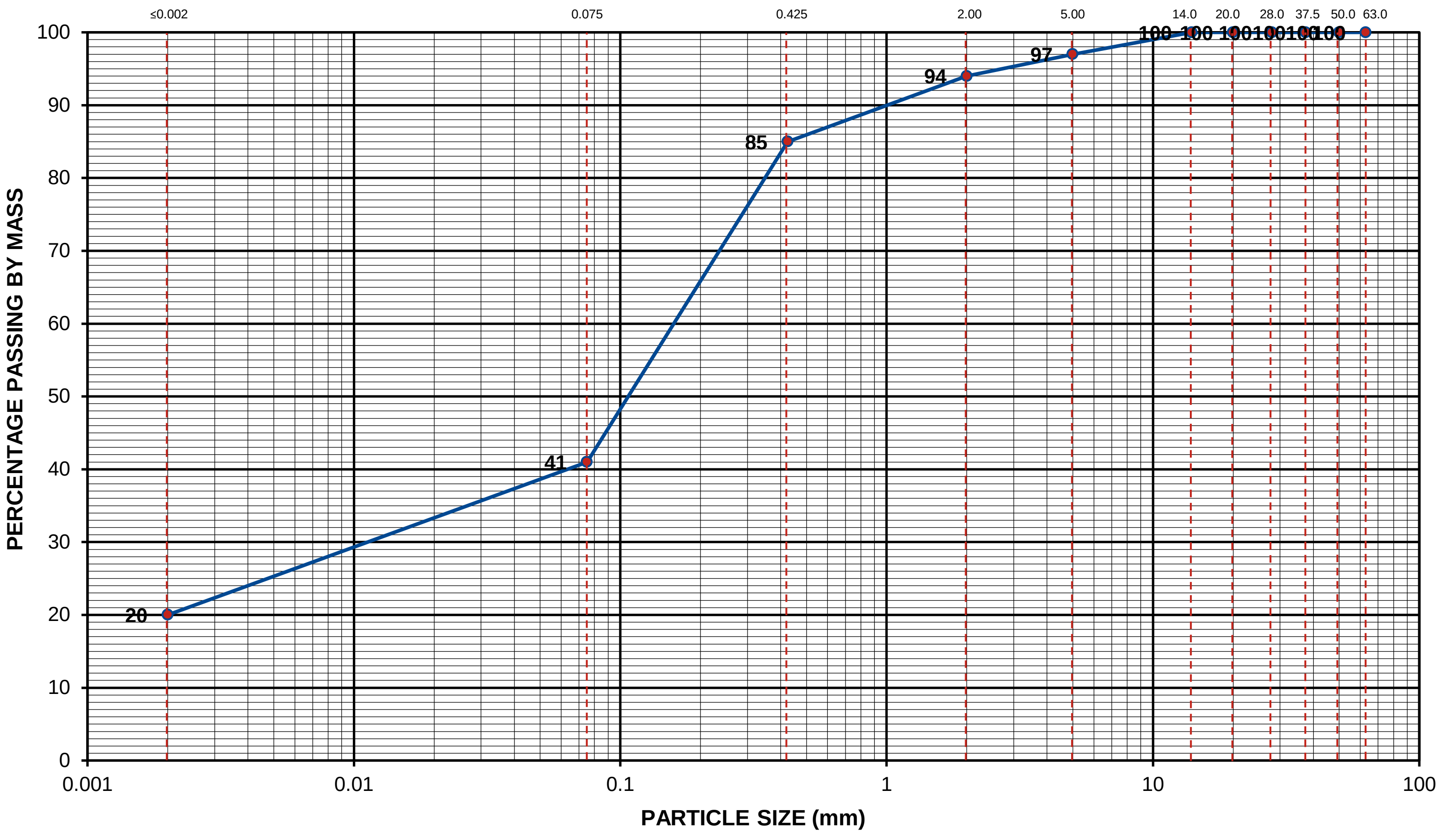

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
20%	21%			53%			6%			-

HOLE No. : Test Pit 51 **DEPTH :** 500 - 800mm **SAMPLE No. :** AC37

MATERIAL DESCRIPTION : (SC) Moist reddish grey brown dense clayey sand

ATTERBERG LIMITS : 47 / 21 / 9.8 (GM: 1.01) **POTENTIAL EXPANSIVENESS :** Medium - 4.9mm **PAGE No. :** 36 of 51

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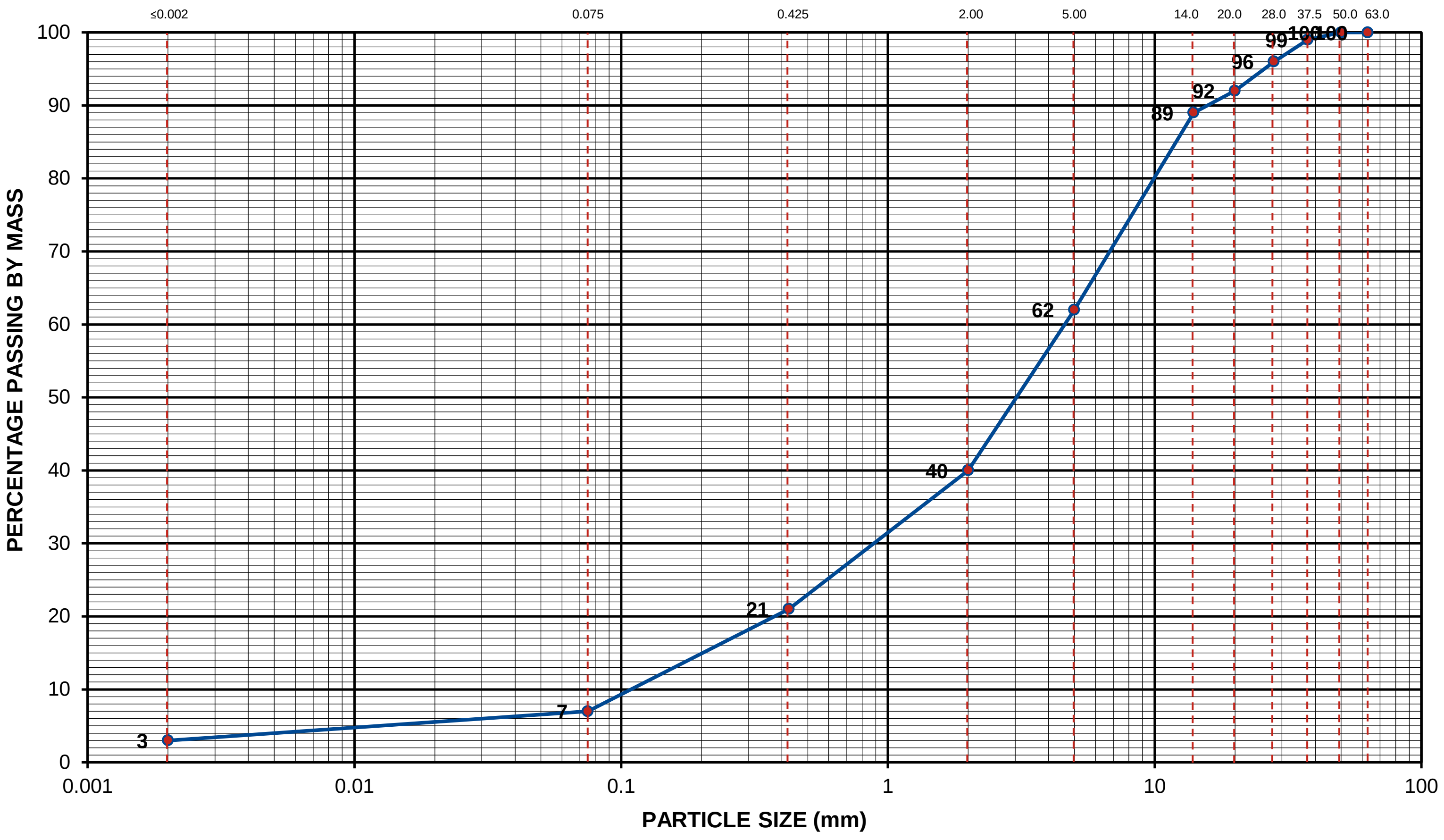

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
3%	4%			33%			60%			-

HOLE No. : Test Pit 51 **DEPTH :** 800 - 1100mm **SAMPLE No. :** AC38

MATERIAL DESCRIPTION : (SW-SM) Slightly moist light grey brown dense well-graded sand with silt and mudstone gravel

ATTERBERG LIMITS : 45 / 16 / 7.5 (GM: 2.33) **POTENTIAL EXPANSIVENESS :** Low

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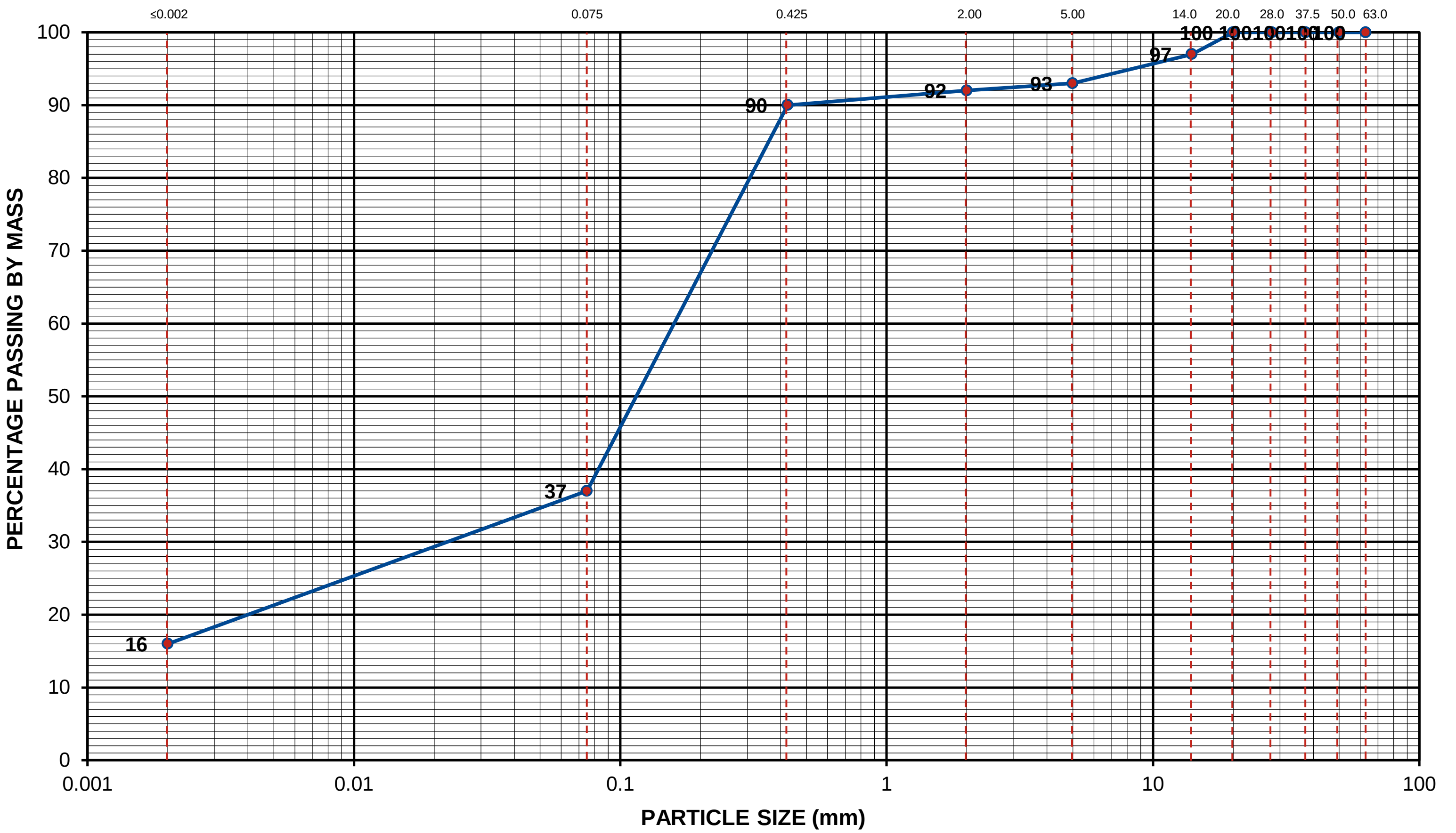

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
16%	21%			55%			8%			-

HOLE No. : Test Pit 24 **DEPTH :** 0 - 400mm **SAMPLE No. :** AC39

MATERIAL DESCRIPTION : (SM) Slightly moist reddish brown medium dense silty sand

ATTERBERG LIMITS : - / sp / 1.3 (GM: 0.82) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 38 of 51

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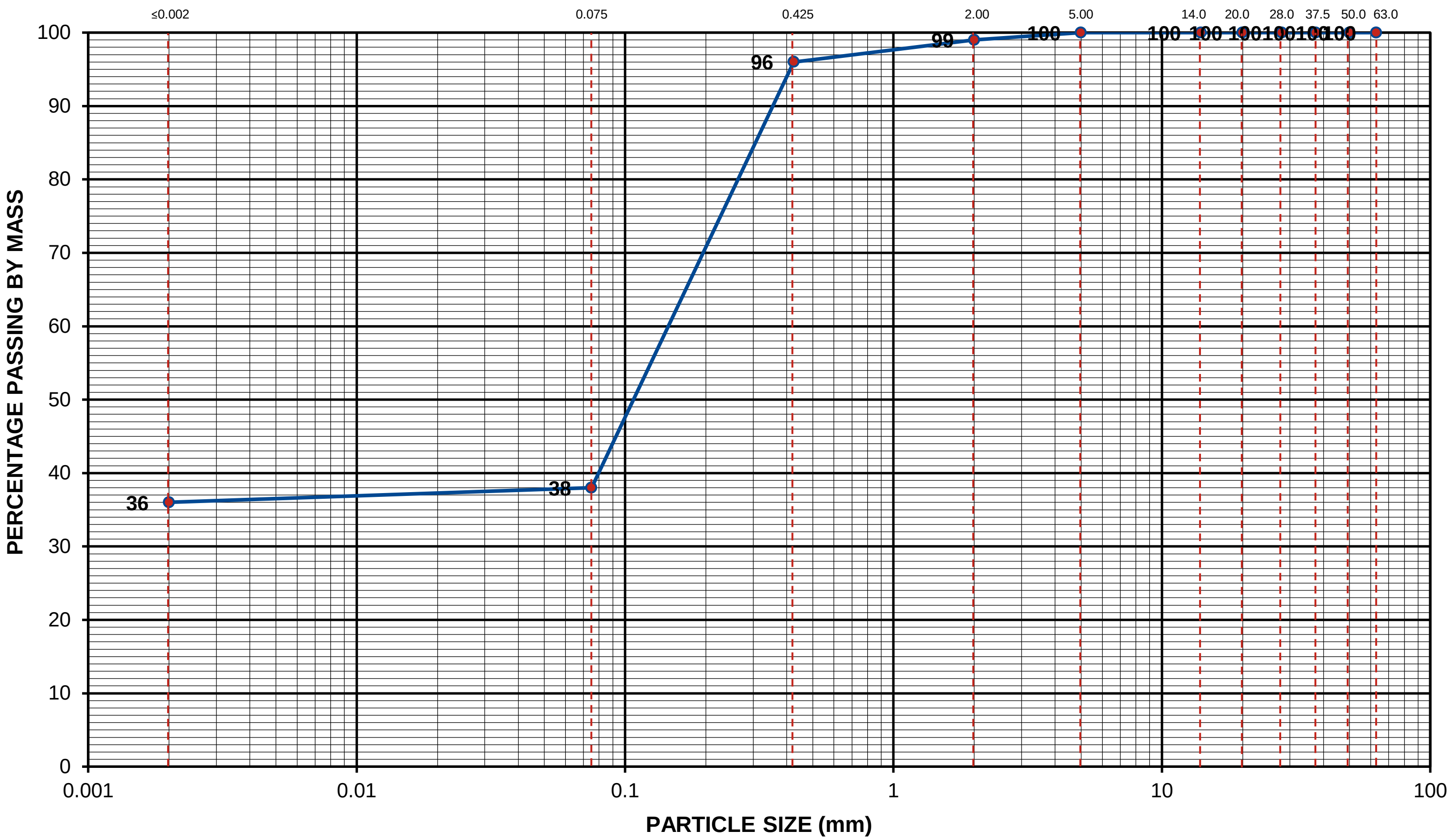

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
36%	2%			61%			1%			-

HOLE No. : Test Pit 24 **DEPTH :** 400 - 800mm **SAMPLE No. :** AC 40

MATERIAL DESCRIPTION : (SC) Moist reddish grey dense clayey sand

ATTERBERG LIMITS : 36 / 14 / 6.7 (GM: 0.70) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 39 of 51

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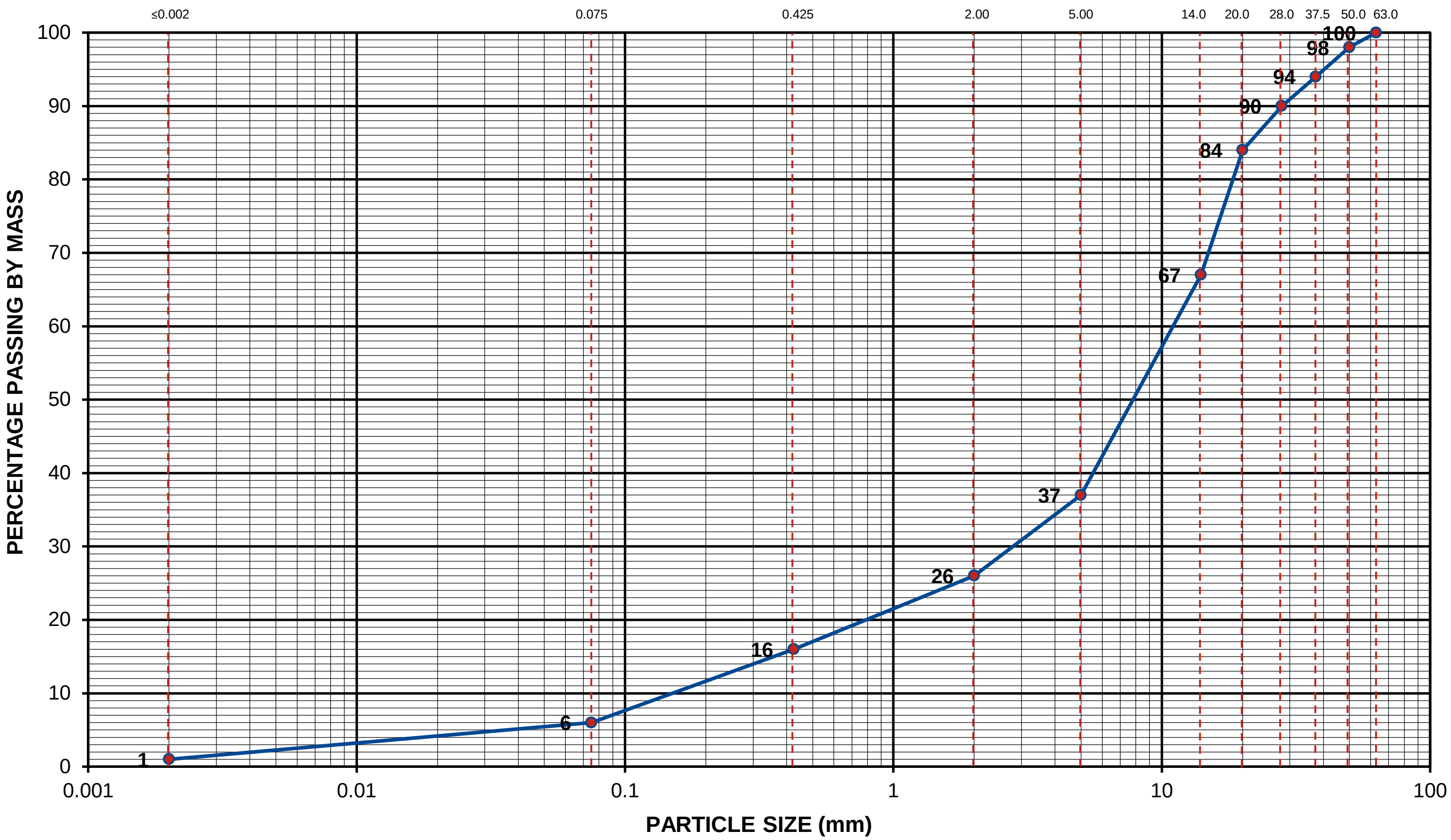

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
1%	5%			20%			74%			-

HOLE No. : Test Pit 24
DEPTH : 800 - 1900mm
SAMPLE No. : AC41
MATERIAL DESCRIPTION : (GP-GM) Slightly moist grey dense poorly graded mudstone gravel with silt and sand
ATTERBERG LIMITS : 33 / 8 / 4.0 (GM: 2.51)
POTENTIAL EXPANSIVENESS : Low

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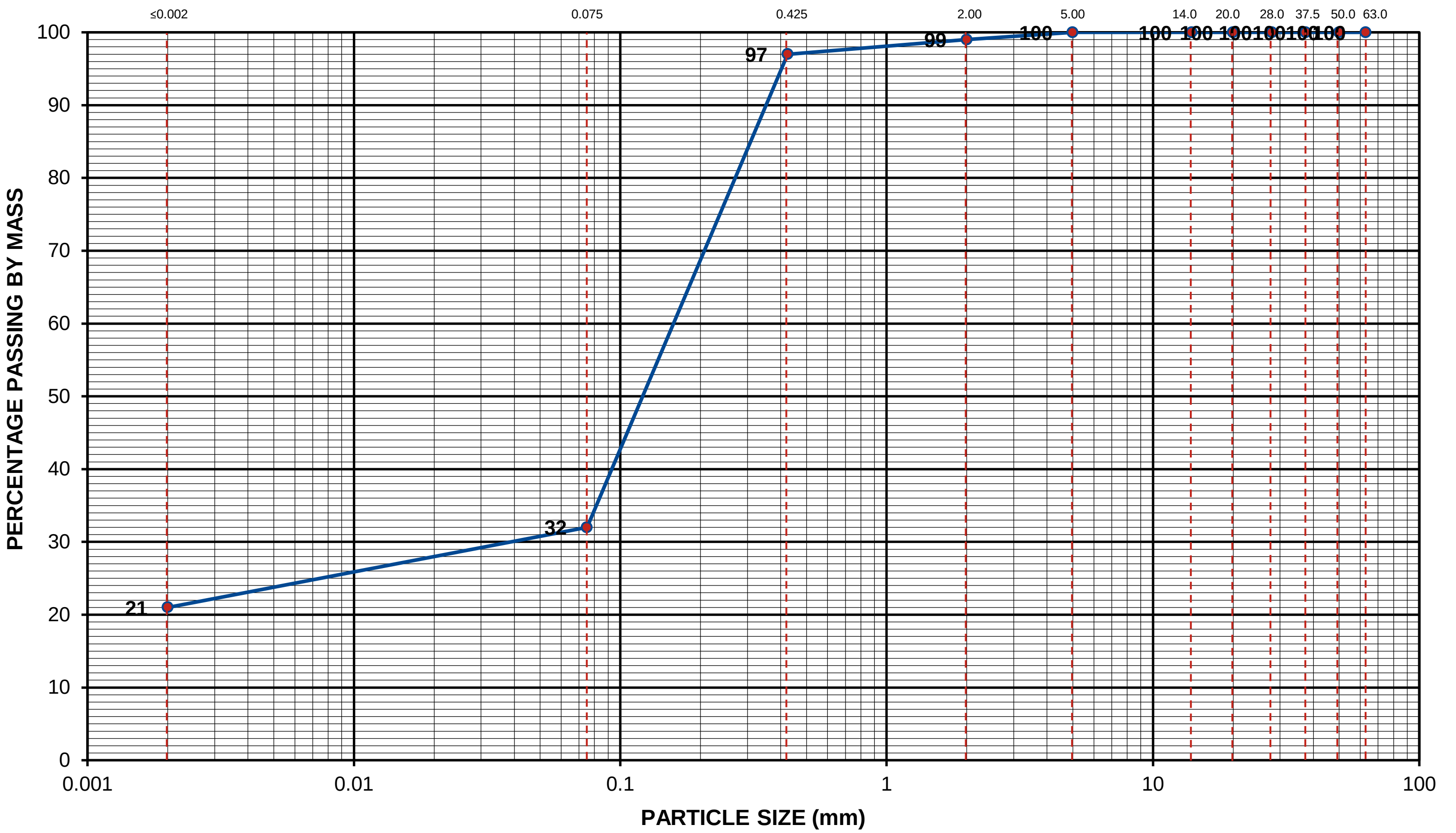

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
21%	11%			67%			1%			-

HOLE No. : Test Pit 32	**DEPTH :** 0 - 400mm	**SAMPLE No. :** AC42

MATERIAL DESCRIPTION : (SM) Slightly moist reddish brown medium dense silty sand

ATTERBERG LIMITS : - / SP / 1.1 (GM: 0.72)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 41 of 51

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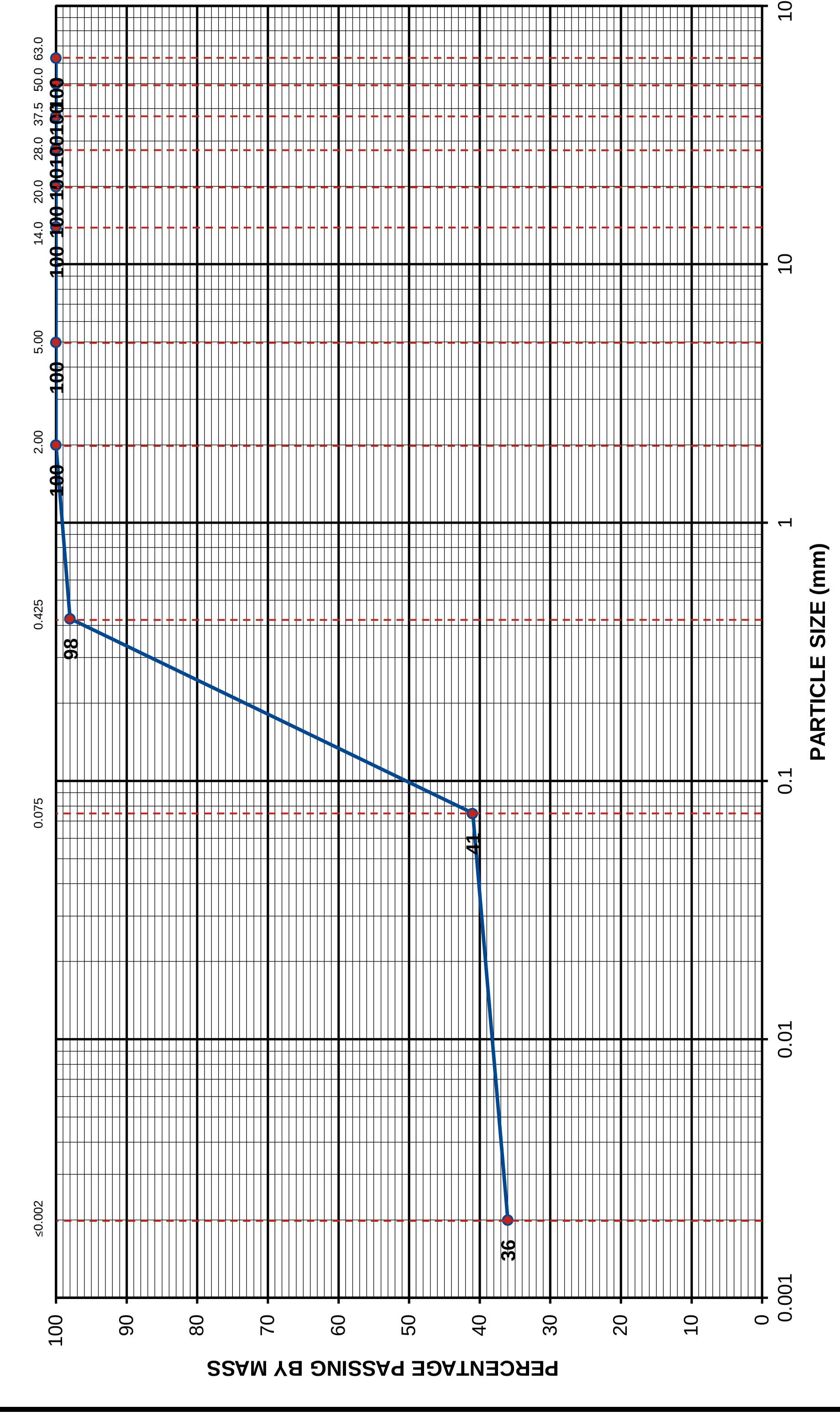

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
36%	5%			59%			-			-

HOLE No. : Test Pit 32 **DEPTH :** 400 - 800mm **SAMPLE No. :** AC43

MATERIAL DESCRIPTION : (SC) Slightly moist reddish grey dense clayey sand

ATTERBERG LIMITS : 35 / 16 / 7.6 (GM: 0.67) **POTENTIAL EXPANSIVENESS :** Low **PAGE No. :** 42 of 51

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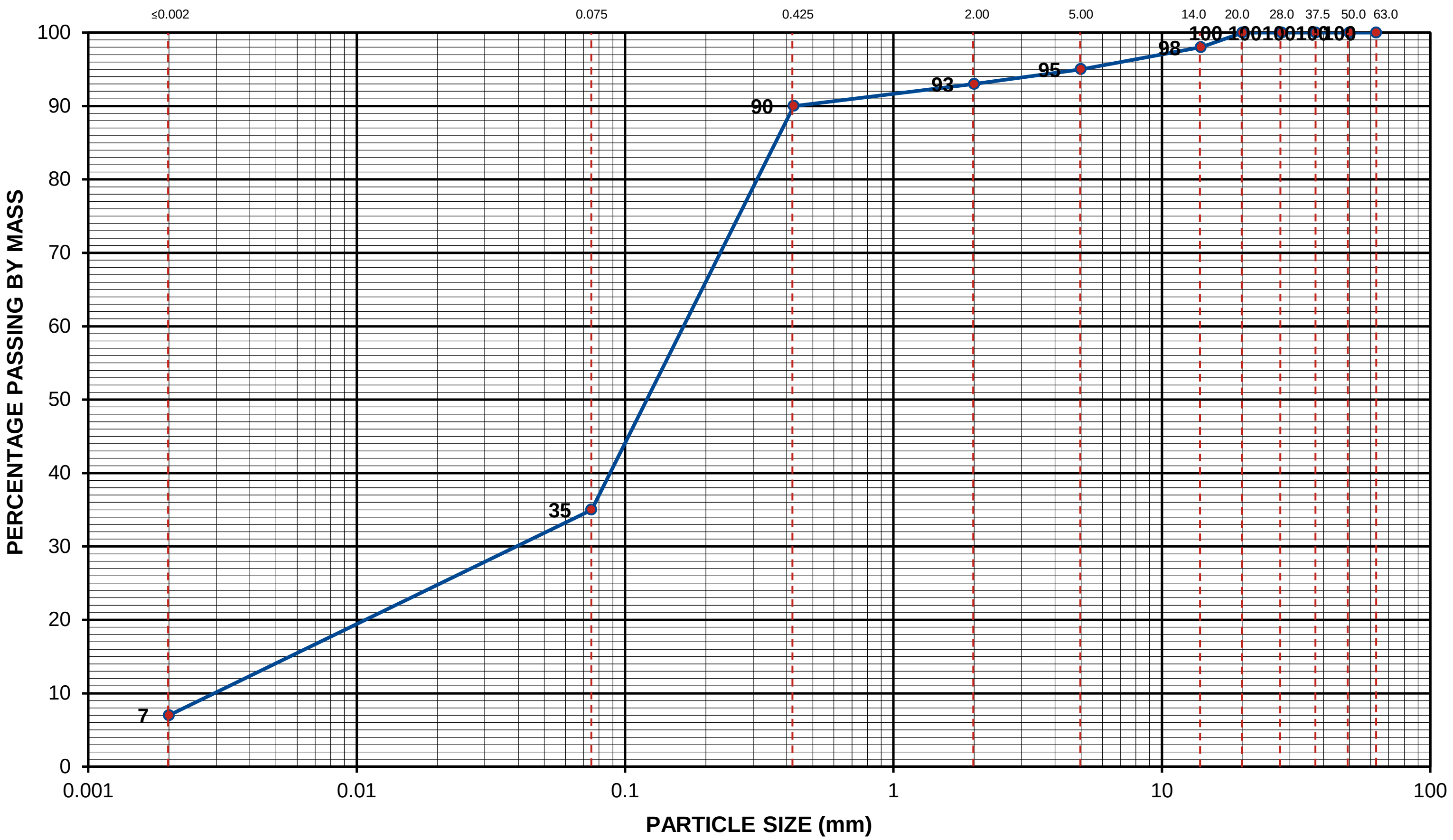

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
7%	28%			58%			7%			-

HOLE No. : Test Pit 32
DEPTH : 800 - 1300mm
SAMPLE No. : AC 44

MATERIAL DESCRIPTION : (SC) Moist light brown dense clayey sand

ATTERBERG LIMITS : 37 / 12 / 6.4 (GM: 0.83)
POTENTIAL EXPANSIVENESS : Low
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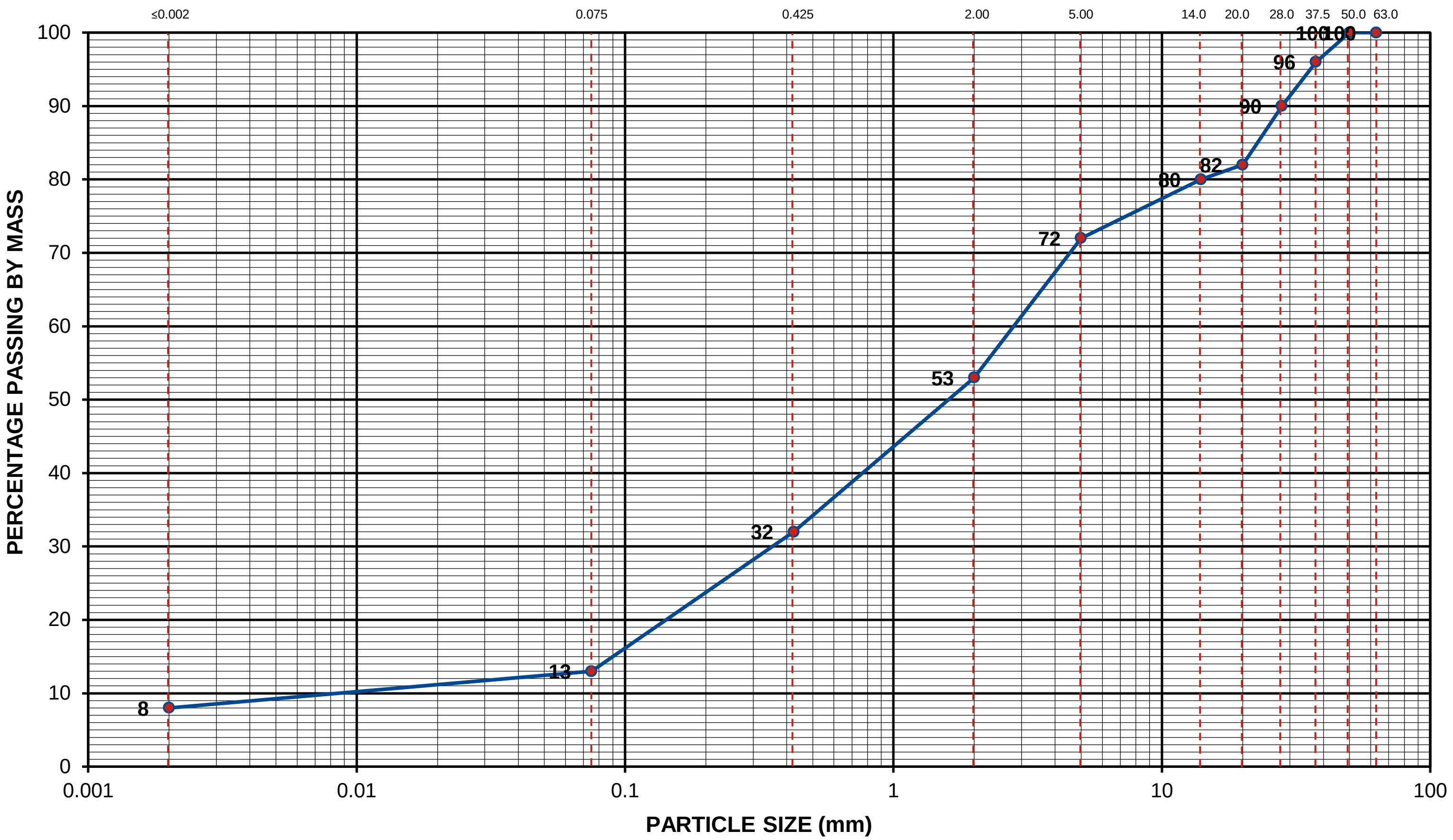

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
8%	5%			40%			47%			-

HOLE No. : Test Pit 32
DEPTH : 1300 - 2000mm
SAMPLE No. : AC 45
MATERIAL DESCRIPTION : (SC) Slightly moist dense clayey sand with mudstone gravel
ATTERBERG LIMITS : 38 / 16 / 8.2 (GM: 2.03)
POTENTIAL EXPANSIVENESS : Low
PAGE No. : 44 of 51

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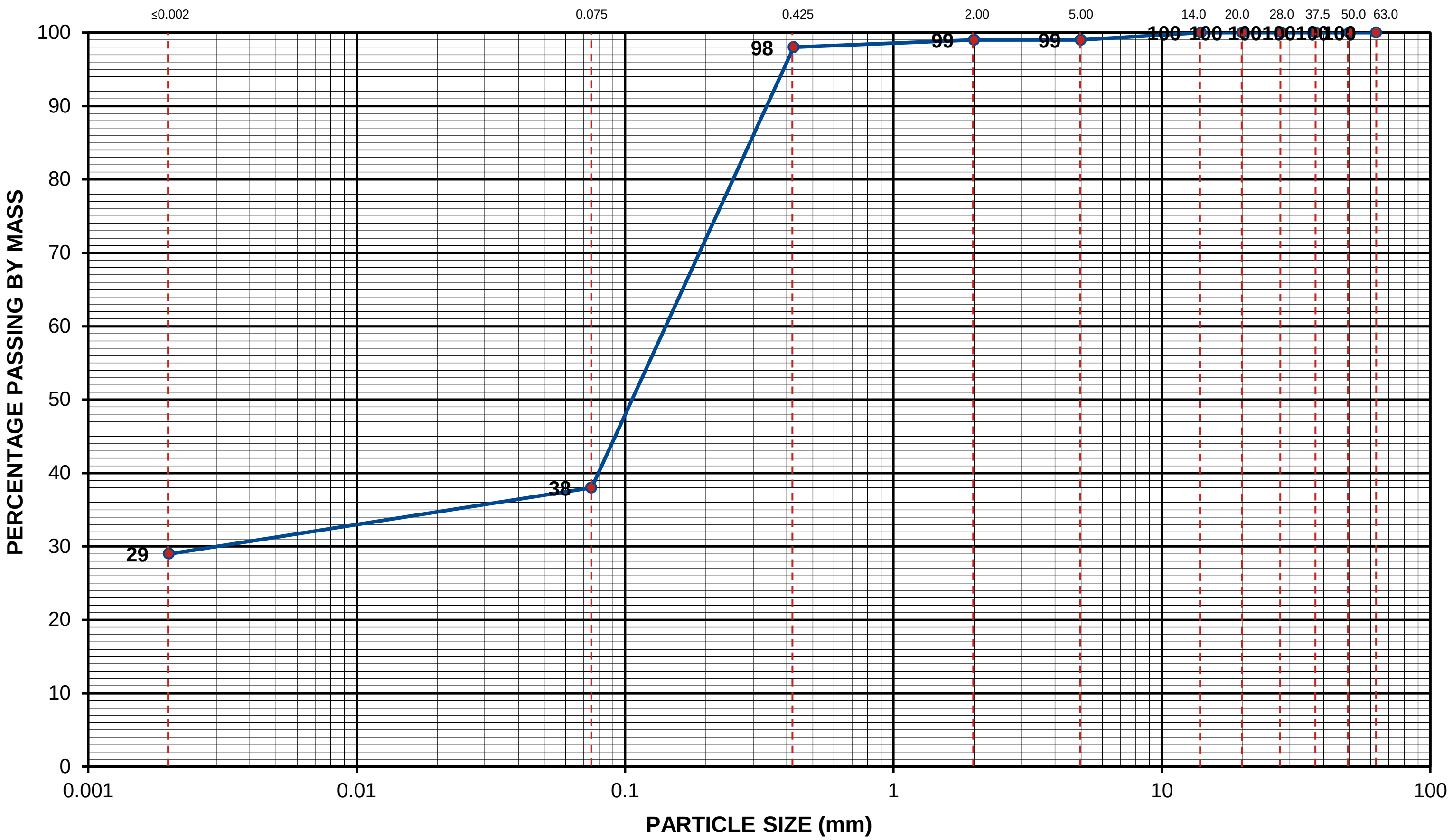

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
29%	9%			61%			1%			-

HOLE No. : Test Pit 3	**DEPTH :** 0 - 500mm	**SAMPLE No. :** AC47
MATERIAL DESCRIPTION : (SC) Moist reddish brown medium dense clayey sand		
ATTERBERG LIMITS : 31 / 10 / 5.4 (GM: 0.65)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 45 of 51

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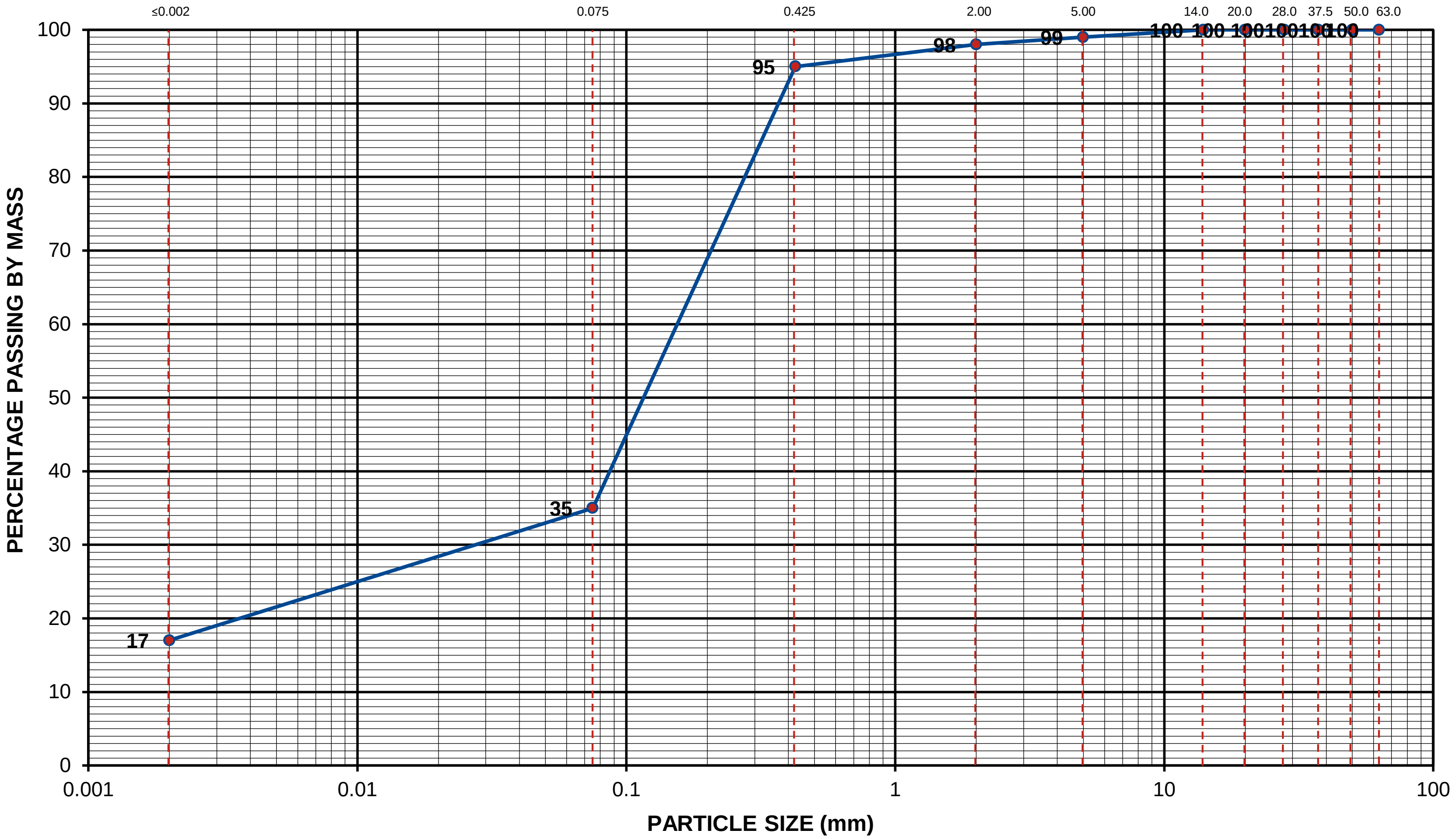

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
17%	18%			63%			2%			-

HOLE No. : Test Pit 3
DEPTH : 500 - 800mm
SAMPLE No. : AC48
MATERIAL DESCRIPTION : (SM) Moist light brown dense silty sand
ATTERBERG LIMITS : 49 / 20 / 9.5 (GM: 0.73)
POTENTIAL EXPANSIVENESS : Medium - 4.9mm
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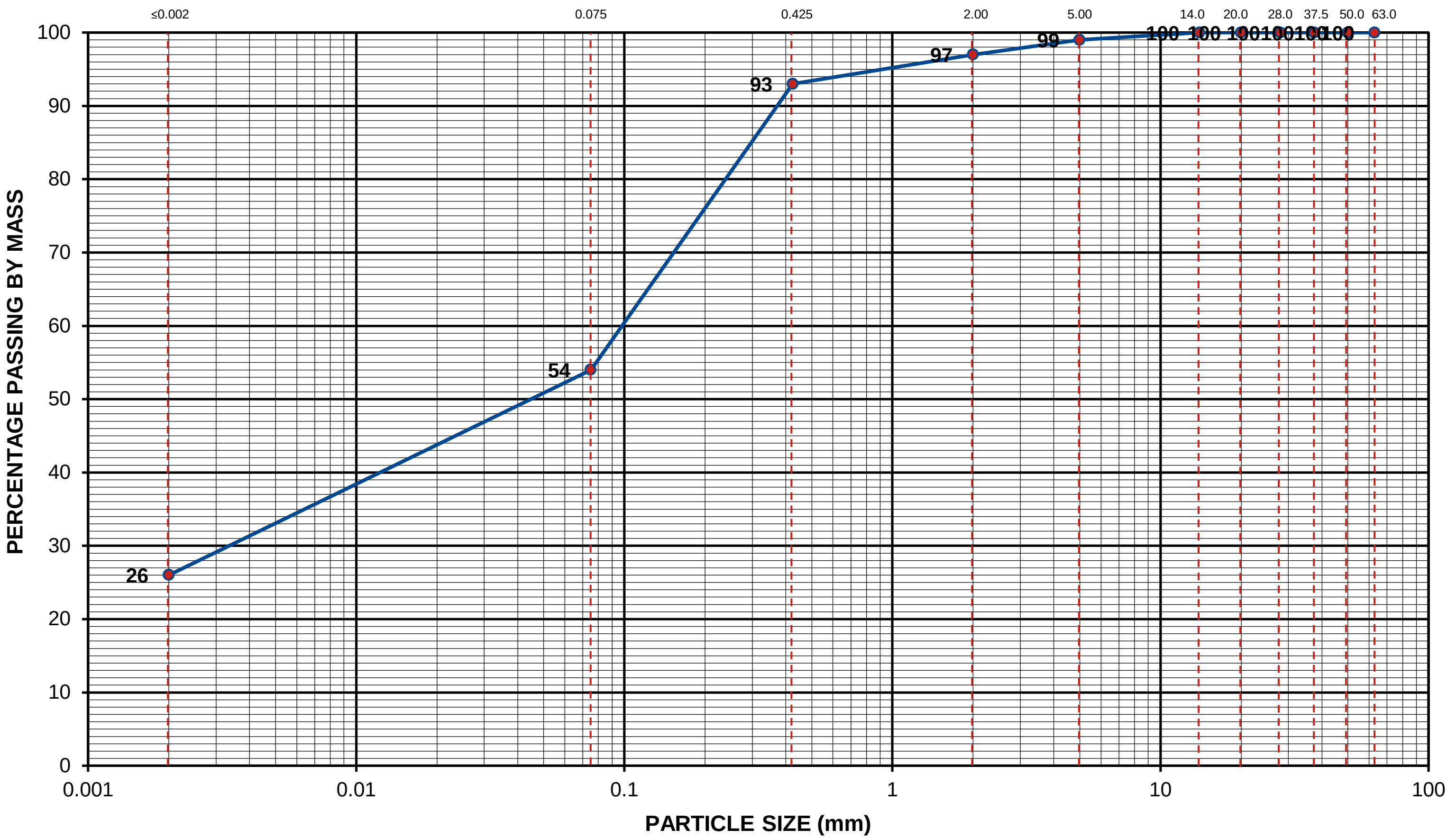

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
26%	28%			43%			3%			-

HOLE No. : Test Pit 3 **DEPTH :** 800 - 1700mm **SAMPLE No. :** AC49

MATERIAL DESCRIPTION : (CL) Moist light brown stiff sandy lean clay

ATTERBERG LIMITS : 39 / 19 / 7.0 (GM: 0.57) **POTENTIAL EXPANSIVENESS :** Medium - 11.7mm **PAGE No. :** 47 of 51

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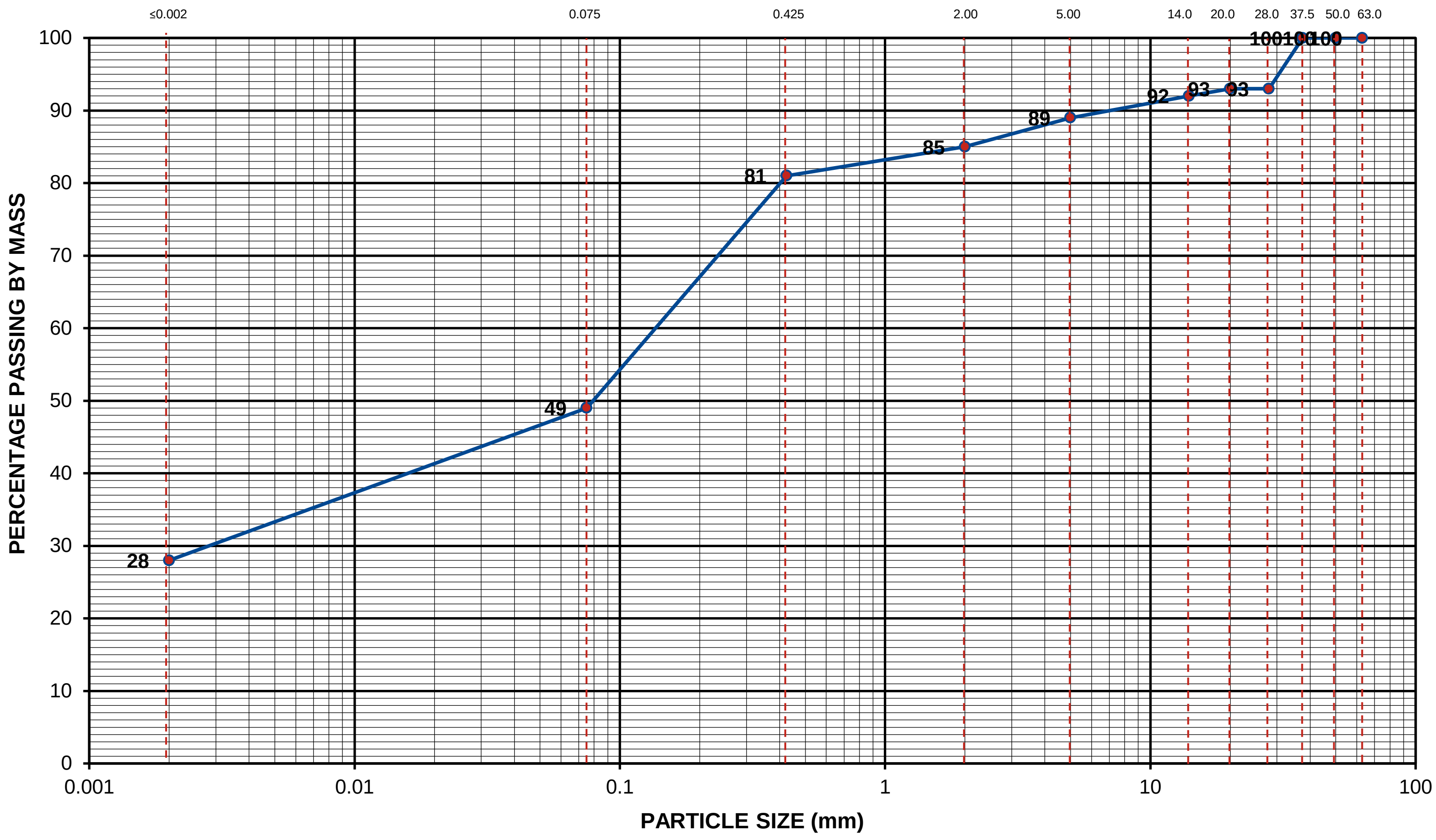

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
28%	21%			36%			15%			-

HOLE No. : Test Pit 3 **DEPTH :** 1700 - 2000mm **SAMPLE No. :** AC50

MATERIAL DESCRIPTION : (SM) Slightly moist grey dense silty sand with mudstone gravel

ATTERBERG LIMITS : 46 / 18 / 9.4 (GM: 0.85) **POTENTIAL EXPANSIVENESS :** Medium - 3.1mm **PAGE No. :** 48 of 51

AURECON - New Mangaung Cemetery, Nalisview, Bloemfontein

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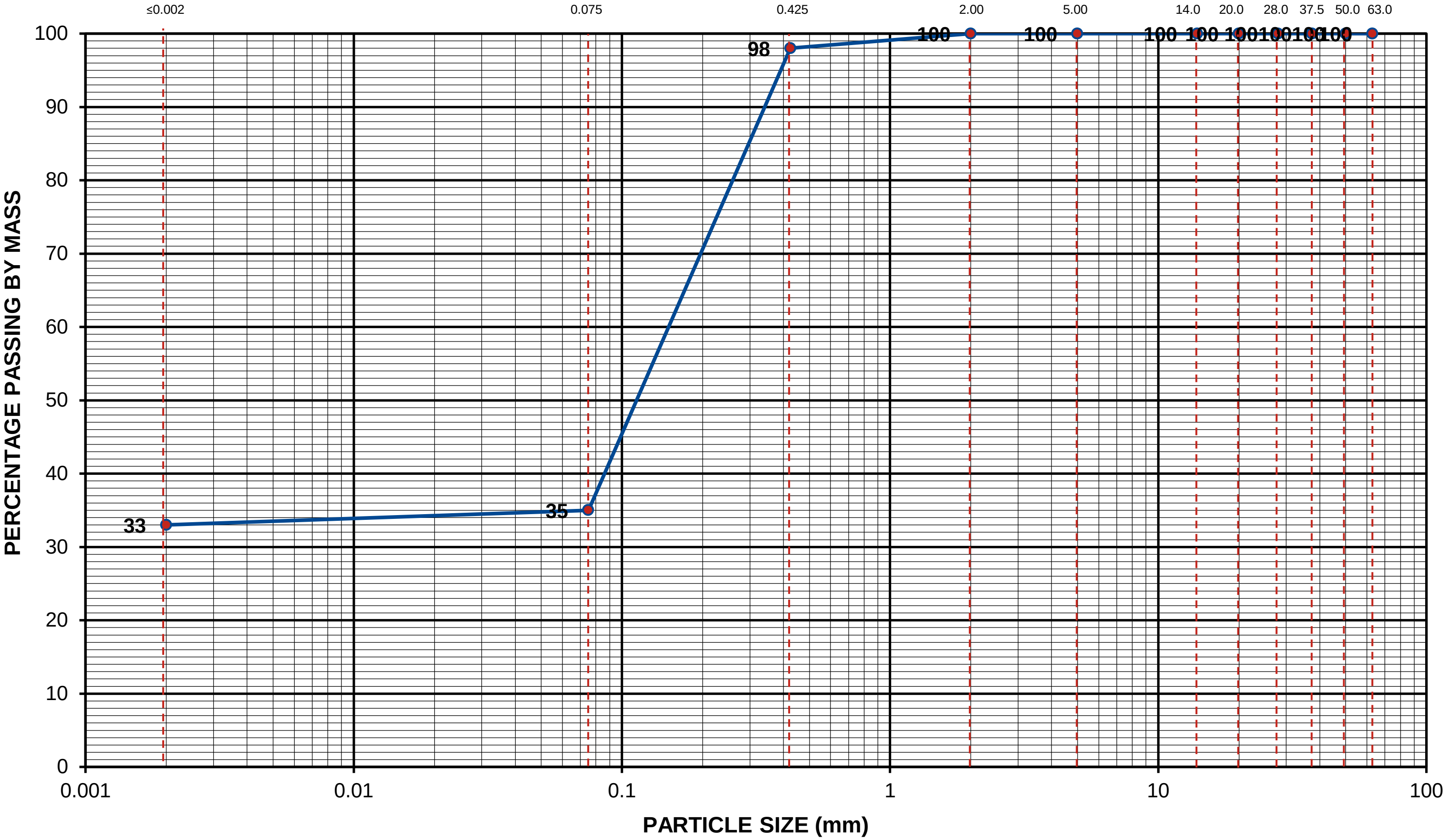

(≤0.002)	(0.002 - 0.006) FINE	(0.006 - 0.020) MEDIUM	(0.020 - 0.060) COARSE	(0.060 - 0.200) FINE	(0.200 - 0.600) MEDIUM	(0.600 - 2.000) COARSE	(2.0 - 6.0) FINE	(6.0 - 20.0) MEDIUM	(20.0 - 60.0) COARSE	(60.0 - 200.0)
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
33%	2%			65%			-			-

HOLE No. : Test Pit 1	**DEPTH :** 0 - 700mm	**SAMPLE No. :** AC51
MATERIAL DESCRIPTION : (SC) Moist reddish brown medium dense clayey sand		
ATTERBERG LIMITS : 37 / 15 / 6.7 (GM: 0.67)	**POTENTIAL EXPANSIVENESS :** Low	**PAGE No. :** 49 of 51

AURECON - New Mangaung Cemetery, Nalisview, Bloemfontein

AURECON - New Mangaung Cemetery, Nalisview, Bloemfontein

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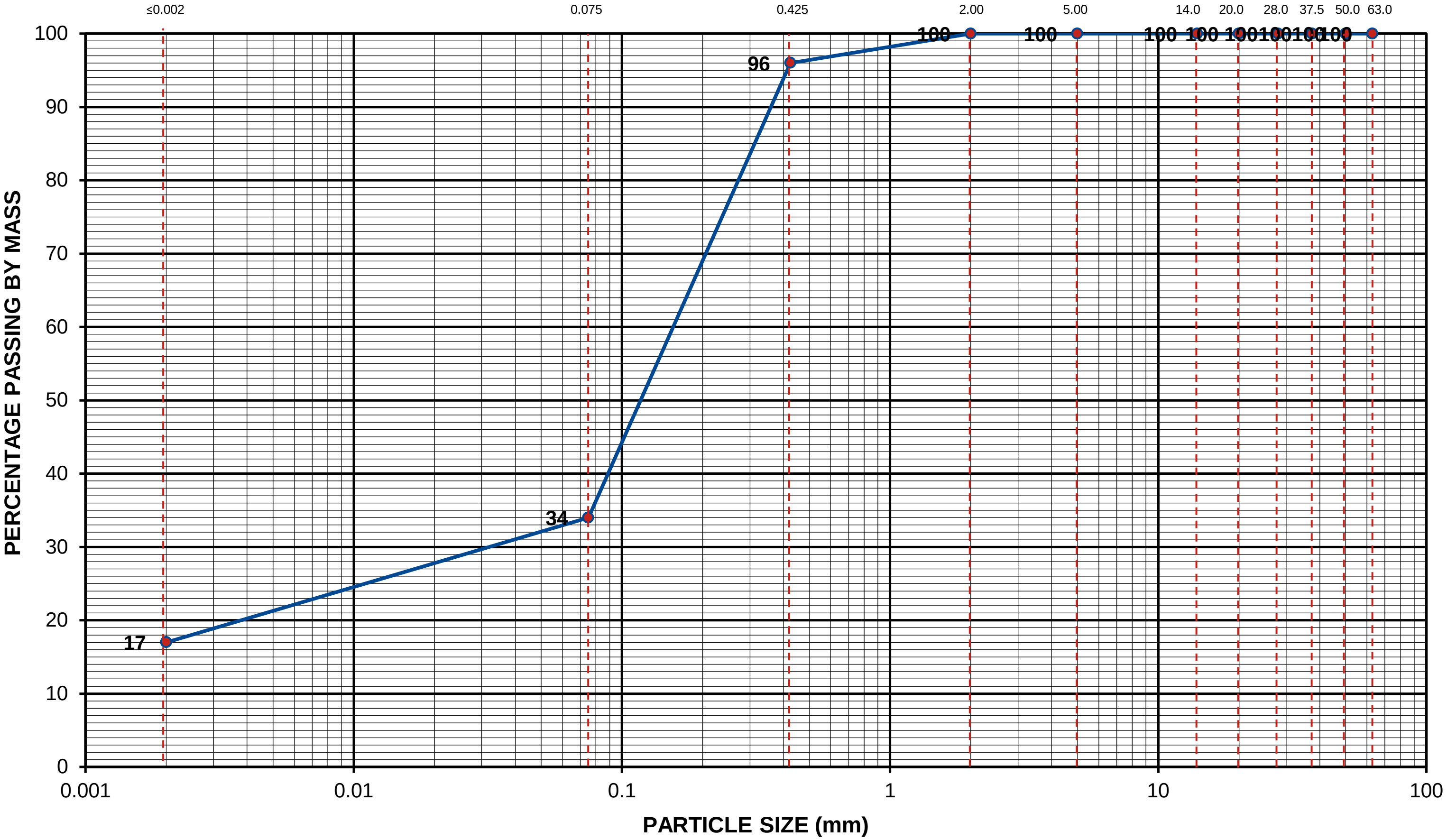

(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
17%	17%			66%			-			-

HOLE No. : Test Pit 1 | **DEPTH :** 700 - 900mm | **SAMPLE No. :** AC52

MATERIAL DESCRIPTION : (SC) Moist light brown dense clayey sand

ATTERBERG LIMITS : 41 / 17 / 7.5 (GM: 0.70) | **POTENTIAL EXPANSIVENESS :** Medium - 3.1mm | **PAGE No. :** 50 of 51

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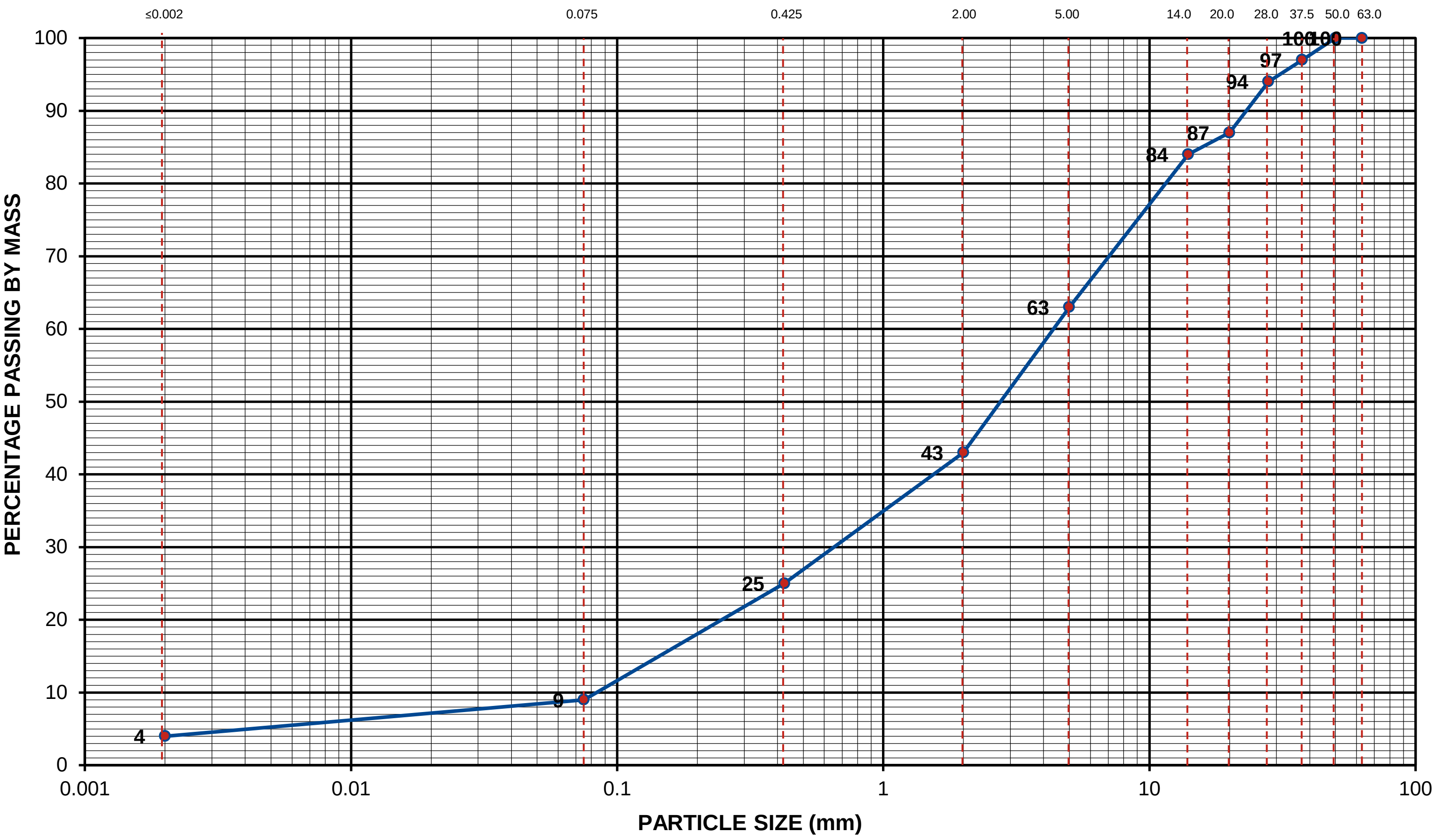
*PARTICLE SIZE DISTRIBUTION



(≤0.002)	(0.002 - 0.006)	(0.006 - 0.020)	(0.020 - 0.060)	(0.060 - 0.200)	(0.200 - 0.600)	(0.600 - 2.000)	(2.0 - 6.0)	(6.0 - 20.0)	(20.0 - 60.0)	(60.0 - 200.0)
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	
CLAY	**SILT**			**SAND**			**GRAVEL**			**COBBLE**
4%	5%			34%			57%			-

HOLE No. : Test Pit 1
DEPTH : 900 - 2000mm
SAMPLE No. : AC53
MATERIAL DESCRIPTION : (SW-SM) Moist light grey brown dense well-graded sand with silt and mudstone gravel
ATTERBERG LIMITS : 53 / 19 / 8.8 (GM: 2.23)
POTENTIAL EXPANSIVENESS : Low
PAGE No. : 51 of 51

AURECON - New Mangaung Cemetery, Nalisview, Bloemfontein

APPENDIX E

*DYNAMIC CONE PENETROMETER (DCP) TESTS

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 1 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	110	0	-	-	-	-	-
5	143	33	33	6.6	Dense	144	39
10	174	64	31	6.2	Dense	150	43
15	210	100	36	7.2	Dense	134	35
20	239	129	29	5.8	Dense	157	47
25	268	158	29	5.8	Dense	157	47
30	304	194	36	7.2	Dense	134	35
35	346	236	42	8.4	Dense	119	29
40	413	303	67	13.4	Medium Dense	84	15
45	503	393	90	18.0	Medium Dense	69	10
50	605	495	102	20.4	Medium Dense	63	9
55	683	573	78	15.6	Medium Dense	76	13
60	745	635	62	12.4	Dense	89	17
65	809	699	64	12.8	Medium Dense	87	16
70	854	744	45	9.0	Dense	113	26
75	900	790	46	9.2	Dense	111	25
80	934	824	34	6.8	Dense	140	38
85	961	851	27	5.4	Dense	165	52
90	974	864	13	2.6	Very Dense	> 200	> 110
95	999	889	25	5.0	Very Dense	174	57
100	1014	904	15	3.0	Very Dense	> 200	> 110
105	1023	913	9	1.8	Very Dense	> 200	> 110
110	1045	935	22	4.4	Very Dense	188	68
115	1056	946	11	2.2	Very Dense	> 200	> 110
120	1074	964	18	3.6	Very Dense	> 200	88
125	1083	973	9	1.8	Very Dense	> 200	> 110
130	1096	986	13	2.6	Very Dense	> 200	> 110
135	1114	1004	18	3.6	Very Dense	> 200	88
140	1134	1024	20	4.0	Very Dense	200	77
145	1150	1040	16	3.2	Very Dense	> 200	103
150	1171	1061	21	4.2	Very Dense	193	72
155	1189	1079	18	3.6	Very Dense	> 200	88
160	1208	1098	19	3.8	Very Dense	> 200	82
165	1224	1114	16	3.2	Very Dense	> 200	103
170	1245	1135	21	4.2	Very Dense	193	72
175	1274	1164	29	5.8	Dense	157	47
180	1294	1184	20	4.0	Very Dense	200	77
185	1324	1214	30	6.0	Dense	154	45
190	1346	1236	22	4.4	Very Dense	188	68
195	1374	1264	28	5.6	Dense	161	49
200	1396	1286	22	4.4	Very Dense	188	68
205	1414	1304	18	3.6	Very Dense	> 200	88
210	1436	1326	22	4.4	Very Dense	188	68
215	1454	1344	18	3.6	Very Dense	> 200	88
220	1486	1376	32	6.4	Dense	147	41
225	1505	1395	19	3.8	Very Dense	> 200	82
230	1523	1413	18	3.6	Very Dense	> 200	88
235	1545	1435	22	4.4	Very Dense	188	68
240	1563	1453	18	3.6	Very Dense	> 200	88
245	1575	1465	12	2.4	Very Dense	> 200	> 110
250	1593	1483	18	3.6	Very Dense	> 200	88

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 1 **DEPTH BELOW NGL:** 0.000m

<u>*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)</u>

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1616	1506	23	4.6	Very Dense	183	64
260	1634	1524	18	3.6	Very Dense	> 200	88
265	1655	1545	21	4.2	Very Dense	193	72
270	1675	1565	20	4.0	Very Dense	200	77
275	1695	1585	20	4.0	Very Dense	200	77
280	1714	1604	19	3.8	Very Dense	> 200	82
285	1743	1633	29	5.8	Dense	157	47
290	1749	1639	6	1.2	Very Dense	> 200	> 110
295	1758	1648	9	1.8	Very Dense	> 200	> 110
300	1783	1673	25	5.0	Very Dense	174	57
305	1793	1683	10	2.0	Very Dense	> 200	> 110
310	1814	1704	21	4.2	Very Dense	193	72
315	1830	1720	16	3.2	Very Dense	> 200	103
320	1854	1744	24	4.8	Very Dense	178	60
325	1873	1763	19	3.8	Very Dense	> 200	82
330	1900	1790	27	5.4	Dense	165	52
335	1920	1810	20	4.0	Very Dense	200	77
340	1933	1823	13	2.6	Very Dense	> 200	> 110
345	1953	1843	20	4.0	Very Dense	200	77

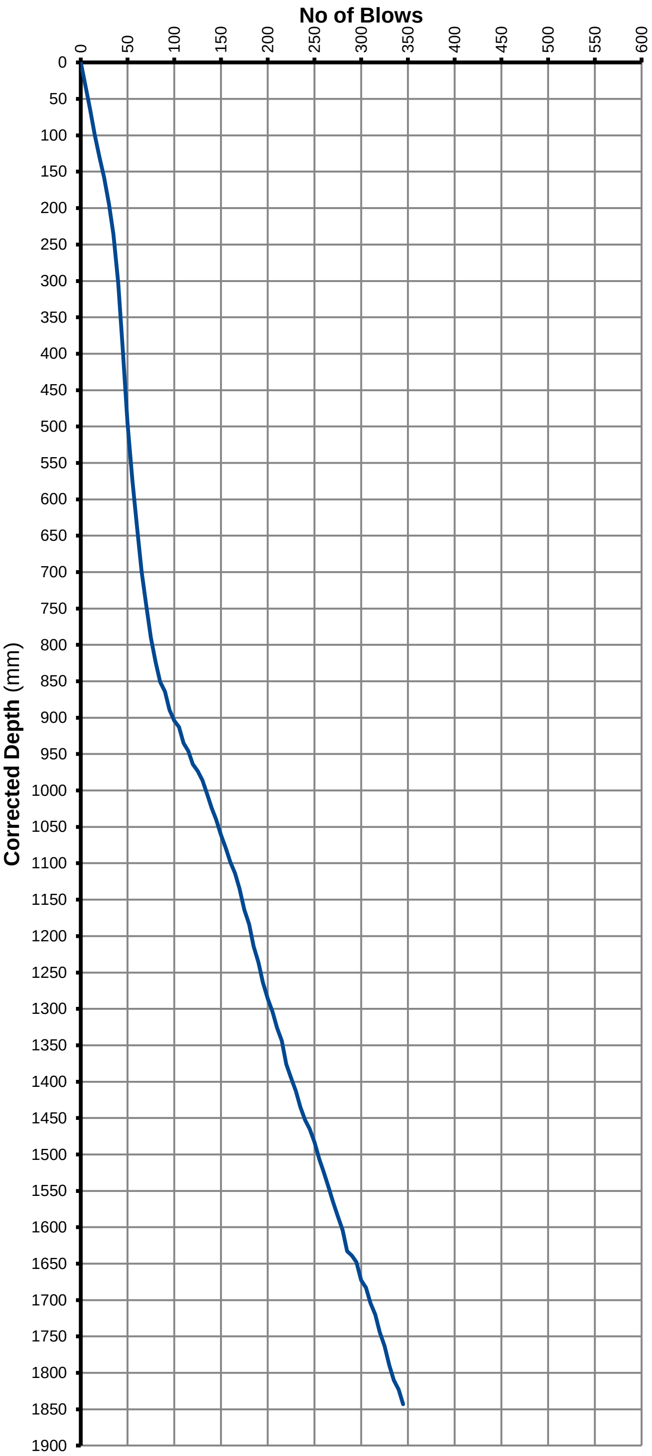
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

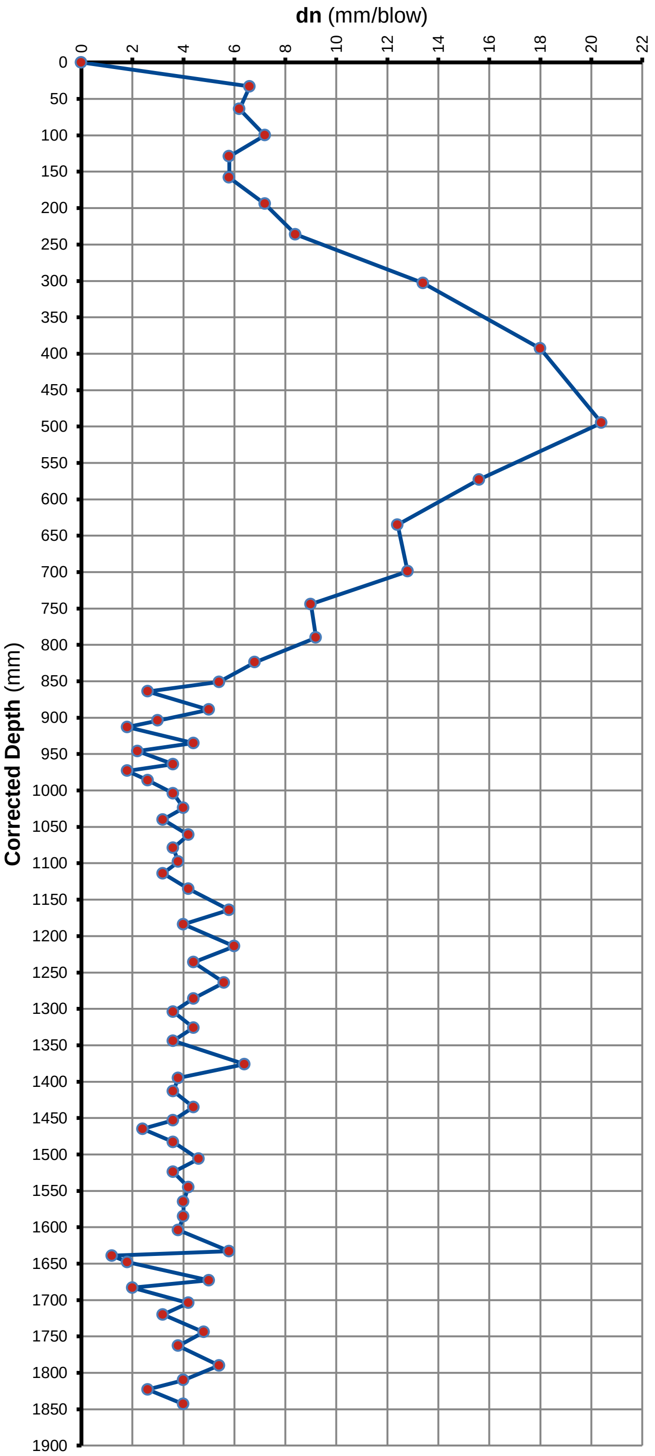
POSITION: DCP 1 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



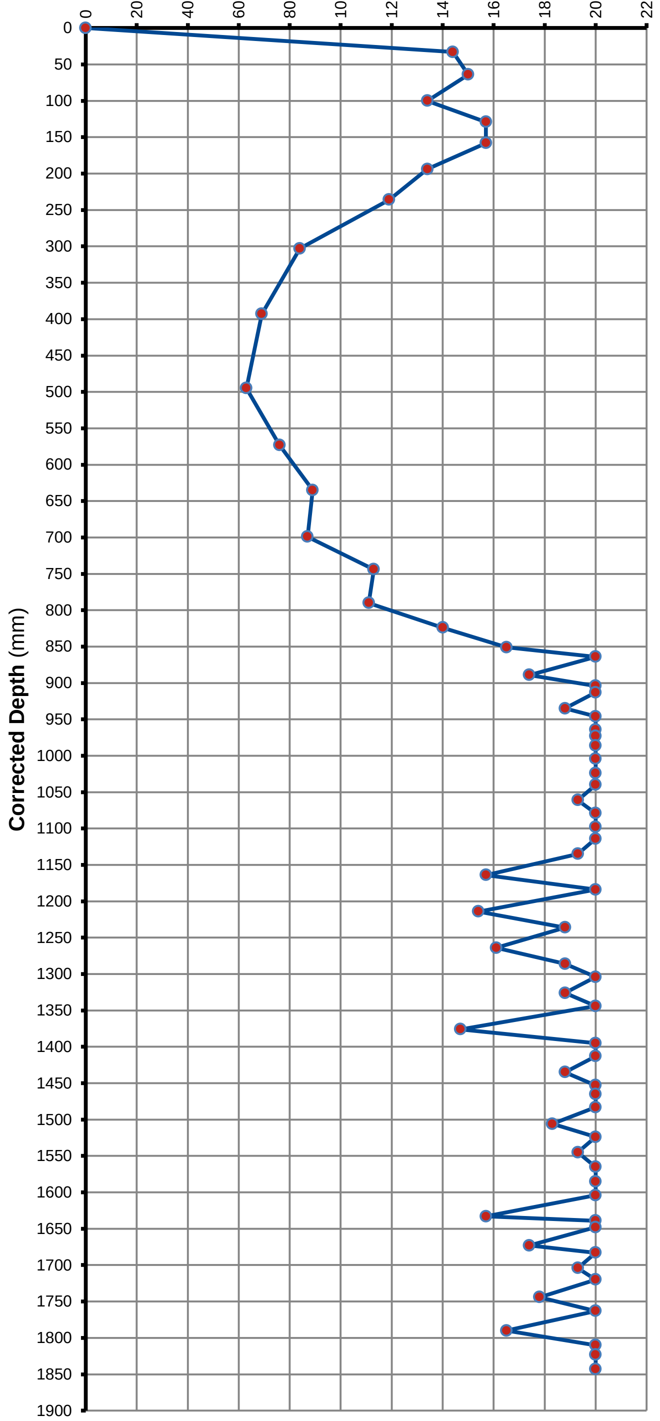
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

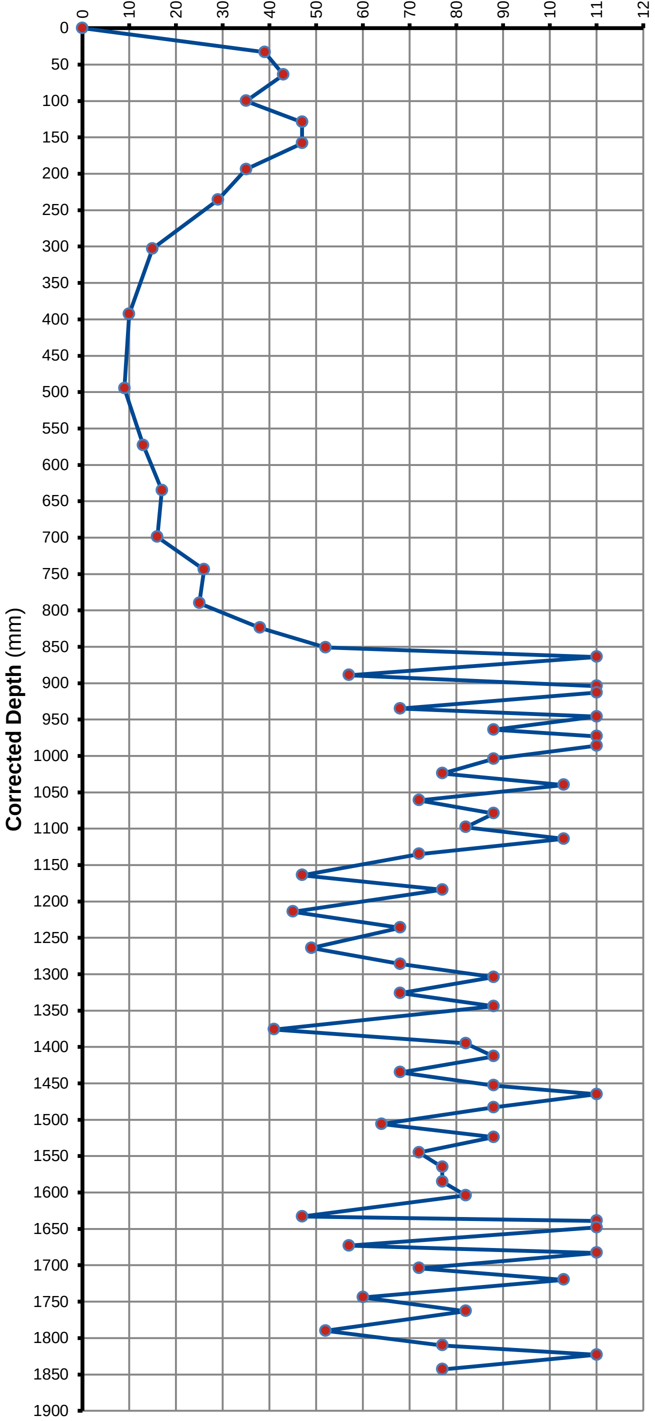
POSITION: DCP 1 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 2 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	110	0	-	-	-	-	-
5	156	46	46	9.2	Dense	111	25
10	189	79	33	6.6	Dense	144	39
15	274	164	85	17.0	Medium Dense	72	11
20	354	244	80	16.0	Medium Dense	75	12
25	422	312	68	13.6	Medium Dense	83	15
30	461	351	39	7.8	Dense	126	32
35	506	396	45	9.0	Dense	113	26
40	546	436	40	8.0	Dense	124	31
45	594	484	48	9.6	Dense	107	24
50	624	514	30	6.0	Dense	154	45
55	654	544	30	6.0	Dense	154	45
60	679	569	25	5.0	Very Dense	174	57
65	705	595	26	5.2	Dense	169	54
70	736	626	31	6.2	Dense	150	43
75	765	655	29	5.8	Dense	157	47
80	783	673	18	3.6	Very Dense	> 200	88
85	820	710	37	7.4	Dense	132	34
90	846	736	26	5.2	Dense	169	54
95	876	766	30	6.0	Dense	154	45
100	900	790	24	4.8	Very Dense	178	60
105	925	815	25	5.0	Very Dense	174	57
110	946	836	21	4.2	Very Dense	193	72
115	970	860	24	4.8	Very Dense	178	60
120	994	884	24	4.8	Very Dense	178	60
125	1006	896	12	2.4	Very Dense	> 200	> 110
130	1042	932	36	7.2	Dense	134	35
135	1064	954	22	4.4	Very Dense	188	68
140	1091	981	27	5.4	Dense	165	52
145	1113	1003	22	4.4	Very Dense	188	68
150	1140	1030	27	5.4	Dense	165	52
155	1169	1059	29	5.8	Dense	157	47
160	1200	1090	31	6.2	Dense	150	43
165	1241	1131	41	8.2	Dense	122	30
170	1278	1168	37	7.4	Dense	132	34
175	1314	1204	36	7.2	Dense	134	35
180	1346	1236	32	6.4	Dense	147	41
185	1376	1266	30	6.0	Dense	154	45
190	1410	1300	34	6.8	Dense	140	38
195	1436	1326	26	5.2	Dense	169	54
200	1465	1355	29	5.8	Dense	157	47
205	1496	1386	31	6.2	Dense	150	43
210	1524	1414	28	5.6	Dense	161	49
215	1555	1445	31	6.2	Dense	150	43
220	1584	1474	29	5.8	Dense	157	47
225	1614	1504	30	6.0	Dense	154	45
230	1640	1530	26	5.2	Dense	169	54
235	1667	1557	27	5.4	Dense	165	52
240	1691	1581	24	4.8	Very Dense	178	60
245	1717	1607	26	5.2	Dense	169	54
250	1743	1633	26	5.2	Dense	169	54

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 2 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1765	1655	22	4.4	Very Dense	188	68
260	1795	1685	30	6.0	Dense	154	45
265	1819	1709	24	4.8	Very Dense	178	60
270	1843	1733	24	4.8	Very Dense	178	60
275	1865	1755	22	4.4	Very Dense	188	68
280	1893	1783	28	5.6	Dense	161	49
285	1923	1813	30	6.0	Dense	154	45
290	1943	1833	20	4.0	Very Dense	200	77

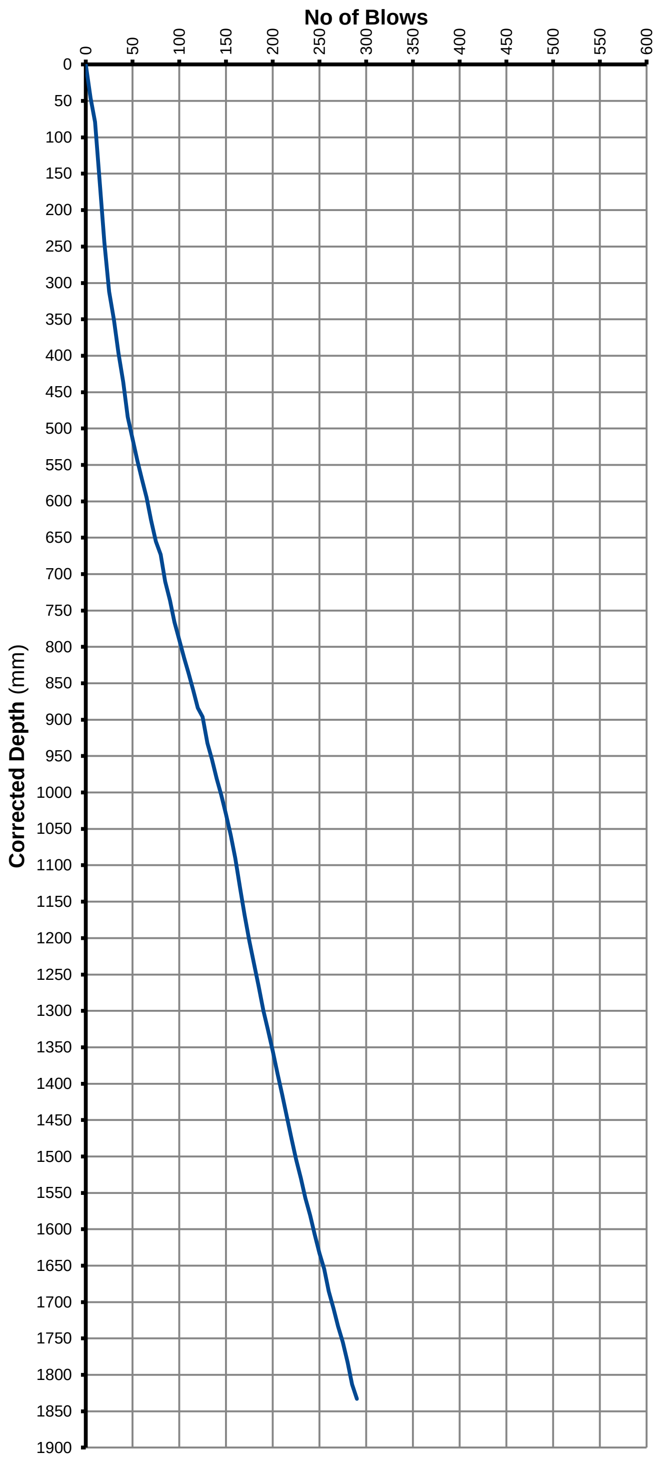
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

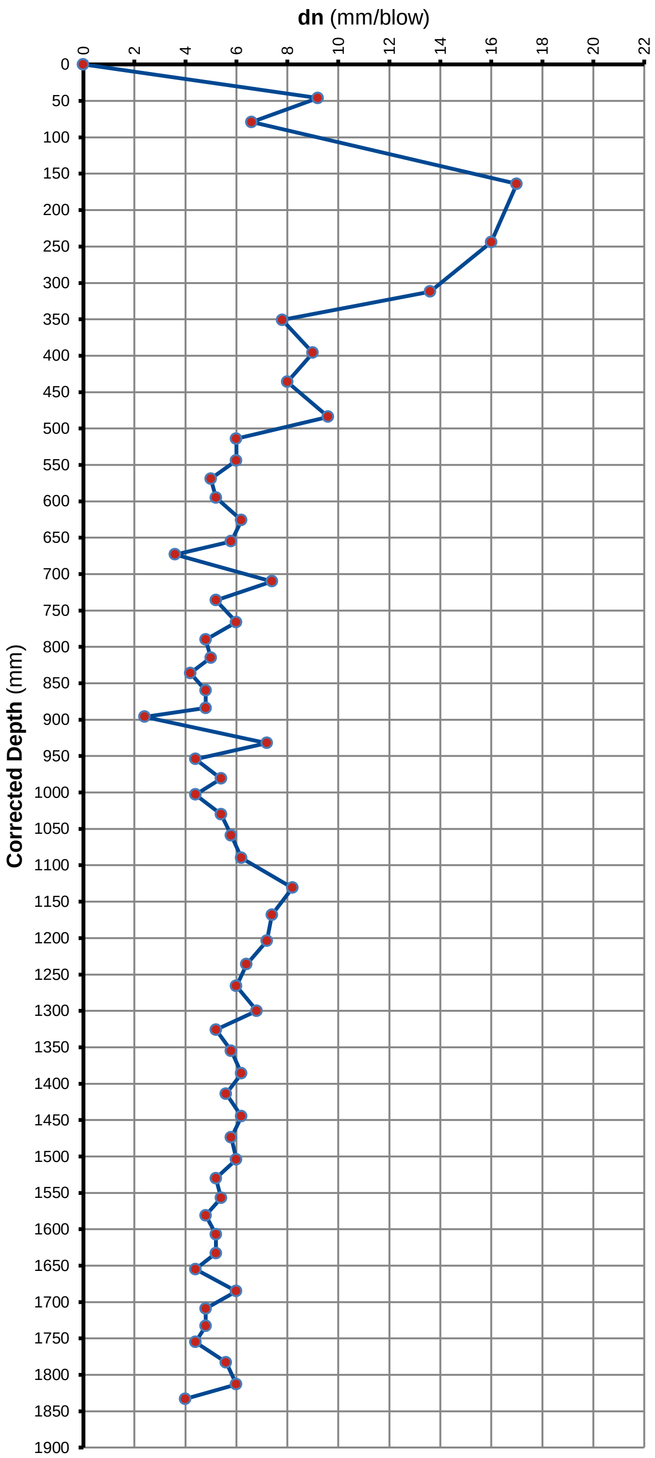
POSITION: DCP 2 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



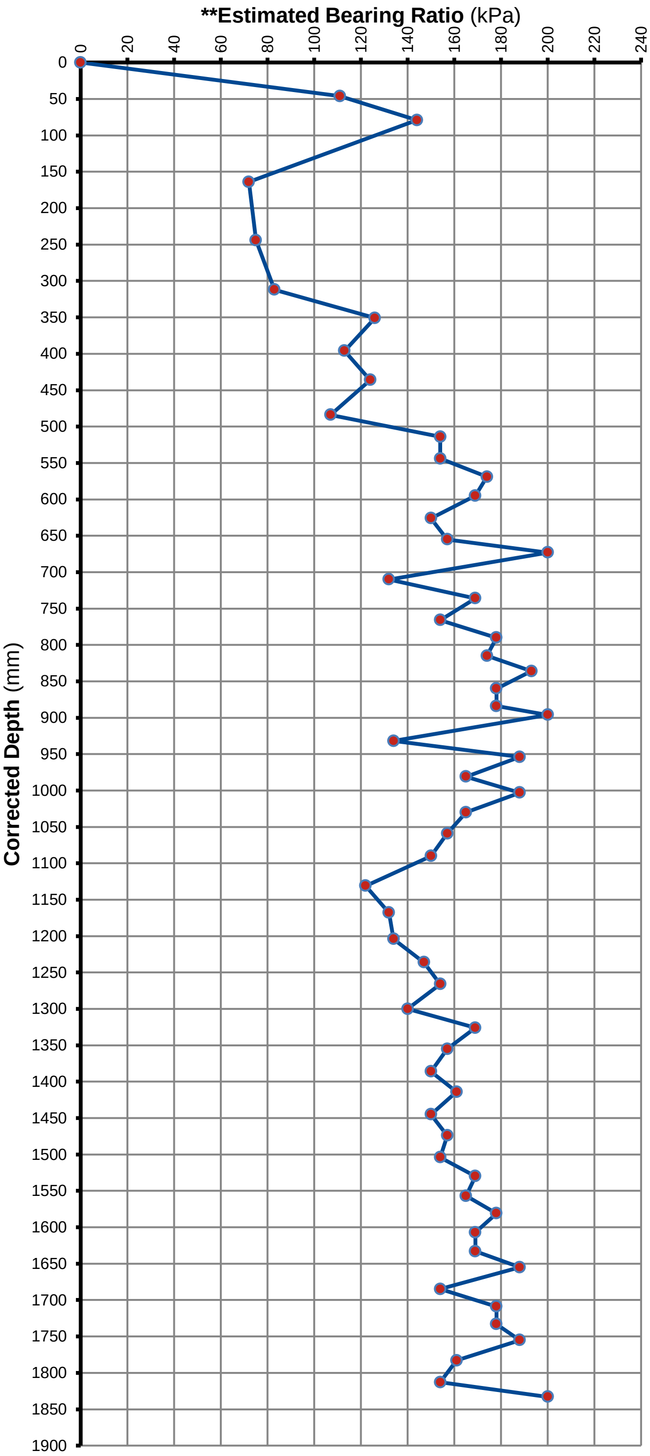
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

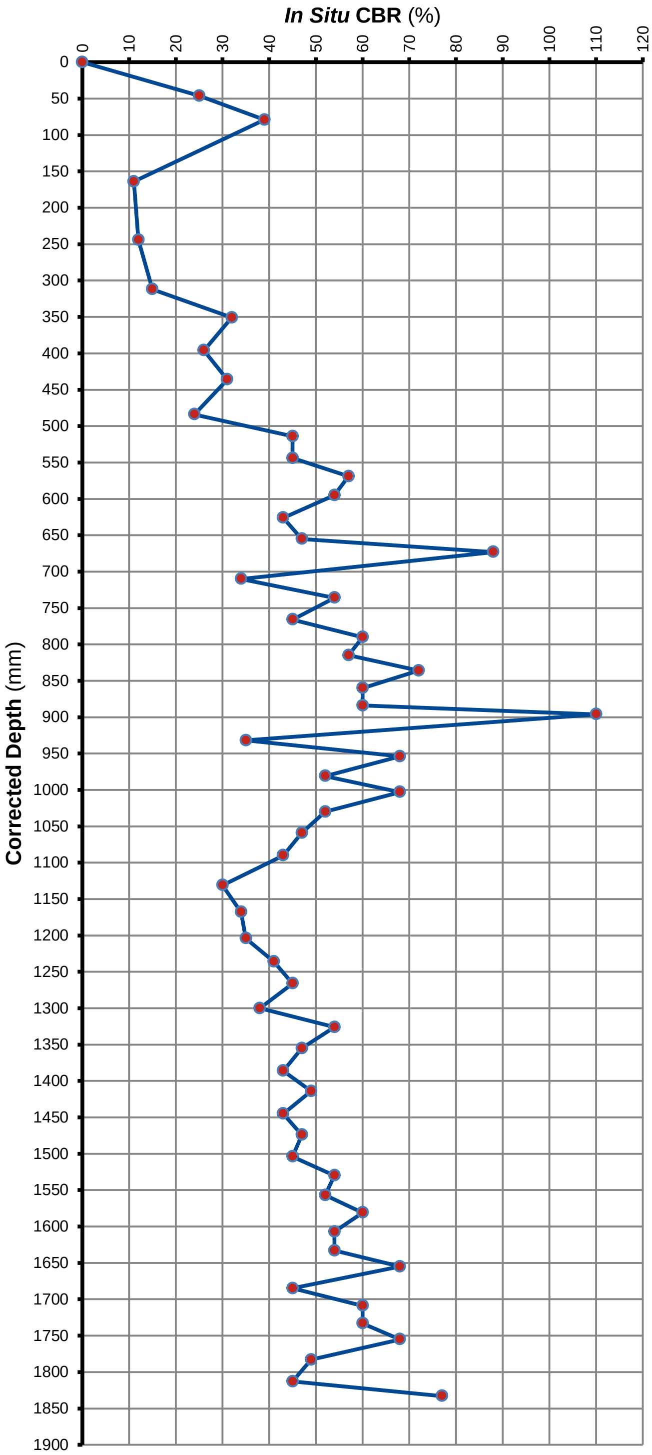
POSITION: DCP 2 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 3 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	110	0	-	-	-	-	-
5	186	76	76	15.2	Medium Dense	77	13
10	234	124	48	9.6	Dense	107	24
15	273	163	39	7.8	Dense	126	32
20	314	204	41	8.2	Dense	122	30
25	354	244	40	8.0	Dense	124	31
30	392	282	38	7.6	Dense	129	33
35	432	322	40	8.0	Dense	124	31
40	476	366	44	8.8	Dense	115	27
45	511	401	35	7.0	Dense	137	36
50	543	433	32	6.4	Dense	147	41
55	583	473	40	8.0	Dense	124	31
60	616	506	33	6.6	Dense	144	39
65	653	543	37	7.4	Dense	132	34
70	692	582	39	7.8	Dense	126	32
75	730	620	38	7.6	Dense	129	33
80	765	655	35	7.0	Dense	137	36
85	800	690	35	7.0	Dense	137	36
90	843	733	43	8.6	Dense	117	28
95	876	766	33	6.6	Dense	144	39
100	920	810	44	8.8	Dense	115	27
105	956	846	36	7.2	Dense	134	35
110	994	884	38	7.6	Dense	129	33
115	1034	924	40	8.0	Dense	124	31
120	1076	966	42	8.4	Dense	119	29
125	1124	1014	48	9.6	Dense	107	24
130	1163	1053	39	7.8	Dense	126	32
135	1200	1090	37	7.4	Dense	132	34
140	1223	1113	23	4.6	Very Dense	183	64
145	1254	1144	31	6.2	Dense	150	43
150	1275	1165	21	4.2	Very Dense	193	72
155	1290	1180	15	3.0	Very Dense	> 200	> 110
160	1305	1195	15	3.0	Very Dense	> 200	> 110
165	1314	1204	9	1.8	Very Dense	> 200	> 110
170	1324	1214	10	2.0	Very Dense	> 200	> 110
175	1339	1229	15	3.0	Very Dense	> 200	> 110
180	1345	1235	6	1.2	Very Dense	> 200	> 110
185	1355	1245	10	2.0	Very Dense	> 200	> 110
190	1364	1254	9	1.8	Very Dense	> 200	> 110
195	1367	1257	3	0.6	Very Dense	> 200	> 110
200	1372	1262	5	1.0	Very Dense	> 200	> 110
205	1376	1266	4	0.8	Very Dense	> 200	> 110
210	1383	1273	7	1.4	Very Dense	> 200	> 110
215	1389	1279	6	1.2	Very Dense	> 200	> 110
220	1395	1285	6	1.2	Very Dense	> 200	> 110
225	1403	1293	8	1.6	Very Dense	> 200	> 110
230	1409	1299	6	1.2	Very Dense	> 200	> 110
235	1416	1306	7	1.4	Very Dense	> 200	> 110
240	1423	1313	7	1.4	Very Dense	> 200	> 110
245	1425	1315	2	0.4	Very Dense	> 200	> 110
250	1429	1319	4	0.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 3 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

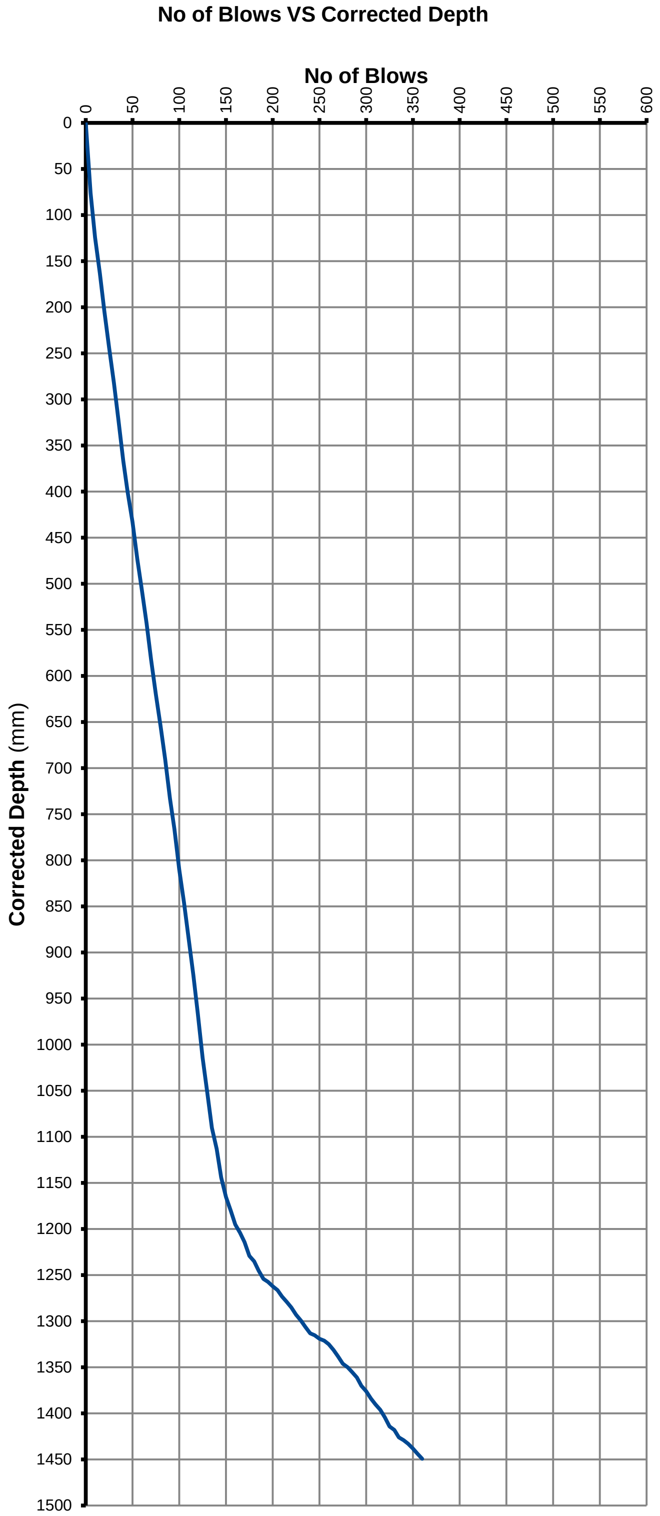
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1431	1321	2	0.4	Very Dense	> 200	> 110
260	1435	1325	4	0.8	Very Dense	> 200	> 110
265	1441	1331	6	1.2	Very Dense	> 200	> 110
270	1448	1338	7	1.4	Very Dense	> 200	> 110
275	1456	1346	8	1.6	Very Dense	> 200	> 110
280	1460	1350	4	0.8	Very Dense	> 200	> 110
285	1465	1355	5	1.0	Very Dense	> 200	> 110
290	1471	1361	6	1.2	Very Dense	> 200	> 110
295	1480	1370	9	1.8	Very Dense	> 200	> 110
300	1486	1376	6	1.2	Very Dense	> 200	> 110
305	1494	1384	8	1.6	Very Dense	> 200	> 110
310	1500	1390	6	1.2	Very Dense	> 200	> 110
315	1506	1396	6	1.2	Very Dense	> 200	> 110
320	1514	1404	8	1.6	Very Dense	> 200	> 110
325	1524	1414	10	2.0	Very Dense	> 200	> 110
330	1528	1418	4	0.8	Very Dense	> 200	> 110
335	1536	1426	8	1.6	Very Dense	> 200	> 110
340	1539	1429	3	0.6	Very Dense	> 200	> 110
345	1543	1433	4	0.8	Very Dense	> 200	> 110
350	1548	1438	5	1.0	Very Dense	> 200	> 110
355	1554	1444	6	1.2	Very Dense	> 200	> 110
360	1559	1449	5	1.0	Very Dense	> 200	> 110
365	Refusal						

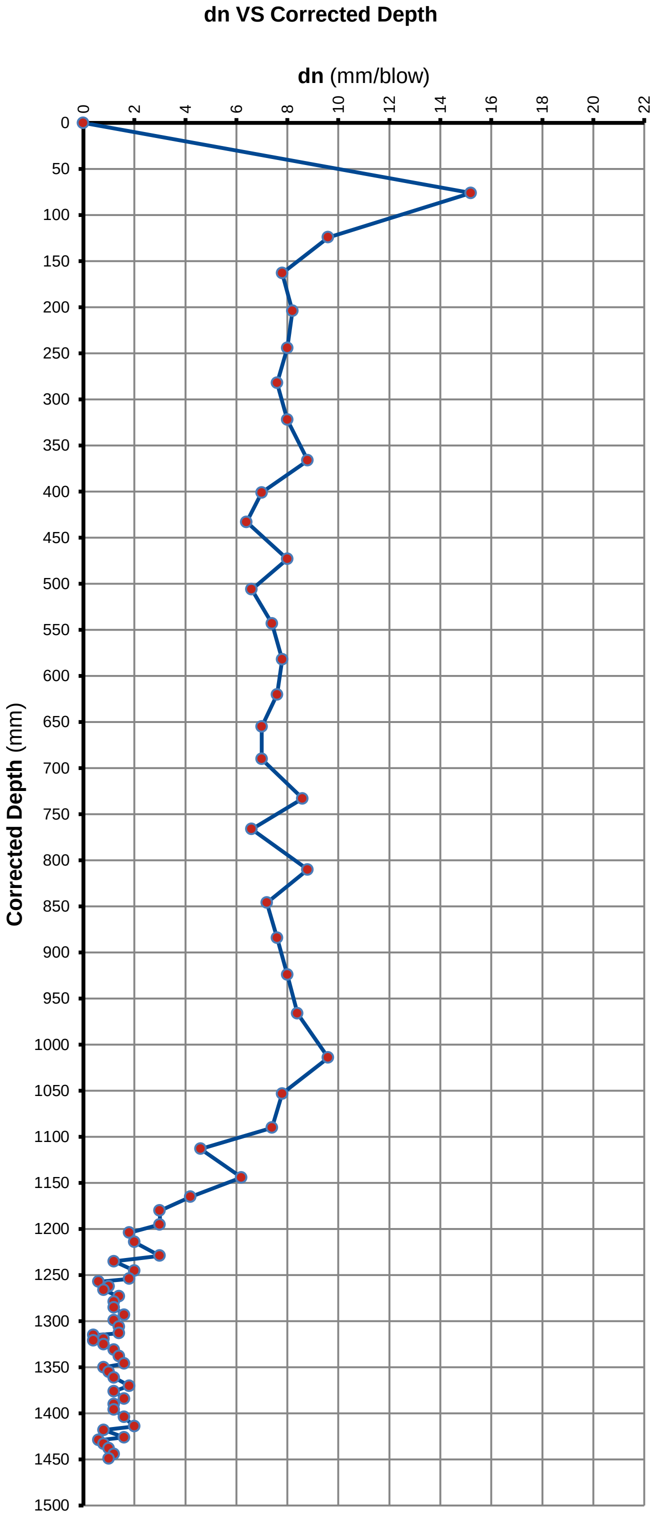
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 3 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

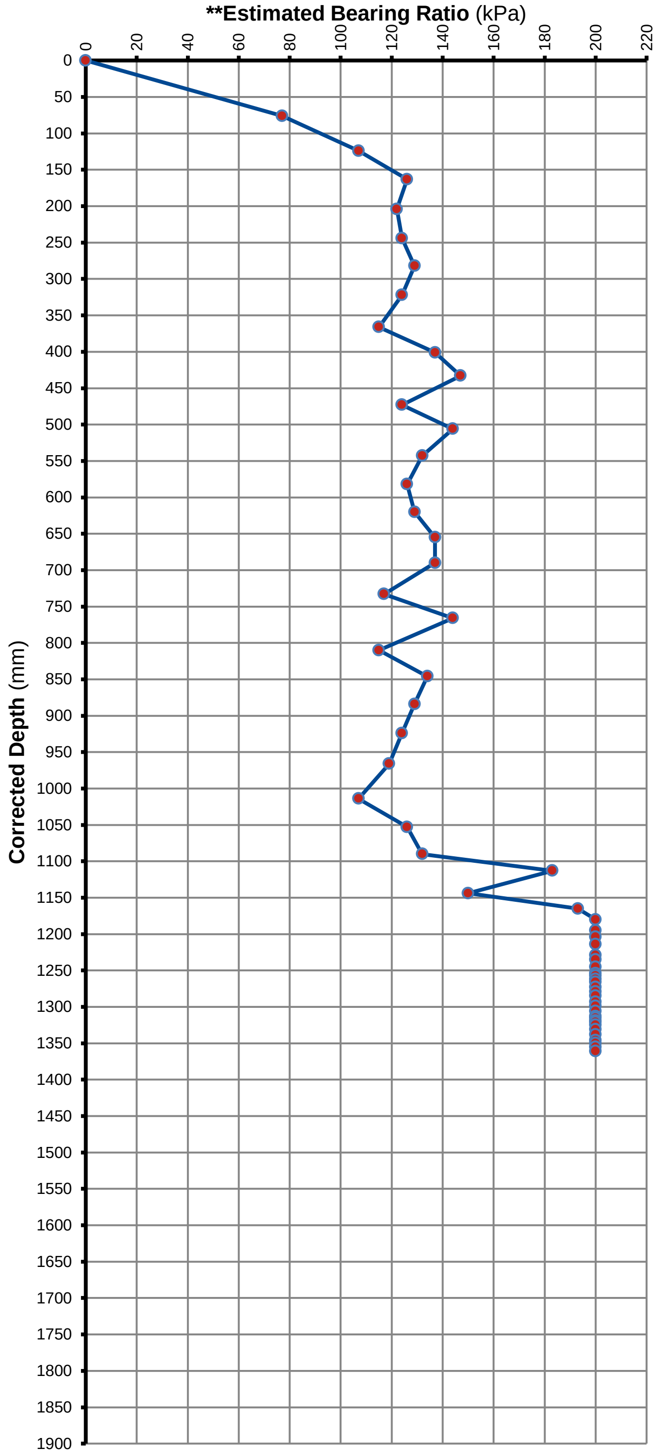
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

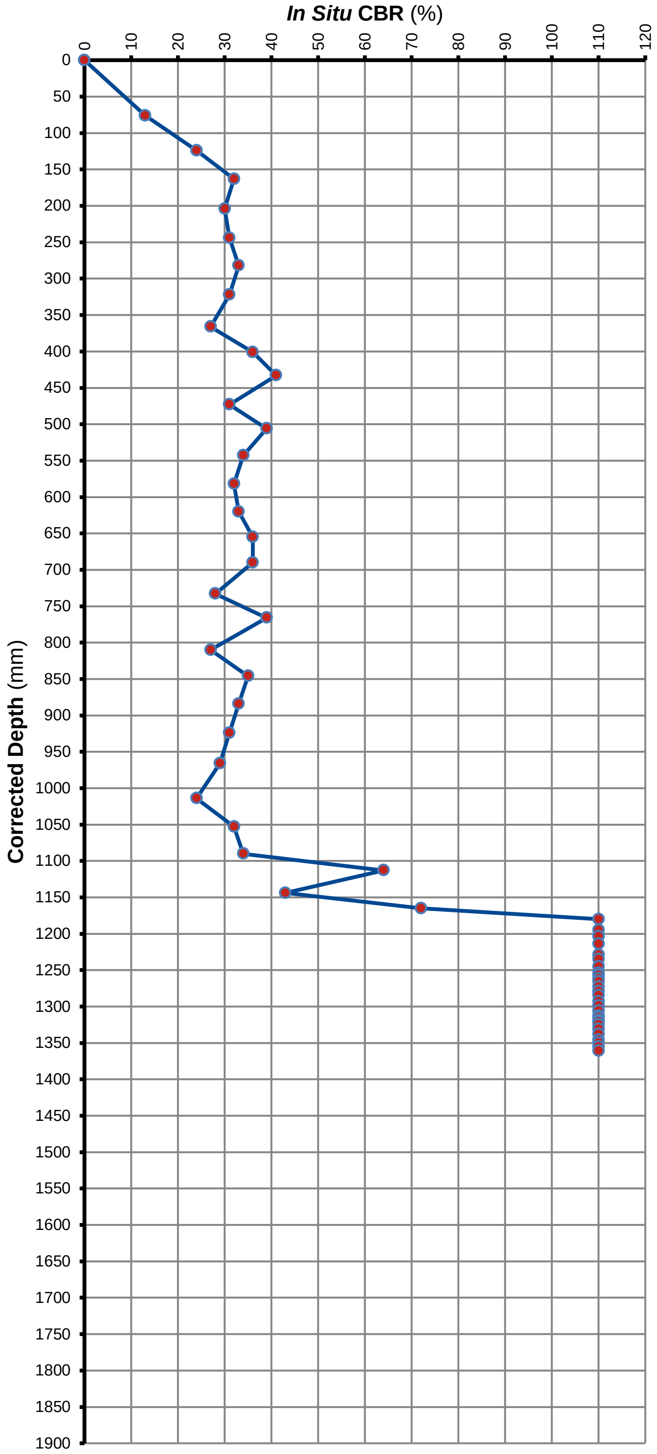
POSITION: DCP 3 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP5 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	120	0	-	-	-	-	-
5	200	80	80	16.0	Medium Dense	75	12
10	240	120	40	8.0	Dense	124	31
15	281	161	41	8.2	Dense	122	30
20	314	194	33	6.6	Dense	144	39
25	341	221	27	5.4	Dense	165	52
30	360	240	19	3.8	Very Dense	> 200	82
35	380	260	20	4.0	Very Dense	200	77
40	396	276	16	3.2	Very Dense	> 200	103
45	410	290	14	2.8	Very Dense	> 200	> 110
50	432	312	22	4.4	Very Dense	188	68
55	461	341	29	5.8	Dense	157	47
60	485	365	24	4.8	Very Dense	178	60
65	515	395	30	6.0	Dense	154	45
70	554	434	39	7.8	Dense	126	32
75	591	471	37	7.4	Dense	132	34
80	634	514	43	8.6	Dense	117	28
85	674	554	40	8.0	Dense	124	31
90	721	601	47	9.4	Dense	109	25
95	754	634	33	6.6	Dense	144	39
100	783	663	29	5.8	Dense	157	47
105	813	693	30	6.0	Dense	154	45
110	832	712	19	3.8	Very Dense	> 200	82
115	850	730	18	3.6	Very Dense	> 200	88
120	862	742	12	2.4	Very Dense	> 200	> 110
125	882	762	20	4.0	Very Dense	200	77
130	893	773	11	2.2	Very Dense	> 200	> 110
135	910	790	17	3.4	Very Dense	> 200	95
140	924	804	14	2.8	Very Dense	> 200	> 110
145	934	814	10	2.0	Very Dense	> 200	> 110
150	945	825	11	2.2	Very Dense	> 200	> 110
155	957	837	12	2.4	Very Dense	> 200	> 110
160	970	850	13	2.6	Very Dense	> 200	> 110
165	981	861	11	2.2	Very Dense	> 200	> 110
170	991	871	10	2.0	Very Dense	> 200	> 110
175	1002	882	11	2.2	Very Dense	> 200	> 110
180	1007	887	5	1.0	Very Dense	> 200	> 110
185	1014	894	7	1.4	Very Dense	> 200	> 110
190	1019	899	5	1.0	Very Dense	> 200	> 110
195	1024	904	5	1.0	Very Dense	> 200	> 110
200	1026	906	2	0.4	Very Dense	> 200	> 110
205	1032	912	6	1.2	Very Dense	> 200	> 110
210	1038	918	6	1.2	Very Dense	> 200	> 110
215	1041	921	3	0.6	Very Dense	> 200	> 110
220	1043	923	2	0.4	Very Dense	> 200	> 110
225	1047	927	4	0.8	Very Dense	> 200	> 110
230	1048	928	1	0.2	Very Dense	> 200	> 110
235	1049	929	1	0.2	Very Dense	> 200	> 110
240	1050	930	1	0.2	Very Dense	> 200	> 110
245	Refusal						

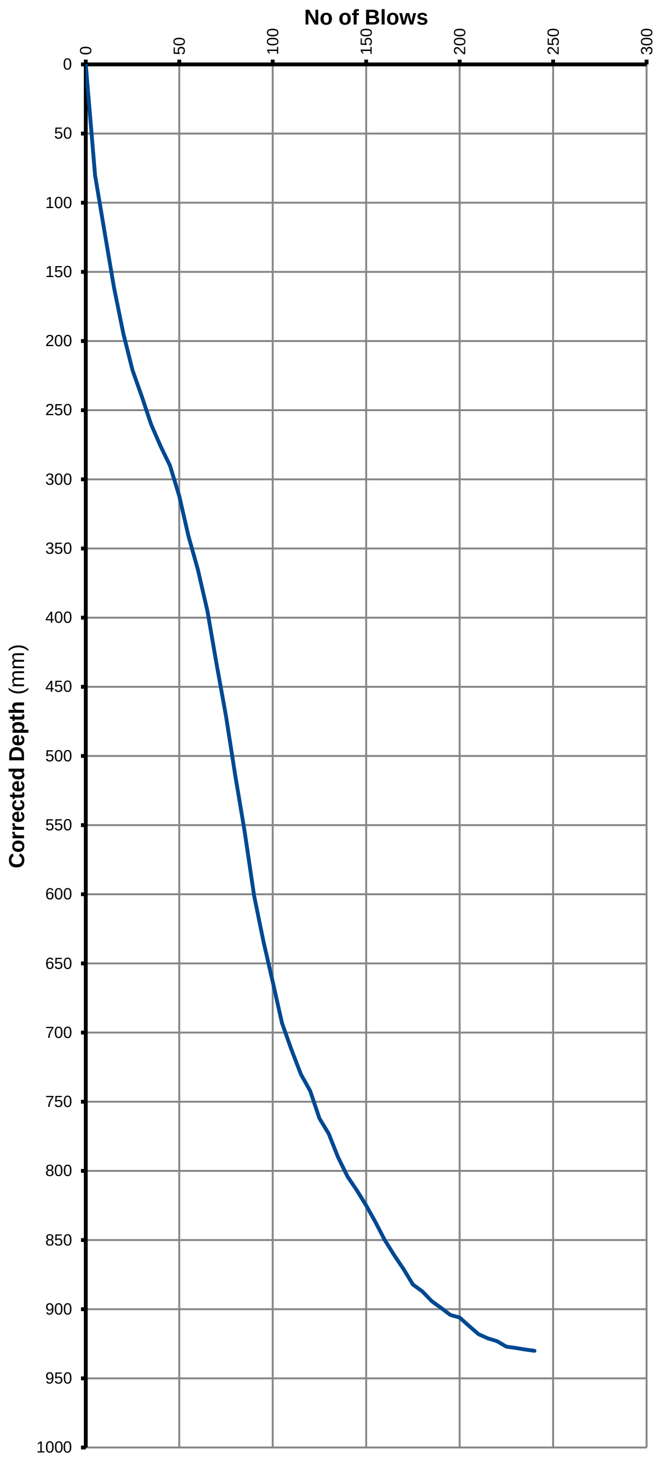
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

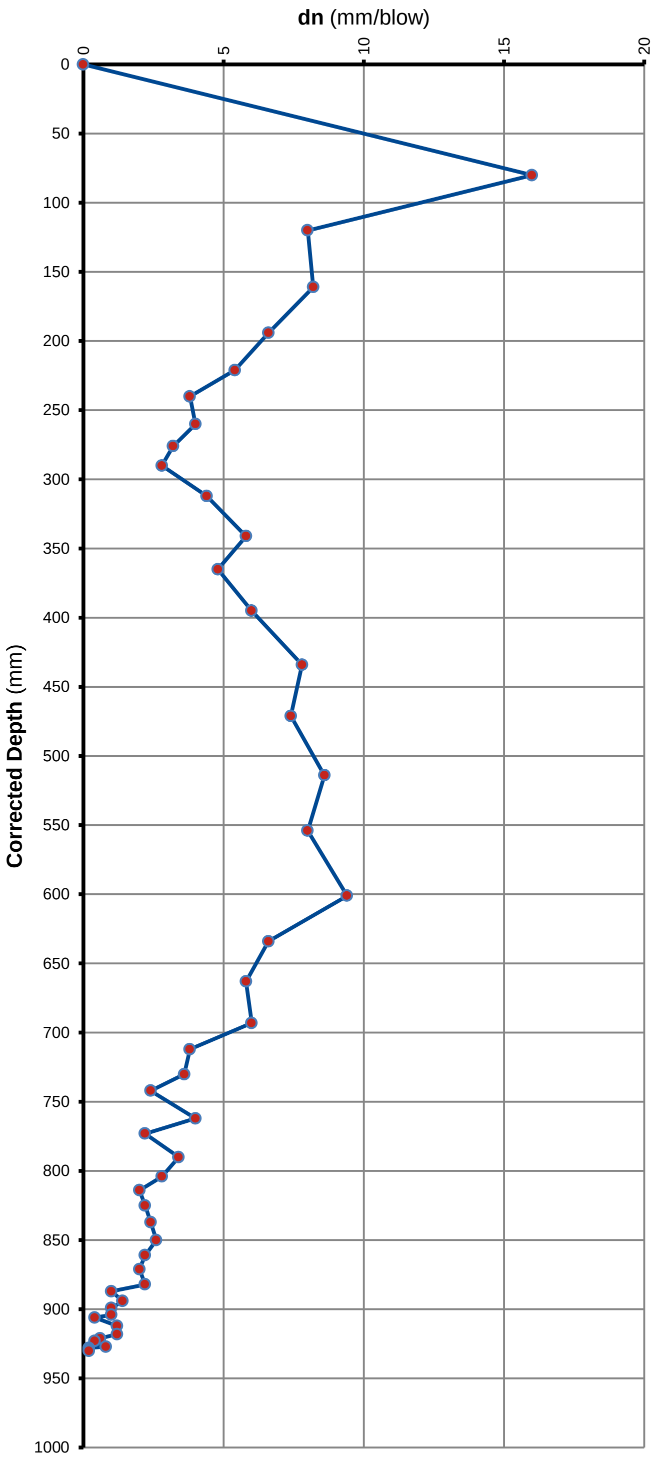
POSITION: DCP5 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



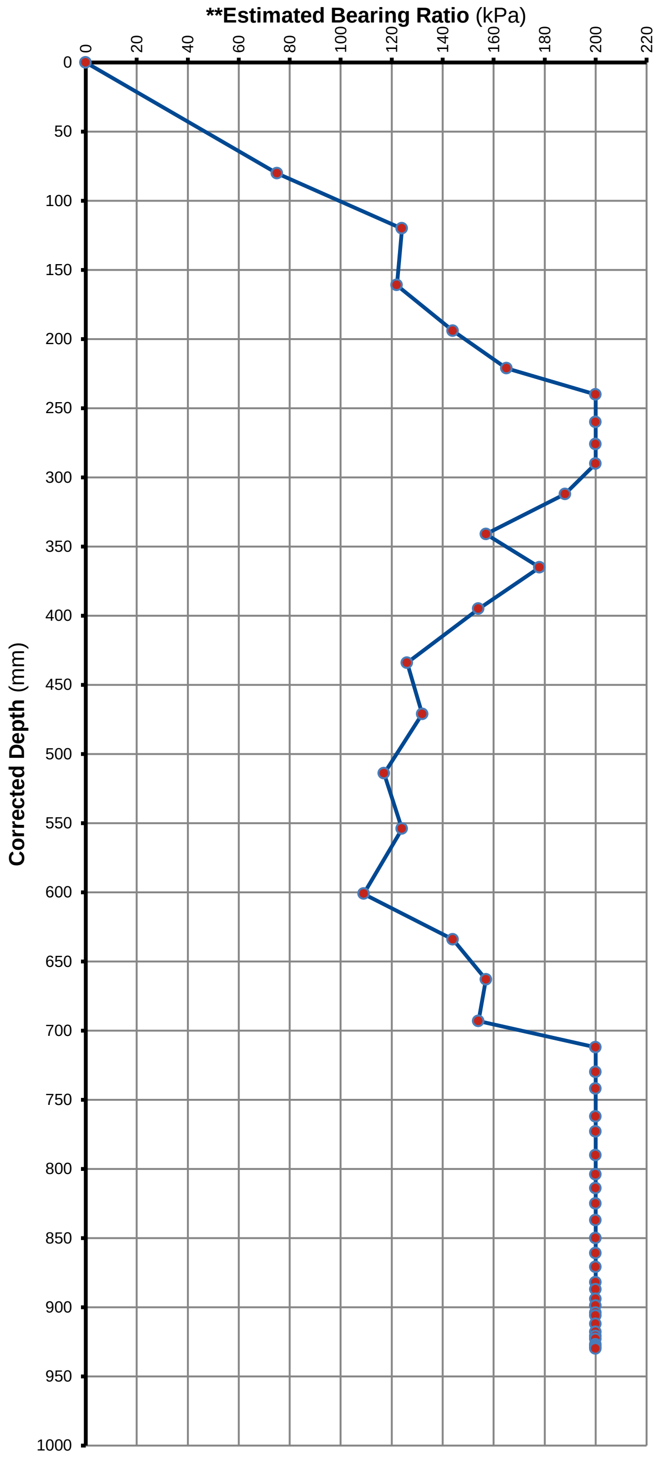
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

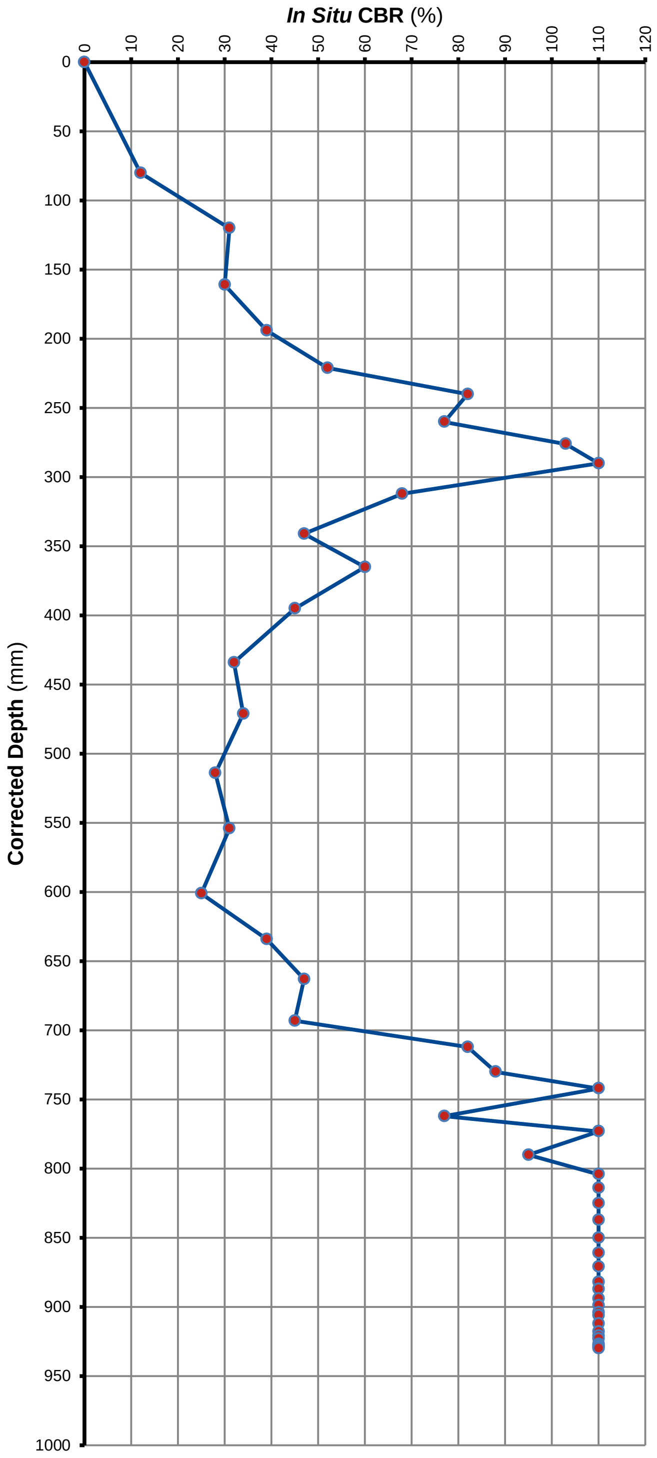
POSITION: DCP5 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 4 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	110	0	-	-	-	-	-
5	176	66	66	13.2	Medium Dense	85	16
10	200	90	24	4.8	Very Dense	178	60
15	256	146	56	11.2	Dense	95	20
20	300	190	44	8.8	Dense	115	27
25	345	235	45	9.0	Dense	113	26
30	389	279	44	8.8	Dense	115	27
35	432	322	43	8.6	Dense	117	28
40	473	363	41	8.2	Dense	122	30
45	514	404	41	8.2	Dense	122	30
50	556	446	42	8.4	Dense	119	29
55	596	486	40	8.0	Dense	124	31
60	630	520	34	6.8	Dense	140	38
65	665	555	35	7.0	Dense	137	36
70	694	584	29	5.8	Dense	157	47
75	721	611	27	5.4	Dense	165	52
80	745	635	24	4.8	Very Dense	178	60
85	774	664	29	5.8	Dense	157	47
90	795	685	21	4.2	Very Dense	193	72
95	816	706	21	4.2	Very Dense	193	72
100	835	725	19	3.8	Very Dense	> 200	82
105	856	746	21	4.2	Very Dense	193	72
110	873	763	17	3.4	Very Dense	> 200	95
115	893	783	20	4.0	Very Dense	200	77
120	911	801	18	3.6	Very Dense	> 200	88
125	924	814	13	2.6	Very Dense	> 200	> 110
130	936	826	12	2.4	Very Dense	> 200	> 110
135	953	843	17	3.4	Very Dense	> 200	95
140	968	858	15	3.0	Very Dense	> 200	> 110
145	983	873	15	3.0	Very Dense	> 200	> 110
150	1000	890	17	3.4	Very Dense	> 200	95
155	1012	902	12	2.4	Very Dense	> 200	> 110
160	1023	913	11	2.2	Very Dense	> 200	> 110
165	1045	935	22	4.4	Very Dense	188	68
170	1065	955	20	4.0	Very Dense	200	77
175	1086	976	21	4.2	Very Dense	193	72
180	1101	991	15	3.0	Very Dense	> 200	> 110
185	1122	1012	21	4.2	Very Dense	193	72
190	1135	1025	13	2.6	Very Dense	> 200	> 110
195	1156	1046	21	4.2	Very Dense	193	72
200	1176	1066	20	4.0	Very Dense	200	77
205	1198	1088	22	4.4	Very Dense	188	68
210	1230	1120	32	6.4	Dense	147	41
215	1239	1129	9	1.8	Very Dense	> 200	> 110
220	1256	1146	17	3.4	Very Dense	> 200	95
225	1276	1166	20	4.0	Very Dense	200	77
230	1318	1208	42	8.4	Dense	119	29
235	1352	1242	34	6.8	Dense	140	38
240	1364	1254	12	2.4	Very Dense	> 200	> 110
245	1374	1264	10	2.0	Very Dense	> 200	> 110
250	1390	1280	16	3.2	Very Dense	> 200	103

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 4 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1413	1303	23	4.6	Very Dense	183	64
260	1431	1321	18	3.6	Very Dense	> 200	88
265	1446	1336	15	3.0	Very Dense	> 200	> 110
270	1463	1353	17	3.4	Very Dense	> 200	95
275	1475	1365	12	2.4	Very Dense	> 200	> 110
280	1485	1375	10	2.0	Very Dense	> 200	> 110
285	1493	1383	8	1.6	Very Dense	> 200	> 110
290	1510	1400	17	3.4	Very Dense	> 200	95
295	1513	1403	3	0.6	Very Dense	> 200	> 110
300	1530	1420	17	3.4	Very Dense	> 200	95
305	1545	1435	15	3.0	Very Dense	> 200	> 110
310	1551	1441	6	1.2	Very Dense	> 200	> 110
315	1563	1453	12	2.4	Very Dense	> 200	> 110
320	1582	1472	19	3.8	Very Dense	> 200	82
325	1600	1490	18	3.6	Very Dense	> 200	88
330	1624	1514	24	4.8	Very Dense	178	60
335	1654	1544	30	6.0	Dense	154	45
340	1673	1563	19	3.8	Very Dense	> 200	82
345	1693	1583	20	4.0	Very Dense	200	77
350	1712	1602	19	3.8	Very Dense	> 200	82
355	1729	1619	17	3.4	Very Dense	> 200	95
360	1743	1633	14	2.8	Very Dense	> 200	> 110
365	1753	1643	10	2.0	Very Dense	> 200	> 110
370	1776	1666	23	4.6	Very Dense	183	64
375	1782	1672	6	1.2	Very Dense	> 200	> 110
380	1793	1683	11	2.2	Very Dense	> 200	> 110
385	1799	1689	6	1.2	Very Dense	> 200	> 110
390	1803	1693	4	0.8	Very Dense	> 200	> 110
395	1809	1699	6	1.2	Very Dense	> 200	> 110
400	1814	1704	5	1.0	Very Dense	> 200	> 110
405	1822	1712	8	1.6	Very Dense	> 200	> 110
410	1826	1716	4	0.8	Very Dense	> 200	> 110
415	1834	1724	8	1.6	Very Dense	> 200	> 110
420	1839	1729	5	1.0	Very Dense	> 200	> 110
425	1842	1732	3	0.6	Very Dense	> 200	> 110
430	1847	1737	5	1.0	Very Dense	> 200	> 110
435	1850	1740	3	0.6	Very Dense	> 200	> 110
440	1853	1743	3	0.6	Very Dense	> 200	> 110
445	1857	1747	4	0.8	Very Dense	> 200	> 110
450	1861	1751	4	0.8	Very Dense	> 200	> 110
455	Refusal						

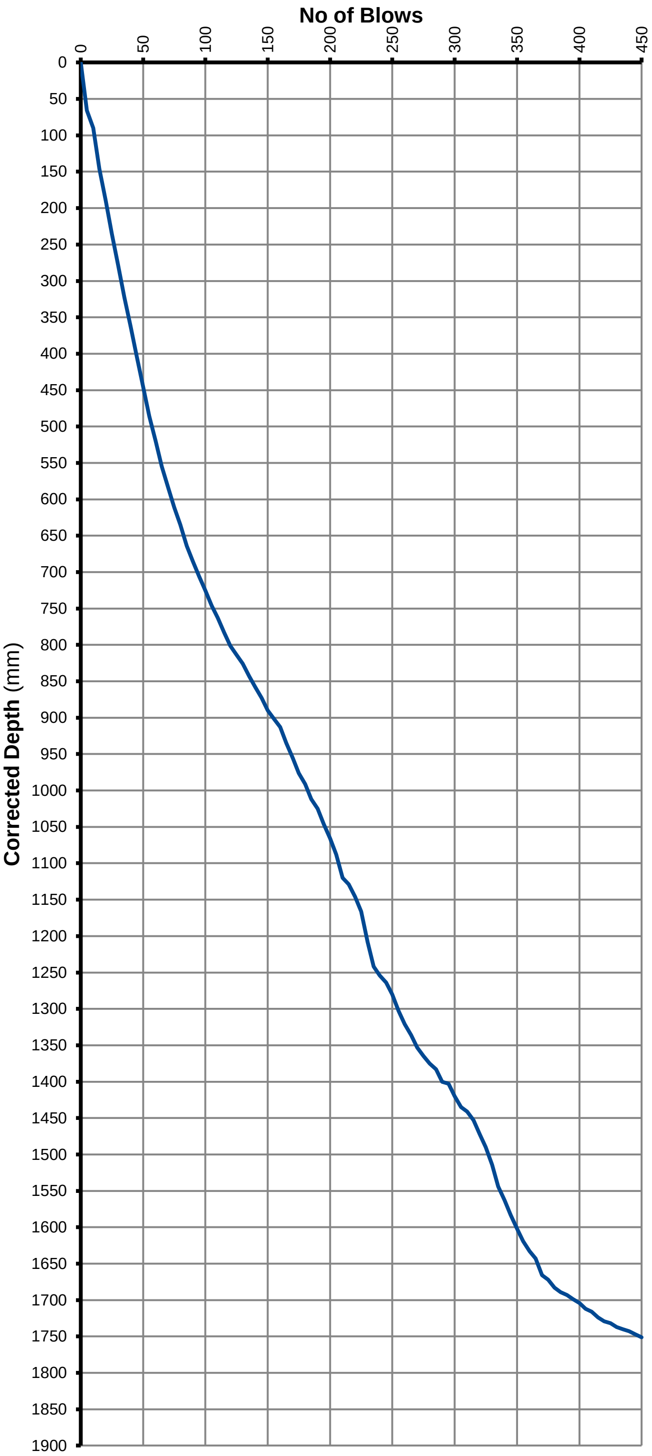
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

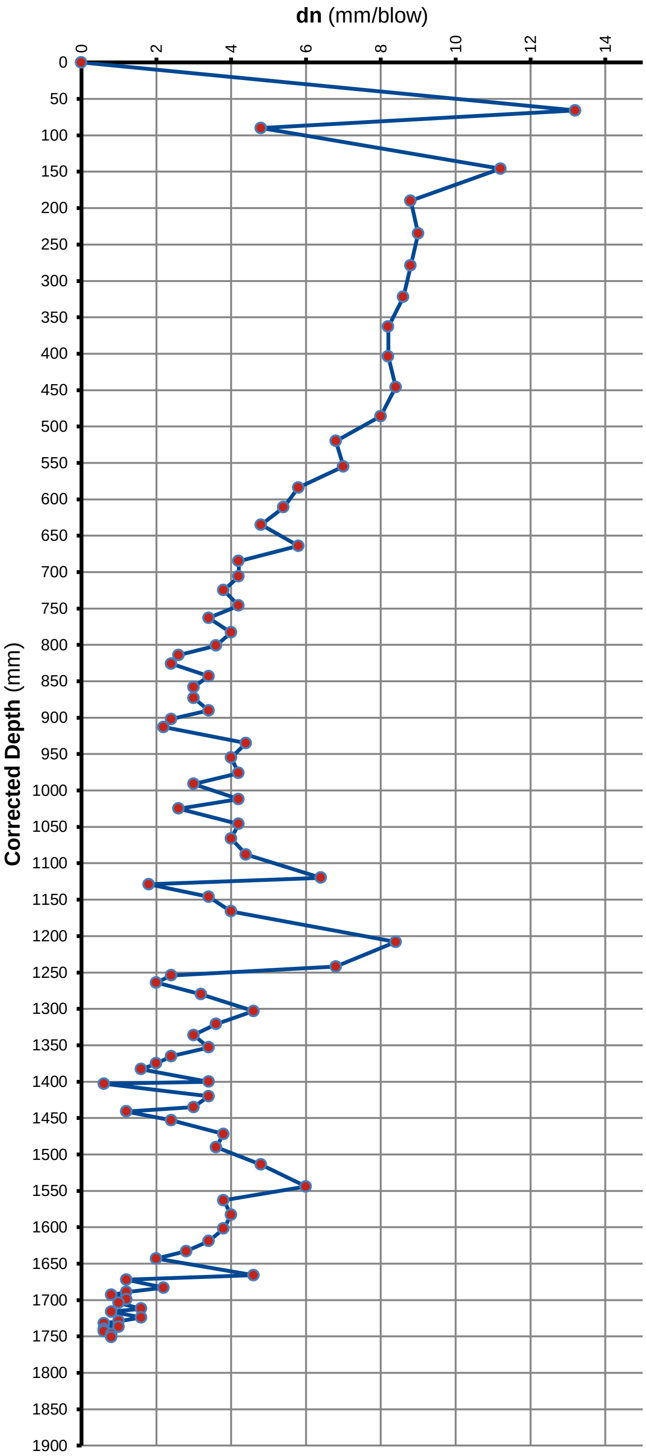
POSITION: DCP 4 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



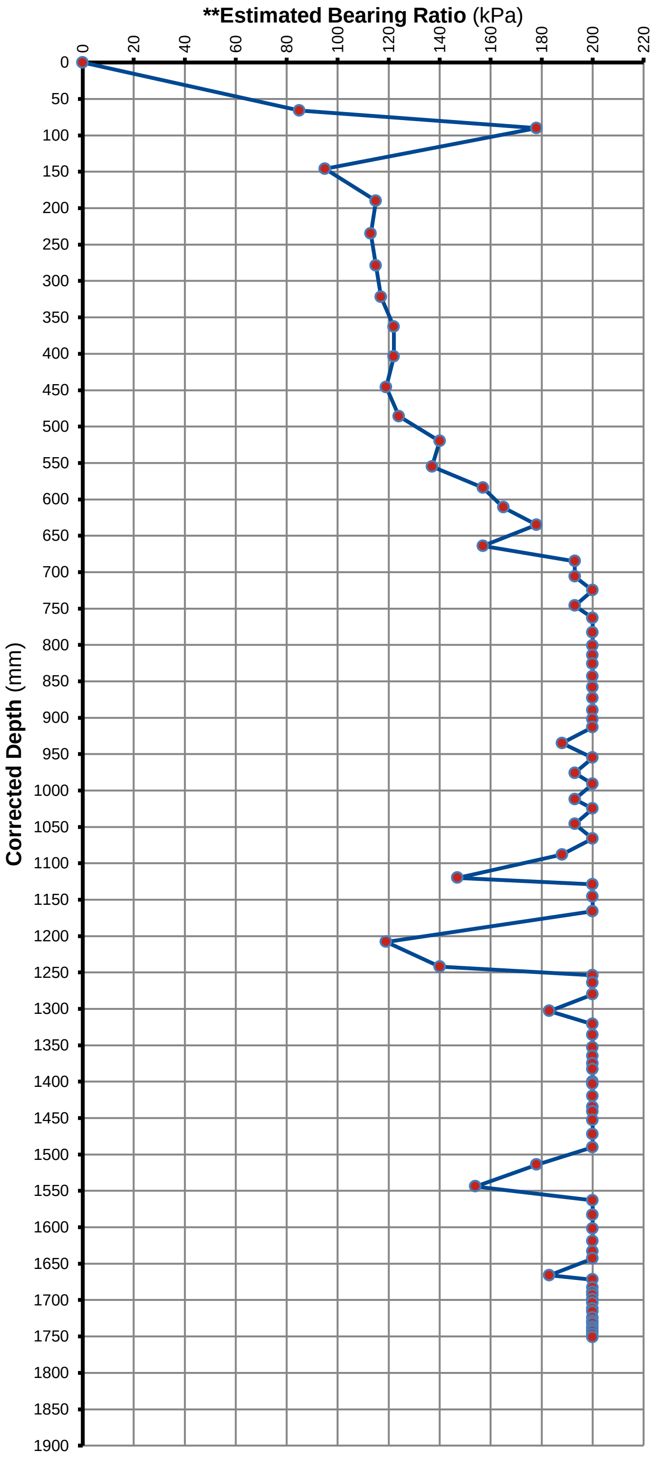
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

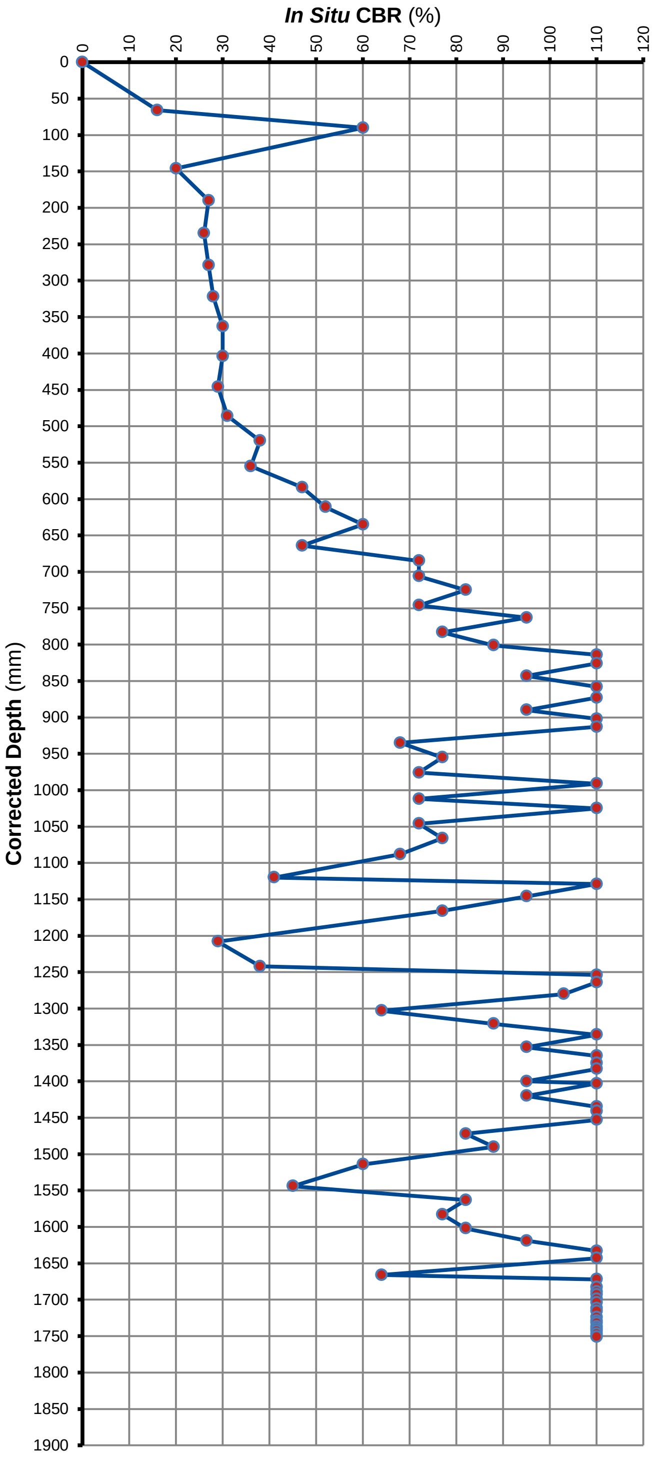
POSITION: DCP 4 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 6 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	45	45	45	9.0	Dense	113	26
10	73	73	28	5.6	Dense	161	49
15	103	103	30	6.0	Dense	154	45
20	128	128	25	5.0	Very Dense	174	57
25	163	163	35	7.0	Dense	137	36
30	210	210	47	9.4	Dense	109	25
35	243	243	33	6.6	Dense	144	39
40	283	283	40	8.0	Dense	124	31
45	310	310	27	5.4	Dense	165	52
50	369	369	59	11.8	Dense	92	18
55	430	430	61	12.2	Dense	90	17
60	489	489	59	11.8	Dense	92	18
65	510	510	21	4.2	Very Dense	193	72
70	528	528	18	3.6	Very Dense	> 200	88
75	543	543	15	3.0	Very Dense	> 200	> 110
80	565	565	22	4.4	Very Dense	188	68
85	583	583	18	3.6	Very Dense	> 200	88
90	603	603	20	4.0	Very Dense	200	77
95	626	626	23	4.6	Very Dense	183	64
100	644	644	18	3.6	Very Dense	> 200	88
105	660	660	16	3.2	Very Dense	> 200	103
110	676	676	16	3.2	Very Dense	> 200	103
115	693	693	17	3.4	Very Dense	> 200	95
120	704	704	11	2.2	Very Dense	> 200	> 110
125	720	720	16	3.2	Very Dense	> 200	103
130	732	732	12	2.4	Very Dense	> 200	> 110
135	748	748	16	3.2	Very Dense	> 200	103
140	762	762	14	2.8	Very Dense	> 200	> 110
145	778	778	16	3.2	Very Dense	> 200	103
150	795	795	17	3.4	Very Dense	> 200	95
155	810	810	15	3.0	Very Dense	> 200	> 110
160	828	828	18	3.6	Very Dense	> 200	88
165	846	846	18	3.6	Very Dense	> 200	88
170	873	873	27	5.4	Dense	165	52
175	890	890	17	3.4	Very Dense	> 200	95
180	910	910	20	4.0	Very Dense	200	77
185	931	931	21	4.2	Very Dense	193	72
190	952	952	21	4.2	Very Dense	193	72
195	972	972	20	4.0	Very Dense	200	77
200	992	992	20	4.0	Very Dense	200	77
205	1006	1006	14	2.8	Very Dense	> 200	> 110
210	1031	1031	25	5.0	Very Dense	174	57
215	1052	1052	21	4.2	Very Dense	193	72
220	1070	1070	18	3.6	Very Dense	> 200	88
225	1093	1093	23	4.6	Very Dense	183	64
230	1126	1126	33	6.6	Dense	144	39
235	1153	1153	27	5.4	Dense	165	52
240	1182	1182	29	5.8	Dense	157	47
245	1202	1202	20	4.0	Very Dense	200	77
250	1223	1223	21	4.2	Very Dense	193	72

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 6 **DEPTH BELOW NGL:** 0.000m

<u>*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)</u>

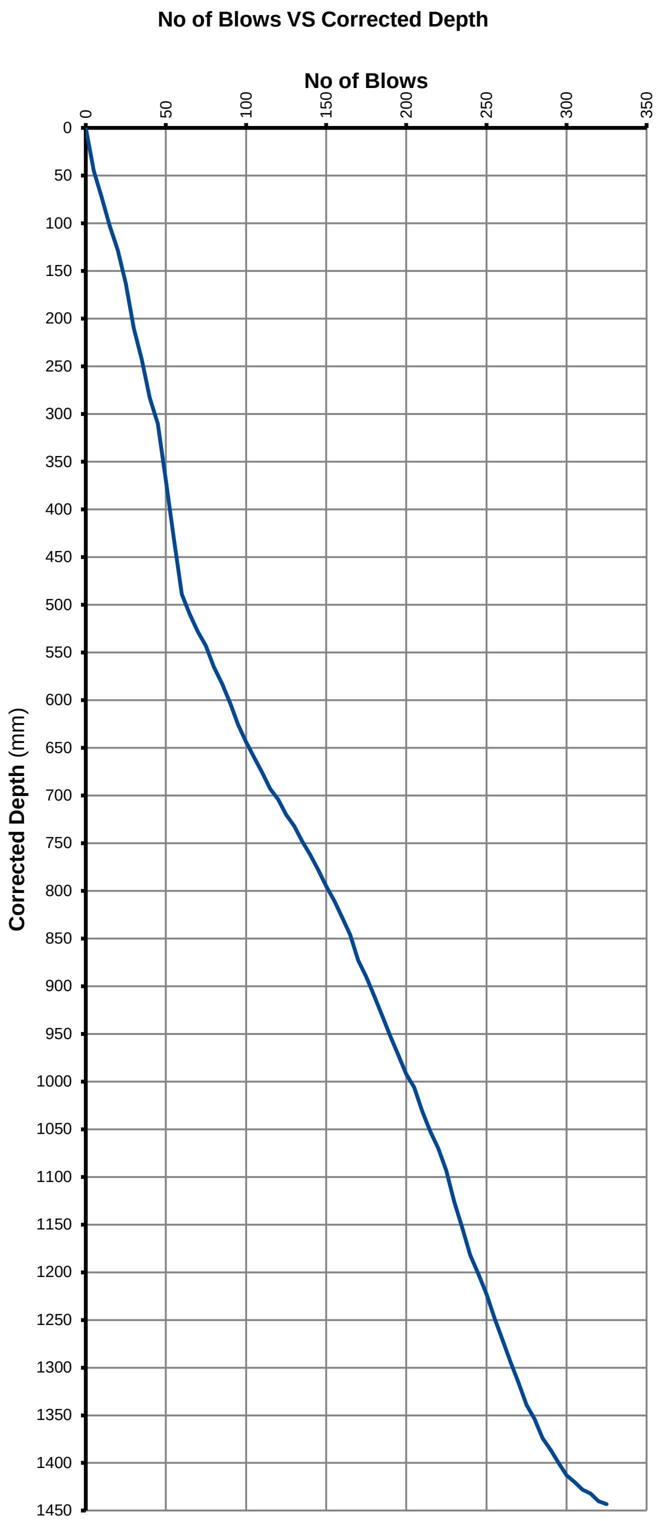
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1248	1248	25	5.0	Very Dense	174	57
260	1271	1271	23	4.6	Very Dense	183	64
265	1294	1294	23	4.6	Very Dense	183	64
270	1316	1316	22	4.4	Very Dense	188	68
275	1339	1339	23	4.6	Very Dense	183	64
280	1354	1354	15	3.0	Very Dense	> 200	> 110
285	1374	1374	20	4.0	Very Dense	200	77
290	1386	1386	12	2.4	Very Dense	> 200	> 110
295	1400	1400	14	2.8	Very Dense	> 200	> 110
300	1413	1413	13	2.6	Very Dense	> 200	> 110
305	1420	1420	7	1.4	Very Dense	> 200	> 110
310	1428	1428	8	1.6	Very Dense	> 200	> 110
315	1432	1432	4	0.8	Very Dense	> 200	> 110
320	1440	1440	8	1.6	Very Dense	> 200	> 110
325	1443	1443	3	0.6	Very Dense	> 200	> 110
330	Refusal						

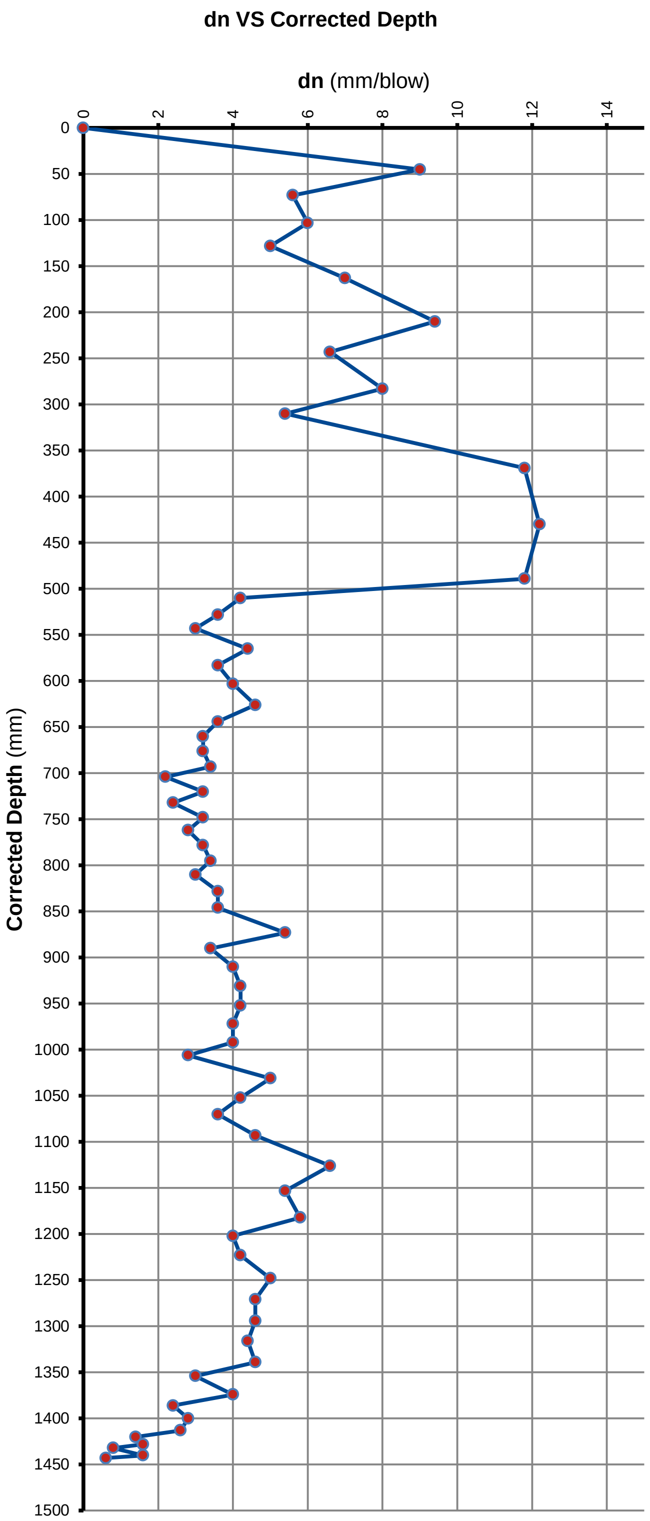
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 6 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





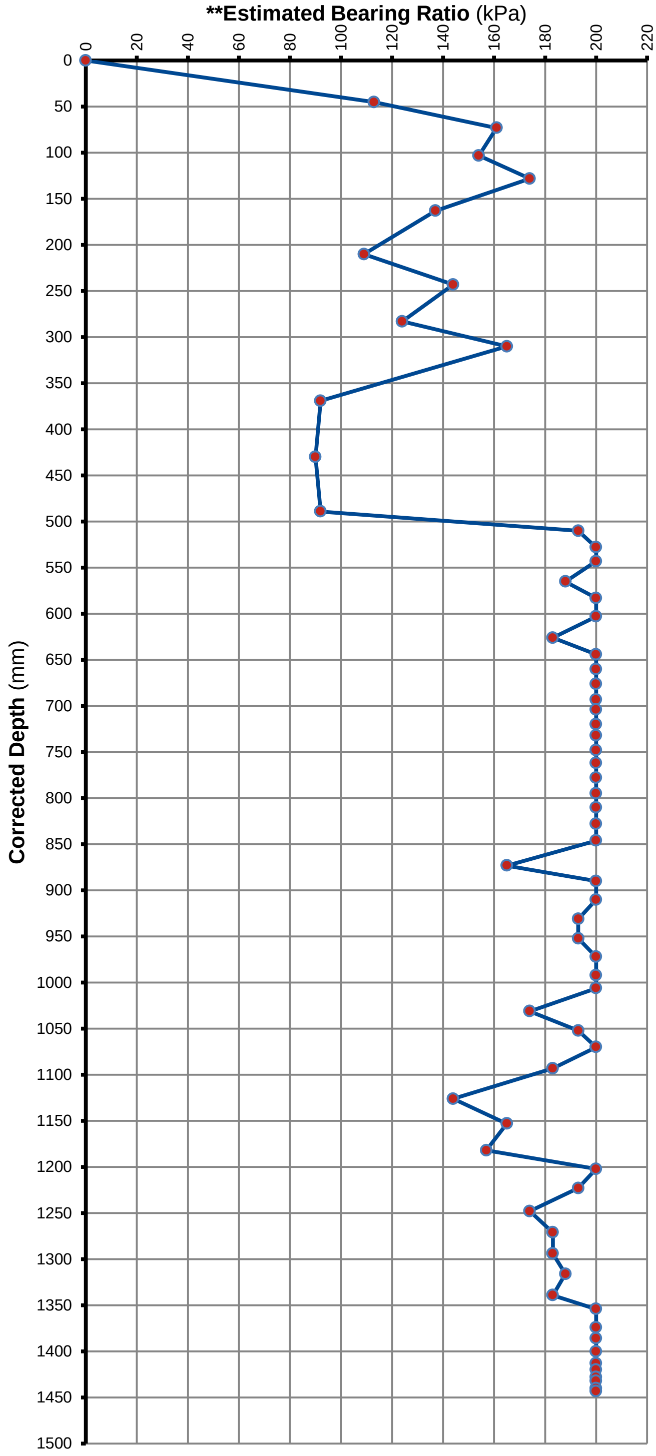
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

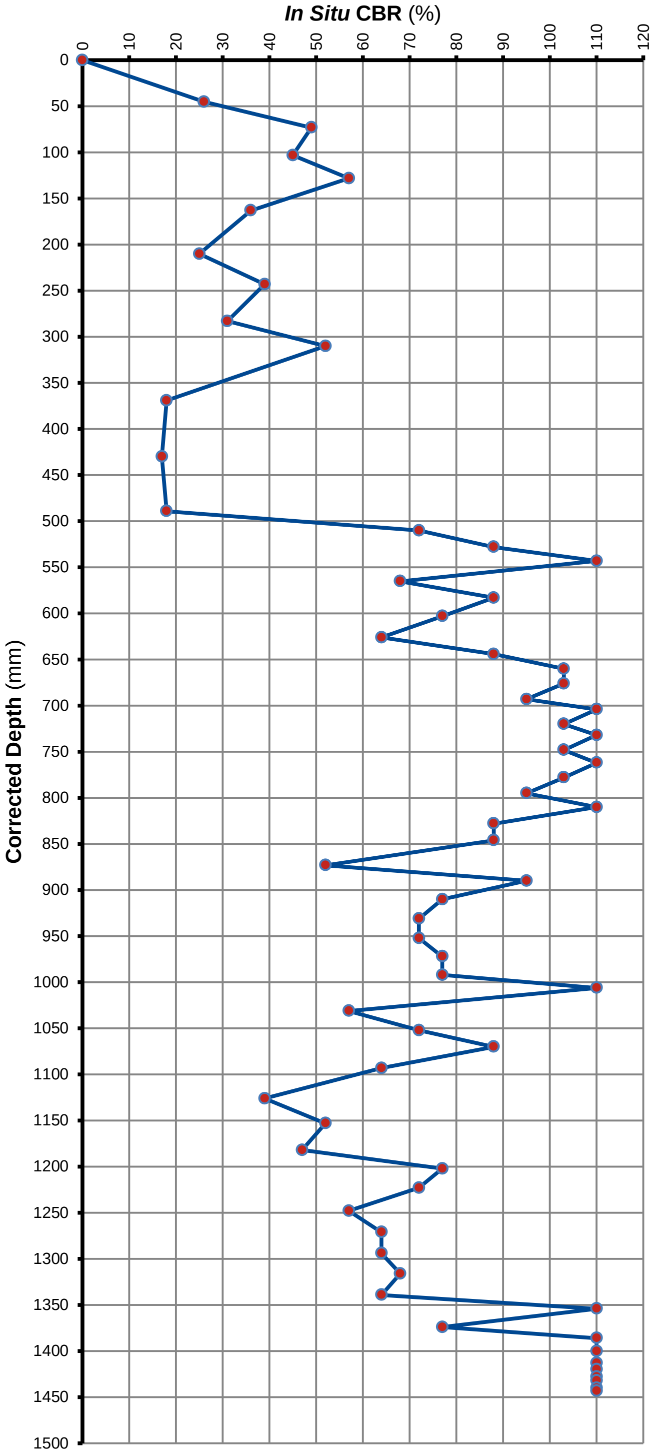
POSITION: DCP 6 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP7 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	30	0	-	-	-	-	-
5	67	37	37	7.4	Dense	132	34
10	110	80	43	8.6	Dense	117	28
15	151	121	41	8.2	Dense	122	30
20	181	151	30	6.0	Dense	154	45
25	252	222	71	14.2	Medium Dense	81	14
30	321	291	69	13.8	Medium Dense	82	15
35	372	342	51	10.2	Dense	102	22
40	394	364	22	4.4	Very Dense	188	68
45	421	391	27	5.4	Dense	165	52
50	461	431	40	8.0	Dense	124	31
55	493	463	32	6.4	Dense	147	41
60	510	480	17	3.4	Very Dense	> 200	95
65	518	488	8	1.6	Very Dense	> 200	> 110
70	520	490	2	0.4	Very Dense	> 200	> 110
75	523	493	3	0.6	Very Dense	> 200	> 110
80	526	496	3	0.6	Very Dense	> 200	> 110
85	530	500	4	0.8	Very Dense	> 200	> 110
90	Refusal						

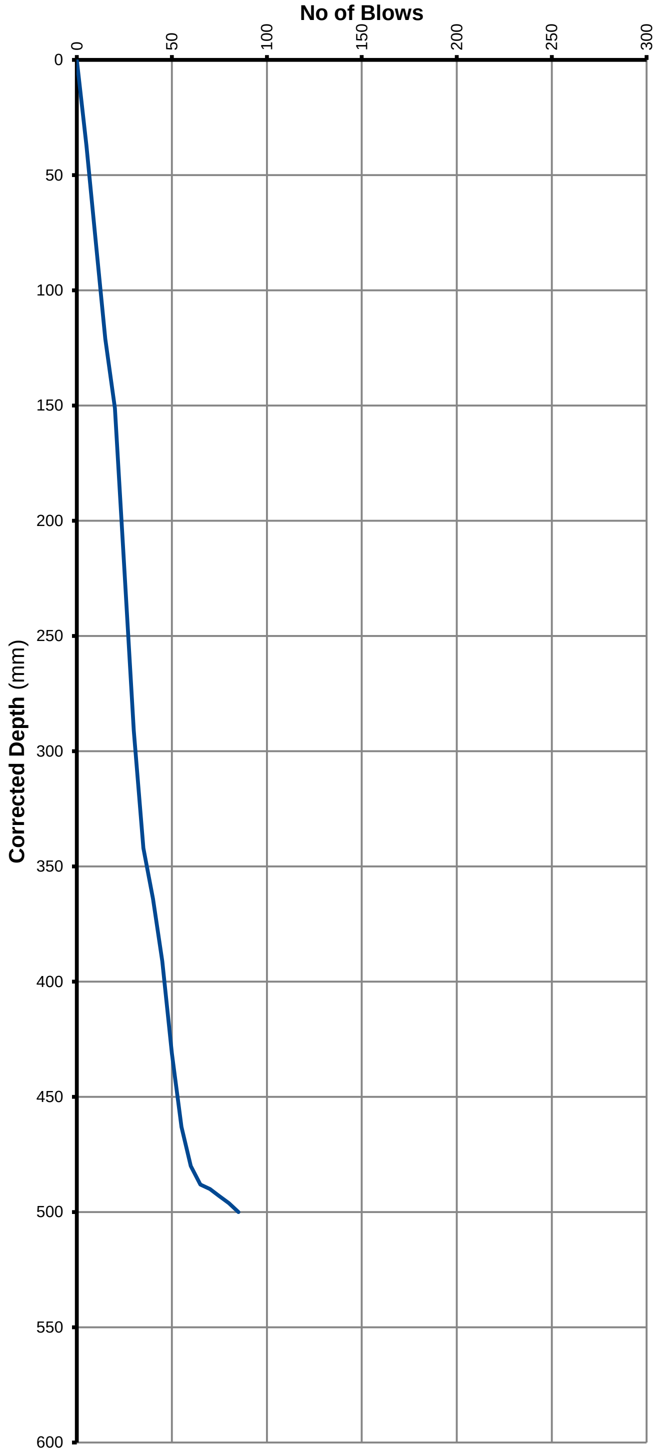
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

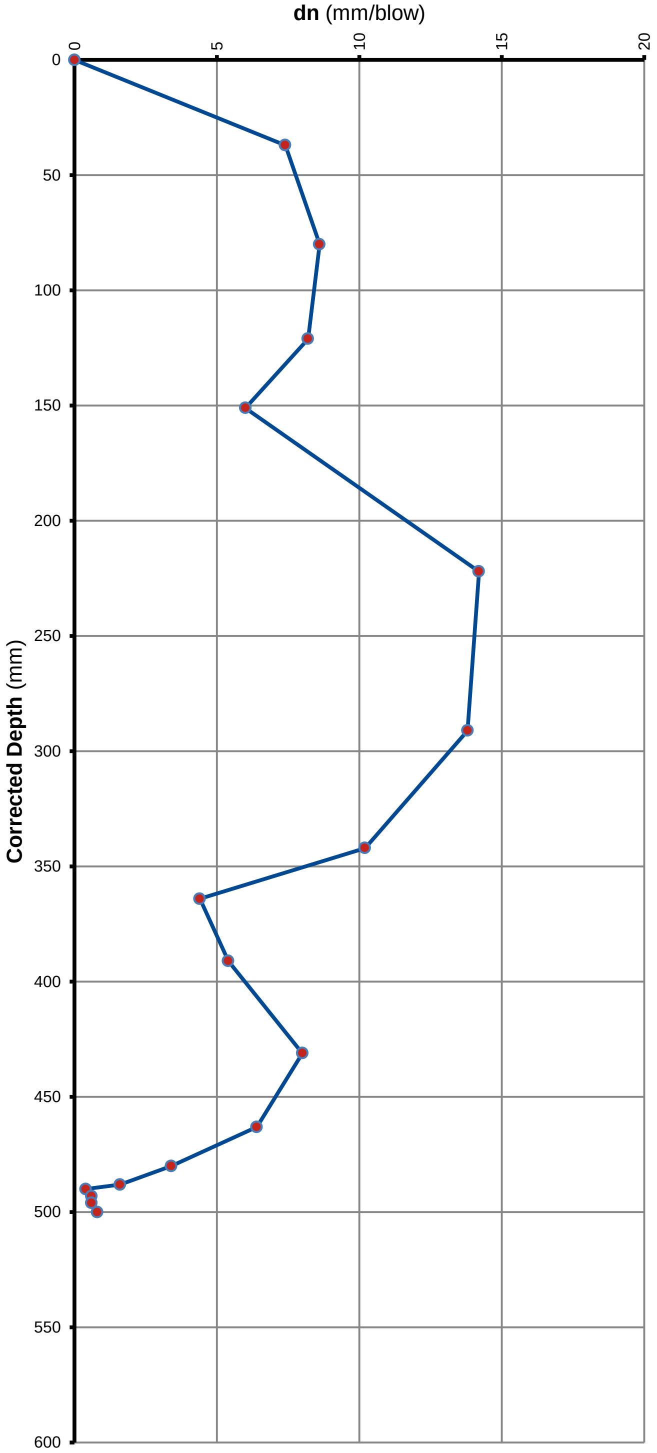
POSITION: DCP7 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

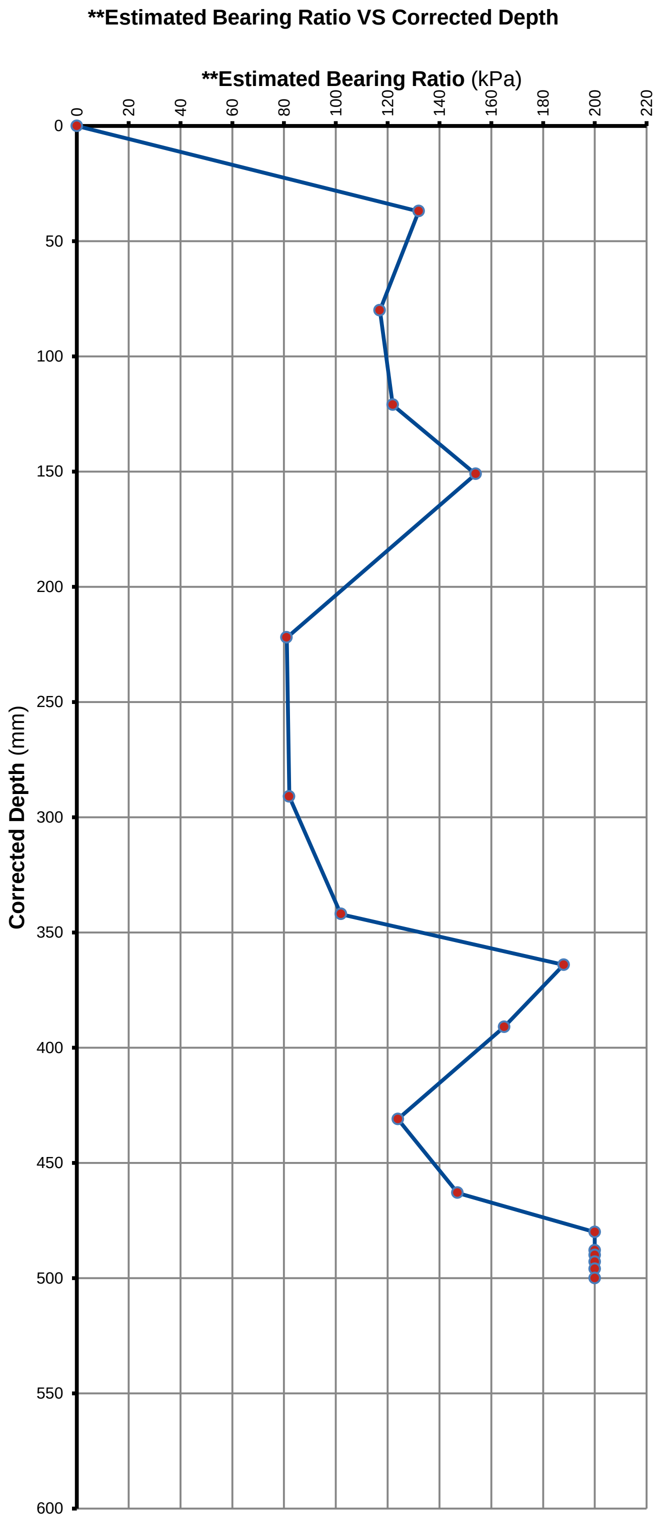


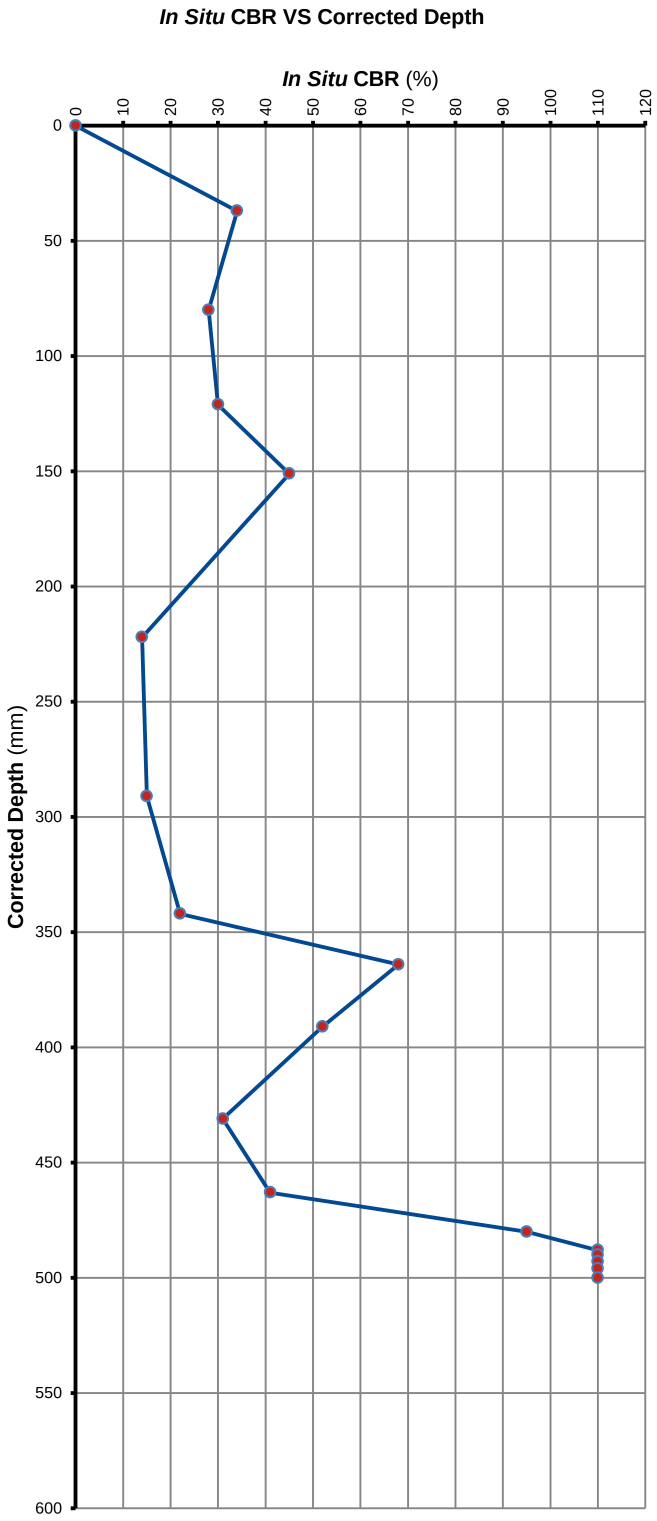
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP7 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


**Estimated Bearing Ratio VS Corrected Depth


In Situ CBR VS Corrected Depth

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 8 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	20	0	-	-	-	-	-
5	46	26	26	5.2	Dense	169	54
10	81	61	35	7.0	Dense	137	36
15	118	98	37	7.4	Dense	132	34
20	150	130	32	6.4	Dense	147	41
25	170	150	20	4.0	Very Dense	200	77
30	210	190	40	8.0	Dense	124	31
35	235	215	25	5.0	Very Dense	174	57
40	261	241	26	5.2	Dense	169	54
45	291	271	30	6.0	Dense	154	45
50	326	306	35	7.0	Dense	137	36
55	364	344	38	7.6	Dense	129	33
60	402	382	38	7.6	Dense	129	33
65	432	412	30	6.0	Dense	154	45
70	475	455	43	8.6	Dense	117	28
75	514	494	39	7.8	Dense	126	32
80	544	524	30	6.0	Dense	154	45
85	581	561	37	7.4	Dense	132	34
90	615	595	34	6.8	Dense	140	38
95	645	625	30	6.0	Dense	154	45
100	686	666	41	8.2	Dense	122	30
105	715	695	29	5.8	Dense	157	47
110	740	720	25	5.0	Very Dense	174	57
115	764	744	24	4.8	Very Dense	178	60
120	786	766	22	4.4	Very Dense	188	68
125	804	784	18	3.6	Very Dense	> 200	88
130	816	796	12	2.4	Very Dense	> 200	> 110
135	834	814	18	3.6	Very Dense	> 200	88
140	843	823	9	1.8	Very Dense	> 200	> 110
145	862	842	19	3.8	Very Dense	> 200	82
150	878	858	16	3.2	Very Dense	> 200	103
155	892	872	14	2.8	Very Dense	> 200	> 110
160	907	887	15	3.0	Very Dense	> 200	> 110
165	924	904	17	3.4	Very Dense	> 200	95
170	946	926	22	4.4	Very Dense	188	68
175	965	945	19	3.8	Very Dense	> 200	82
180	982	962	17	3.4	Very Dense	> 200	95
185	995	975	13	2.6	Very Dense	> 200	> 110
190	1010	990	15	3.0	Very Dense	> 200	> 110
195	1021	1001	11	2.2	Very Dense	> 200	> 110
200	1028	1008	7	1.4	Very Dense	> 200	> 110
205	1041	1021	13	2.6	Very Dense	> 200	> 110
210	1056	1036	15	3.0	Very Dense	> 200	> 110
215	1067	1047	11	2.2	Very Dense	> 200	> 110
220	1081	1061	14	2.8	Very Dense	> 200	> 110
225	1096	1076	15	3.0	Very Dense	> 200	> 110
230	1103	1083	7	1.4	Very Dense	> 200	> 110
235	1121	1101	18	3.6	Very Dense	> 200	88
240	1136	1116	15	3.0	Very Dense	> 200	> 110
245	1148	1128	12	2.4	Very Dense	> 200	> 110
250	1161	1141	13	2.6	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 8 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1171	1151	10	2.0	Very Dense	> 200	> 110
260	1182	1162	11	2.2	Very Dense	> 200	> 110
265	1195	1175	13	2.6	Very Dense	> 200	> 110
270	1209	1189	14	2.8	Very Dense	> 200	> 110
275	1216	1196	7	1.4	Very Dense	> 200	> 110
280	1232	1212	16	3.2	Very Dense	> 200	103
285	1245	1225	13	2.6	Very Dense	> 200	> 110
290	1256	1236	11	2.2	Very Dense	> 200	> 110
295	1276	1256	20	4.0	Very Dense	200	77
300	1286	1266	10	2.0	Very Dense	> 200	> 110
305	1302	1282	16	3.2	Very Dense	> 200	103
310	1312	1292	10	2.0	Very Dense	> 200	> 110
315	1334	1314	22	4.4	Very Dense	188	68
320	1345	1325	11	2.2	Very Dense	> 200	> 110
325	1356	1336	11	2.2	Very Dense	> 200	> 110
330	1370	1350	14	2.8	Very Dense	> 200	> 110
335	1392	1372	22	4.4	Very Dense	188	68
340	1407	1387	15	3.0	Very Dense	> 200	> 110
345	1421	1401	14	2.8	Very Dense	> 200	> 110
350	1432	1412	11	2.2	Very Dense	> 200	> 110
355	1442	1422	10	2.0	Very Dense	> 200	> 110
360	1450	1430	8	1.6	Very Dense	> 200	> 110
365	1458	1438	8	1.6	Very Dense	> 200	> 110
370	1464	1444	6	1.2	Very Dense	> 200	> 110
375	1469	1449	5	1.0	Very Dense	> 200	> 110
380	1476	1456	7	1.4	Very Dense	> 200	> 110
385	1482	1462	6	1.2	Very Dense	> 200	> 110
390	1487	1467	5	1.0	Very Dense	> 200	> 110
395	1491	1471	4	0.8	Very Dense	> 200	> 110
400	1497	1477	6	1.2	Very Dense	> 200	> 110
405	1502	1482	5	1.0	Very Dense	> 200	> 110
410	1512	1492	10	2.0	Very Dense	> 200	> 110
415	1517	1497	5	1.0	Very Dense	> 200	> 110
420	1524	1504	7	1.4	Very Dense	> 200	> 110
425	1532	1512	8	1.6	Very Dense	> 200	> 110
430	1538	1518	6	1.2	Very Dense	> 200	> 110
435	1548	1528	10	2.0	Very Dense	> 200	> 110
440	1555	1535	7	1.4	Very Dense	> 200	> 110
445	1561	1541	6	1.2	Very Dense	> 200	> 110
450	1562	1542	1	0.2	Very Dense	> 200	> 110
455	1567	1547	5	1.0	Very Dense	> 200	> 110
460	1571	1551	4	0.8	Very Dense	> 200	> 110
465	1573	1553	2	0.4	Very Dense	> 200	> 110
470	1581	1561	8	1.6	Very Dense	> 200	> 110
475	1587	1567	6	1.2	Very Dense	> 200	> 110
480	1589	1569	2	0.4	Very Dense	> 200	> 110
485	1592	1572	3	0.6	Very Dense	> 200	> 110
490	1597	1577	5	1.0	Very Dense	> 200	> 110
495	1599	1579	2	0.4	Very Dense	> 200	> 110
500	1604	1584	5	1.0	Very Dense	> 200	> 110
505	1608	1588	4	0.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 8 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
510	1614	1594	6	1.2	Very Dense	> 200	> 110
515	1617	1597	3	0.6	Very Dense	> 200	> 110
520	1621	1601	4	0.8	Very Dense	> 200	> 110
525	1625	1605	4	0.8	Very Dense	> 200	> 110
530	1629	1609	4	0.8	Very Dense	> 200	> 110
535	1632	1612	3	0.6	Very Dense	> 200	> 110
540	1637	1617	5	1.0	Very Dense	> 200	> 110
545	1641	1621	4	0.8	Very Dense	> 200	> 110
550	1646	1626	5	1.0	Very Dense	> 200	> 110
555	1650	1630	4	0.8	Very Dense	> 200	> 110
560	1656	1636	6	1.2	Very Dense	> 200	> 110
565	1657	1637	1	0.2	Very Dense	> 200	> 110
570	1663	1643	6	1.2	Very Dense	> 200	> 110
575	1666	1646	3	0.6	Very Dense	> 200	> 110
580	1670	1650	4	0.8	Very Dense	> 200	> 110
585	1672	1652	2	0.4	Very Dense	> 200	> 110
590	1676	1656	4	0.8	Very Dense	> 200	> 110
595	1678	1658	2	0.4	Very Dense	> 200	> 110
600	1679	1659	1	0.2	Very Dense	> 200	> 110
605	1680	1660	1	0.2	Very Dense	> 200	> 110
610	Refusal						

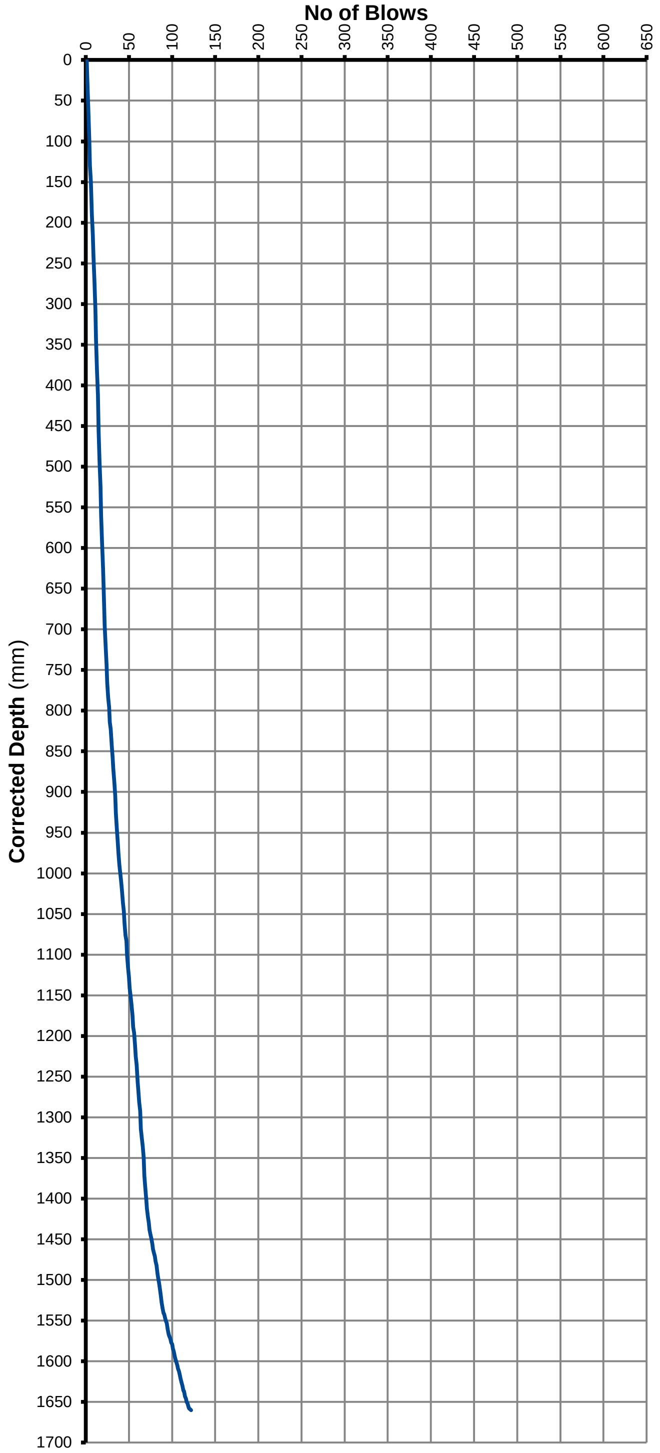
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

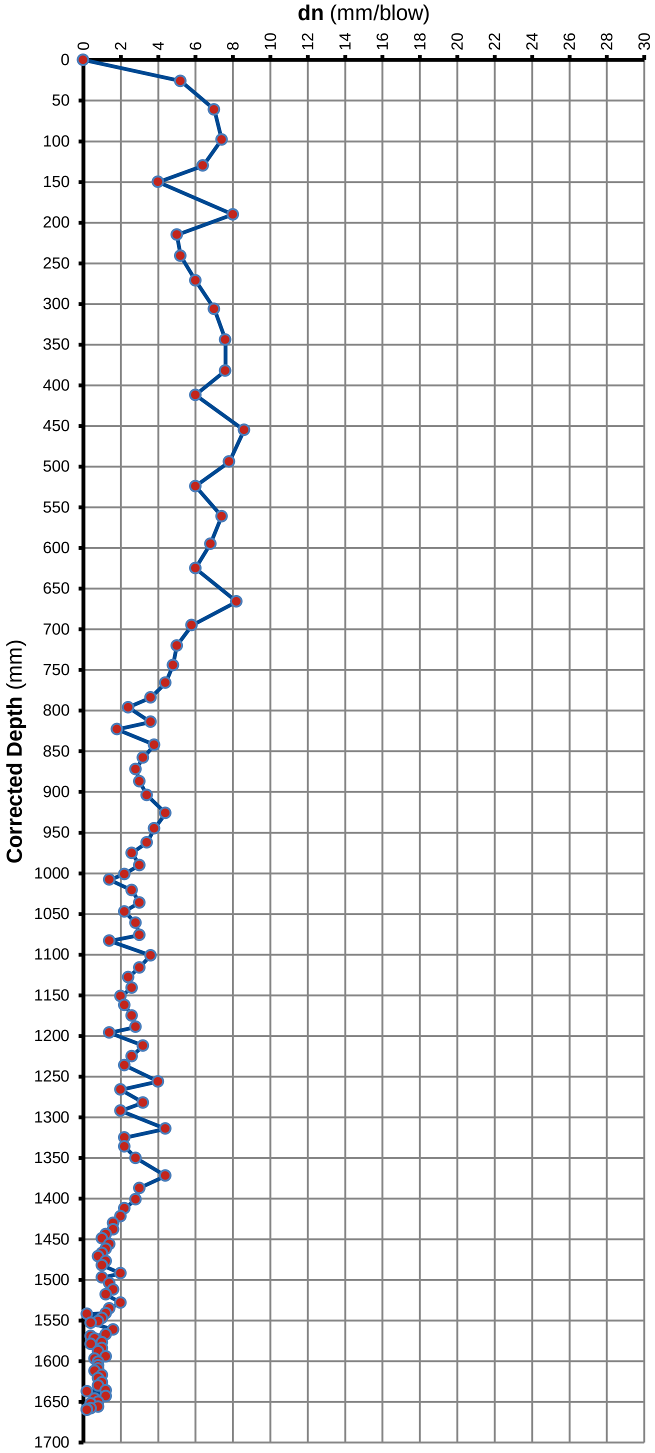
POSITION: DCP 8 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



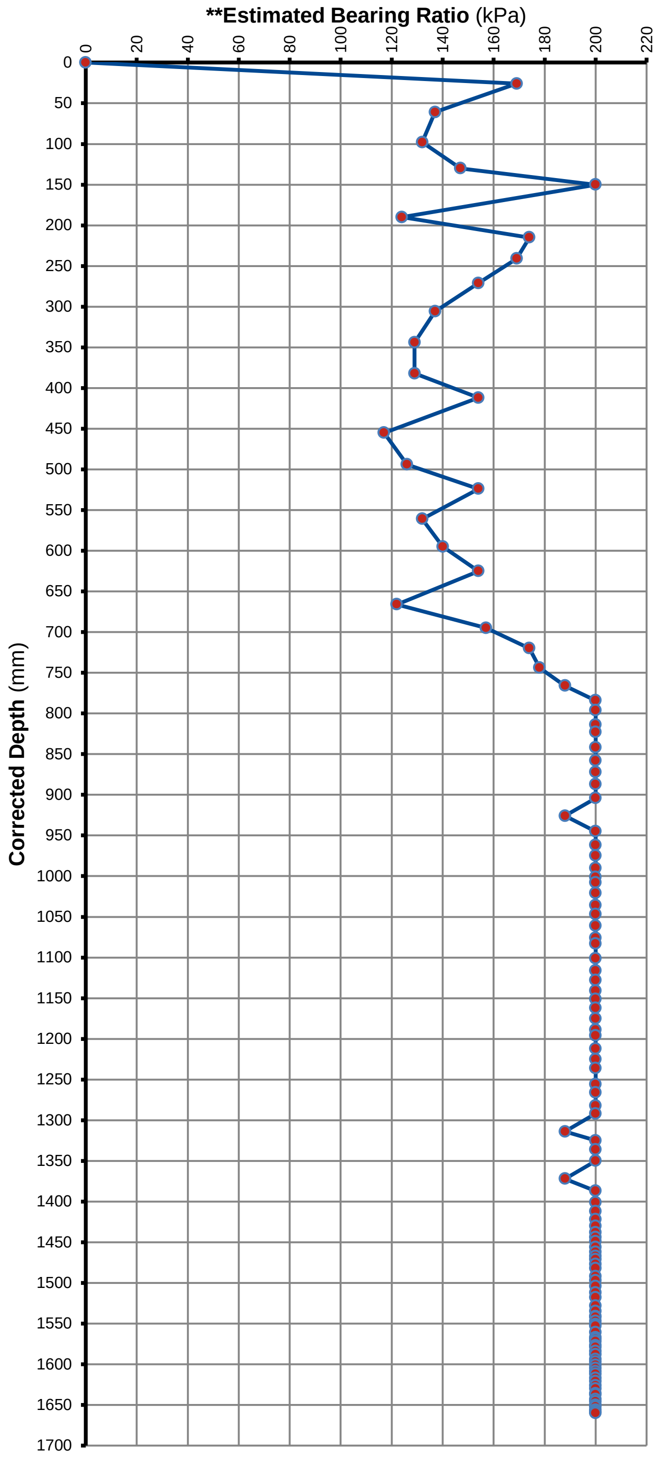
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

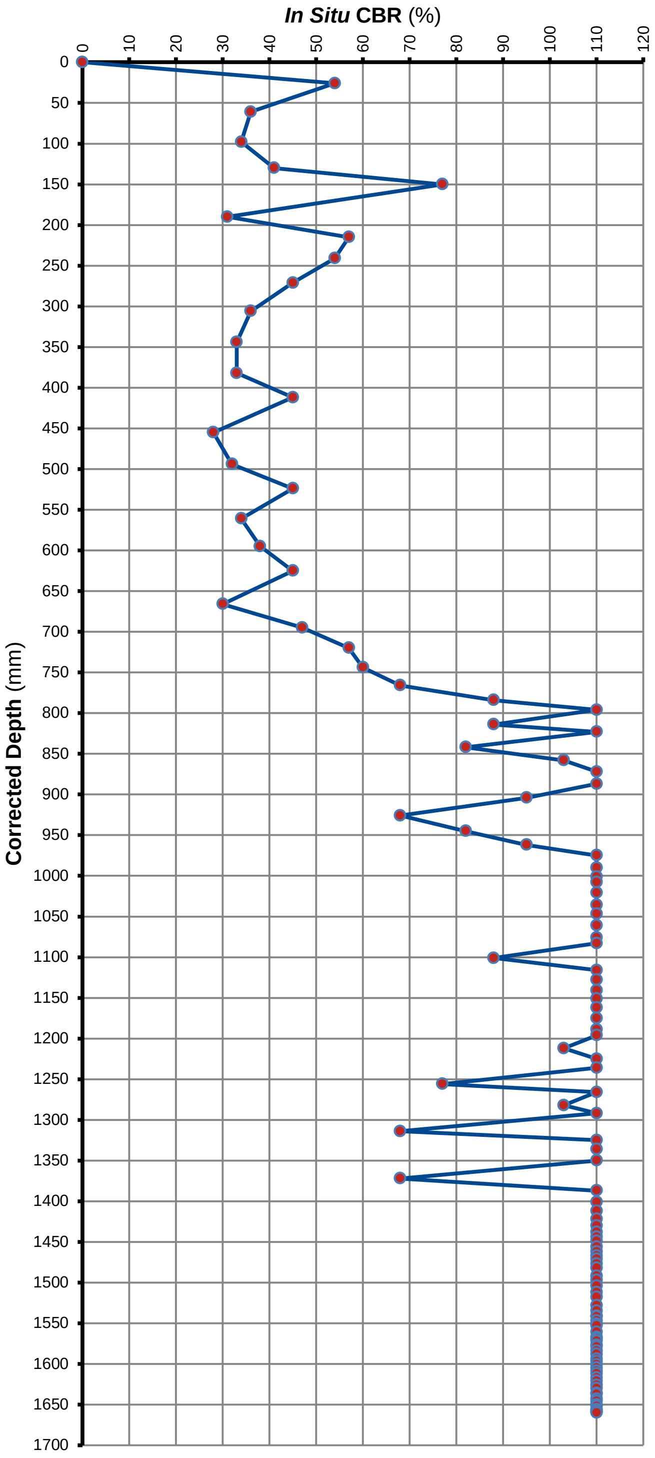
POSITION: DCP 8 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 9 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	230	0	-	-	-	-	-
5	415	185	185	37.0	Loose	41	4
10	489	259	74	14.8	Medium Dense	78	13
15	525	295	36	7.2	Dense	134	35
20	567	337	42	8.4	Dense	119	29
25	598	368	31	6.2	Dense	150	43
30	631	401	33	6.6	Dense	144	39
35	650	420	19	3.8	Very Dense	> 200	82
40	687	457	37	7.4	Dense	132	34
45	711	481	24	4.8	Very Dense	178	60
50	748	518	37	7.4	Dense	132	34
55	792	562	44	8.8	Dense	115	27
60	818	588	26	5.2	Dense	169	54
65	847	617	29	5.8	Dense	157	47
70	881	651	34	6.8	Dense	140	38
75	924	694	43	8.6	Dense	117	28
80	940	710	16	3.2	Very Dense	> 200	103
85	967	737	27	5.4	Dense	165	52
90	990	760	23	4.6	Very Dense	183	64
95	1008	778	18	3.6	Very Dense	> 200	88
100	1027	797	19	3.8	Very Dense	> 200	82
105	1039	809	12	2.4	Very Dense	> 200	> 110
110	1056	826	17	3.4	Very Dense	> 200	95
115	1075	845	19	3.8	Very Dense	> 200	82
120	1099	869	24	4.8	Very Dense	178	60
125	1120	890	21	4.2	Very Dense	193	72
130	1142	912	22	4.4	Very Dense	188	68
135	1157	927	15	3.0	Very Dense	> 200	> 110
140	1181	951	24	4.8	Very Dense	178	60
145	1200	970	19	3.8	Very Dense	> 200	82
150	1218	988	18	3.6	Very Dense	> 200	88
155	1227	997	9	1.8	Very Dense	> 200	> 110
160	1235	1005	8	1.6	Very Dense	> 200	> 110
165	1249	1019	14	2.8	Very Dense	> 200	> 110
170	1255	1025	6	1.2	Very Dense	> 200	> 110
175	1260	1030	5	1.0	Very Dense	> 200	> 110
180	1263	1033	3	0.6	Very Dense	> 200	> 110
185	Refusal						

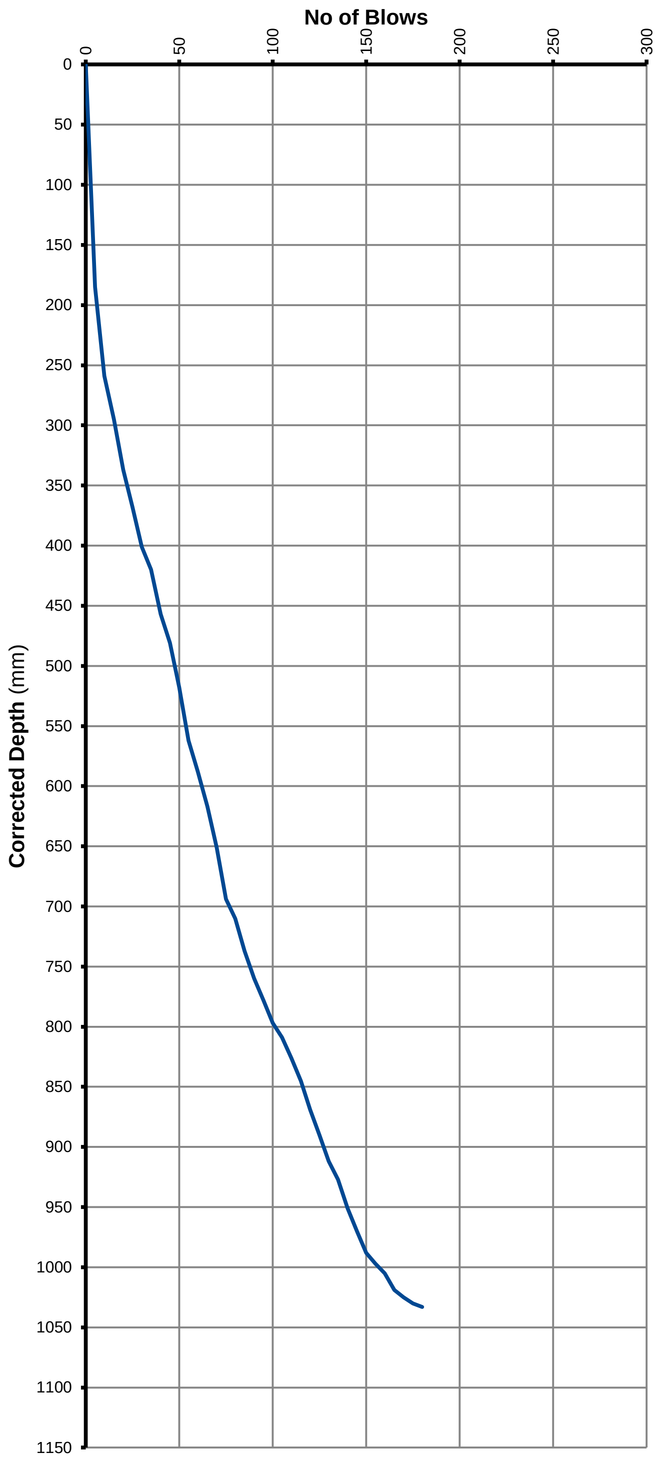
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

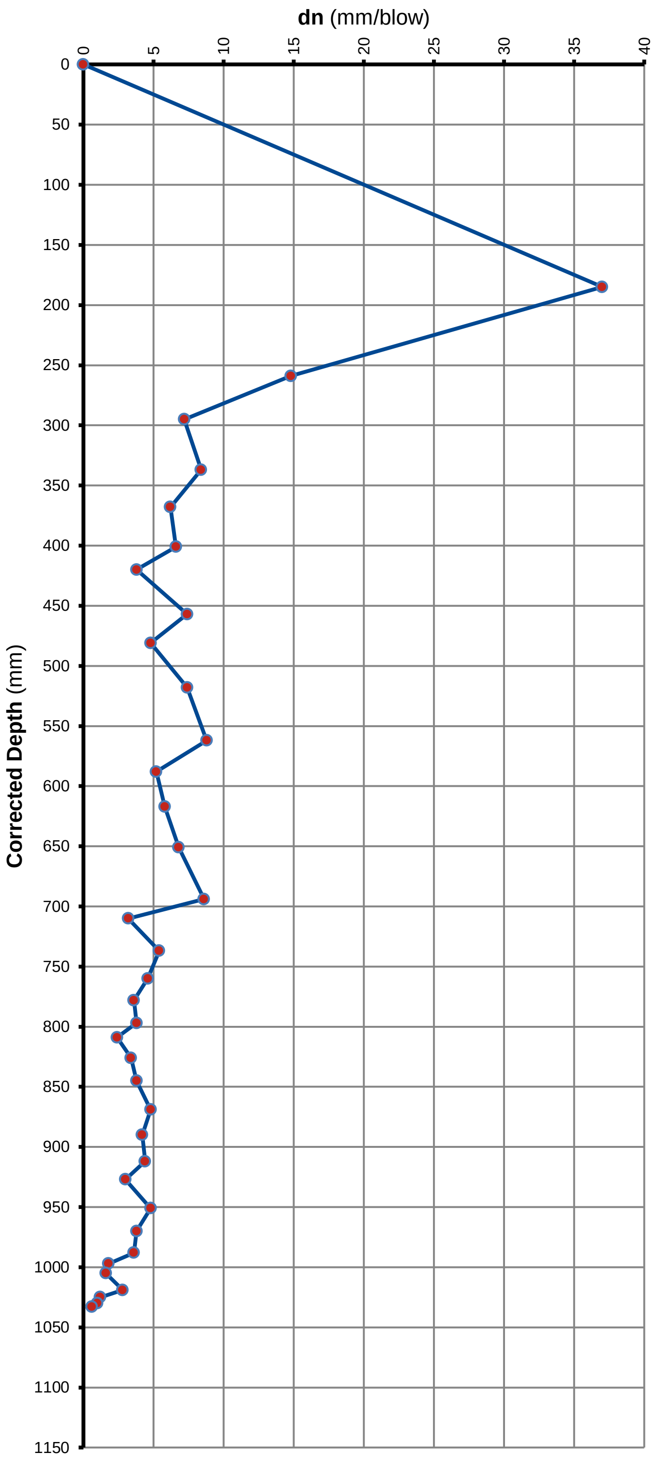
POSITION: DCP 9 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



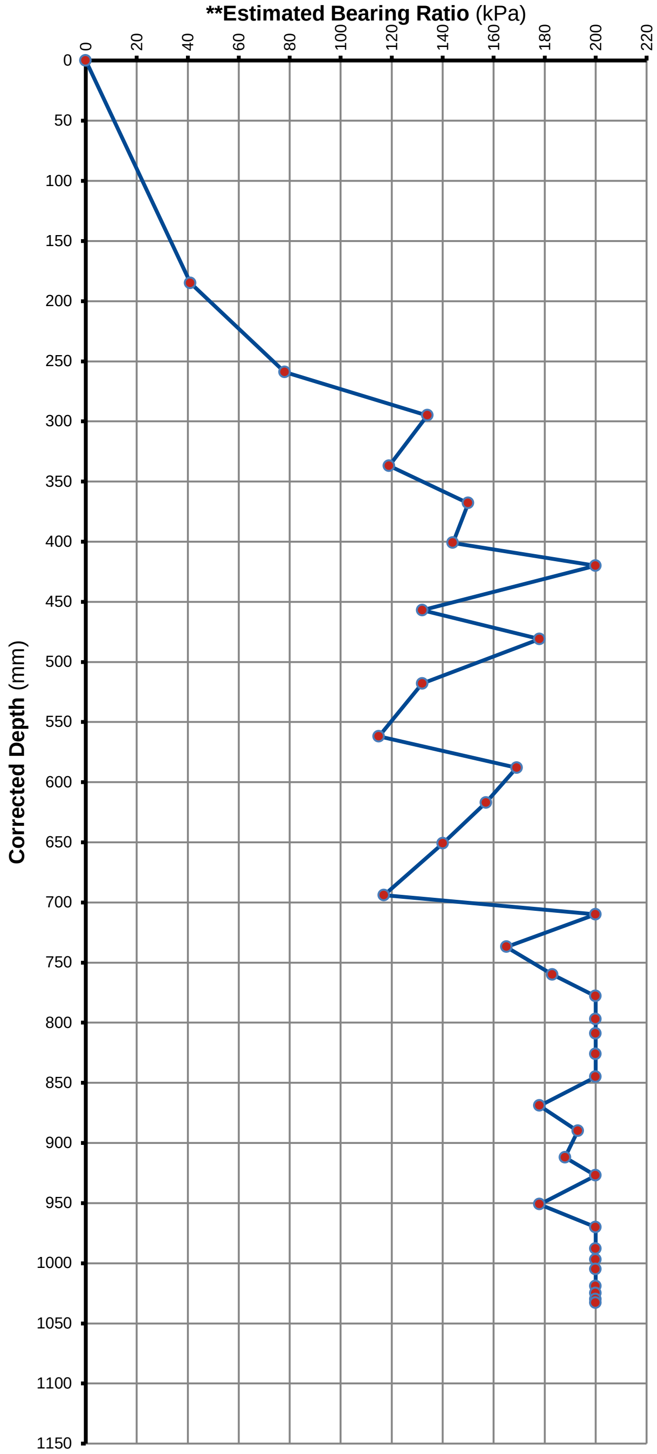
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

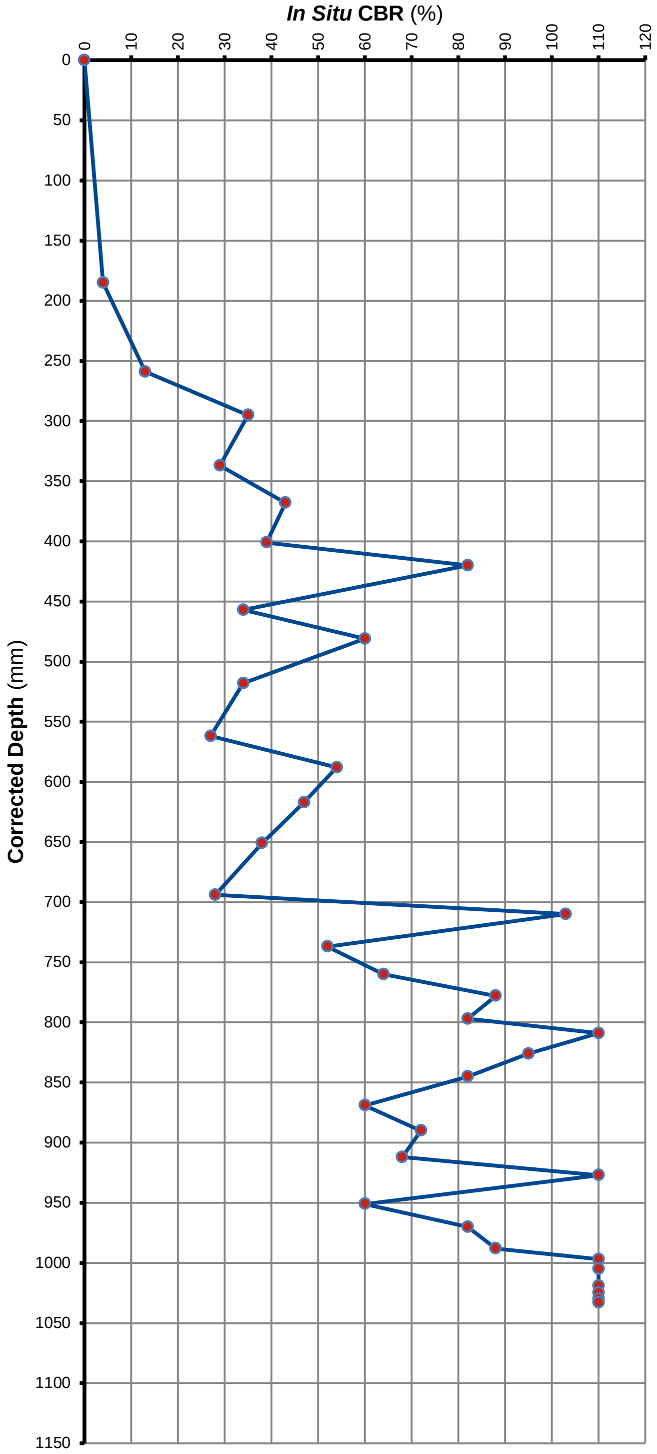
POSITION: DCP 9 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 10 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	230	0	-	-	-	-	-
5	445	215	215	43.0	Loose	40	3
10	499	269	54	10.8	Dense	98	20
15	542	312	43	8.6	Dense	117	28
20	589	359	47	9.4	Dense	109	25
25	627	397	38	7.6	Dense	129	33
30	690	460	63	12.6	Medium Dense	88	17
35	750	520	60	12.0	Dense	91	18
40	811	581	61	12.2	Dense	90	17
45	878	648	67	13.4	Medium Dense	84	15
50	923	693	45	9.0	Dense	113	26
55	945	715	22	4.4	Very Dense	188	68
60	958	728	13	2.6	Very Dense	> 200	> 110
65	965	735	7	1.4	Very Dense	> 200	> 110
70	972	742	7	1.4	Very Dense	> 200	> 110
75	981	751	9	1.8	Very Dense	> 200	> 110
80	998	768	17	3.4	Very Dense	> 200	95
85	1012	782	14	2.8	Very Dense	> 200	> 110
90	1025	795	13	2.6	Very Dense	> 200	> 110
95	1040	810	15	3.0	Very Dense	> 200	> 110
100	1057	827	17	3.4	Very Dense	> 200	95
105	1069	839	12	2.4	Very Dense	> 200	> 110
110	1081	851	12	2.4	Very Dense	> 200	> 110
115	1095	865	14	2.8	Very Dense	> 200	> 110
120	1106	876	11	2.2	Very Dense	> 200	> 110
125	1120	890	14	2.8	Very Dense	> 200	> 110
130	1132	902	12	2.4	Very Dense	> 200	> 110
135	1148	918	16	3.2	Very Dense	> 200	103
140	1161	931	13	2.6	Very Dense	> 200	> 110
145	1180	950	19	3.8	Very Dense	> 200	82
150	1194	964	14	2.8	Very Dense	> 200	> 110
155	1209	979	15	3.0	Very Dense	> 200	> 110
160	1221	991	12	2.4	Very Dense	> 200	> 110
165	1232	1002	11	2.2	Very Dense	> 200	> 110
170	1247	1017	15	3.0	Very Dense	> 200	> 110
175	1259	1029	12	2.4	Very Dense	> 200	> 110
180	1270	1040	11	2.2	Very Dense	> 200	> 110
185	1280	1050	10	2.0	Very Dense	> 200	> 110
190	1296	1066	16	3.2	Very Dense	> 200	103
195	1314	1084	18	3.6	Very Dense	> 200	88
200	1321	1091	7	1.4	Very Dense	> 200	> 110
205	1329	1099	8	1.6	Very Dense	> 200	> 110
210	1336	1106	7	1.4	Very Dense	> 200	> 110
215	1342	1112	6	1.2	Very Dense	> 200	> 110
220	1349	1119	7	1.4	Very Dense	> 200	> 110
225	1355	1125	6	1.2	Very Dense	> 200	> 110
230	1361	1131	6	1.2	Very Dense	> 200	> 110
235	1370	1140	9	1.8	Very Dense	> 200	> 110
240	1381	1151	11	2.2	Very Dense	> 200	> 110
245	1388	1158	7	1.4	Very Dense	> 200	> 110
250	1397	1167	9	1.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 10 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1405	1175	8	1.6	Very Dense	> 200	> 110
260	1412	1182	7	1.4	Very Dense	> 200	> 110
265	1419	1189	7	1.4	Very Dense	> 200	> 110
270	1423	1193	4	0.8	Very Dense	> 200	> 110
275	1425	1195	2	0.4	Very Dense	> 200	> 110
280	1427	1197	2	0.4	Very Dense	> 200	> 110
285	1428	1198	1	0.2	Very Dense	> 200	> 110
290	Refusal						

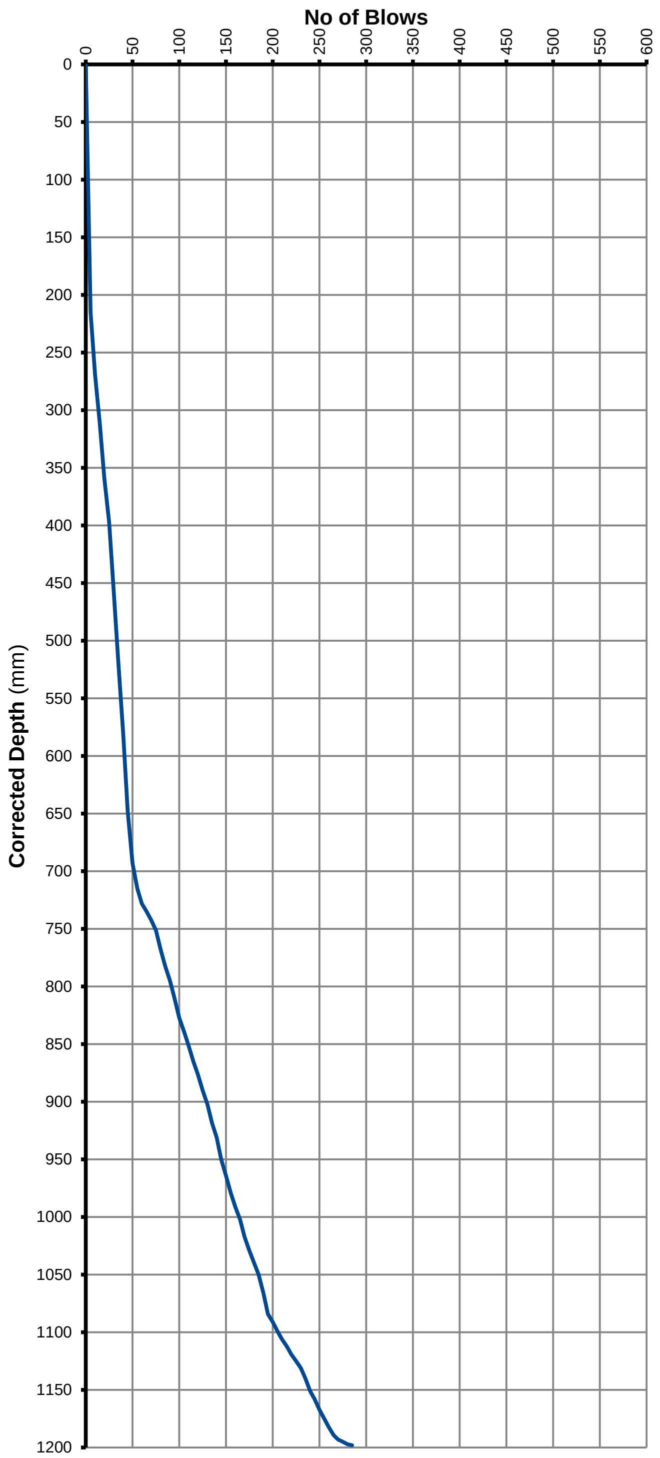
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

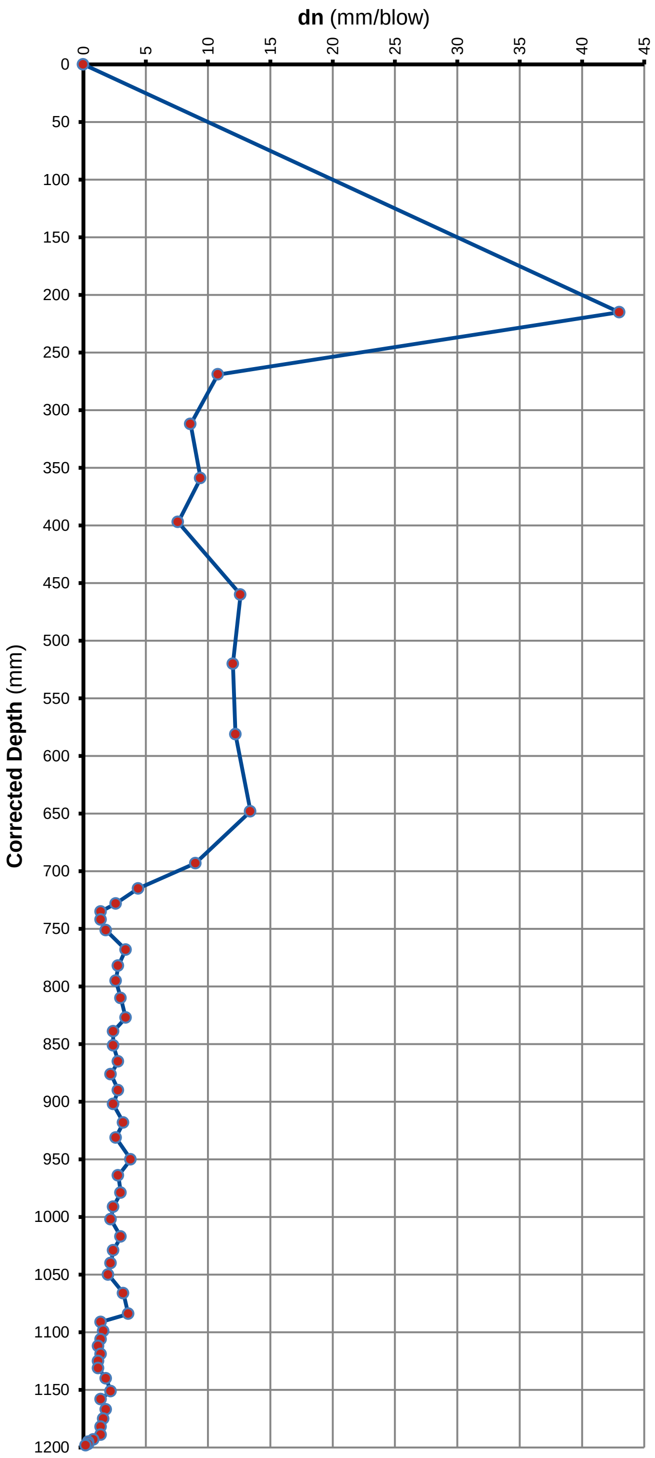
POSITION: DCP 10 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



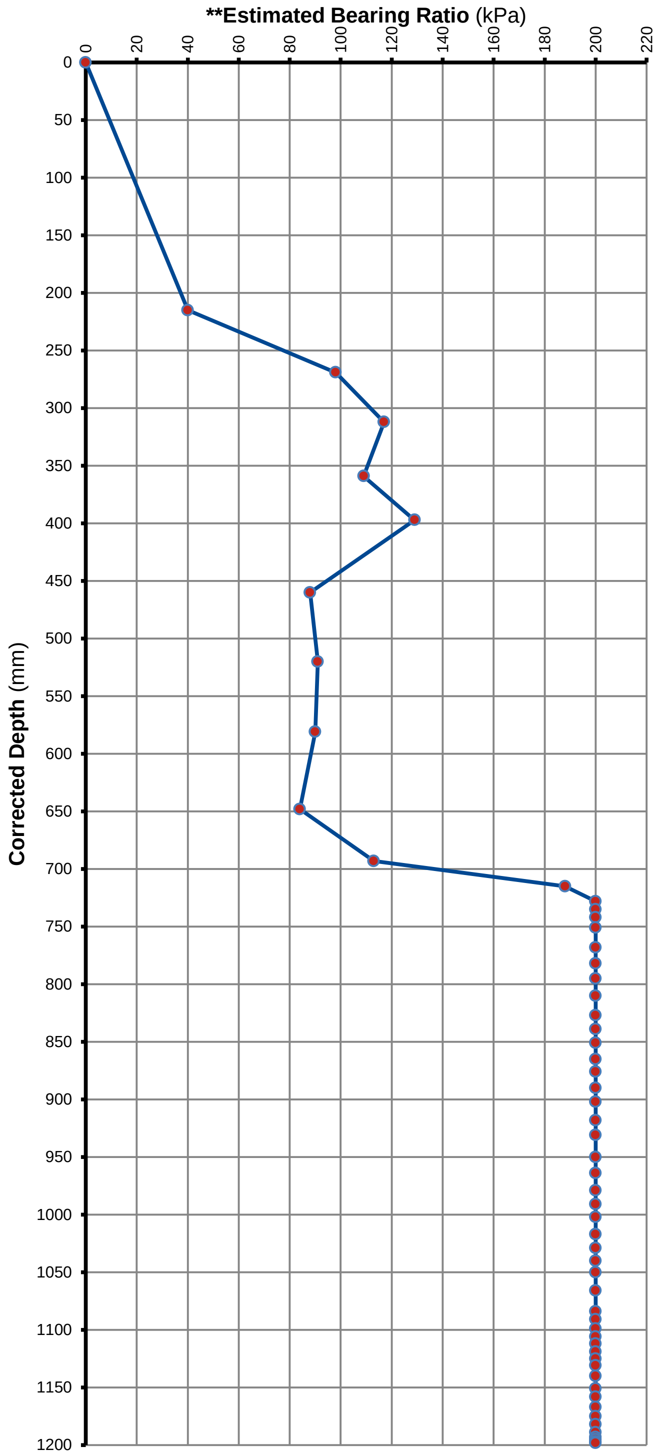
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

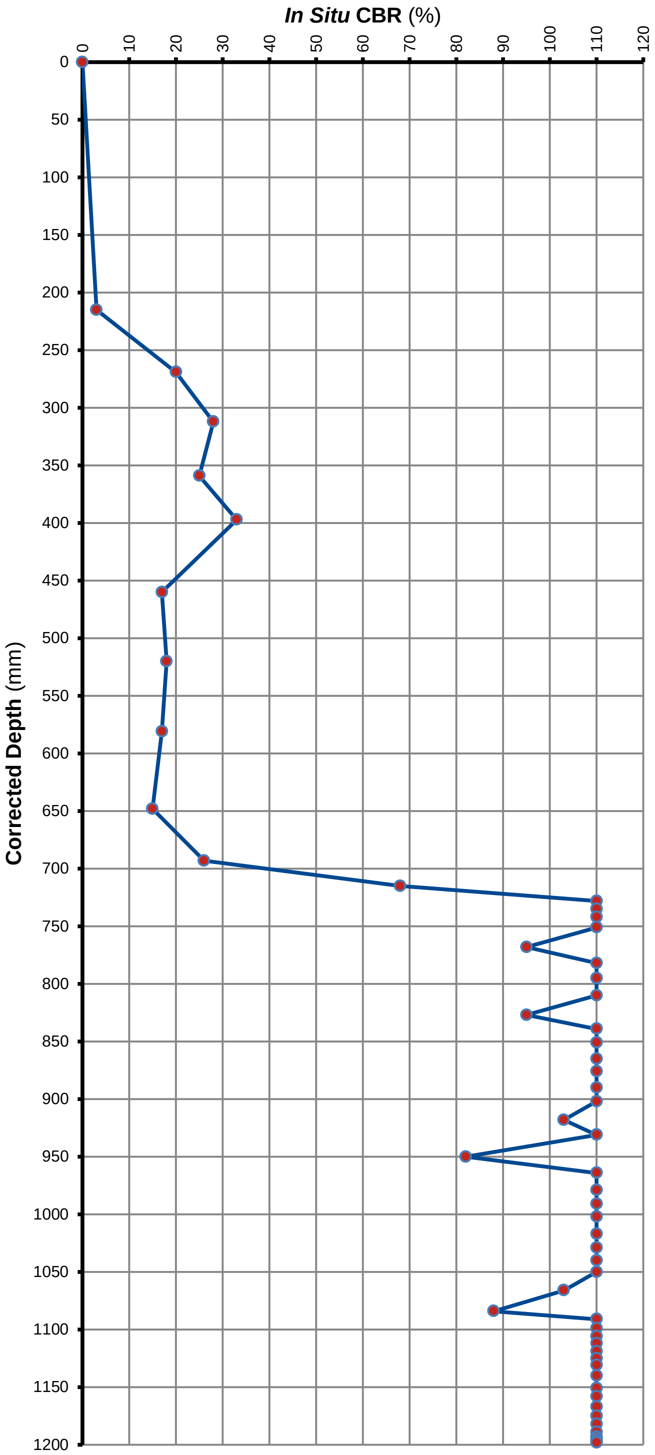
POSITION: DCP 10 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 11 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	220	0	-	-	-	-	-
5	441	221	221	44.2	Loose	39	3
10	497	277	56	11.2	Dense	95	20
15	523	303	26	5.2	Dense	169	54
20	575	355	52	10.4	Dense	101	22
25	600	380	25	5.0	Very Dense	174	57
30	631	411	31	6.2	Dense	150	43
35	657	437	26	5.2	Dense	169	54
40	672	452	15	3.0	Very Dense	> 200	> 110
45	699	479	27	5.4	Dense	165	52
50	724	504	25	5.0	Very Dense	174	57
55	750	530	26	5.2	Dense	169	54
60	781	561	31	6.2	Dense	150	43
65	809	589	28	5.6	Dense	161	49
70	845	625	36	7.2	Dense	134	35
75	877	657	32	6.4	Dense	147	41
80	898	678	21	4.2	Very Dense	193	72
85	920	700	22	4.4	Very Dense	188	68
90	956	736	36	7.2	Dense	134	35
95	972	752	16	3.2	Very Dense	> 200	103
100	989	769	17	3.4	Very Dense	> 200	95
105	1005	785	16	3.2	Very Dense	> 200	103
110	1012	792	7	1.4	Very Dense	> 200	> 110
115	1025	805	13	2.6	Very Dense	> 200	> 110
120	1037	817	12	2.4	Very Dense	> 200	> 110
125	1046	826	9	1.8	Very Dense	> 200	> 110
130	1058	838	12	2.4	Very Dense	> 200	> 110
135	1065	845	7	1.4	Very Dense	> 200	> 110
140	1079	859	14	2.8	Very Dense	> 200	> 110
145	1094	874	15	3.0	Very Dense	> 200	> 110
150	1112	892	18	3.6	Very Dense	> 200	88
155	1128	908	16	3.2	Very Dense	> 200	103
160	1140	920	12	2.4	Very Dense	> 200	> 110
165	1159	939	19	3.8	Very Dense	> 200	82
170	1172	952	13	2.6	Very Dense	> 200	> 110
175	1190	970	18	3.6	Very Dense	> 200	88
180	1217	997	27	5.4	Dense	165	52
185	1231	1011	14	2.8	Very Dense	> 200	> 110
190	1248	1028	17	3.4	Very Dense	> 200	95
195	1265	1045	17	3.4	Very Dense	> 200	95
200	1280	1060	15	3.0	Very Dense	> 200	> 110
205	1293	1073	13	2.6	Very Dense	> 200	> 110
210	1314	1094	21	4.2	Very Dense	193	72
215	1327	1107	13	2.6	Very Dense	> 200	> 110
220	1339	1119	12	2.4	Very Dense	> 200	> 110
225	1350	1130	11	2.2	Very Dense	> 200	> 110
230	1362	1142	12	2.4	Very Dense	> 200	> 110
235	1375	1155	13	2.6	Very Dense	> 200	> 110
240	1388	1168	13	2.6	Very Dense	> 200	> 110
245	1394	1174	6	1.2	Very Dense	> 200	> 110
250	1406	1186	12	2.4	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 11 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1413	1193	7	1.4	Very Dense	> 200	> 110
260	1420	1200	7	1.4	Very Dense	> 200	> 110
265	1425	1205	5	1.0	Very Dense	> 200	> 110
270	1433	1213	8	1.6	Very Dense	> 200	> 110
275	1440	1220	7	1.4	Very Dense	> 200	> 110
280	1448	1228	8	1.6	Very Dense	> 200	> 110
285	1455	1235	7	1.4	Very Dense	> 200	> 110
290	1461	1241	6	1.2	Very Dense	> 200	> 110
295	1468	1248	7	1.4	Very Dense	> 200	> 110
300	1473	1253	5	1.0	Very Dense	> 200	> 110
305	1479	1259	6	1.2	Very Dense	> 200	> 110
310	1486	1266	7	1.4	Very Dense	> 200	> 110
315	1493	1273	7	1.4	Very Dense	> 200	> 110
320	1502	1282	9	1.8	Very Dense	> 200	> 110
325	1510	1290	8	1.6	Very Dense	> 200	> 110
330	1518	1298	8	1.6	Very Dense	> 200	> 110
335	1526	1306	8	1.6	Very Dense	> 200	> 110
340	1529	1309	3	0.6	Very Dense	> 200	> 110
345	1531	1311	2	0.4	Very Dense	> 200	> 110
350	1532	1312	1	0.2	Very Dense	> 200	> 110
355	Refusal						

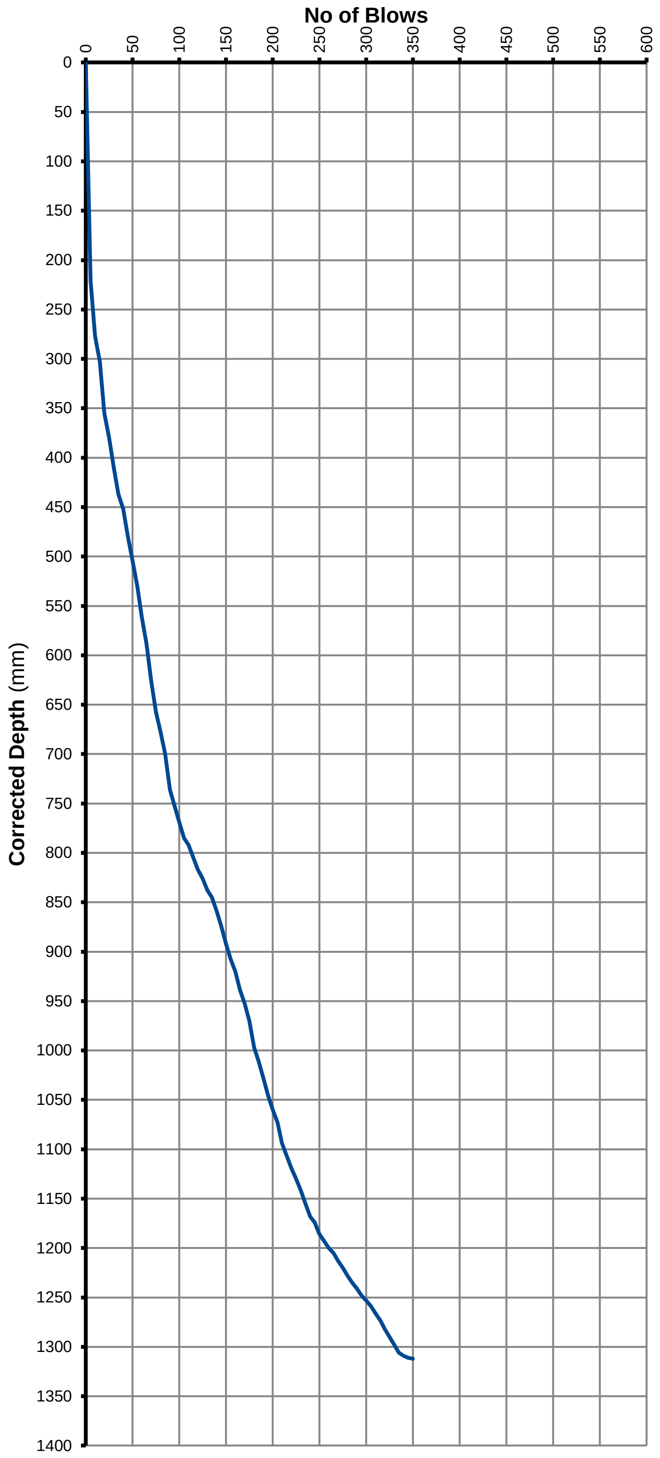
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

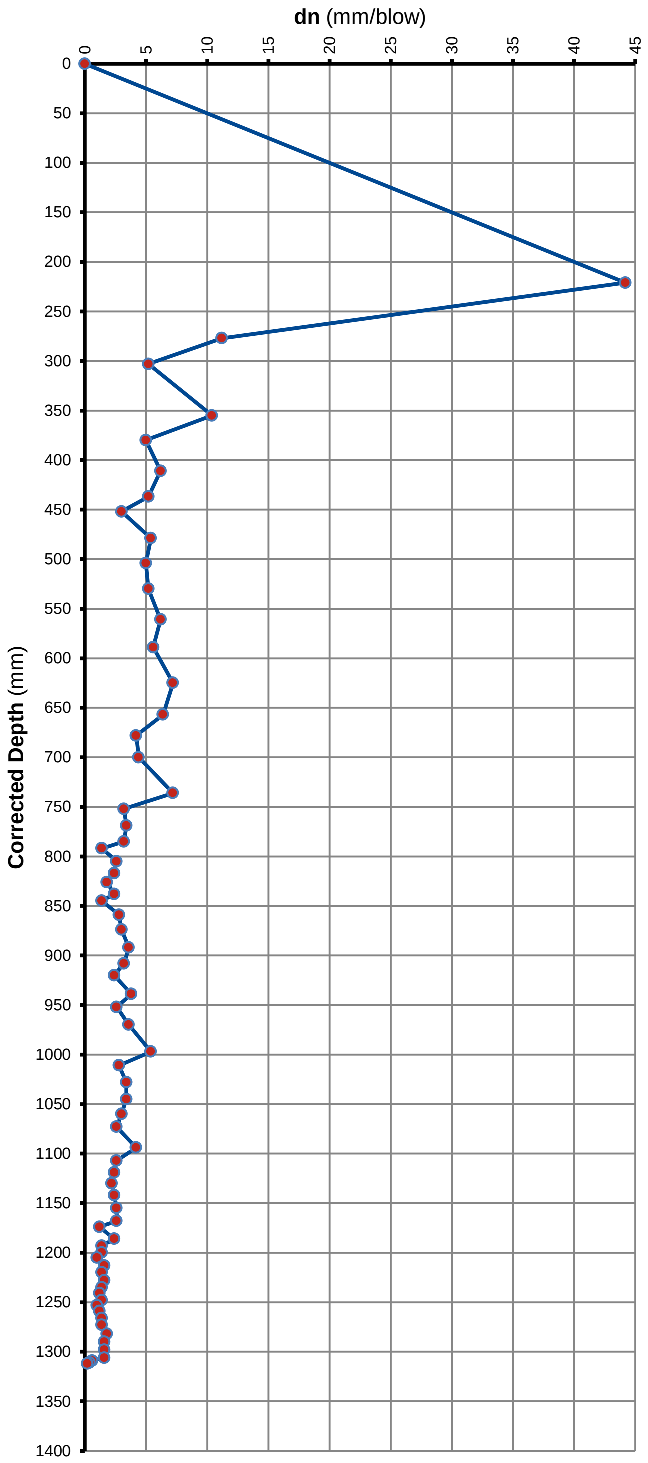
POSITION: DCP 11 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



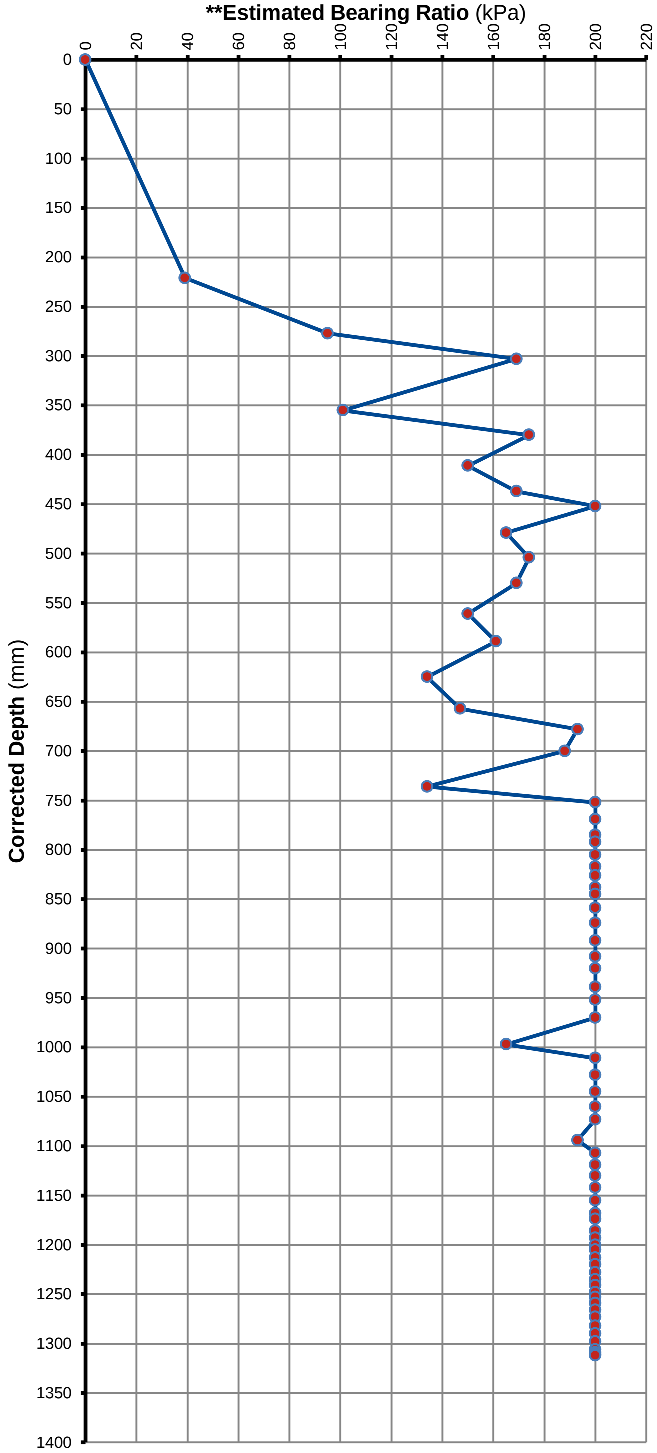
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

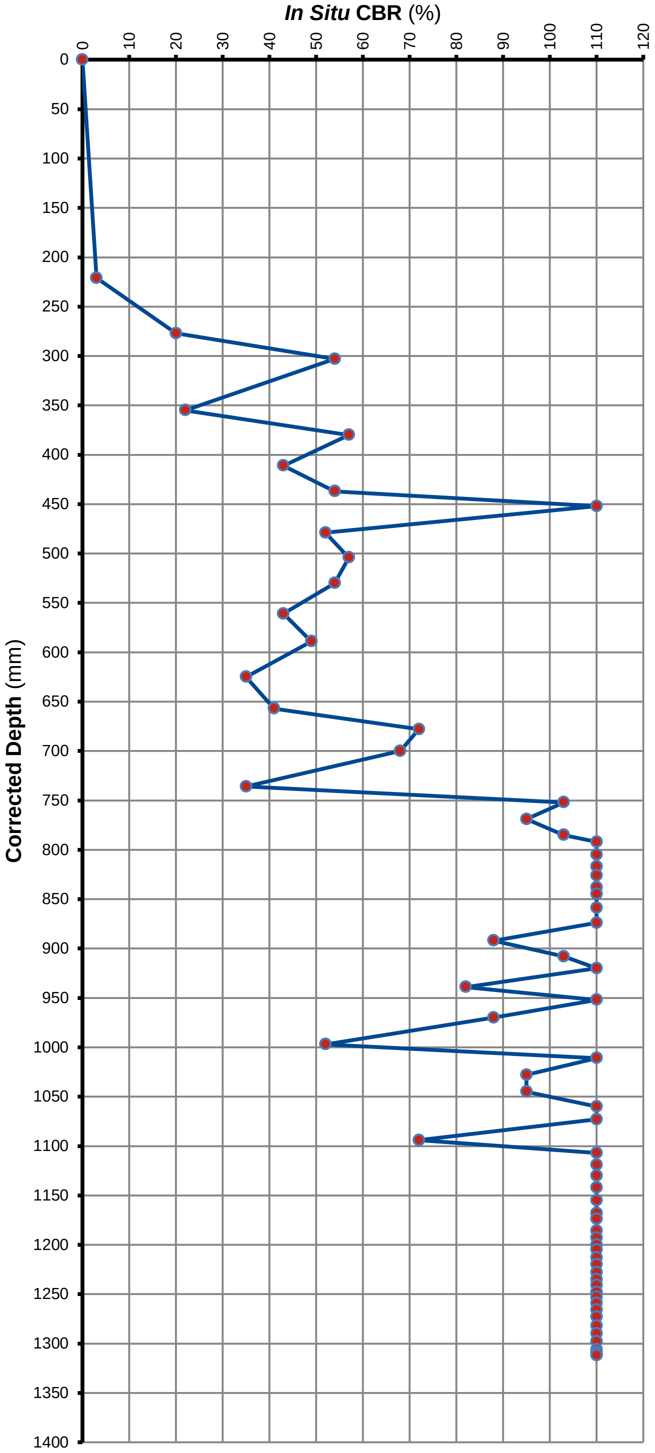
POSITION: DCP 11 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 12 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	220	0	-	-	-	-	-
5	488	268	268	53.6	Loose	15	2
10	575	355	87	17.4	Medium Dense	71	11
15	611	391	36	7.2	Dense	134	35
20	638	418	27	5.4	Dense	165	52
25	659	439	21	4.2	Very Dense	193	72
30	672	452	13	2.6	Very Dense	> 200	> 110
35	686	466	14	2.8	Very Dense	> 200	> 110
40	703	483	17	3.4	Very Dense	> 200	95
45	728	508	25	5.0	Very Dense	174	57
50	741	521	13	2.6	Very Dense	> 200	> 110
55	755	535	14	2.8	Very Dense	> 200	> 110
60	774	554	19	3.8	Very Dense	> 200	82
65	786	566	12	2.4	Very Dense	> 200	> 110
70	800	580	14	2.8	Very Dense	> 200	> 110
75	834	614	34	6.8	Dense	140	38
80	864	644	30	6.0	Dense	154	45
85	891	671	27	5.4	Dense	165	52
90	911	691	20	4.0	Very Dense	200	77
95	929	709	18	3.6	Very Dense	> 200	88
100	941	721	12	2.4	Very Dense	> 200	> 110
105	968	748	27	5.4	Dense	165	52
110	977	757	9	1.8	Very Dense	> 200	> 110
115	985	765	8	1.6	Very Dense	> 200	> 110
120	998	778	13	2.6	Very Dense	> 200	> 110
125	1014	794	16	3.2	Very Dense	> 200	103
130	1026	806	12	2.4	Very Dense	> 200	> 110
135	1035	815	9	1.8	Very Dense	> 200	> 110
140	1049	829	14	2.8	Very Dense	> 200	> 110
145	1060	840	11	2.2	Very Dense	> 200	> 110
150	1072	852	12	2.4	Very Dense	> 200	> 110
155	1088	868	16	3.2	Very Dense	> 200	103
160	1095	875	7	1.4	Very Dense	> 200	> 110
165	1111	891	16	3.2	Very Dense	> 200	103
170	1126	906	15	3.0	Very Dense	> 200	> 110
175	1135	915	9	1.8	Very Dense	> 200	> 110
180	1149	929	14	2.8	Very Dense	> 200	> 110
185	1159	939	10	2.0	Very Dense	> 200	> 110
190	1170	950	11	2.2	Very Dense	> 200	> 110
195	1181	961	11	2.2	Very Dense	> 200	> 110
200	1195	975	14	2.8	Very Dense	> 200	> 110
205	1210	990	15	3.0	Very Dense	> 200	> 110
210	1214	994	4	0.8	Very Dense	> 200	> 110
215	1227	1007	13	2.6	Very Dense	> 200	> 110
220	1235	1015	8	1.6	Very Dense	> 200	> 110
225	1241	1021	6	1.2	Very Dense	> 200	> 110
230	1248	1028	7	1.4	Very Dense	> 200	> 110
235	1254	1034	6	1.2	Very Dense	> 200	> 110
240	1262	1042	8	1.6	Very Dense	> 200	> 110
245	1270	1050	8	1.6	Very Dense	> 200	> 110
250	1281	1061	11	2.2	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 12 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

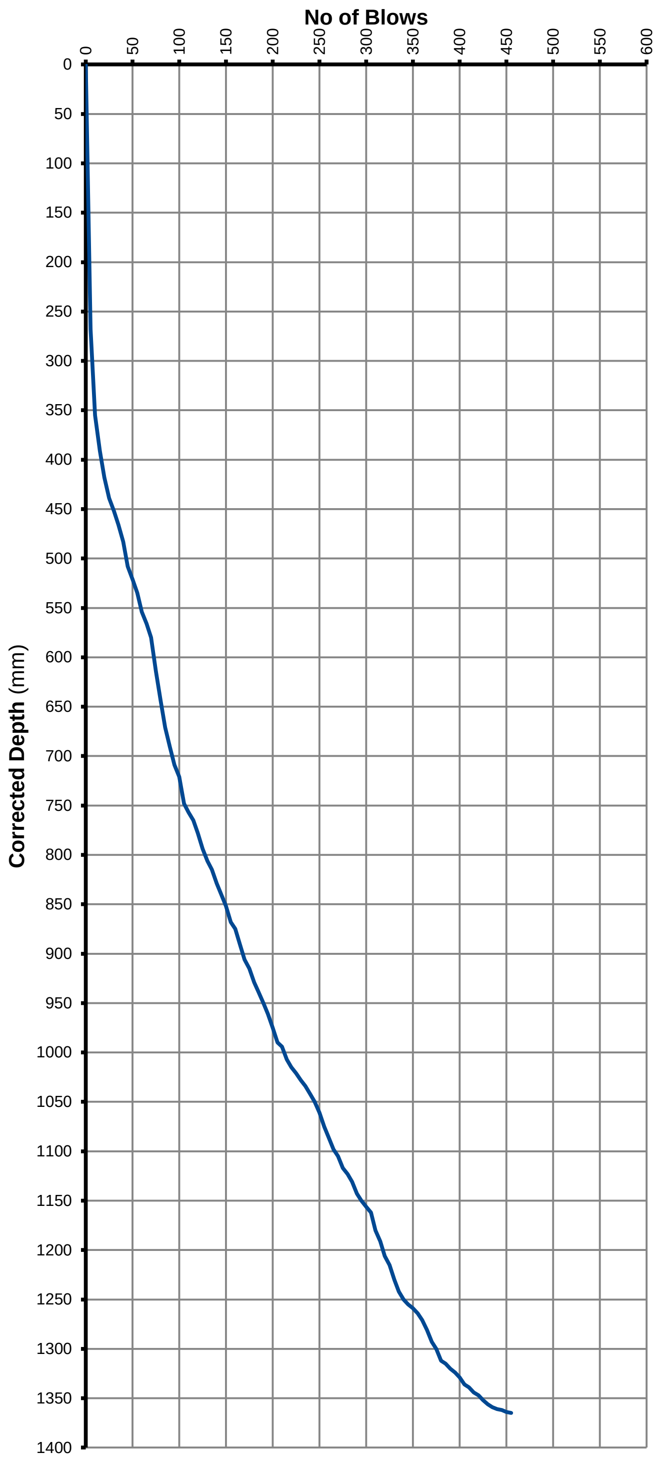
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1295	1075	14	2.8	Very Dense	> 200	> 110
260	1306	1086	11	2.2	Very Dense	> 200	> 110
265	1318	1098	12	2.4	Very Dense	> 200	> 110
270	1325	1105	7	1.4	Very Dense	> 200	> 110
275	1337	1117	12	2.4	Very Dense	> 200	> 110
280	1343	1123	6	1.2	Very Dense	> 200	> 110
285	1351	1131	8	1.6	Very Dense	> 200	> 110
290	1363	1143	12	2.4	Very Dense	> 200	> 110
295	1370	1150	7	1.4	Very Dense	> 200	> 110
300	1376	1156	6	1.2	Very Dense	> 200	> 110
305	1382	1162	6	1.2	Very Dense	> 200	> 110
310	1400	1180	18	3.6	Very Dense	> 200	88
315	1411	1191	11	2.2	Very Dense	> 200	> 110
320	1426	1206	15	3.0	Very Dense	> 200	> 110
325	1435	1215	9	1.8	Very Dense	> 200	> 110
330	1450	1230	15	3.0	Very Dense	> 200	> 110
335	1462	1242	12	2.4	Very Dense	> 200	> 110
340	1470	1250	8	1.6	Very Dense	> 200	> 110
345	1475	1255	5	1.0	Very Dense	> 200	> 110
350	1479	1259	4	0.8	Very Dense	> 200	> 110
355	1484	1264	5	1.0	Very Dense	> 200	> 110
360	1491	1271	7	1.4	Very Dense	> 200	> 110
365	1501	1281	10	2.0	Very Dense	> 200	> 110
370	1513	1293	12	2.4	Very Dense	> 200	> 110
375	1520	1300	7	1.4	Very Dense	> 200	> 110
380	1532	1312	12	2.4	Very Dense	> 200	> 110
385	1535	1315	3	0.6	Very Dense	> 200	> 110
390	1540	1320	5	1.0	Very Dense	> 200	> 110
395	1544	1324	4	0.8	Very Dense	> 200	> 110
400	1549	1329	5	1.0	Very Dense	> 200	> 110
405	1556	1336	7	1.4	Very Dense	> 200	> 110
410	1559	1339	3	0.6	Very Dense	> 200	> 110
415	1564	1344	5	1.0	Very Dense	> 200	> 110
420	1567	1347	3	0.6	Very Dense	> 200	> 110
425	1572	1352	5	1.0	Very Dense	> 200	> 110
430	1576	1356	4	0.8	Very Dense	> 200	> 110
435	1579	1359	3	0.6	Very Dense	> 200	> 110
440	1581	1361	2	0.4	Very Dense	> 200	> 110
445	1582	1362	1	0.2	Very Dense	> 200	> 110
450	1584	1364	2	0.4	Very Dense	> 200	> 110
455	1585	1365	1	0.2	Very Dense	> 200	> 110
460	Refrusal						

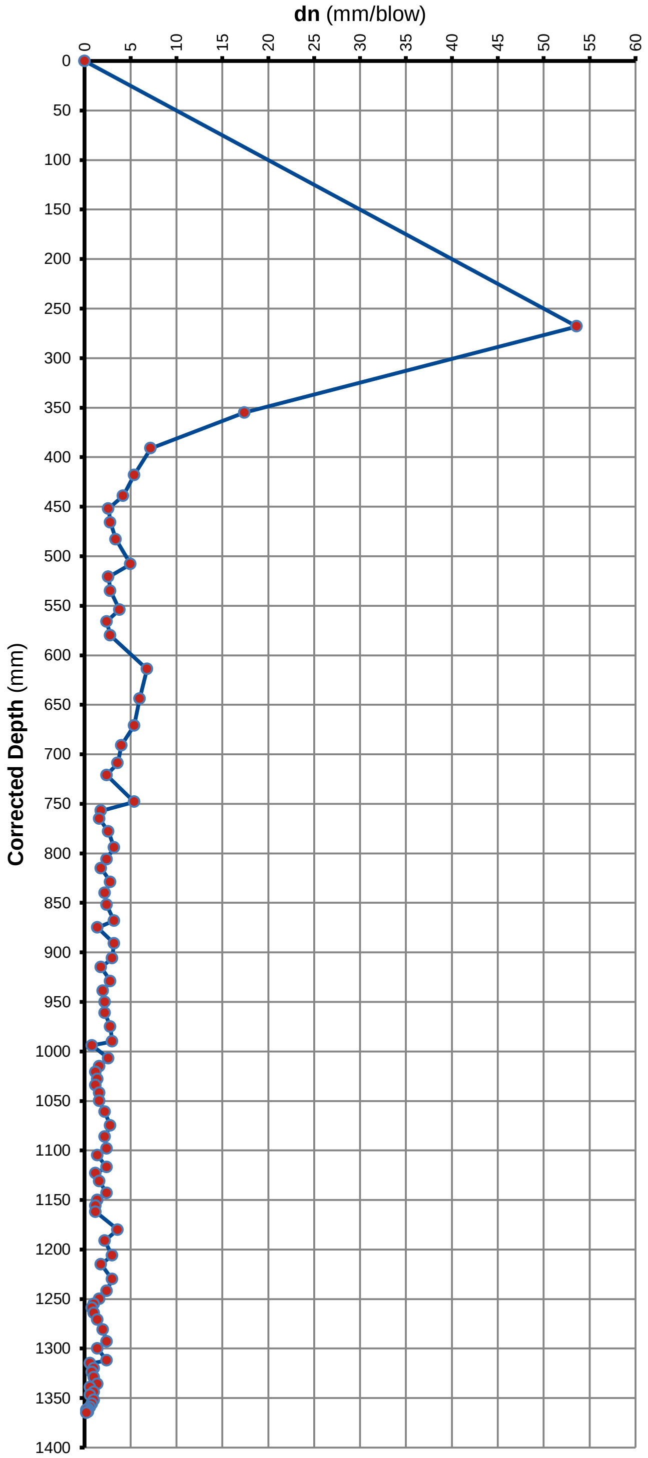
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 12 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

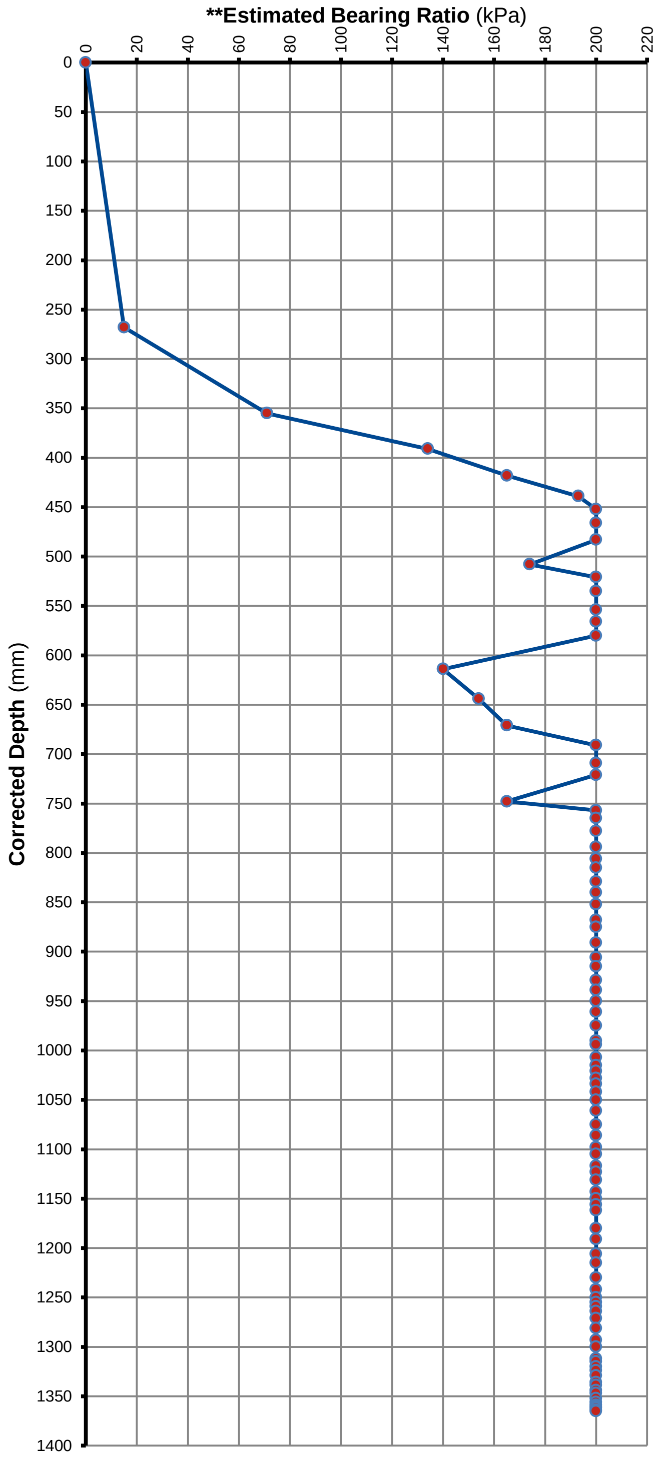
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

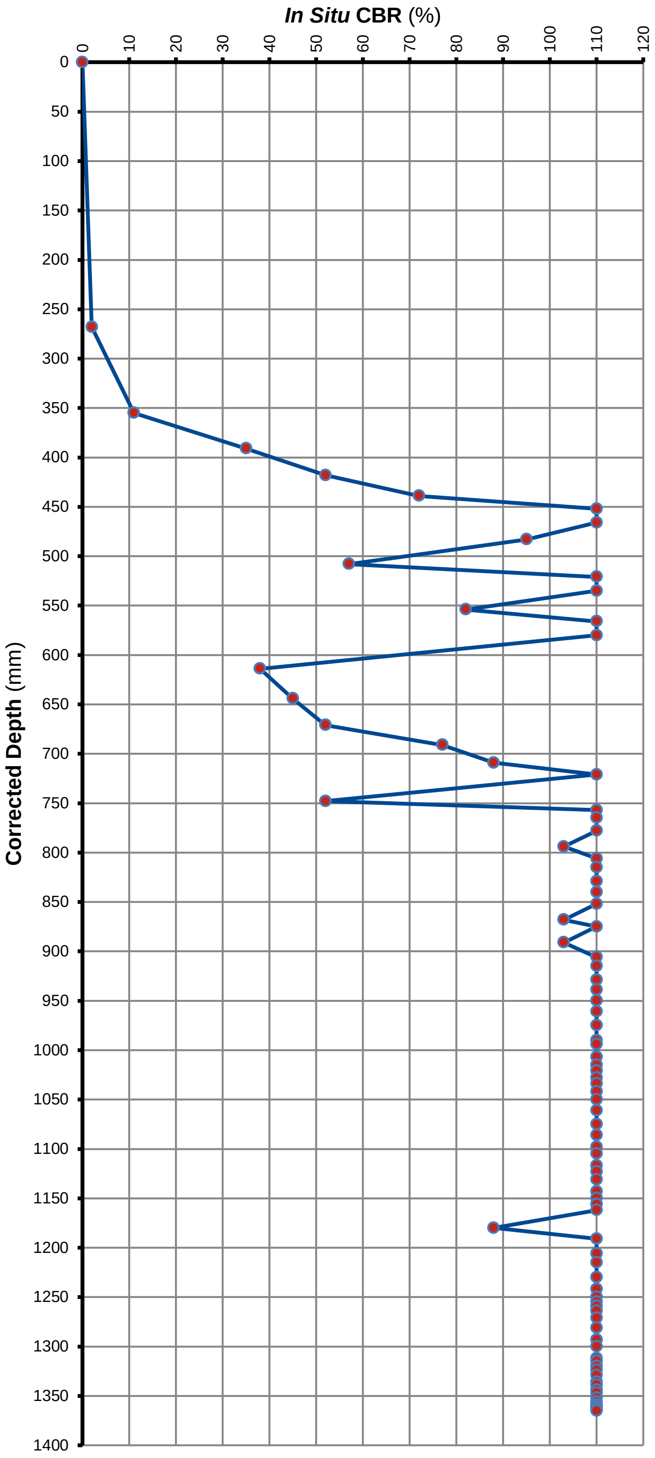
POSITION: DCP 12 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

**Estimated Bearing Ratio VS Corrected Depth



In Situ CBR VS Corrected Depth



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 13 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	230	0	-	-	-	-	-
5	390	160	160	32.0	Loose	43	5
10	443	213	53	10.6	Dense	99	21
15	481	251	38	7.6	Dense	129	33
20	538	308	57	11.4	Dense	94	19
25	570	340	32	6.4	Dense	147	41
30	599	369	29	5.8	Dense	157	47
35	623	393	24	4.8	Very Dense	178	60
40	648	418	25	5.0	Very Dense	174	57
45	671	441	23	4.6	Very Dense	183	64
50	685	455	14	2.8	Very Dense	> 200	> 110
55	700	470	15	3.0	Very Dense	> 200	> 110
60	720	490	20	4.0	Very Dense	200	77
65	742	512	22	4.4	Very Dense	188	68
70	761	531	19	3.8	Very Dense	> 200	82
75	790	560	29	5.8	Dense	157	47
80	821	591	31	6.2	Dense	150	43
85	850	620	29	5.8	Dense	157	47
90	869	639	19	3.8	Very Dense	> 200	82
95	888	658	19	3.8	Very Dense	> 200	82
100	914	684	26	5.2	Dense	169	54
105	929	699	15	3.0	Very Dense	> 200	> 110
110	938	708	9	1.8	Very Dense	> 200	> 110
115	945	715	7	1.4	Very Dense	> 200	> 110
120	960	730	15	3.0	Very Dense	> 200	> 110
125	978	748	18	3.6	Very Dense	> 200	88
130	991	761	13	2.6	Very Dense	> 200	> 110
135	1010	780	19	3.8	Very Dense	> 200	82
140	1027	797	17	3.4	Very Dense	> 200	95
145	1039	809	12	2.4	Very Dense	> 200	> 110
150	1050	820	11	2.2	Very Dense	> 200	> 110
155	1071	841	21	4.2	Very Dense	193	72
160	1095	865	24	4.8	Very Dense	178	60
165	1112	882	17	3.4	Very Dense	> 200	95
170	1130	900	18	3.6	Very Dense	> 200	88
175	1154	924	24	4.8	Very Dense	178	60
180	1168	938	14	2.8	Very Dense	> 200	> 110
185	1180	950	12	2.4	Very Dense	> 200	> 110
190	1194	964	14	2.8	Very Dense	> 200	> 110
195	1222	992	28	5.6	Dense	161	49
200	1257	1027	35	7.0	Dense	137	36
205	1295	1065	38	7.6	Dense	129	33
210	1325	1095	30	6.0	Dense	154	45
215	1356	1126	31	6.2	Dense	150	43
220	1384	1154	28	5.6	Dense	161	49
225	1422	1192	38	7.6	Dense	129	33
230	1451	1221	29	5.8	Dense	157	47
235	1478	1248	27	5.4	Dense	165	52
240	1512	1282	34	6.8	Dense	140	38
245	1537	1307	25	5.0	Very Dense	174	57
250	1560	1330	23	4.6	Very Dense	183	64

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 13 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1572	1342	12	2.4	Very Dense	> 200	> 110
260	1600	1370	28	5.6	Dense	161	49
265	1611	1381	11	2.2	Very Dense	> 200	> 110
270	1615	1385	4	0.8	Very Dense	> 200	> 110
275	1628	1398	13	2.6	Very Dense	> 200	> 110
280	1659	1429	31	6.2	Dense	150	43
285	1688	1458	29	5.8	Dense	157	47
290	1701	1471	13	2.6	Very Dense	> 200	> 110
295	1712	1482	11	2.2	Very Dense	> 200	> 110
300	1720	1490	8	1.6	Very Dense	> 200	> 110
305	1725	1495	5	1.0	Very Dense	> 200	> 110
310	1731	1501	6	1.2	Very Dense	> 200	> 110
315	1740	1510	9	1.8	Very Dense	> 200	> 110
320	1746	1516	6	1.2	Very Dense	> 200	> 110
325	1751	1521	5	1.0	Very Dense	> 200	> 110
330	1754	1524	3	0.6	Very Dense	> 200	> 110
335	1756	1526	2	0.4	Very Dense	> 200	> 110
340	1757	1527	1	0.2	Very Dense	> 200	> 110
345	1758	1528	1	0.2	Very Dense	> 200	> 110
350	Refrusal						

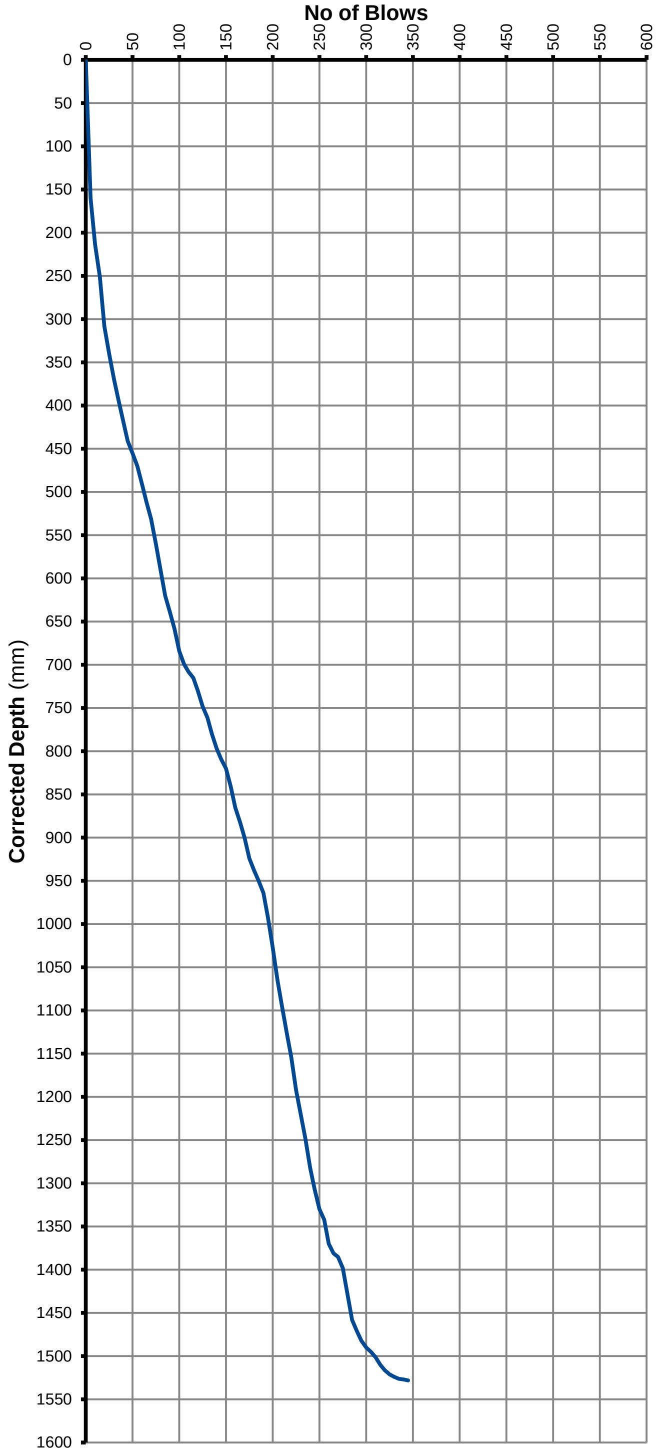
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

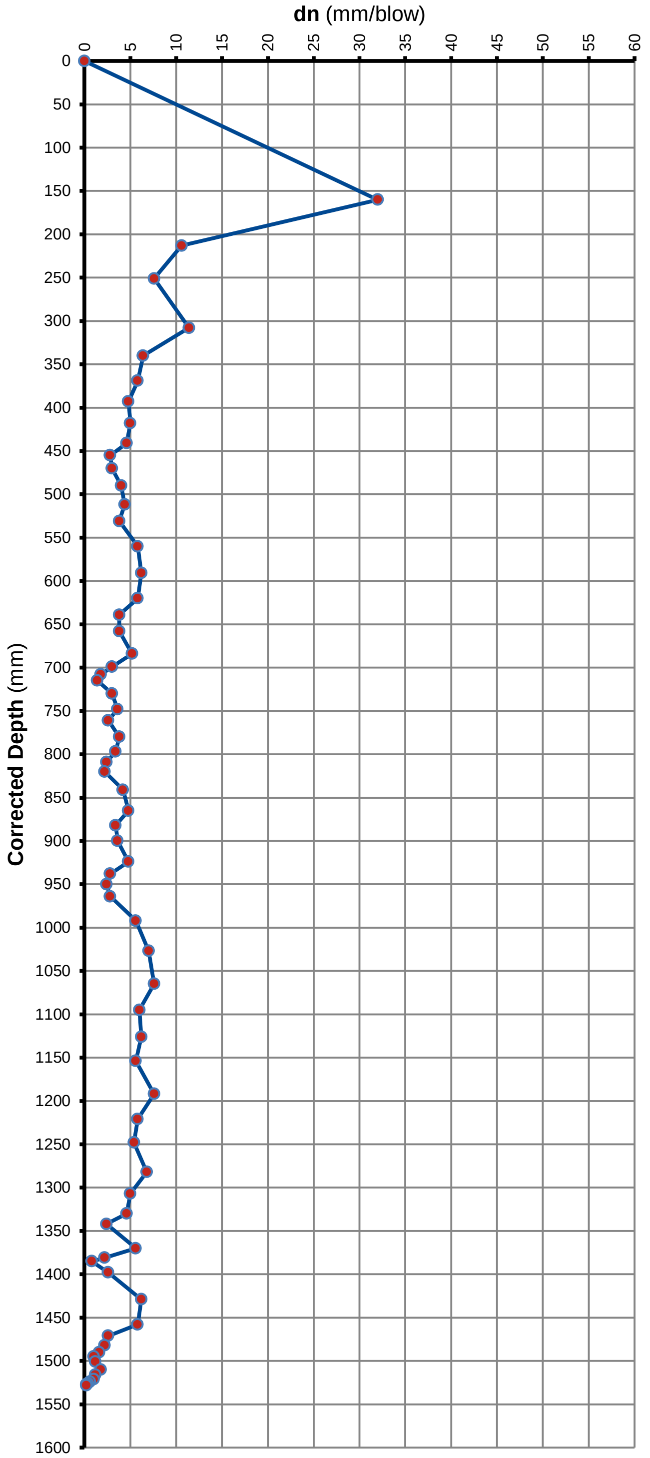
POSITION: DCP 13 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



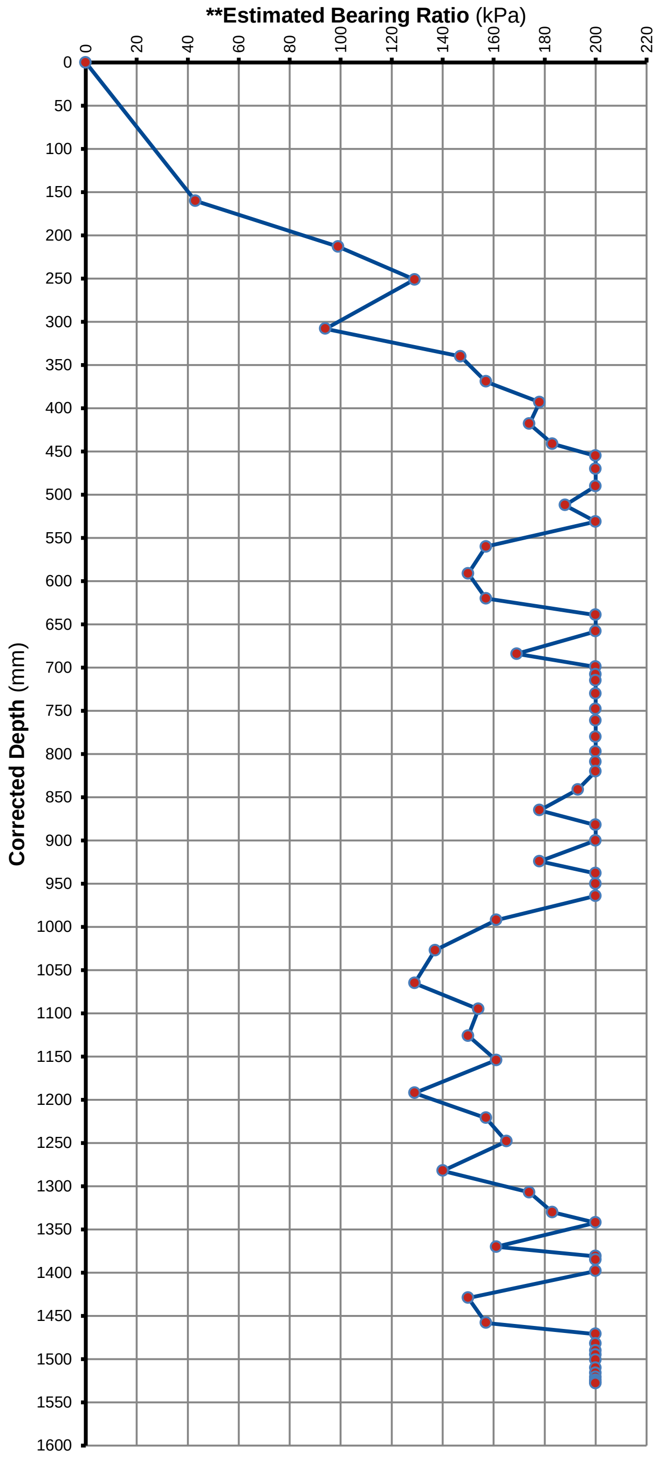
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

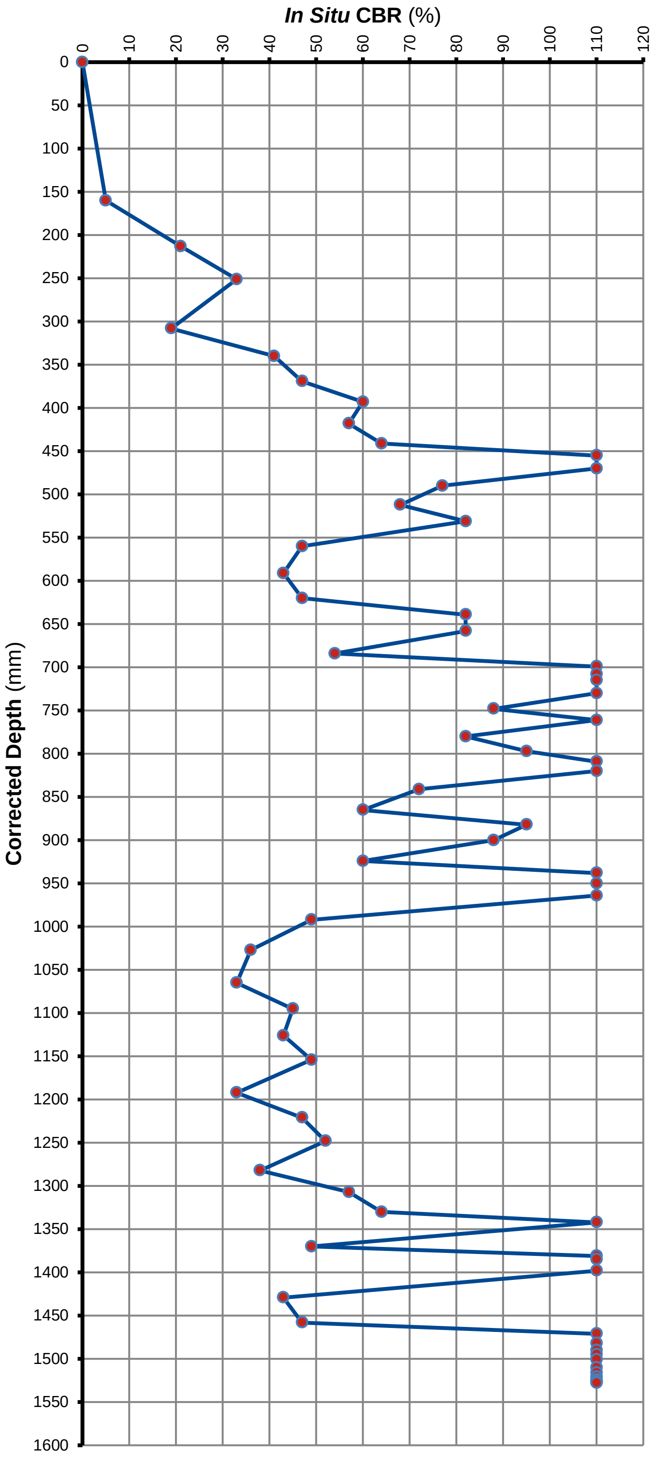
POSITION: DCP 13 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 14 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	225	0	-	-	-	-	-
5	435	210	210	42.0	Loose	40	3
10	492	267	57	11.4	Dense	94	19
15	534	309	42	8.4	Dense	119	29
20	575	350	41	8.2	Dense	122	30
25	611	386	36	7.2	Dense	134	35
30	668	443	57	11.4	Dense	94	19
35	711	486	43	8.6	Dense	117	28
40	758	533	47	9.4	Dense	109	25
45	800	575	42	8.4	Dense	119	29
50	840	615	40	8.0	Dense	124	31
55	880	655	40	8.0	Dense	124	31
60	918	693	38	7.6	Dense	129	33
65	958	733	40	8.0	Dense	124	31
70	998	773	40	8.0	Dense	124	31
75	1050	825	52	10.4	Dense	101	22
80	1081	856	31	6.2	Dense	150	43
85	1115	890	34	6.8	Dense	140	38
90	1148	923	33	6.6	Dense	144	39
95	1182	957	34	6.8	Dense	140	38
100	1220	995	38	7.6	Dense	129	33
105	1260	1035	40	8.0	Dense	124	31
110	1300	1075	40	8.0	Dense	124	31
115	1345	1120	45	9.0	Dense	113	26
120	1389	1164	44	8.8	Dense	115	27
125	1430	1205	41	8.2	Dense	122	30
130	1478	1253	48	9.6	Dense	107	24
135	1518	1293	40	8.0	Dense	124	31
140	1559	1334	41	8.2	Dense	122	30
145	1590	1365	31	6.2	Dense	150	43
150	1628	1403	38	7.6	Dense	129	33
155	1659	1434	31	6.2	Dense	150	43
160	1688	1463	29	5.8	Dense	157	47
165	1718	1493	30	6.0	Dense	154	45
170	1745	1520	27	5.4	Dense	165	52
175	1780	1555	35	7.0	Dense	137	36
180	1810	1585	30	6.0	Dense	154	45
185	1840	1615	30	6.0	Dense	154	45
190	1861	1636	21	4.2	Very Dense	193	72
195	1892	1667	31	6.2	Dense	150	43
200	1908	1683	16	3.2	Very Dense	> 200	103
205	1930	1705	22	4.4	Very Dense	188	68
210	1951	1726	21	4.2	Very Dense	193	72
215	1972	1747	21	4.2	Very Dense	193	72
220	2000	1775	28	5.6	Dense	161	49

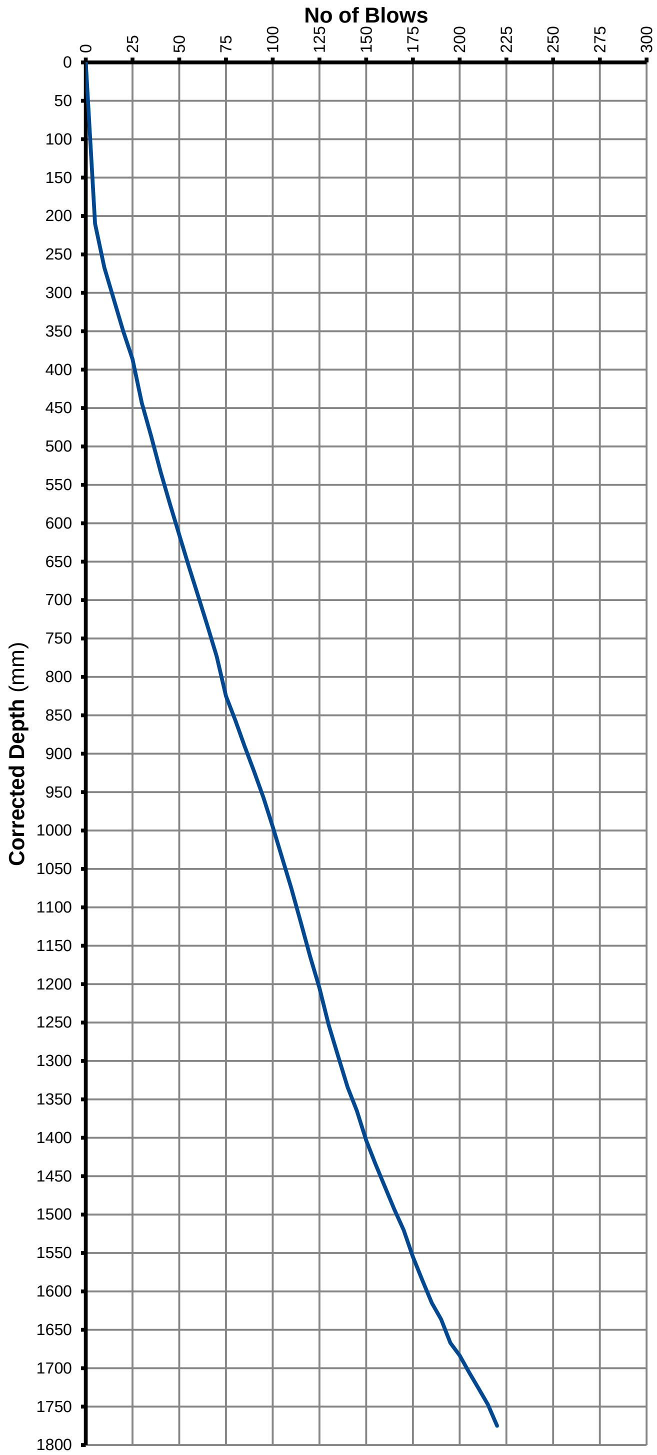
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

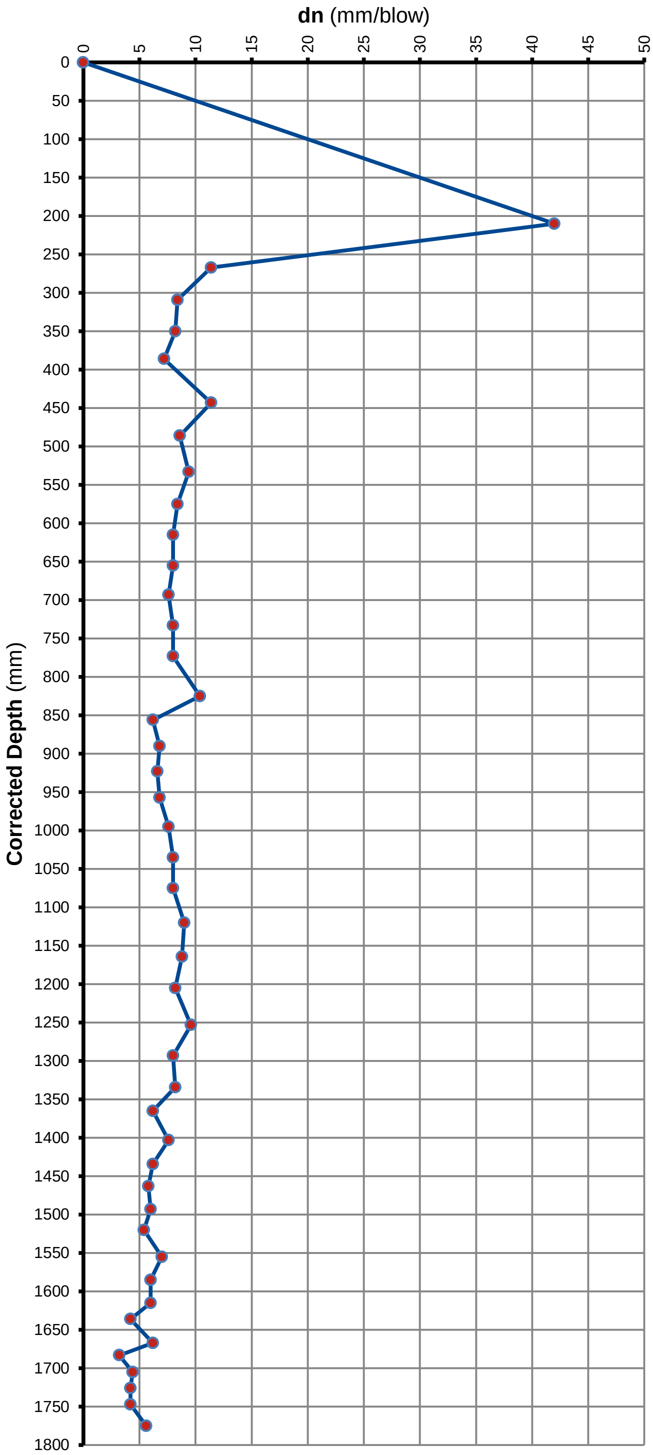
POSITION: DCP 14 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



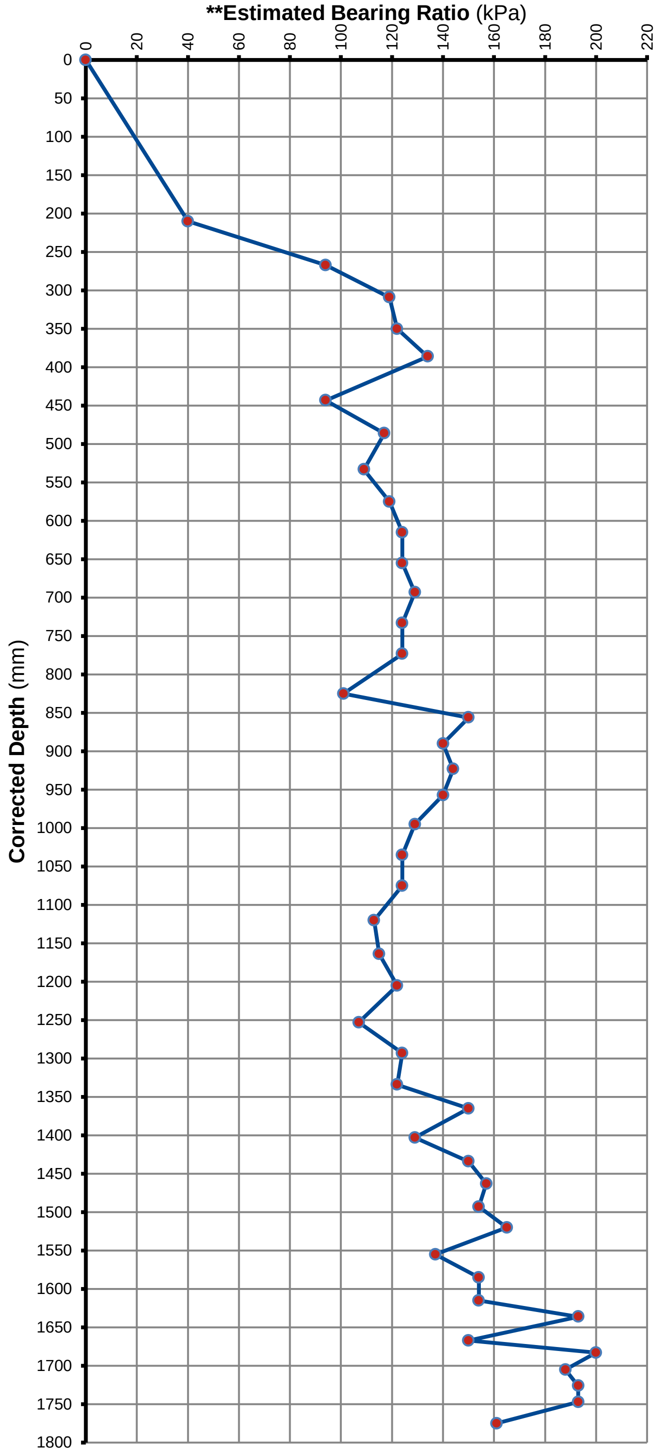
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

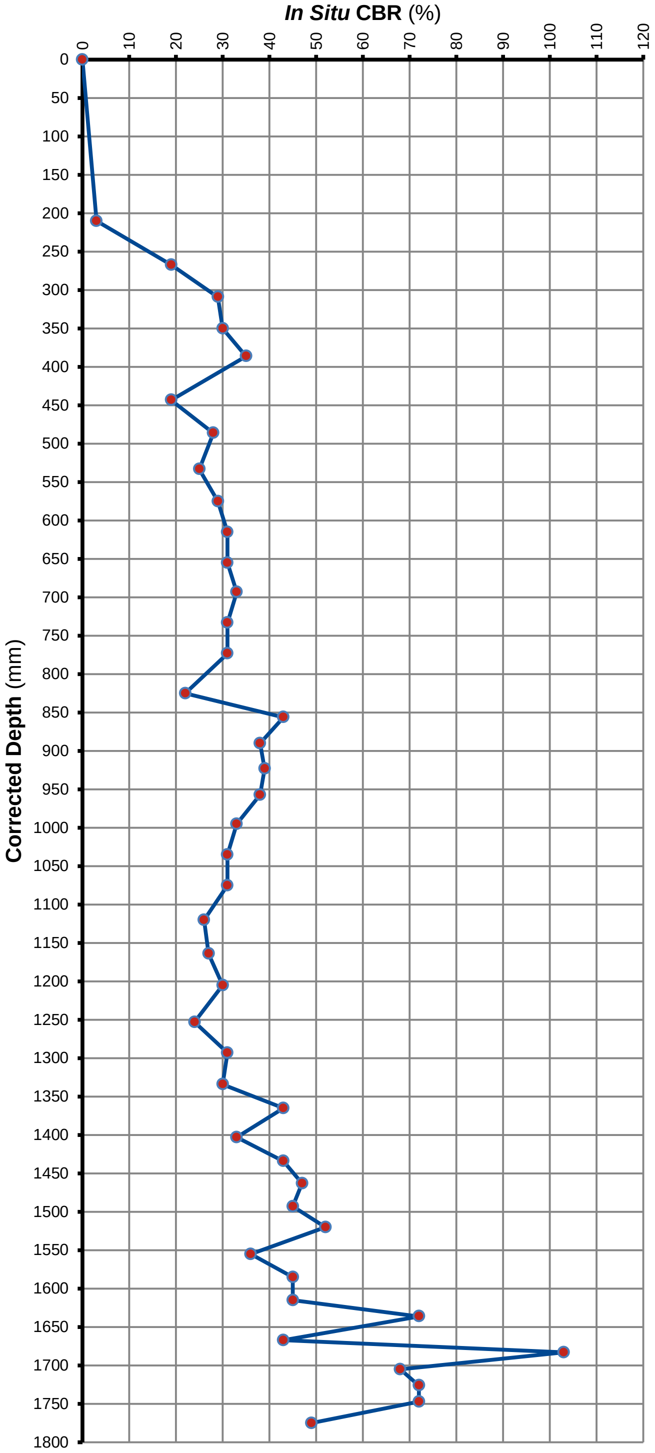
POSITION: DCP 14 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

Simlab

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 15 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	232	0	-	-	-	-	-
5	600	368	368	73.6	Loose	1	2
10	671	439	71	14.2	Medium Dense	81	14
15	719	487	48	9.6	Dense	107	24
20	760	528	41	8.2	Dense	122	30
25	810	578	50	10.0	Dense	104	23
30	869	637	59	11.8	Dense	92	18
35	910	678	41	8.2	Dense	122	30
40	945	713	35	7.0	Dense	137	36
45	979	747	34	6.8	Dense	140	38
50	1010	778	31	6.2	Dense	150	43
55	1049	817	39	7.8	Dense	126	32
60	1079	847	30	6.0	Dense	154	45
65	1108	876	29	5.8	Dense	157	47
70	1123	891	15	3.0	Very Dense	> 200	> 110
75	1140	908	17	3.4	Very Dense	> 200	95
80	1159	927	19	3.8	Very Dense	> 200	82
85	1175	943	16	3.2	Very Dense	> 200	103
90	1190	958	15	3.0	Very Dense	> 200	> 110
95	1209	977	19	3.8	Very Dense	> 200	82
100	1219	987	10	2.0	Very Dense	> 200	> 110
105	1230	998	11	2.2	Very Dense	> 200	> 110
110	1240	1008	10	2.0	Very Dense	> 200	> 110
115	1251	1019	11	2.2	Very Dense	> 200	> 110
120	1255	1023	4	0.8	Very Dense	> 200	> 110
125	1265	1033	10	2.0	Very Dense	> 200	> 110
130	1278	1046	13	2.6	Very Dense	> 200	> 110
135	1290	1058	12	2.4	Very Dense	> 200	> 110
140	1305	1073	15	3.0	Very Dense	> 200	> 110
145	1325	1093	20	4.0	Very Dense	200	77
150	1353	1121	28	5.6	Dense	161	49
155	1360	1128	7	1.4	Very Dense	> 200	> 110
160	1380	1148	20	4.0	Very Dense	200	77
165	1393	1161	13	2.6	Very Dense	> 200	> 110
170	1408	1176	15	3.0	Very Dense	> 200	> 110
175	1421	1189	13	2.6	Very Dense	> 200	> 110
180	1435	1203	14	2.8	Very Dense	> 200	> 110
185	1448	1216	13	2.6	Very Dense	> 200	> 110
190	1461	1229	13	2.6	Very Dense	> 200	> 110
195	1474	1242	13	2.6	Very Dense	> 200	> 110
200	1489	1257	15	3.0	Very Dense	> 200	> 110
205	1500	1268	11	2.2	Very Dense	> 200	> 110
210	1510	1278	10	2.0	Very Dense	> 200	> 110
215	1523	1291	13	2.6	Very Dense	> 200	> 110
220	1536	1304	13	2.6	Very Dense	> 200	> 110
225	1550	1318	14	2.8	Very Dense	> 200	> 110
230	1559	1327	9	1.8	Very Dense	> 200	> 110
235	1560	1328	1	0.2	Very Dense	> 200	> 110
240	1575	1343	15	3.0	Very Dense	> 200	> 110
245	1583	1351	8	1.6	Very Dense	> 200	> 110
250	1590	1358	7	1.4	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 15 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1600	1368	10	2.0	Very Dense	> 200	> 110
260	1608	1376	8	1.6	Very Dense	> 200	> 110
265	1611	1379	3	0.6	Very Dense	> 200	> 110
270	1615	1383	4	0.8	Very Dense	> 200	> 110
275	1620	1388	5	1.0	Very Dense	> 200	> 110
280	1628	1396	8	1.6	Very Dense	> 200	> 110
285	1630	1398	2	0.4	Very Dense	> 200	> 110
290	1640	1408	10	2.0	Very Dense	> 200	> 110
295	1645	1413	5	1.0	Very Dense	> 200	> 110
300	1649	1417	4	0.8	Very Dense	> 200	> 110
305	1655	1423	6	1.2	Very Dense	> 200	> 110
310	1660	1428	5	1.0	Very Dense	> 200	> 110
315	1670	1438	10	2.0	Very Dense	> 200	> 110
320	1676	1444	6	1.2	Very Dense	> 200	> 110
325	1680	1448	4	0.8	Very Dense	> 200	> 110
330	1688	1456	8	1.6	Very Dense	> 200	> 110
335	1690	1458	2	0.4	Very Dense	> 200	> 110
340	1695	1463	5	1.0	Very Dense	> 200	> 110
345	1700	1468	5	1.0	Very Dense	> 200	> 110
350	1708	1476	8	1.6	Very Dense	> 200	> 110
355	1712	1480	4	0.8	Very Dense	> 200	> 110
360	1715	1483	3	0.6	Very Dense	> 200	> 110
365	1718	1486	3	0.6	Very Dense	> 200	> 110
370	1720	1488	2	0.4	Very Dense	> 200	> 110
375	1725	1493	5	1.0	Very Dense	> 200	> 110
380	1728	1496	3	0.6	Very Dense	> 200	> 110
385	1732	1500	4	0.8	Very Dense	> 200	> 110
390	1735	1503	3	0.6	Very Dense	> 200	> 110
395	1739	1507	4	0.8	Very Dense	> 200	> 110
400	1740	1508	1	0.2	Very Dense	> 200	> 110
405	1742	1510	2	0.4	Very Dense	> 200	> 110
410	1745	1513	3	0.6	Very Dense	> 200	> 110
415	1749	1517	4	0.8	Very Dense	> 200	> 110
420	1751	1519	2	0.4	Very Dense	> 200	> 110
425	1752	1520	1	0.2	Very Dense	> 200	> 110
430	Refusal						

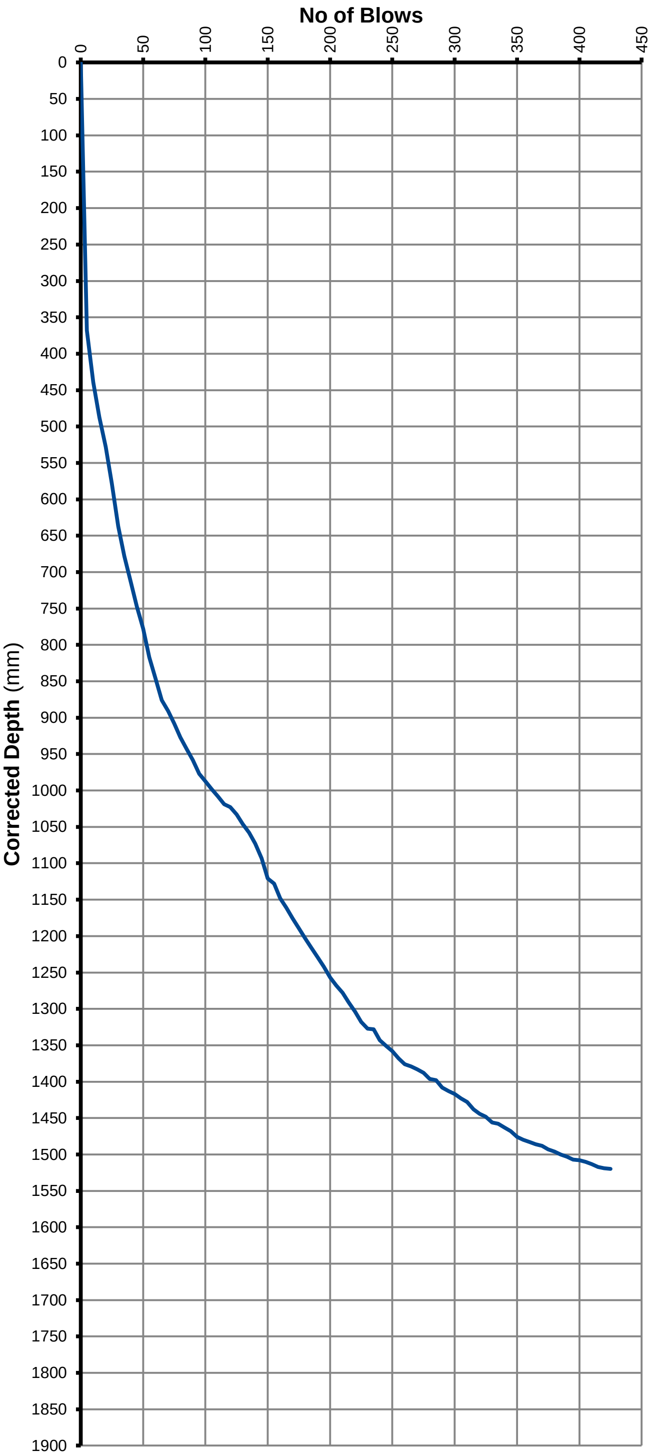
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

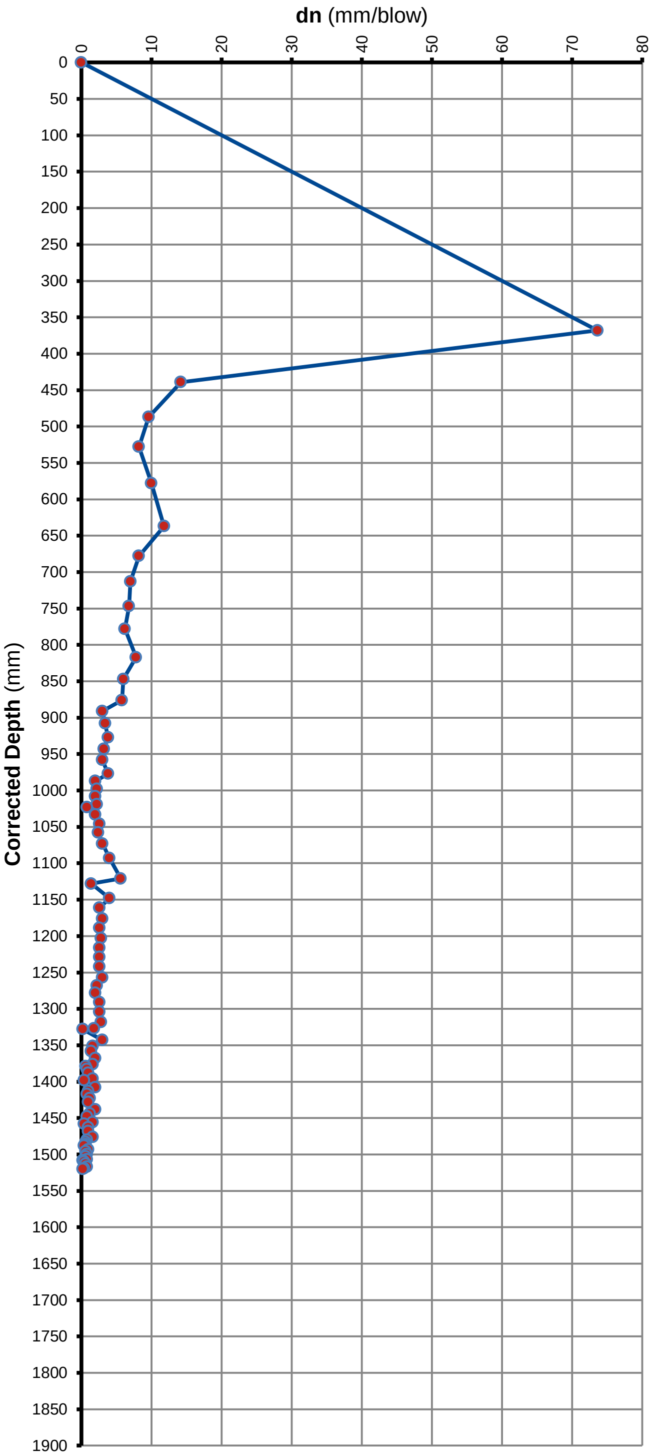
POSITION: DCP 15 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



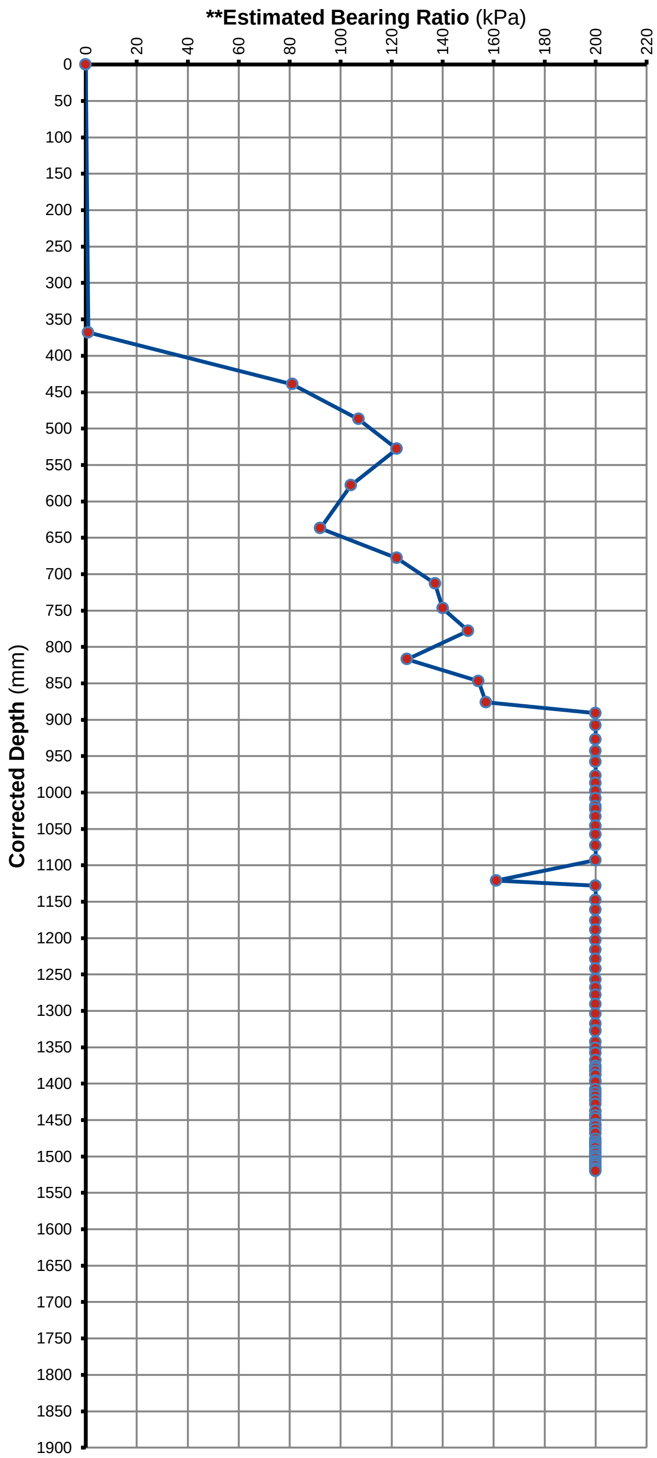
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

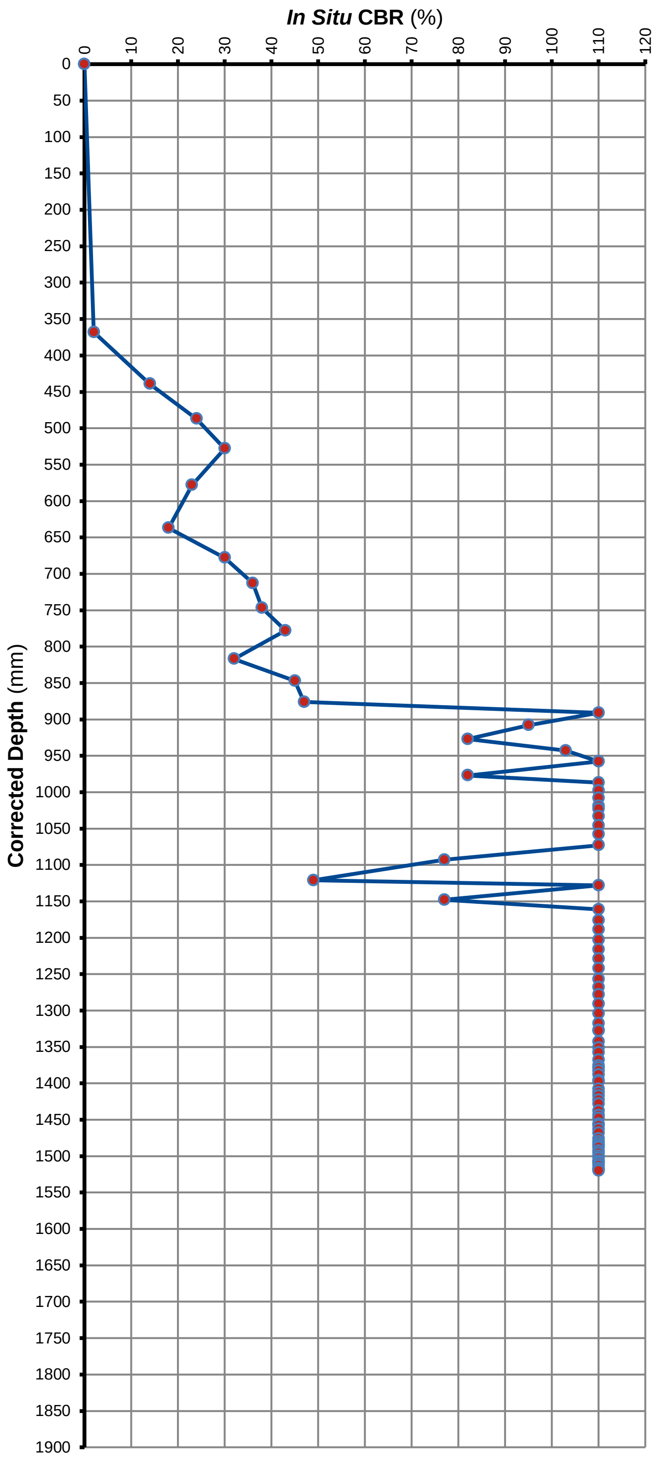
POSITION: DCP 15 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP16 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	225	0	-	-	-	-	-
5	385	160	160	32.0	Loose	43	5
10	438	213	53	10.6	Dense	99	21
15	489	264	51	10.2	Dense	102	22
20	539	314	50	10.0	Dense	104	23
25	570	345	31	6.2	Dense	150	43
30	600	375	30	6.0	Dense	154	45
35	639	414	39	7.8	Dense	126	32
40	670	445	31	6.2	Dense	150	43
45	699	474	29	5.8	Dense	157	47
50	729	504	30	6.0	Dense	154	45
55	758	533	29	5.8	Dense	157	47
60	798	573	40	8.0	Dense	124	31
65	830	605	32	6.4	Dense	147	41
70	865	640	35	7.0	Dense	137	36
75	900	675	35	7.0	Dense	137	36
80	945	720	45	9.0	Dense	113	26
85	986	761	41	8.2	Dense	122	30
90	1025	800	39	7.8	Dense	126	32
95	1062	837	37	7.4	Dense	132	34
100	1098	873	36	7.2	Dense	134	35
105	1138	913	40	8.0	Dense	124	31
110	1168	943	30	6.0	Dense	154	45
115	1195	970	27	5.4	Dense	165	52
120	1200	975	5	1.0	Very Dense	> 200	> 110
125	1245	1020	45	9.0	Dense	113	26
130	1280	1055	35	7.0	Dense	137	36
135	1310	1085	30	6.0	Dense	154	45
140	1338	1113	28	5.6	Dense	161	49
145	1370	1145	32	6.4	Dense	147	41
150	1405	1180	35	7.0	Dense	137	36
155	1438	1213	33	6.6	Dense	144	39
160	1452	1227	14	2.8	Very Dense	> 200	> 110
165	1469	1244	17	3.4	Very Dense	> 200	95
170	1488	1263	19	3.8	Very Dense	> 200	82
175	1490	1265	2	0.4	Very Dense	> 200	> 110
180	1509	1284	19	3.8	Very Dense	> 200	82
185	1511	1286	2	0.4	Very Dense	> 200	> 110
190	1520	1295	9	1.8	Very Dense	> 200	> 110
195	1530	1305	10	2.0	Very Dense	> 200	> 110
200	1539	1314	9	1.8	Very Dense	> 200	> 110
205	1548	1323	9	1.8	Very Dense	> 200	> 110
210	1555	1330	7	1.4	Very Dense	> 200	> 110
215	1561	1336	6	1.2	Very Dense	> 200	> 110
220	1570	1345	9	1.8	Very Dense	> 200	> 110
225	1578	1353	8	1.6	Very Dense	> 200	> 110
230	1590	1365	12	2.4	Very Dense	> 200	> 110
235	1600	1375	10	2.0	Very Dense	> 200	> 110
240	1605	1380	5	1.0	Very Dense	> 200	> 110
245	1615	1390	10	2.0	Very Dense	> 200	> 110
250	1620	1395	5	1.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP16 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1638	1413	18	3.6	Very Dense	> 200	88
260	1645	1420	7	1.4	Very Dense	> 200	> 110
265	1650	1425	5	1.0	Very Dense	> 200	> 110
270	1655	1430	5	1.0	Very Dense	> 200	> 110
275	1660	1435	5	1.0	Very Dense	> 200	> 110
280	1668	1443	8	1.6	Very Dense	> 200	> 110
285	1672	1447	4	0.8	Very Dense	> 200	> 110
290	1678	1453	6	1.2	Very Dense	> 200	> 110
295	1680	1455	2	0.4	Very Dense	> 200	> 110
300	1682	1457	2	0.4	Very Dense	> 200	> 110
305	1690	1465	8	1.6	Very Dense	> 200	> 110
310	1690	1465	0	0.0	Very Dense	> 200	> 110
315	Refusal						

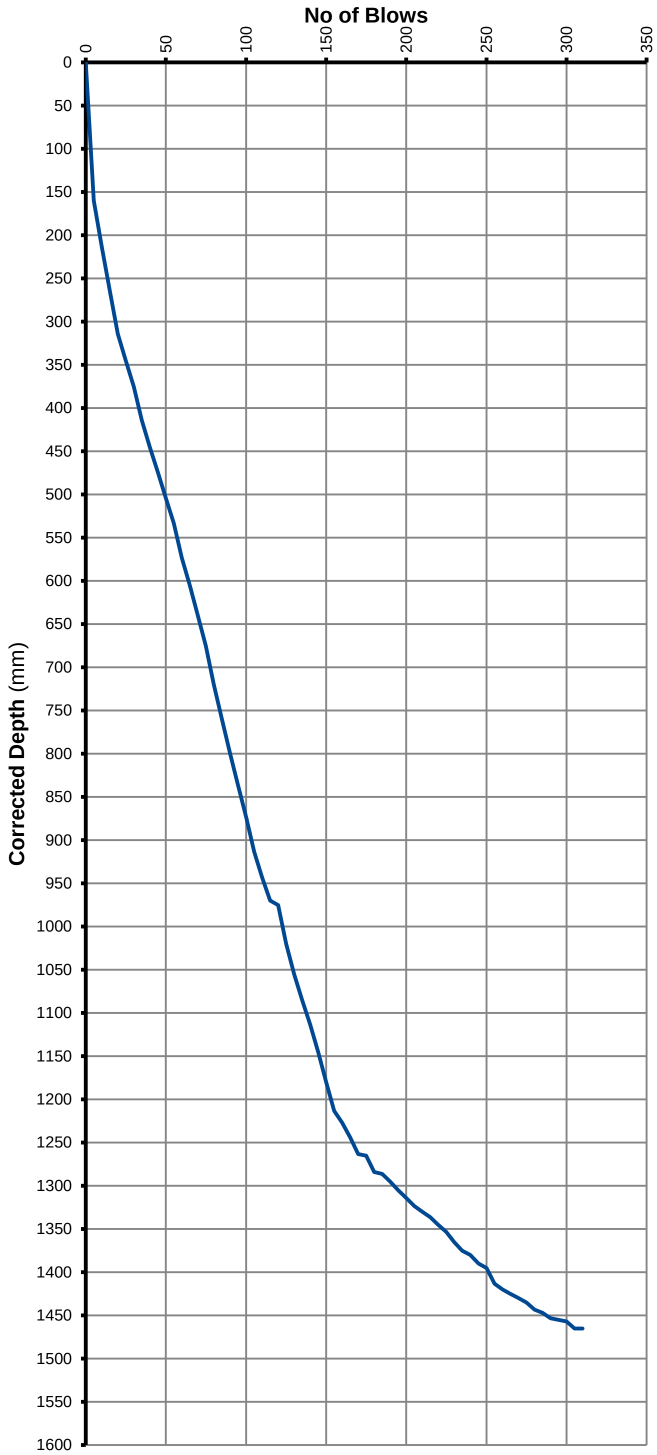
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

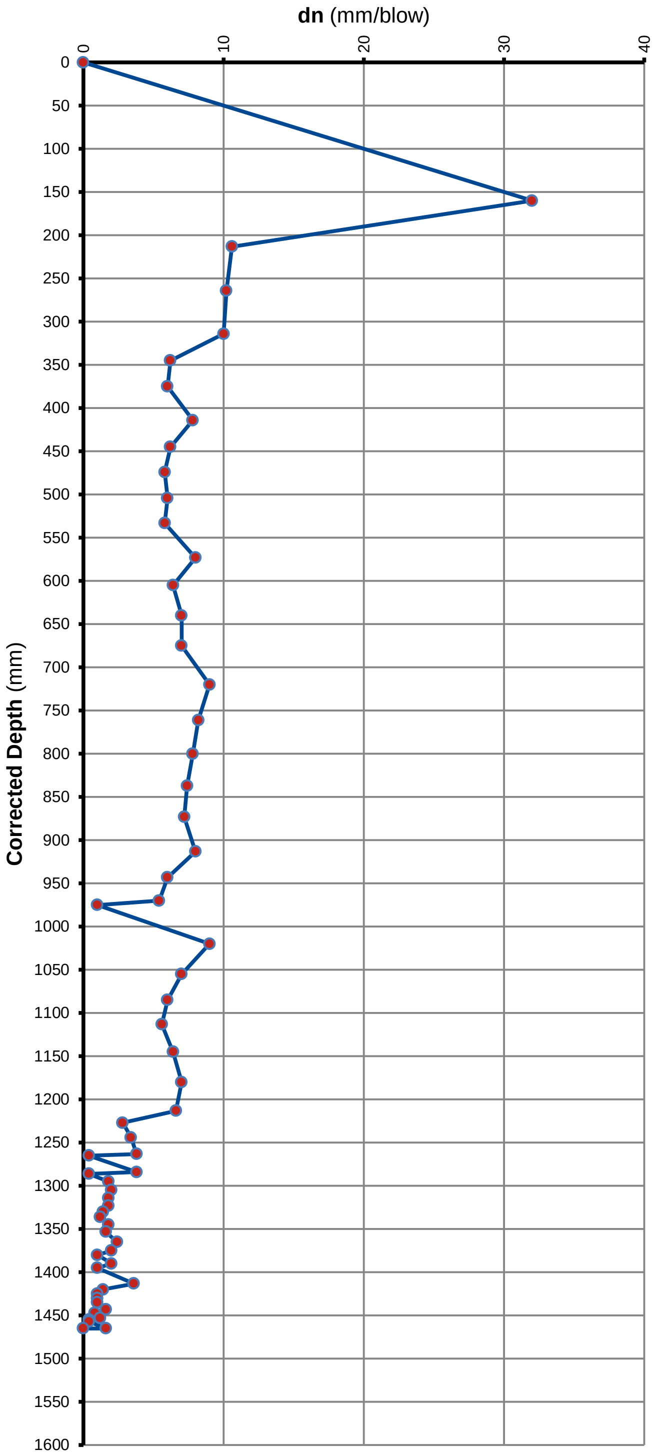
POSITION: DCP16 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



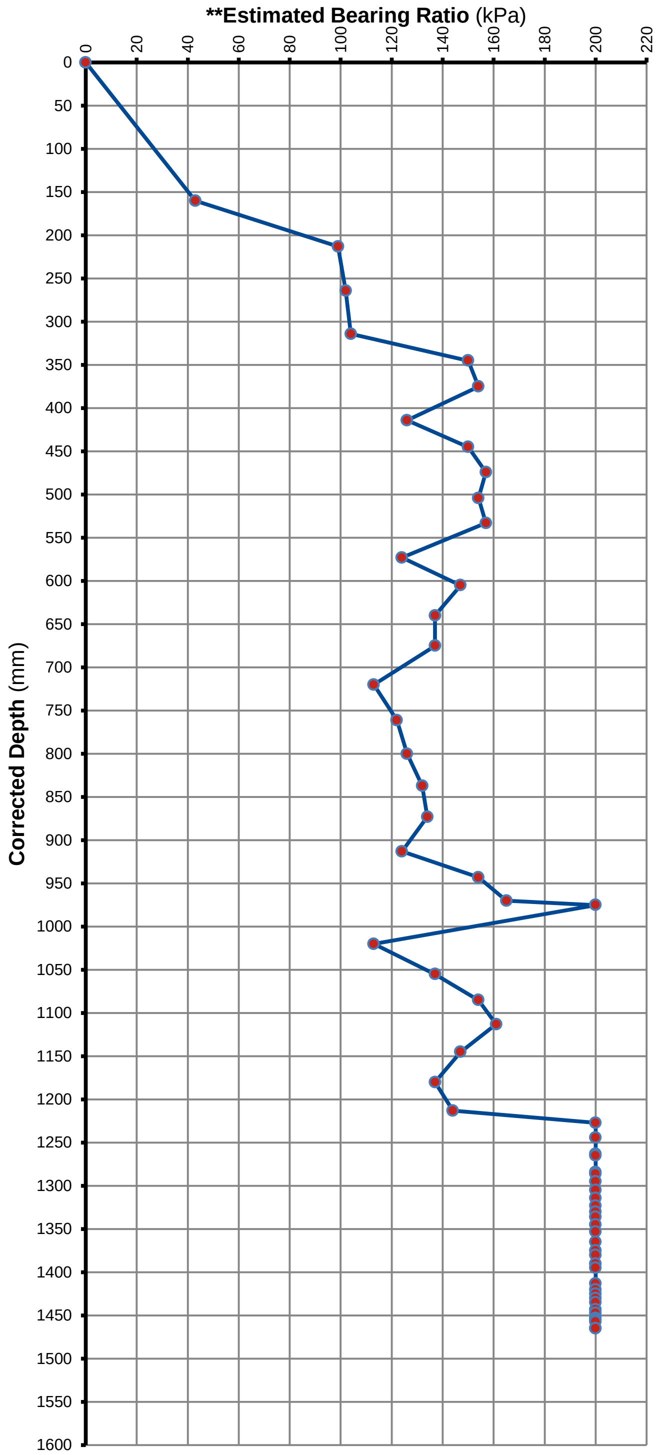
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

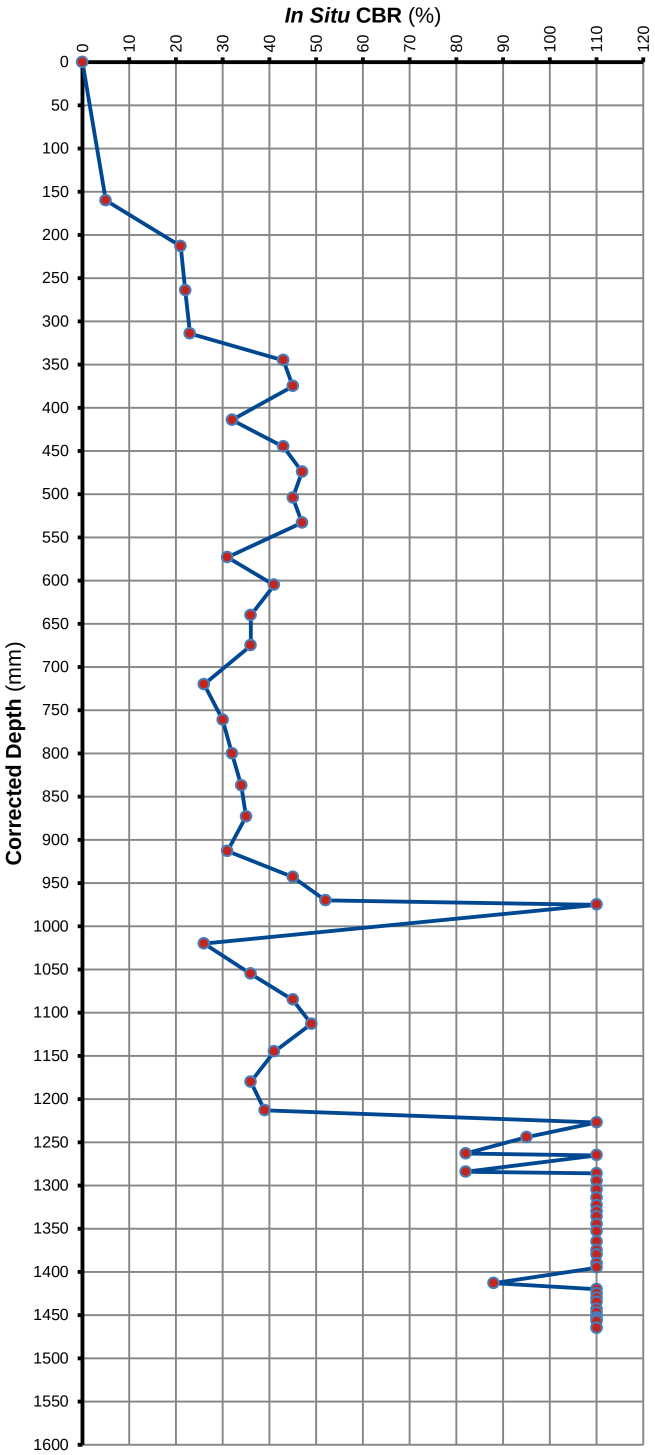
POSITION: DCP16 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP17 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	232	0	-	-	-	-	-
5	408	176	176	35.2	Loose	42	4
10	535	303	127	25.4	Medium Dense	53	7
15	570	338	35	7.0	Dense	137	36
20	600	368	30	6.0	Dense	154	45
25	631	399	31	6.2	Dense	150	43
30	669	437	38	7.6	Dense	129	33
35	700	468	31	6.2	Dense	150	43
40	740	508	40	8.0	Dense	124	31
45	771	539	31	6.2	Dense	150	43
50	789	557	18	3.6	Very Dense	> 200	88
55	809	577	20	4.0	Very Dense	200	77
60	821	589	12	2.4	Very Dense	> 200	> 110
65	840	608	19	3.8	Very Dense	> 200	82
70	868	636	28	5.6	Dense	161	49
75	891	659	23	4.6	Very Dense	183	64
80	909	677	18	3.6	Very Dense	> 200	88
85	918	686	9	1.8	Very Dense	> 200	> 110
90	920	688	2	0.4	Very Dense	> 200	> 110
95	921	689	1	0.2	Very Dense	> 200	> 110
100	928	696	7	1.4	Very Dense	> 200	> 110
105	930	698	2	0.4	Very Dense	> 200	> 110
110	930	698	0	0.0	Very Dense	> 200	> 110
115	Refusal						

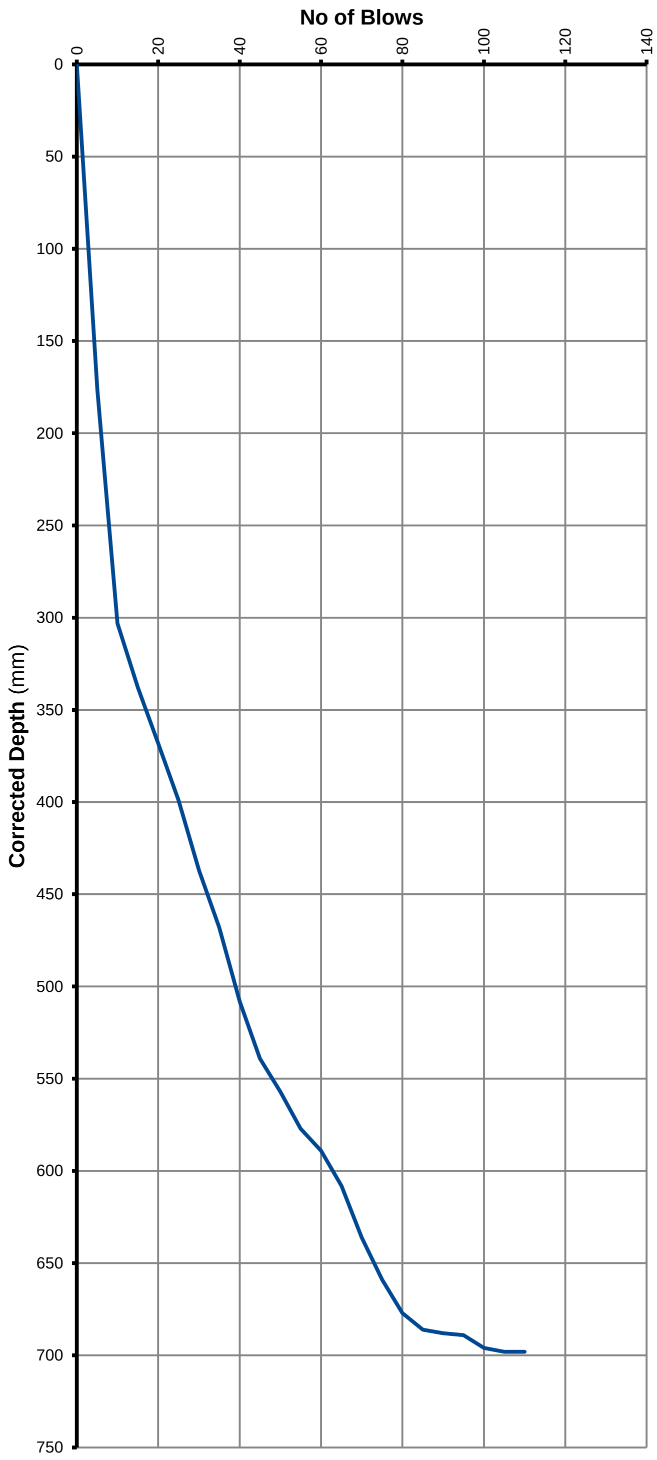
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

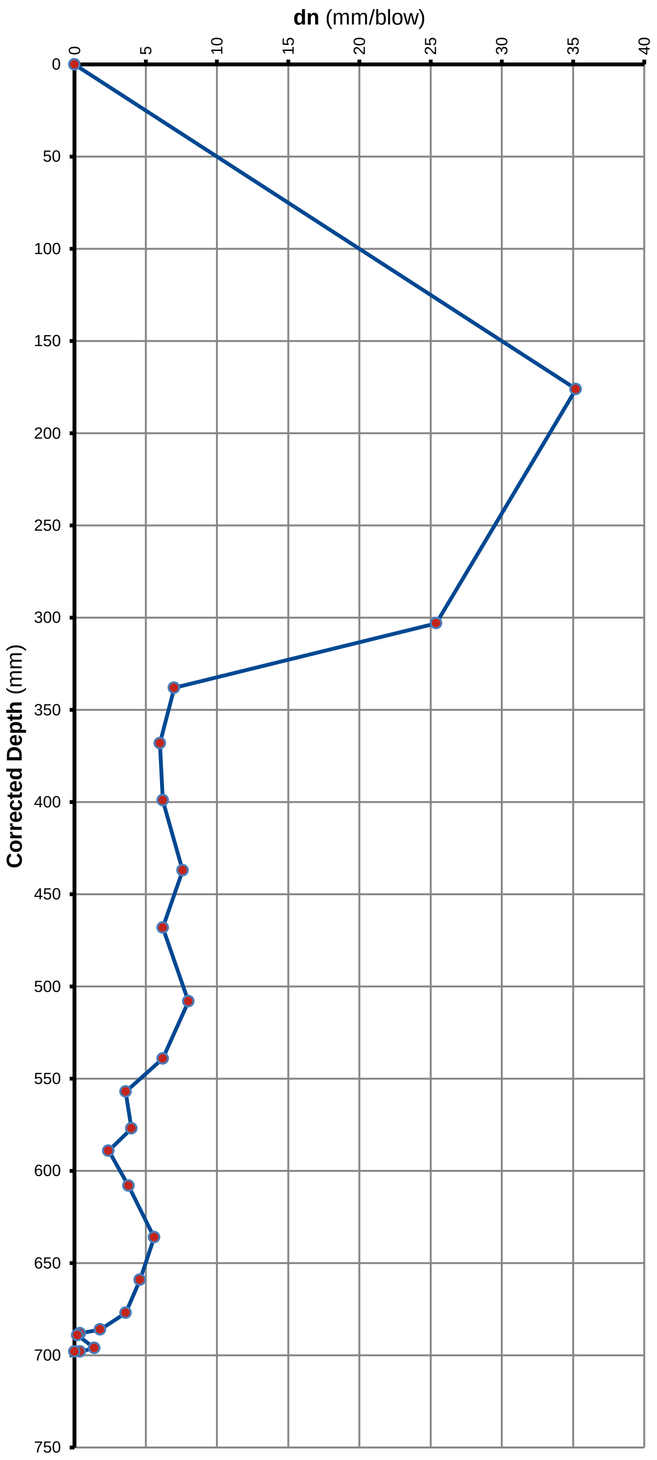
POSITION: DCP17 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



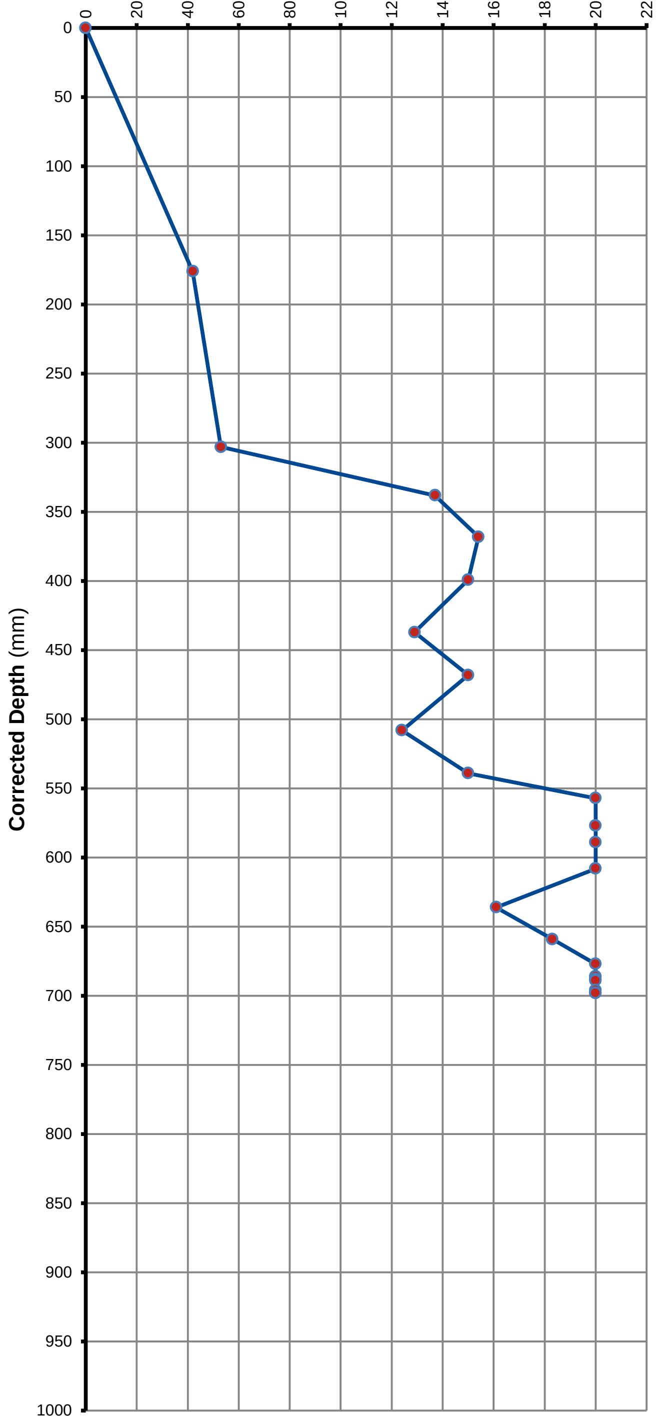
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

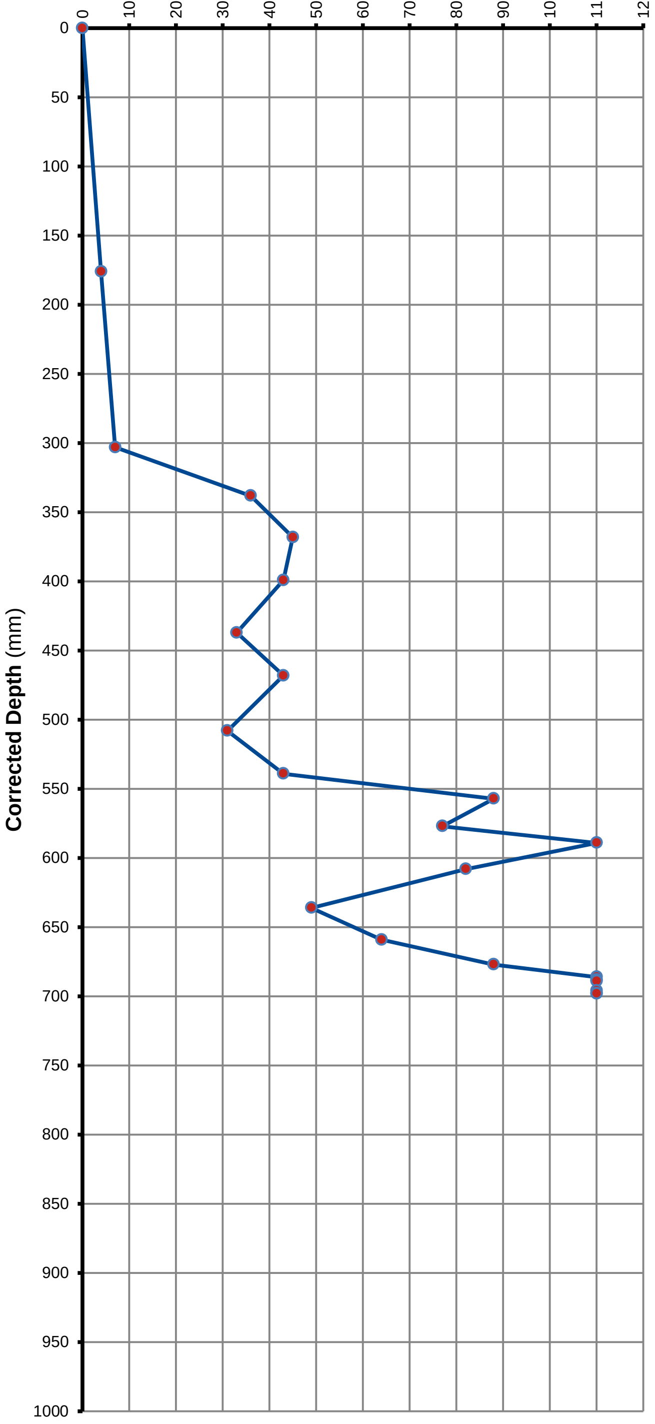
POSITION: DCP17 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP18 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	235	0	-	-	-	-	-
5	469	234	234	46.8	Loose	35	3
10	560	325	91	18.2	Medium Dense	69	10
15	639	404	79	15.8	Medium Dense	75	12
20	710	475	71	14.2	Medium Dense	81	14
25	750	515	40	8.0	Dense	124	31
30	779	544	29	5.8	Dense	157	47
35	790	555	11	2.2	Very Dense	> 200	> 110
40	809	574	19	3.8	Very Dense	> 200	82
45	819	584	10	2.0	Very Dense	> 200	> 110
50	828	593	9	1.8	Very Dense	> 200	> 110
55	840	605	12	2.4	Very Dense	> 200	> 110
60	845	610	5	1.0	Very Dense	> 200	> 110
65	850	615	5	1.0	Very Dense	> 200	> 110
70	860	625	10	2.0	Very Dense	> 200	> 110
75	865	630	5	1.0	Very Dense	> 200	> 110
80	870	635	5	1.0	Very Dense	> 200	> 110
85	880	645	10	2.0	Very Dense	> 200	> 110
90	888	653	8	1.6	Very Dense	> 200	> 110
95	898	663	10	2.0	Very Dense	> 200	> 110
100	905	670	7	1.4	Very Dense	> 200	> 110
105	915	680	10	2.0	Very Dense	> 200	> 110
110	925	690	10	2.0	Very Dense	> 200	> 110
115	935	700	10	2.0	Very Dense	> 200	> 110
120	948	713	13	2.6	Very Dense	> 200	> 110
125	958	723	10	2.0	Very Dense	> 200	> 110
130	962	727	4	0.8	Very Dense	> 200	> 110
135	970	735	8	1.6	Very Dense	> 200	> 110
140	978	743	8	1.6	Very Dense	> 200	> 110
145	980	745	2	0.4	Very Dense	> 200	> 110
150	985	750	5	1.0	Very Dense	> 200	> 110
155	990	755	5	1.0	Very Dense	> 200	> 110
160	998	763	8	1.6	Very Dense	> 200	> 110
165	1002	767	4	0.8	Very Dense	> 200	> 110
170	1008	773	6	1.2	Very Dense	> 200	> 110
175	1018	783	10	2.0	Very Dense	> 200	> 110
180	1022	787	4	0.8	Very Dense	> 200	> 110
185	1028	793	6	1.2	Very Dense	> 200	> 110
190	1030	795	2	0.4	Very Dense	> 200	> 110
195	1039	804	9	1.8	Very Dense	> 200	> 110
200	1043	808	4	0.8	Very Dense	> 200	> 110
205	1043	808	0	0.0	Very Dense	> 200	> 110
210	1049	814	6	1.2	Very Dense	> 200	> 110
215	1049	814	0	0.0	Very Dense	> 200	> 110
220	1051	816	2	0.4	Very Dense	> 200	> 110
225	1059	824	8	1.6	Very Dense	> 200	> 110
230	1060	825	1	0.2	Very Dense	> 200	> 110
235	1065	830	5	1.0	Very Dense	> 200	> 110
240	1069	834	4	0.8	Very Dense	> 200	> 110
245	1069	834	0	0.0	Very Dense	> 200	> 110
250	1069	834	0	0.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP18 **DEPTH BELOW NGL:** 0.000m

<u>*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)</u>

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	Refusal						

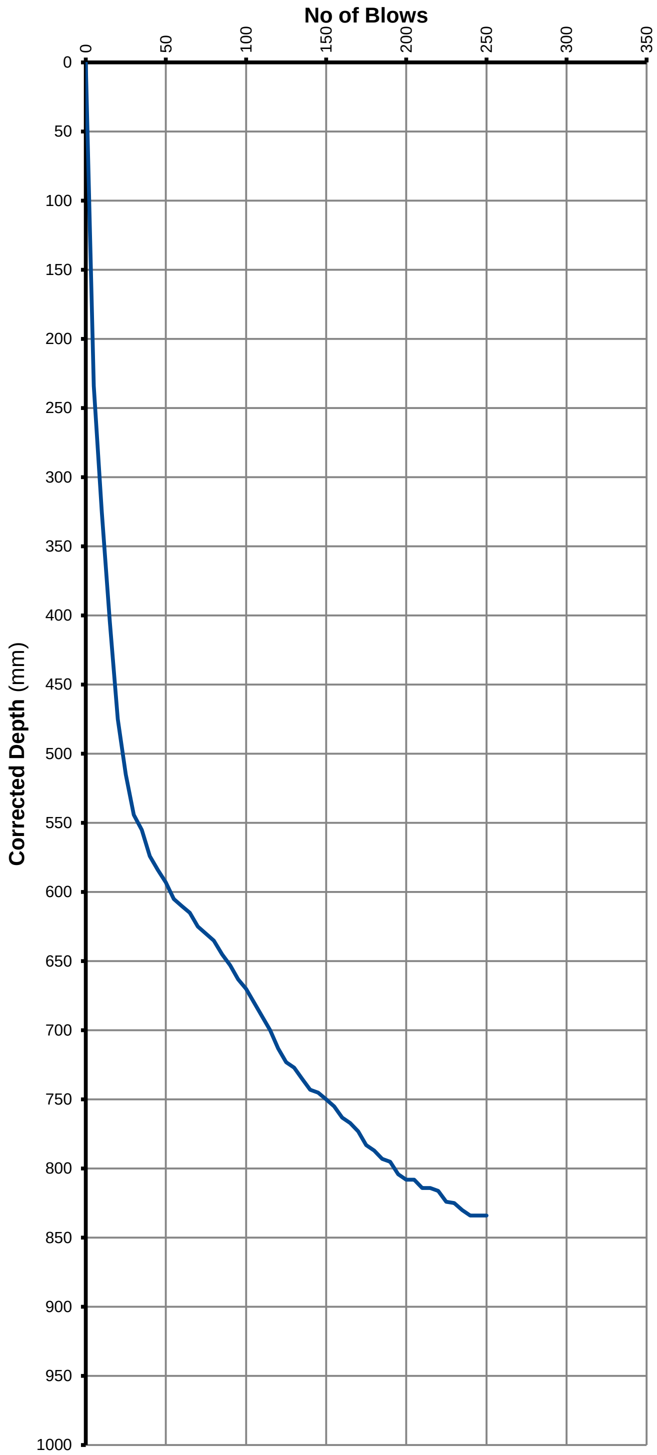
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

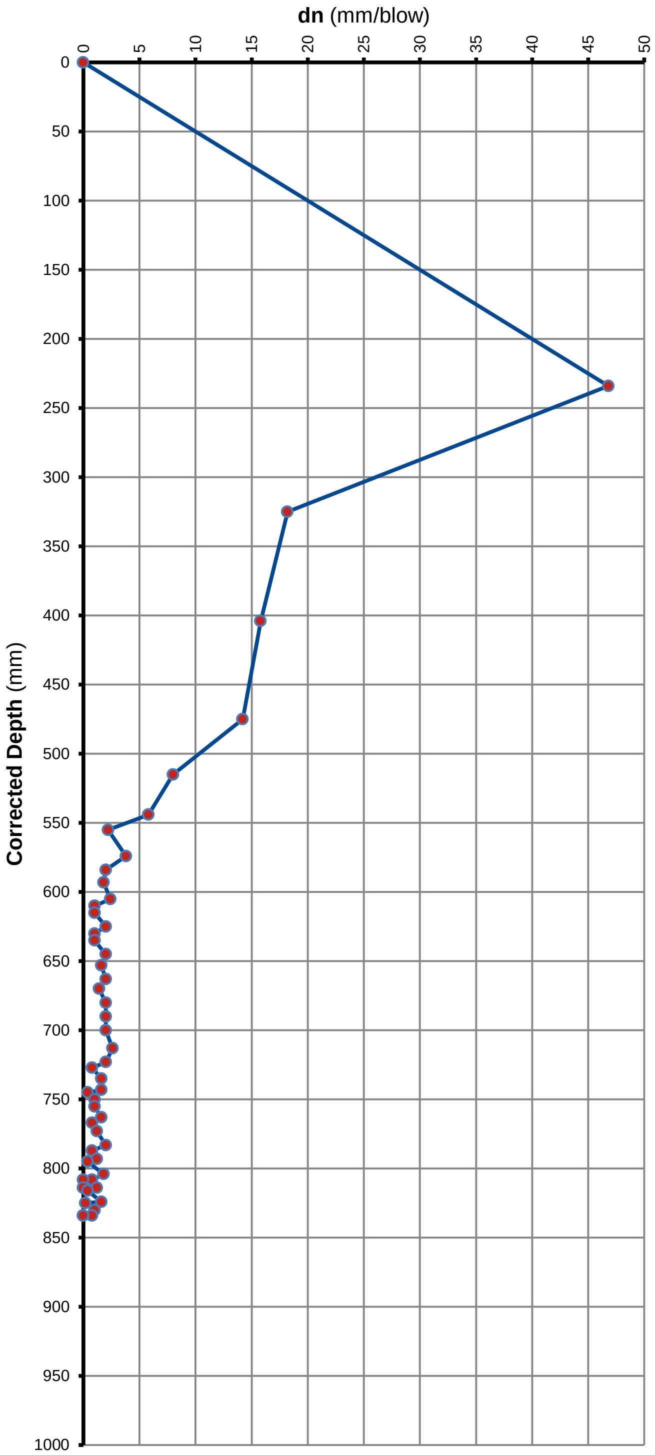
POSITION: DCP18 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



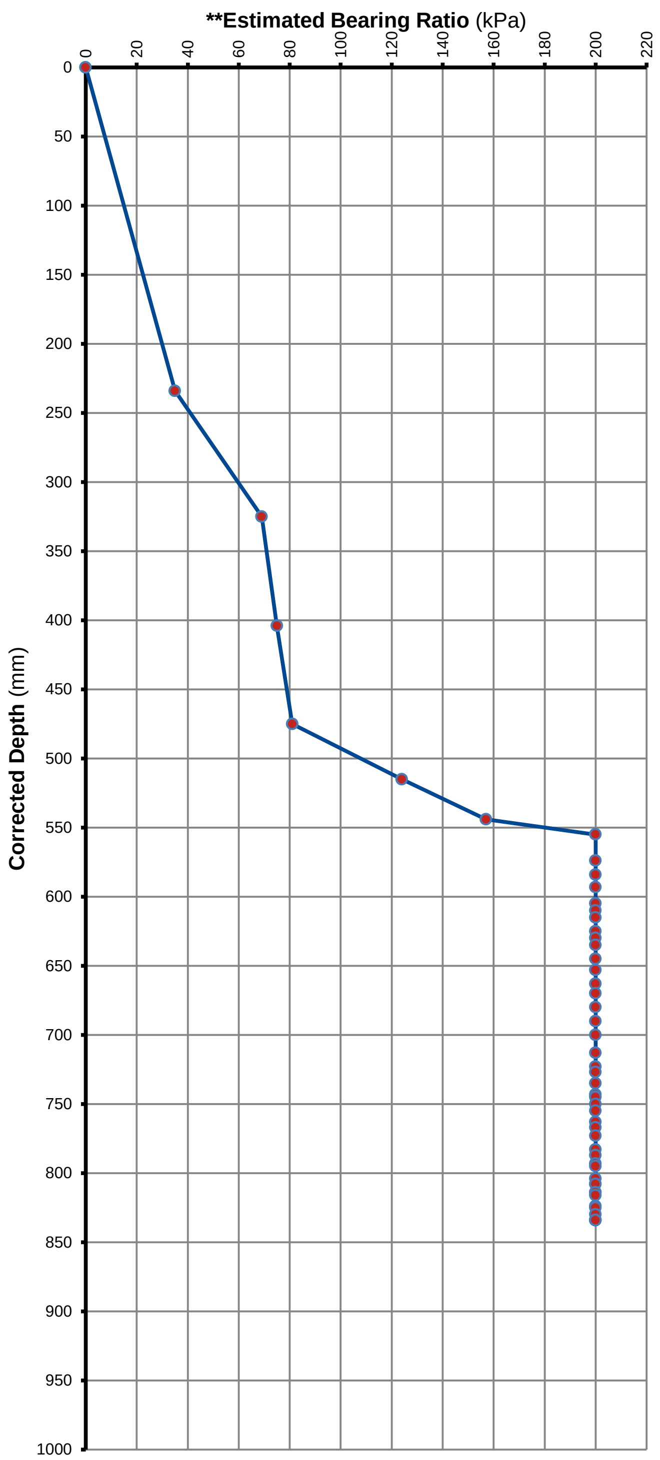
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

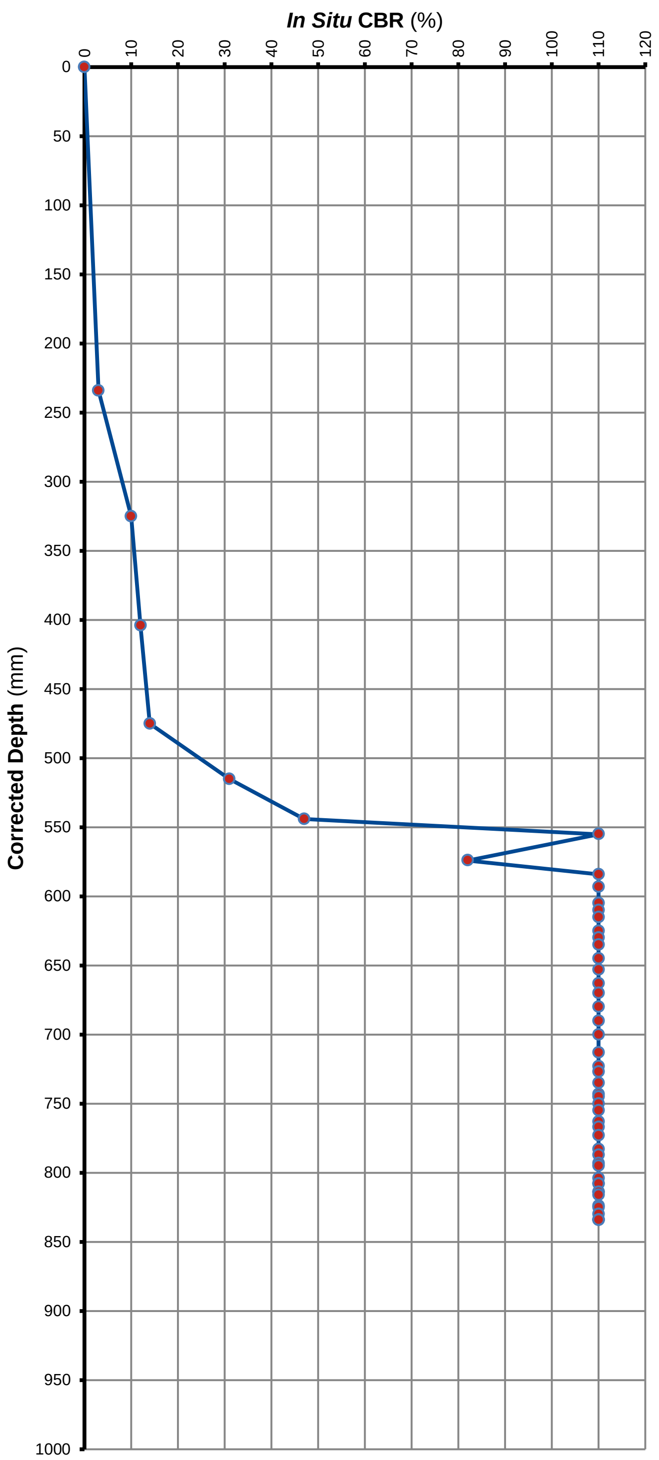
POSITION: DCP18 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP19 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	239	0	-	-	-	-	-
5	420	181	181	36.2	Loose	41	4
10	561	322	141	28.2	Medium Dense	48	6
15	618	379	57	11.4	Dense	94	19
20	640	401	22	4.4	Very Dense	188	68
25	660	421	20	4.0	Very Dense	200	77
30	670	431	10	2.0	Very Dense	> 200	> 110
35	684	445	14	2.8	Very Dense	> 200	> 110
40	697	458	13	2.6	Very Dense	> 200	> 110
45	702	463	5	1.0	Very Dense	> 200	> 110
50	713	474	11	2.2	Very Dense	> 200	> 110
55	720	481	7	1.4	Very Dense	> 200	> 110
60	729	490	9	1.8	Very Dense	> 200	> 110
65	735	496	6	1.2	Very Dense	> 200	> 110
70	740	501	5	1.0	Very Dense	> 200	> 110
75	744	505	4	0.8	Very Dense	> 200	> 110
80	751	512	7	1.4	Very Dense	> 200	> 110
85	760	521	9	1.8	Very Dense	> 200	> 110
90	769	530	9	1.8	Very Dense	> 200	> 110
95	775	536	6	1.2	Very Dense	> 200	> 110
100	782	543	7	1.4	Very Dense	> 200	> 110
105	788	549	6	1.2	Very Dense	> 200	> 110
110	795	556	7	1.4	Very Dense	> 200	> 110
115	796	557	1	0.2	Very Dense	> 200	> 110
120	Refusal						

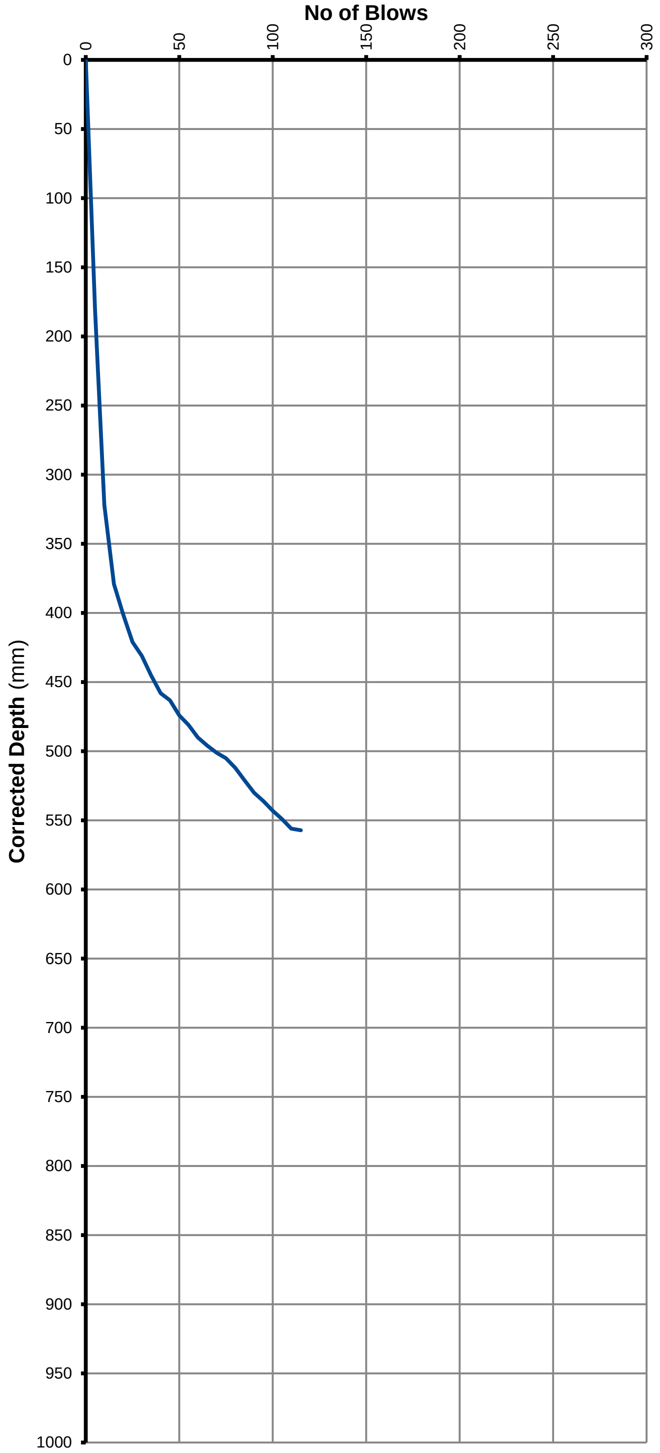
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

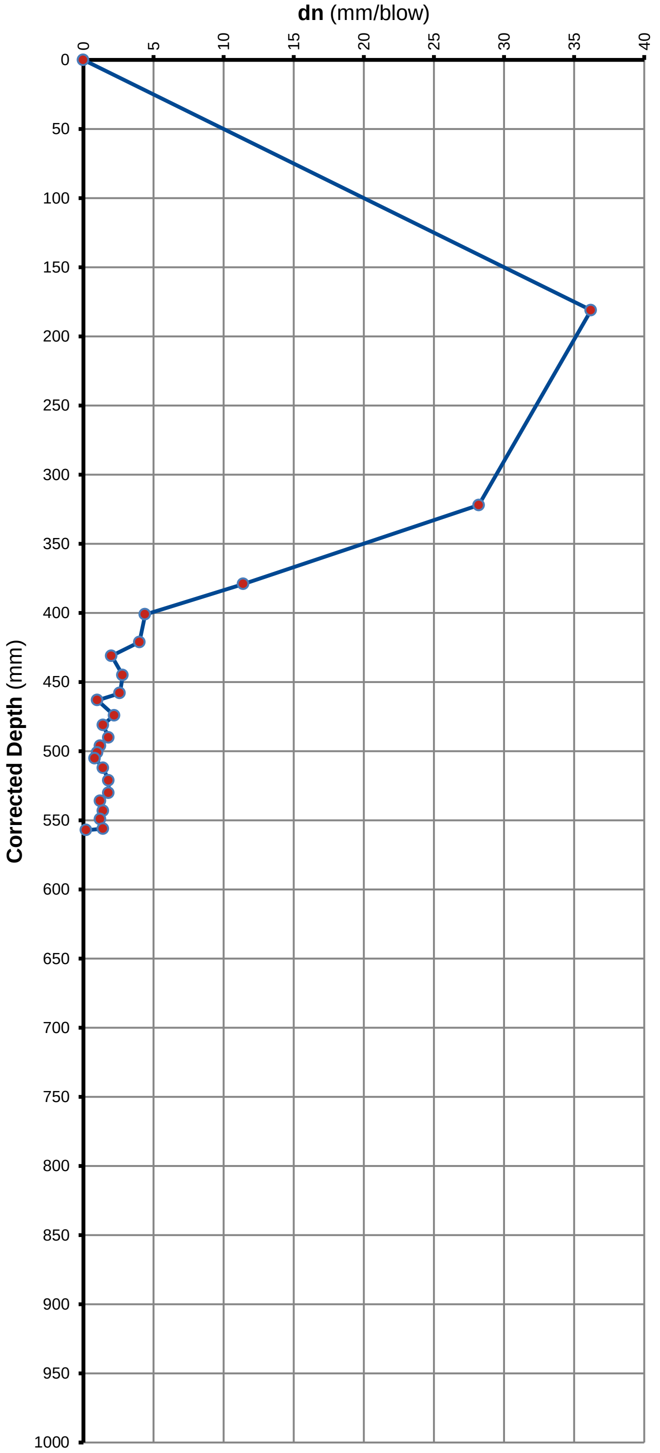
POSITION: DCP19 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



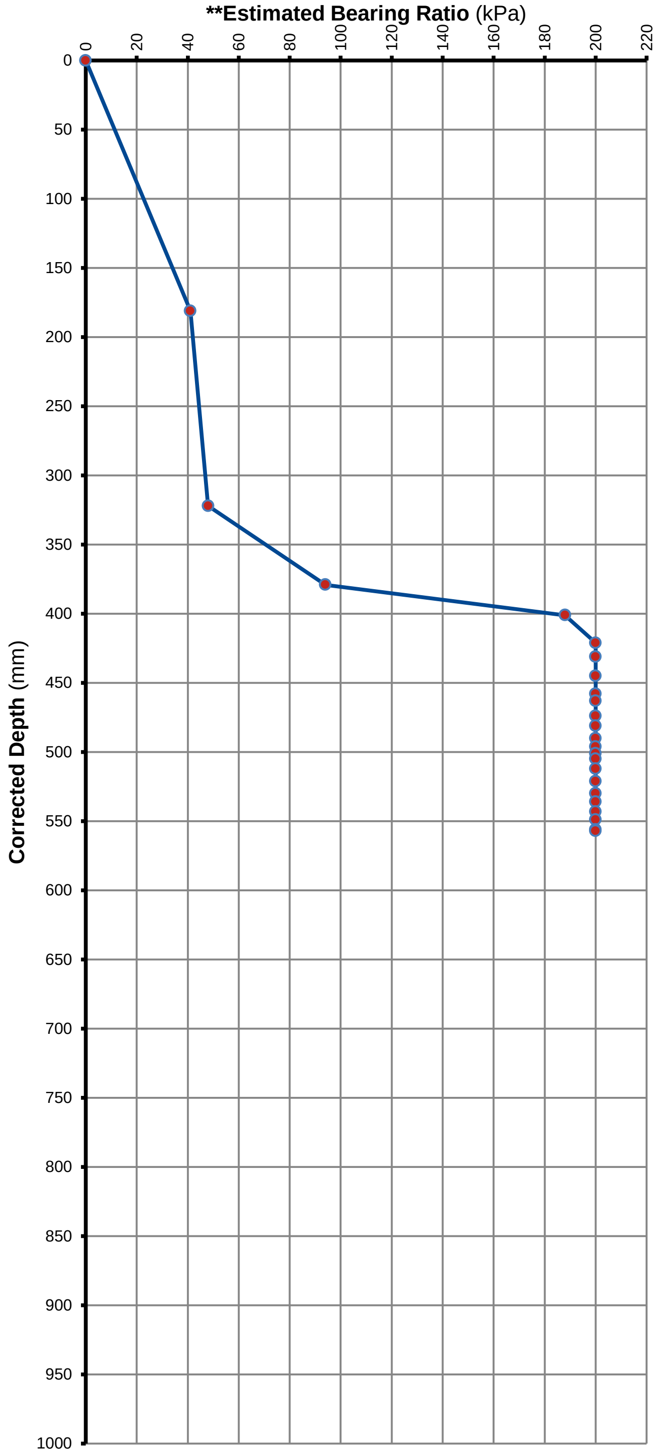
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

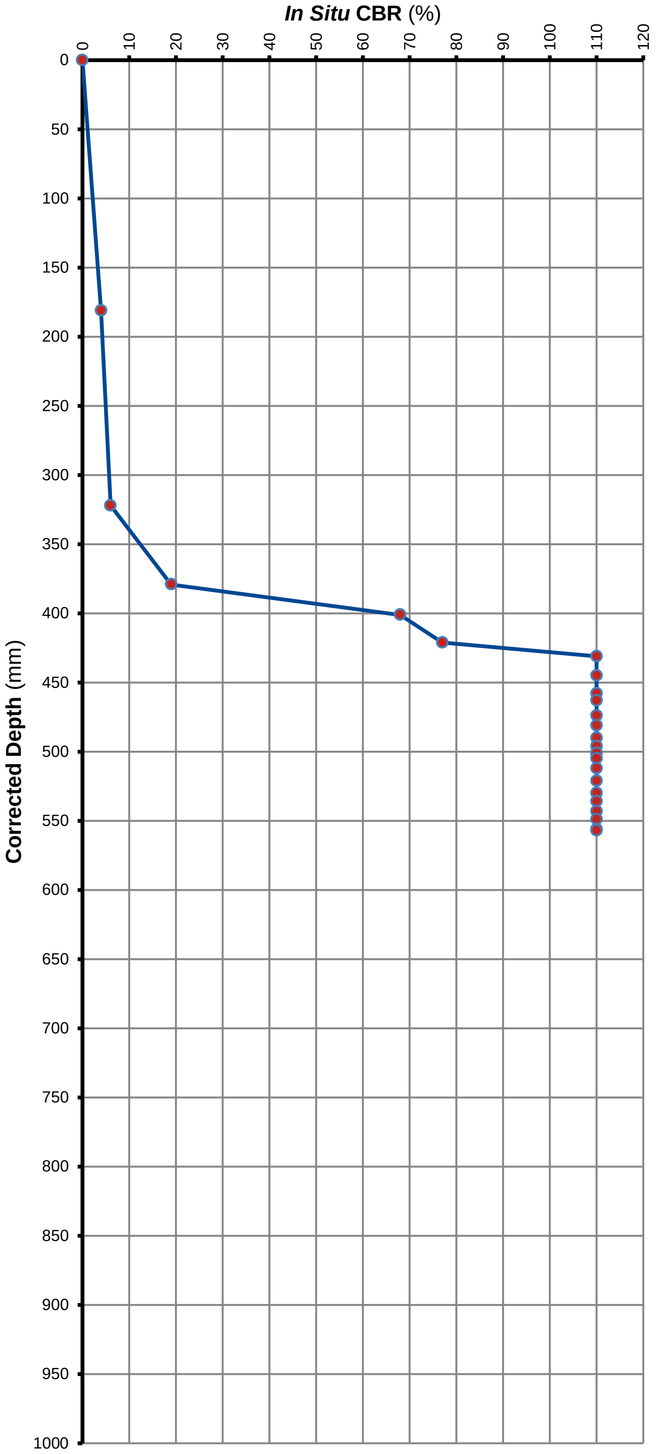
POSITION: DCP19 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: TP20 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	235	0	-	-	-	-	-
5	445	210	210	42.0	Loose	40	3
10	515	280	70	14.0	Medium Dense	81	14
15	553	318	38	7.6	Dense	129	33
20	585	350	32	6.4	Dense	147	41
25	622	387	37	7.4	Dense	132	34
30	660	425	38	7.6	Dense	129	33
35	690	455	30	6.0	Dense	154	45
40	720	485	30	6.0	Dense	154	45
45	743	508	23	4.6	Very Dense	183	64
50	770	535	27	5.4	Dense	165	52
55	793	558	23	4.6	Very Dense	183	64
60	823	588	30	6.0	Dense	154	45
65	850	615	27	5.4	Dense	165	52
70	880	645	30	6.0	Dense	154	45
75	909	674	29	5.8	Dense	157	47
80	931	696	22	4.4	Very Dense	188	68
85	960	725	29	5.8	Dense	157	47
90	980	745	20	4.0	Very Dense	200	77
95	1003	768	23	4.6	Very Dense	183	64
100	1024	789	21	4.2	Very Dense	193	72
105	1040	805	16	3.2	Very Dense	> 200	103
110	1059	824	19	3.8	Very Dense	> 200	82
115	1071	836	12	2.4	Very Dense	> 200	> 110
120	1090	855	19	3.8	Very Dense	> 200	82
125	1100	865	10	2.0	Very Dense	> 200	> 110
130	1111	876	11	2.2	Very Dense	> 200	> 110
135	1129	894	18	3.6	Very Dense	> 200	88
140	1140	905	11	2.2	Very Dense	> 200	> 110
145	1153	918	13	2.6	Very Dense	> 200	> 110
150	1169	934	16	3.2	Very Dense	> 200	103
155	1179	944	10	2.0	Very Dense	> 200	> 110
160	1190	955	11	2.2	Very Dense	> 200	> 110
165	1200	965	10	2.0	Very Dense	> 200	> 110
170	1209	974	9	1.8	Very Dense	> 200	> 110
175	1219	984	10	2.0	Very Dense	> 200	> 110
180	1230	995	11	2.2	Very Dense	> 200	> 110
185	1240	1005	10	2.0	Very Dense	> 200	> 110
190	1248	1013	8	1.6	Very Dense	> 200	> 110
195	1259	1024	11	2.2	Very Dense	> 200	> 110
200	1270	1035	11	2.2	Very Dense	> 200	> 110
205	1276	1041	6	1.2	Very Dense	> 200	> 110
210	1280	1045	4	0.8	Very Dense	> 200	> 110
215	1285	1050	5	1.0	Very Dense	> 200	> 110
220	1293	1058	8	1.6	Very Dense	> 200	> 110
225	1300	1065	7	1.4	Very Dense	> 200	> 110
230	1310	1075	10	2.0	Very Dense	> 200	> 110
235	1315	1080	5	1.0	Very Dense	> 200	> 110
240	1320	1085	5	1.0	Very Dense	> 200	> 110
245	1325	1090	5	1.0	Very Dense	> 200	> 110
250	1328	1093	3	0.6	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: TP20 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1330	1095	2	0.4	Very Dense	> 200	> 110
260	1332	1097	2	0.4	Very Dense	> 200	> 110
265	1335	1100	3	0.6	Very Dense	> 200	> 110
270	1338	1103	3	0.6	Very Dense	> 200	> 110
275	1338	1103	0	0.0	Very Dense	> 200	> 110
280	1343	1108	5	1.0	Very Dense	> 200	> 110
285	1350	1115	7	1.4	Very Dense	> 200	> 110
290	1350	1115	0	0.0	Very Dense	> 200	> 110
295	1353	1118	3	0.6	Very Dense	> 200	> 110
300	1358	1123	5	1.0	Very Dense	> 200	> 110
305	1358	1123	0	0.0	Very Dense	> 200	> 110
310	1362	1127	4	0.8	Very Dense	> 200	> 110
315	1365	1130	3	0.6	Very Dense	> 200	> 110
320	1365	1130	0	0.0	Very Dense	> 200	> 110
325	Refusal						

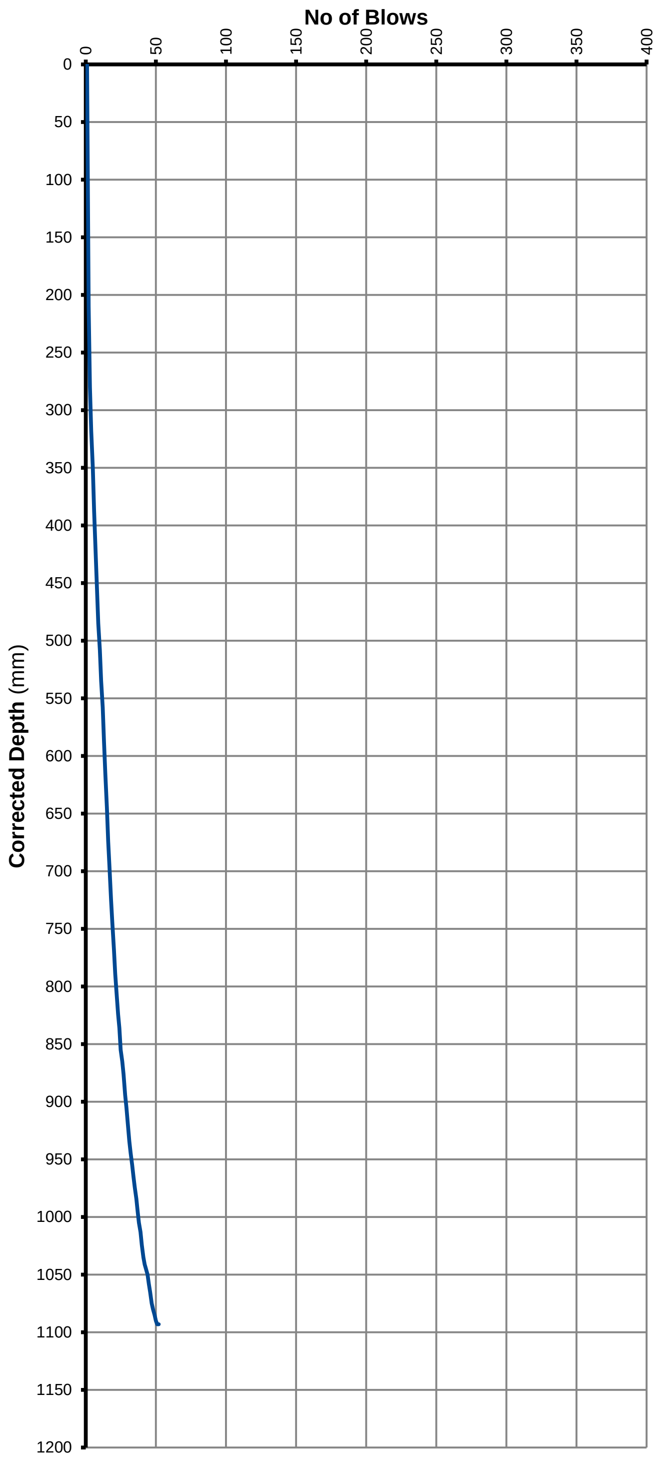
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

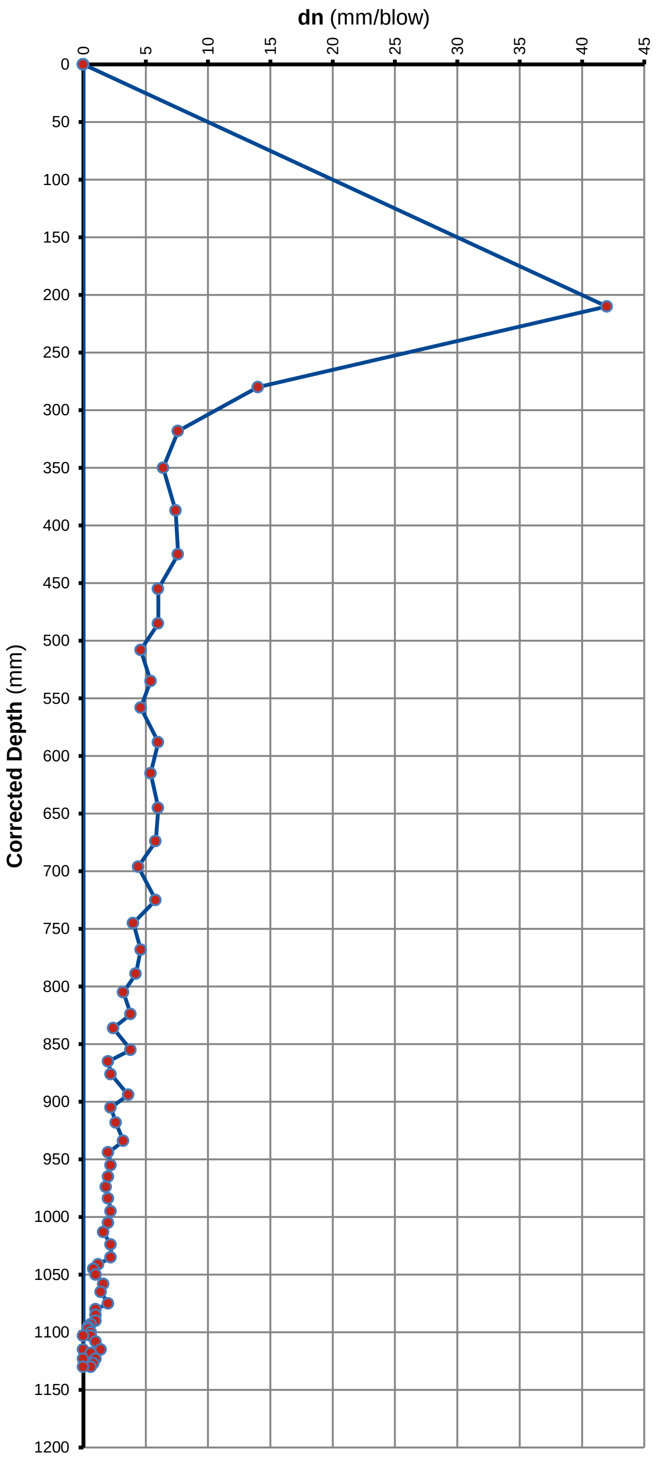
POSITION: TP20 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



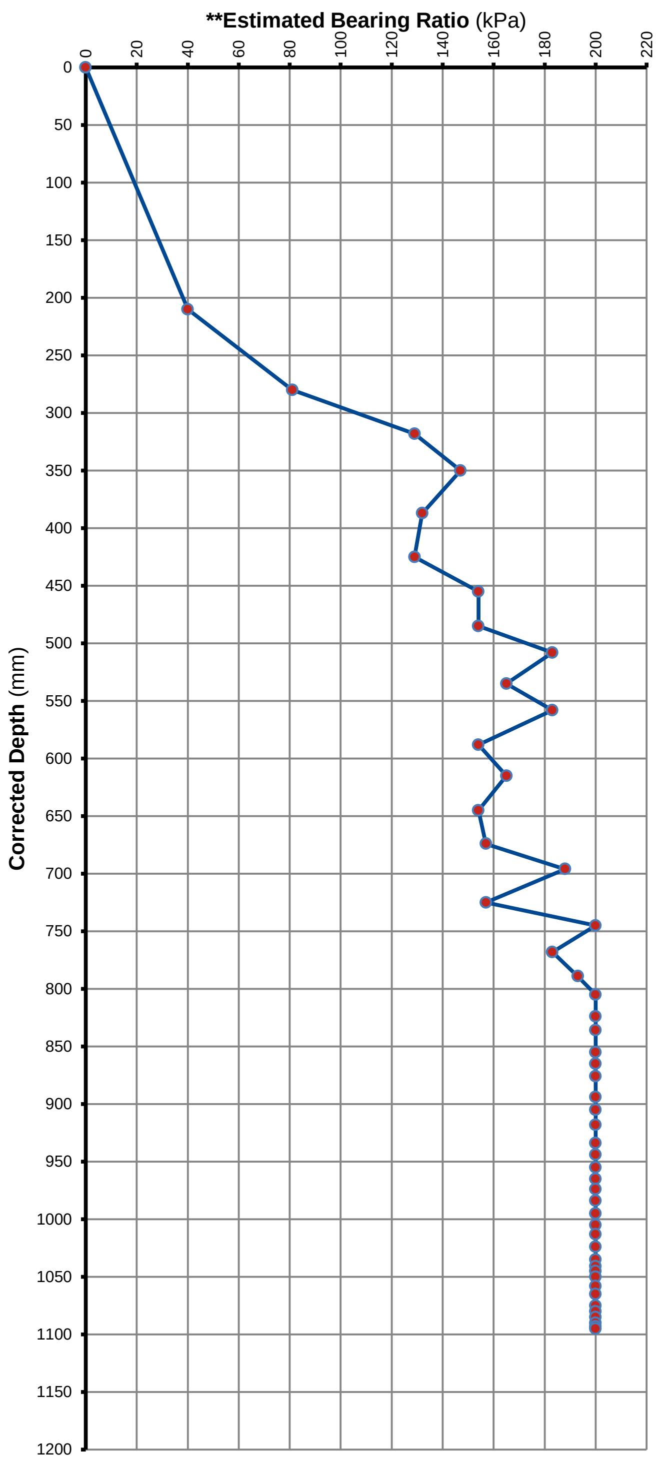
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

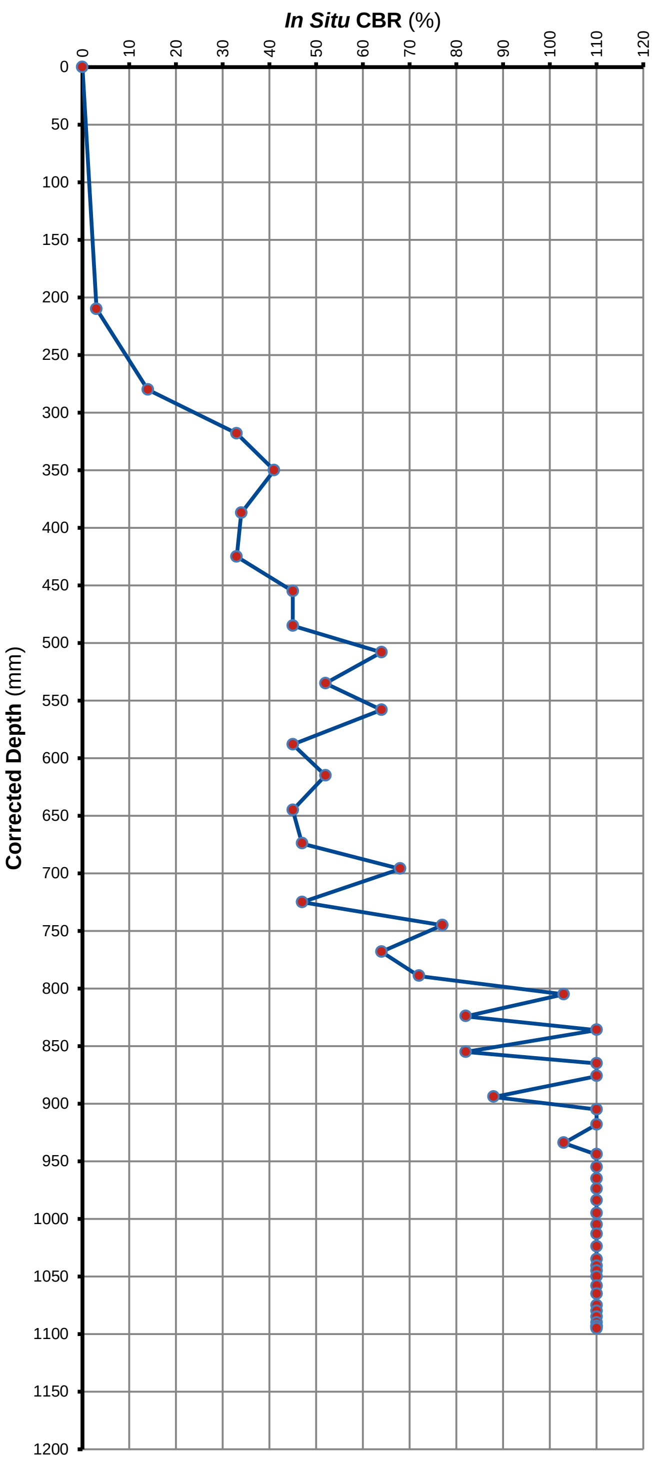
POSITION: TP20 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP21 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	240	0	-	-	-	-	-
5	515	275	275	55.0	Loose	20	2
10	590	350	75	15.0	Medium Dense	156	13
15	620	380	30	6.0	Dense	308	45
20	642	402	22	4.4	Very Dense	376	68
25	665	425	23	4.6	Very Dense	366	64
30	690	450	25	5.0	Very Dense	348	57
35	710	470	20	4.0	Very Dense	400	77
40	730	490	20	4.0	Very Dense	400	77
45	759	519	29	5.8	Dense	314	47
50	780	540	21	4.2	Very Dense	386	72
55	808	568	28	5.6	Dense	322	49
60	830	590	22	4.4	Very Dense	376	68
65	862	622	32	6.4	Dense	294	41
70	895	655	33	6.6	Dense	288	39
75	928	688	33	6.6	Dense	288	39
80	953	713	25	5.0	Very Dense	348	57
85	979	739	26	5.2	Dense	338	54
90	998	758	19	3.8	Very Dense	> 400	82
95	1020	780	22	4.4	Very Dense	376	68
100	1049	809	29	5.8	Dense	314	47
105	1070	830	21	4.2	Very Dense	386	72
110	1095	855	25	5.0	Very Dense	348	57
115	1118	878	23	4.6	Very Dense	366	64
120	1133	893	15	3.0	Very Dense	> 400	> 110
125	1152	912	19	3.8	Very Dense	> 400	82
130	1170	930	18	3.6	Very Dense	> 400	88
135	1188	948	18	3.6	Very Dense	> 400	88
140	1198	958	10	2.0	Very Dense	> 400	> 110
145	1220	980	22	4.4	Very Dense	376	68
150	1240	1000	20	4.0	Very Dense	400	77
155	1261	1021	21	4.2	Very Dense	386	72
160	1279	1039	18	3.6	Very Dense	> 400	88
165	1292	1052	13	2.6	Very Dense	> 400	> 110
170	1315	1075	23	4.6	Very Dense	366	64
175	1330	1090	15	3.0	Very Dense	> 400	> 110
180	1345	1105	15	3.0	Very Dense	> 400	> 110
185	1360	1120	15	3.0	Very Dense	> 400	> 110
190	1379	1139	19	3.8	Very Dense	> 400	82
195	1395	1155	16	3.2	Very Dense	> 400	103
200	1408	1168	13	2.6	Very Dense	> 400	> 110
205	1420	1180	12	2.4	Very Dense	> 400	> 110
210	1433	1193	13	2.6	Very Dense	> 400	> 110
215	1445	1205	12	2.4	Very Dense	> 400	> 110
220	1450	1210	5	1.0	Very Dense	> 400	> 110
225	1457	1217	7	1.4	Very Dense	> 400	> 110
230	1462	1222	5	1.0	Very Dense	> 400	> 110
235	1467	1227	5	1.0	Very Dense	> 400	> 110
240	1472	1232	5	1.0	Very Dense	> 400	> 110
245	1478	1238	6	1.2	Very Dense	> 400	> 110
250	1482	1242	4	0.8	Very Dense	> 400	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP21 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

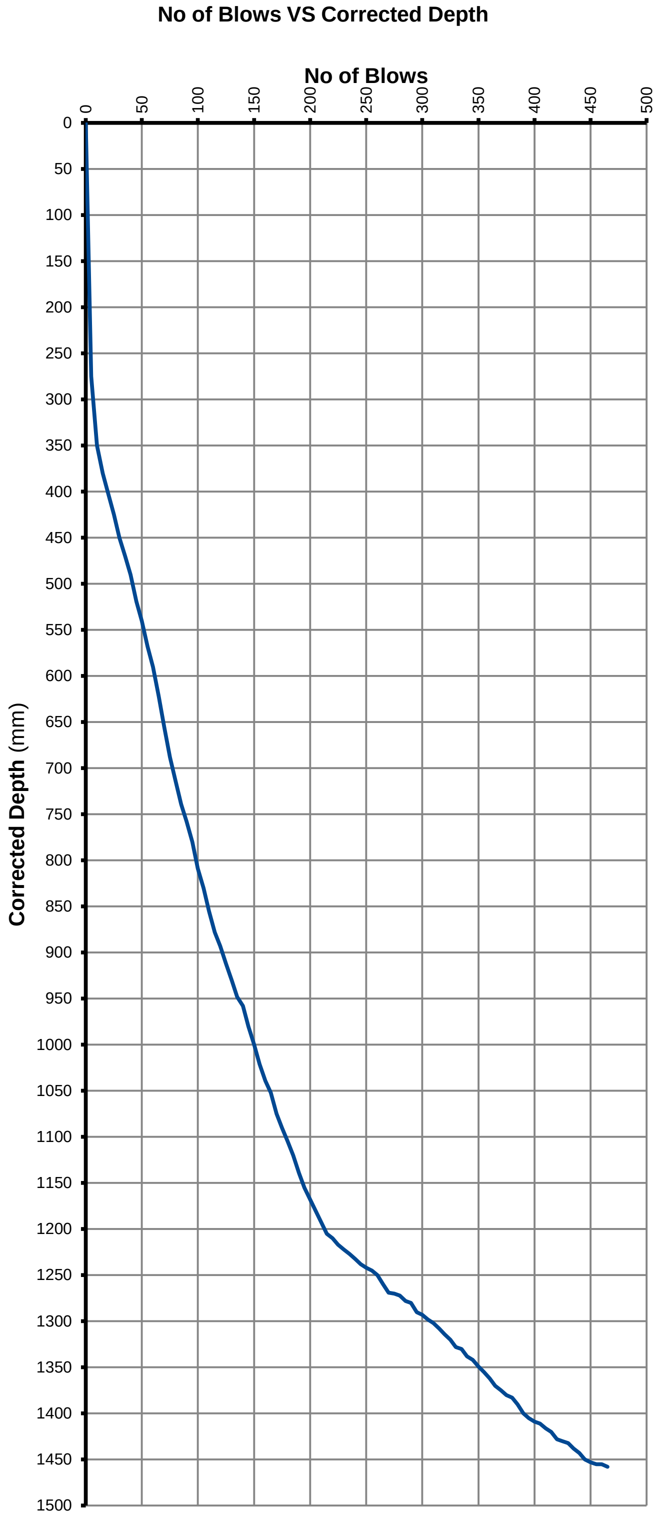
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1485	1245	3	0.6	Very Dense	> 400	> 110
260	1490	1250	5	1.0	Very Dense	> 400	> 110
265	1500	1260	10	2.0	Very Dense	> 400	> 110
270	1509	1269	9	1.8	Very Dense	> 400	> 110
275	1510	1270	1	0.2	Very Dense	> 400	> 110
280	1512	1272	2	0.4	Very Dense	> 400	> 110
285	1518	1278	6	1.2	Very Dense	> 400	> 110
290	1520	1280	2	0.4	Very Dense	> 400	> 110
295	1530	1290	10	2.0	Very Dense	> 400	> 110
300	1533	1293	3	0.6	Very Dense	> 400	> 110
305	1538	1298	5	1.0	Very Dense	> 400	> 110
310	1542	1302	4	0.8	Very Dense	> 400	> 110
315	1548	1308	6	1.2	Very Dense	> 400	> 110
320	1554	1314	6	1.2	Very Dense	> 400	> 110
325	1560	1320	6	1.2	Very Dense	> 400	> 110
330	1568	1328	8	1.6	Very Dense	> 400	> 110
335	1570	1330	2	0.4	Very Dense	> 400	> 110
340	1578	1338	8	1.6	Very Dense	> 400	> 110
345	1582	1342	4	0.8	Very Dense	> 400	> 110
350	1589	1349	7	1.4	Very Dense	> 400	> 110
355	1595	1355	6	1.2	Very Dense	> 400	> 110
360	1602	1362	7	1.4	Very Dense	> 400	> 110
365	1610	1370	8	1.6	Very Dense	> 400	> 110
370	1615	1375	5	1.0	Very Dense	> 400	> 110
375	1620	1380	5	1.0	Very Dense	> 400	> 110
380	1623	1383	3	0.6	Very Dense	> 400	> 110
385	1630	1390	7	1.4	Very Dense	> 400	> 110
390	1640	1400	10	2.0	Very Dense	> 400	> 110
395	1645	1405	5	1.0	Very Dense	> 400	> 110
400	1649	1409	4	0.8	Very Dense	> 400	> 110
405	1651	1411	2	0.4	Very Dense	> 400	> 110
410	1656	1416	5	1.0	Very Dense	> 400	> 110
415	1660	1420	4	0.8	Very Dense	> 400	> 110
420	1668	1428	8	1.6	Very Dense	> 400	> 110
425	1670	1430	2	0.4	Very Dense	> 400	> 110
430	1672	1432	2	0.4	Very Dense	> 400	> 110
435	1678	1438	6	1.2	Very Dense	> 400	> 110
440	1683	1443	5	1.0	Very Dense	> 400	> 110
445	1690	1450	7	1.4	Very Dense	> 400	> 110
450	1693	1453	3	0.6	Very Dense	> 400	> 110
455	1695	1455	2	0.4	Very Dense	> 400	> 110
460	1695	1455	0	0.0	Very Dense	> 400	> 110
465	1698	1458	3	0.6	Very Dense	> 400	> 110
470	Refusal						

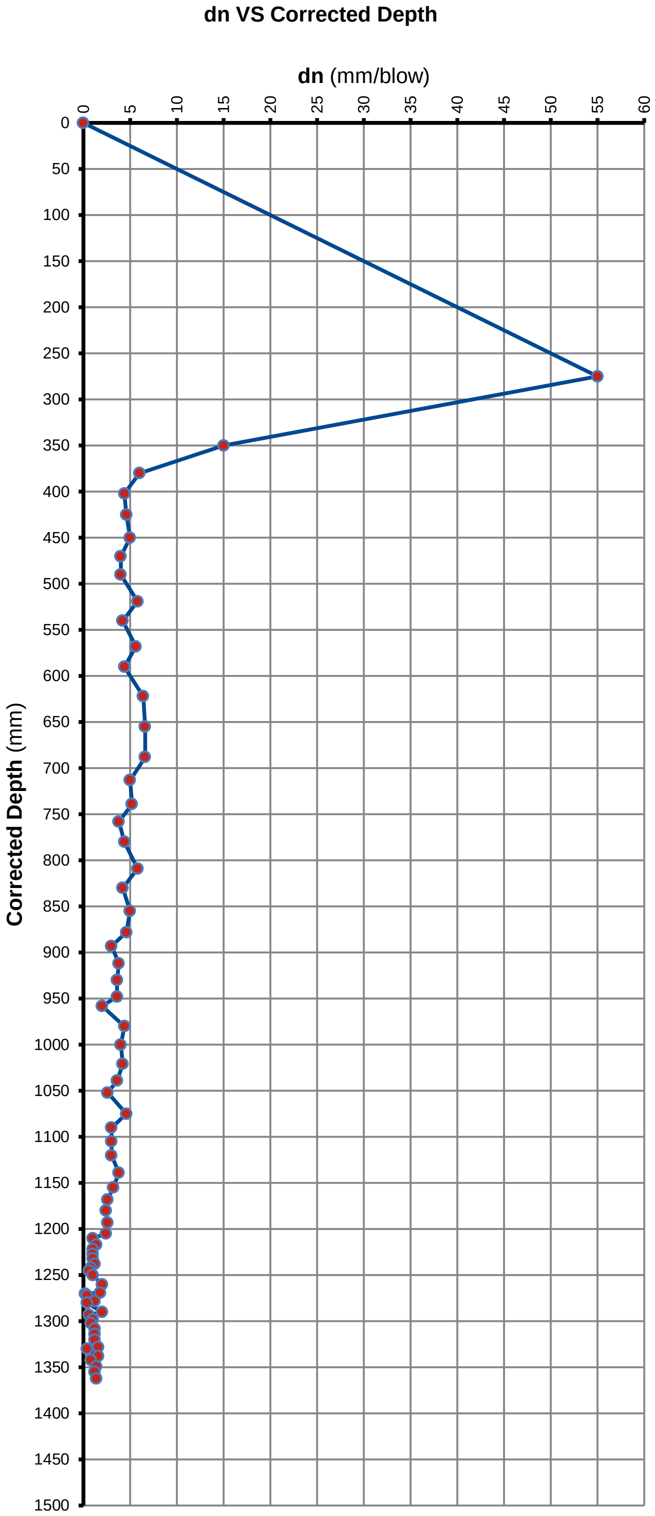
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP21 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





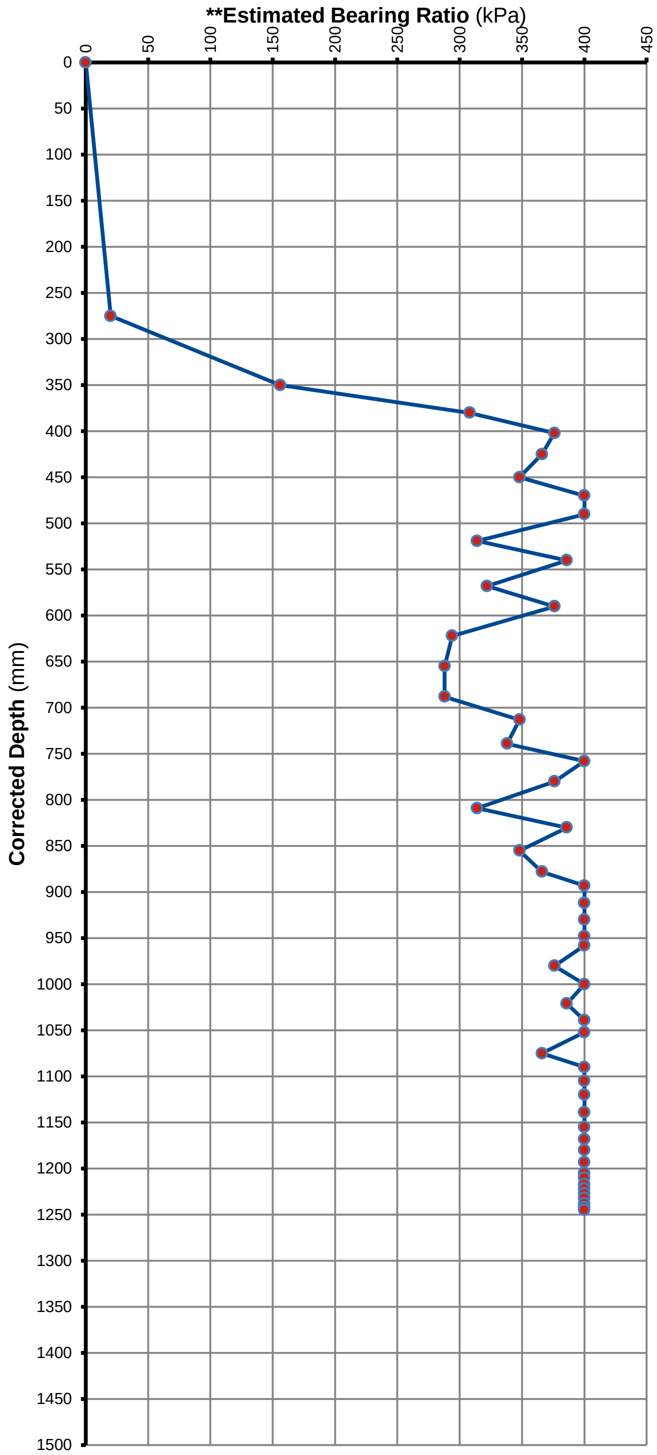
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

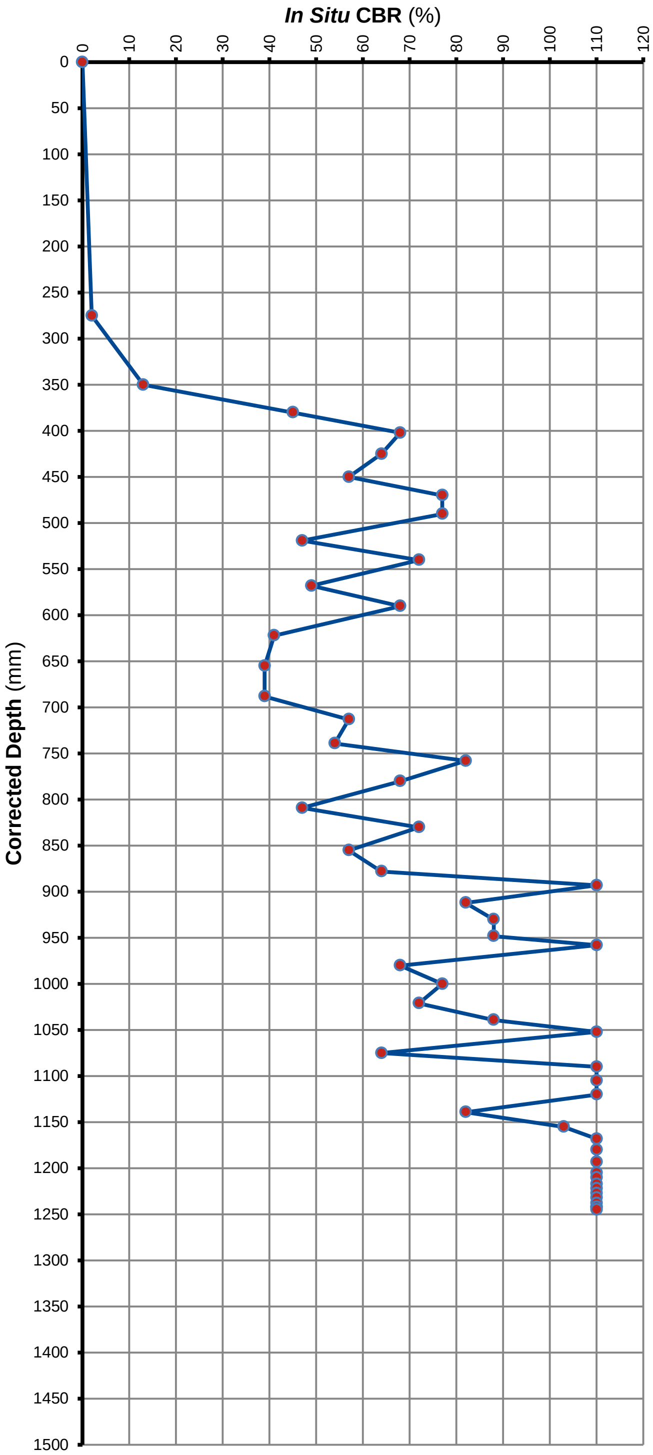
POSITION: DCP21 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP22 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	235	0	-	-	-	-	-
5	483	248	248	49.6	Loose	29	3
10	565	330	82	16.4	Medium Dense	73	12
15	608	373	43	8.6	Dense	117	28
20	650	415	42	8.4	Dense	119	29
25	695	460	45	9.0	Dense	113	26
30	730	495	35	7.0	Dense	137	36
35	765	530	35	7.0	Dense	137	36
40	802	567	37	7.4	Dense	132	34
45	843	608	41	8.2	Dense	122	30
50	880	645	37	7.4	Dense	132	34
55	918	683	38	7.6	Dense	129	33
60	945	710	27	5.4	Dense	165	52
65	978	743	33	6.6	Dense	144	39
70	1000	765	22	4.4	Very Dense	188	68
75	1030	795	30	6.0	Dense	154	45
80	1055	820	25	5.0	Very Dense	174	57
85	1081	846	26	5.2	Dense	169	54
90	1105	870	24	4.8	Very Dense	178	60
95	1128	893	23	4.6	Very Dense	183	64
100	1149	914	21	4.2	Very Dense	193	72
105	1170	935	21	4.2	Very Dense	193	72
110	1188	953	18	3.6	Very Dense	> 200	88
115	1209	974	21	4.2	Very Dense	193	72
120	1230	995	21	4.2	Very Dense	193	72
125	1251	1016	21	4.2	Very Dense	193	72
130	1279	1044	28	5.6	Dense	161	49
135	1300	1065	21	4.2	Very Dense	193	72
140	1327	1092	27	5.4	Dense	165	52
145	1345	1110	18	3.6	Very Dense	> 200	88
150	1360	1125	15	3.0	Very Dense	> 200	> 110
155	1378	1143	18	3.6	Very Dense	> 200	88
160	1399	1164	21	4.2	Very Dense	193	72
165	1411	1176	12	2.4	Very Dense	> 200	> 110
170	1428	1193	17	3.4	Very Dense	> 200	95
175	1439	1204	11	2.2	Very Dense	> 200	> 110
180	1448	1213	9	1.8	Very Dense	> 200	> 110
185	1457	1222	9	1.8	Very Dense	> 200	> 110
190	1463	1228	6	1.2	Very Dense	> 200	> 110
195	1473	1238	10	2.0	Very Dense	> 200	> 110
200	1482	1247	9	1.8	Very Dense	> 200	> 110
205	1491	1256	9	1.8	Very Dense	> 200	> 110
210	1495	1260	4	0.8	Very Dense	> 200	> 110
215	1500	1265	5	1.0	Very Dense	> 200	> 110
220	1510	1275	10	2.0	Very Dense	> 200	> 110
225	1523	1288	13	2.6	Very Dense	> 200	> 110
230	1525	1290	2	0.4	Very Dense	> 200	> 110
235	1533	1298	8	1.6	Very Dense	> 200	> 110
240	1545	1310	12	2.4	Very Dense	> 200	> 110
245	1559	1324	14	2.8	Very Dense	> 200	> 110
250	1568	1333	9	1.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP22 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1580	1345	12	2.4	Very Dense	> 200	> 110
260	1590	1355	10	2.0	Very Dense	> 200	> 110
265	1598	1363	8	1.6	Very Dense	> 200	> 110
270	1605	1370	7	1.4	Very Dense	> 200	> 110
275	1615	1380	10	2.0	Very Dense	> 200	> 110
280	1630	1395	15	3.0	Very Dense	> 200	> 110
285	1645	1410	15	3.0	Very Dense	> 200	> 110
290	1650	1415	5	1.0	Very Dense	> 200	> 110
295	1660	1425	10	2.0	Very Dense	> 200	> 110
300	1666	1431	6	1.2	Very Dense	> 200	> 110
305	1672	1437	6	1.2	Very Dense	> 200	> 110
310	1678	1443	6	1.2	Very Dense	> 200	> 110
315	1685	1450	7	1.4	Very Dense	> 200	> 110
320	1690	1455	5	1.0	Very Dense	> 200	> 110
325	1695	1460	5	1.0	Very Dense	> 200	> 110
330	1698	1463	3	0.6	Very Dense	> 200	> 110
335	1700	1465	2	0.4	Very Dense	> 200	> 110
340	1708	1473	8	1.6	Very Dense	> 200	> 110
345	1713	1478	5	1.0	Very Dense	> 200	> 110
350	1715	1480	2	0.4	Very Dense	> 200	> 110
355	1720	1485	5	1.0	Very Dense	> 200	> 110
360	1721	1486	1	0.2	Very Dense	> 200	> 110
365	1721	1486	0	0.0	Very Dense	> 200	> 110
370	Refusal						

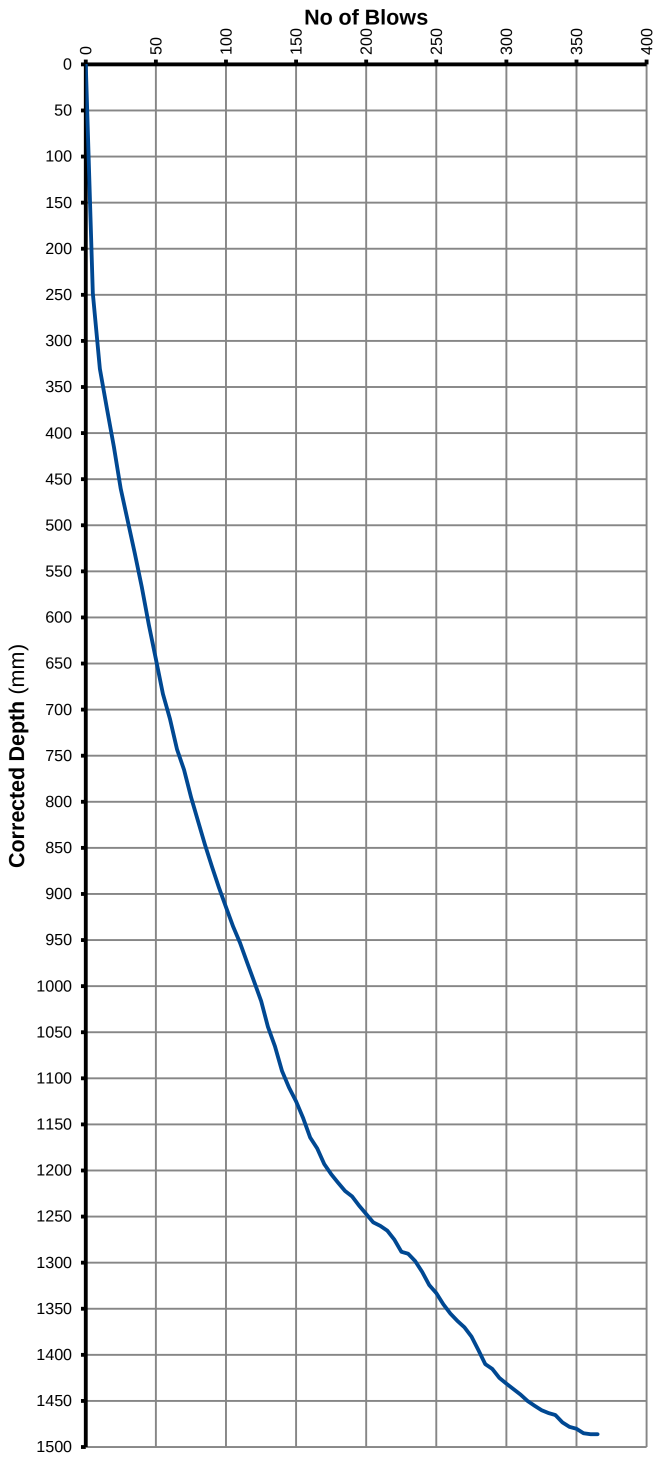
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

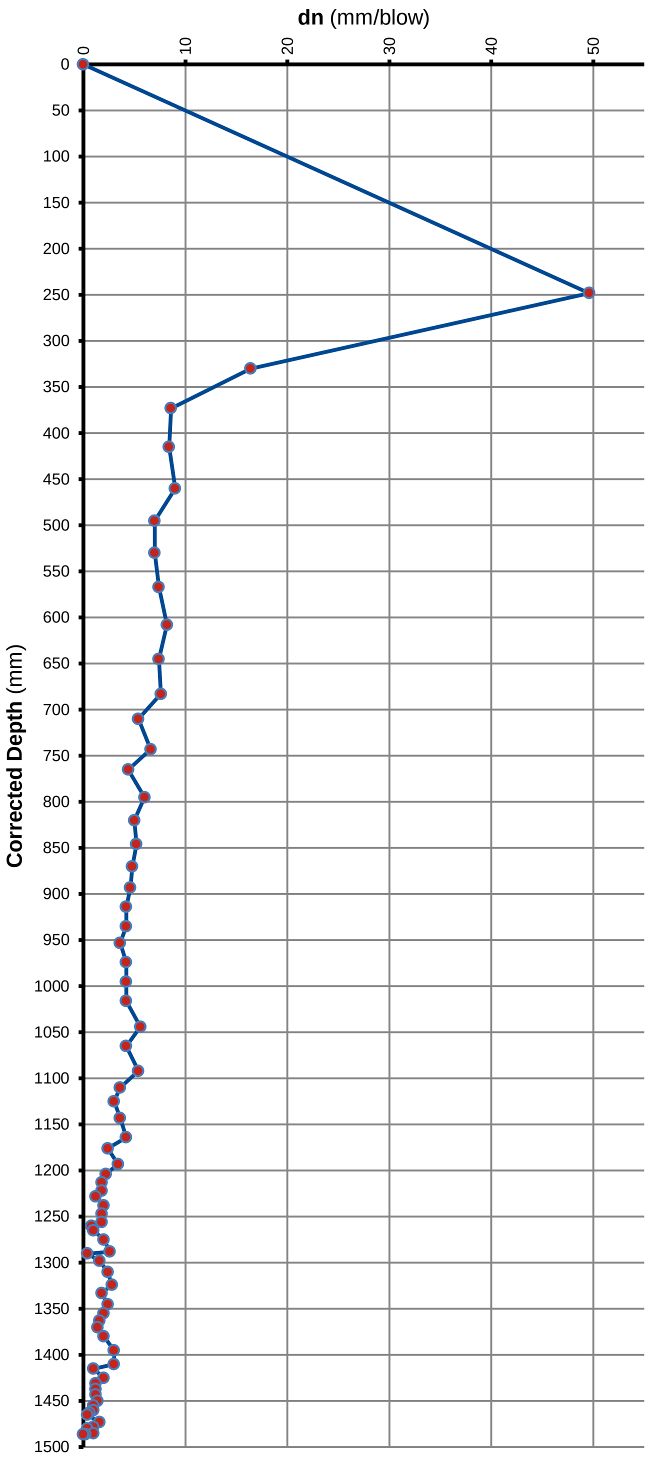
POSITION: DCP22 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



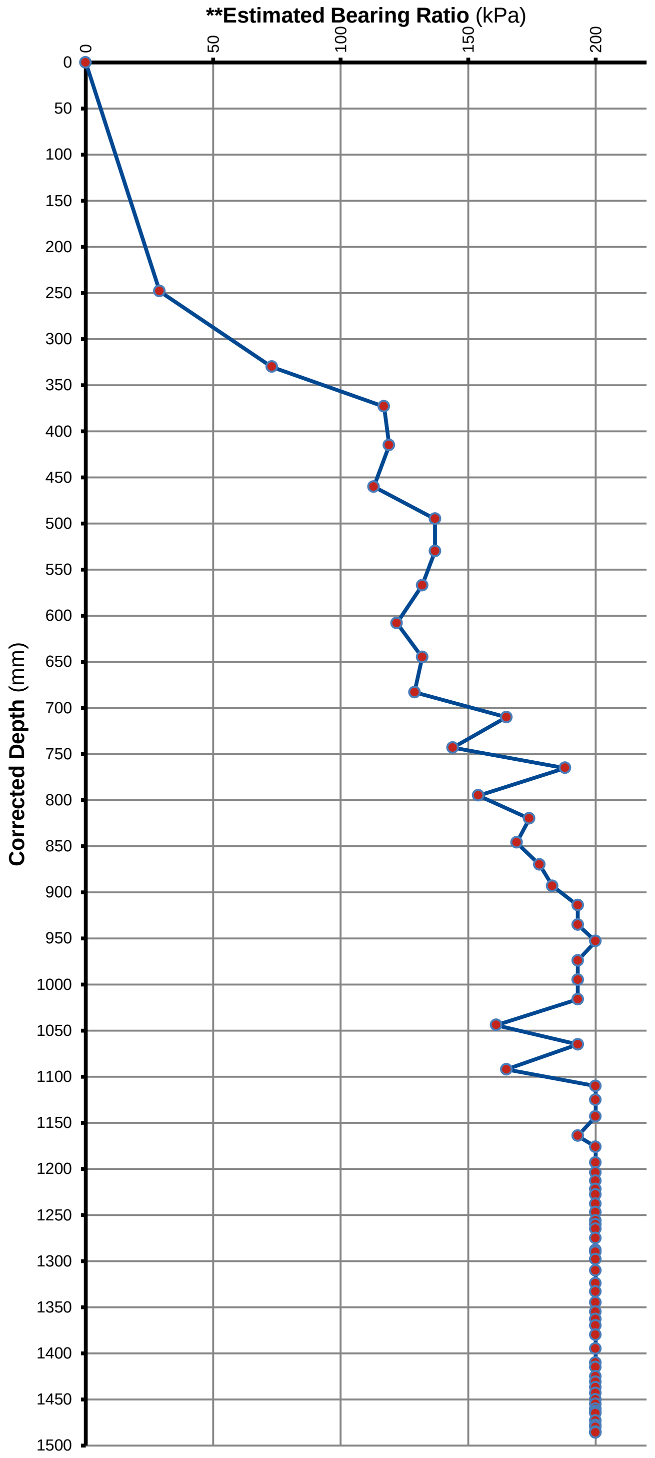
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

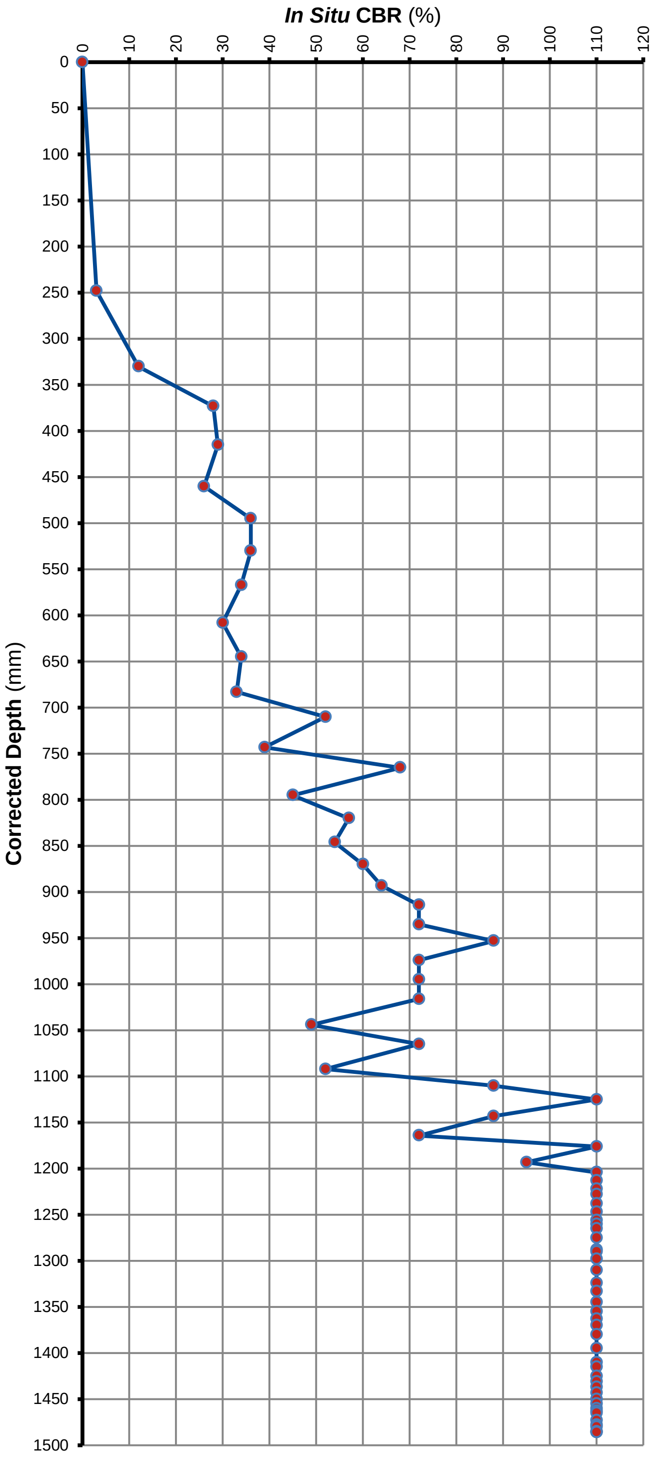
POSITION: DCP22 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 23 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	242	0	-	-	-	-	-
5	475	233	233	46.6	Loose	36	3
10	730	488	255	51.0	Loose	25	3
15	850	608	120	24.0	Medium Dense	55	7
20	920	678	70	14.0	Medium Dense	81	14
25	970	728	50	10.0	Dense	104	23
30	1002	760	32	6.4	Dense	147	41
35	1021	779	19	3.8	Very Dense	> 200	82
40	1038	796	17	3.4	Very Dense	> 200	95
45	1049	807	11	2.2	Very Dense	> 200	> 110
50	1067	825	18	3.6	Very Dense	> 200	88
55	1080	838	13	2.6	Very Dense	> 200	> 110
60	1085	843	5	1.0	Very Dense	> 200	> 110
65	1093	851	8	1.6	Very Dense	> 200	> 110
70	1100	858	7	1.4	Very Dense	> 200	> 110
75	1112	870	12	2.4	Very Dense	> 200	> 110
80	1118	876	6	1.2	Very Dense	> 200	> 110
85	1122	880	4	0.8	Very Dense	> 200	> 110
90	1129	887	7	1.4	Very Dense	> 200	> 110
95	1140	898	11	2.2	Very Dense	> 200	> 110
100	1146	904	6	1.2	Very Dense	> 200	> 110
105	1158	916	12	2.4	Very Dense	> 200	> 110
110	1163	921	5	1.0	Very Dense	> 200	> 110
115	1175	933	12	2.4	Very Dense	> 200	> 110
120	1183	941	8	1.6	Very Dense	> 200	> 110
125	1193	951	10	2.0	Very Dense	> 200	> 110
130	1198	956	5	1.0	Very Dense	> 200	> 110
135	1202	960	4	0.8	Very Dense	> 200	> 110
140	1210	968	8	1.6	Very Dense	> 200	> 110
145	1218	976	8	1.6	Very Dense	> 200	> 110
150	1223	981	5	1.0	Very Dense	> 200	> 110
155	1230	988	7	1.4	Very Dense	> 200	> 110
160	1235	993	5	1.0	Very Dense	> 200	> 110
165	1240	998	5	1.0	Very Dense	> 200	> 110
170	1245	1003	5	1.0	Very Dense	> 200	> 110
175	1249	1007	4	0.8	Very Dense	> 200	> 110
180	1250	1008	1	0.2	Very Dense	> 200	> 110
185	1252	1010	2	0.4	Very Dense	> 200	> 110
190	1260	1018	8	1.6	Very Dense	> 200	> 110
195	1260	1018	0	0.0	Very Dense	> 200	> 110
200	Refusal						

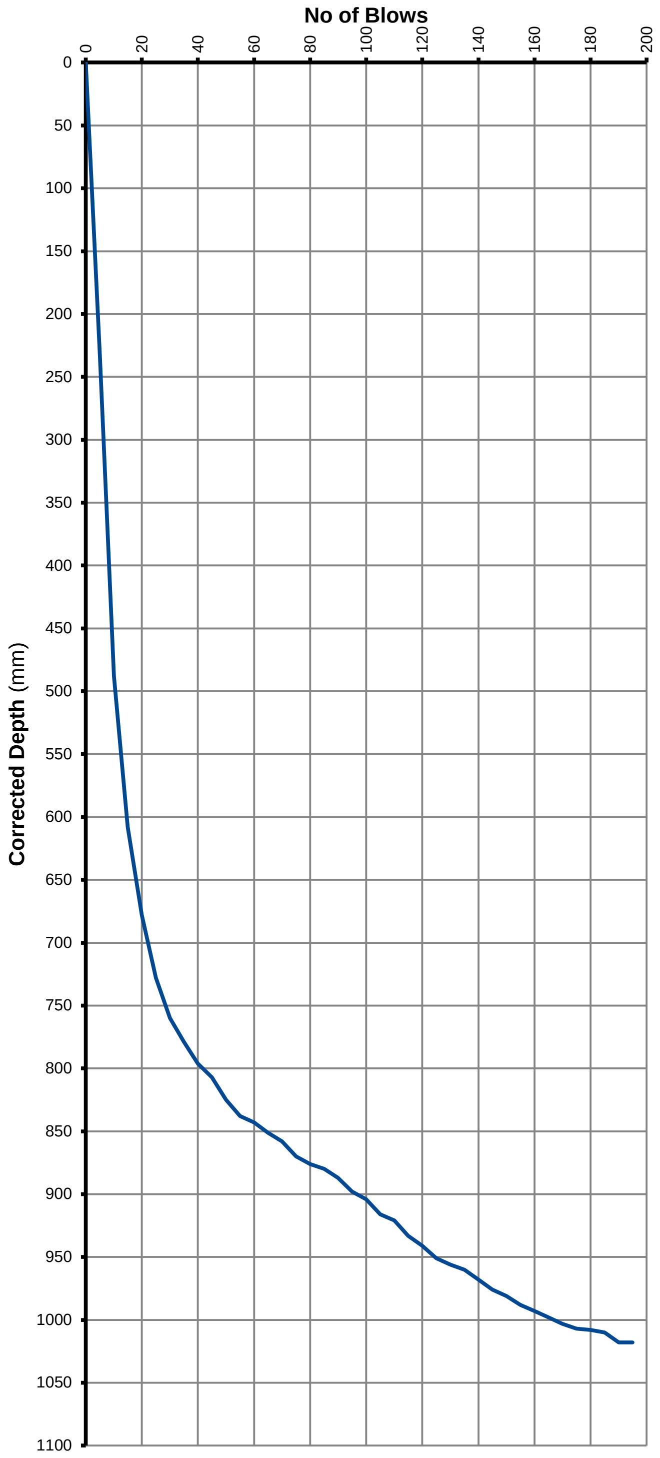
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

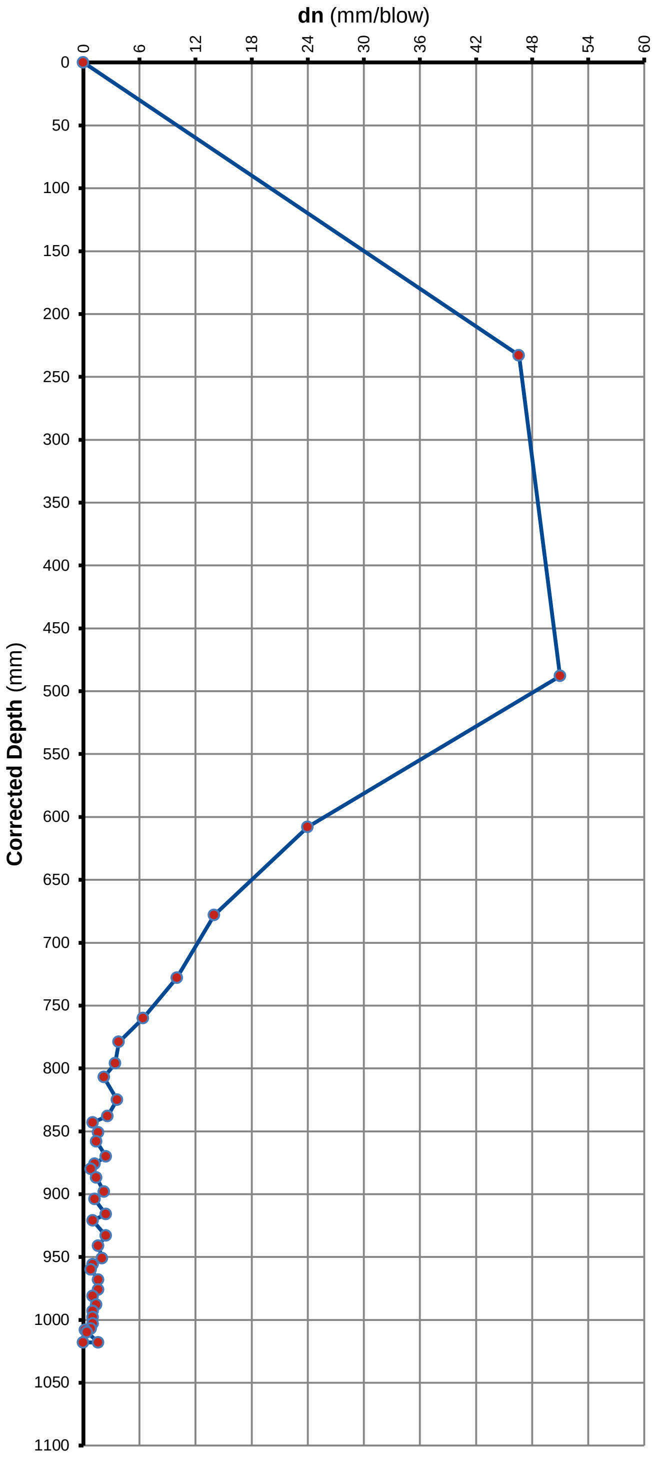
POSITION: DCP 23 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

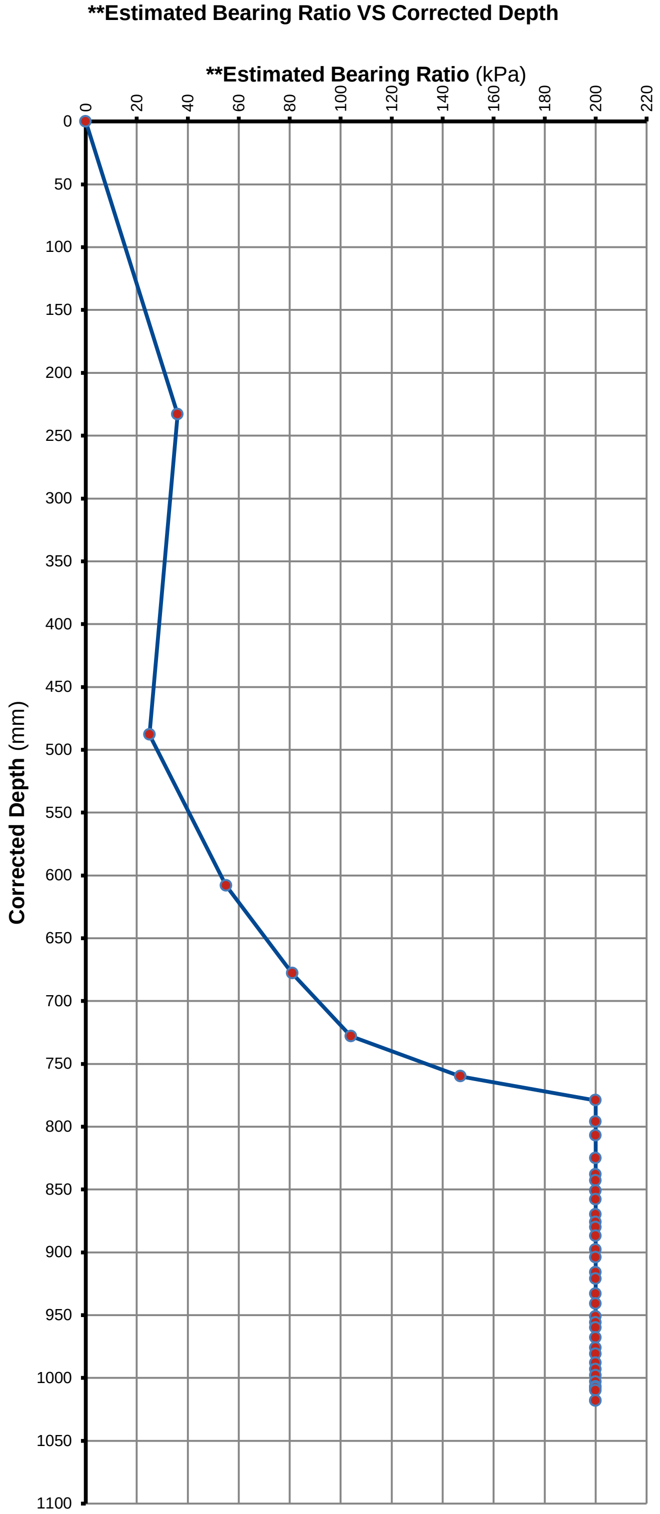


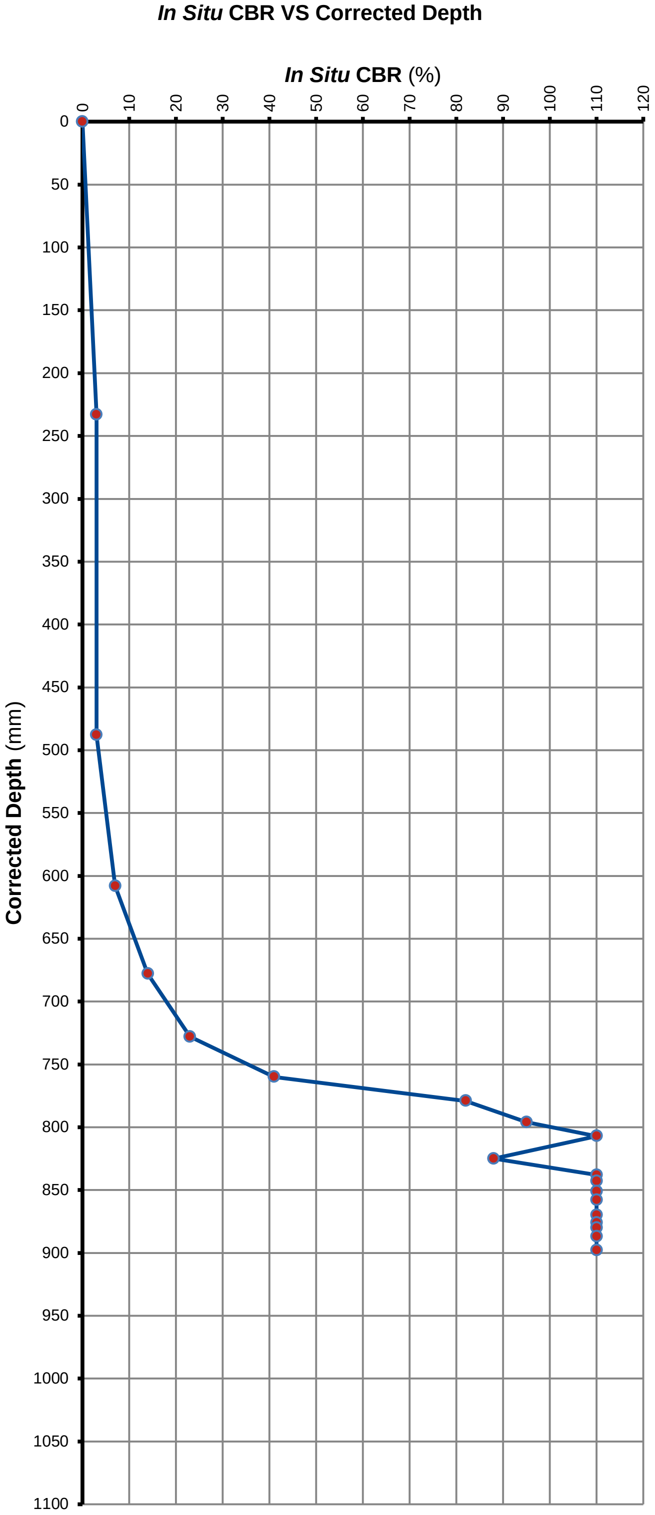
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 23 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


****Estimated Bearing Ratio VS Corrected Depth**


***In Situ* CBR VS Corrected Depth**

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 24 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	242	0	-	-	-	-	-
5	475	233	233	46.6	Loose	36	3
10	730	488	255	51.0	Loose	25	3
15	850	608	120	24.0	Medium Dense	55	7
20	920	678	70	14.0	Medium Dense	81	14
25	970	728	50	10.0	Dense	104	23
30	1002	760	32	6.4	Dense	147	41
35	1021	779	19	3.8	Very Dense	> 200	82
40	1038	796	17	3.4	Very Dense	> 200	95
45	1049	807	11	2.2	Very Dense	> 200	> 110
50	1067	825	18	3.6	Very Dense	> 200	88
55	1080	838	13	2.6	Very Dense	> 200	> 110
60	1085	843	5	1.0	Very Dense	> 200	> 110
65	1093	851	8	1.6	Very Dense	> 200	> 110
70	1100	858	7	1.4	Very Dense	> 200	> 110
75	1112	870	12	2.4	Very Dense	> 200	> 110
80	1118	876	6	1.2	Very Dense	> 200	> 110
85	1122	880	4	0.8	Very Dense	> 200	> 110
90	1129	887	7	1.4	Very Dense	> 200	> 110
95	1140	898	11	2.2	Very Dense	> 200	> 110
100	1146	904	6	1.2	Very Dense	> 200	> 110
105	1158	916	12	2.4	Very Dense	> 200	> 110
110	1163	921	5	1.0	Very Dense	> 200	> 110
115	1175	933	12	2.4	Very Dense	> 200	> 110
120	1183	941	8	1.6	Very Dense	> 200	> 110
125	1193	951	10	2.0	Very Dense	> 200	> 110
130	1198	956	5	1.0	Very Dense	> 200	> 110
135	1202	960	4	0.8	Very Dense	> 200	> 110
140	1210	968	8	1.6	Very Dense	> 200	> 110
145	1218	976	8	1.6	Very Dense	> 200	> 110
150	1223	981	5	1.0	Very Dense	> 200	> 110
155	1230	988	7	1.4	Very Dense	> 200	> 110
160	1235	993	5	1.0	Very Dense	> 200	> 110
165	1240	998	5	1.0	Very Dense	> 200	> 110
170	1245	1003	5	1.0	Very Dense	> 200	> 110
175	1249	1007	4	0.8	Very Dense	> 200	> 110
180	1250	1008	1	0.2	Very Dense	> 200	> 110
185	1252	1010	2	0.4	Very Dense	> 200	> 110
190	1260	1018	8	1.6	Very Dense	> 200	> 110
195	1260	1018	0	0.0	Very Dense	> 200	> 110
200	1270	1028	10	2.0	Very Dense	> 200	> 110
205	1272	1030	2	0.4	Very Dense	> 200	> 110
210	1275	1033	3	0.6	Very Dense	> 200	> 110
215	1275	1033	0	0.0	Very Dense	> 200	> 110
220	1280	1038	5	1.0	Very Dense	> 200	> 110
225	1283	1041	3	0.6	Very Dense	> 200	> 110
230	1286	1044	3	0.6	Very Dense	> 200	> 110
235	1288	1046	2	0.4	Very Dense	> 200	> 110
240	1288	1046	0	0.0	Very Dense	> 200	> 110
245	Refusal						

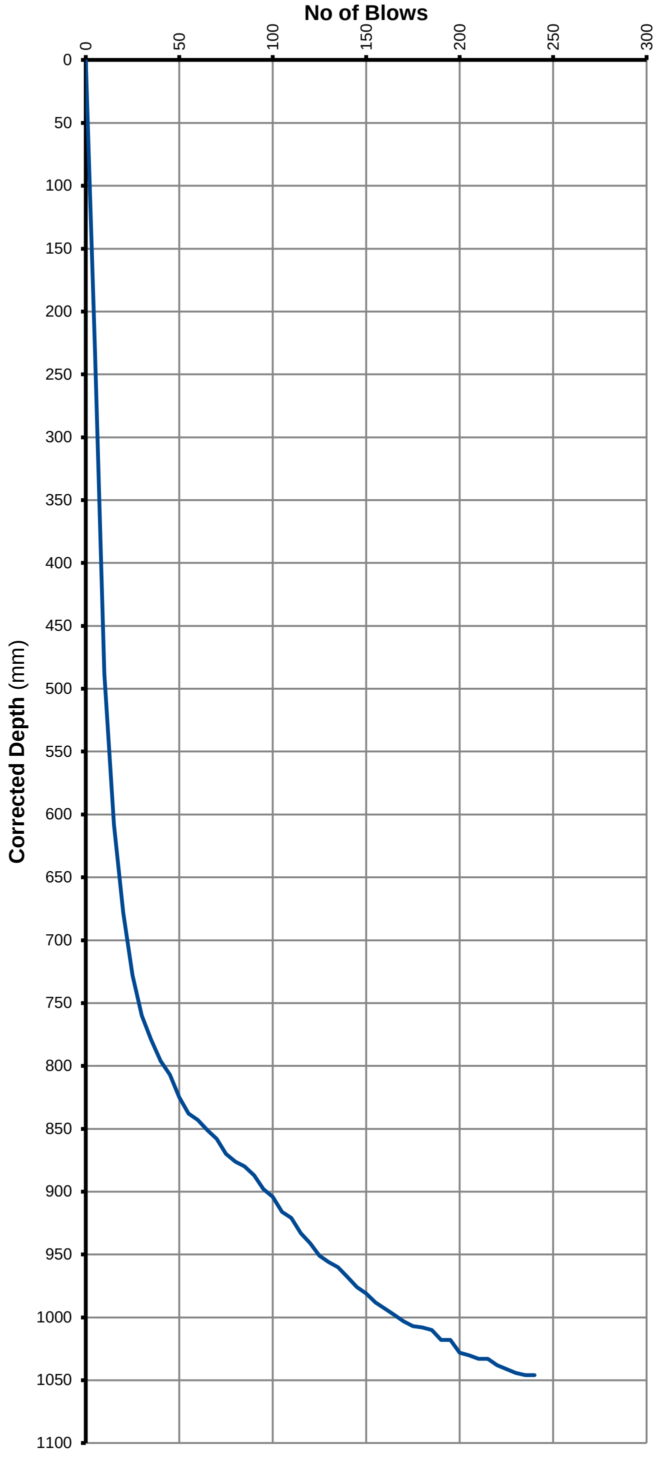
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

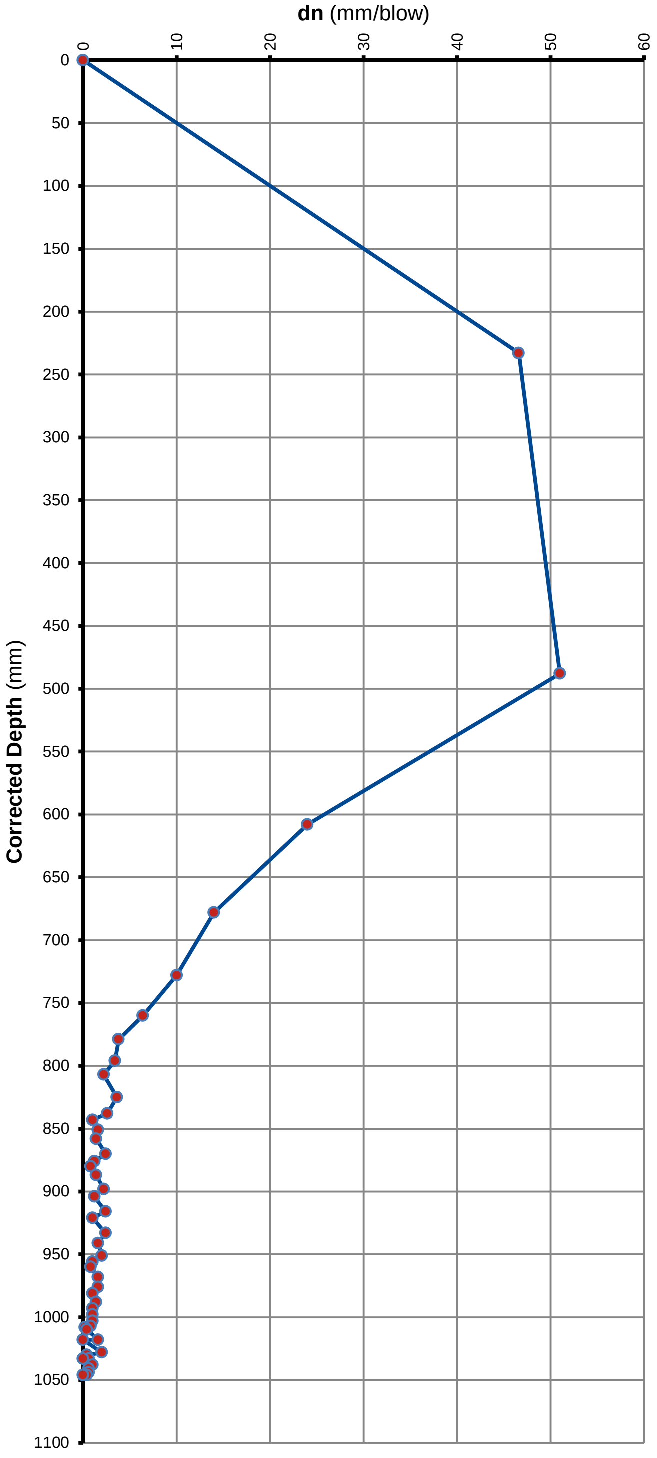
POSITION: DCP 24 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



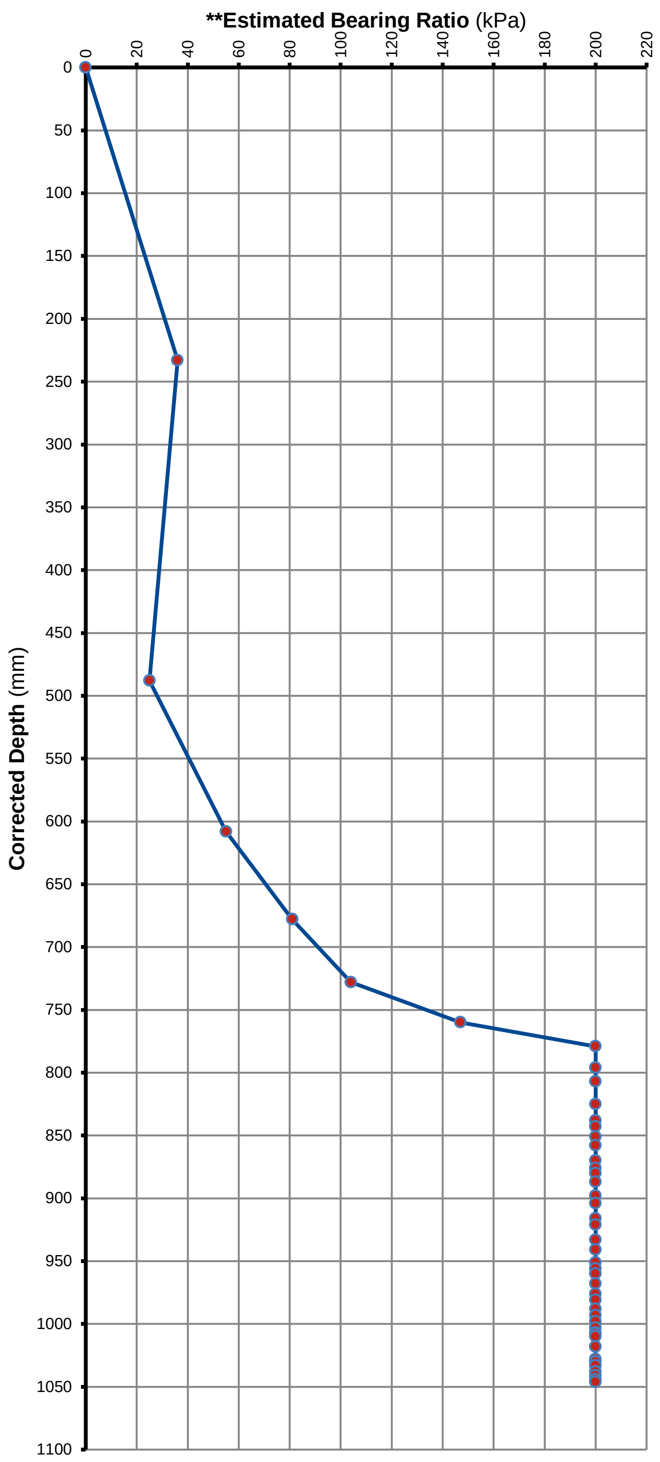
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

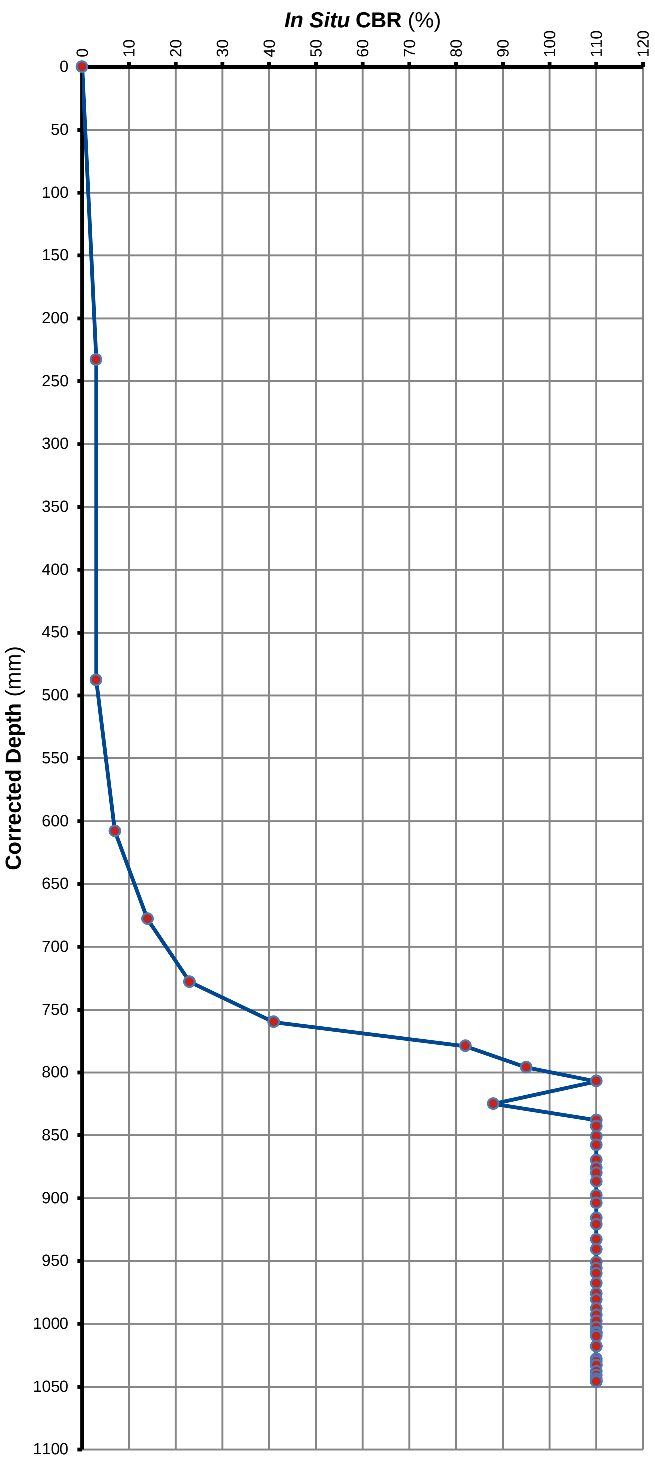
POSITION: DCP 24 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 25 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	230	0	-	-	-	-	-
5	508	278	278	55.6	Loose	8	2
10	575	345	67	13.4	Medium Dense	84	15
15	622	392	47	9.4	Dense	109	25
20	680	450	58	11.6	Dense	93	19
25	721	491	41	8.2	Dense	122	30
30	776	546	55	11.0	Dense	97	20
35	823	593	47	9.4	Dense	109	25
40	869	639	46	9.2	Dense	111	25
45	910	680	41	8.2	Dense	122	30
50	934	704	24	4.8	Very Dense	178	60
55	948	718	14	2.8	Very Dense	> 200	> 110
60	958	728	10	2.0	Very Dense	> 200	> 110
65	969	739	11	2.2	Very Dense	> 200	> 110
70	978	748	9	1.8	Very Dense	> 200	> 110
75	985	755	7	1.4	Very Dense	> 200	> 110
80	998	768	13	2.6	Very Dense	> 200	> 110
85	1007	777	9	1.8	Very Dense	> 200	> 110
90	1010	780	3	0.6	Very Dense	> 200	> 110
95	1018	788	8	1.6	Very Dense	> 200	> 110
100	1025	795	7	1.4	Very Dense	> 200	> 110
105	1031	801	6	1.2	Very Dense	> 200	> 110
110	1038	808	7	1.4	Very Dense	> 200	> 110
115	1050	820	12	2.4	Very Dense	> 200	> 110
120	1058	828	8	1.6	Very Dense	> 200	> 110
125	1065	835	7	1.4	Very Dense	> 200	> 110
130	1070	840	5	1.0	Very Dense	> 200	> 110
135	1073	843	3	0.6	Very Dense	> 200	> 110
140	1075	845	2	0.4	Very Dense	> 200	> 110
145	1078	848	3	0.6	Very Dense	> 200	> 110
150	1084	854	6	1.2	Very Dense	> 200	> 110
155	1088	858	4	0.8	Very Dense	> 200	> 110
160	1092	862	4	0.8	Very Dense	> 200	> 110
165	1099	869	7	1.4	Very Dense	> 200	> 110
170	1103	873	4	0.8	Very Dense	> 200	> 110
175	1109	879	6	1.2	Very Dense	> 200	> 110
180	1117	887	8	1.6	Very Dense	> 200	> 110
185	1125	895	8	1.6	Very Dense	> 200	> 110
190	1128	898	3	0.6	Very Dense	> 200	> 110
195	1132	902	4	0.8	Very Dense	> 200	> 110
200	1139	909	7	1.4	Very Dense	> 200	> 110
205	1145	915	6	1.2	Very Dense	> 200	> 110
210	1150	920	5	1.0	Very Dense	> 200	> 110
215	1154	924	4	0.8	Very Dense	> 200	> 110
220	1160	930	6	1.2	Very Dense	> 200	> 110
225	1165	935	5	1.0	Very Dense	> 200	> 110
230	1170	940	5	1.0	Very Dense	> 200	> 110
235	1173	943	3	0.6	Very Dense	> 200	> 110
240	1173	943	0	0.0	Very Dense	> 200	> 110
245	1181	951	8	1.6	Very Dense	> 200	> 110
250	1182	952	1	0.2	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 25 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1185	955	3	0.6	Very Dense	> 200	> 110
260	1185	955	0	0.0	Very Dense	> 200	> 110
265	Refusal						

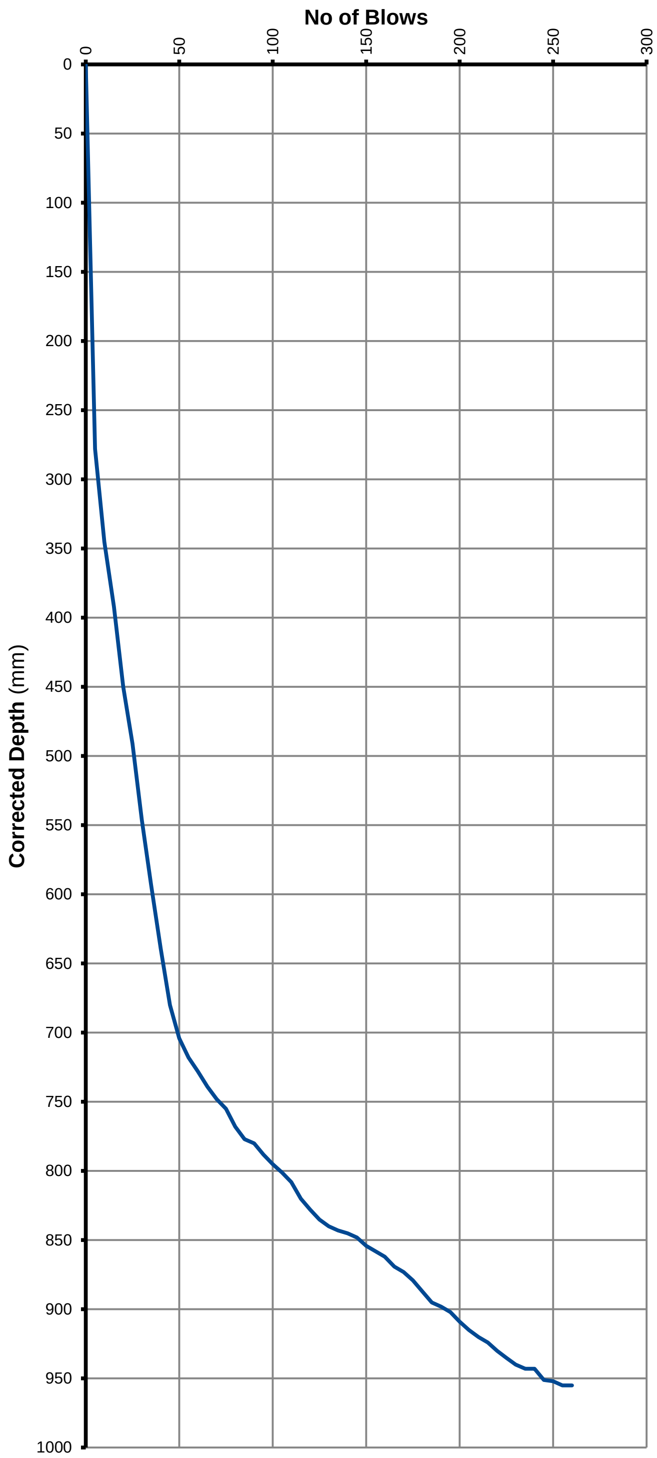
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

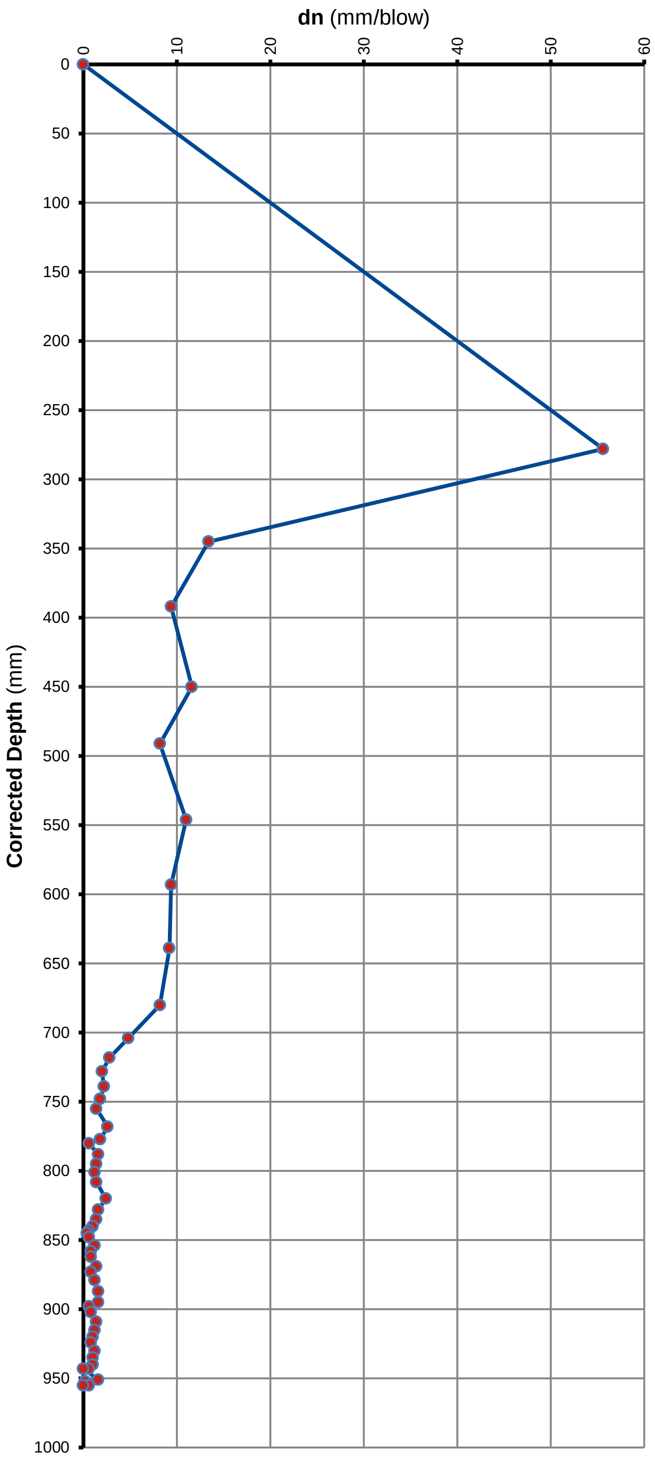
POSITION: DCP 25 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

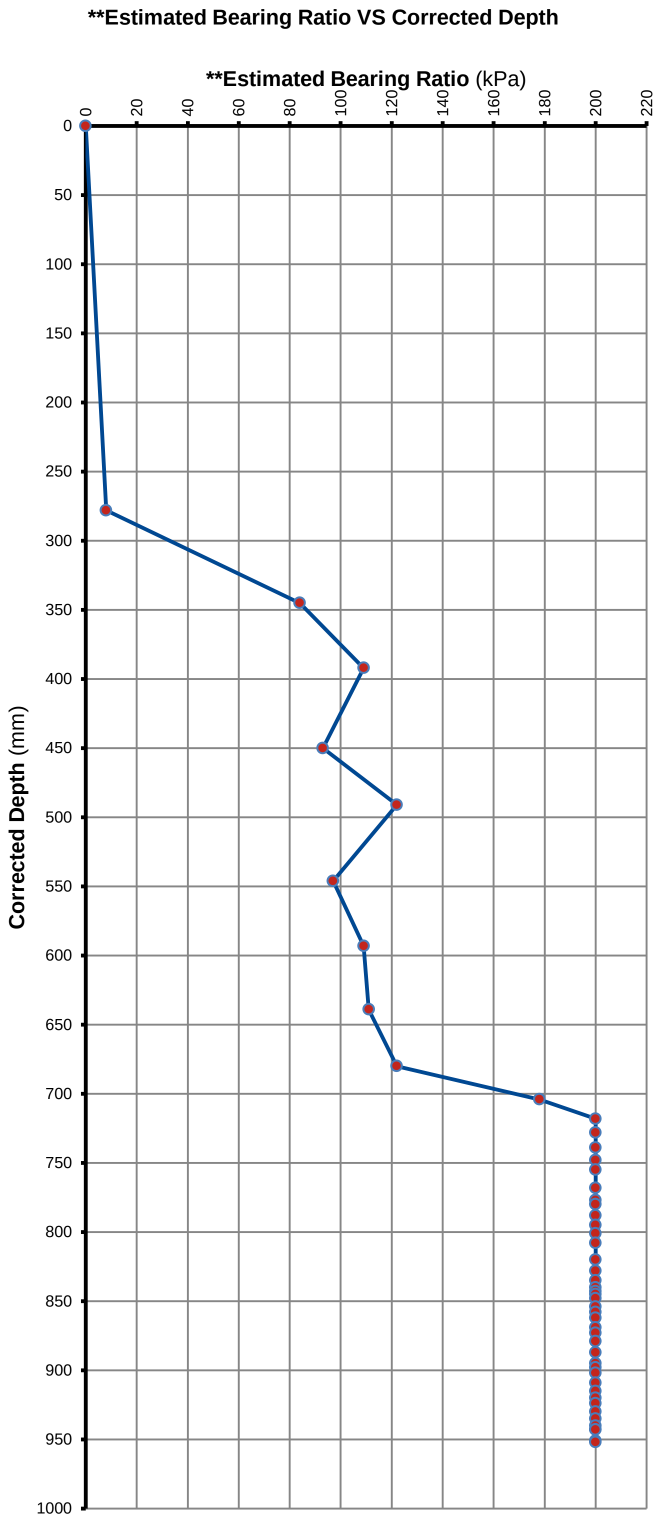


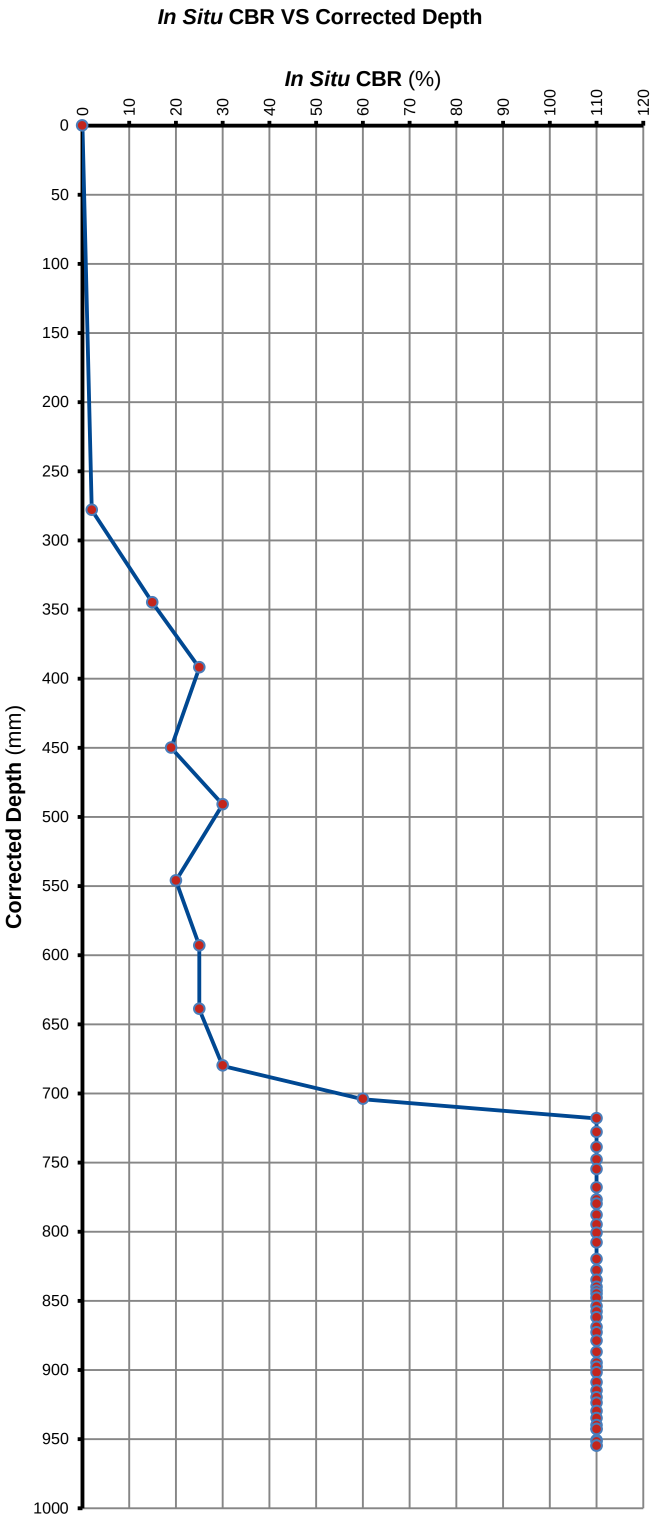
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 25 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


****Estimated Bearing Ratio VS Corrected Depth**


***In Situ* CBR VS Corrected Depth**

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 26 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	232	0	-	-	-	-	-
5	420	188	188	37.6	Loose	41	4
10	481	249	61	12.2	Dense	90	17
15	522	290	41	8.2	Dense	122	30
20	550	318	28	5.6	Dense	161	49
25	572	340	22	4.4	Very Dense	188	68
30	598	366	26	5.2	Dense	169	54
35	623	391	25	5.0	Very Dense	174	57
40	660	428	37	7.4	Dense	132	34
45	699	467	39	7.8	Dense	126	32
50	721	489	22	4.4	Very Dense	188	68
55	750	518	29	5.8	Dense	157	47
60	772	540	22	4.4	Very Dense	188	68
65	800	568	28	5.6	Dense	161	49
70	820	588	20	4.0	Very Dense	200	77
75	841	609	21	4.2	Very Dense	193	72
80	859	627	18	3.6	Very Dense	> 200	88
85	880	648	21	4.2	Very Dense	193	72
90	903	671	23	4.6	Very Dense	183	64
95	923	691	20	4.0	Very Dense	200	77
100	940	708	17	3.4	Very Dense	> 200	95
105	961	729	21	4.2	Very Dense	193	72
110	975	743	14	2.8	Very Dense	> 200	> 110
115	991	759	16	3.2	Very Dense	> 200	103
120	1008	776	17	3.4	Very Dense	> 200	95
125	1023	791	15	3.0	Very Dense	> 200	> 110
130	1038	806	15	3.0	Very Dense	> 200	> 110
135	1050	818	12	2.4	Very Dense	> 200	> 110
140	1070	838	20	4.0	Very Dense	200	77
145	1085	853	15	3.0	Very Dense	> 200	> 110
150	1101	869	16	3.2	Very Dense	> 200	103
155	1112	880	11	2.2	Very Dense	> 200	> 110
160	1120	888	8	1.6	Very Dense	> 200	> 110
165	1130	898	10	2.0	Very Dense	> 200	> 110
170	1135	903	5	1.0	Very Dense	> 200	> 110
175	1148	916	13	2.6	Very Dense	> 200	> 110
180	1155	923	7	1.4	Very Dense	> 200	> 110
185	1167	935	12	2.4	Very Dense	> 200	> 110
190	1173	941	6	1.2	Very Dense	> 200	> 110
195	1183	951	10	2.0	Very Dense	> 200	> 110
200	1195	963	12	2.4	Very Dense	> 200	> 110
205	1207	975	12	2.4	Very Dense	> 200	> 110
210	1211	979	4	0.8	Very Dense	> 200	> 110
215	1221	989	10	2.0	Very Dense	> 200	> 110
220	1230	998	9	1.8	Very Dense	> 200	> 110
225	1240	1008	10	2.0	Very Dense	> 200	> 110
230	1249	1017	9	1.8	Very Dense	> 200	> 110
235	1258	1026	9	1.8	Very Dense	> 200	> 110
240	1270	1038	12	2.4	Very Dense	> 200	> 110
245	1279	1047	9	1.8	Very Dense	> 200	> 110
250	1289	1057	10	2.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 26 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

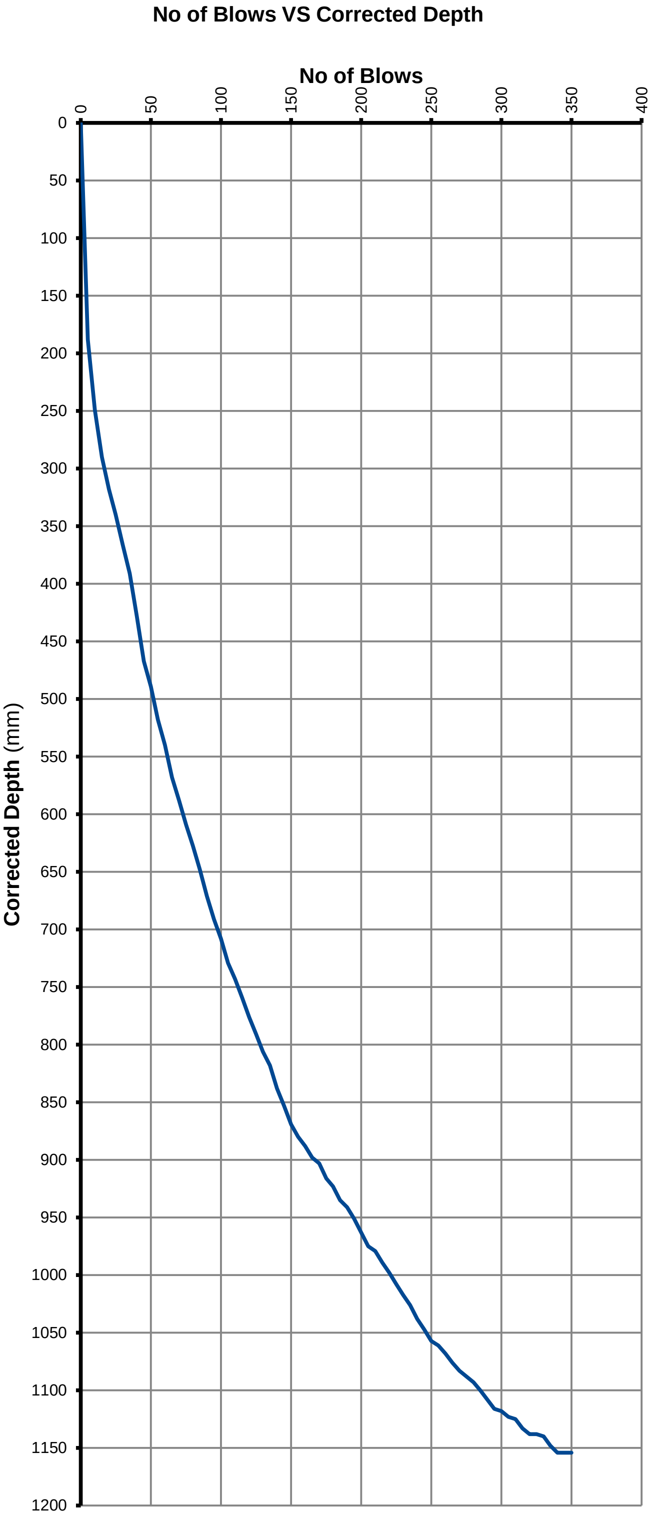
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1293	1061	4	0.8	Very Dense	> 200	> 110
260	1300	1068	7	1.4	Very Dense	> 200	> 110
265	1308	1076	8	1.6	Very Dense	> 200	> 110
270	1315	1083	7	1.4	Very Dense	> 200	> 110
275	1320	1088	5	1.0	Very Dense	> 200	> 110
280	1325	1093	5	1.0	Very Dense	> 200	> 110
285	1332	1100	7	1.4	Very Dense	> 200	> 110
290	1340	1108	8	1.6	Very Dense	> 200	> 110
295	1348	1116	8	1.6	Very Dense	> 200	> 110
300	1350	1118	2	0.4	Very Dense	> 200	> 110
305	1355	1123	5	1.0	Very Dense	> 200	> 110
310	1357	1125	2	0.4	Very Dense	> 200	> 110
315	1365	1133	8	1.6	Very Dense	> 200	> 110
320	1370	1138	5	1.0	Very Dense	> 200	> 110
325	1370	1138	0	0.0	Very Dense	> 200	> 110
330	1372	1140	2	0.4	Very Dense	> 200	> 110
335	1380	1148	8	1.6	Very Dense	> 200	> 110
340	1386	1154	6	1.2	Very Dense	> 200	> 110
345	1386	1154	0	0.0	Very Dense	> 200	> 110
350	1386	1154	0	0.0	Very Dense	> 200	> 110
355	Refusal						

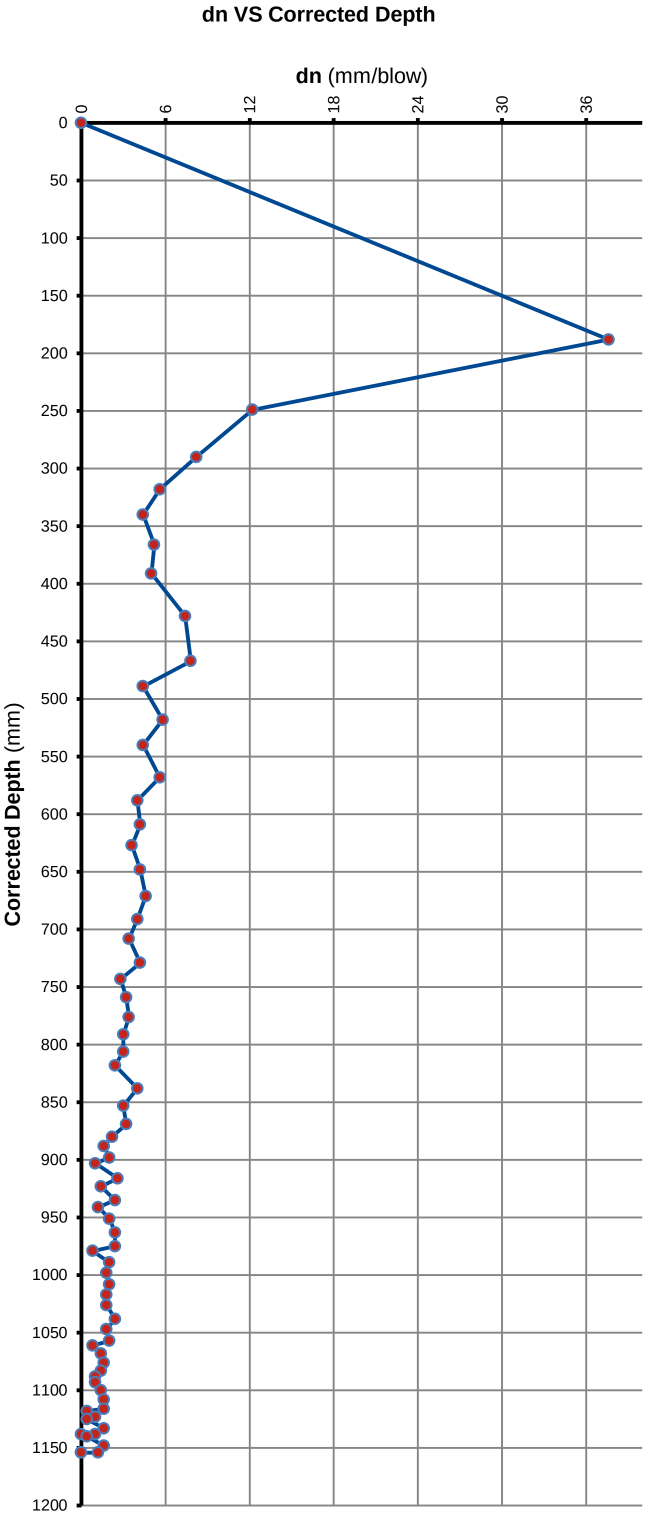
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 26 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

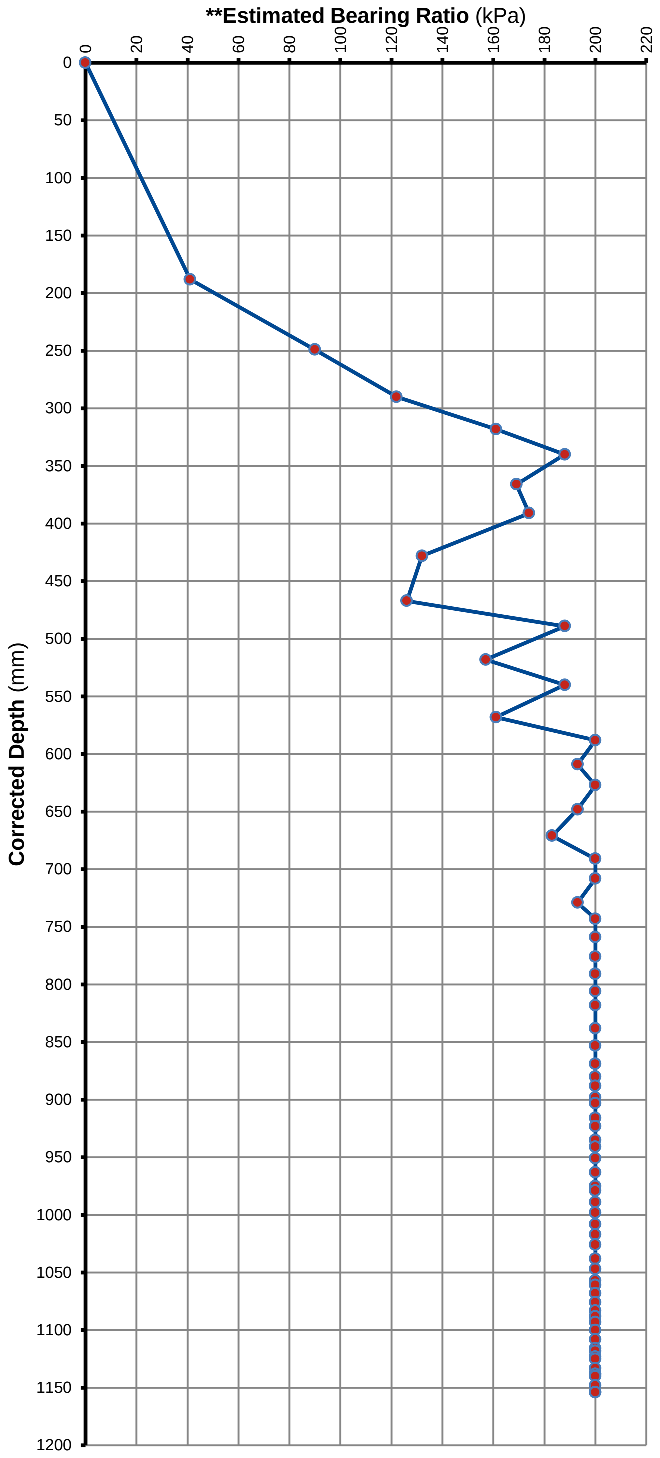
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

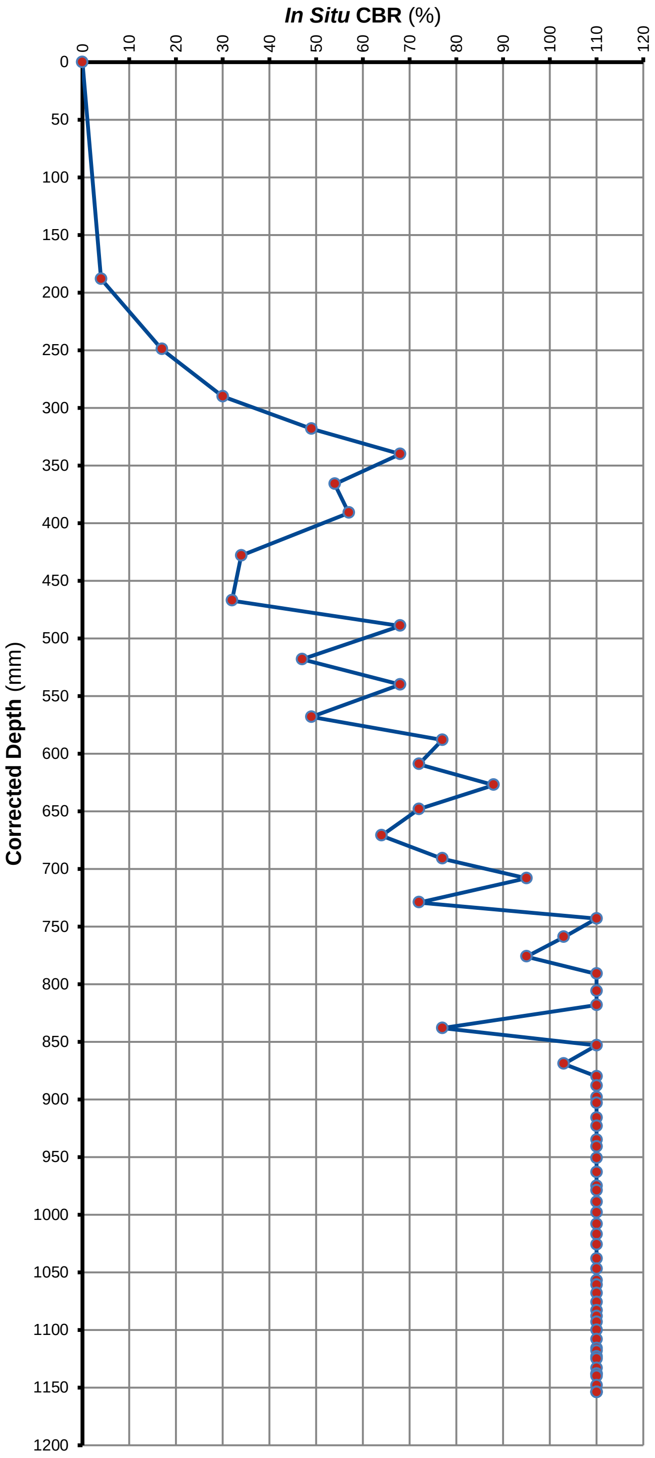
POSITION: DCP 26 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 27 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	235	0	-	-	-	-	-
5	520	285	285	57.0	Loose	4	2
10	583	348	63	12.6	Medium Dense	88	17
15	615	380	32	6.4	Dense	147	41
20	638	403	23	4.6	Very Dense	183	64
25	660	425	22	4.4	Very Dense	188	68
30	685	450	25	5.0	Very Dense	174	57
35	716	481	31	6.2	Dense	150	43
40	750	515	34	6.8	Dense	140	38
45	781	546	31	6.2	Dense	150	43
50	821	586	40	8.0	Dense	124	31
55	863	628	42	8.4	Dense	119	29
60	890	655	27	5.4	Dense	165	52
65	893	658	3	0.6	Very Dense	> 200	> 110
70	898	663	5	1.0	Very Dense	> 200	> 110
75	900	665	2	0.4	Very Dense	> 200	> 110
80	905	670	5	1.0	Very Dense	> 200	> 110
85	915	680	10	2.0	Very Dense	> 200	> 110
90	927	692	12	2.4	Very Dense	> 200	> 110
95	932	697	5	1.0	Very Dense	> 200	> 110
100	945	710	13	2.6	Very Dense	> 200	> 110
105	960	725	15	3.0	Very Dense	> 200	> 110
110	960	725	0	0.0	Very Dense	> 200	> 110
115	960	725	0	0.0	Very Dense	> 200	> 110
120	Refusal						

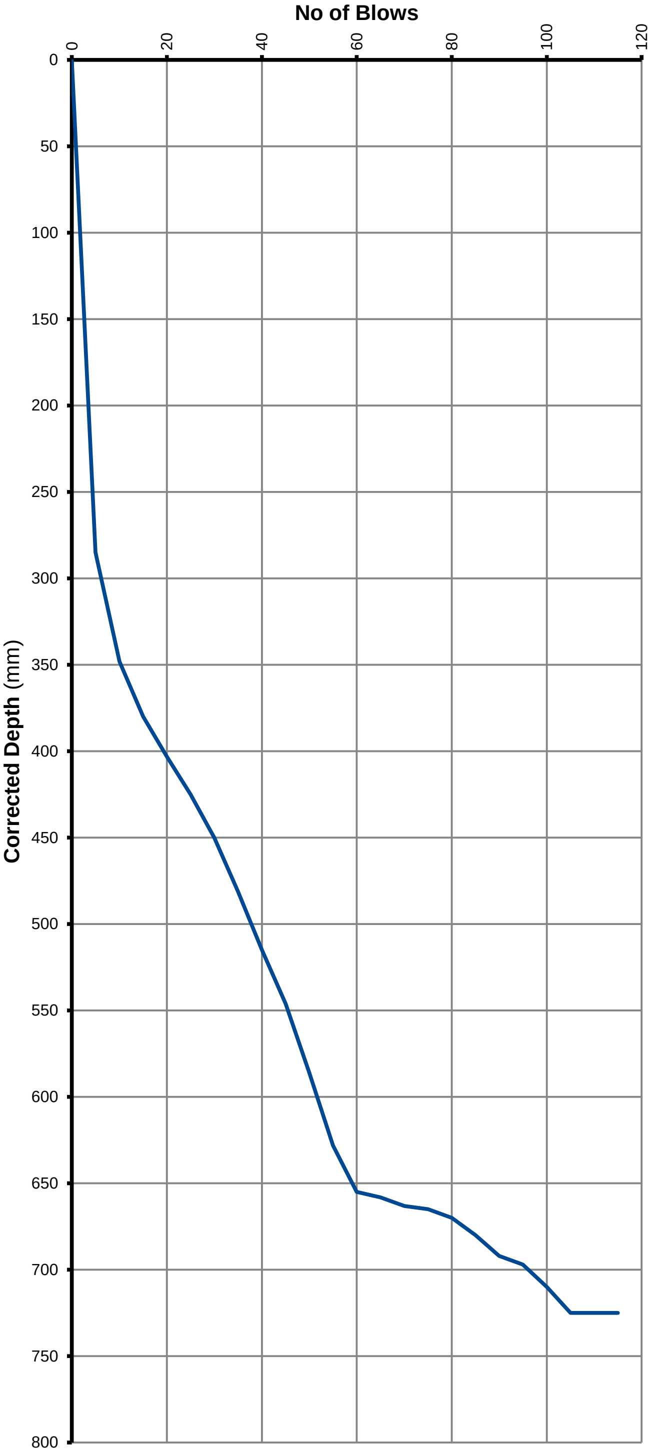
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

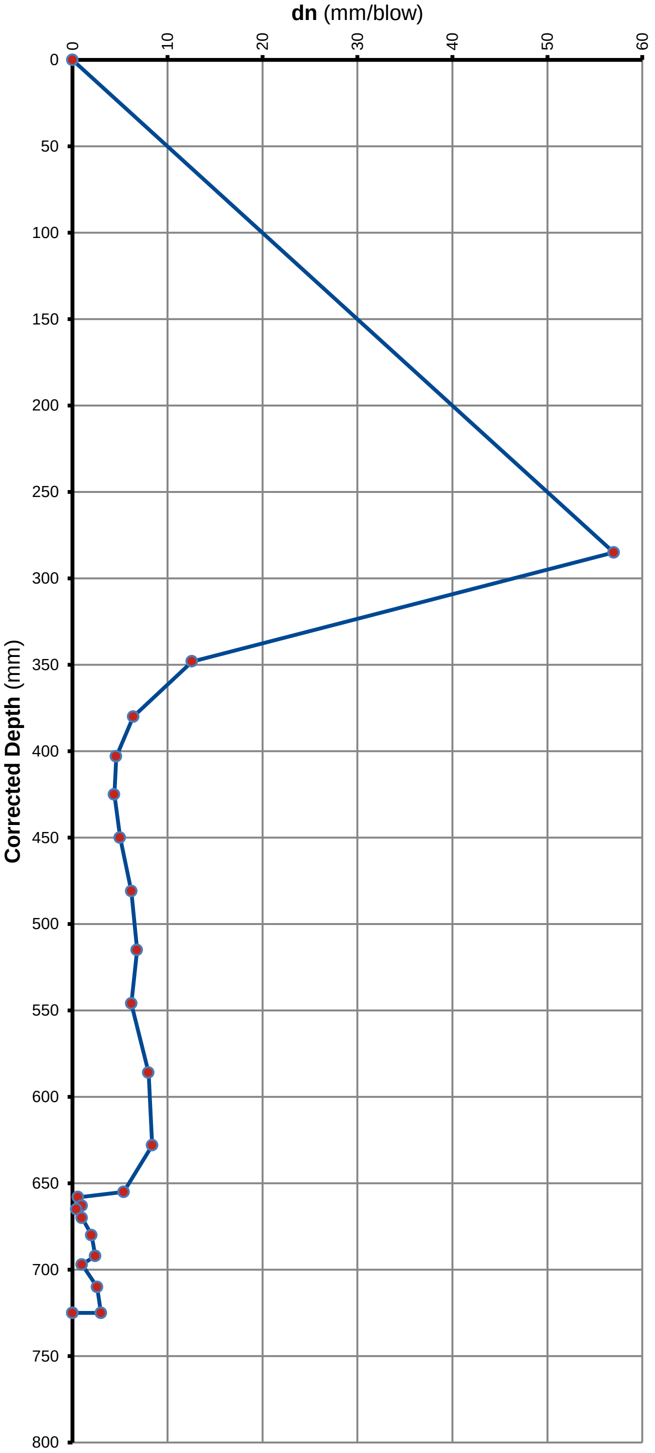
POSITION: DCP 27 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



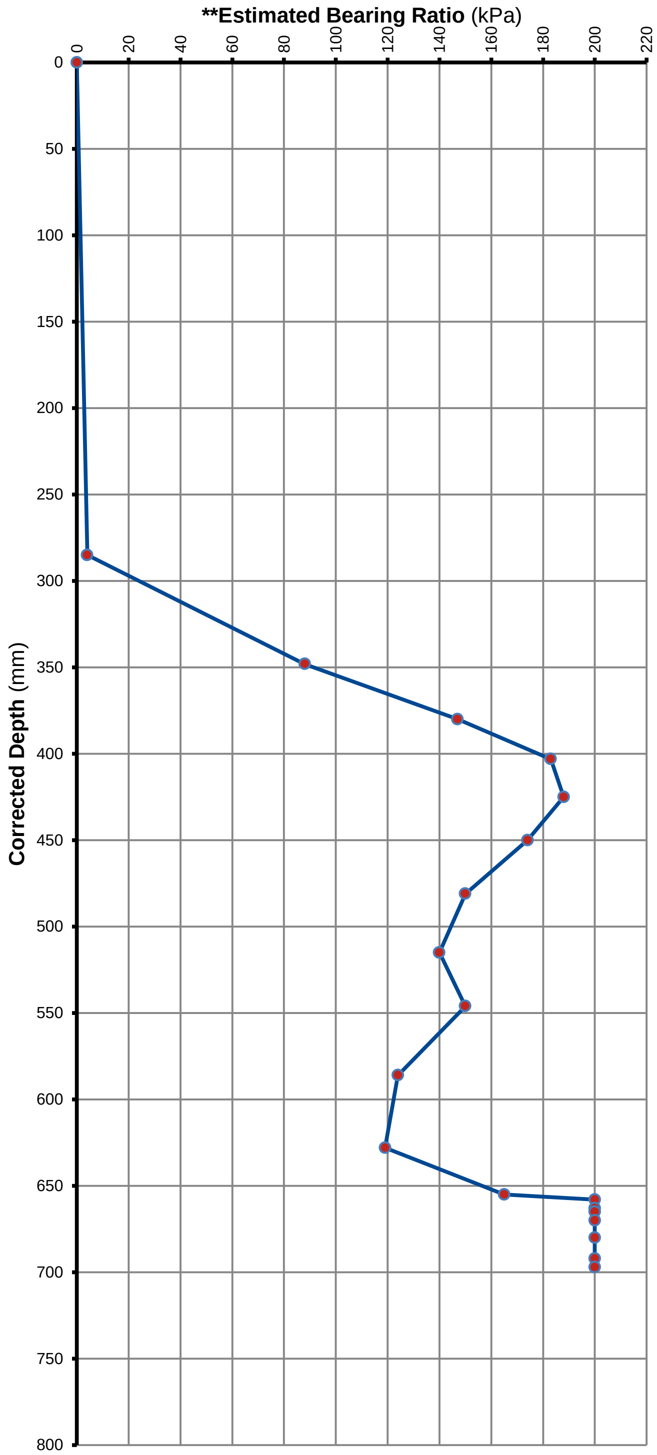
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

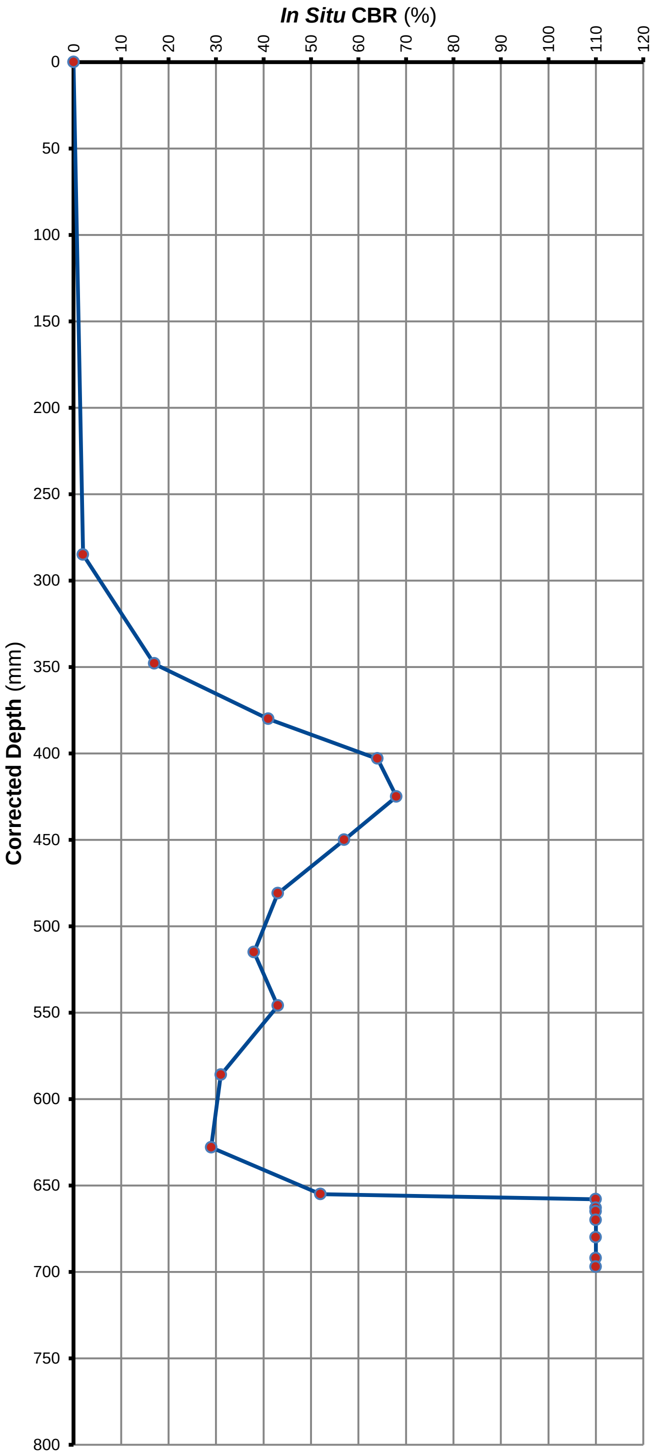
POSITION: DCP 27 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 28 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	240	0	-	-	-	-	-
5	426	186	186	37.2	Loose	41	4
10	525	285	99	19.8	Medium Dense	65	9
15	570	330	45	9.0	Dense	113	26
20	595	355	25	5.0	Very Dense	174	57
25	621	381	26	5.2	Dense	169	54
30	649	409	28	5.6	Dense	161	49
35	678	438	29	5.8	Dense	157	47
40	701	461	23	4.6	Very Dense	183	64
45	738	498	37	7.4	Dense	132	34
50	778	538	40	8.0	Dense	124	31
55	818	578	40	8.0	Dense	124	31
60	860	620	42	8.4	Dense	119	29
65	912	672	52	10.4	Dense	101	22
70	960	720	48	9.6	Dense	107	24
75	1009	769	49	9.8	Dense	106	23
80	1050	810	41	8.2	Dense	122	30
85	1078	838	28	5.6	Dense	161	49
90	1106	866	28	5.6	Dense	161	49
95	1130	890	24	4.8	Very Dense	178	60
100	1150	910	20	4.0	Very Dense	200	77
105	1162	922	12	2.4	Very Dense	> 200	> 110
110	1175	935	13	2.6	Very Dense	> 200	> 110
115	1188	948	13	2.6	Very Dense	> 200	> 110
120	1198	958	10	2.0	Very Dense	> 200	> 110
125	1209	969	11	2.2	Very Dense	> 200	> 110
130	1220	980	11	2.2	Very Dense	> 200	> 110
135	1223	983	3	0.6	Very Dense	> 200	> 110
140	1228	988	5	1.0	Very Dense	> 200	> 110
145	1235	995	7	1.4	Very Dense	> 200	> 110
150	1240	1000	5	1.0	Very Dense	> 200	> 110
155	1248	1008	8	1.6	Very Dense	> 200	> 110
160	1256	1016	8	1.6	Very Dense	> 200	> 110
165	1260	1020	4	0.8	Very Dense	> 200	> 110
170	1265	1025	5	1.0	Very Dense	> 200	> 110
175	1265	1025	0	0.0	Very Dense	> 200	> 110
180	1265	1025	0	0.0	Very Dense	> 200	> 110
185	Refusal						

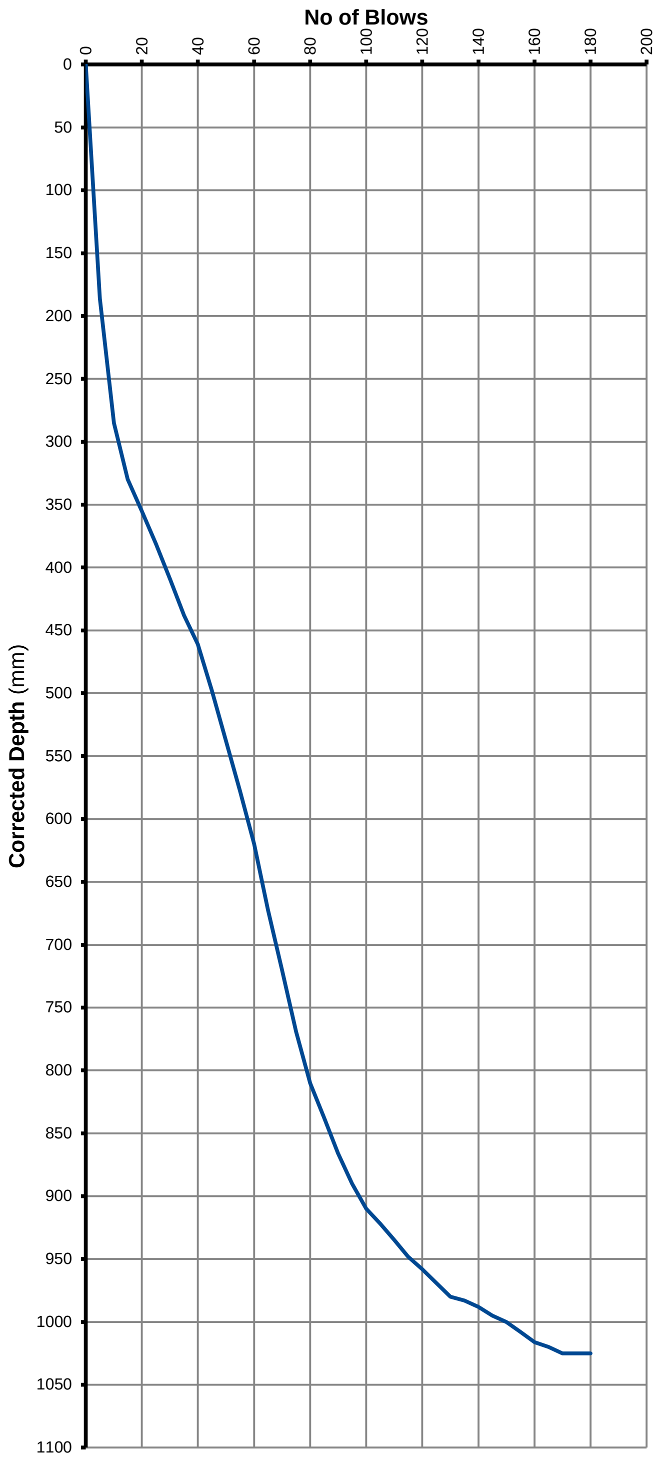
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

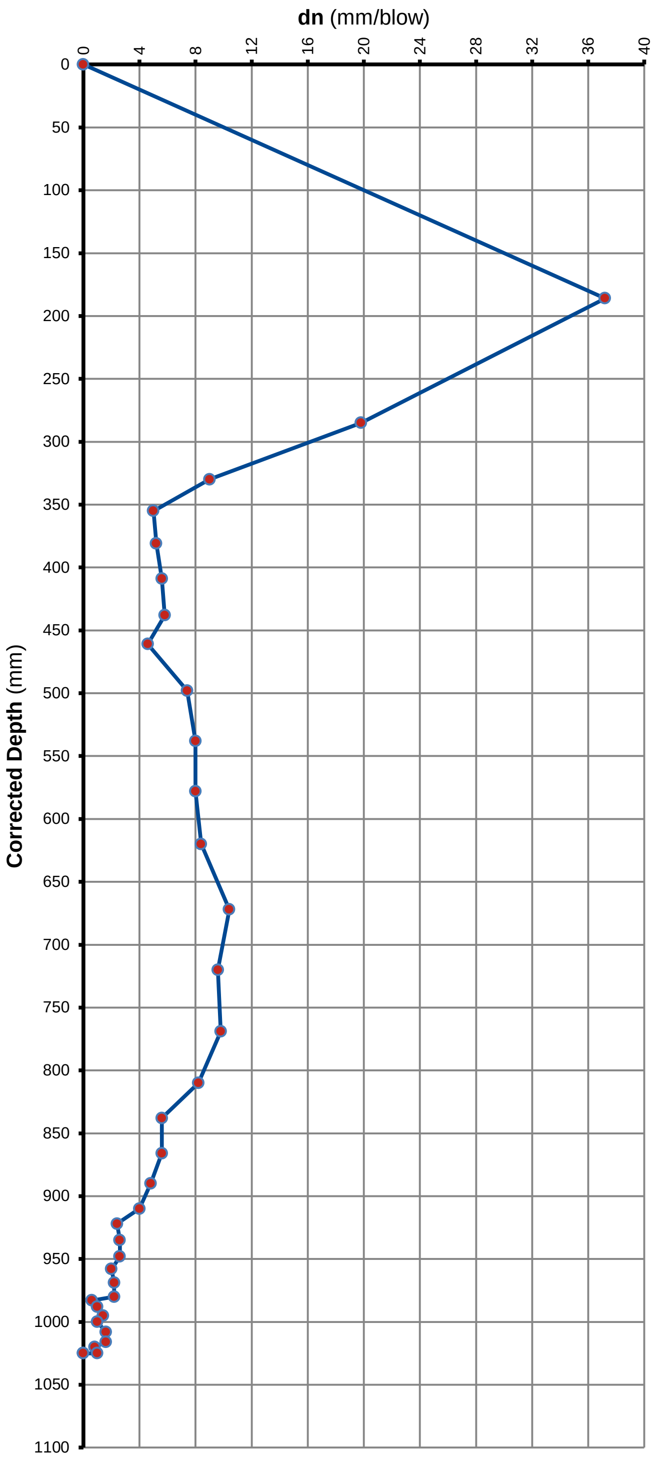
POSITION: DCP 28 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



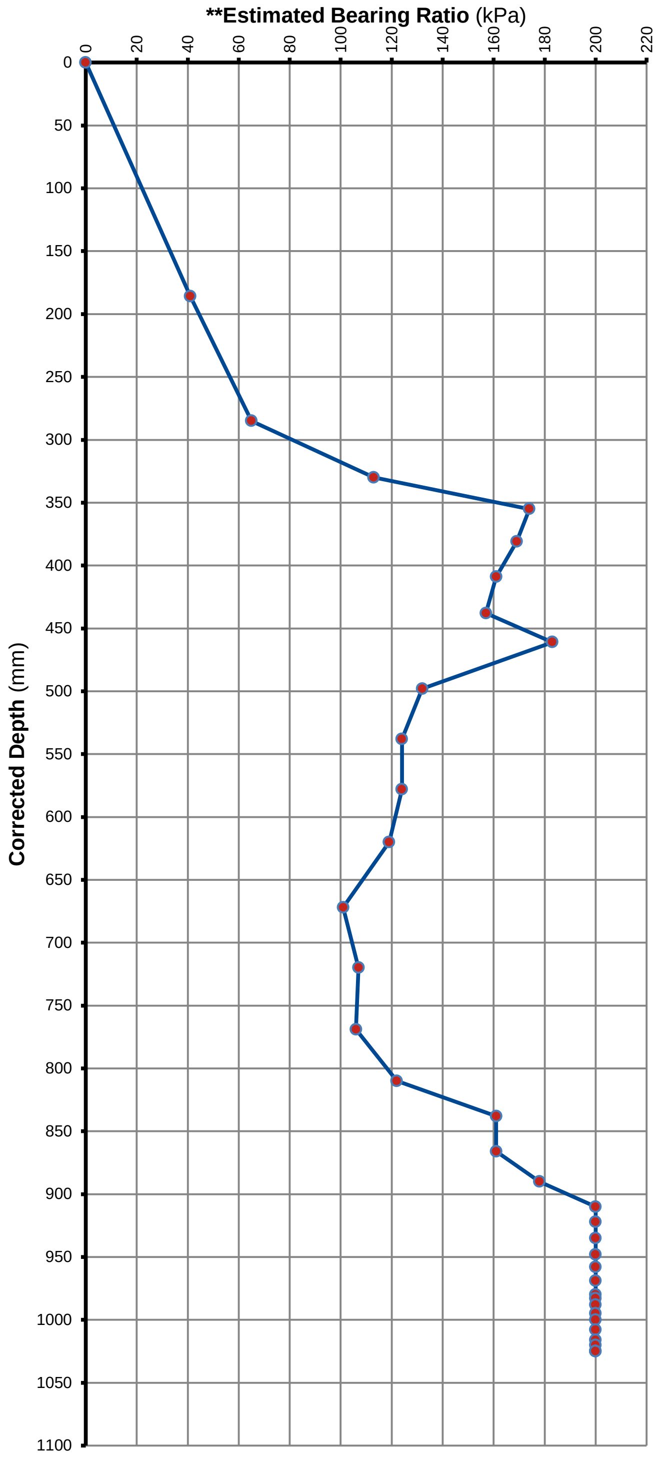
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

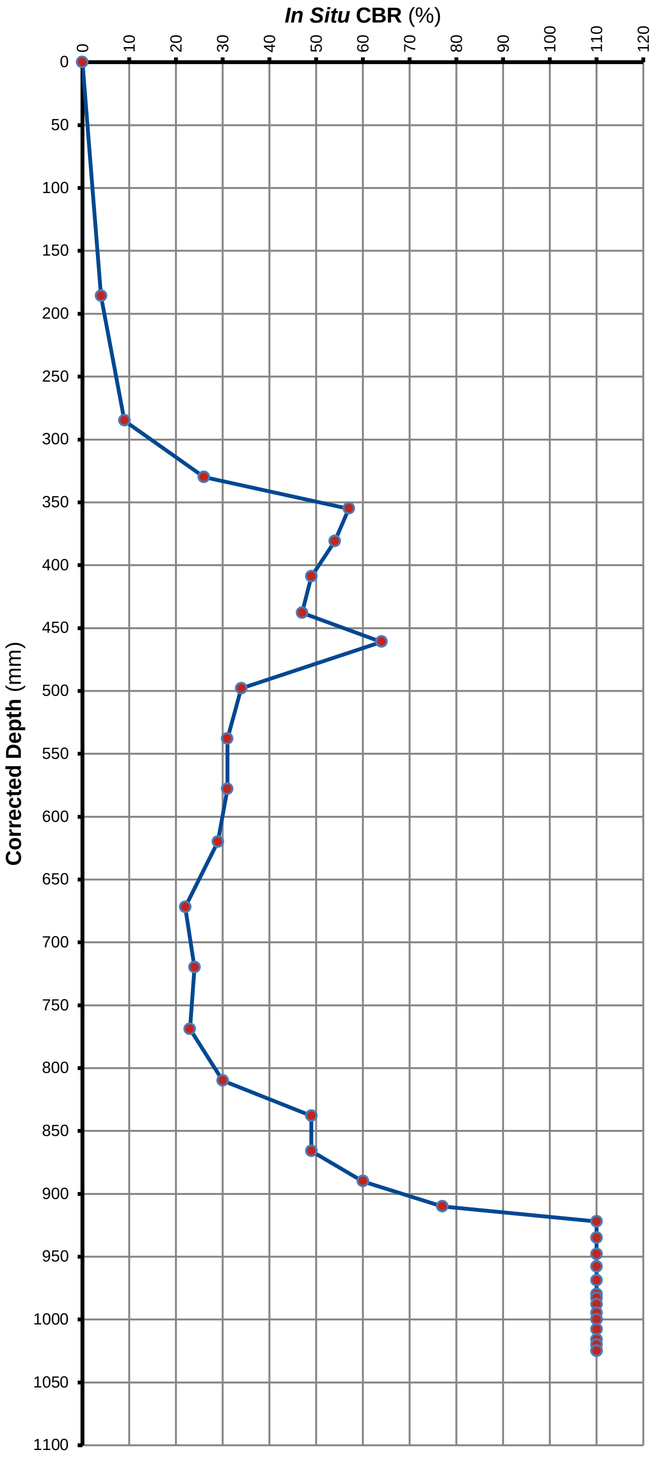
POSITION: DCP 28 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 29 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

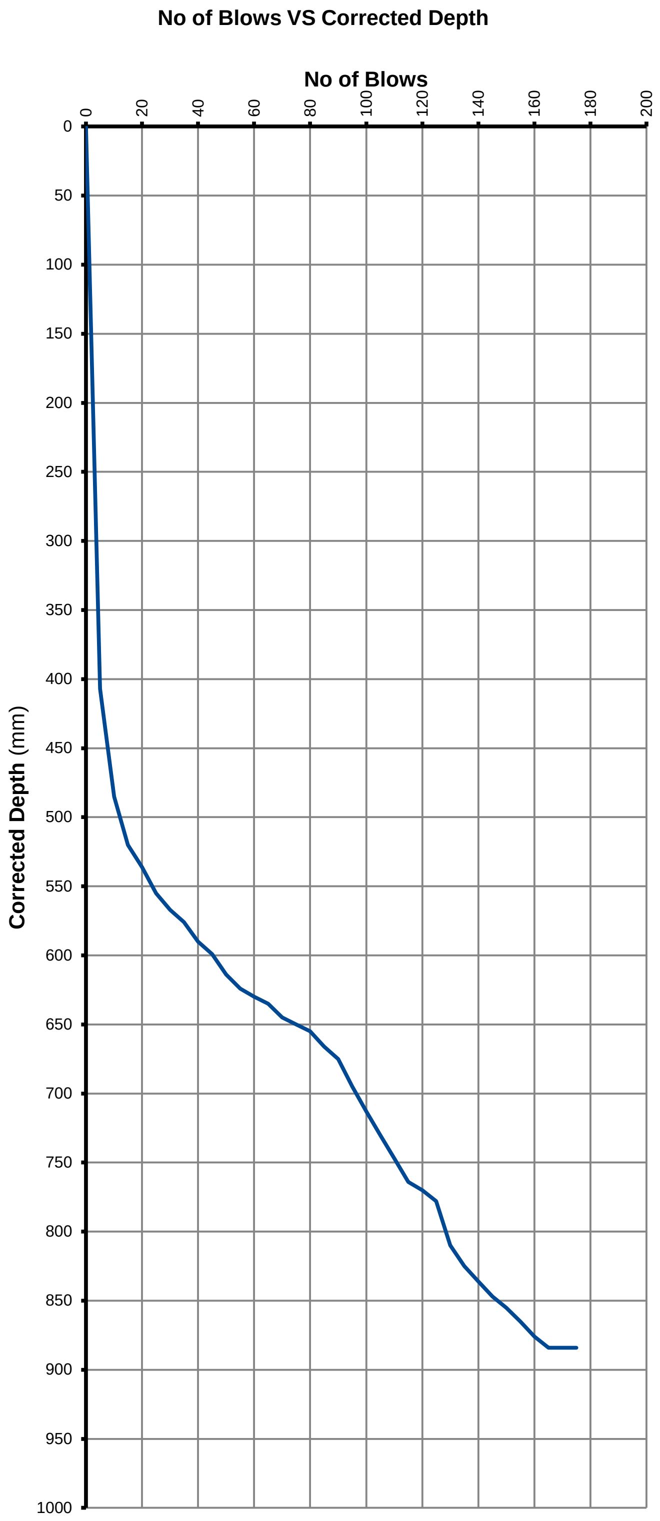
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	245	0	-	-	-	-	-
5	652	407	407	81.4	Very Loose	1	1
10	730	485	78	15.6	Medium Dense	76	13
15	765	520	35	7.0	Dense	137	36
20	781	536	16	3.2	Very Dense	> 200	103
25	800	555	19	3.8	Very Dense	> 200	82
30	812	567	12	2.4	Very Dense	> 200	> 110
35	821	576	9	1.8	Very Dense	> 200	> 110
40	835	590	14	2.8	Very Dense	> 200	> 110
45	844	599	9	1.8	Very Dense	> 200	> 110
50	859	614	15	3.0	Very Dense	> 200	> 110
55	869	624	10	2.0	Very Dense	> 200	> 110
60	875	630	6	1.2	Very Dense	> 200	> 110
65	880	635	5	1.0	Very Dense	> 200	> 110
70	890	645	10	2.0	Very Dense	> 200	> 110
75	895	650	5	1.0	Very Dense	> 200	> 110
80	900	655	5	1.0	Very Dense	> 200	> 110
85	911	666	11	2.2	Very Dense	> 200	> 110
90	920	675	9	1.8	Very Dense	> 200	> 110
95	940	695	20	4.0	Very Dense	200	77
100	958	713	18	3.6	Very Dense	> 200	88
105	975	730	17	3.4	Very Dense	> 200	95
110	992	747	17	3.4	Very Dense	> 200	95
115	1009	764	17	3.4	Very Dense	> 200	95
120	1015	770	6	1.2	Very Dense	> 200	> 110
125	1023	778	8	1.6	Very Dense	> 200	> 110
130	1055	810	32	6.4	Dense	147	41
135	1070	825	15	3.0	Very Dense	> 200	> 110
140	1081	836	11	2.2	Very Dense	> 200	> 110
145	1092	847	11	2.2	Very Dense	> 200	> 110
150	1100	855	8	1.6	Very Dense	> 200	> 110
155	1110	865	10	2.0	Very Dense	> 200	> 110
160	1121	876	11	2.2	Very Dense	> 200	> 110
165	1129	884	8	1.6	Very Dense	> 200	> 110
170	1129	884	0	0.0	Very Dense	> 200	> 110
175	1129	884	0	0.0	Very Dense	> 200	> 110
180	Refusal						

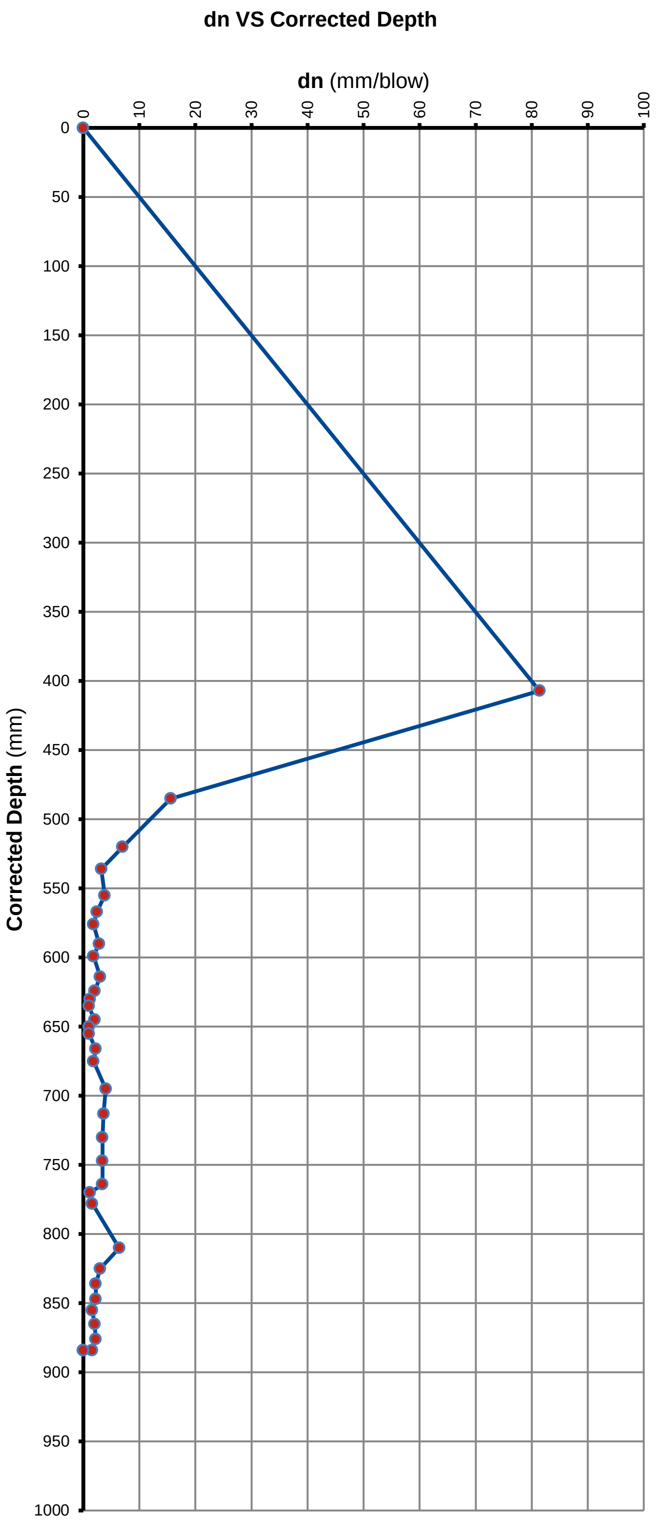
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 29 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





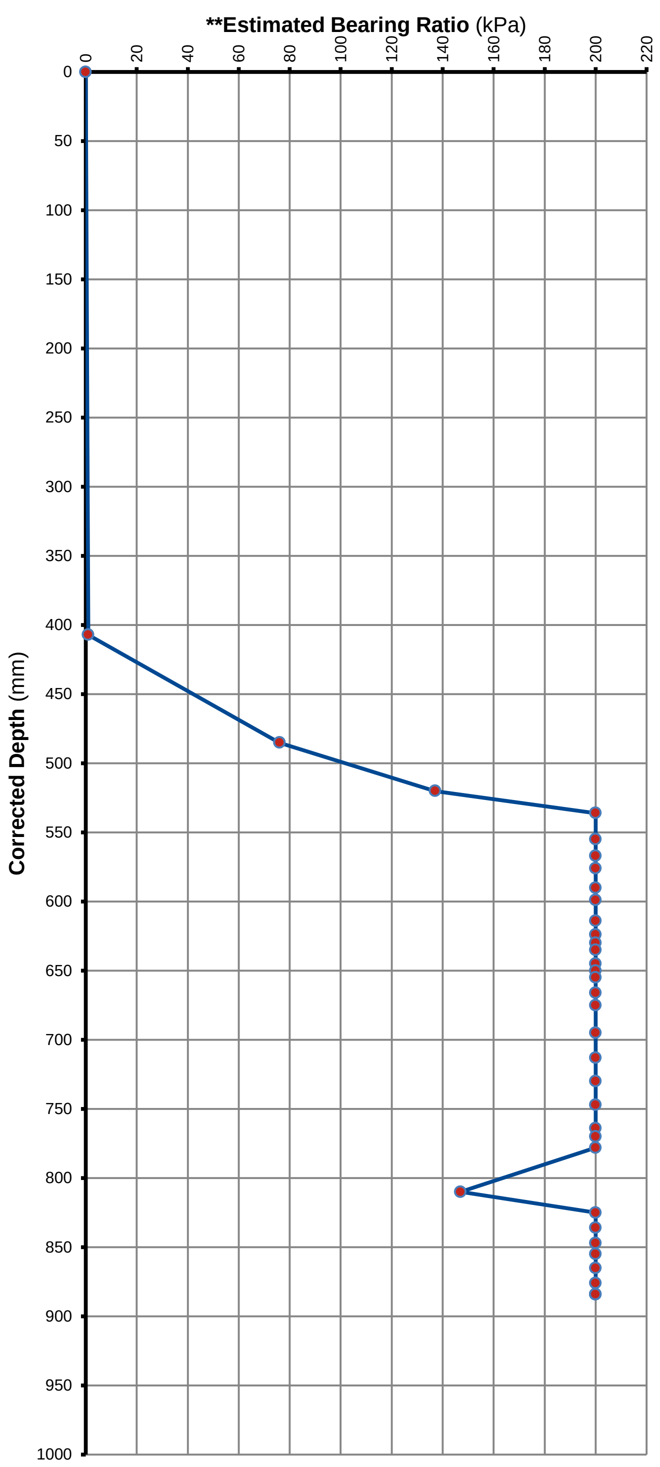
Page 2 of 3

*DYNAMIC CONE PENETROMETER (DCP) TEST

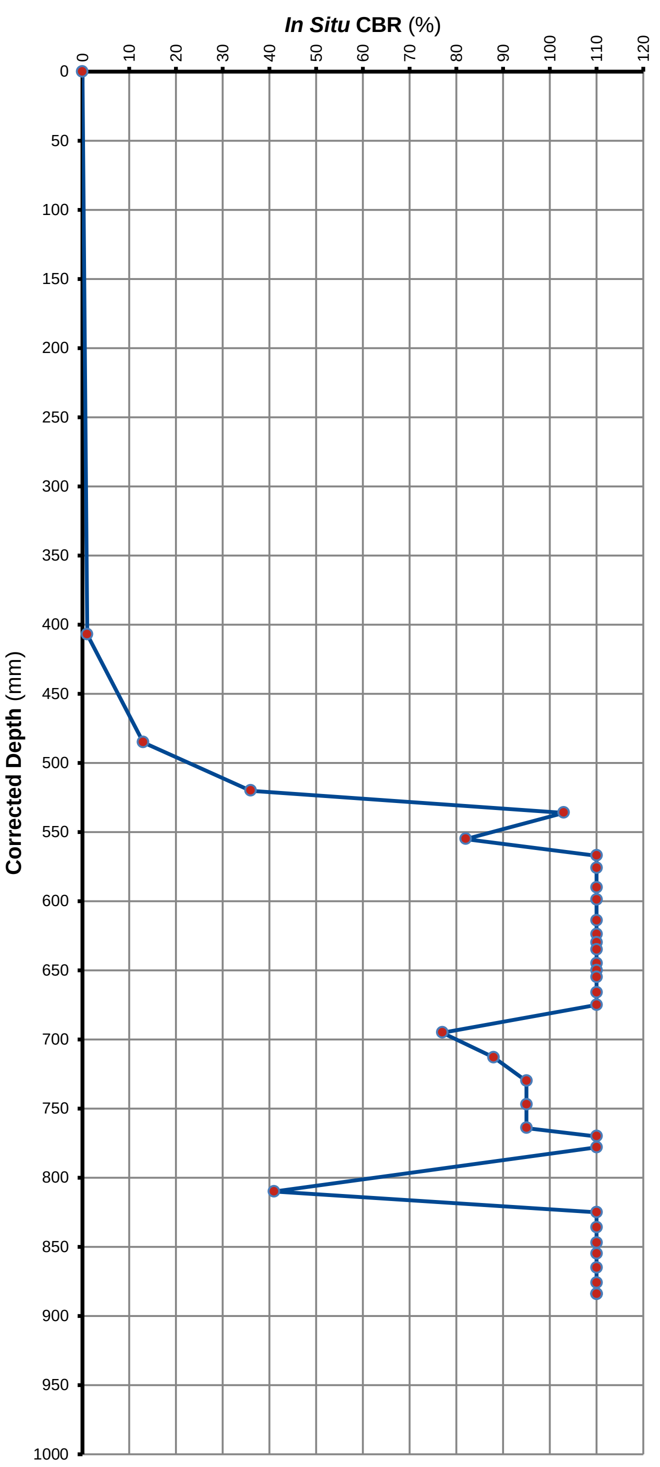
POSITION: DCP 29 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

**Estimated Bearing Ratio VS Corrected Depth



In Situ CBR VS Corrected Depth



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 30 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

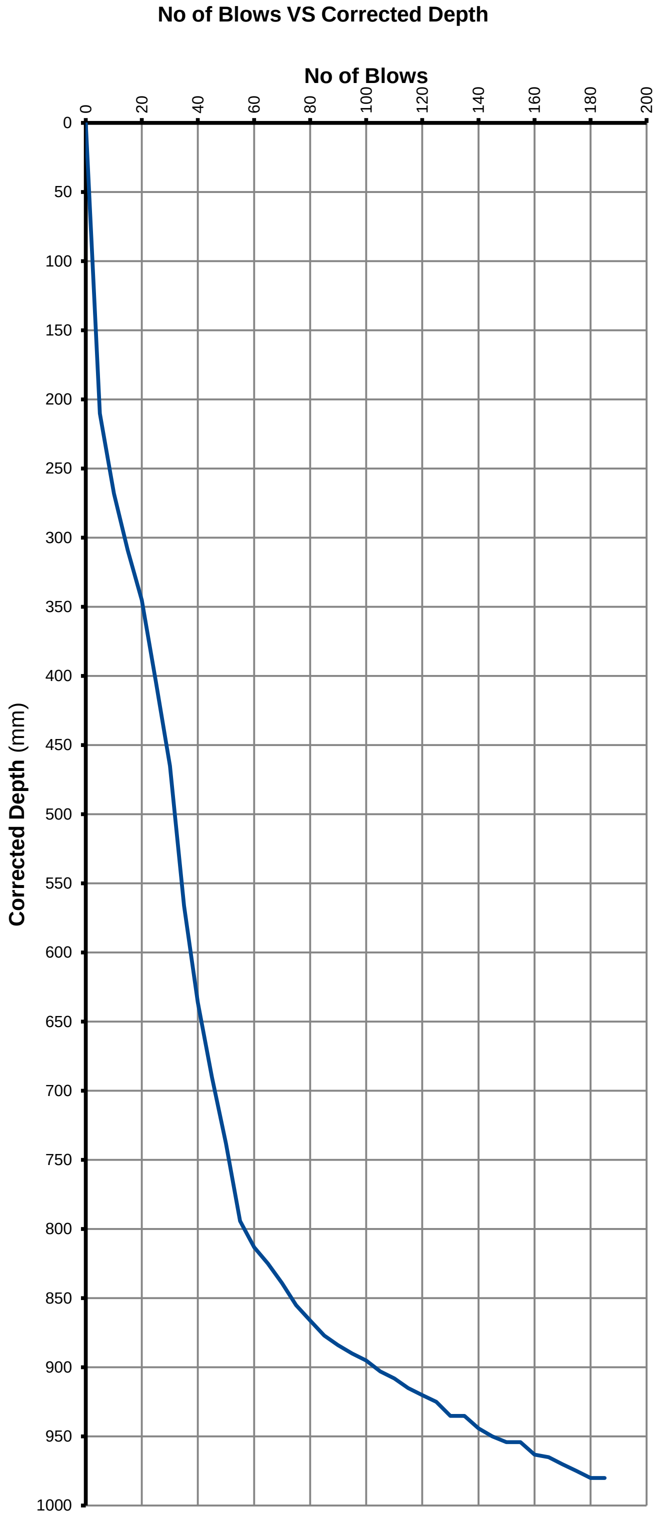
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	275	0	-	-	-	-	-
5	485	210	210	42.0	Loose	40	3
10	543	268	58	11.6	Dense	93	19
15	584	309	41	8.2	Dense	122	30
20	620	345	36	7.2	Dense	134	35
25	679	404	59	11.8	Dense	92	18
30	740	465	61	12.2	Dense	90	17
35	841	566	101	20.2	Medium Dense	64	9
40	911	636	70	14.0	Medium Dense	81	14
45	965	690	54	10.8	Dense	98	20
50	1013	738	48	9.6	Dense	107	24
55	1069	794	56	11.2	Dense	95	20
60	1088	813	19	3.8	Very Dense	> 200	82
65	1100	825	12	2.4	Very Dense	> 200	> 110
70	1114	839	14	2.8	Very Dense	> 200	> 110
75	1130	855	16	3.2	Very Dense	> 200	103
80	1141	866	11	2.2	Very Dense	> 200	> 110
85	1152	877	11	2.2	Very Dense	> 200	> 110
90	1159	884	7	1.4	Very Dense	> 200	> 110
95	1165	890	6	1.2	Very Dense	> 200	> 110
100	1170	895	5	1.0	Very Dense	> 200	> 110
105	1178	903	8	1.6	Very Dense	> 200	> 110
110	1183	908	5	1.0	Very Dense	> 200	> 110
115	1190	915	7	1.4	Very Dense	> 200	> 110
120	1195	920	5	1.0	Very Dense	> 200	> 110
125	1200	925	5	1.0	Very Dense	> 200	> 110
130	1210	935	10	2.0	Very Dense	> 200	> 110
135	1210	935	0	0.0	Very Dense	> 200	> 110
140	1219	944	9	1.8	Very Dense	> 200	> 110
145	1225	950	6	1.2	Very Dense	> 200	> 110
150	1229	954	4	0.8	Very Dense	> 200	> 110
155	1229	954	0	0.0	Very Dense	> 200	> 110
160	1238	963	9	1.8	Very Dense	> 200	> 110
165	1240	965	2	0.4	Very Dense	> 200	> 110
170	1245	970	5	1.0	Very Dense	> 200	> 110
175	1250	975	5	1.0	Very Dense	> 200	> 110
180	1255	980	5	1.0	Very Dense	> 200	> 110
185	1255	980	0	0.0	Very Dense	> 200	> 110
190	Refusal						

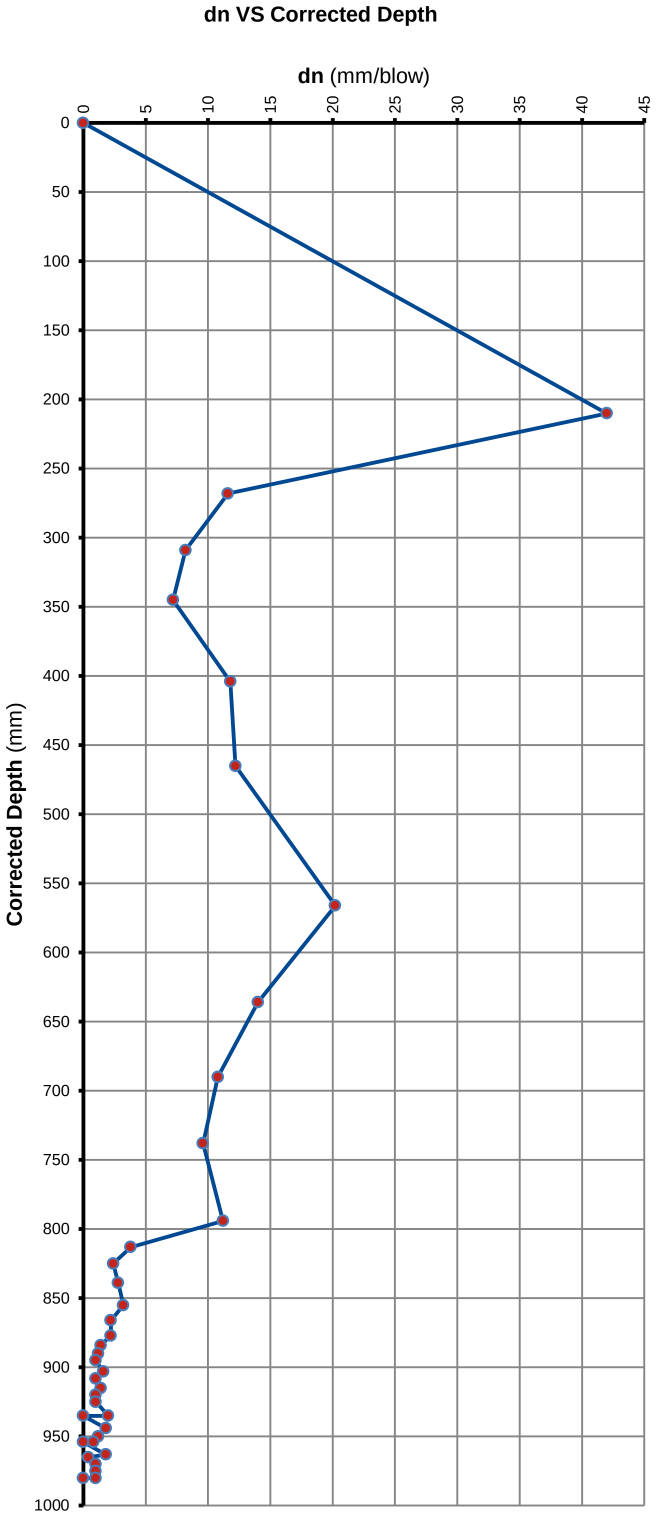
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 30 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





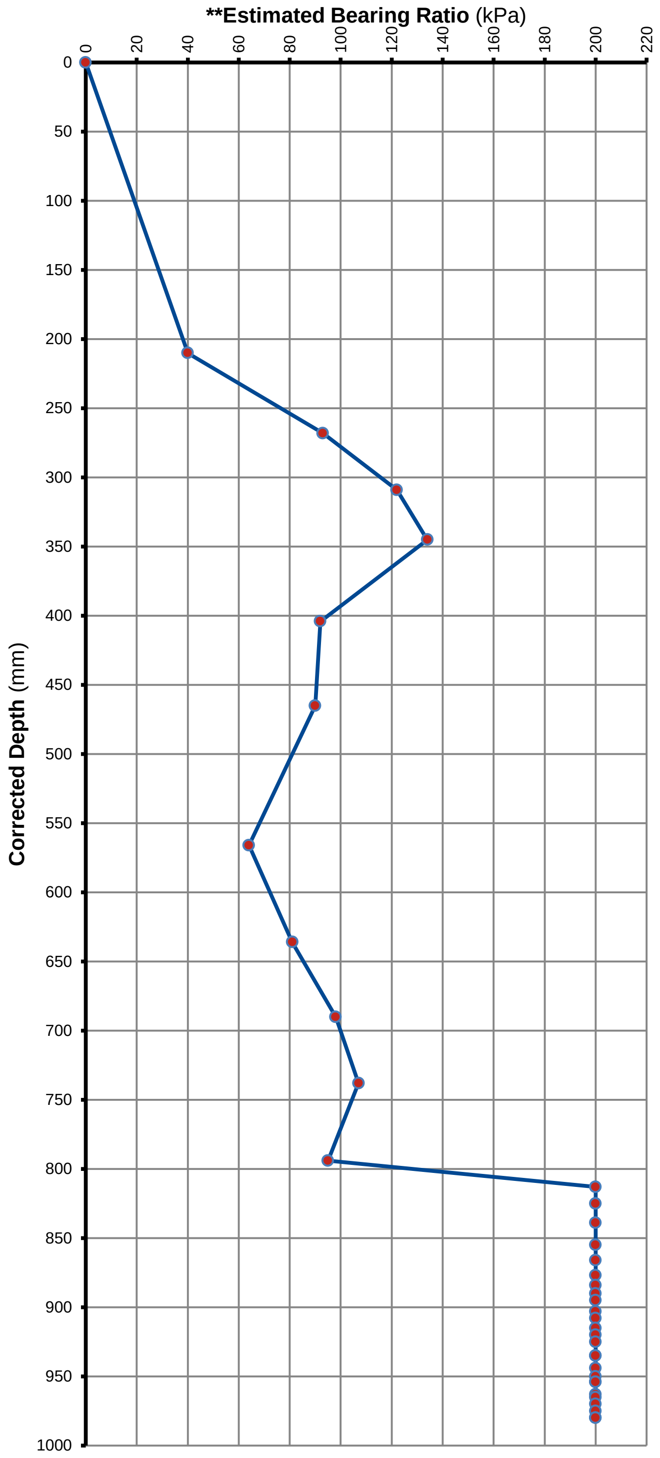
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

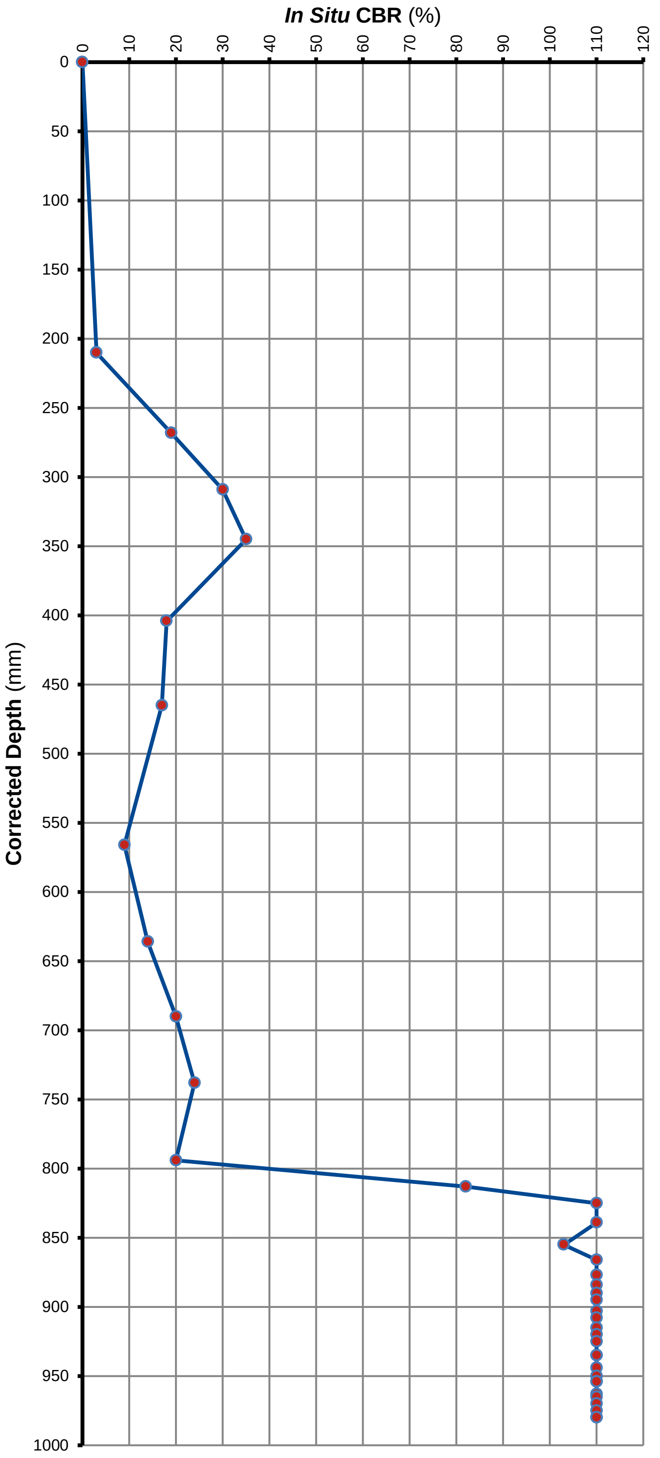
POSITION: DCP 30 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 31 **DEPTH BELOW NGL:** 0.000m

***DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)**

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	220	0	-	-	-	-	-
5	445	225	225	45.0	Loose	38	3
10	519	299	74	14.8	Medium Dense	78	13
15	578	358	59	11.8	Dense	92	18
20	630	410	52	10.4	Dense	101	22
25	681	461	51	10.2	Dense	102	22
30	729	509	48	9.6	Dense	107	24
35	769	549	40	8.0	Dense	124	31
40	810	590	41	8.2	Dense	122	30
45	845	625	35	7.0	Dense	137	36
50	878	658	33	6.6	Dense	144	39
55	910	690	32	6.4	Dense	147	41
60	942	722	32	6.4	Dense	147	41
65	979	759	37	7.4	Dense	132	34
70	1011	791	32	6.4	Dense	147	41
75	1041	821	30	6.0	Dense	154	45
80	1073	853	32	6.4	Dense	147	41
85	1100	880	27	5.4	Dense	165	52
90	1118	898	18	3.6	Very Dense	> 200	88
95	1132	912	14	2.8	Very Dense	> 200	> 110
100	1156	936	24	4.8	Very Dense	178	60
105	1171	951	15	3.0	Very Dense	> 200	> 110
110	1178	958	7	1.4	Very Dense	> 200	> 110
115	1190	970	12	2.4	Very Dense	> 200	> 110
120	1209	989	19	3.8	Very Dense	> 200	82
125	1226	1006	17	3.4	Very Dense	> 200	95
130	1240	1020	14	2.8	Very Dense	> 200	> 110
135	1255	1035	15	3.0	Very Dense	> 200	> 110
140	1270	1050	15	3.0	Very Dense	> 200	> 110
145	1290	1070	20	4.0	Very Dense	200	77
150	1306	1086	16	3.2	Very Dense	> 200	103
155	1313	1093	7	1.4	Very Dense	> 200	> 110
160	1330	1110	17	3.4	Very Dense	> 200	95
165	1349	1129	19	3.8	Very Dense	> 200	82
170	1360	1140	11	2.2	Very Dense	> 200	> 110
175	1382	1162	22	4.4	Very Dense	188	68
180	1395	1175	13	2.6	Very Dense	> 200	> 110
185	1409	1189	14	2.8	Very Dense	> 200	> 110
190	1427	1207	18	3.6	Very Dense	> 200	88
195	1445	1225	18	3.6	Very Dense	> 200	88
200	1466	1246	21	4.2	Very Dense	193	72
205	1480	1260	14	2.8	Very Dense	> 200	> 110
210	1498	1278	18	3.6	Very Dense	> 200	88
215	1520	1300	22	4.4	Very Dense	188	68
220	1539	1319	19	3.8	Very Dense	> 200	82
225	1560	1340	21	4.2	Very Dense	193	72
230	1577	1357	17	3.4	Very Dense	> 200	95
235	1590	1370	13	2.6	Very Dense	> 200	> 110
240	1610	1390	20	4.0	Very Dense	200	77
245	1628	1408	18	3.6	Very Dense	> 200	88
250	1640	1420	12	2.4	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 31 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

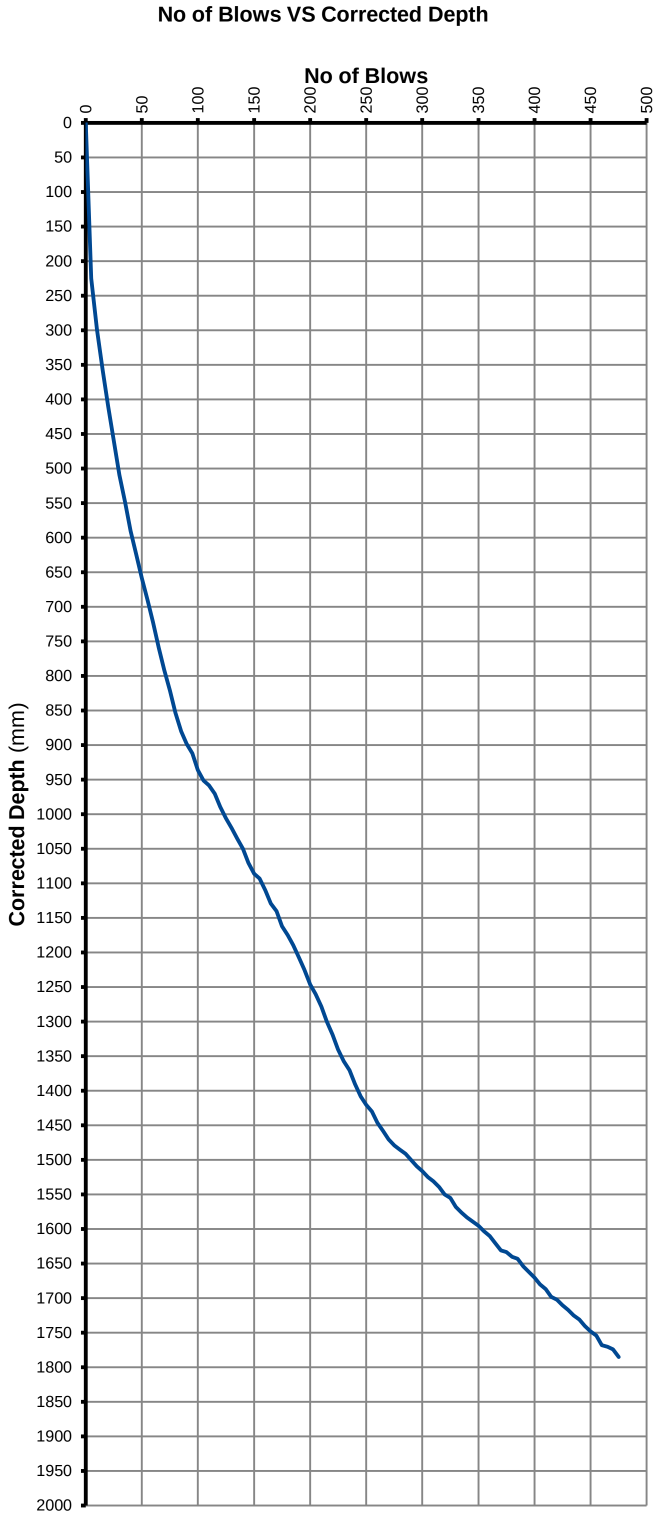
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1650	1430	10	2.0	Very Dense	> 200	> 110
260	1666	1446	16	3.2	Very Dense	> 200	103
265	1678	1458	12	2.4	Very Dense	> 200	> 110
270	1690	1470	12	2.4	Very Dense	> 200	> 110
275	1699	1479	9	1.8	Very Dense	> 200	> 110
280	1705	1485	6	1.2	Very Dense	> 200	> 110
285	1711	1491	6	1.2	Very Dense	> 200	> 110
290	1720	1500	9	1.8	Very Dense	> 200	> 110
295	1729	1509	9	1.8	Very Dense	> 200	> 110
300	1736	1516	7	1.4	Very Dense	> 200	> 110
305	1745	1525	9	1.8	Very Dense	> 200	> 110
310	1751	1531	6	1.2	Very Dense	> 200	> 110
315	1759	1539	8	1.6	Very Dense	> 200	> 110
320	1770	1550	11	2.2	Very Dense	> 200	> 110
325	1775	1555	5	1.0	Very Dense	> 200	> 110
330	1788	1568	13	2.6	Very Dense	> 200	> 110
335	1796	1576	8	1.6	Very Dense	> 200	> 110
340	1803	1583	7	1.4	Very Dense	> 200	> 110
345	1809	1589	6	1.2	Very Dense	> 200	> 110
350	1815	1595	6	1.2	Very Dense	> 200	> 110
355	1823	1603	8	1.6	Very Dense	> 200	> 110
360	1830	1610	7	1.4	Very Dense	> 200	> 110
365	1840	1620	10	2.0	Very Dense	> 200	> 110
370	1851	1631	11	2.2	Very Dense	> 200	> 110
375	1853	1633	2	0.4	Very Dense	> 200	> 110
380	1860	1640	7	1.4	Very Dense	> 200	> 110
385	1863	1643	3	0.6	Very Dense	> 200	> 110
390	1874	1654	11	2.2	Very Dense	> 200	> 110
395	1882	1662	8	1.6	Very Dense	> 200	> 110
400	1890	1670	8	1.6	Very Dense	> 200	> 110
405	1900	1680	10	2.0	Very Dense	> 200	> 110
410	1907	1687	7	1.4	Very Dense	> 200	> 110
415	1918	1698	11	2.2	Very Dense	> 200	> 110
420	1922	1702	4	0.8	Very Dense	> 200	> 110
425	1930	1710	8	1.6	Very Dense	> 200	> 110
430	1937	1717	7	1.4	Very Dense	> 200	> 110
435	1945	1725	8	1.6	Very Dense	> 200	> 110
440	1951	1731	6	1.2	Very Dense	> 200	> 110
445	1960	1740	9	1.8	Very Dense	> 200	> 110
450	1968	1748	8	1.6	Very Dense	> 200	> 110
455	1974	1754	6	1.2	Very Dense	> 200	> 110
460	1988	1768	14	2.8	Very Dense	> 200	> 110
465	1990	1770	2	0.4	Very Dense	> 200	> 110
470	1994	1774	4	0.8	Very Dense	> 200	> 110
475	2005	1785	11	2.2	Very Dense	> 200	> 110

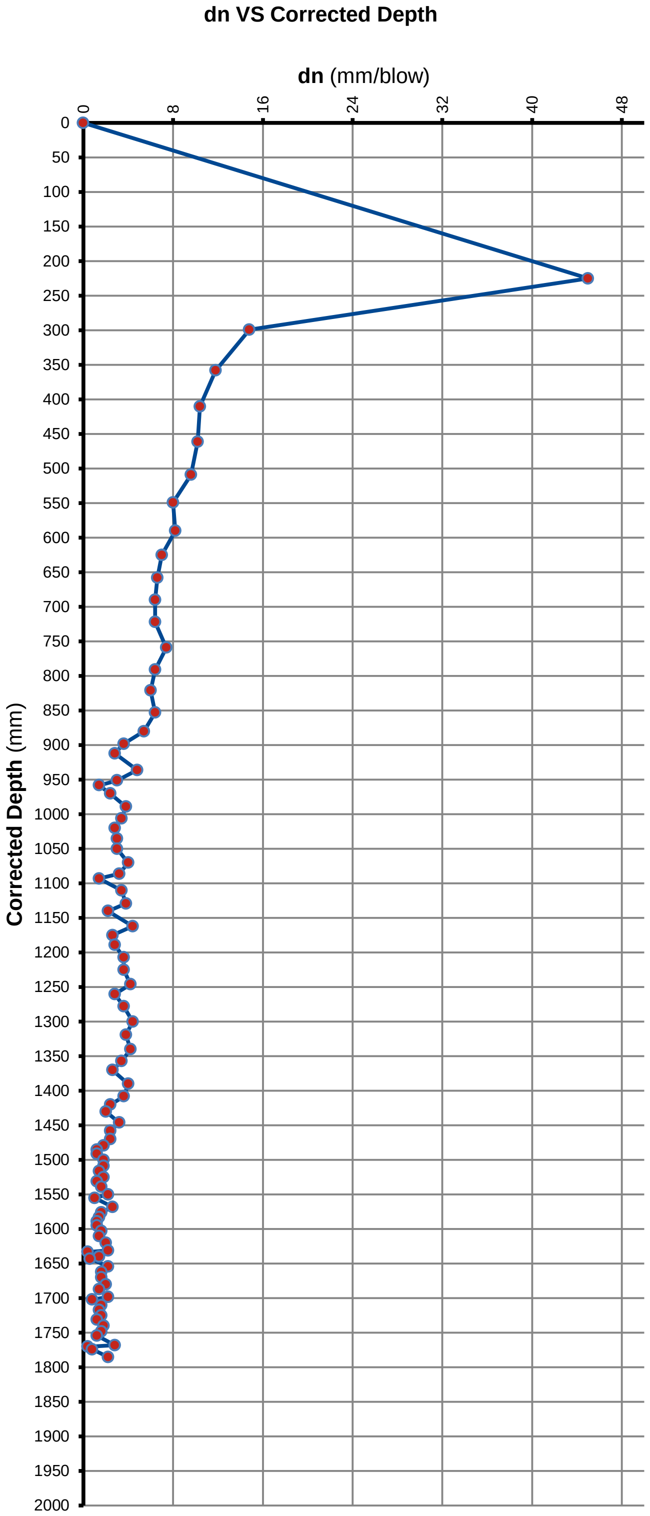
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 31 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





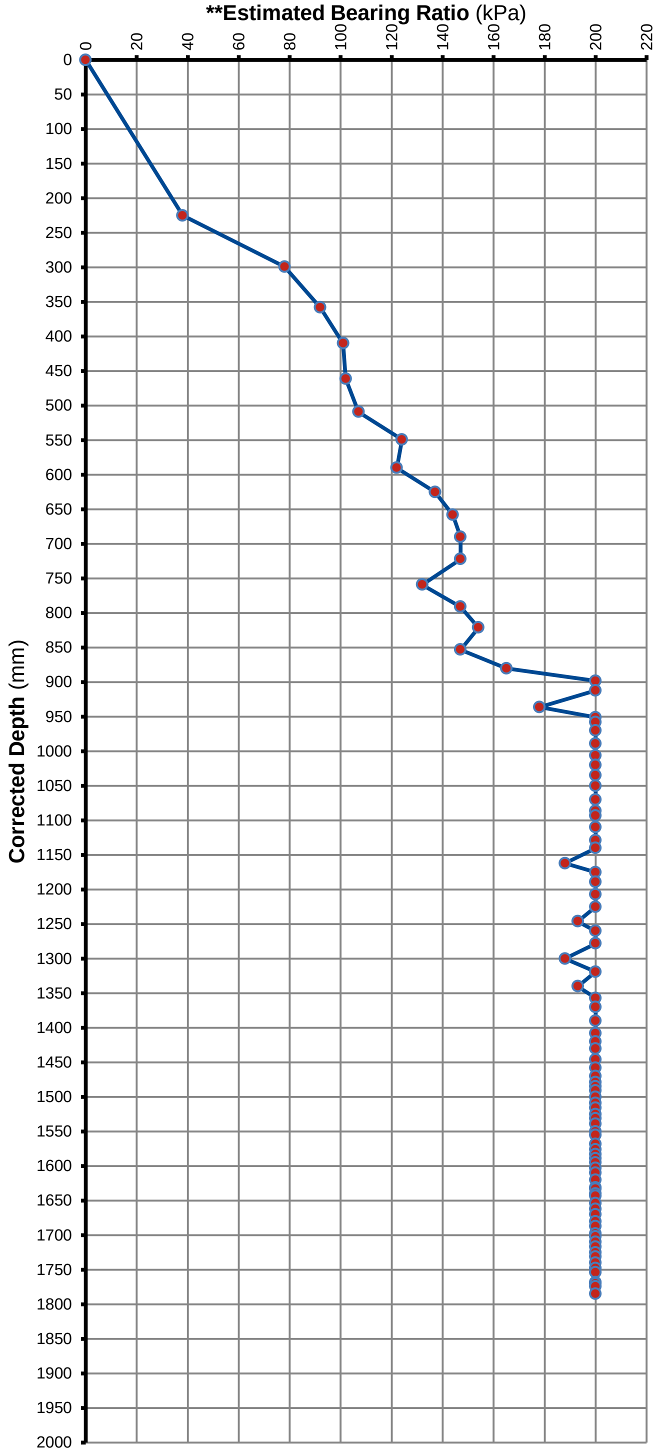
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

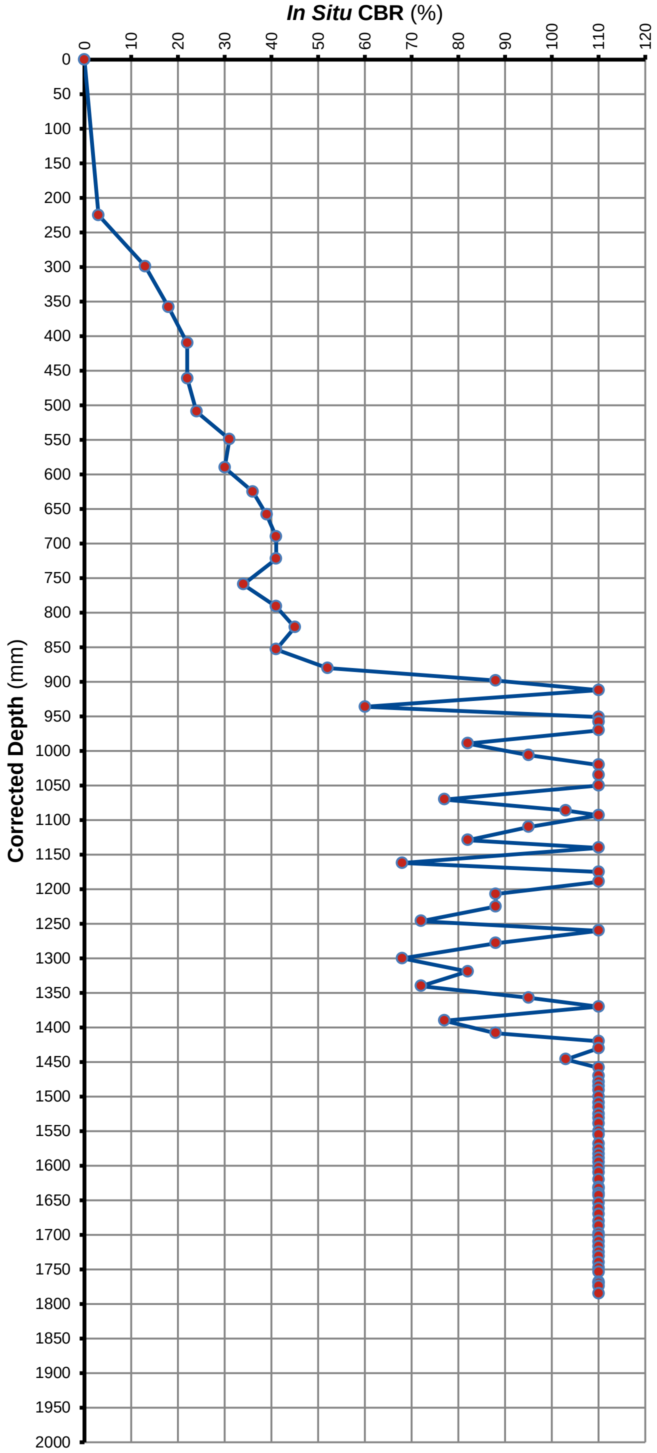
POSITION: DCP 31 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 32 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	133	0	-	-	-	-	-
5	338	205	205	41.0	Loose	41	3
10	428	295	90	18.0	Medium Dense	69	10
15	483	350	55	11.0	Dense	97	20
20	535	402	52	10.4	Dense	101	22
25	592	459	57	11.4	Dense	94	19
30	630	497	38	7.6	Dense	129	33
35	656	523	26	5.2	Dense	169	54
40	674	541	18	3.6	Very Dense	> 200	88
45	687	554	13	2.6	Very Dense	> 200	> 110
50	709	576	22	4.4	Very Dense	188	68
55	729	596	20	4.0	Very Dense	200	77
60	745	612	16	3.2	Very Dense	> 200	103
65	766	633	21	4.2	Very Dense	193	72
70	788	655	22	4.4	Very Dense	188	68
75	812	679	24	4.8	Very Dense	178	60
80	838	705	26	5.2	Dense	169	54
85	862	729	24	4.8	Very Dense	178	60
90	890	757	28	5.6	Dense	161	49
95	923	790	33	6.6	Dense	144	39
100	954	821	31	6.2	Dense	150	43
105	987	854	33	6.6	Dense	144	39
110	1019	886	32	6.4	Dense	147	41
115	1054	921	35	7.0	Dense	137	36
120	1080	947	26	5.2	Dense	169	54
125	1103	970	23	4.6	Very Dense	183	64
130	1157	1024	54	10.8	Dense	98	20
135	1180	1047	23	4.6	Very Dense	183	64
140	1203	1070	23	4.6	Very Dense	183	64
145	1231	1098	28	5.6	Dense	161	49
150	1263	1130	32	6.4	Dense	147	41
155	1285	1152	22	4.4	Very Dense	188	68
160	1311	1178	26	5.2	Dense	169	54
165	1334	1201	23	4.6	Very Dense	183	64
170	1365	1232	31	6.2	Dense	150	43
175	1390	1257	25	5.0	Very Dense	174	57
180	1411	1278	21	4.2	Very Dense	193	72
185	1429	1296	18	3.6	Very Dense	> 200	88
190	1451	1318	22	4.4	Very Dense	188	68
195	1472	1339	21	4.2	Very Dense	193	72
200	1493	1360	21	4.2	Very Dense	193	72
205	1515	1382	22	4.4	Very Dense	188	68
210	1535	1402	20	4.0	Very Dense	200	77
215	1550	1417	15	3.0	Very Dense	> 200	> 110
220	1568	1435	18	3.6	Very Dense	> 200	88
225	1580	1447	12	2.4	Very Dense	> 200	> 110
230	1594	1461	14	2.8	Very Dense	> 200	> 110
235	1604	1471	10	2.0	Very Dense	> 200	> 110
240	1618	1485	14	2.8	Very Dense	> 200	> 110
245	1629	1496	11	2.2	Very Dense	> 200	> 110
250	1639	1506	10	2.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 32 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1641	1508	2	0.4	Very Dense	> 200	> 110
260	1650	1517	9	1.8	Very Dense	> 200	> 110
265	1650	1517	0	0.0	Very Dense	> 200	> 110
270	1665	1532	15	3.0	Very Dense	> 200	> 110
275	1673	1540	8	1.6	Very Dense	> 200	> 110
280	1680	1547	7	1.4	Very Dense	> 200	> 110
285	1689	1556	9	1.8	Very Dense	> 200	> 110
290	1698	1565	9	1.8	Very Dense	> 200	> 110
295	1710	1577	12	2.4	Very Dense	> 200	> 110
300	1721	1588	11	2.2	Very Dense	> 200	> 110
305	1732	1599	11	2.2	Very Dense	> 200	> 110
310	1741	1608	9	1.8	Very Dense	> 200	> 110
315	1751	1618	10	2.0	Very Dense	> 200	> 110
320	1765	1632	14	2.8	Very Dense	> 200	> 110
325	1773	1640	8	1.6	Very Dense	> 200	> 110
330	1784	1651	11	2.2	Very Dense	> 200	> 110
335	1802	1669	18	3.6	Very Dense	> 200	88
340	1811	1678	9	1.8	Very Dense	> 200	> 110
345	1820	1687	9	1.8	Very Dense	> 200	> 110
350	1829	1696	9	1.8	Very Dense	> 200	> 110
355	1840	1707	11	2.2	Very Dense	> 200	> 110
360	1844	1711	4	0.8	Very Dense	> 200	> 110
365	1845	1712	1	0.2	Very Dense	> 200	> 110
370	1853	1720	8	1.6	Very Dense	> 200	> 110
375	1861	1728	8	1.6	Very Dense	> 200	> 110
380	1871	1738	10	2.0	Very Dense	> 200	> 110
385	1877	1744	6	1.2	Very Dense	> 200	> 110
390	1885	1752	8	1.6	Very Dense	> 200	> 110
395	1891	1758	6	1.2	Very Dense	> 200	> 110
400	1900	1767	9	1.8	Very Dense	> 200	> 110
405	1913	1780	13	2.6	Very Dense	> 200	> 110
410	1922	1789	9	1.8	Very Dense	> 200	> 110
415	1931	1798	9	1.8	Very Dense	> 200	> 110
420	1931	1798	0	0.0	Very Dense	> 200	> 110
425	1935	1802	4	0.8	Very Dense	> 200	> 110
430	1945	1812	10	2.0	Very Dense	> 200	> 110
435	1952	1819	7	1.4	Very Dense	> 200	> 110
440	1955	1822	3	0.6	Very Dense	> 200	> 110
445	1960	1827	5	1.0	Very Dense	> 200	> 110
450	1970	1837	10	2.0	Very Dense	> 200	> 110
455	1979	1846	9	1.8	Very Dense	> 200	> 110
460	1983	1850	4	0.8	Very Dense	> 200	> 110
465	1994	1861	11	2.2	Very Dense	> 200	> 110
470	2006	1873	12	2.4	Very Dense	> 200	> 110

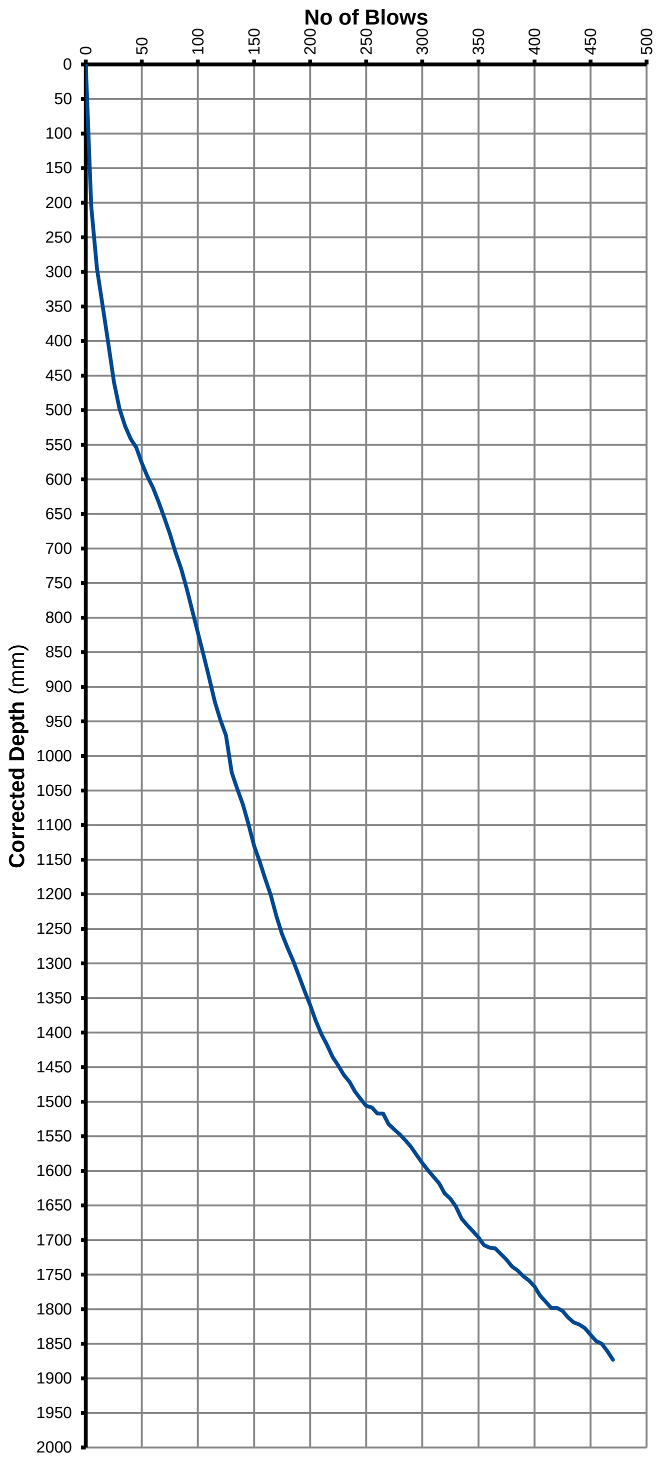
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

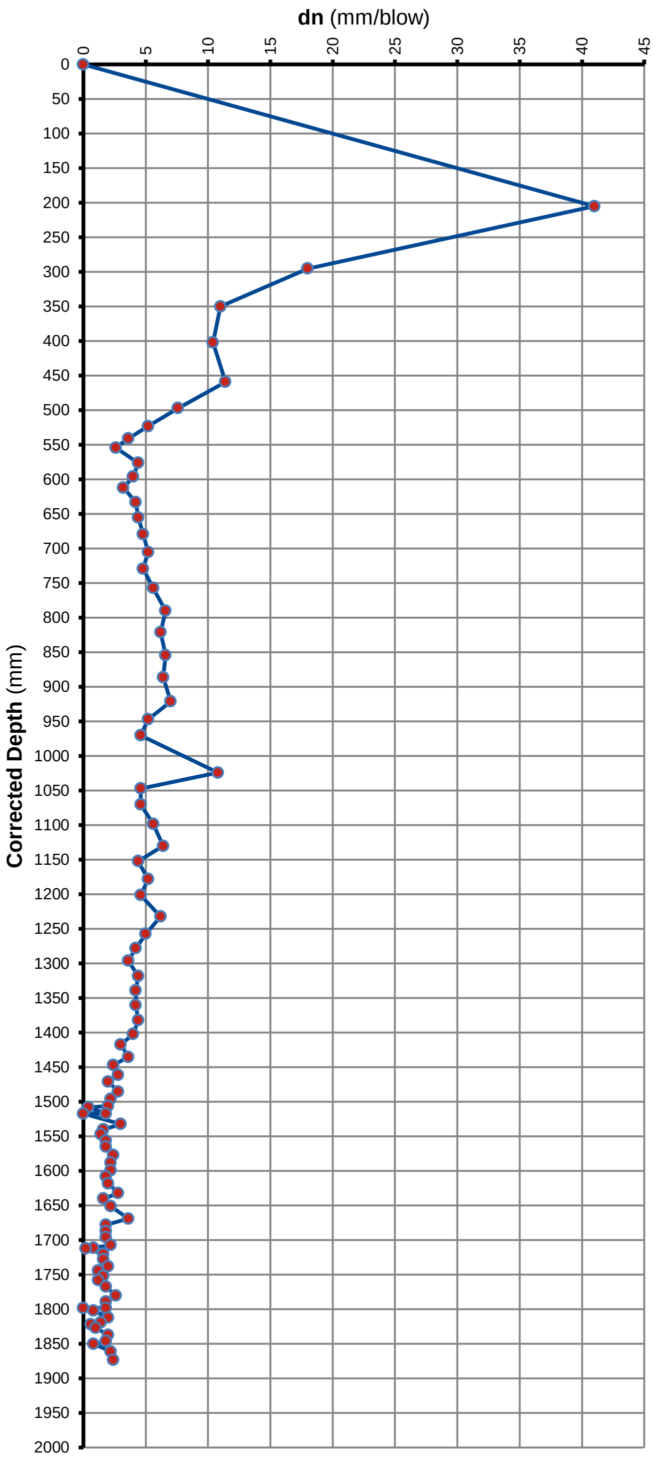
POSITION: DCP 32 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



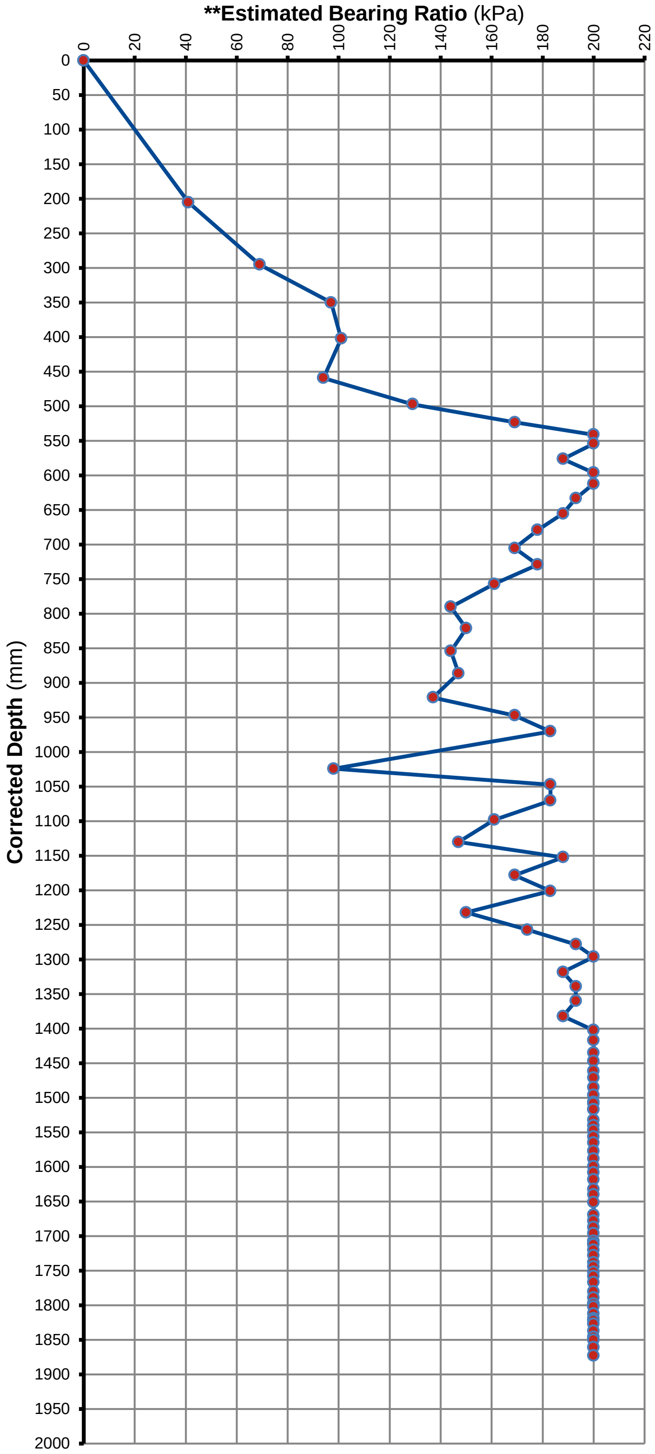
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

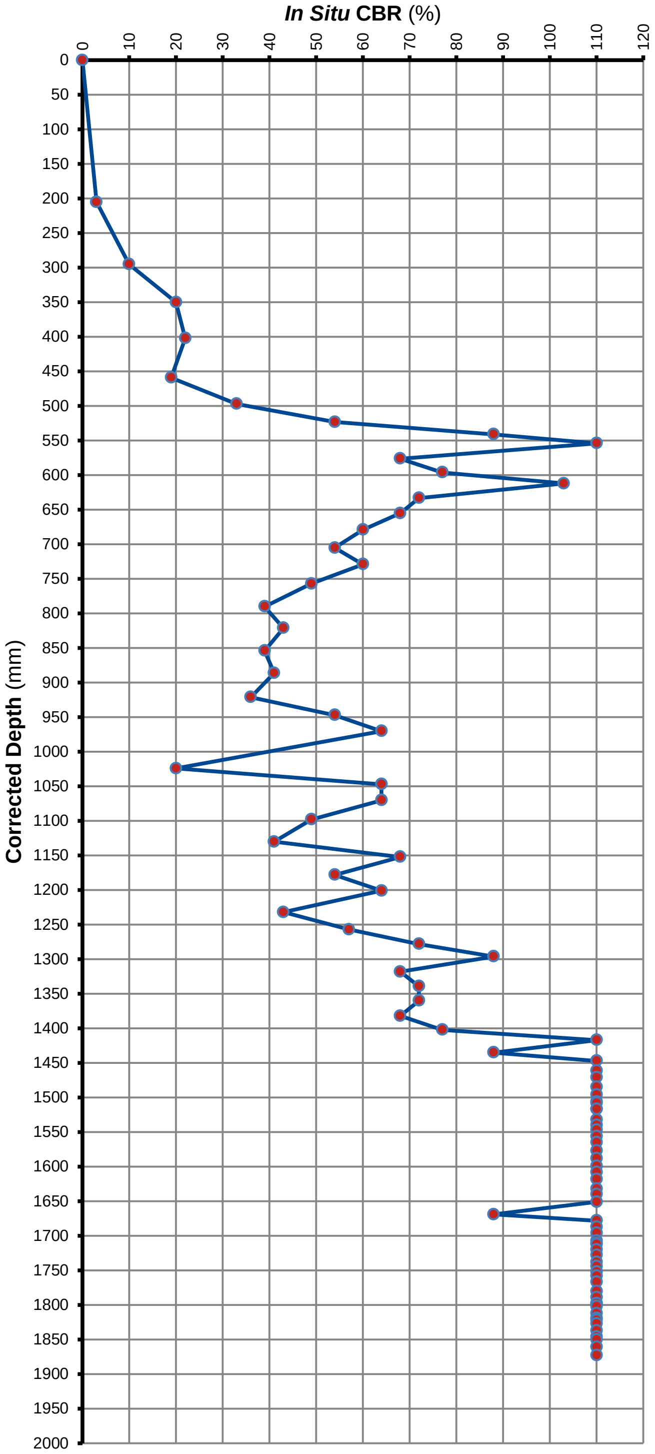
POSITION: DCP 32 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 33 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	163	0	-	-	-	-	-
5	452	289	289	57.8	Loose	2	2
10	515	352	63	12.6	Medium Dense	88	17
15	564	401	49	9.8	Dense	106	23
20	604	441	40	8.0	Dense	124	31
25	630	467	26	5.2	Dense	169	54
30	656	493	26	5.2	Dense	169	54
35	679	516	23	4.6	Very Dense	183	64
40	695	532	16	3.2	Very Dense	> 200	103
45	716	553	21	4.2	Very Dense	193	72
50	734	571	18	3.6	Very Dense	> 200	88
55	750	587	16	3.2	Very Dense	> 200	103
60	768	605	18	3.6	Very Dense	> 200	88
65	781	618	13	2.6	Very Dense	> 200	> 110
70	799	636	18	3.6	Very Dense	> 200	88
75	812	649	13	2.6	Very Dense	> 200	> 110
80	826	663	14	2.8	Very Dense	> 200	> 110
85	840	677	14	2.8	Very Dense	> 200	> 110
90	857	694	17	3.4	Very Dense	> 200	95
95	871	708	14	2.8	Very Dense	> 200	> 110
100	889	726	18	3.6	Very Dense	> 200	88
105	905	742	16	3.2	Very Dense	> 200	103
110	926	763	21	4.2	Very Dense	193	72
115	940	777	14	2.8	Very Dense	> 200	> 110
120	960	797	20	4.0	Very Dense	200	77
125	979	816	19	3.8	Very Dense	> 200	82
130	997	834	18	3.6	Very Dense	> 200	88
135	1013	850	16	3.2	Very Dense	> 200	103
140	1031	868	18	3.6	Very Dense	> 200	88
145	1048	885	17	3.4	Very Dense	> 200	95
150	1067	904	19	3.8	Very Dense	> 200	82
155	1080	917	13	2.6	Very Dense	> 200	> 110
160	1100	937	20	4.0	Very Dense	200	77
165	1118	955	18	3.6	Very Dense	> 200	88
170	1135	972	17	3.4	Very Dense	> 200	95
175	1146	983	11	2.2	Very Dense	> 200	> 110
180	1165	1002	19	3.8	Very Dense	> 200	82
185	1176	1013	11	2.2	Very Dense	> 200	> 110
190	1186	1023	10	2.0	Very Dense	> 200	> 110
195	1198	1035	12	2.4	Very Dense	> 200	> 110
200	1208	1045	10	2.0	Very Dense	> 200	> 110
205	1218	1055	10	2.0	Very Dense	> 200	> 110
210	1229	1066	11	2.2	Very Dense	> 200	> 110
215	1235	1072	6	1.2	Very Dense	> 200	> 110
220	1243	1080	8	1.6	Very Dense	> 200	> 110
225	1250	1087	7	1.4	Very Dense	> 200	> 110
230	1258	1095	8	1.6	Very Dense	> 200	> 110
235	1266	1103	8	1.6	Very Dense	> 200	> 110
240	1275	1112	9	1.8	Very Dense	> 200	> 110
245	1283	1120	8	1.6	Very Dense	> 200	> 110
250	1289	1126	6	1.2	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 33 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1298	1135	9	1.8	Very Dense	> 200	> 110
260	1305	1142	7	1.4	Very Dense	> 200	> 110
265	1313	1150	8	1.6	Very Dense	> 200	> 110
270	1319	1156	6	1.2	Very Dense	> 200	> 110
275	1328	1165	9	1.8	Very Dense	> 200	> 110
280	1338	1175	10	2.0	Very Dense	> 200	> 110
285	1351	1188	13	2.6	Very Dense	> 200	> 110
290	1358	1195	7	1.4	Very Dense	> 200	> 110
295	1368	1205	10	2.0	Very Dense	> 200	> 110
300	1380	1217	12	2.4	Very Dense	> 200	> 110
305	1391	1228	11	2.2	Very Dense	> 200	> 110
310	1400	1237	9	1.8	Very Dense	> 200	> 110
315	1411	1248	11	2.2	Very Dense	> 200	> 110
320	1423	1260	12	2.4	Very Dense	> 200	> 110
325	1432	1269	9	1.8	Very Dense	> 200	> 110
330	1442	1279	10	2.0	Very Dense	> 200	> 110
335	1452	1289	10	2.0	Very Dense	> 200	> 110
340	1462	1299	10	2.0	Very Dense	> 200	> 110
345	1470	1307	8	1.6	Very Dense	> 200	> 110
350	1478	1315	8	1.6	Very Dense	> 200	> 110
355	1489	1326	11	2.2	Very Dense	> 200	> 110
360	1497	1334	8	1.6	Very Dense	> 200	> 110
365	1506	1343	9	1.8	Very Dense	> 200	> 110
370	1518	1355	12	2.4	Very Dense	> 200	> 110
375	1528	1365	10	2.0	Very Dense	> 200	> 110
380	1535	1372	7	1.4	Very Dense	> 200	> 110
385	1544	1381	9	1.8	Very Dense	> 200	> 110
390	1551	1388	7	1.4	Very Dense	> 200	> 110
395	1562	1399	11	2.2	Very Dense	> 200	> 110
400	1570	1407	8	1.6	Very Dense	> 200	> 110
405	1575	1412	5	1.0	Very Dense	> 200	> 110
410	1579	1416	4	0.8	Very Dense	> 200	> 110
415	1579	1416	0	0.0	Very Dense	> 200	> 110
420	Refusal						

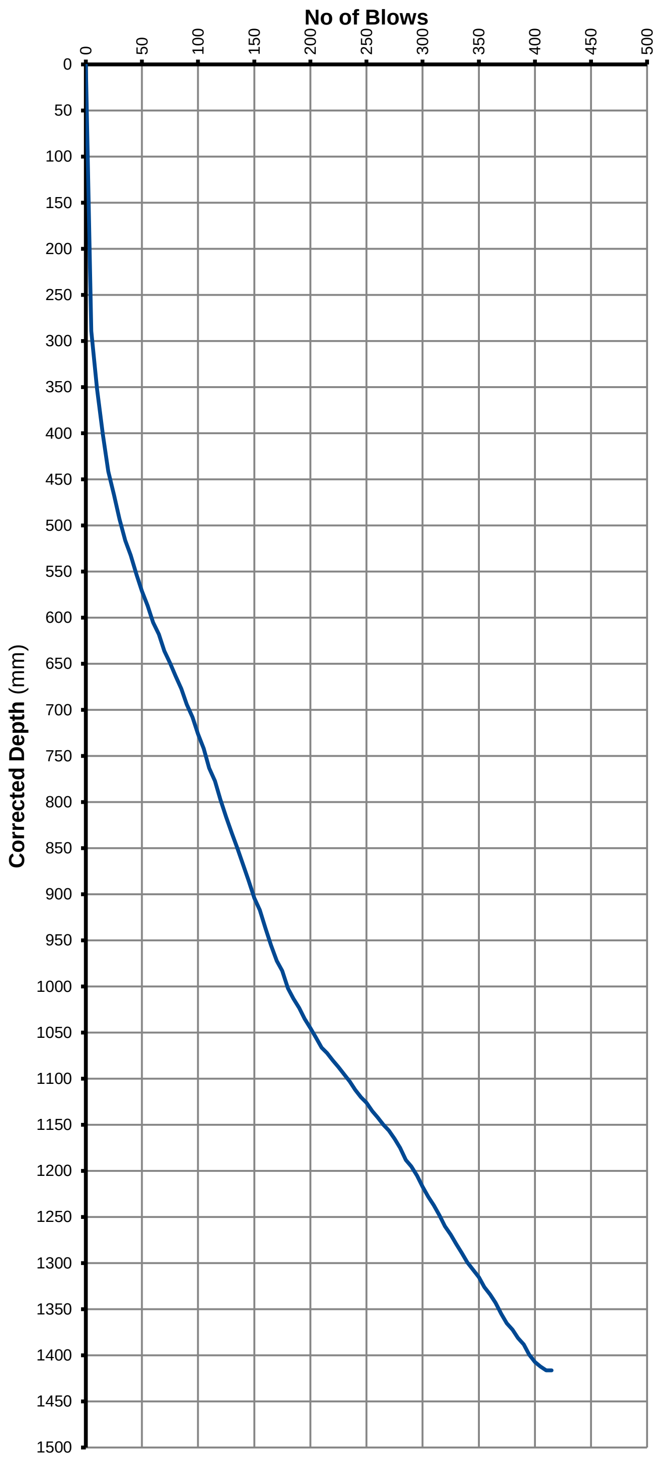
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

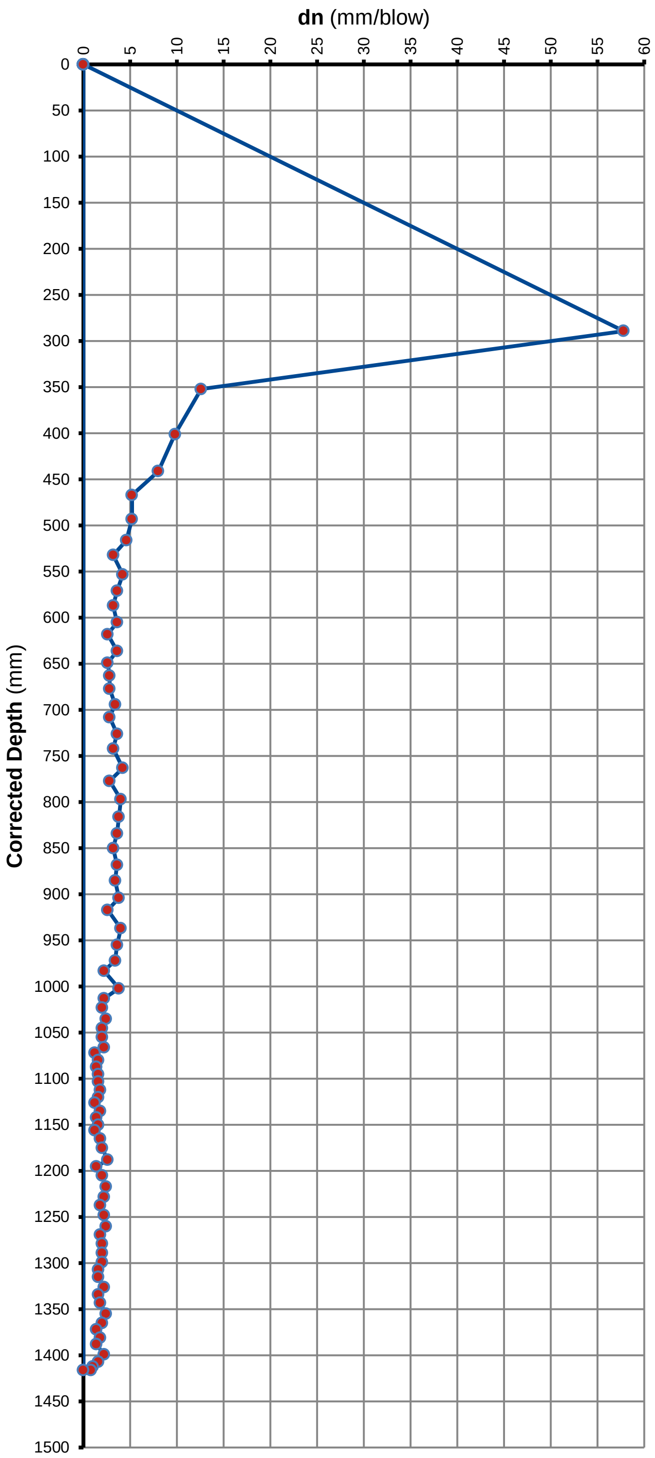
POSITION: DCP 33 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



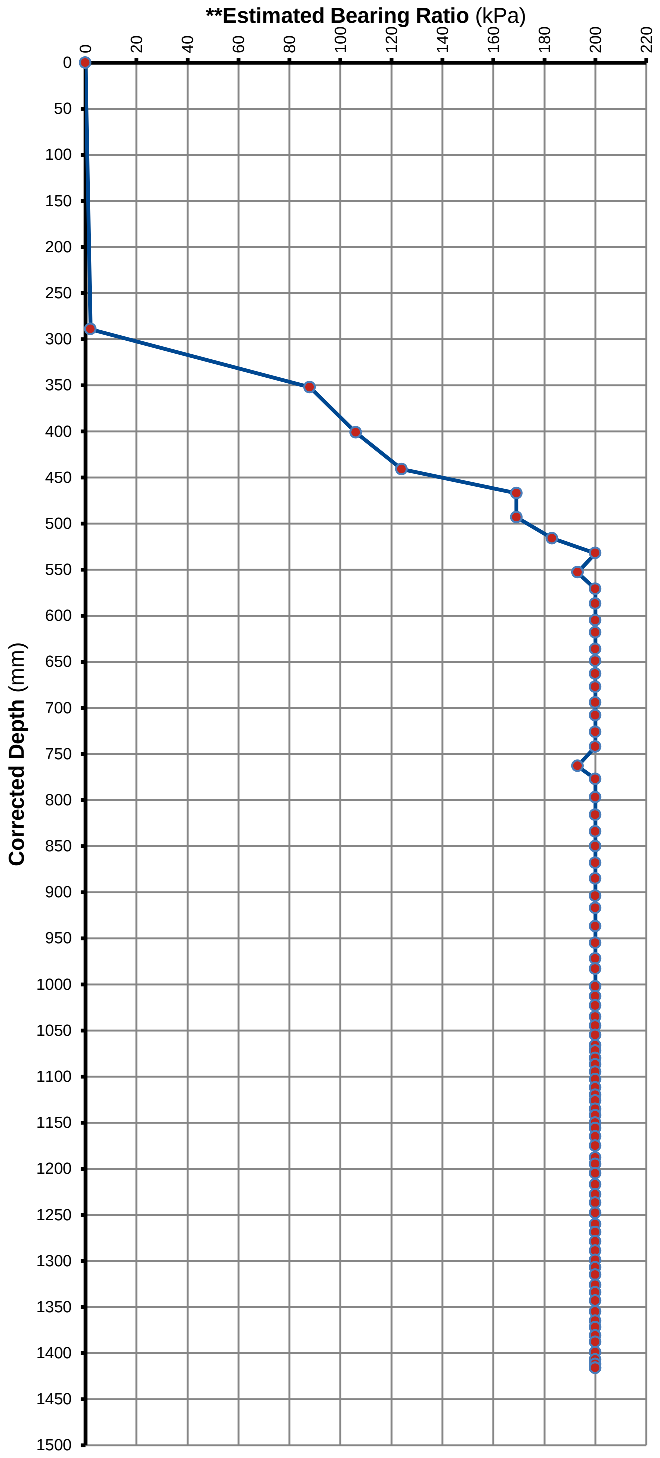
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

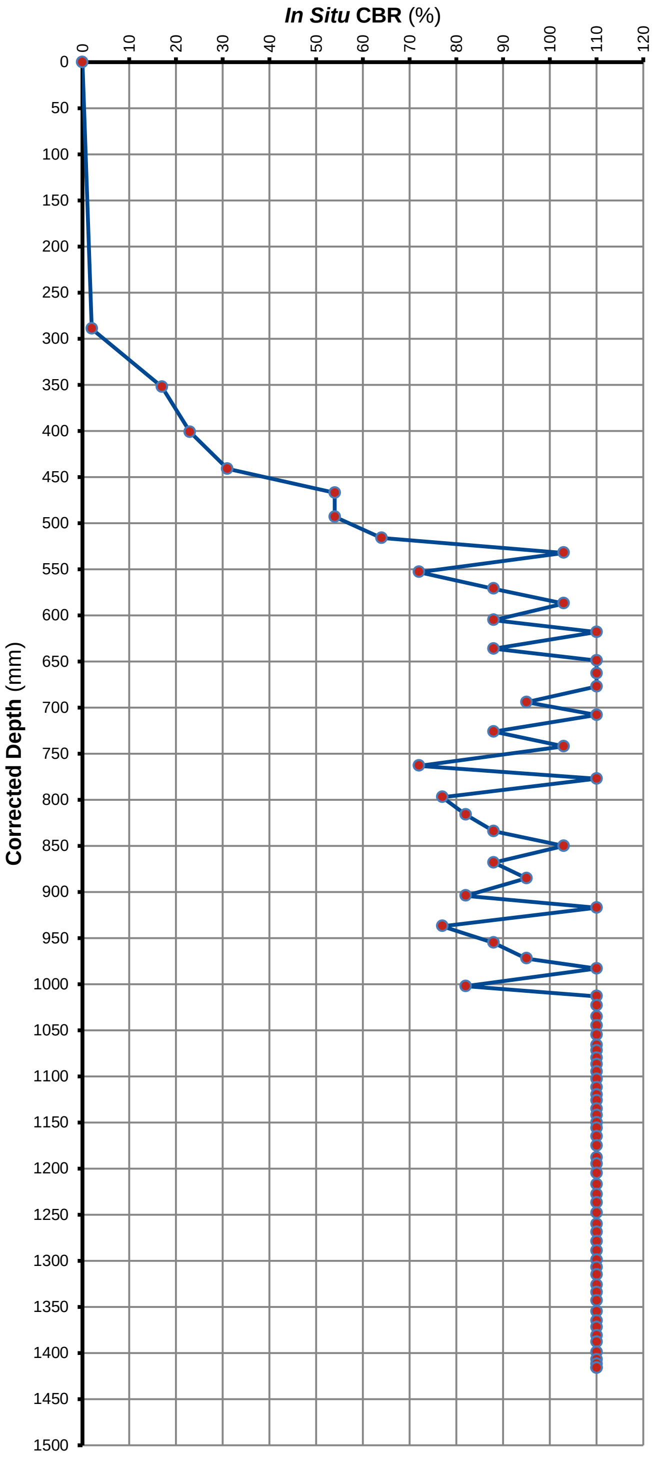
POSITION: DCP 33 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 34 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	125	0	-	-	-	-	-
5	222	97	97	19.4	Medium Dense	66	9
10	371	246	149	29.8	Medium Dense	46	5
15	451	326	80	16.0	Medium Dense	75	12
20	499	374	48	9.6	Dense	107	24
25	546	421	47	9.4	Dense	109	25
30	600	475	54	10.8	Dense	98	20
35	632	507	32	6.4	Dense	147	41
40	652	527	20	4.0	Very Dense	200	77
45	663	538	11	2.2	Very Dense	> 200	> 110
50	678	553	15	3.0	Very Dense	> 200	> 110
55	691	566	13	2.6	Very Dense	> 200	> 110
60	700	575	9	1.8	Very Dense	> 200	> 110
65	709	584	9	1.8	Very Dense	> 200	> 110
70	711	586	2	0.4	Very Dense	> 200	> 110
75	720	595	9	1.8	Very Dense	> 200	> 110
80	731	606	11	2.2	Very Dense	> 200	> 110
85	741	616	10	2.0	Very Dense	> 200	> 110
90	748	623	7	1.4	Very Dense	> 200	> 110
95	760	635	12	2.4	Very Dense	> 200	> 110
100	765	640	5	1.0	Very Dense	> 200	> 110
105	776	651	11	2.2	Very Dense	> 200	> 110
110	785	660	9	1.8	Very Dense	> 200	> 110
115	796	671	11	2.2	Very Dense	> 200	> 110
120	804	679	8	1.6	Very Dense	> 200	> 110
125	815	690	11	2.2	Very Dense	> 200	> 110
130	830	705	15	3.0	Very Dense	> 200	> 110
135	848	723	18	3.6	Very Dense	> 200	88
140	861	736	13	2.6	Very Dense	> 200	> 110
145	879	754	18	3.6	Very Dense	> 200	88
150	890	765	11	2.2	Very Dense	> 200	> 110
155	901	776	11	2.2	Very Dense	> 200	> 110
160	913	788	12	2.4	Very Dense	> 200	> 110
165	930	805	17	3.4	Very Dense	> 200	95
170	951	826	21	4.2	Very Dense	193	72
175	975	850	24	4.8	Very Dense	178	60
180	997	872	22	4.4	Very Dense	188	68
185	1018	893	21	4.2	Very Dense	193	72
190	1032	907	14	2.8	Very Dense	> 200	> 110
195	1060	935	28	5.6	Dense	161	49
200	1072	947	12	2.4	Very Dense	> 200	> 110
205	1103	978	31	6.2	Dense	150	43
210	1122	997	19	3.8	Very Dense	> 200	82
215	1141	1016	19	3.8	Very Dense	> 200	82
220	1159	1034	18	3.6	Very Dense	> 200	88
225	1184	1059	25	5.0	Very Dense	174	57
230	1195	1070	11	2.2	Very Dense	> 200	> 110
235	1220	1095	25	5.0	Very Dense	174	57
240	1241	1116	21	4.2	Very Dense	193	72
245	1264	1139	23	4.6	Very Dense	183	64
250	1289	1164	25	5.0	Very Dense	174	57

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 34 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1313	1188	24	4.8	Very Dense	178	60
260	1330	1205	17	3.4	Very Dense	> 200	95
265	1348	1223	18	3.6	Very Dense	> 200	88
270	1361	1236	13	2.6	Very Dense	> 200	> 110
275	1373	1248	12	2.4	Very Dense	> 200	> 110
280	1395	1270	22	4.4	Very Dense	188	68
285	1415	1290	20	4.0	Very Dense	200	77
290	1433	1308	18	3.6	Very Dense	> 200	88
295	1449	1324	16	3.2	Very Dense	> 200	103
300	1464	1339	15	3.0	Very Dense	> 200	> 110
305	1476	1351	12	2.4	Very Dense	> 200	> 110
310	1489	1364	13	2.6	Very Dense	> 200	> 110
315	1503	1378	14	2.8	Very Dense	> 200	> 110
320	1514	1389	11	2.2	Very Dense	> 200	> 110
325	1525	1400	11	2.2	Very Dense	> 200	> 110
330	1538	1413	13	2.6	Very Dense	> 200	> 110
335	1546	1421	8	1.6	Very Dense	> 200	> 110
340	1557	1432	11	2.2	Very Dense	> 200	> 110
345	1563	1438	6	1.2	Very Dense	> 200	> 110
350	1572	1447	9	1.8	Very Dense	> 200	> 110
355	1580	1455	8	1.6	Very Dense	> 200	> 110
360	1589	1464	9	1.8	Very Dense	> 200	> 110
365	1598	1473	9	1.8	Very Dense	> 200	> 110
370	1609	1484	11	2.2	Very Dense	> 200	> 110
375	1614	1489	5	1.0	Very Dense	> 200	> 110
380	1620	1495	6	1.2	Very Dense	> 200	> 110
385	1625	1500	5	1.0	Very Dense	> 200	> 110
390	1633	1508	8	1.6	Very Dense	> 200	> 110
395	1633	1508	0	0.0	Very Dense	> 200	> 110
400	Refusal						

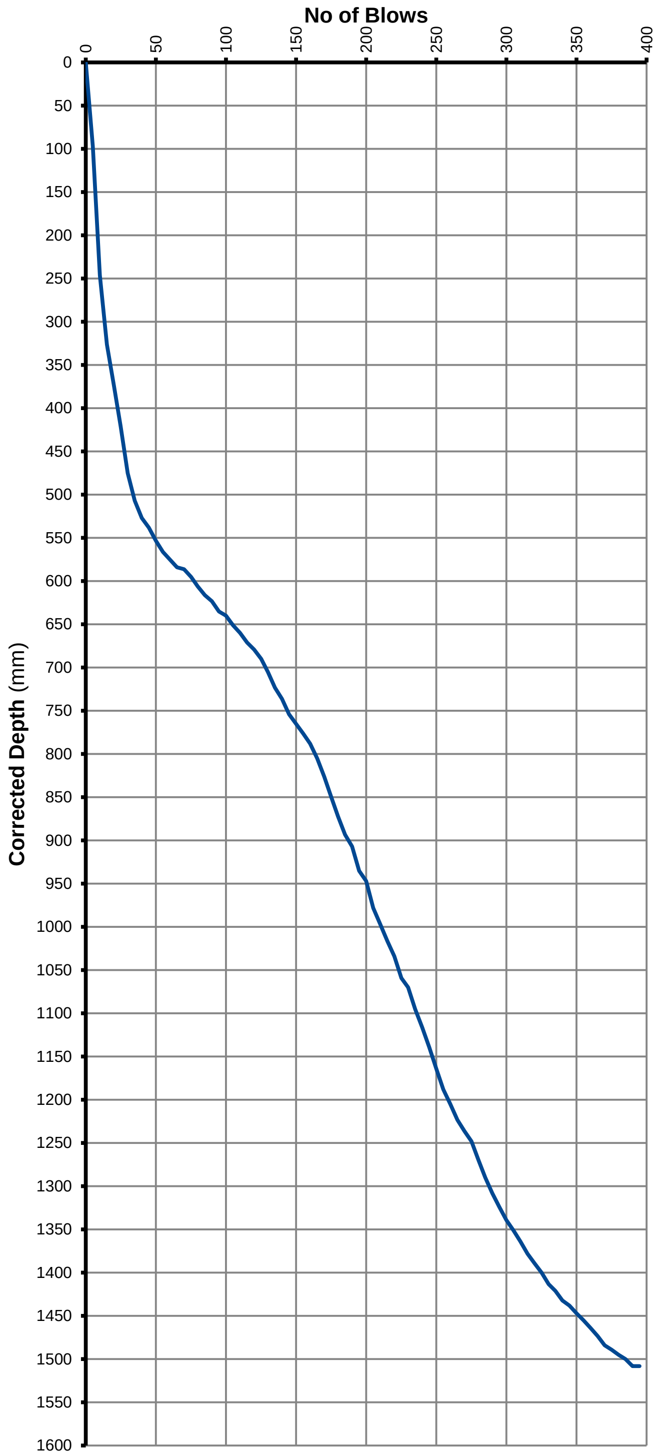
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

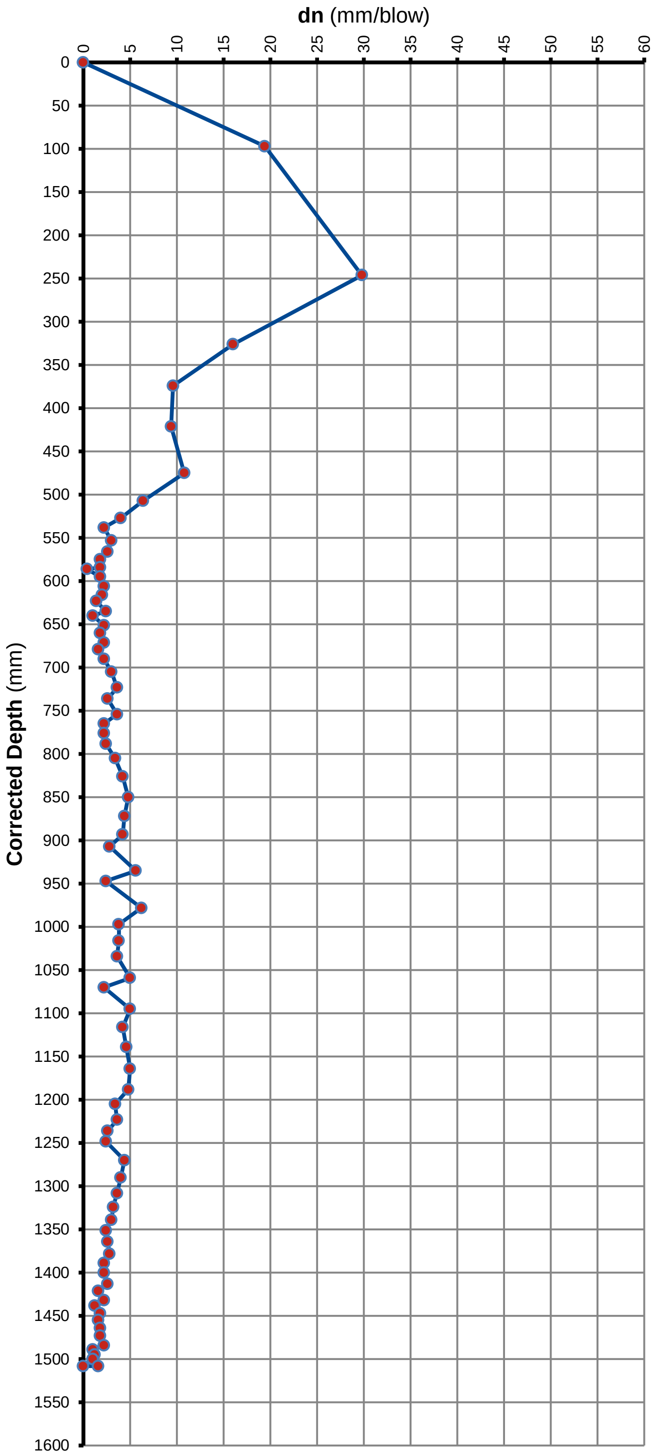
POSITION: DCP 34 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



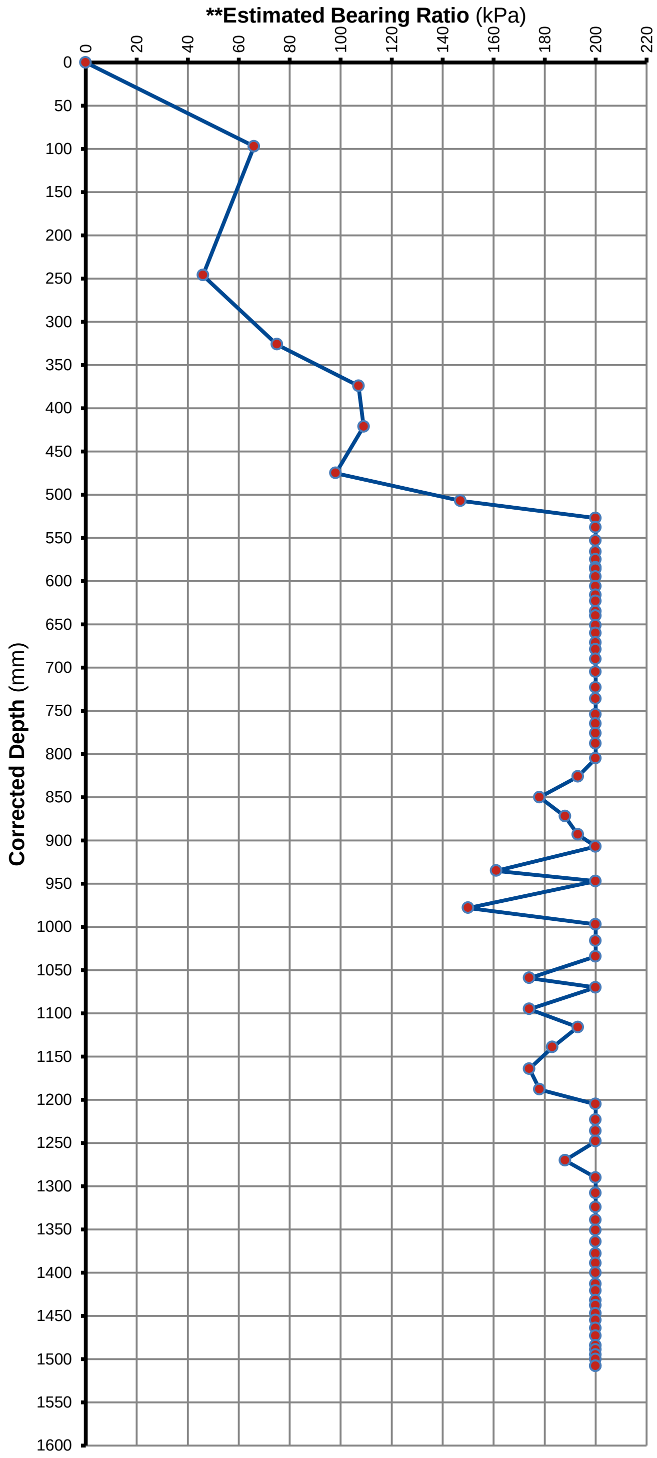
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

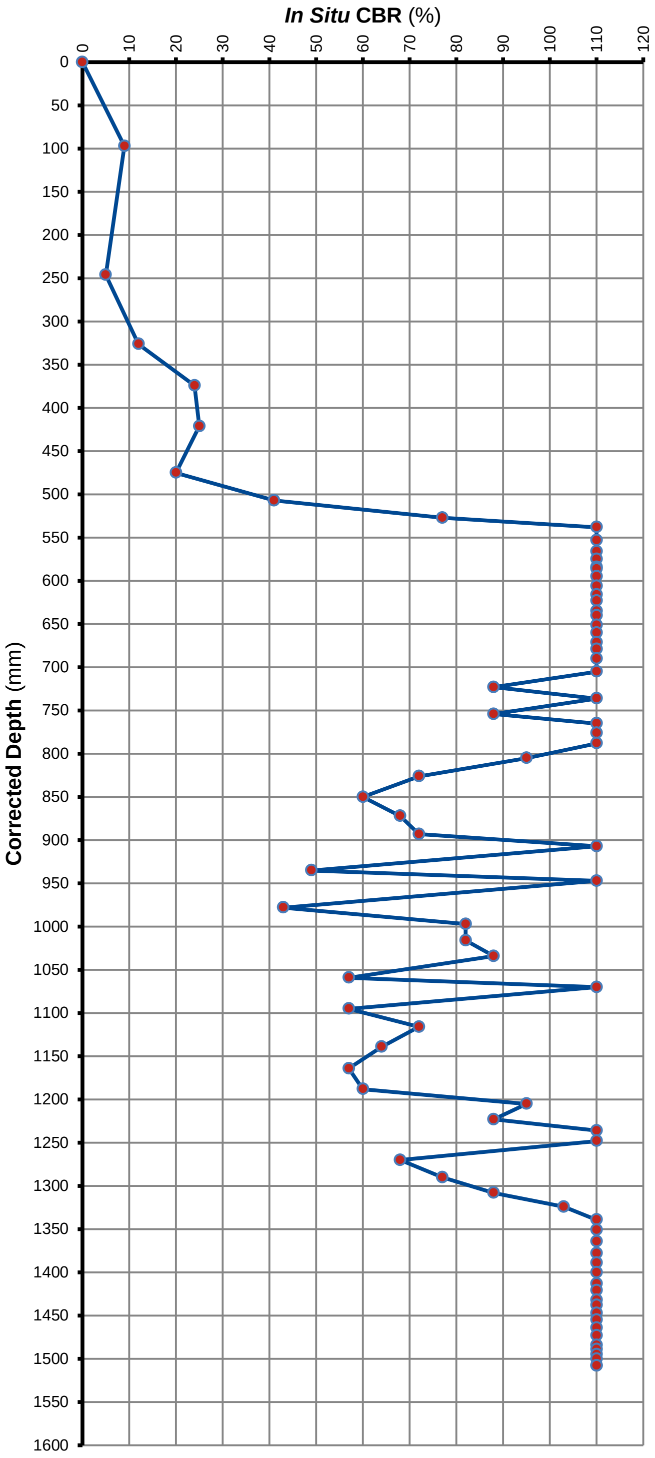
POSITION: DCP 34 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 35 **DEPTH BELOW NGL:** 0.000m

<u>*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)</u>

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	122	0	-	-	-	-	-
5	265	143	143	28.6	Medium Dense	47	6
10	427	305	162	32.4	Loose	43	5
15	525	403	98	19.6	Medium Dense	65	9
20	559	437	34	6.8	Dense	140	38
25	590	468	31	6.2	Dense	150	43
30	628	506	38	7.6	Dense	129	33
35	660	538	32	6.4	Dense	147	41
40	693	571	33	6.6	Dense	144	39
45	719	597	26	5.2	Dense	169	54
50	748	626	29	5.8	Dense	157	47
55	775	653	27	5.4	Dense	165	52
60	798	676	23	4.6	Very Dense	183	64
65	819	697	21	4.2	Very Dense	193	72
70	841	719	22	4.4	Very Dense	188	68
75	863	741	22	4.4	Very Dense	188	68
80	883	761	20	4.0	Very Dense	200	77
85	900	778	17	3.4	Very Dense	> 200	95
90	924	802	24	4.8	Very Dense	178	60
95	940	818	16	3.2	Very Dense	> 200	103
100	962	840	22	4.4	Very Dense	188	68
105	989	867	27	5.4	Dense	165	52
110	1020	898	31	6.2	Dense	150	43
115	1057	935	37	7.4	Dense	132	34
120	1089	967	32	6.4	Dense	147	41
125	1112	990	23	4.6	Very Dense	183	64
130	1159	1037	47	9.4	Dense	109	25
135	1184	1062	25	5.0	Very Dense	174	57
140	1213	1091	29	5.8	Dense	157	47
145	1248	1126	35	7.0	Dense	137	36
150	1275	1153	27	5.4	Dense	165	52
155	1308	1186	33	6.6	Dense	144	39
160	1338	1216	30	6.0	Dense	154	45
165	1370	1248	32	6.4	Dense	147	41
170	1398	1276	28	5.6	Dense	161	49
175	1425	1303	27	5.4	Dense	165	52
180	1450	1328	25	5.0	Very Dense	174	57
185	1471	1349	21	4.2	Very Dense	193	72
190	1493	1371	22	4.4	Very Dense	188	68
195	1513	1391	20	4.0	Very Dense	200	77
200	1535	1413	22	4.4	Very Dense	188	68
205	1558	1436	23	4.6	Very Dense	183	64
210	1580	1458	22	4.4	Very Dense	188	68
215	1603	1481	23	4.6	Very Dense	183	64
220	1629	1507	26	5.2	Dense	169	54
225	1658	1536	29	5.8	Dense	157	47
230	1685	1563	27	5.4	Dense	165	52
235	1709	1587	24	4.8	Very Dense	178	60
240	1724	1602	15	3.0	Very Dense	> 200	> 110
245	1746	1624	22	4.4	Very Dense	188	68
250	1770	1648	24	4.8	Very Dense	178	60

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 35 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1789	1667	19	3.8	Very Dense	> 200	82
260	1809	1687	20	4.0	Very Dense	200	77
265	1828	1706	19	3.8	Very Dense	> 200	82
270	1845	1723	17	3.4	Very Dense	> 200	95
275	1869	1747	24	4.8	Very Dense	178	60
280	1881	1759	12	2.4	Very Dense	> 200	> 110
285	1894	1772	13	2.6	Very Dense	> 200	> 110
290	1910	1788	16	3.2	Very Dense	> 200	103
295	1921	1799	11	2.2	Very Dense	> 200	> 110
300	1930	1808	9	1.8	Very Dense	> 200	> 110
305	1940	1818	10	2.0	Very Dense	> 200	> 110
310	1952	1830	12	2.4	Very Dense	> 200	> 110
315	1960	1838	8	1.6	Very Dense	> 200	> 110
320	1969	1847	9	1.8	Very Dense	> 200	> 110
325	1978	1856	9	1.8	Very Dense	> 200	> 110
330	1989	1867	11	2.2	Very Dense	> 200	> 110
335	1996	1874	7	1.4	Very Dense	> 200	> 110
340	2001	1879	5	1.0	Very Dense	> 200	> 110

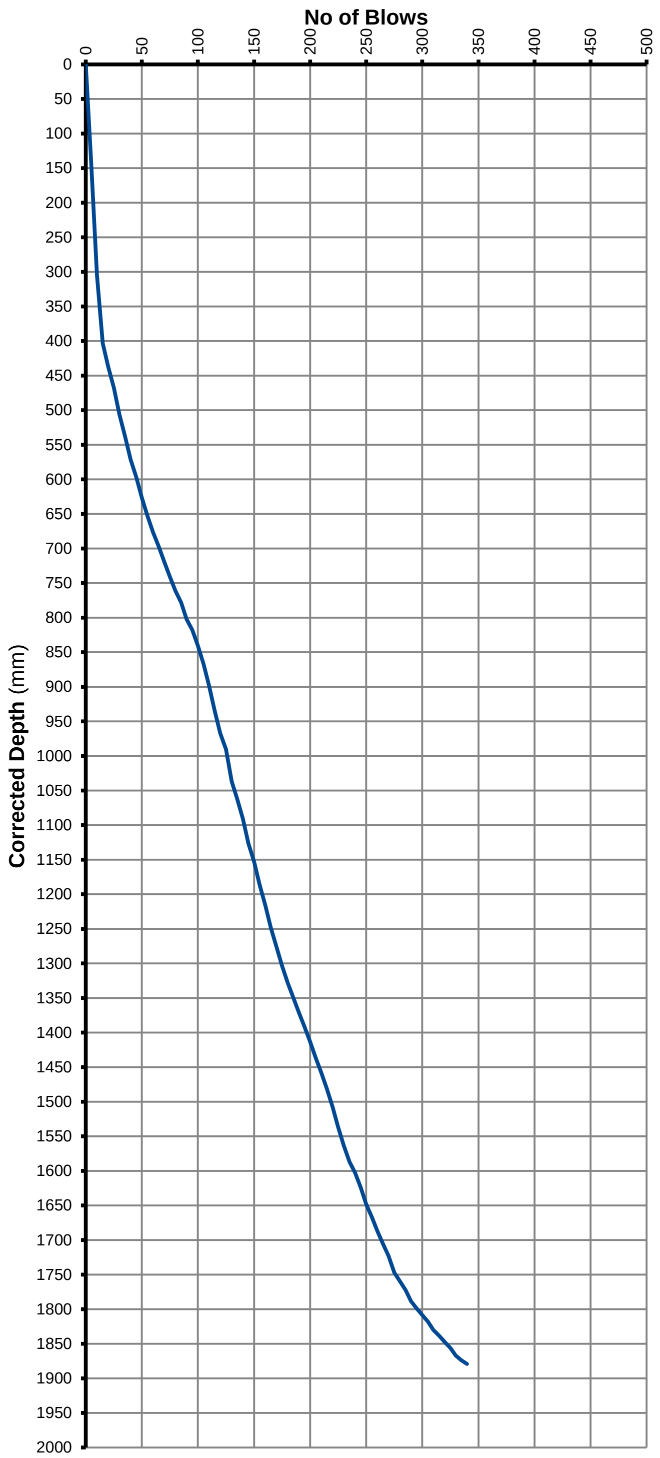
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

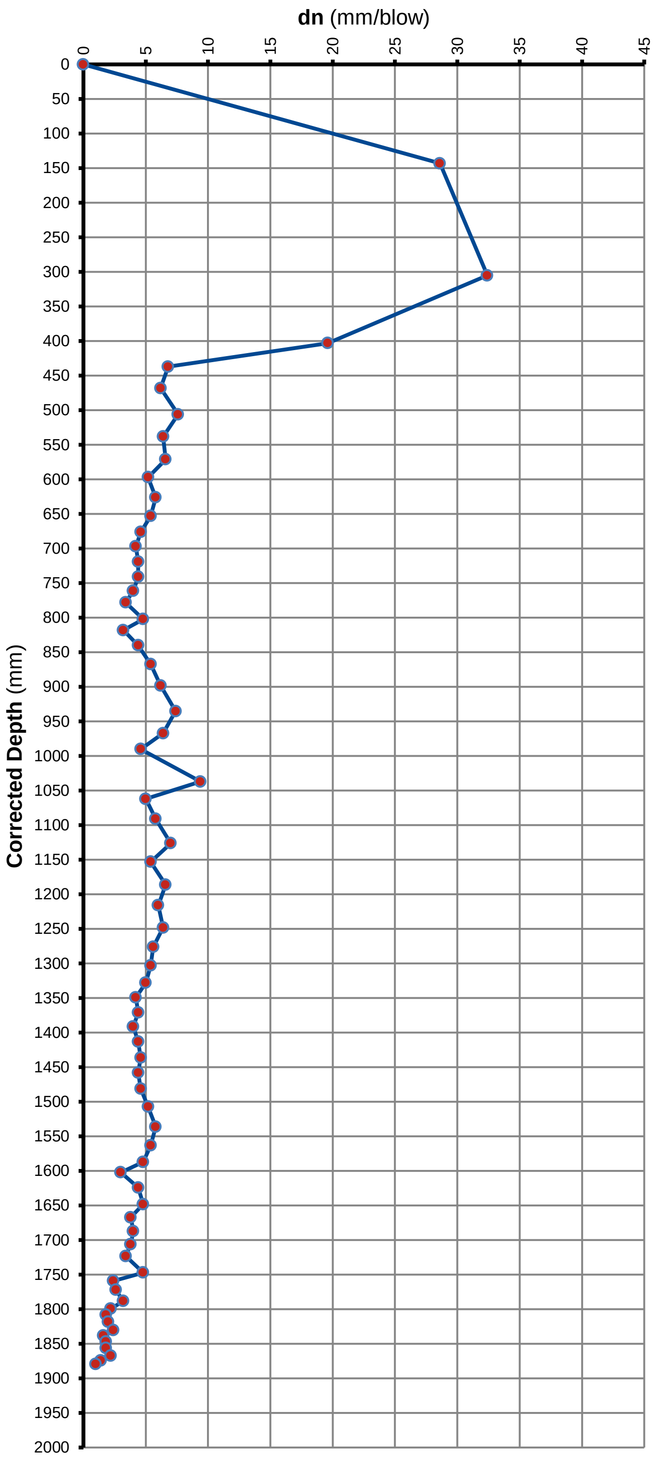
POSITION: DCP 35 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



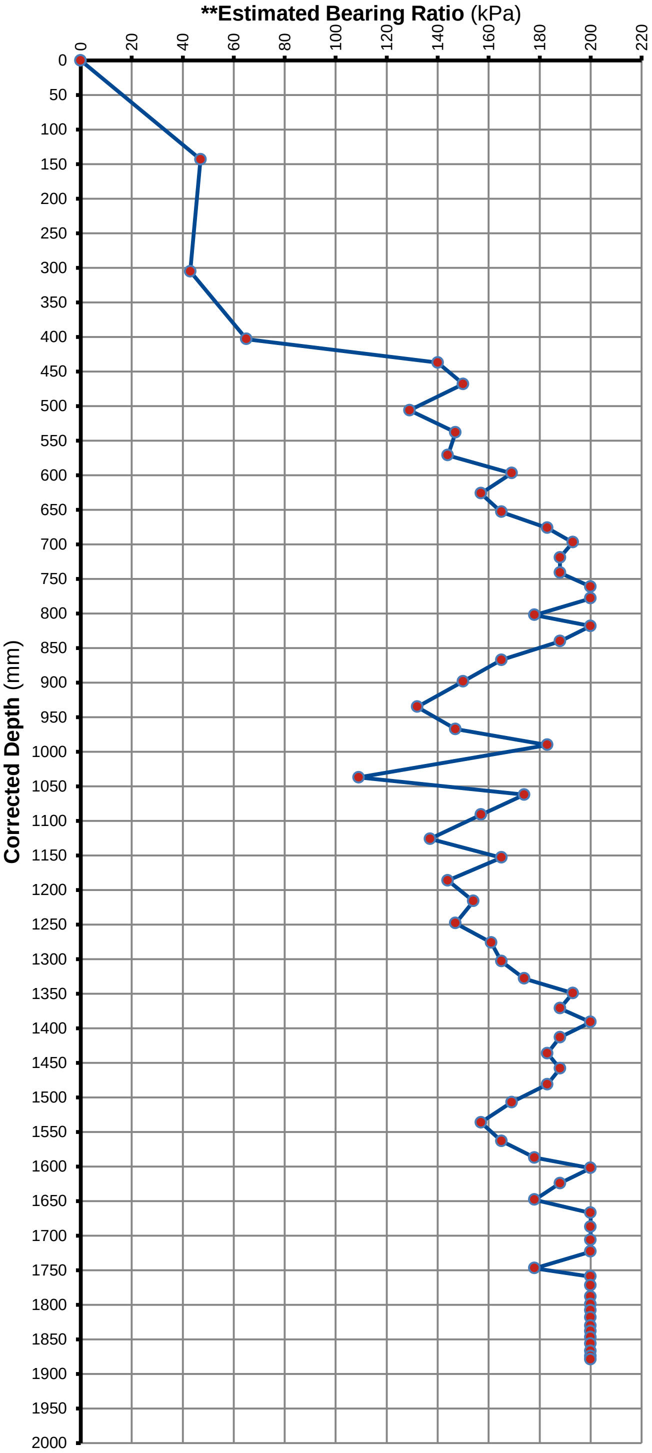
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

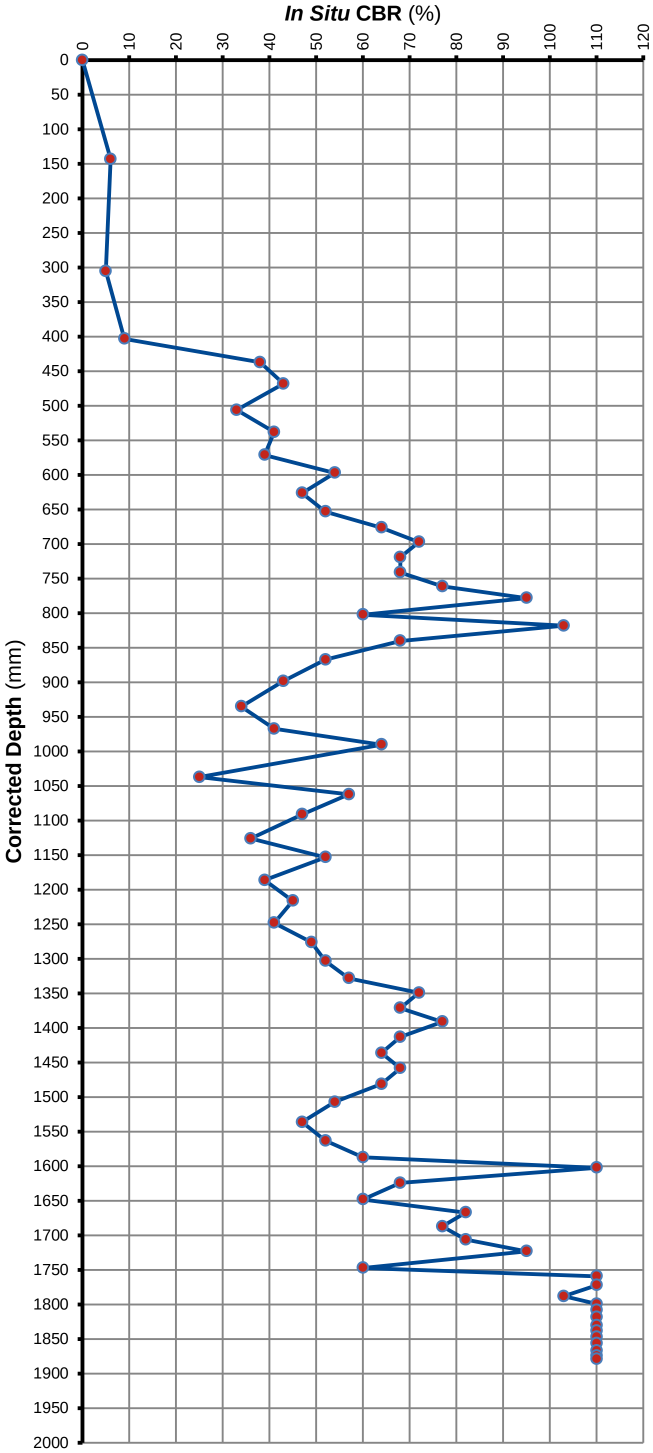
POSITION: DCP 35 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 36 **DEPTH BELOW NGL:** 0.000m

***DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)**

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	428	428	428	85.6	Very Loose	1	1
10	591	591	163	32.6	Loose	43	5
15	635	635	44	8.8	Dense	115	27
20	669	669	34	6.8	Dense	140	38
25	699	699	30	6.0	Dense	154	45
30	728	728	29	5.8	Dense	157	47
35	758	758	30	6.0	Dense	154	45
40	791	791	33	6.6	Dense	144	39
45	825	825	34	6.8	Dense	140	38
50	860	860	35	7.0	Dense	137	36
55	894	894	34	6.8	Dense	140	38
60	943	943	49	9.8	Dense	106	23
65	995	995	52	10.4	Dense	101	22
70	1030	1030	35	7.0	Dense	137	36
75	1061	1061	31	6.2	Dense	150	43
80	1093	1093	32	6.4	Dense	147	41
85	1123	1123	30	6.0	Dense	154	45
90	1150	1150	27	5.4	Dense	165	52
95	1172	1172	22	4.4	Very Dense	188	68
100	1195	1195	23	4.6	Very Dense	183	64
105	1219	1219	24	4.8	Very Dense	178	60
110	1249	1249	30	6.0	Dense	154	45
115	1268	1268	19	3.8	Very Dense	> 200	82
120	1292	1292	24	4.8	Very Dense	178	60
125	1315	1315	23	4.6	Very Dense	183	64
130	1344	1344	29	5.8	Dense	157	47
135	1370	1370	26	5.2	Dense	169	54
140	1390	1390	20	4.0	Very Dense	200	77
145	1409	1409	19	3.8	Very Dense	> 200	82
150	1425	1425	16	3.2	Very Dense	> 200	103
155	1443	1443	18	3.6	Very Dense	> 200	88
160	1460	1460	17	3.4	Very Dense	> 200	95
165	1479	1479	19	3.8	Very Dense	> 200	82
170	1490	1490	11	2.2	Very Dense	> 200	> 110
175	1508	1508	18	3.6	Very Dense	> 200	88
180	1521	1521	13	2.6	Very Dense	> 200	> 110
185	1535	1535	14	2.8	Very Dense	> 200	> 110
190	1546	1546	11	2.2	Very Dense	> 200	> 110
195	1555	1555	9	1.8	Very Dense	> 200	> 110
200	1569	1569	14	2.8	Very Dense	> 200	> 110
205	1581	1581	12	2.4	Very Dense	> 200	> 110
210	1597	1597	16	3.2	Very Dense	> 200	103
215	1611	1611	14	2.8	Very Dense	> 200	> 110
220	1622	1622	11	2.2	Very Dense	> 200	> 110
225	1629	1629	7	1.4	Very Dense	> 200	> 110
230	1638	1638	9	1.8	Very Dense	> 200	> 110
235	1650	1650	12	2.4	Very Dense	> 200	> 110
240	1658	1658	8	1.6	Very Dense	> 200	> 110
245	1665	1665	7	1.4	Very Dense	> 200	> 110
250	1674	1674	9	1.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 36 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1682	1682	8	1.6	Very Dense	> 200	> 110
260	1691	1691	9	1.8	Very Dense	> 200	> 110
265	1700	1700	9	1.8	Very Dense	> 200	> 110
270	1708	1708	8	1.6	Very Dense	> 200	> 110
275	1717	1717	9	1.8	Very Dense	> 200	> 110
280	1725	1725	8	1.6	Very Dense	> 200	> 110
285	1735	1735	10	2.0	Very Dense	> 200	> 110
290	1746	1746	11	2.2	Very Dense	> 200	> 110
295	1755	1755	9	1.8	Very Dense	> 200	> 110
300	1763	1763	8	1.6	Very Dense	> 200	> 110
305	1771	1771	8	1.6	Very Dense	> 200	> 110
310	1778	1778	7	1.4	Very Dense	> 200	> 110
315	1785	1785	7	1.4	Very Dense	> 200	> 110
320	1790	1790	5	1.0	Very Dense	> 200	> 110
325	1799	1799	9	1.8	Very Dense	> 200	> 110
330	1806	1806	7	1.4	Very Dense	> 200	> 110
335	1811	1811	5	1.0	Very Dense	> 200	> 110
340	1813	1813	2	0.4	Very Dense	> 200	> 110
345	1820	1820	7	1.4	Very Dense	> 200	> 110
350	1827	1827	7	1.4	Very Dense	> 200	> 110
355	1831	1831	4	0.8	Very Dense	> 200	> 110
360	1832	1832	1	0.2	Very Dense	> 200	> 110
365	1840	1840	8	1.6	Very Dense	> 200	> 110
370	1845	1845	5	1.0	Very Dense	> 200	> 110
375	1850	1850	5	1.0	Very Dense	> 200	> 110
380	1854	1854	4	0.8	Very Dense	> 200	> 110
385	1855	1855	1	0.2	Very Dense	> 200	> 110
390	1862	1862	7	1.4	Very Dense	> 200	> 110
395	1870	1870	8	1.6	Very Dense	> 200	> 110
400	1872	1872	2	0.4	Very Dense	> 200	> 110
405	1875	1875	3	0.6	Very Dense	> 200	> 110
410	1880	1880	5	1.0	Very Dense	> 200	> 110
415	1887	1887	7	1.4	Very Dense	> 200	> 110
420	1893	1893	6	1.2	Very Dense	> 200	> 110
425	1900	1900	7	1.4	Very Dense	> 200	> 110
430	1909	1909	9	1.8	Very Dense	> 200	> 110
435	1911	1911	2	0.4	Very Dense	> 200	> 110
440	1915	1915	4	0.8	Very Dense	> 200	> 110
445	1920	1920	5	1.0	Very Dense	> 200	> 110
450	1926	1926	6	1.2	Very Dense	> 200	> 110
455	1931	1931	5	1.0	Very Dense	> 200	> 110
460	1935	1935	4	0.8	Very Dense	> 200	> 110
465	1943	1943	8	1.6	Very Dense	> 200	> 110
470	1950	1950	7	1.4	Very Dense	> 200	> 110
475	1955	1955	5	1.0	Very Dense	> 200	> 110
480	1960	1960	5	1.0	Very Dense	> 200	> 110
485	1967	1967	7	1.4	Very Dense	> 200	> 110
490	1971	1971	4	0.8	Very Dense	> 200	> 110
495	1979	1979	8	1.6	Very Dense	> 200	> 110
500	1987	1987	8	1.6	Very Dense	> 200	> 110
505	1993	1993	6	1.2	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 36 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

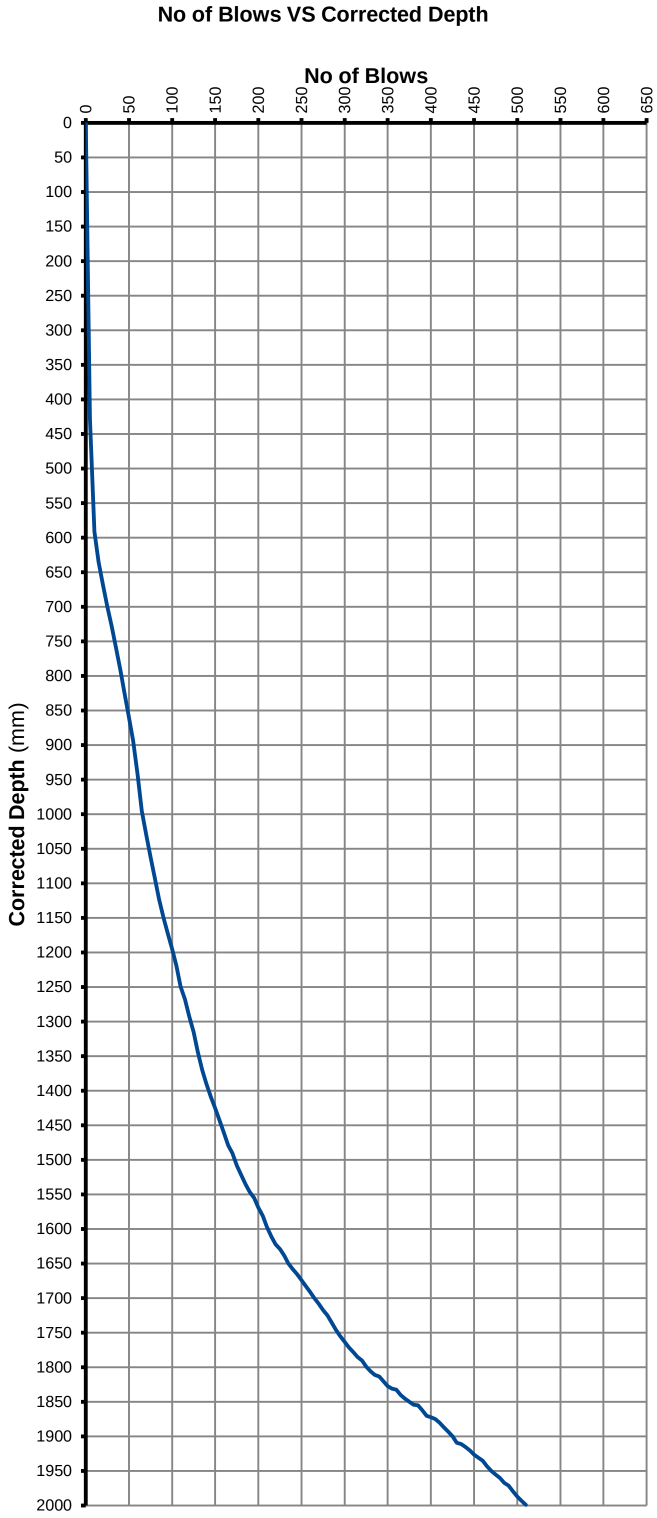
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
510	1999	1999	6	1.2	Very Dense	> 200	> 110

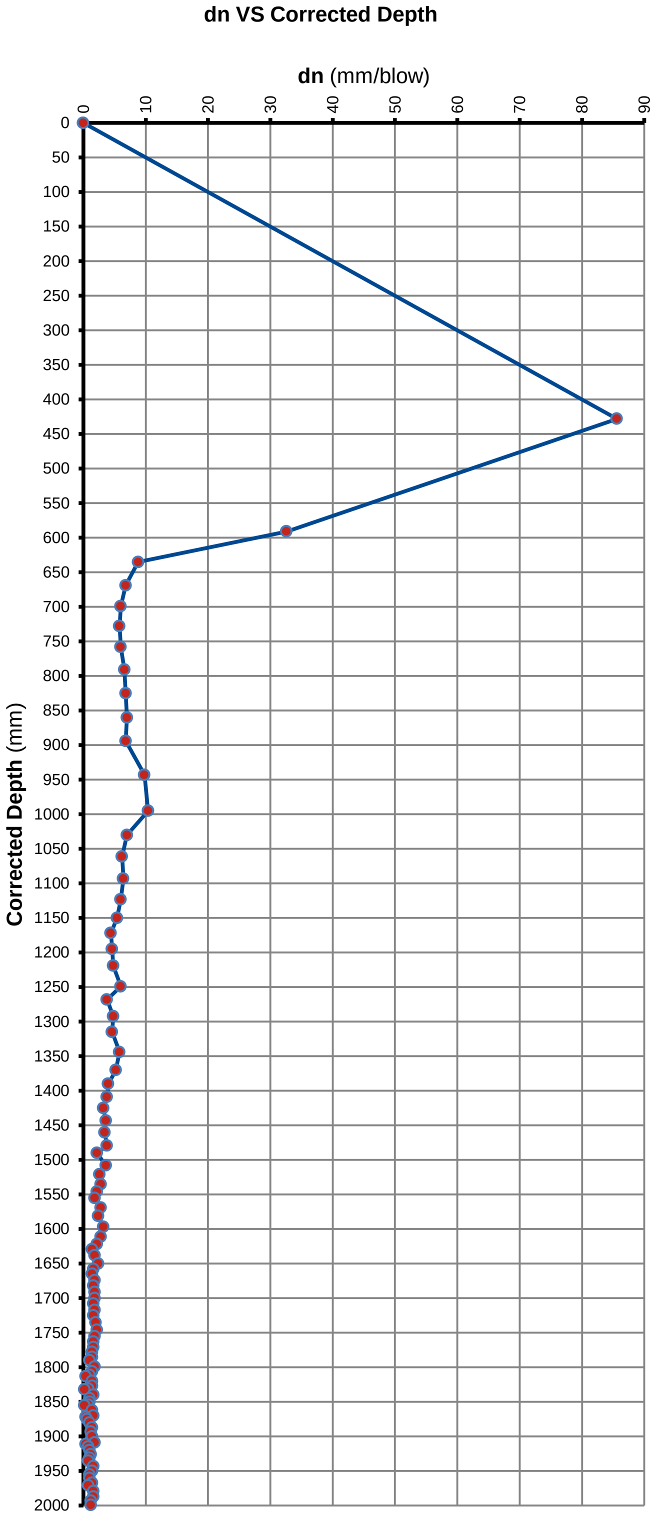
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 36 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





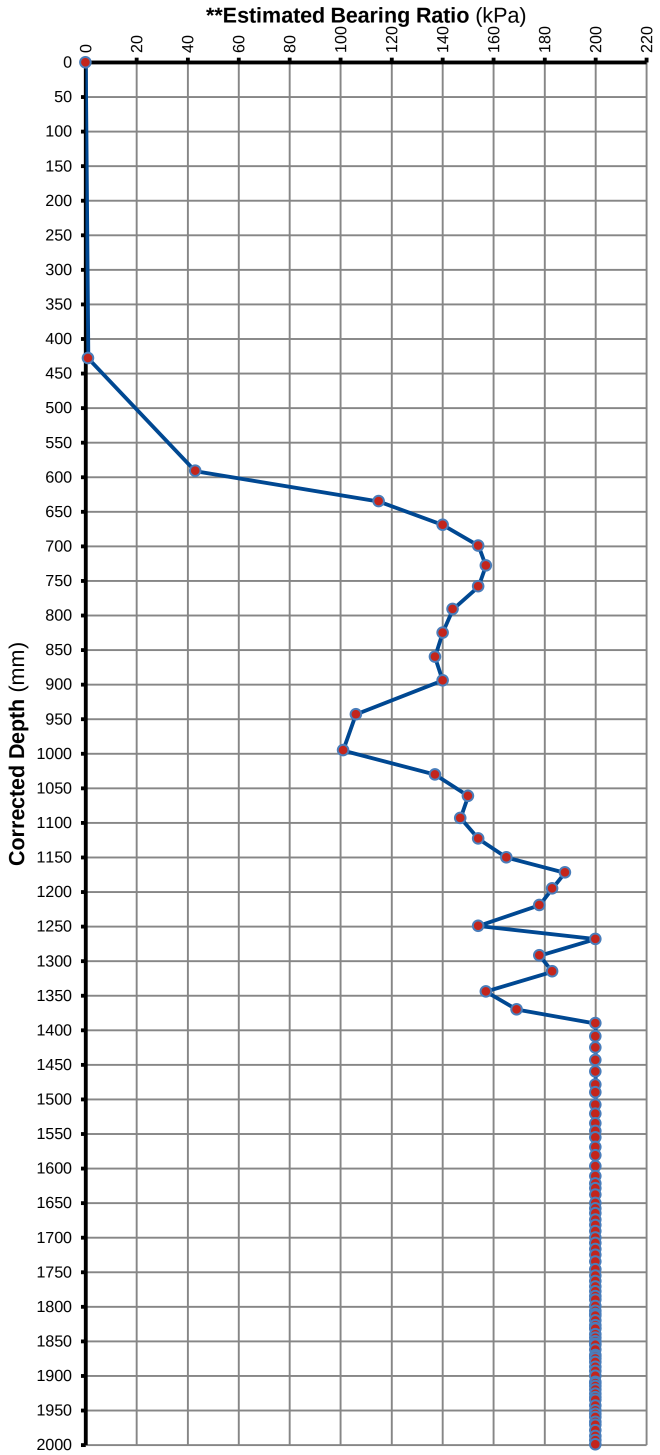
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

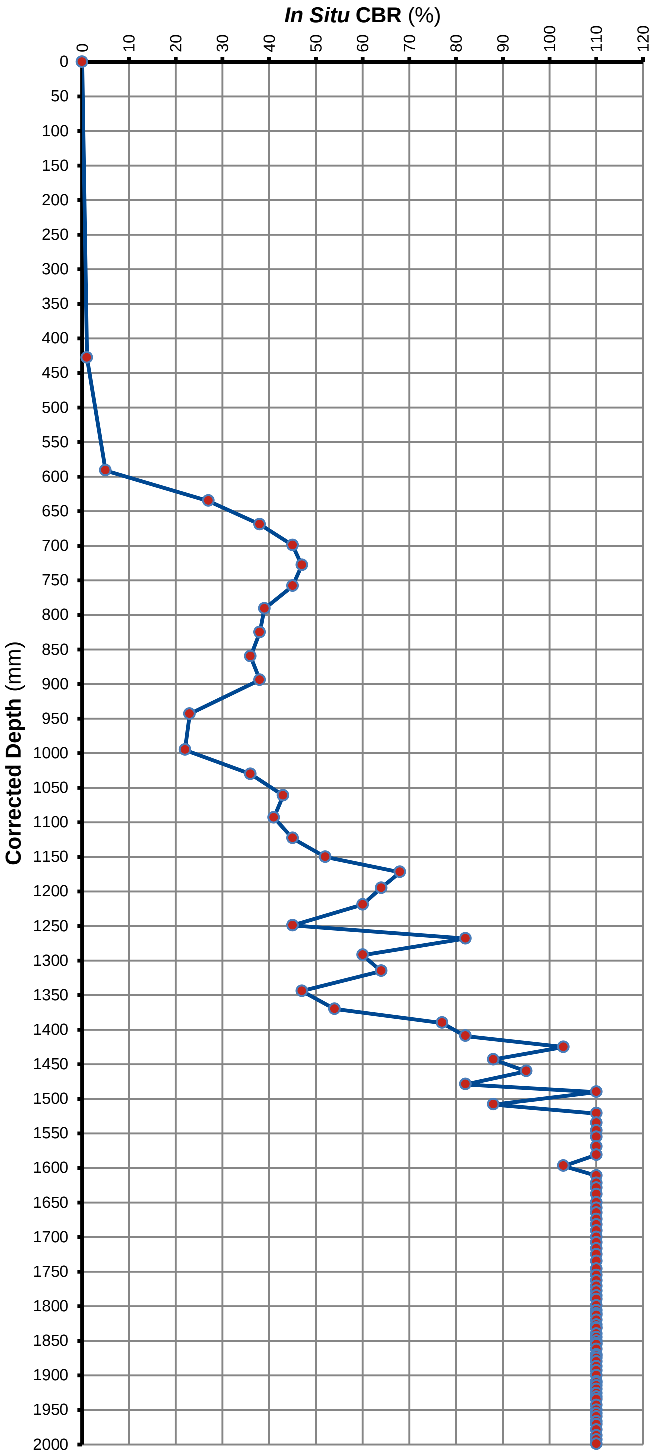
POSITION: DCP 36 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 37 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	182	182	182	36.4	Loose	41	4
10	280	280	98	19.6	Medium Dense	65	9
15	351	351	71	14.2	Medium Dense	81	14
20	415	415	64	12.8	Medium Dense	87	16
25	467	467	52	10.4	Dense	101	22
30	515	515	48	9.6	Dense	107	24
35	561	561	46	9.2	Dense	111	25
40	603	603	42	8.4	Dense	119	29
45	648	648	45	9.0	Dense	113	26
50	682	682	34	6.8	Dense	140	38
55	714	714	32	6.4	Dense	147	41
60	746	746	32	6.4	Dense	147	41
65	781	781	35	7.0	Dense	137	36
70	823	823	42	8.4	Dense	119	29
75	855	855	32	6.4	Dense	147	41
80	896	896	41	8.2	Dense	122	30
85	932	932	36	7.2	Dense	134	35
90	960	960	28	5.6	Dense	161	49
95	989	989	29	5.8	Dense	157	47
100	1005	1005	16	3.2	Very Dense	> 200	103
105	1040	1040	35	7.0	Dense	137	36
110	1068	1068	28	5.6	Dense	161	49
115	1095	1095	27	5.4	Dense	165	52
120	1122	1122	27	5.4	Dense	165	52
125	1141	1141	19	3.8	Very Dense	> 200	82
130	1162	1162	21	4.2	Very Dense	193	72
135	1184	1184	22	4.4	Very Dense	188	68
140	1208	1208	24	4.8	Very Dense	178	60
145	1233	1233	25	5.0	Very Dense	174	57
150	1256	1256	23	4.6	Very Dense	183	64
155	1281	1281	25	5.0	Very Dense	174	57
160	1309	1309	28	5.6	Dense	161	49
165	1331	1331	22	4.4	Very Dense	188	68
170	1354	1354	23	4.6	Very Dense	183	64
175	1372	1372	18	3.6	Very Dense	> 200	88
180	1390	1390	18	3.6	Very Dense	> 200	88
185	1410	1410	20	4.0	Very Dense	200	77
190	1425	1425	15	3.0	Very Dense	> 200	> 110
195	1437	1437	12	2.4	Very Dense	> 200	> 110
200	1449	1449	12	2.4	Very Dense	> 200	> 110
205	1458	1458	9	1.8	Very Dense	> 200	> 110
210	1465	1465	7	1.4	Very Dense	> 200	> 110
215	1473	1473	8	1.6	Very Dense	> 200	> 110
220	1481	1481	8	1.6	Very Dense	> 200	> 110
225	1490	1490	9	1.8	Very Dense	> 200	> 110
230	1498	1498	8	1.6	Very Dense	> 200	> 110
235	1506	1506	8	1.6	Very Dense	> 200	> 110
240	1511	1511	5	1.0	Very Dense	> 200	> 110
245	1520	1520	9	1.8	Very Dense	> 200	> 110
250	1529	1529	9	1.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 37 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1533	1533	4	0.8	Very Dense	> 200	> 110
260	1540	1540	7	1.4	Very Dense	> 200	> 110
265	1549	1549	9	1.8	Very Dense	> 200	> 110
270	1555	1555	6	1.2	Very Dense	> 200	> 110
275	1561	1561	6	1.2	Very Dense	> 200	> 110
280	1570	1570	9	1.8	Very Dense	> 200	> 110
285	1576	1576	6	1.2	Very Dense	> 200	> 110
290	1579	1579	3	0.6	Very Dense	> 200	> 110
295	1581	1581	2	0.4	Very Dense	> 200	> 110
300	1588	1588	7	1.4	Very Dense	> 200	> 110
305	1592	1592	4	0.8	Very Dense	> 200	> 110
310	1599	1599	7	1.4	Very Dense	> 200	> 110
315	1600	1600	1	0.2	Very Dense	> 200	> 110
320	1609	1609	9	1.8	Very Dense	> 200	> 110
325	1609	1609	0	0.0	Very Dense	> 200	> 110
330	1619	1619	10	2.0	Very Dense	> 200	> 110
335	1625	1625	6	1.2	Very Dense	> 200	> 110
340	1631	1631	6	1.2	Very Dense	> 200	> 110
345	1631	1631	0	0.0	Very Dense	> 200	> 110
350	Refusal						

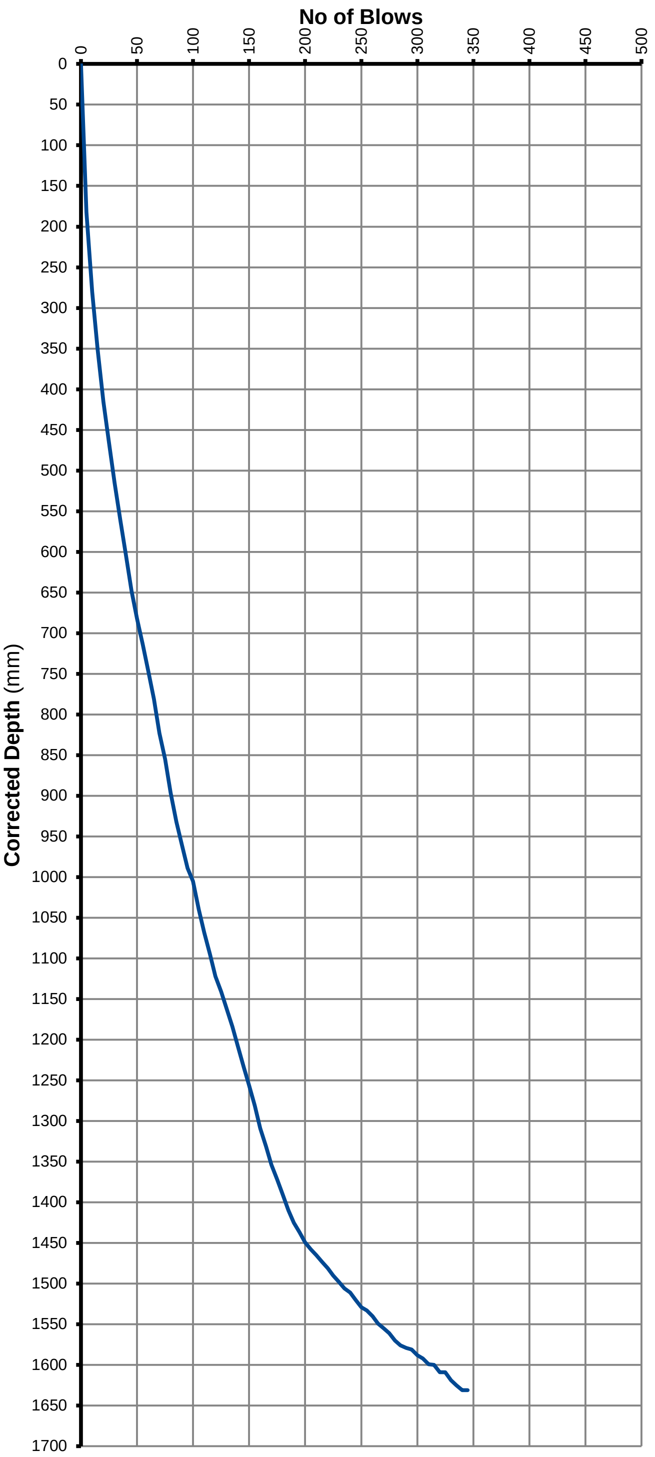
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

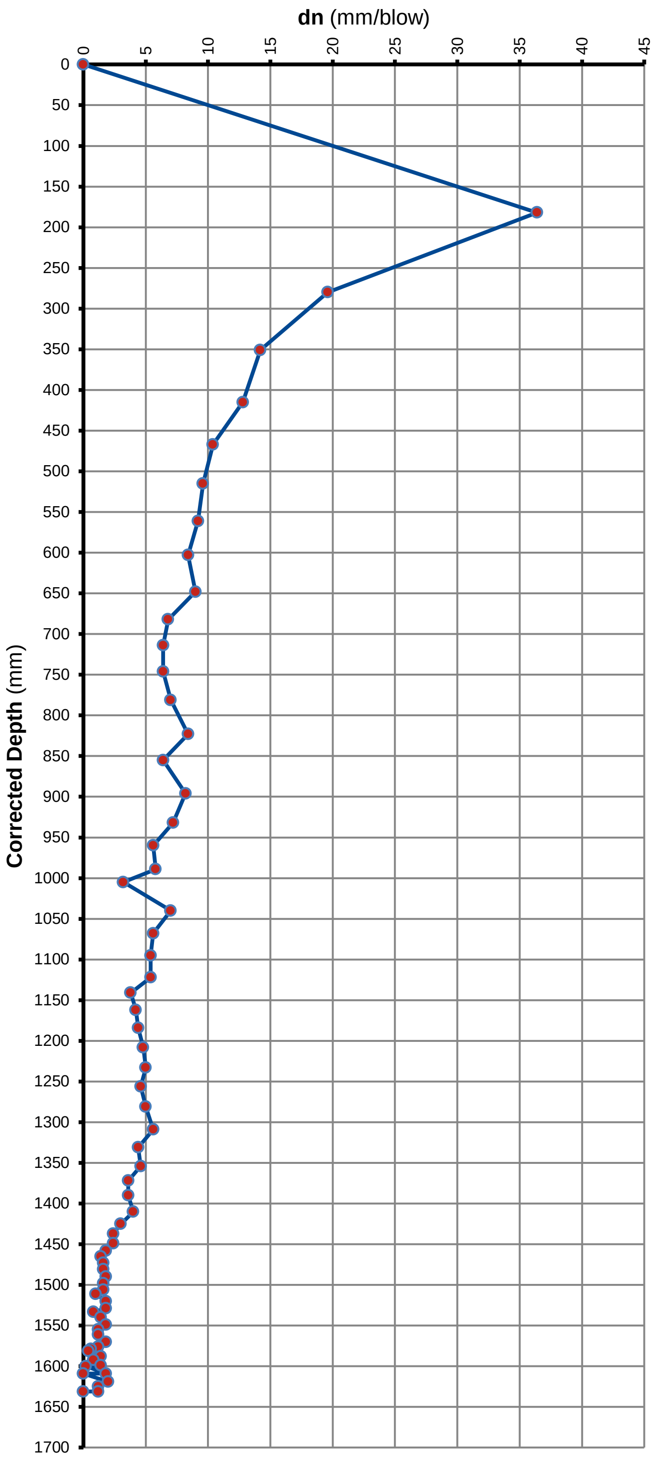
POSITION: DCP 37 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

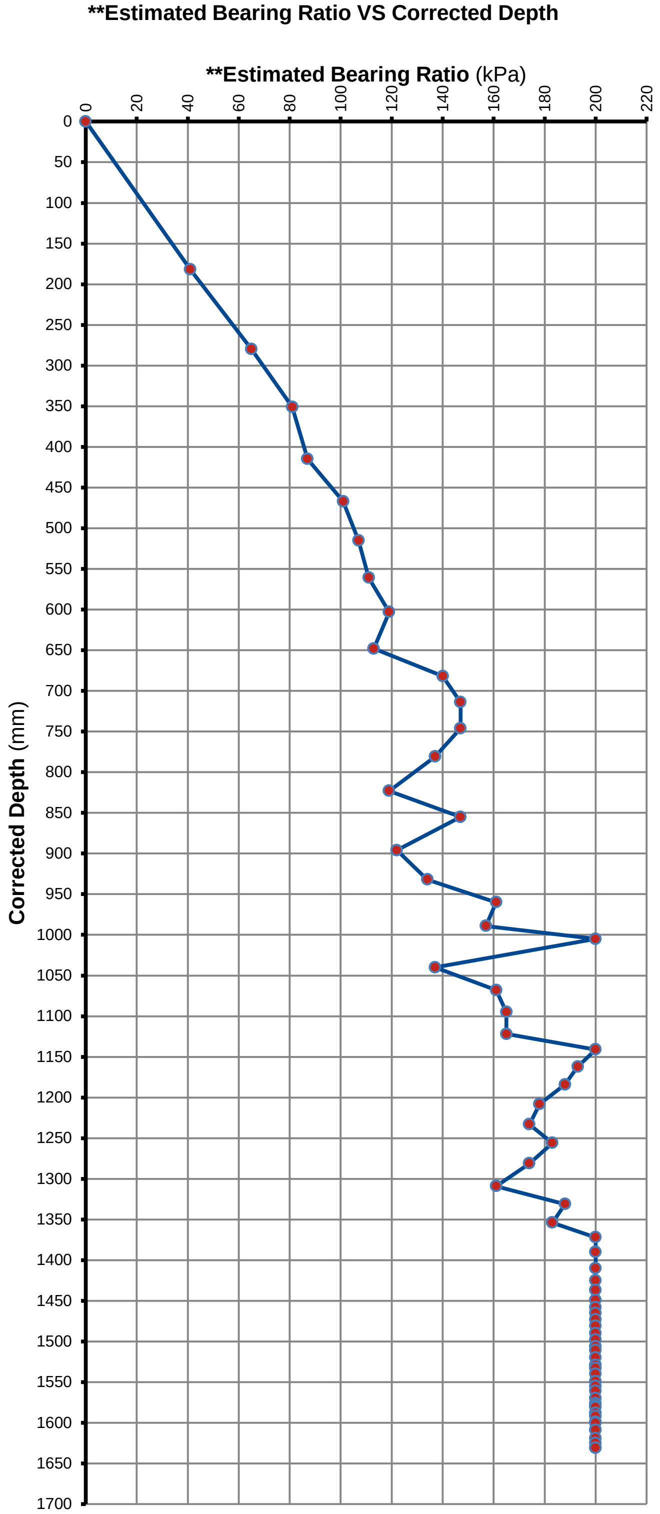


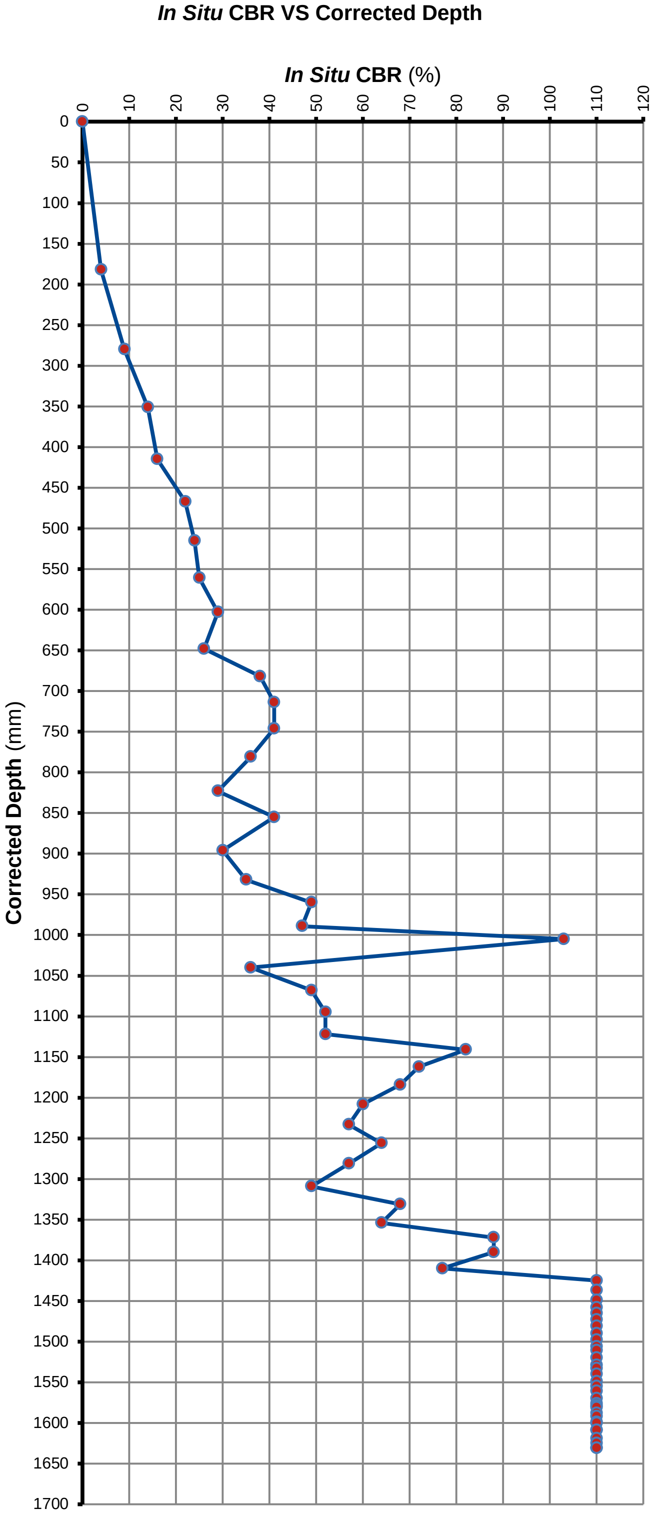
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 37 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


**Estimated Bearing Ratio VS Corrected Depth


In Situ CBR VS Corrected Depth

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 38 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	251	251	251	50.2	Loose	27	3
10	312	312	61	12.2	Dense	90	17
15	370	370	58	11.6	Dense	93	19
20	420	420	50	10.0	Dense	104	23
25	469	469	49	9.8	Dense	106	23
30	521	521	52	10.4	Dense	101	22
35	570	570	49	9.8	Dense	106	23
40	620	620	50	10.0	Dense	104	23
45	670	670	50	10.0	Dense	104	23
50	718	718	48	9.6	Dense	107	24
55	755	755	37	7.4	Dense	132	34
60	786	786	31	6.2	Dense	150	43
65	820	820	34	6.8	Dense	140	38
70	848	848	28	5.6	Dense	161	49
75	880	880	32	6.4	Dense	147	41
80	908	908	28	5.6	Dense	161	49
85	931	931	23	4.6	Very Dense	183	64
90	958	958	27	5.4	Dense	165	52
95	985	985	27	5.4	Dense	165	52
100	1006	1006	21	4.2	Very Dense	193	72
105	1025	1025	19	3.8	Very Dense	> 200	82
110	1042	1042	17	3.4	Very Dense	> 200	95
115	1060	1060	18	3.6	Very Dense	> 200	88
120	1079	1079	19	3.8	Very Dense	> 200	82
125	1096	1096	17	3.4	Very Dense	> 200	95
130	1111	1111	15	3.0	Very Dense	> 200	> 110
135	1130	1130	19	3.8	Very Dense	> 200	82
140	1151	1151	21	4.2	Very Dense	193	72
145	1171	1171	20	4.0	Very Dense	200	77
150	1192	1192	21	4.2	Very Dense	193	72
155	1212	1212	20	4.0	Very Dense	200	77
160	1234	1234	22	4.4	Very Dense	188	68
165	1253	1253	19	3.8	Very Dense	> 200	82
170	1272	1272	19	3.8	Very Dense	> 200	82
175	1294	1294	22	4.4	Very Dense	188	68
180	1311	1311	17	3.4	Very Dense	> 200	95
185	1330	1330	19	3.8	Very Dense	> 200	82
190	1349	1349	19	3.8	Very Dense	> 200	82
195	1373	1373	24	4.8	Very Dense	178	60
200	1390	1390	17	3.4	Very Dense	> 200	95
205	1405	1405	15	3.0	Very Dense	> 200	> 110
210	1421	1421	16	3.2	Very Dense	> 200	103
215	1434	1434	13	2.6	Very Dense	> 200	> 110
220	1450	1450	16	3.2	Very Dense	> 200	103
225	1465	1465	15	3.0	Very Dense	> 200	> 110
230	1480	1480	15	3.0	Very Dense	> 200	> 110
235	1490	1490	10	2.0	Very Dense	> 200	> 110
240	1500	1500	10	2.0	Very Dense	> 200	> 110
245	1512	1512	12	2.4	Very Dense	> 200	> 110
250	1521	1521	9	1.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 38 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1530	1530	9	1.8	Very Dense	> 200	> 110
260	1539	1539	9	1.8	Very Dense	> 200	> 110
265	1549	1549	10	2.0	Very Dense	> 200	> 110
270	1550	1550	1	0.2	Very Dense	> 200	> 110
275	1550	1550	0	0.0	Very Dense	> 200	> 110
280	Refusal						

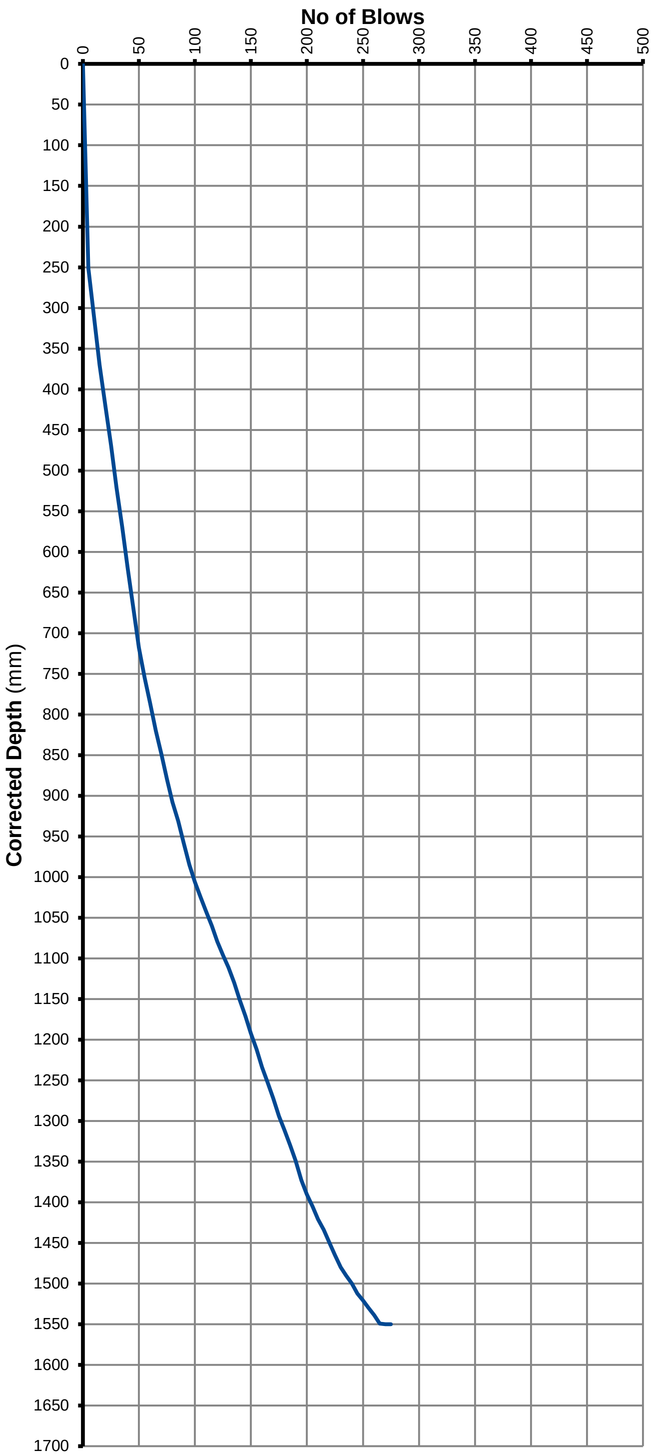
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

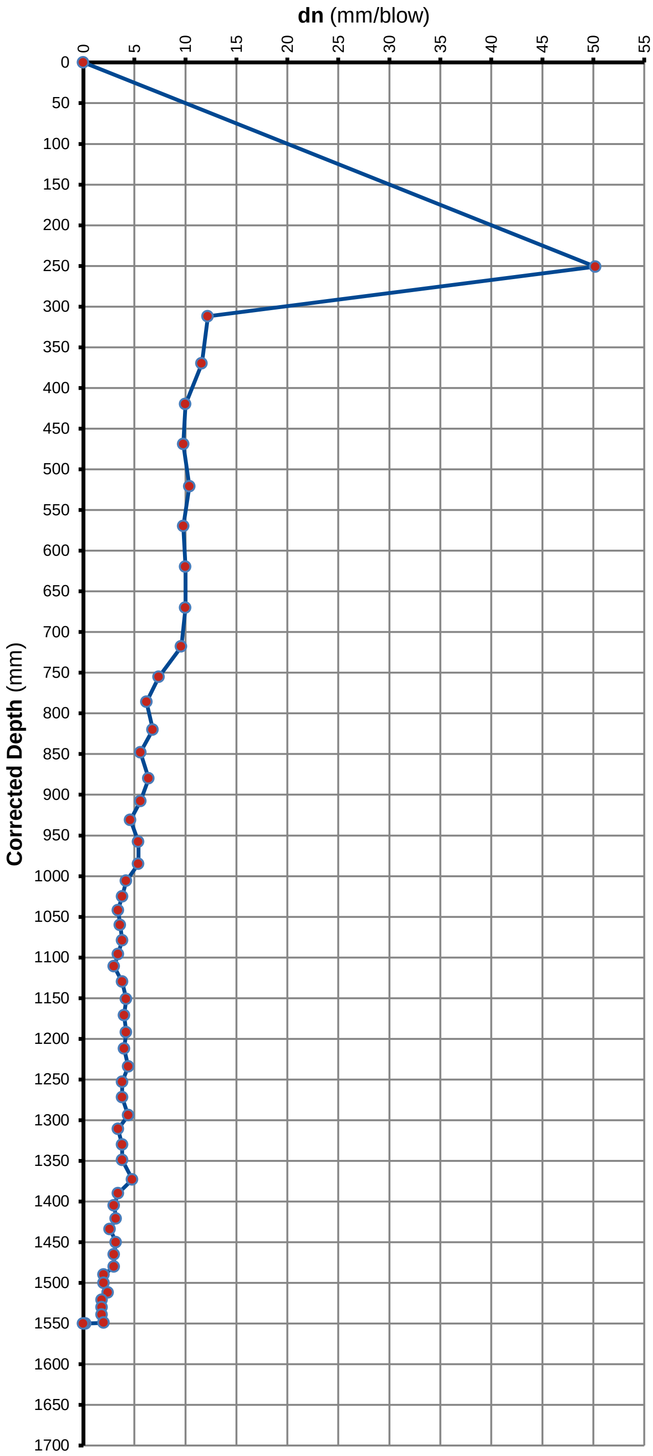
POSITION: DCP 38 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



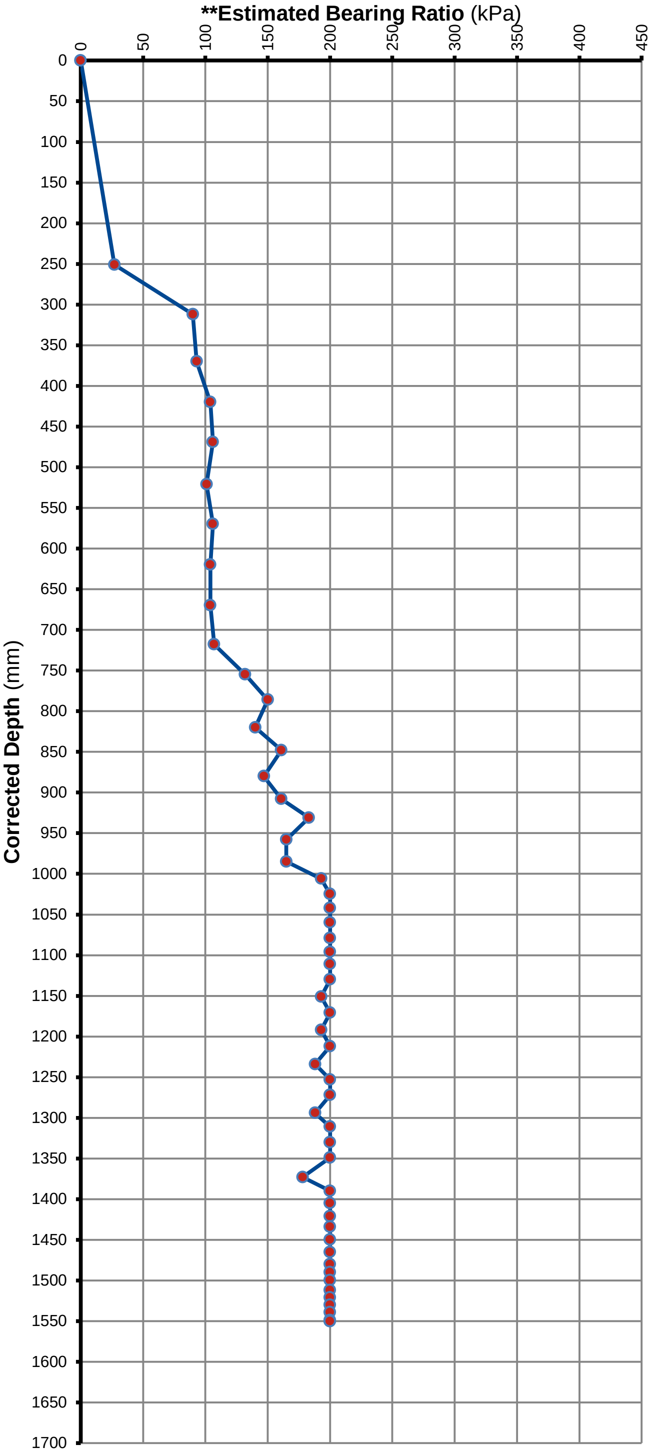
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

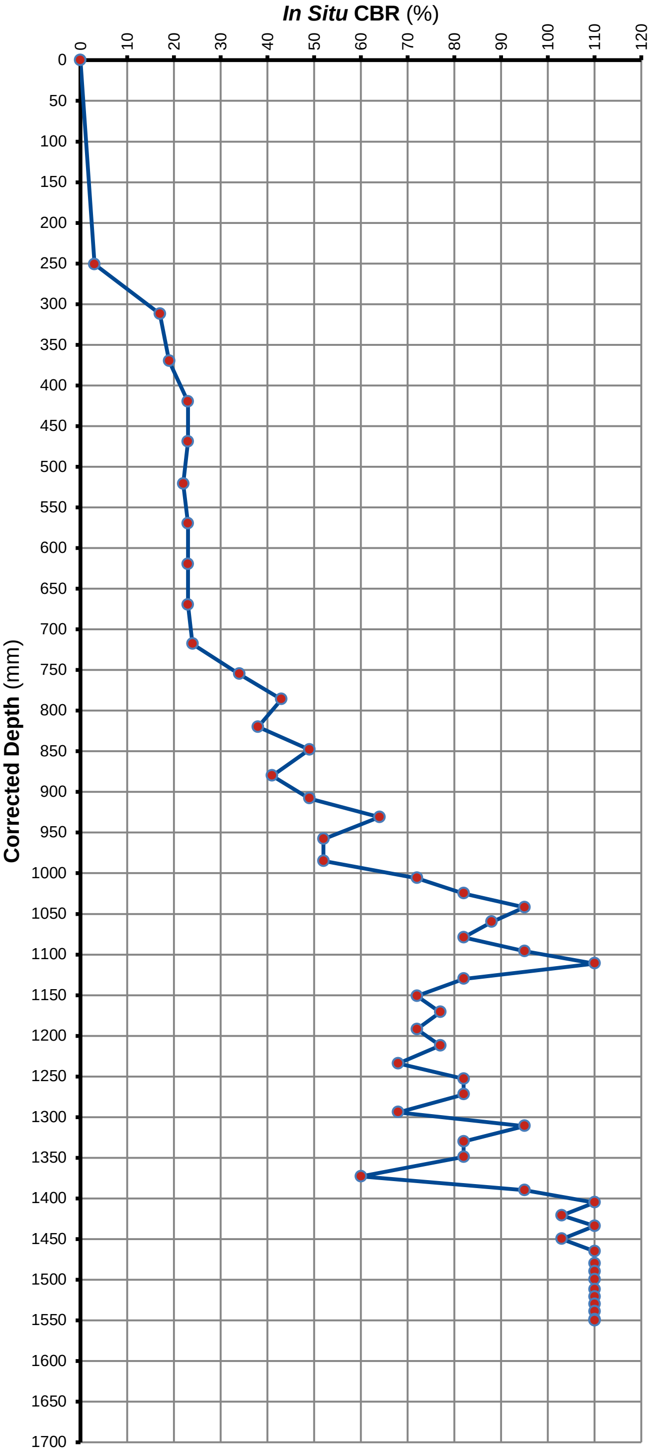
POSITION: DCP 38 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 39 **DEPTH BELOW NGL:** 120

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	238	238	238	47.6	Loose	34	3
10	341	341	103	20.6	Medium Dense	63	9
15	385	385	44	8.8	Dense	115	27
20	413	413	28	5.6	Dense	161	49
25	430	430	17	3.4	Very Dense	> 200	95
30	454	454	24	4.8	Very Dense	178	60
35	486	486	32	6.4	Dense	147	41
40	507	507	21	4.2	Very Dense	193	72
45	537	537	30	6.0	Dense	154	45
50	570	570	33	6.6	Dense	144	39
55	612	612	42	8.4	Dense	119	29
60	645	645	33	6.6	Dense	144	39
65	709	709	64	12.8	Medium Dense	87	16
70	768	768	59	11.8	Dense	92	18
75	811	811	43	8.6	Dense	117	28
80	845	845	34	6.8	Dense	140	38
85	873	873	28	5.6	Dense	161	49
90	896	896	23	4.6	Very Dense	183	64
95	913	913	17	3.4	Very Dense	> 200	95
100	931	931	18	3.6	Very Dense	> 200	88
105	949	949	18	3.6	Very Dense	> 200	88
110	970	970	21	4.2	Very Dense	193	72
115	988	988	18	3.6	Very Dense	> 200	88
120	1013	1013	25	5.0	Very Dense	174	57
125	1030	1030	17	3.4	Very Dense	> 200	95
130	1060	1060	30	6.0	Dense	154	45
135	1085	1085	25	5.0	Very Dense	174	57
140	1112	1112	27	5.4	Dense	165	52
145	1134	1134	22	4.4	Very Dense	188	68
150	1158	1158	24	4.8	Very Dense	178	60
155	1176	1176	18	3.6	Very Dense	> 200	88
160	1194	1194	18	3.6	Very Dense	> 200	88
165	1211	1211	17	3.4	Very Dense	> 200	95
170	1230	1230	19	3.8	Very Dense	> 200	82
175	1245	1245	15	3.0	Very Dense	> 200	> 110
180	1256	1256	11	2.2	Very Dense	> 200	> 110
185	1270	1270	14	2.8	Very Dense	> 200	> 110
190	1280	1280	10	2.0	Very Dense	> 200	> 110
195	1292	1292	12	2.4	Very Dense	> 200	> 110
200	1301	1301	9	1.8	Very Dense	> 200	> 110
205	1309	1309	8	1.6	Very Dense	> 200	> 110
210	1318	1318	9	1.8	Very Dense	> 200	> 110
215	1326	1326	8	1.6	Very Dense	> 200	> 110
220	1335	1335	9	1.8	Very Dense	> 200	> 110
225	1335	1335	0	0.0	Very Dense	> 200	> 110
230	Refusal						

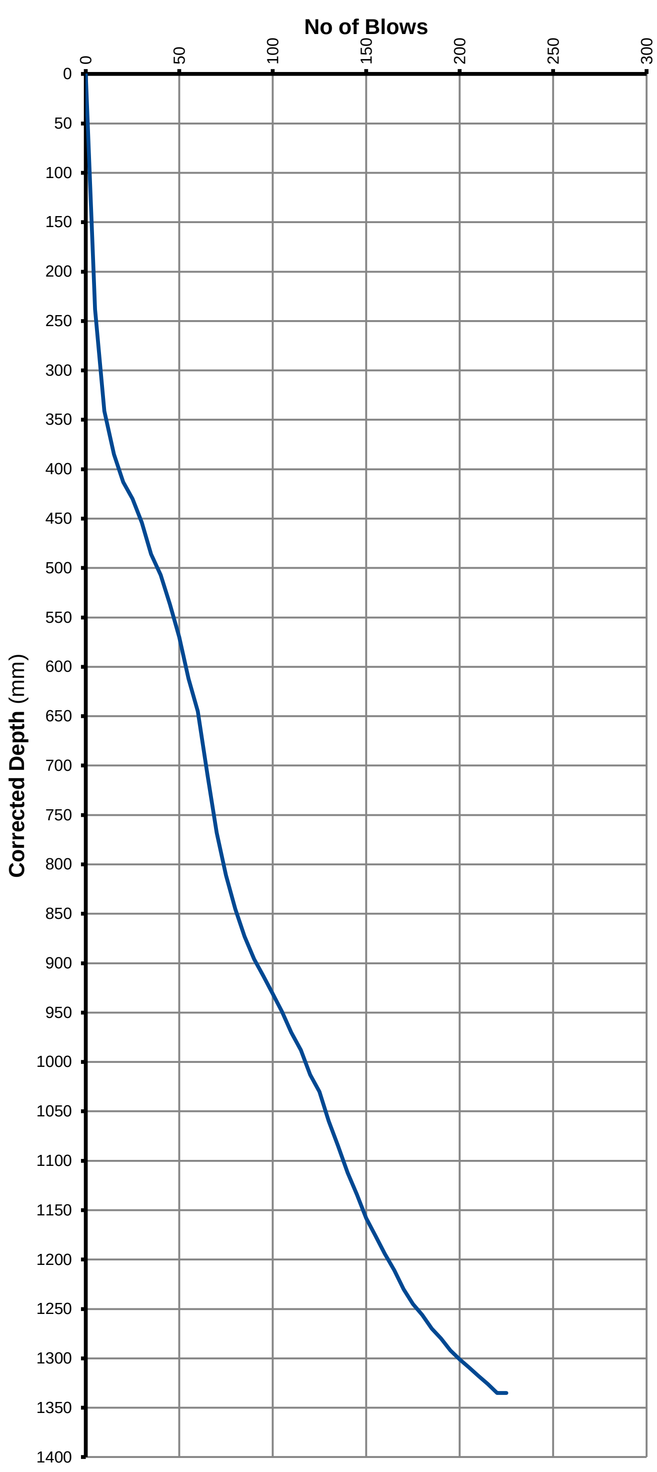
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

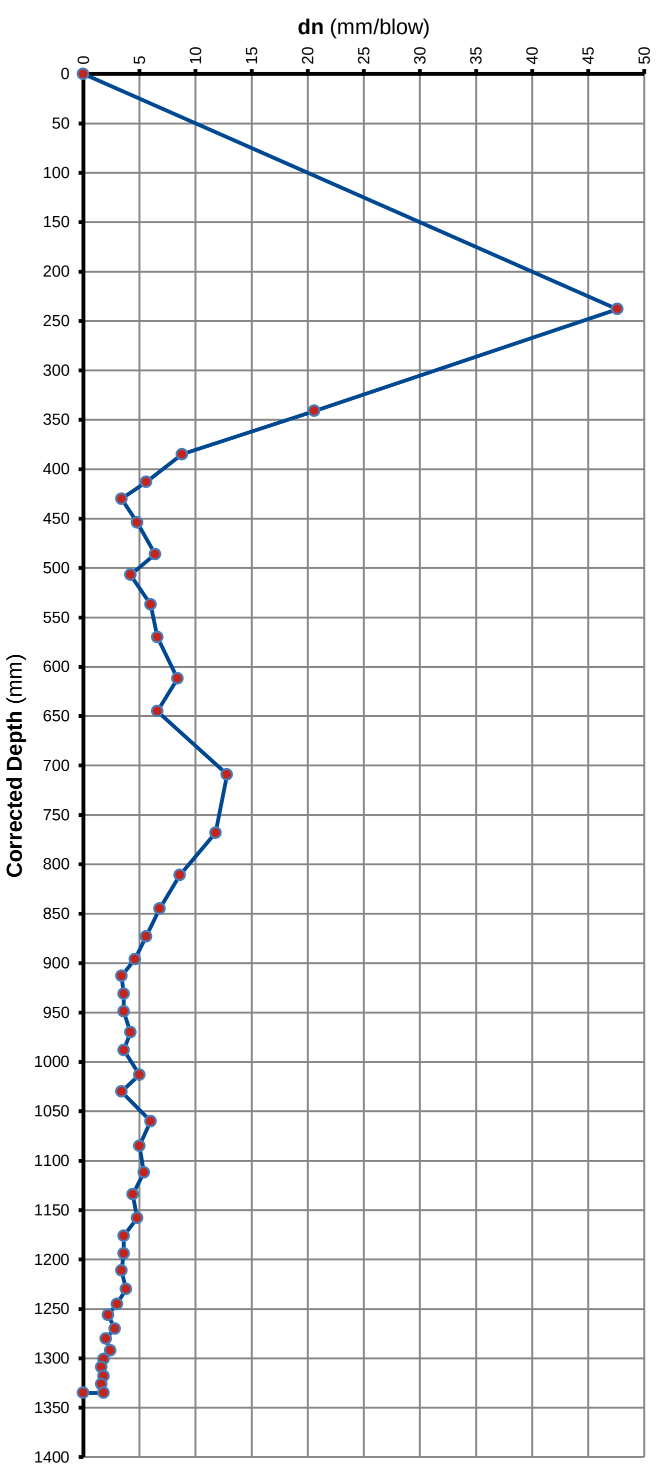
POSITION: DCP 39 **DEPTH BELOW NGL:** 120

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



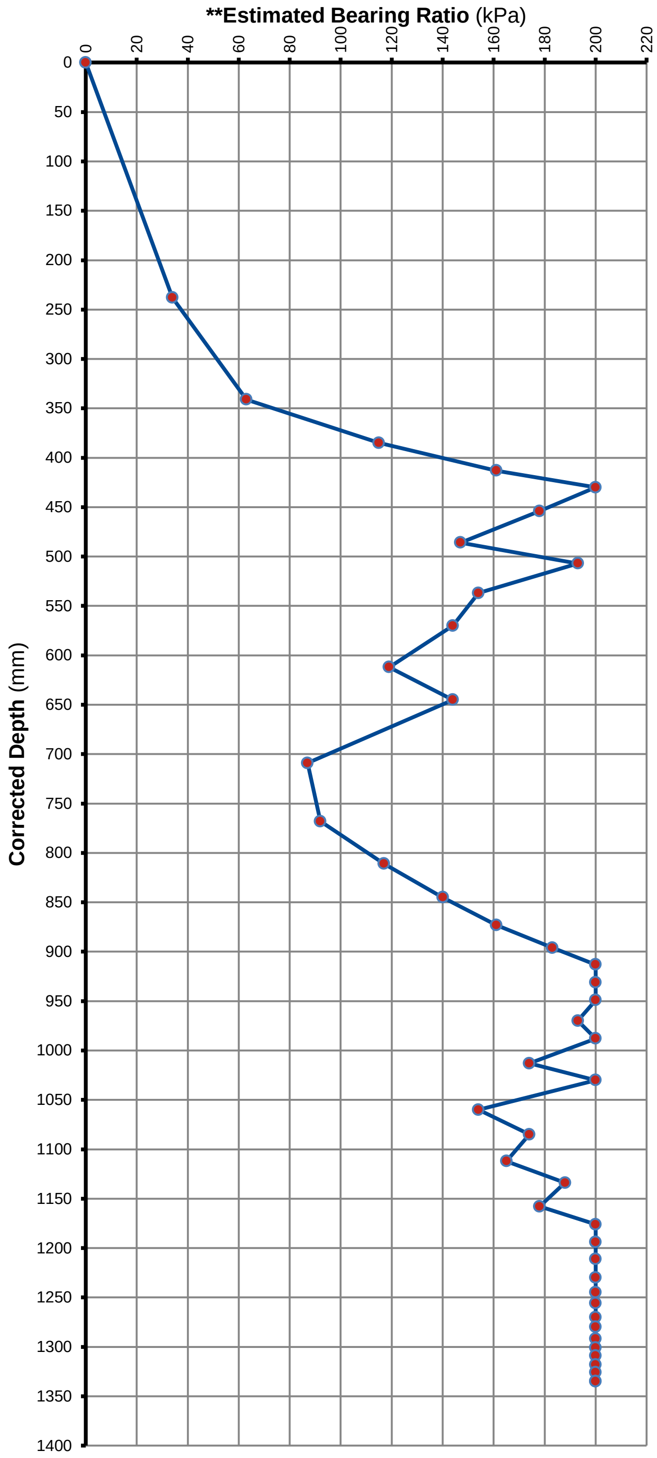
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

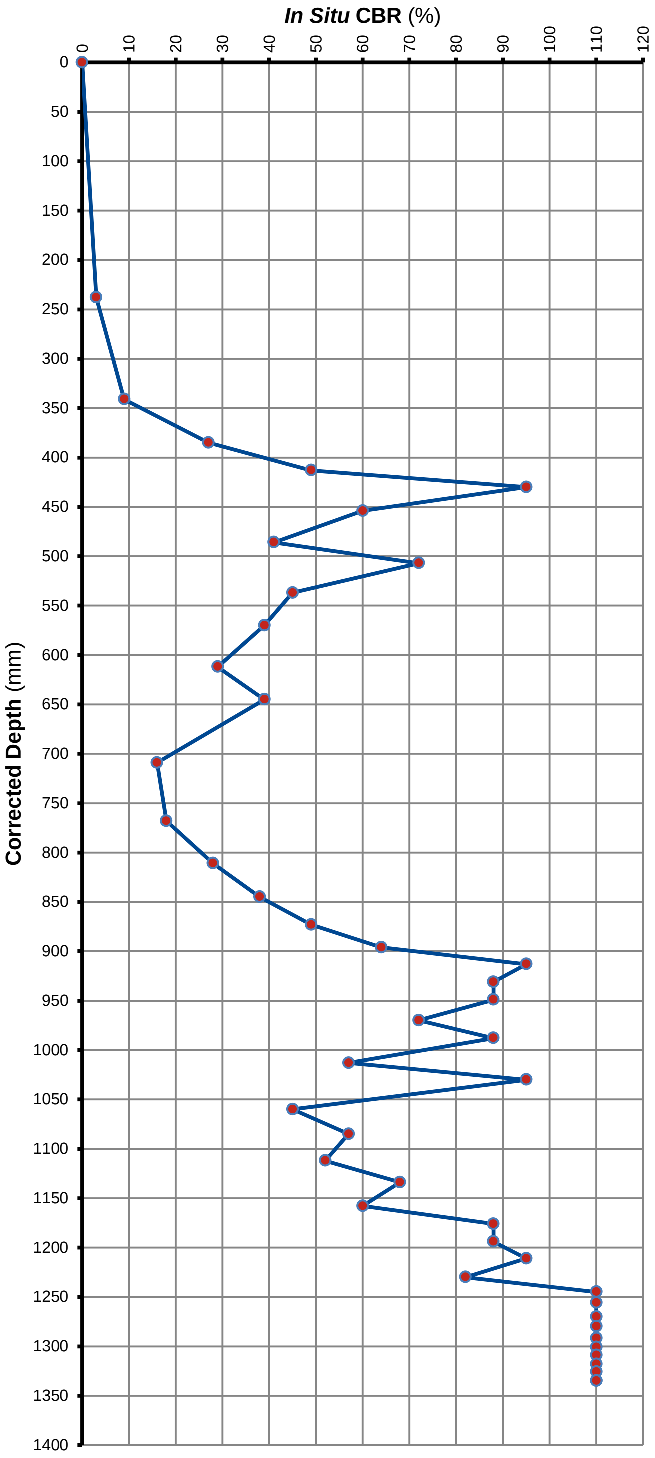
POSITION: DCP 39 **DEPTH BELOW NGL:** 120

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 40 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	171	171	171	34.2	Loose	42	4
10	285	285	114	22.8	Medium Dense	58	8
15	344	344	59	11.8	Dense	92	18
20	400	400	56	11.2	Dense	95	20
25	461	461	61	12.2	Dense	90	17
30	521	521	60	12.0	Dense	91	18
35	560	560	39	7.8	Dense	126	32
40	589	589	29	5.8	Dense	157	47
45	618	618	29	5.8	Dense	157	47
50	635	635	17	3.4	Very Dense	> 200	95
55	650	650	15	3.0	Very Dense	> 200	> 110
60	673	673	23	4.6	Very Dense	183	64
65	696	696	23	4.6	Very Dense	183	64
70	721	721	25	5.0	Very Dense	174	57
75	748	748	27	5.4	Dense	165	52
80	775	775	27	5.4	Dense	165	52
85	796	796	21	4.2	Very Dense	193	72
90	821	821	25	5.0	Very Dense	174	57
95	838	838	17	3.4	Very Dense	> 200	95
100	857	857	19	3.8	Very Dense	> 200	82
105	872	872	15	3.0	Very Dense	> 200	> 110
110	888	888	16	3.2	Very Dense	> 200	103
115	900	900	12	2.4	Very Dense	> 200	> 110
120	912	912	12	2.4	Very Dense	> 200	> 110
125	925	925	13	2.6	Very Dense	> 200	> 110
130	940	940	15	3.0	Very Dense	> 200	> 110
135	950	950	10	2.0	Very Dense	> 200	> 110
140	965	965	15	3.0	Very Dense	> 200	> 110
145	975	975	10	2.0	Very Dense	> 200	> 110
150	987	987	12	2.4	Very Dense	> 200	> 110
155	1000	1000	13	2.6	Very Dense	> 200	> 110
160	1002	1002	2	0.4	Very Dense	> 200	> 110
165	1002	1002	0	0.0	Very Dense	> 200	> 110
170	Refusal						

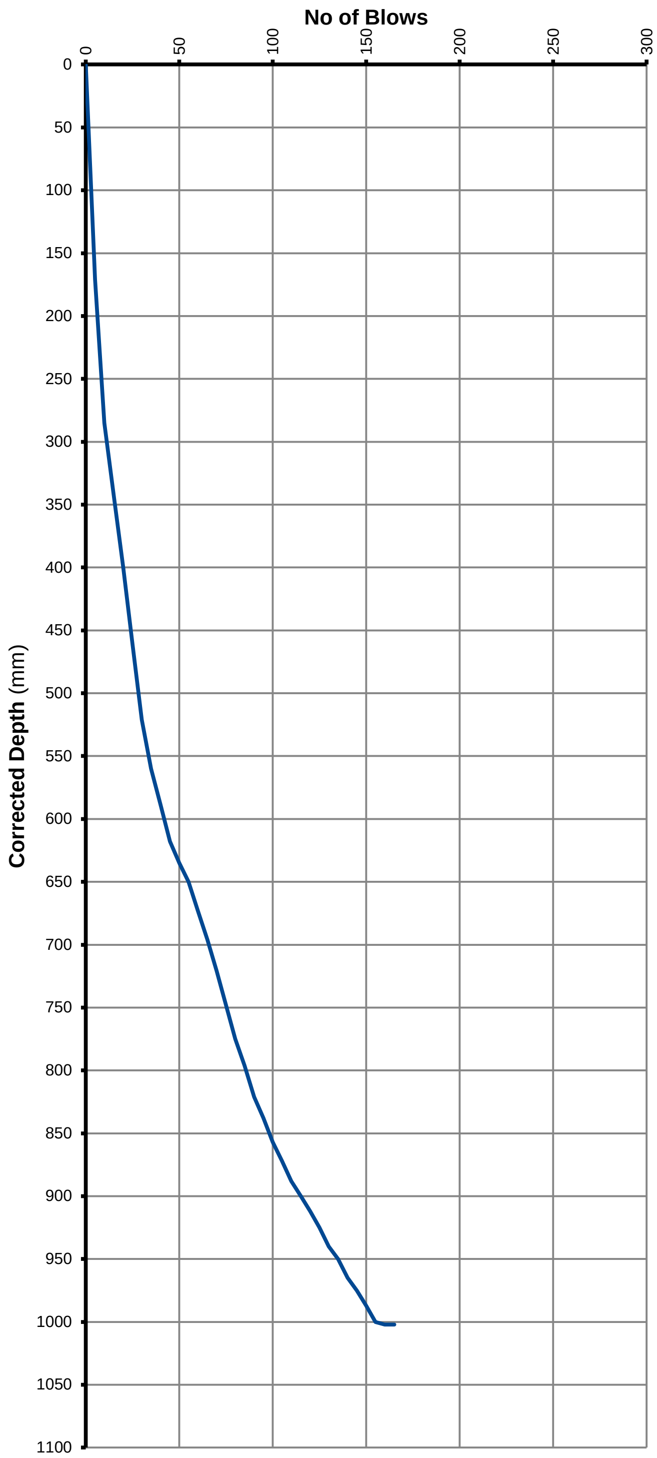
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

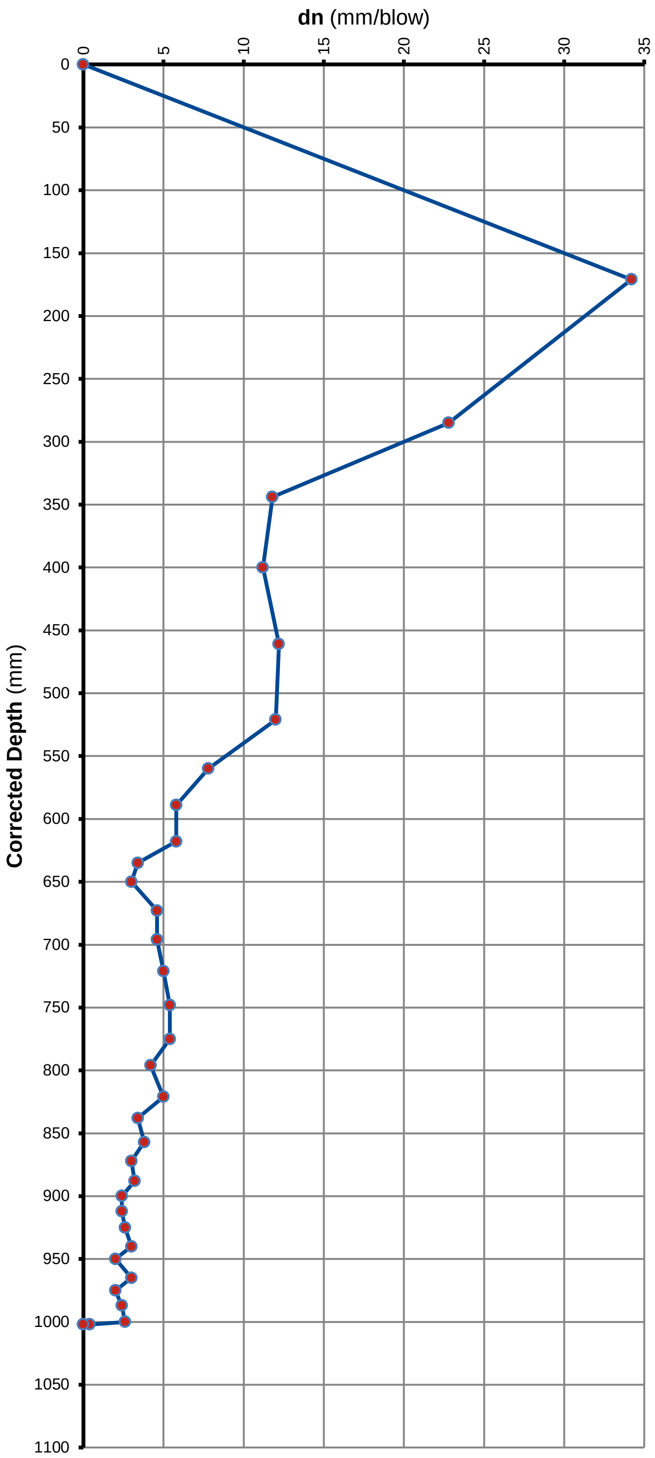
POSITION: DCP 40 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



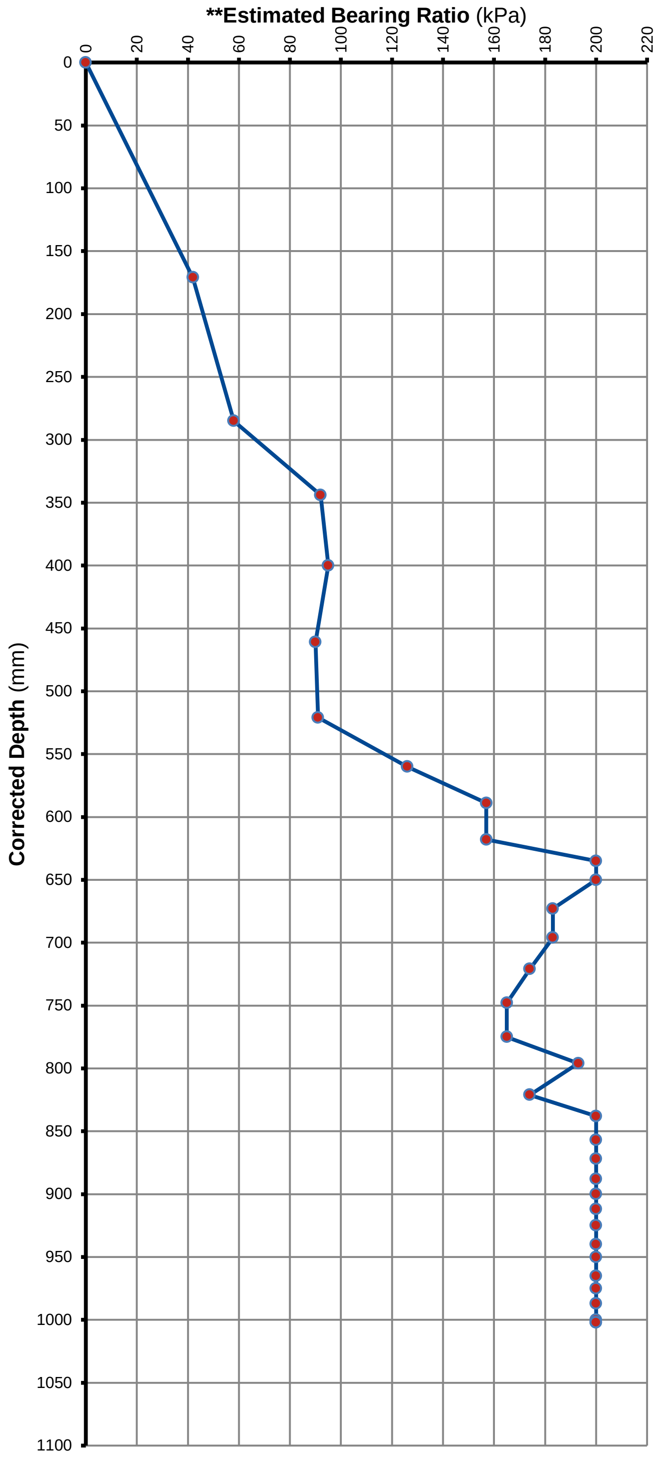
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

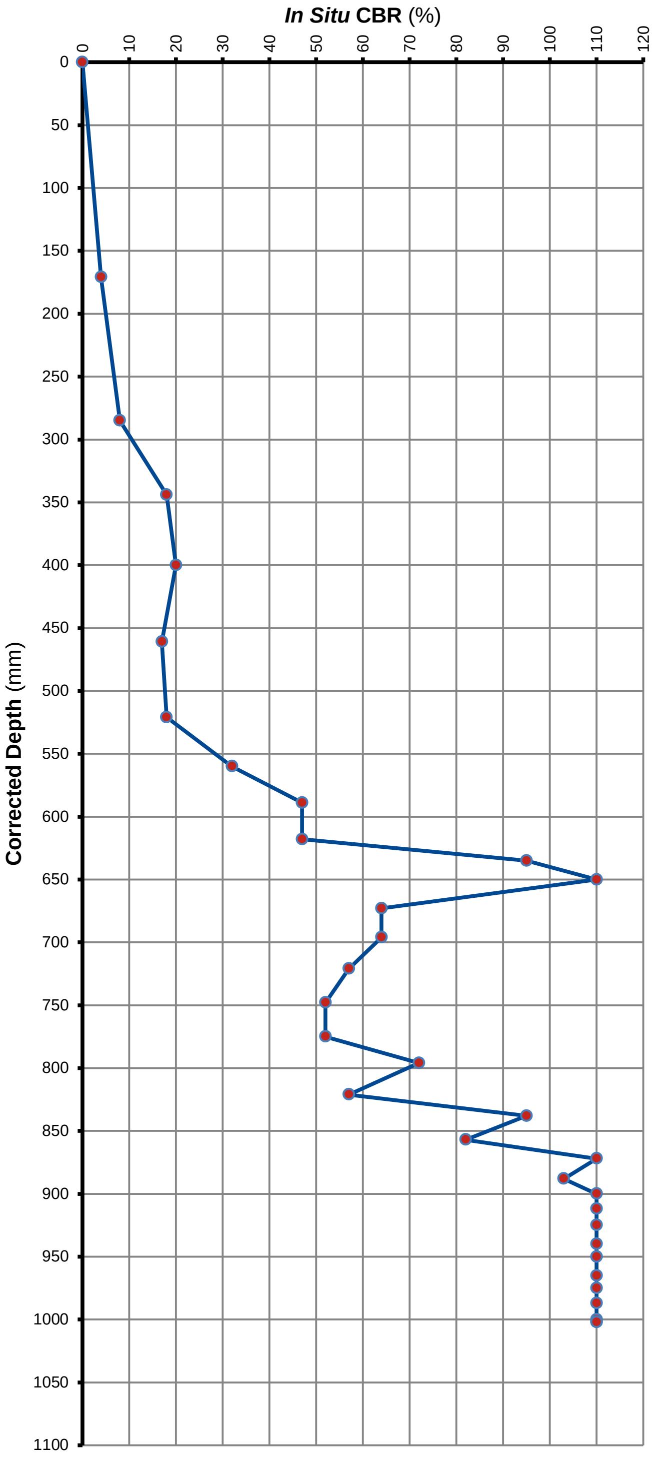
POSITION: DCP 40 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 41 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

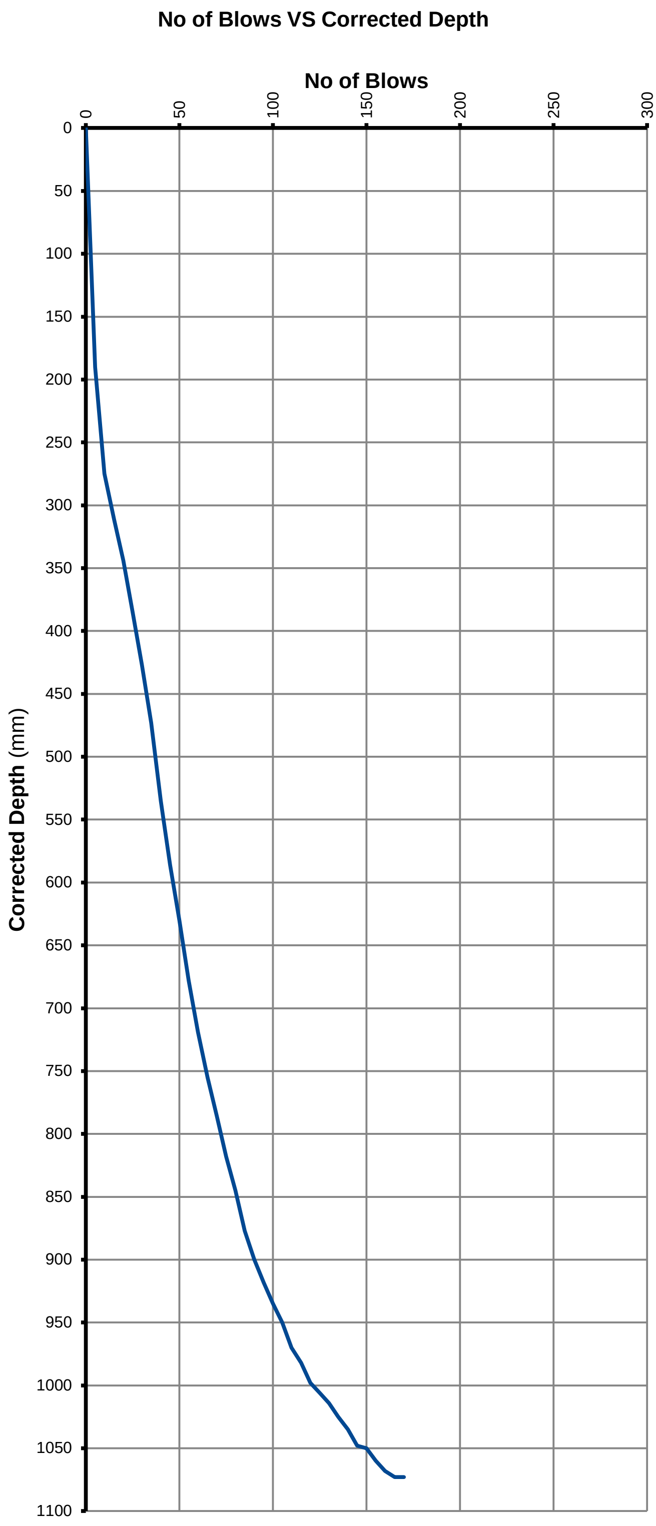
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	190	190	190	38.0	Loose	41	4
10	275	275	85	17.0	Medium Dense	72	11
15	311	311	36	7.2	Dense	134	35
20	344	344	33	6.6	Dense	144	39
25	385	385	41	8.2	Dense	122	30
30	427	427	42	8.4	Dense	119	29
35	473	473	46	9.2	Dense	111	25
40	535	535	62	12.4	Dense	89	17
45	586	586	51	10.2	Dense	102	22
50	630	630	44	8.8	Dense	115	27
55	678	678	48	9.6	Dense	107	24
60	719	719	41	8.2	Dense	122	30
65	755	755	36	7.2	Dense	134	35
70	786	786	31	6.2	Dense	150	43
75	818	818	32	6.4	Dense	147	41
80	845	845	27	5.4	Dense	165	52
85	877	877	32	6.4	Dense	147	41
90	900	900	23	4.6	Very Dense	183	64
95	918	918	18	3.6	Very Dense	> 200	88
100	935	935	17	3.4	Very Dense	> 200	95
105	950	950	15	3.0	Very Dense	> 200	> 110
110	970	970	20	4.0	Very Dense	200	77
115	982	982	12	2.4	Very Dense	> 200	> 110
120	998	998	16	3.2	Very Dense	> 200	103
125	1006	1006	8	1.6	Very Dense	> 200	> 110
130	1014	1014	8	1.6	Very Dense	> 200	> 110
135	1025	1025	11	2.2	Very Dense	> 200	> 110
140	1035	1035	10	2.0	Very Dense	> 200	> 110
145	1048	1048	13	2.6	Very Dense	> 200	> 110
150	1050	1050	2	0.4	Very Dense	> 200	> 110
155	1060	1060	10	2.0	Very Dense	> 200	> 110
160	1068	1068	8	1.6	Very Dense	> 200	> 110
165	1073	1073	5	1.0	Very Dense	> 200	> 110
170	1073	1073	0	0.0	Very Dense	> 200	> 110
175	Refusal						

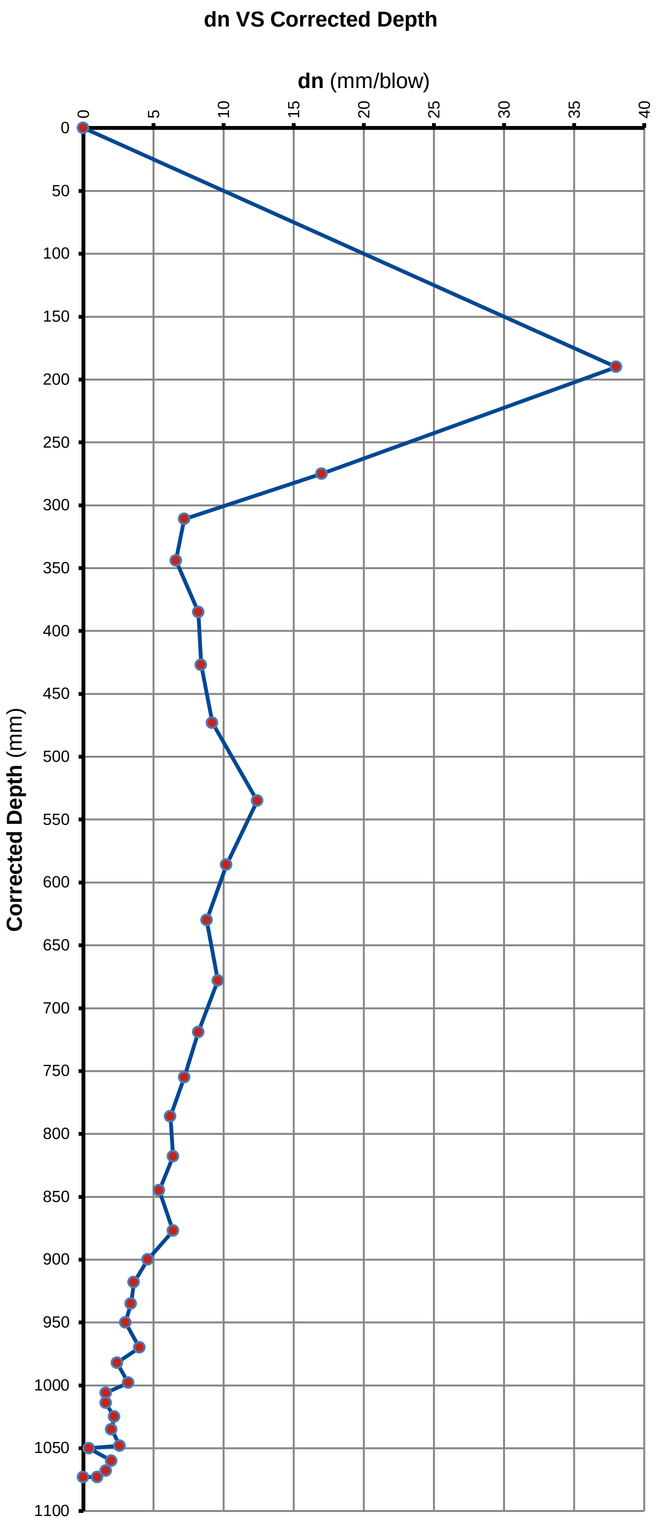
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 41 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





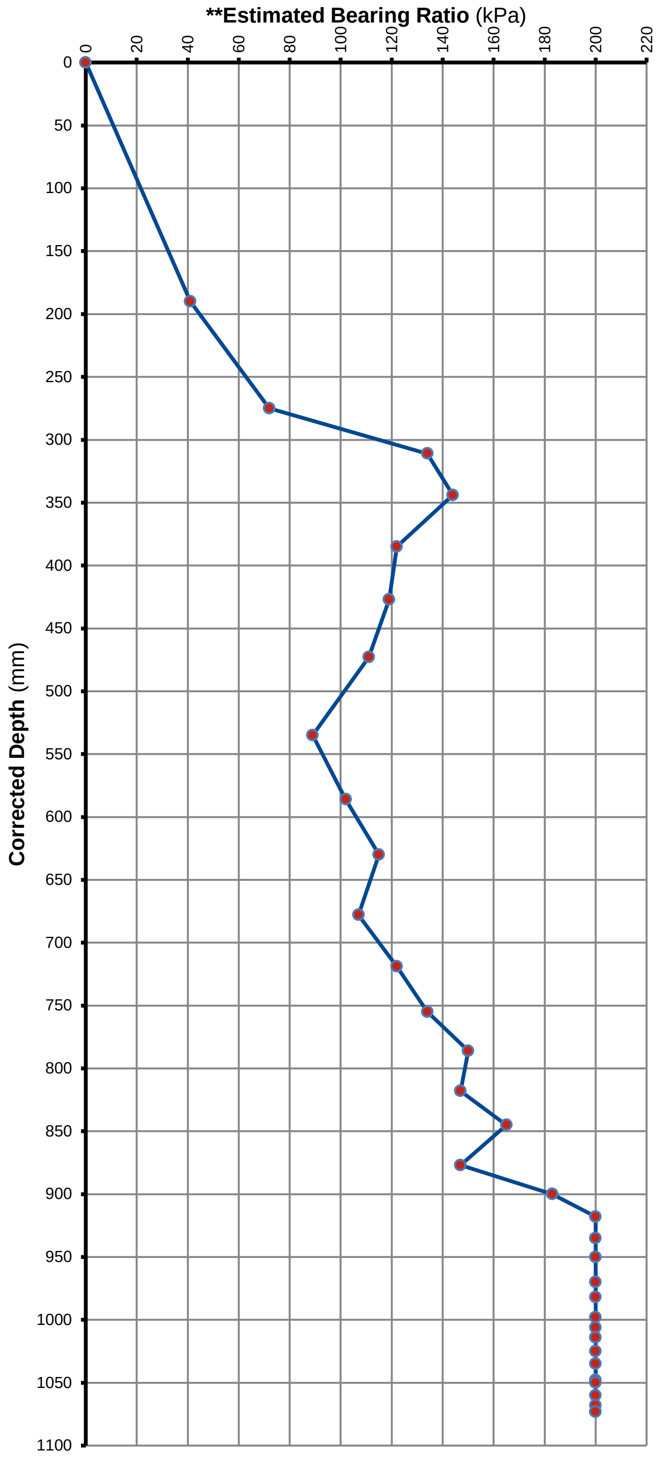
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

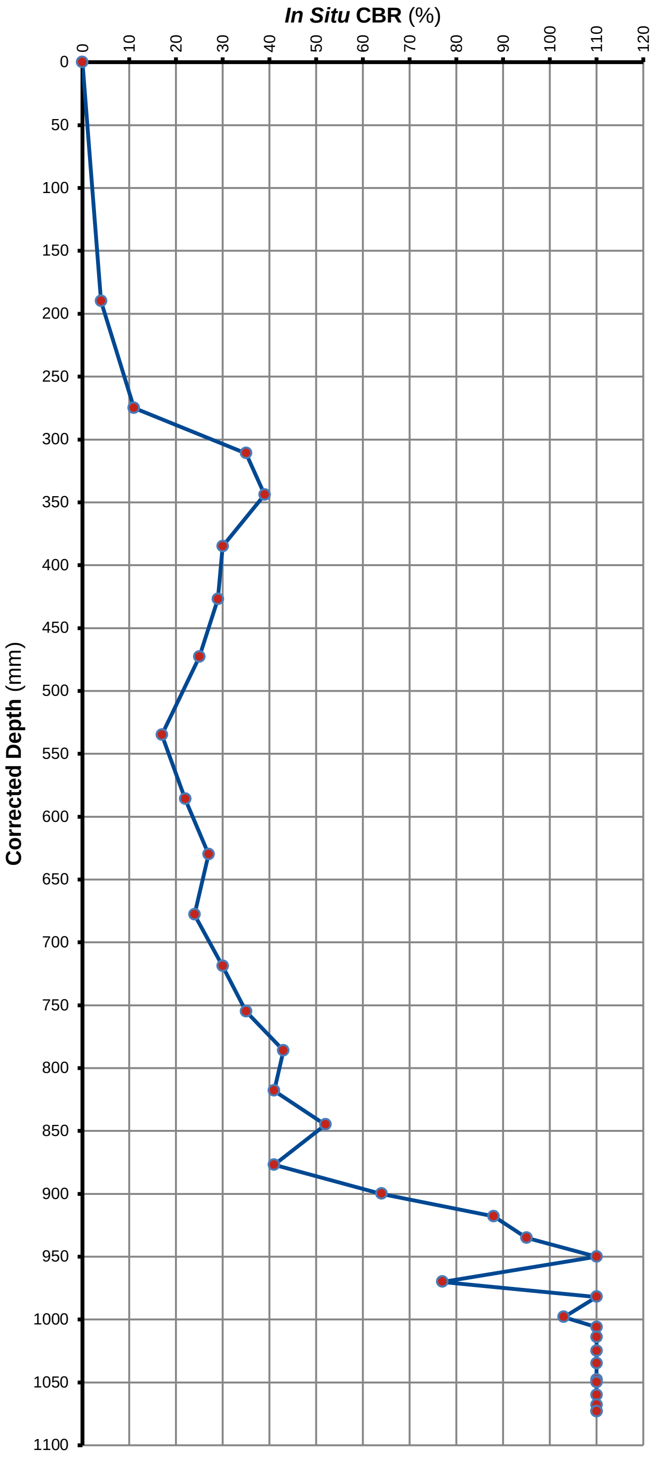
POSITION: DCP 41 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 42 **DEPTH BELOW NGL:** 0.000m

<u>*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)</u>

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	165	165	165	33.0	Loose	43	5
10	286	286	121	24.2	Medium Dense	55	7
15	351	351	65	13.0	Medium Dense	86	16
20	388	388	37	7.4	Dense	132	34
25	420	420	32	6.4	Dense	147	41
30	455	455	35	7.0	Dense	137	36
35	489	489	34	6.8	Dense	140	38
40	522	522	33	6.6	Dense	144	39
45	557	557	35	7.0	Dense	137	36
50	590	590	33	6.6	Dense	144	39
55	631	631	41	8.2	Dense	122	30
60	670	670	39	7.8	Dense	126	32
65	705	705	35	7.0	Dense	137	36
70	743	743	38	7.6	Dense	129	33
75	780	780	37	7.4	Dense	132	34
80	818	818	38	7.6	Dense	129	33
85	851	851	33	6.6	Dense	144	39
90	888	888	37	7.4	Dense	132	34
95	925	925	37	7.4	Dense	132	34
100	950	950	25	5.0	Very Dense	174	57
105	981	981	31	6.2	Dense	150	43
110	1009	1009	28	5.6	Dense	161	49
115	1040	1040	31	6.2	Dense	150	43
120	1061	1061	21	4.2	Very Dense	193	72
125	1089	1089	28	5.6	Dense	161	49
130	1109	1109	20	4.0	Very Dense	200	77
135	1130	1130	21	4.2	Very Dense	193	72
140	1151	1151	21	4.2	Very Dense	193	72
145	1170	1170	19	3.8	Very Dense	> 200	82
150	1187	1187	17	3.4	Very Dense	> 200	95
155	1205	1205	18	3.6	Very Dense	> 200	88
160	1221	1221	16	3.2	Very Dense	> 200	103
165	1235	1235	14	2.8	Very Dense	> 200	> 110
170	1250	1250	15	3.0	Very Dense	> 200	> 110
175	1270	1270	20	4.0	Very Dense	200	77
180	1282	1282	12	2.4	Very Dense	> 200	> 110
185	1299	1299	17	3.4	Very Dense	> 200	95
190	1320	1320	21	4.2	Very Dense	193	72
195	1338	1338	18	3.6	Very Dense	> 200	88
200	1355	1355	17	3.4	Very Dense	> 200	95
205	1368	1368	13	2.6	Very Dense	> 200	> 110
210	1381	1381	13	2.6	Very Dense	> 200	> 110
215	1400	1400	19	3.8	Very Dense	> 200	82
220	1412	1412	12	2.4	Very Dense	> 200	> 110
225	1425	1425	13	2.6	Very Dense	> 200	> 110
230	1441	1441	16	3.2	Very Dense	> 200	103
235	1452	1452	11	2.2	Very Dense	> 200	> 110
240	1462	1462	10	2.0	Very Dense	> 200	> 110
245	1475	1475	13	2.6	Very Dense	> 200	> 110
250	1486	1486	11	2.2	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 42 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1498	1498	12	2.4	Very Dense	> 200	> 110
260	1511	1511	13	2.6	Very Dense	> 200	> 110
265	1520	1520	9	1.8	Very Dense	> 200	> 110
270	1533	1533	13	2.6	Very Dense	> 200	> 110
275	1545	1545	12	2.4	Very Dense	> 200	> 110
280	1552	1552	7	1.4	Very Dense	> 200	> 110
285	1560	1560	8	1.6	Very Dense	> 200	> 110
290	1566	1566	6	1.2	Very Dense	> 200	> 110
295	1572	1572	6	1.2	Very Dense	> 200	> 110
300	1580	1580	8	1.6	Very Dense	> 200	> 110
305	1580	1580	0	0.0	Very Dense	> 200	> 110
310	Refusal						

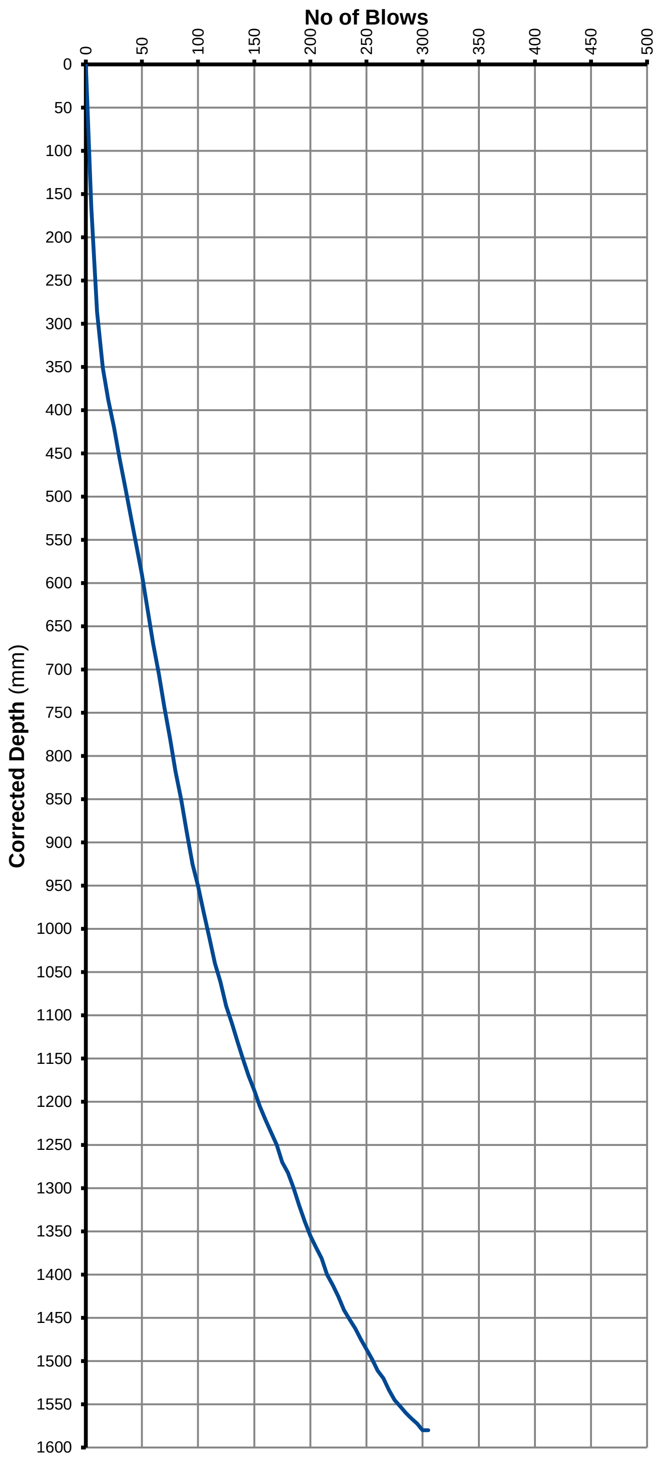
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

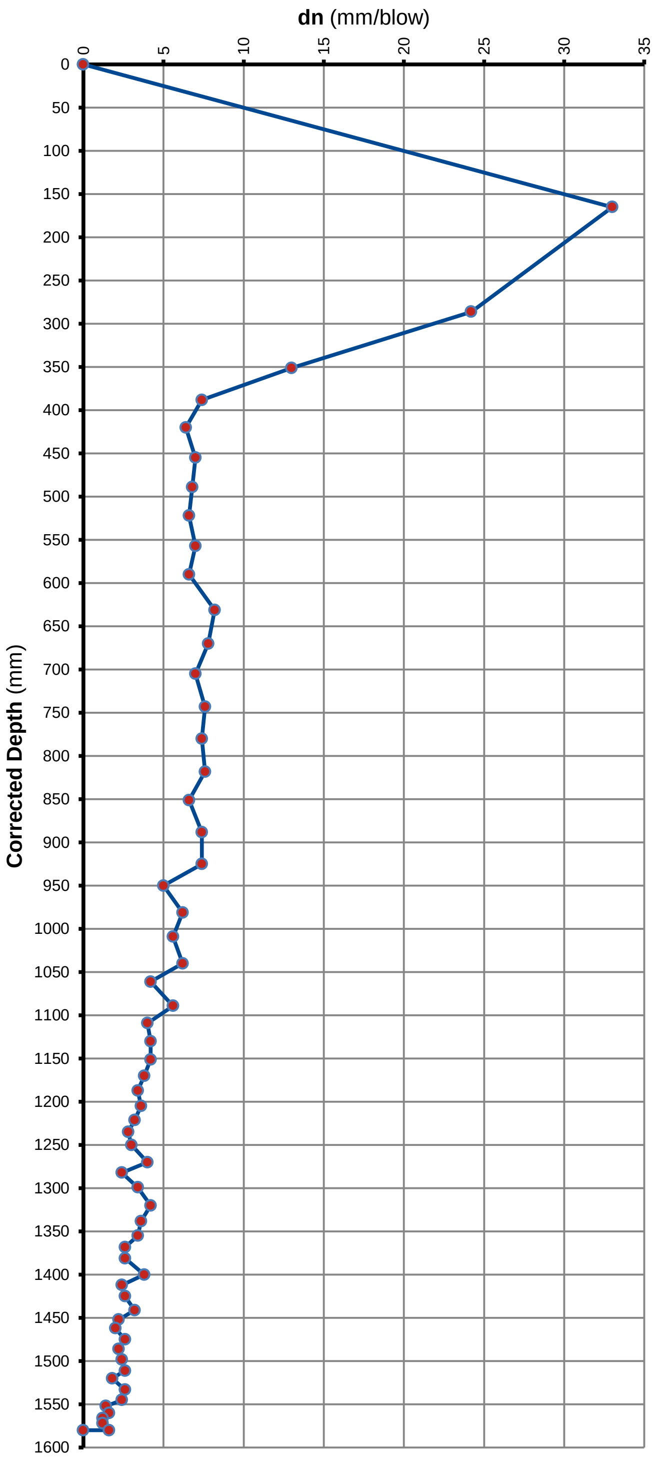
POSITION: DCP 42 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



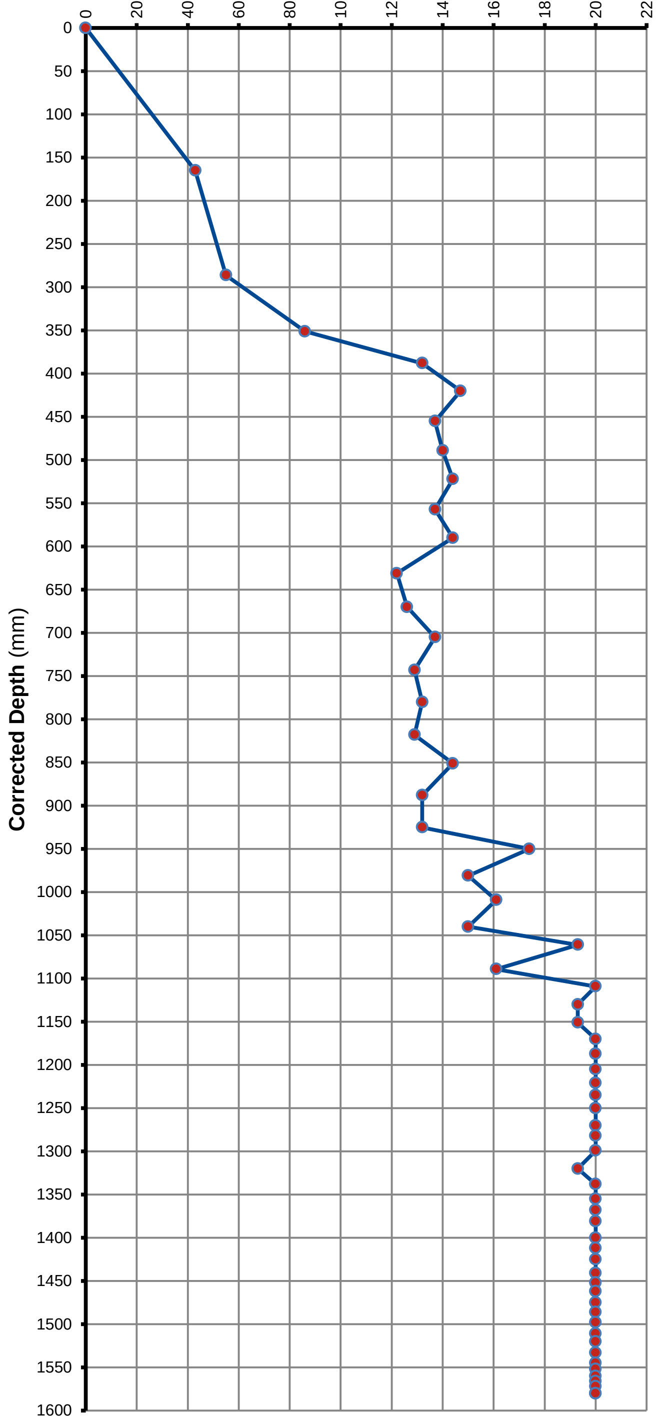
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

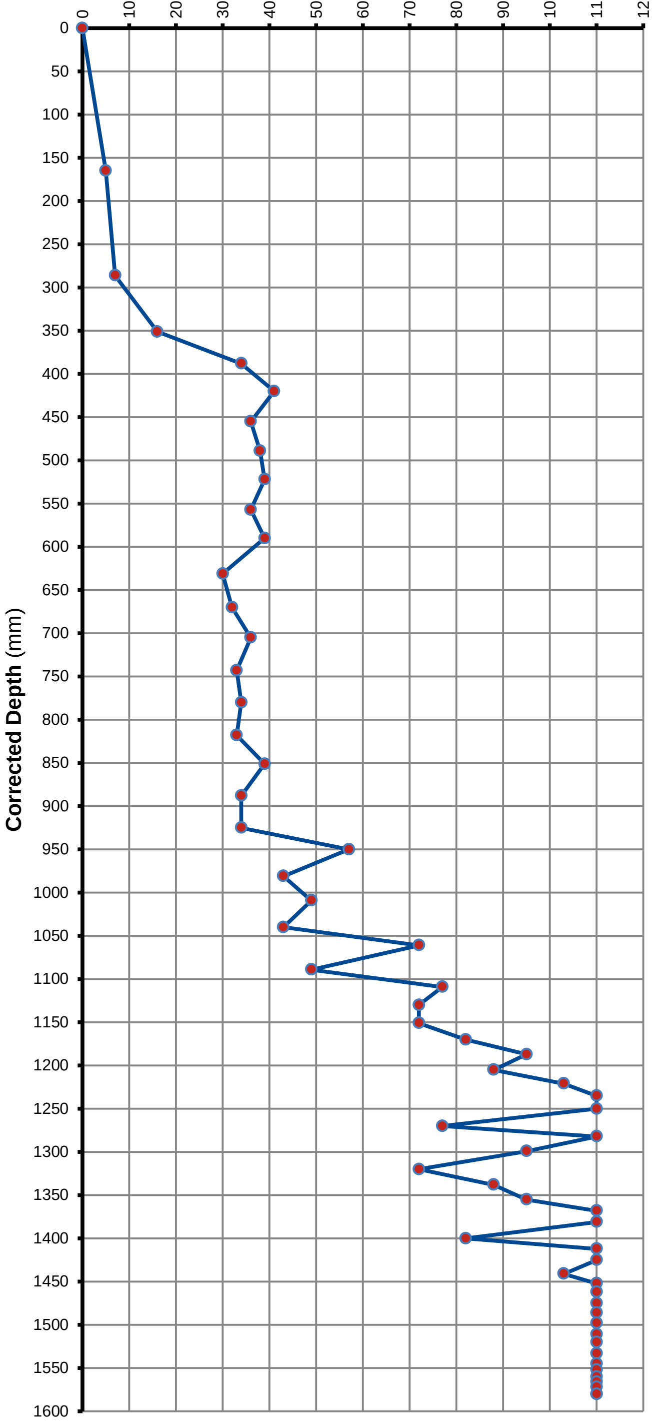
POSITION: DCP 42 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 43 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

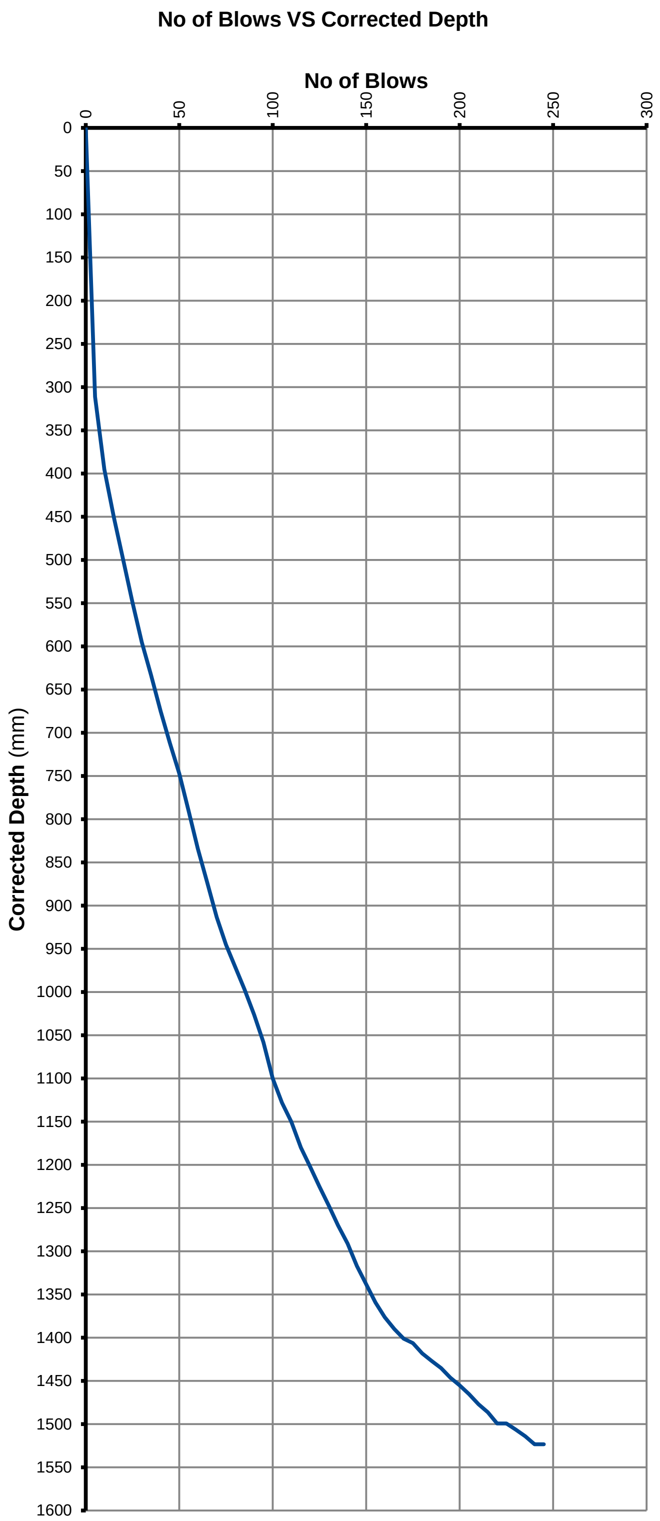
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	15	0	-	-	-	-	-
5	326	311	311	62.2	Loose	1	2
10	410	395	84	16.8	Medium Dense	72	11
15	466	451	56	11.2	Dense	95	20
20	515	500	49	9.8	Dense	106	23
25	564	549	49	9.8	Dense	106	23
30	610	595	46	9.2	Dense	111	25
35	648	633	38	7.6	Dense	129	33
40	690	675	42	8.4	Dense	119	29
45	727	712	37	7.4	Dense	132	34
50	762	747	35	7.0	Dense	137	36
55	805	790	43	8.6	Dense	117	28
60	849	834	44	8.8	Dense	115	27
65	889	874	40	8.0	Dense	124	31
70	928	913	39	7.8	Dense	126	32
75	960	945	32	6.4	Dense	147	41
80	986	971	26	5.2	Dense	169	54
85	1012	997	26	5.2	Dense	169	54
90	1041	1026	29	5.8	Dense	157	47
95	1073	1058	32	6.4	Dense	147	41
100	1115	1100	42	8.4	Dense	119	29
105	1143	1128	28	5.6	Dense	161	49
110	1165	1150	22	4.4	Very Dense	188	68
115	1195	1180	30	6.0	Dense	154	45
120	1217	1202	22	4.4	Very Dense	188	68
125	1240	1225	23	4.6	Very Dense	183	64
130	1262	1247	22	4.4	Very Dense	188	68
135	1285	1270	23	4.6	Very Dense	183	64
140	1306	1291	21	4.2	Very Dense	193	72
145	1332	1317	26	5.2	Dense	169	54
150	1353	1338	21	4.2	Very Dense	193	72
155	1374	1359	21	4.2	Very Dense	193	72
160	1391	1376	17	3.4	Very Dense	> 200	95
165	1405	1390	14	2.8	Very Dense	> 200	> 110
170	1416	1401	11	2.2	Very Dense	> 200	> 110
175	1421	1406	5	1.0	Very Dense	> 200	> 110
180	1433	1418	12	2.4	Very Dense	> 200	> 110
185	1442	1427	9	1.8	Very Dense	> 200	> 110
190	1450	1435	8	1.6	Very Dense	> 200	> 110
195	1461	1446	11	2.2	Very Dense	> 200	> 110
200	1470	1455	9	1.8	Very Dense	> 200	> 110
205	1480	1465	10	2.0	Very Dense	> 200	> 110
210	1492	1477	12	2.4	Very Dense	> 200	> 110
215	1501	1486	9	1.8	Very Dense	> 200	> 110
220	1514	1499	13	2.6	Very Dense	> 200	> 110
225	1514	1499	0	0.0	Very Dense	> 200	> 110
230	1521	1506	7	1.4	Very Dense	> 200	> 110
235	1529	1514	8	1.6	Very Dense	> 200	> 110
240	1538	1523	9	1.8	Very Dense	> 200	> 110
245	1538	1523	0	0.0	Very Dense	> 200	> 110
250	Refusal						

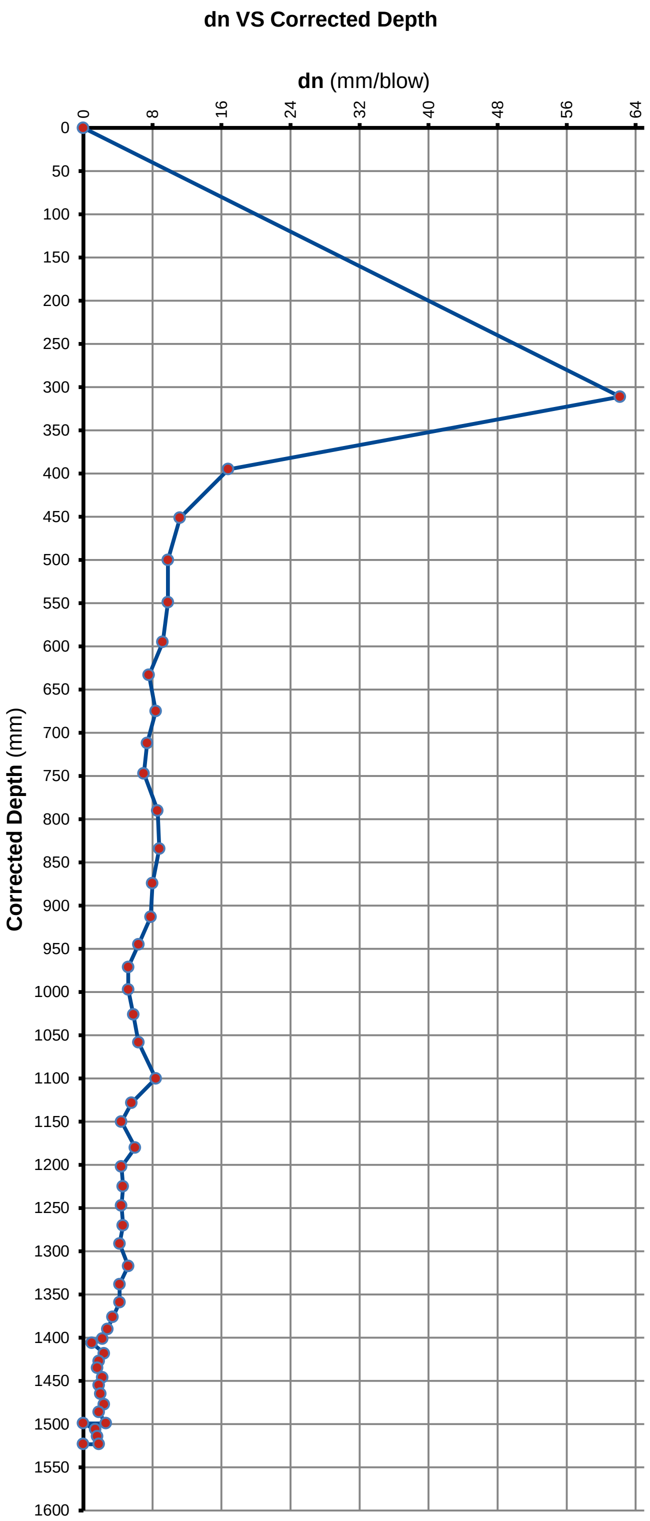
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 43 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

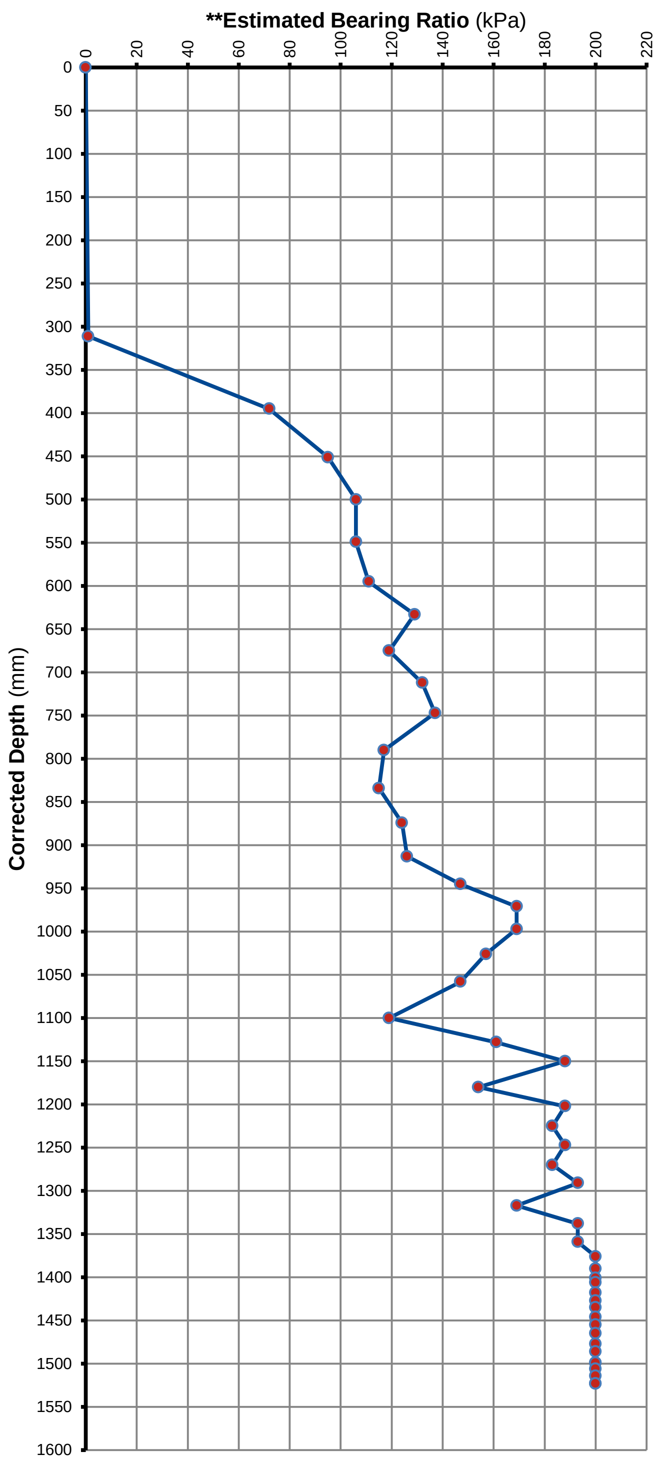
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

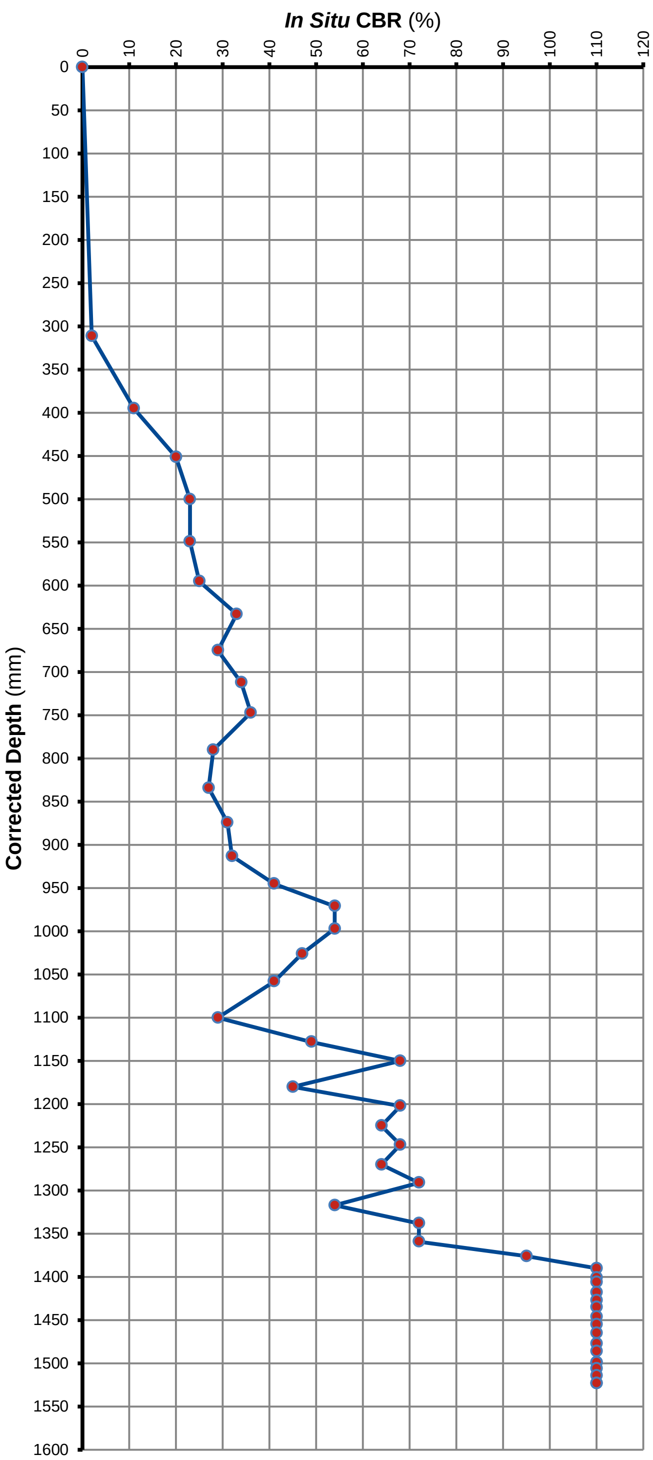
POSITION: DCP 43 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 44 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	221	221	221	44.2	Loose	39	3
10	348	348	127	25.4	Medium Dense	53	7
15	399	399	51	10.2	Dense	102	22
20	440	440	41	8.2	Dense	122	30
25	484	484	44	8.8	Dense	115	27
30	528	528	44	8.8	Dense	115	27
35	560	560	32	6.4	Dense	147	41
40	600	600	40	8.0	Dense	124	31
45	643	643	43	8.6	Dense	117	28
50	680	680	37	7.4	Dense	132	34
55	721	721	41	8.2	Dense	122	30
60	761	761	40	8.0	Dense	124	31
65	798	798	37	7.4	Dense	132	34
70	831	831	33	6.6	Dense	144	39
75	855	855	24	4.8	Very Dense	178	60
80	887	887	32	6.4	Dense	147	41
85	909	909	22	4.4	Very Dense	188	68
90	924	924	15	3.0	Very Dense	> 200	> 110
95	943	943	19	3.8	Very Dense	> 200	82
100	960	960	17	3.4	Very Dense	> 200	95
105	978	978	18	3.6	Very Dense	> 200	88
110	993	993	15	3.0	Very Dense	> 200	> 110
115	1004	1004	11	2.2	Very Dense	> 200	> 110
120	1020	1020	16	3.2	Very Dense	> 200	103
125	1032	1032	12	2.4	Very Dense	> 200	> 110
130	1050	1050	18	3.6	Very Dense	> 200	88
135	1062	1062	12	2.4	Very Dense	> 200	> 110
140	1078	1078	16	3.2	Very Dense	> 200	103
145	1095	1095	17	3.4	Very Dense	> 200	95
150	1112	1112	17	3.4	Very Dense	> 200	95
155	1128	1128	16	3.2	Very Dense	> 200	103
160	1150	1150	22	4.4	Very Dense	188	68
165	1169	1169	19	3.8	Very Dense	> 200	82
170	1187	1187	18	3.6	Very Dense	> 200	88
175	1200	1200	13	2.6	Very Dense	> 200	> 110
180	1215	1215	15	3.0	Very Dense	> 200	> 110
185	1227	1227	12	2.4	Very Dense	> 200	> 110
190	1241	1241	14	2.8	Very Dense	> 200	> 110
195	1251	1251	10	2.0	Very Dense	> 200	> 110
200	1262	1262	11	2.2	Very Dense	> 200	> 110
205	1270	1270	8	1.6	Very Dense	> 200	> 110
210	1285	1285	15	3.0	Very Dense	> 200	> 110
215	1295	1295	10	2.0	Very Dense	> 200	> 110
220	1303	1303	8	1.6	Very Dense	> 200	> 110
225	1307	1307	4	0.8	Very Dense	> 200	> 110
230	1315	1315	8	1.6	Very Dense	> 200	> 110
235	1324	1324	9	1.8	Very Dense	> 200	> 110
240	1331	1331	7	1.4	Very Dense	> 200	> 110
245	1340	1340	9	1.8	Very Dense	> 200	> 110
250	1349	1349	9	1.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 44 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1360	1360	11	2.2	Very Dense	> 200	> 110
260	1370	1370	10	2.0	Very Dense	> 200	> 110
265	1381	1381	11	2.2	Very Dense	> 200	> 110
270	1395	1395	14	2.8	Very Dense	> 200	> 110
275	1409	1409	14	2.8	Very Dense	> 200	> 110
280	1426	1426	17	3.4	Very Dense	> 200	95
285	1444	1444	18	3.6	Very Dense	> 200	88
290	1463	1463	19	3.8	Very Dense	> 200	82
295	1482	1482	19	3.8	Very Dense	> 200	82
300	1504	1504	22	4.4	Very Dense	188	68
305	1526	1526	22	4.4	Very Dense	188	68
310	1542	1542	16	3.2	Very Dense	> 200	103
315	1563	1563	21	4.2	Very Dense	193	72
320	1581	1581	18	3.6	Very Dense	> 200	88
325	1601	1601	20	4.0	Very Dense	200	77
330	1620	1620	19	3.8	Very Dense	> 200	82
335	1640	1640	20	4.0	Very Dense	200	77
340	1655	1655	15	3.0	Very Dense	> 200	> 110
345	1675	1675	20	4.0	Very Dense	200	77
350	1693	1693	18	3.6	Very Dense	> 200	88
355	1710	1710	17	3.4	Very Dense	> 200	95
360	1730	1730	20	4.0	Very Dense	200	77
365	1746	1746	16	3.2	Very Dense	> 200	103
370	1760	1760	14	2.8	Very Dense	> 200	> 110
375	1773	1773	13	2.6	Very Dense	> 200	> 110
380	1784	1784	11	2.2	Very Dense	> 200	> 110
385	1796	1796	12	2.4	Very Dense	> 200	> 110
390	1805	1805	9	1.8	Very Dense	> 200	> 110
395	1817	1817	12	2.4	Very Dense	> 200	> 110
400	1830	1830	13	2.6	Very Dense	> 200	> 110
405	1841	1841	11	2.2	Very Dense	> 200	> 110
410	1854	1854	13	2.6	Very Dense	> 200	> 110
415	1865	1865	11	2.2	Very Dense	> 200	> 110
420	1879	1879	14	2.8	Very Dense	> 200	> 110
425	1891	1891	12	2.4	Very Dense	> 200	> 110
430	1905	1905	14	2.8	Very Dense	> 200	> 110
435	1921	1921	16	3.2	Very Dense	> 200	103
440	1940	1940	19	3.8	Very Dense	> 200	82
445	1962	1962	22	4.4	Very Dense	188	68
450	1979	1979	17	3.4	Very Dense	> 200	95
455	1996	1996	17	3.4	Very Dense	> 200	95
460	2004	2004	8	1.6	Very Dense	> 200	> 110

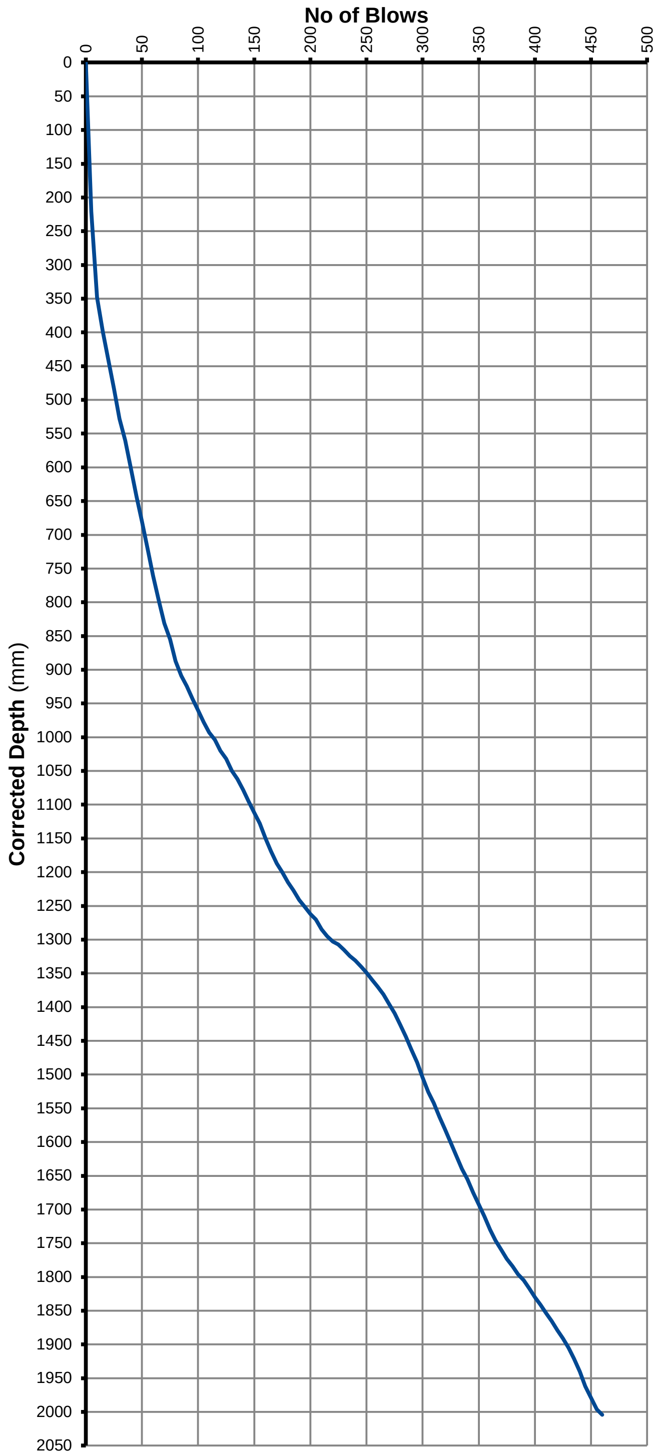
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

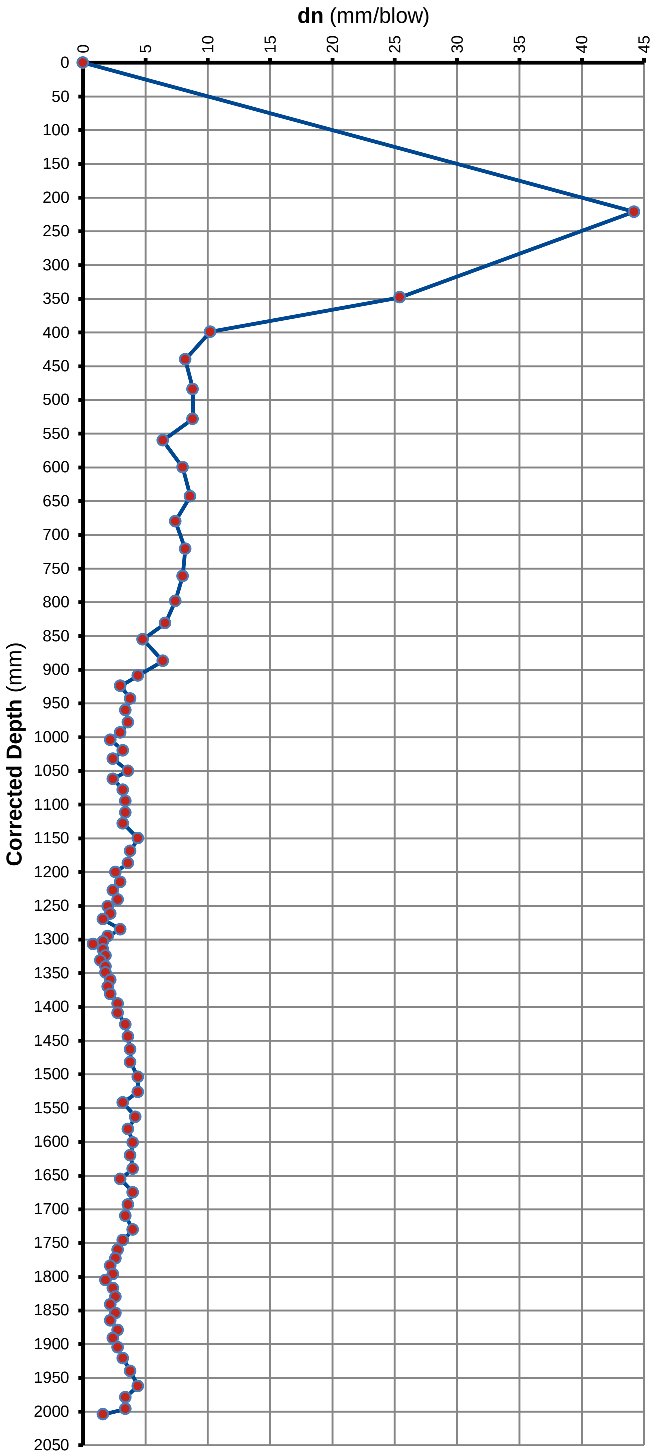
POSITION: DCP 44 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



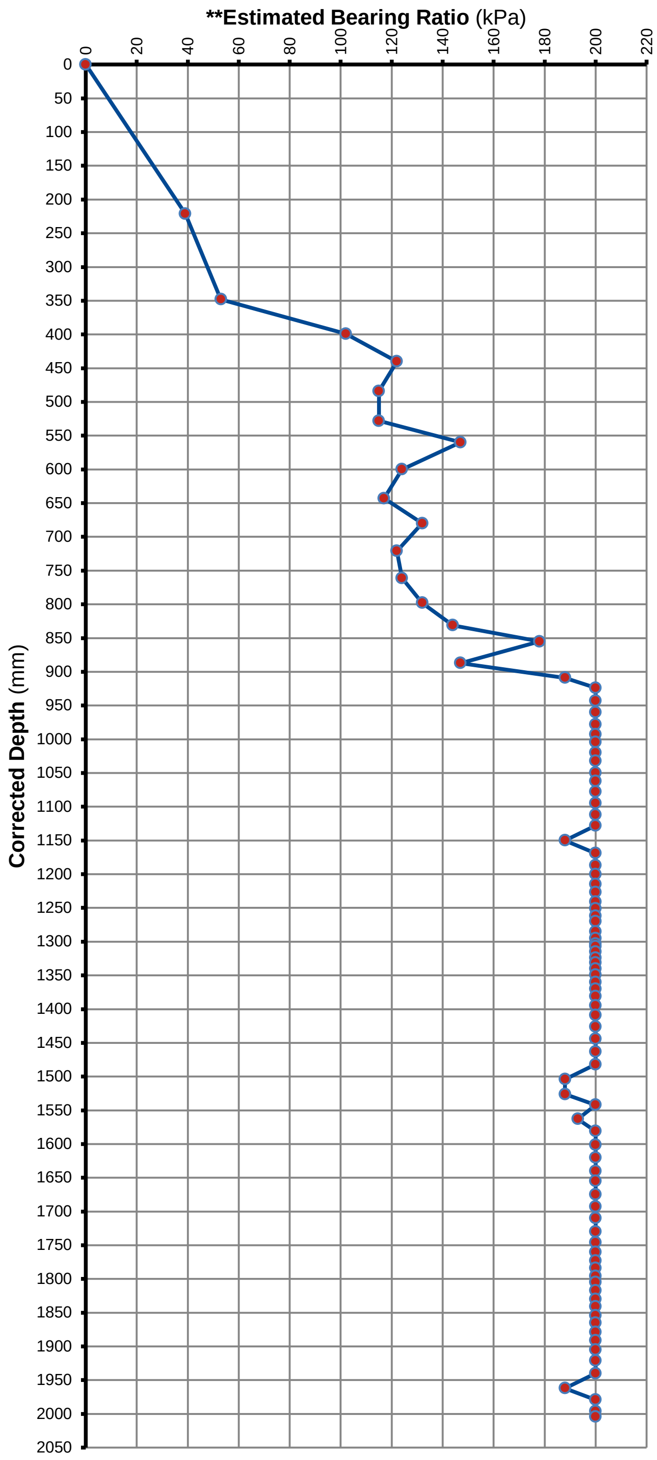
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

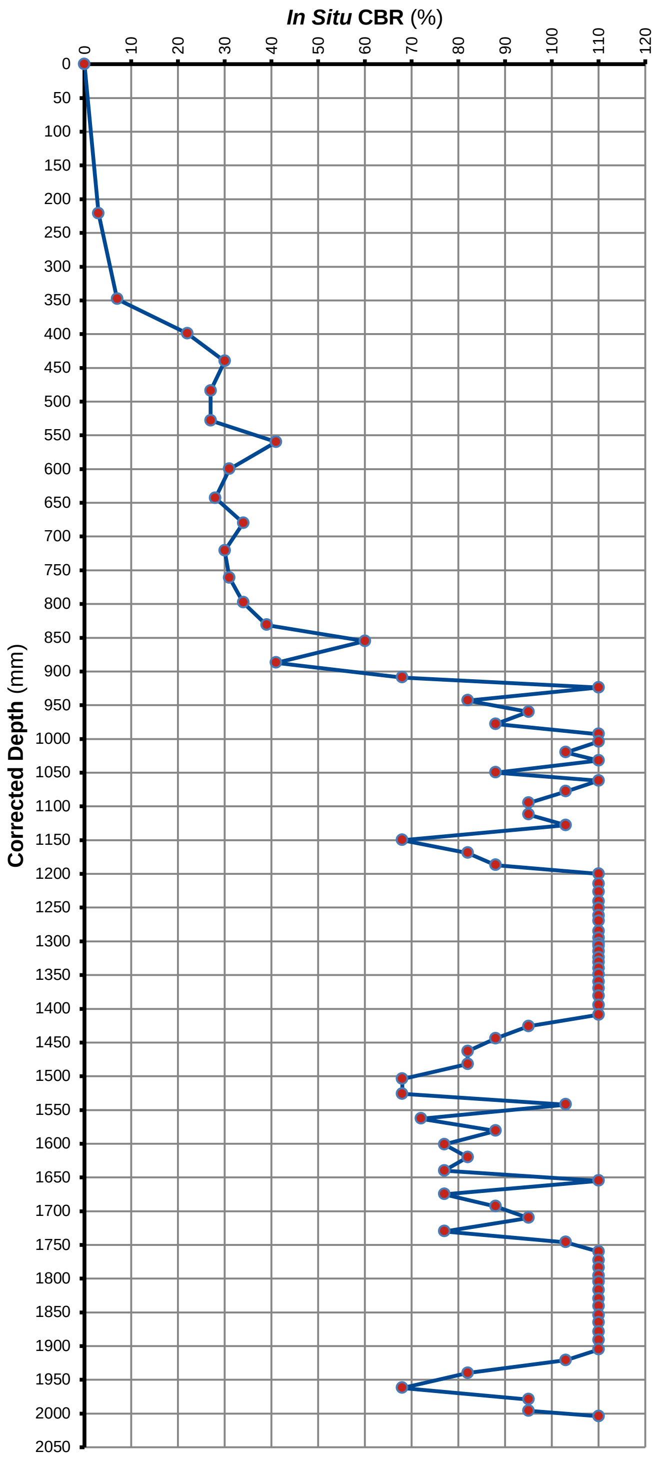
POSITION: DCP 44 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 45 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	155	155	155	31.0	Loose	44	5
10	300	300	145	29.0	Medium Dense	47	5
15	346	346	46	9.2	Dense	111	25
20	394	394	48	9.6	Dense	107	24
25	460	460	66	13.2	Medium Dense	85	16
30	532	532	72	14.4	Medium Dense	80	14
35	599	599	67	13.4	Medium Dense	84	15
40	651	651	52	10.4	Dense	101	22
45	698	698	47	9.4	Dense	109	25
50	741	741	43	8.6	Dense	117	28
55	781	781	40	8.0	Dense	124	31
60	815	815	34	6.8	Dense	140	38
65	860	860	45	9.0	Dense	113	26
70	899	899	39	7.8	Dense	126	32
75	937	937	38	7.6	Dense	129	33
80	971	971	34	6.8	Dense	140	38
85	995	995	24	4.8	Very Dense	178	60
90	1018	1018	23	4.6	Very Dense	183	64
95	1036	1036	18	3.6	Very Dense	> 200	88
100	1045	1045	9	1.8	Very Dense	> 200	> 110
105	1056	1056	11	2.2	Very Dense	> 200	> 110
110	1064	1064	8	1.6	Very Dense	> 200	> 110
115	1076	1076	12	2.4	Very Dense	> 200	> 110
120	1080	1080	4	0.8	Very Dense	> 200	> 110
125	1081	1081	1	0.2	Very Dense	> 200	> 110
130	Refusal						

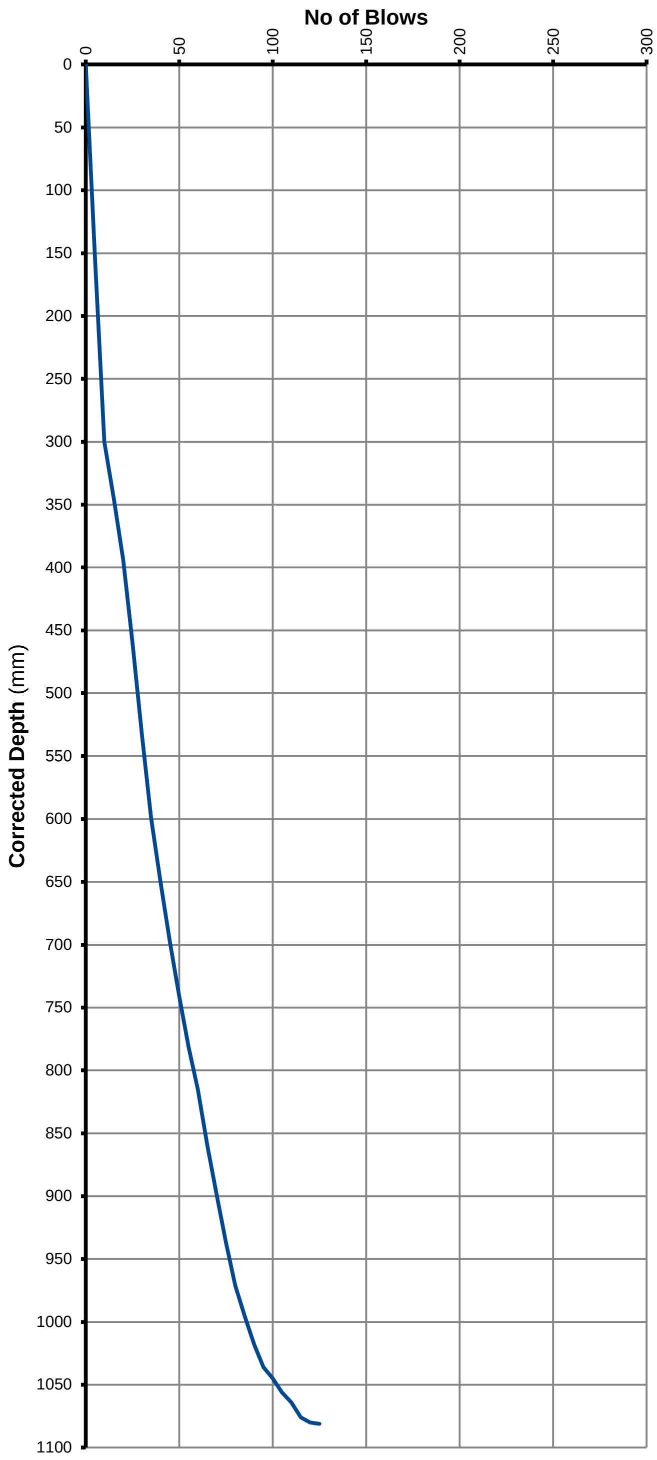
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

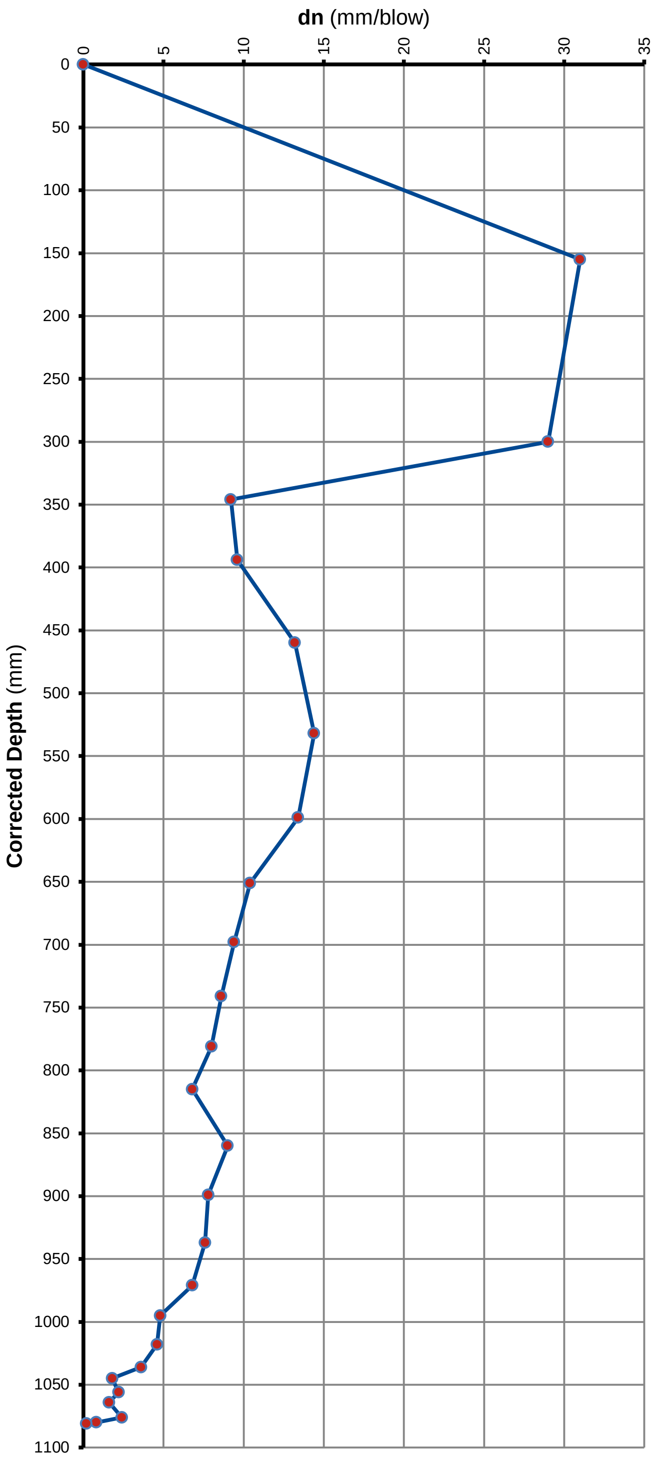
POSITION: DCP 45 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

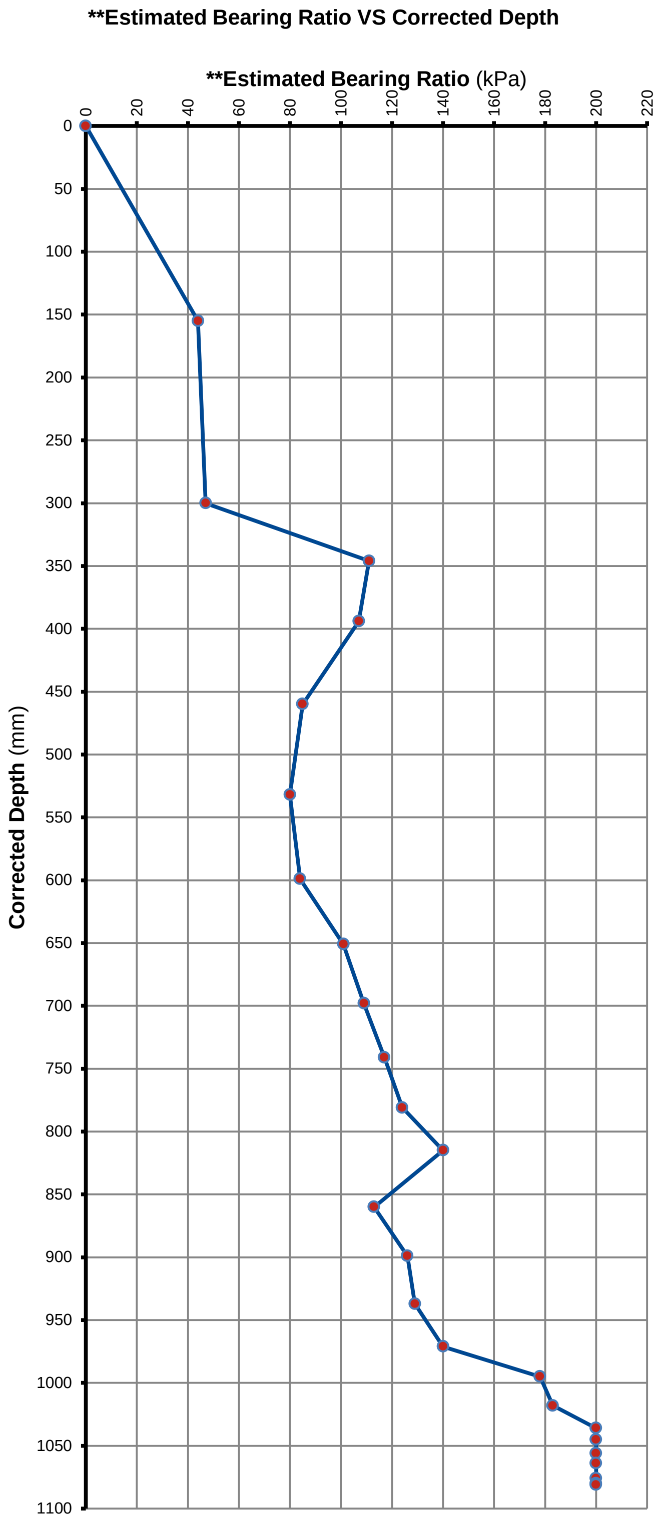


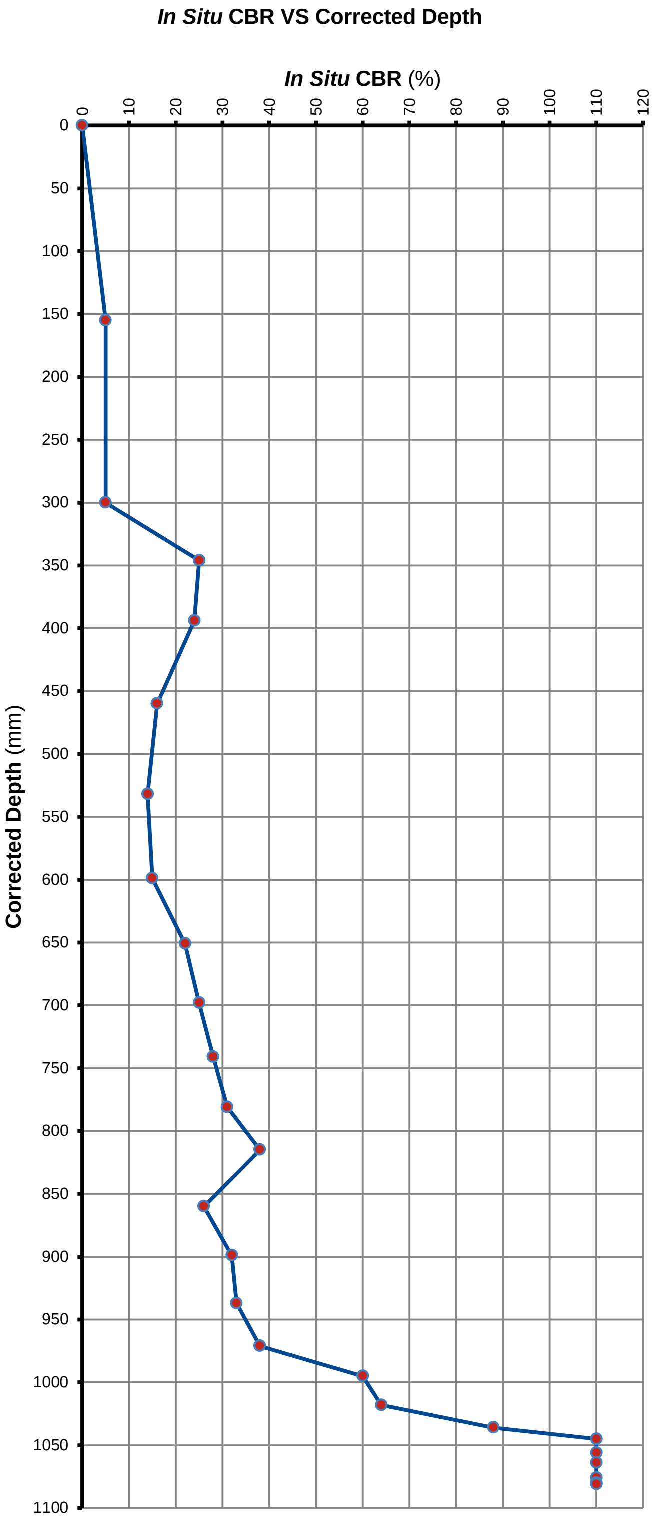
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 45 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


Estimated Bearing Ratio VS Corrected Depth


In Situ **CBR VS Corrected Depth**

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 46 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	238	0	-	-	-	-	-
5	370	132	132	26.4	Medium Dense	51	6
10	421	183	51	10.2	Dense	102	22
15	462	224	41	8.2	Dense	122	30
20	489	251	27	5.4	Dense	165	52
25	520	282	31	6.2	Dense	150	43
30	548	310	28	5.6	Dense	161	49
35	577	339	29	5.8	Dense	157	47
40	605	367	28	5.6	Dense	161	49
45	636	398	31	6.2	Dense	150	43
50	670	432	34	6.8	Dense	140	38
55	709	471	39	7.8	Dense	126	32
60	747	509	38	7.6	Dense	129	33
65	789	551	42	8.4	Dense	119	29
70	830	592	41	8.2	Dense	122	30
75	861	623	31	6.2	Dense	150	43
80	897	659	36	7.2	Dense	134	35
85	932	694	35	7.0	Dense	137	36
90	960	722	28	5.6	Dense	161	49
95	993	755	33	6.6	Dense	144	39
100	1025	787	32	6.4	Dense	147	41
105	1057	819	32	6.4	Dense	147	41
110	1089	851	32	6.4	Dense	147	41
115	1104	866	15	3.0	Very Dense	> 200	> 110
120	1125	887	21	4.2	Very Dense	193	72
125	1148	910	23	4.6	Very Dense	183	64
130	1160	922	12	2.4	Very Dense	> 200	> 110
135	1176	938	16	3.2	Very Dense	> 200	103
140	1192	954	16	3.2	Very Dense	> 200	103
145	1213	975	21	4.2	Very Dense	193	72
150	1226	988	13	2.6	Very Dense	> 200	> 110
155	1245	1007	19	3.8	Very Dense	> 200	82
160	1265	1027	20	4.0	Very Dense	200	77
165	1293	1055	28	5.6	Dense	161	49
170	1324	1086	31	6.2	Dense	150	43
175	1365	1127	41	8.2	Dense	122	30
180	1413	1175	48	9.6	Dense	107	24
185	1460	1222	47	9.4	Dense	109	25
190	1503	1265	43	8.6	Dense	117	28
195	1546	1308	43	8.6	Dense	117	28
200	1592	1354	46	9.2	Dense	111	25
205	1639	1401	47	9.4	Dense	109	25
210	1671	1433	32	6.4	Dense	147	41
215	1700	1462	29	5.8	Dense	157	47
220	1728	1490	28	5.6	Dense	161	49
225	1749	1511	21	4.2	Very Dense	193	72
230	1780	1542	31	6.2	Dense	150	43
235	1789	1551	9	1.8	Very Dense	> 200	> 110
240	1799	1561	10	2.0	Very Dense	> 200	> 110
245	1818	1580	19	3.8	Very Dense	> 200	82
250	1836	1598	18	3.6	Very Dense	> 200	88

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 46 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1860	1622	24	4.8	Very Dense	178	60
260	1878	1640	18	3.6	Very Dense	> 200	88
265	1899	1661	21	4.2	Very Dense	193	72
270	1912	1674	13	2.6	Very Dense	> 200	> 110
275	1934	1696	22	4.4	Very Dense	188	68
280	1955	1717	21	4.2	Very Dense	193	72
285	1978	1740	23	4.6	Very Dense	183	64
290	1995	1757	17	3.4	Very Dense	> 200	95
295	2011	1773	16	3.2	Very Dense	> 200	103

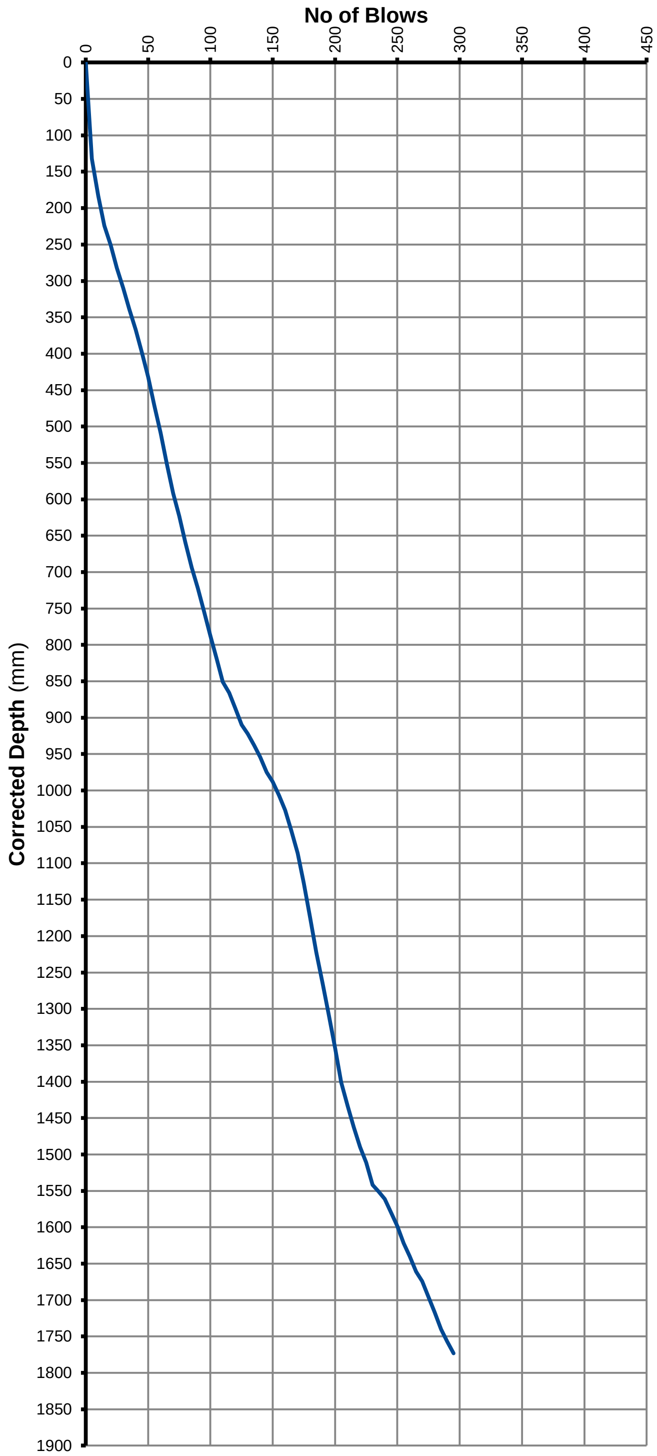
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

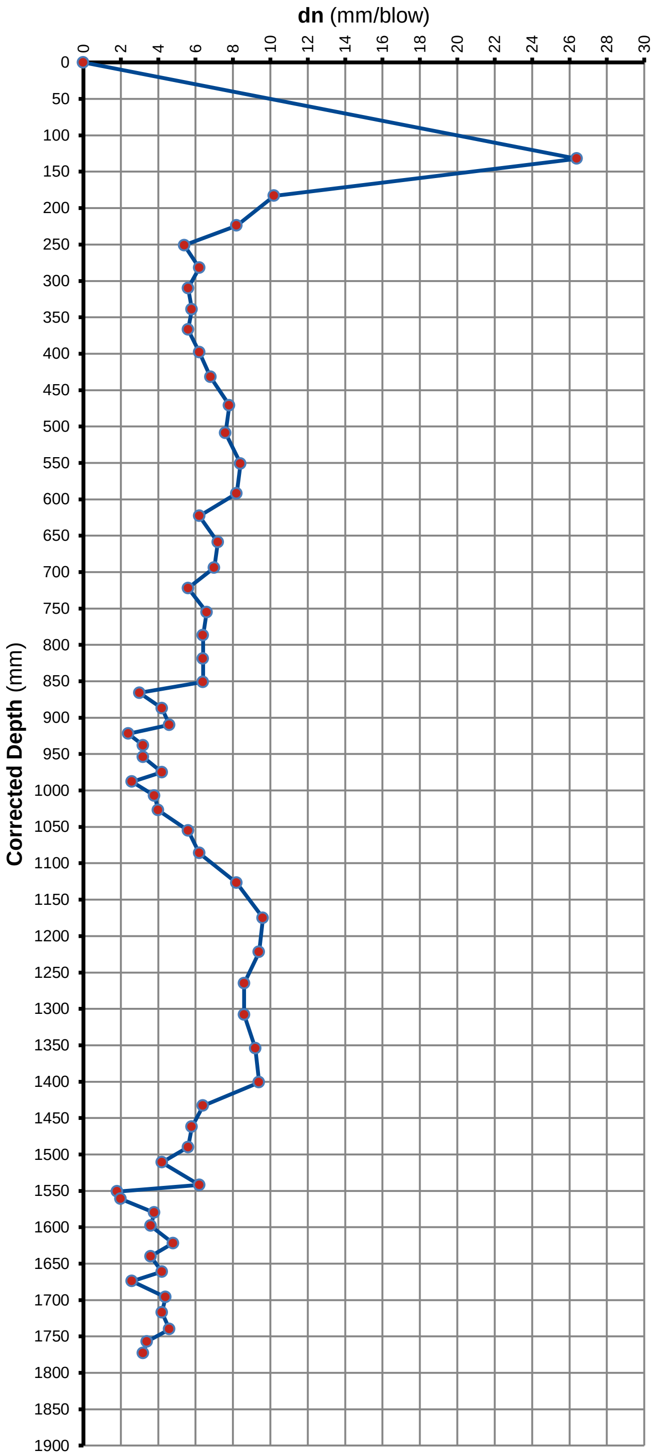
POSITION: DCP 46 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



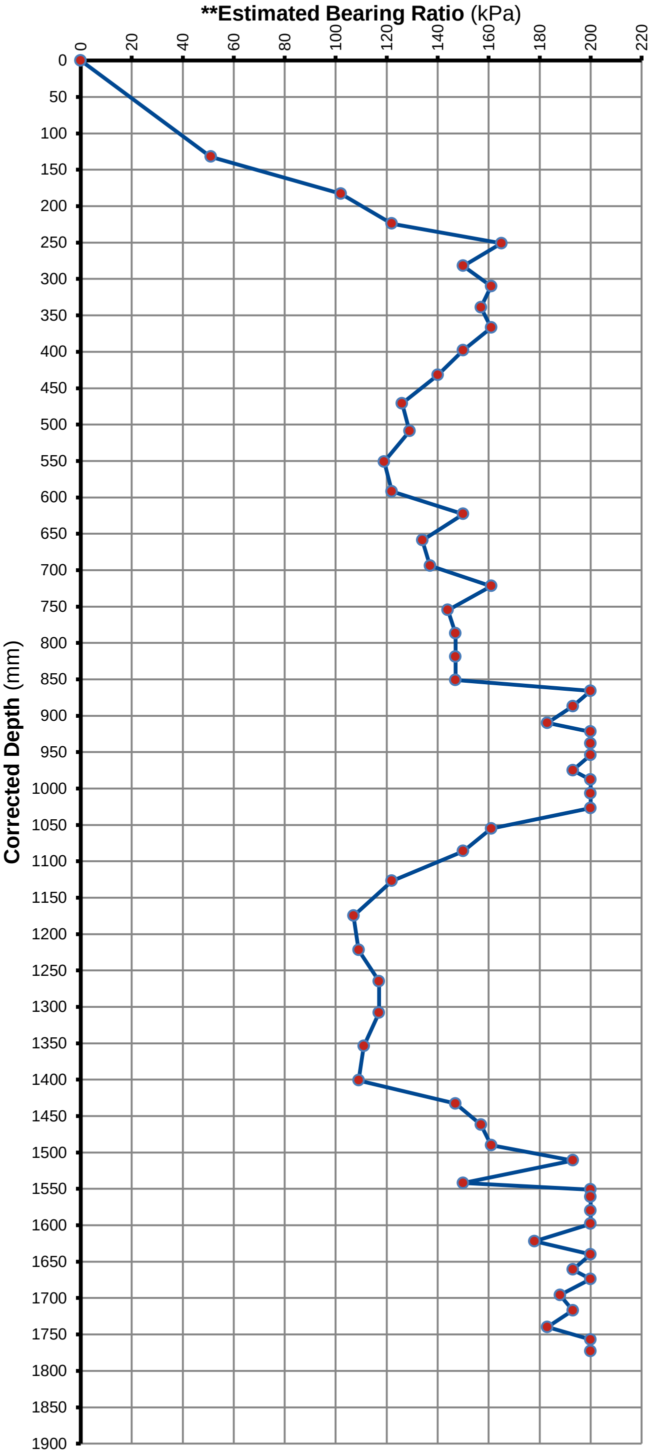
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

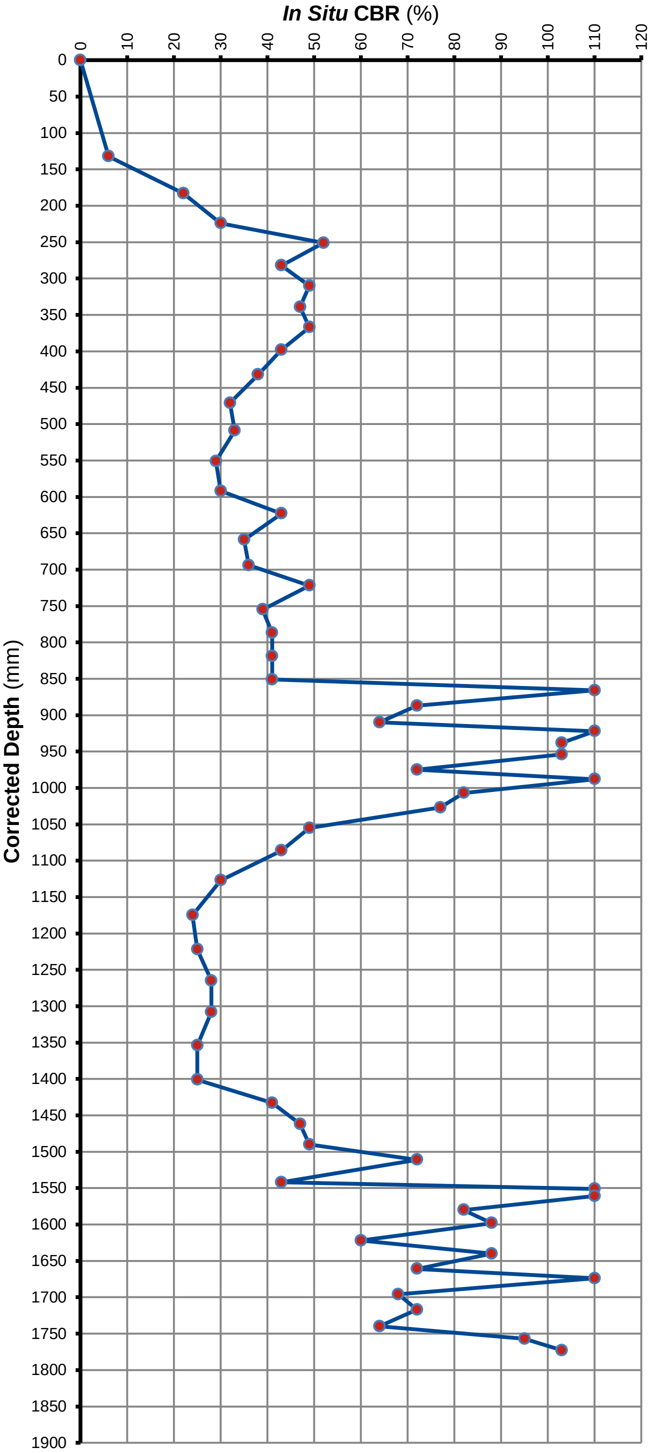
POSITION: DCP 46 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 47 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	311	311	311	62.2	Loose	1	2
10	399	399	88	17.6	Medium Dense	70	11
15	457	457	58	11.6	Dense	93	19
20	505	505	48	9.6	Dense	107	24
25	551	551	46	9.2	Dense	111	25
30	594	594	43	8.6	Dense	117	28
35	633	633	39	7.8	Dense	126	32
40	670	670	37	7.4	Dense	132	34
45	700	700	30	6.0	Dense	154	45
50	722	722	22	4.4	Very Dense	188	68
55	740	740	18	3.6	Very Dense	> 200	88
60	760	760	20	4.0	Very Dense	200	77
65	785	785	25	5.0	Very Dense	174	57
70	806	806	21	4.2	Very Dense	193	72
75	829	829	23	4.6	Very Dense	183	64
80	848	848	19	3.8	Very Dense	> 200	82
85	871	871	23	4.6	Very Dense	183	64
90	895	895	24	4.8	Very Dense	178	60
95	920	920	25	5.0	Very Dense	174	57
100	949	949	29	5.8	Dense	157	47
105	983	983	34	6.8	Dense	140	38
110	1012	1012	29	5.8	Dense	157	47
115	1038	1038	26	5.2	Dense	169	54
120	1055	1055	17	3.4	Very Dense	> 200	95
125	1076	1076	21	4.2	Very Dense	193	72
130	1098	1098	22	4.4	Very Dense	188	68
135	1120	1120	22	4.4	Very Dense	188	68
140	1141	1141	21	4.2	Very Dense	193	72
145	1166	1166	25	5.0	Very Dense	174	57
150	1190	1190	24	4.8	Very Dense	178	60
155	1213	1213	23	4.6	Very Dense	183	64
160	1235	1235	22	4.4	Very Dense	188	68
165	1258	1258	23	4.6	Very Dense	183	64
170	1275	1275	17	3.4	Very Dense	> 200	95
175	1300	1300	25	5.0	Very Dense	174	57
180	1328	1328	28	5.6	Dense	161	49
185	1360	1360	32	6.4	Dense	147	41
190	1385	1385	25	5.0	Very Dense	174	57
195	1420	1420	35	7.0	Dense	137	36
200	1446	1446	26	5.2	Dense	169	54
205	1480	1480	34	6.8	Dense	140	38
210	1522	1522	42	8.4	Dense	119	29
215	1530	1530	8	1.6	Very Dense	> 200	> 110
220	1543	1543	13	2.6	Very Dense	> 200	> 110
225	1548	1548	5	1.0	Very Dense	> 200	> 110
230	1555	1555	7	1.4	Very Dense	> 200	> 110
235	1556	1556	1	0.2	Very Dense	> 200	> 110
240	1556	1556	0	0.0	Very Dense	> 200	> 110
245	Refusal						

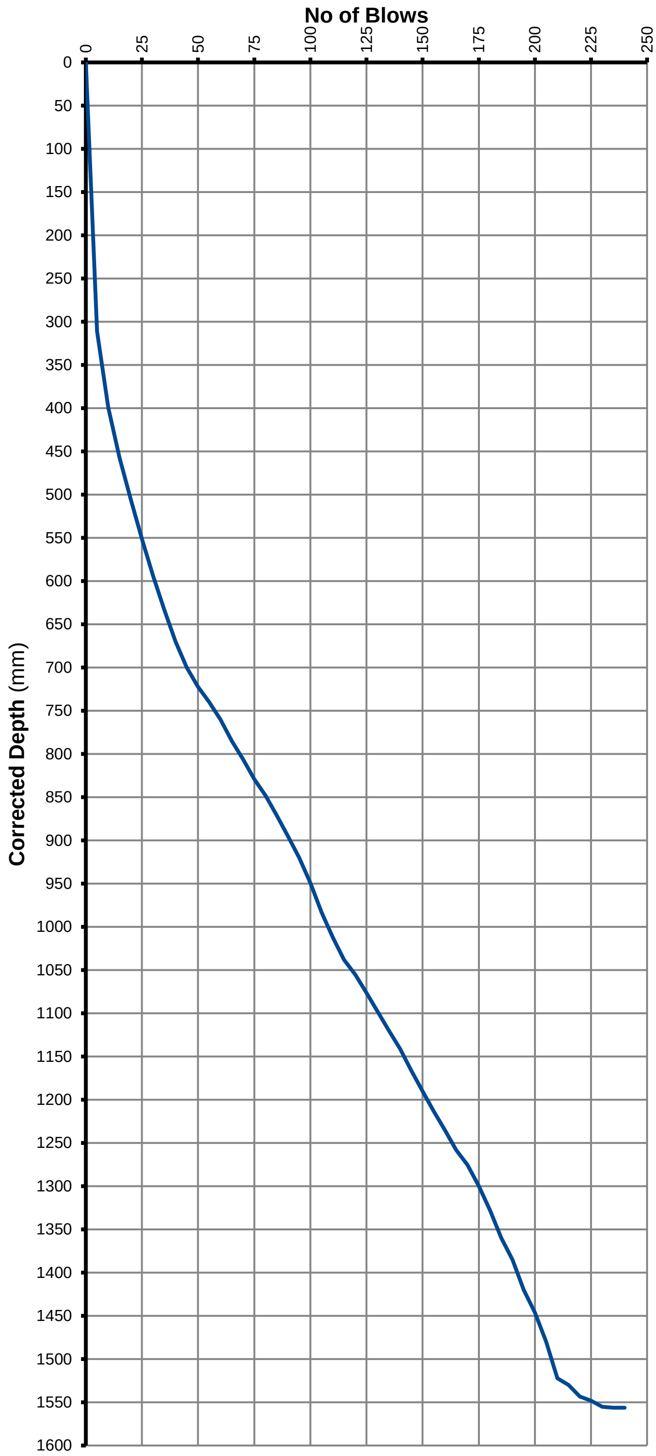
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

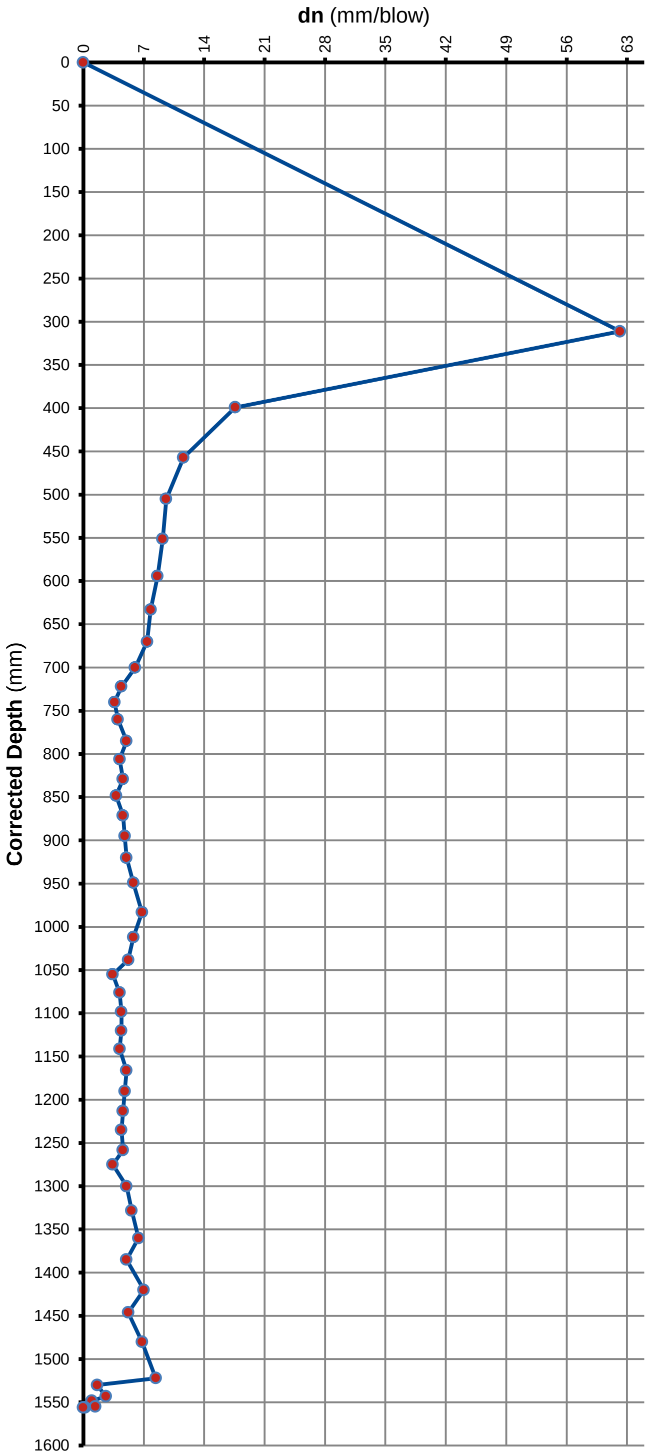
POSITION: DCP 47 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



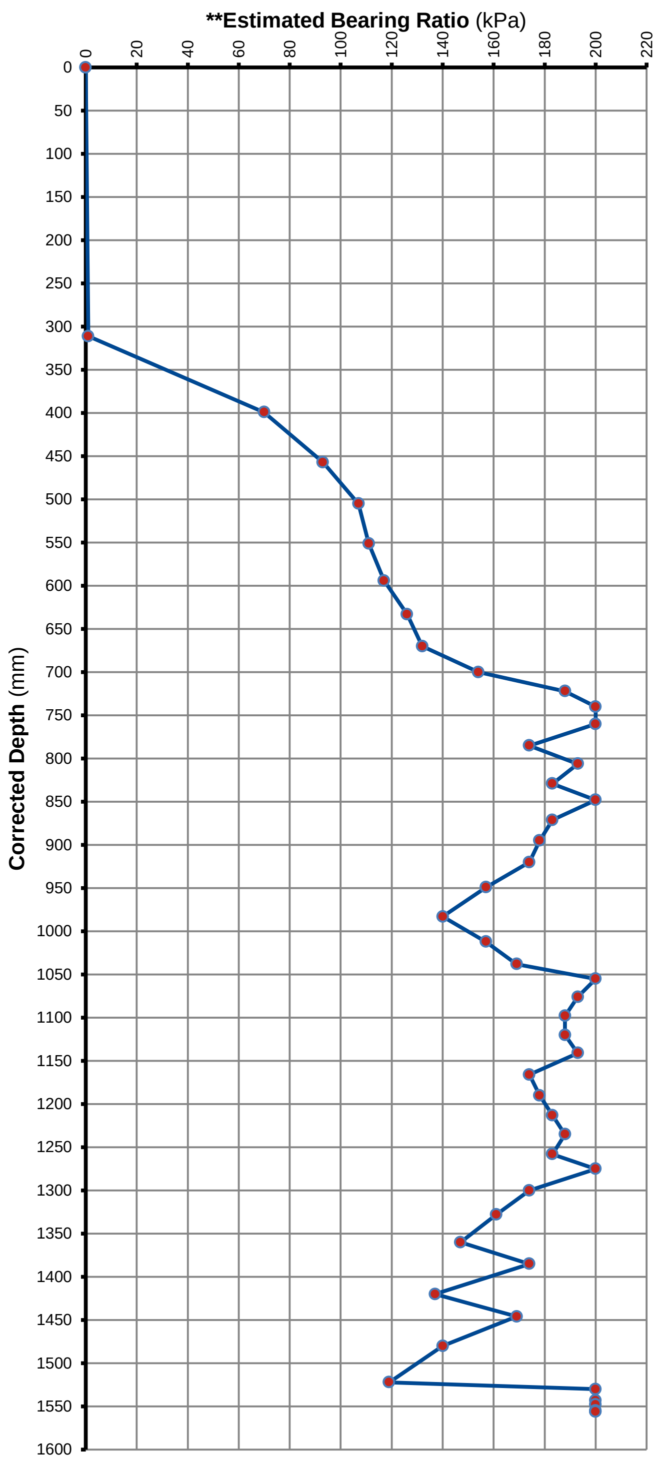
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

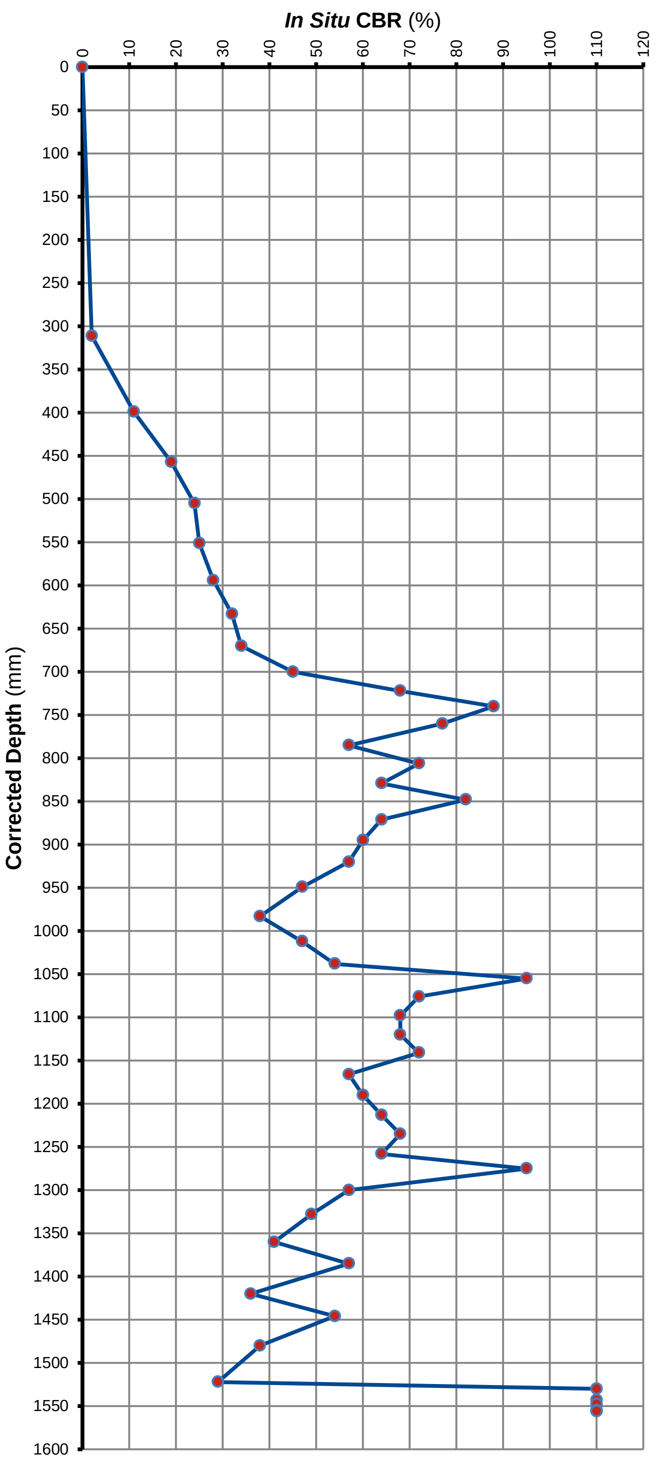
POSITION: DCP 47 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 48 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	180	180	180	36.0	Loose	41	4
10	296	296	116	23.2	Medium Dense	57	7
15	355	355	59	11.8	Dense	92	18
20	403	403	48	9.6	Dense	107	24
25	451	451	48	9.6	Dense	107	24
30	506	506	55	11.0	Dense	97	20
35	555	555	49	9.8	Dense	106	23
40	611	611	56	11.2	Dense	95	20
45	660	660	49	9.8	Dense	106	23
50	718	718	58	11.6	Dense	93	19
55	757	757	39	7.8	Dense	126	32
60	791	791	34	6.8	Dense	140	38
65	815	815	24	4.8	Very Dense	178	60
70	835	835	20	4.0	Very Dense	200	77
75	862	862	27	5.4	Dense	165	52
80	890	890	28	5.6	Dense	161	49
85	913	913	23	4.6	Very Dense	183	64
90	939	939	26	5.2	Dense	169	54
95	962	962	23	4.6	Very Dense	183	64
100	984	984	22	4.4	Very Dense	188	68
105	1000	1000	16	3.2	Very Dense	> 200	103
110	1012	1012	12	2.4	Very Dense	> 200	> 110
115	1025	1025	13	2.6	Very Dense	> 200	> 110
120	1037	1037	12	2.4	Very Dense	> 200	> 110
125	1055	1055	18	3.6	Very Dense	> 200	88
130	1074	1074	19	3.8	Very Dense	> 200	82
135	1090	1090	16	3.2	Very Dense	> 200	103
140	1110	1110	20	4.0	Very Dense	200	77
145	1130	1130	20	4.0	Very Dense	200	77
150	1148	1148	18	3.6	Very Dense	> 200	88
155	1165	1165	17	3.4	Very Dense	> 200	95
160	1184	1184	19	3.8	Very Dense	> 200	82
165	1200	1200	16	3.2	Very Dense	> 200	103
170	1218	1218	18	3.6	Very Dense	> 200	88
175	1235	1235	17	3.4	Very Dense	> 200	95
180	1252	1252	17	3.4	Very Dense	> 200	95
185	1270	1270	18	3.6	Very Dense	> 200	88
190	1289	1289	19	3.8	Very Dense	> 200	82
195	1305	1305	16	3.2	Very Dense	> 200	103
200	1320	1320	15	3.0	Very Dense	> 200	> 110
205	1330	1330	10	2.0	Very Dense	> 200	> 110
210	1342	1342	12	2.4	Very Dense	> 200	> 110
215	1349	1349	7	1.4	Very Dense	> 200	> 110
220	1350	1350	1	0.2	Very Dense	> 200	> 110
225	1350	1350	0	0.0	Very Dense	> 200	> 110
230	Refusal						

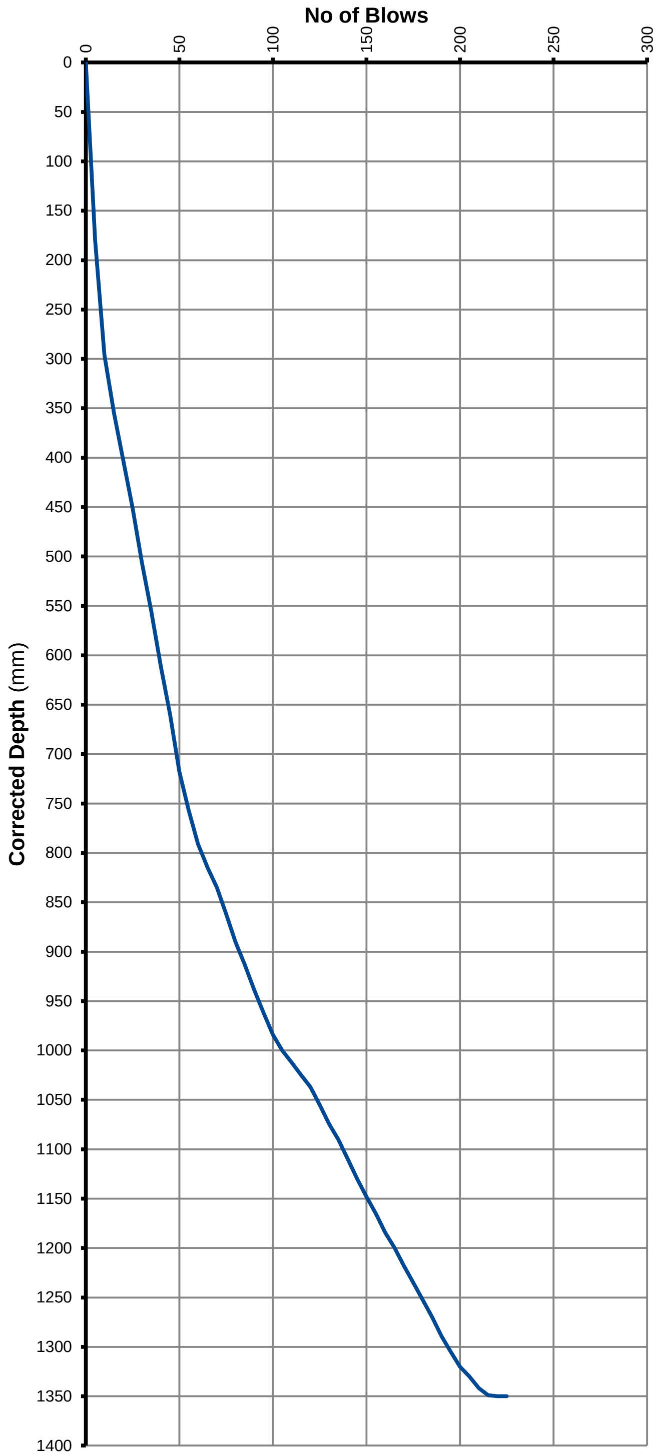
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

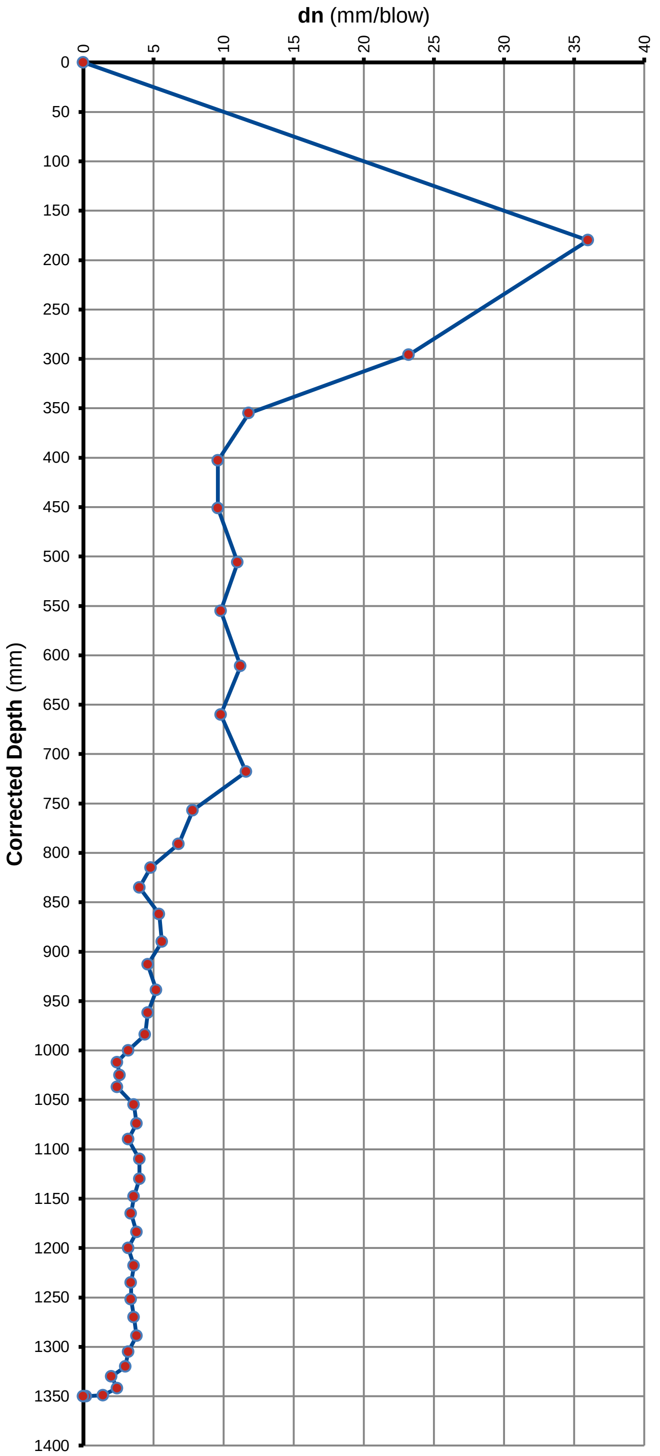
POSITION: DCP 48 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



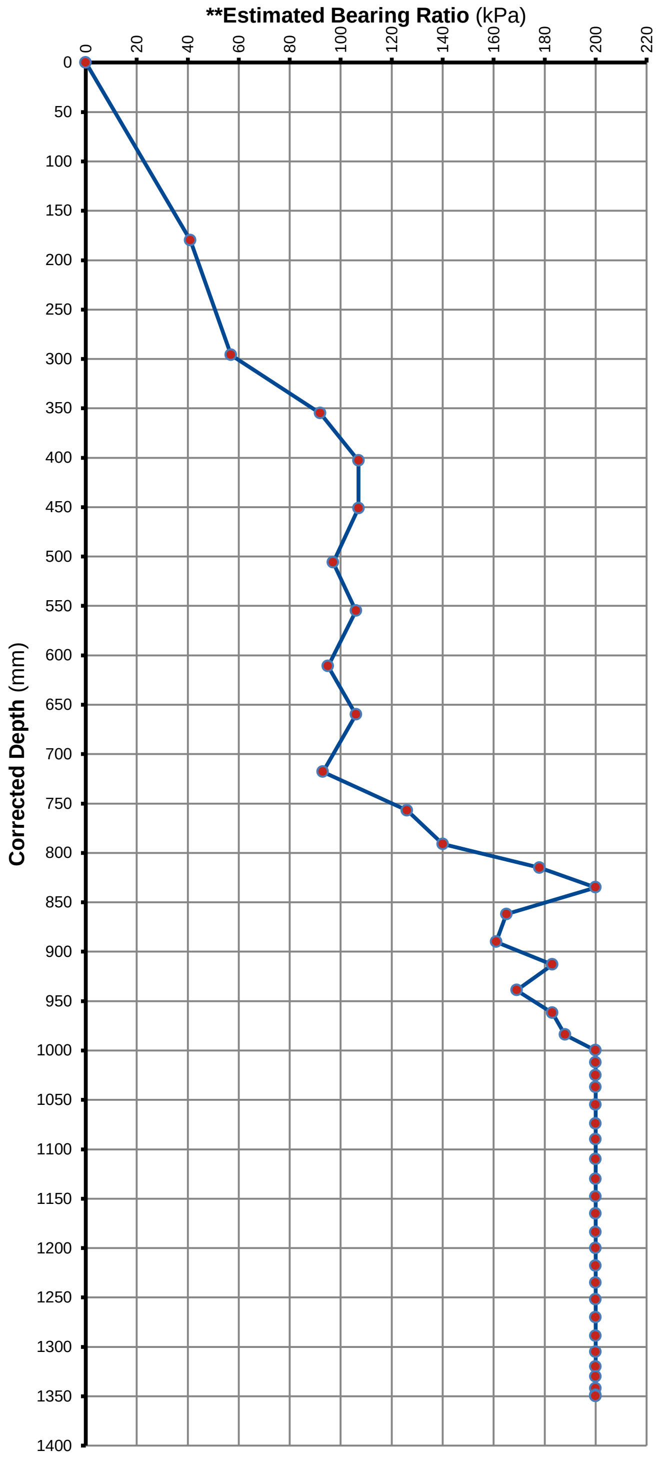
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

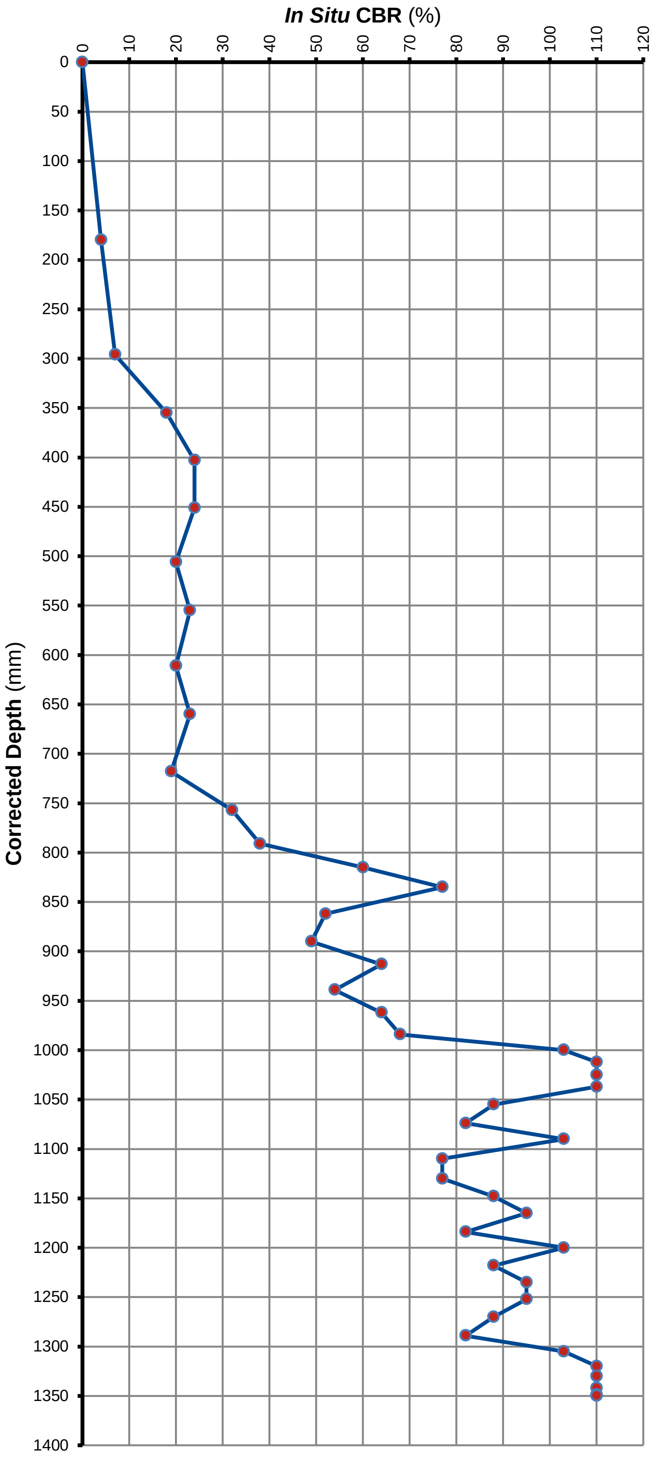
POSITION: DCP 48 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 49 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	10	0	-	-	-	-	-
5	171	161	161	32.2	Loose	43	5
10	308	298	137	27.4	Medium Dense	49	6
15	386	376	78	15.6	Medium Dense	76	13
20	460	450	74	14.8	Medium Dense	78	13
25	521	511	61	12.2	Dense	90	17
30	556	546	35	7.0	Dense	137	36
35	584	574	28	5.6	Dense	161	49
40	619	609	35	7.0	Dense	137	36
45	648	638	29	5.8	Dense	157	47
50	680	670	32	6.4	Dense	147	41
55	721	711	41	8.2	Dense	122	30
60	745	735	24	4.8	Very Dense	178	60
65	768	758	23	4.6	Very Dense	183	64
70	795	785	27	5.4	Dense	165	52
75	826	816	31	6.2	Dense	150	43
80	860	850	34	6.8	Dense	140	38
85	893	883	33	6.6	Dense	144	39
90	930	920	37	7.4	Dense	132	34
95	971	961	41	8.2	Dense	122	30
100	1012	1002	41	8.2	Dense	122	30
105	1056	1046	44	8.8	Dense	115	27
110	1087	1077	31	6.2	Dense	150	43
115	1121	1111	34	6.8	Dense	140	38
120	1155	1145	34	6.8	Dense	140	38
125	1183	1173	28	5.6	Dense	161	49
130	1205	1195	22	4.4	Very Dense	188	68
135	1224	1214	19	3.8	Very Dense	> 200	82
140	1248	1238	24	4.8	Very Dense	178	60
145	1269	1259	21	4.2	Very Dense	193	72
150	1286	1276	17	3.4	Very Dense	> 200	95
155	1310	1300	24	4.8	Very Dense	178	60
160	1330	1320	20	4.0	Very Dense	200	77
165	1348	1338	18	3.6	Very Dense	> 200	88
170	1368	1358	20	4.0	Very Dense	200	77
175	1385	1375	17	3.4	Very Dense	> 200	95
180	1403	1393	18	3.6	Very Dense	> 200	88
185	1424	1414	21	4.2	Very Dense	193	72
190	1441	1431	17	3.4	Very Dense	> 200	95
195	1453	1443	12	2.4	Very Dense	> 200	> 110
200	1470	1460	17	3.4	Very Dense	> 200	95
205	1483	1473	13	2.6	Very Dense	> 200	> 110
210	1499	1489	16	3.2	Very Dense	> 200	103
215	1511	1501	12	2.4	Very Dense	> 200	> 110
220	1526	1516	15	3.0	Very Dense	> 200	> 110
225	1541	1531	15	3.0	Very Dense	> 200	> 110
230	1551	1541	10	2.0	Very Dense	> 200	> 110
235	1566	1556	15	3.0	Very Dense	> 200	> 110
240	1574	1564	8	1.6	Very Dense	> 200	> 110
245	1585	1575	11	2.2	Very Dense	> 200	> 110
250	1591	1581	6	1.2	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 49 **DEPTH BELOW NGL:** 0.000m

***DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)**

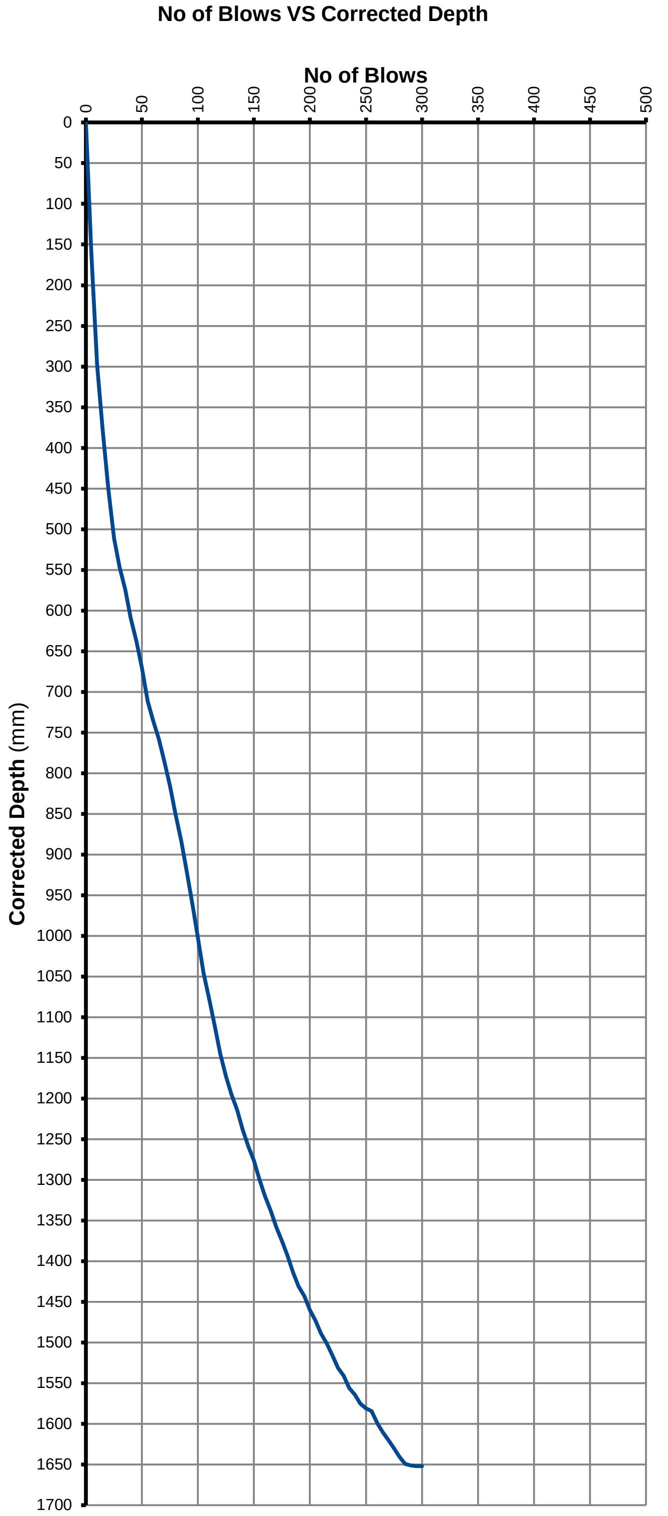
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1594	1584	3	0.6	Very Dense	> 200	> 110
260	1609	1599	15	3.0	Very Dense	> 200	> 110
265	1620	1610	11	2.2	Very Dense	> 200	> 110
270	1630	1620	10	2.0	Very Dense	> 200	> 110
275	1640	1630	10	2.0	Very Dense	> 200	> 110
280	1651	1641	11	2.2	Very Dense	> 200	> 110
285	1659	1649	8	1.6	Very Dense	> 200	> 110
290	1661	1651	2	0.4	Very Dense	> 200	> 110
295	1662	1652	1	0.2	Very Dense	> 200	> 110
300	1662	1652	0	0.0	Very Dense	> 200	> 110
305	Refusal						

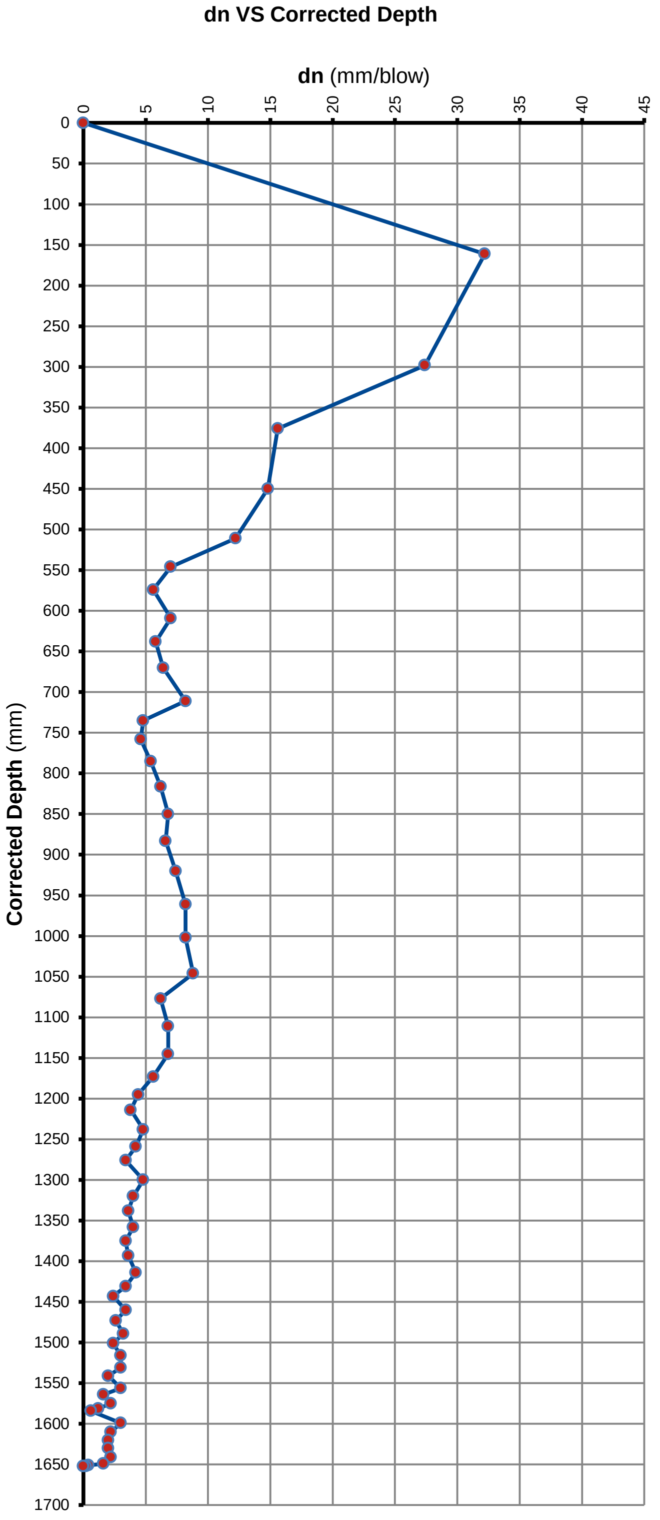
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 49 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





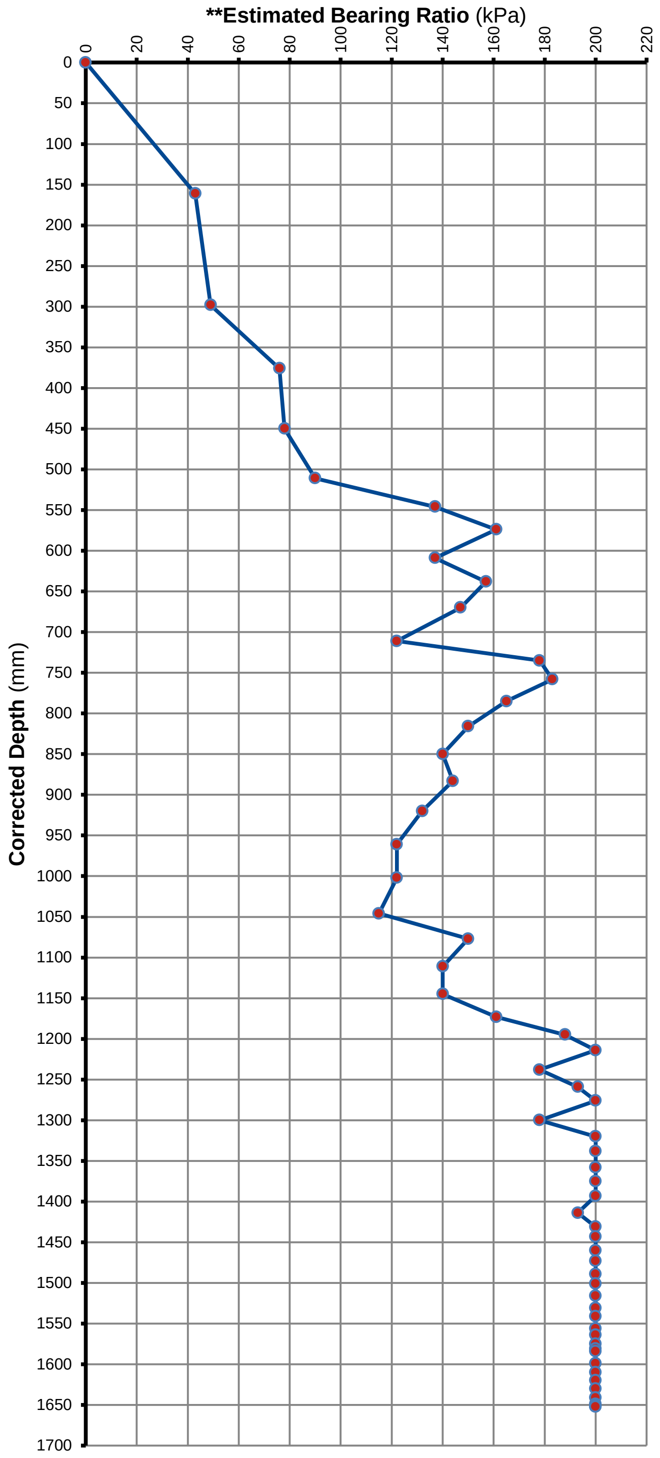
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

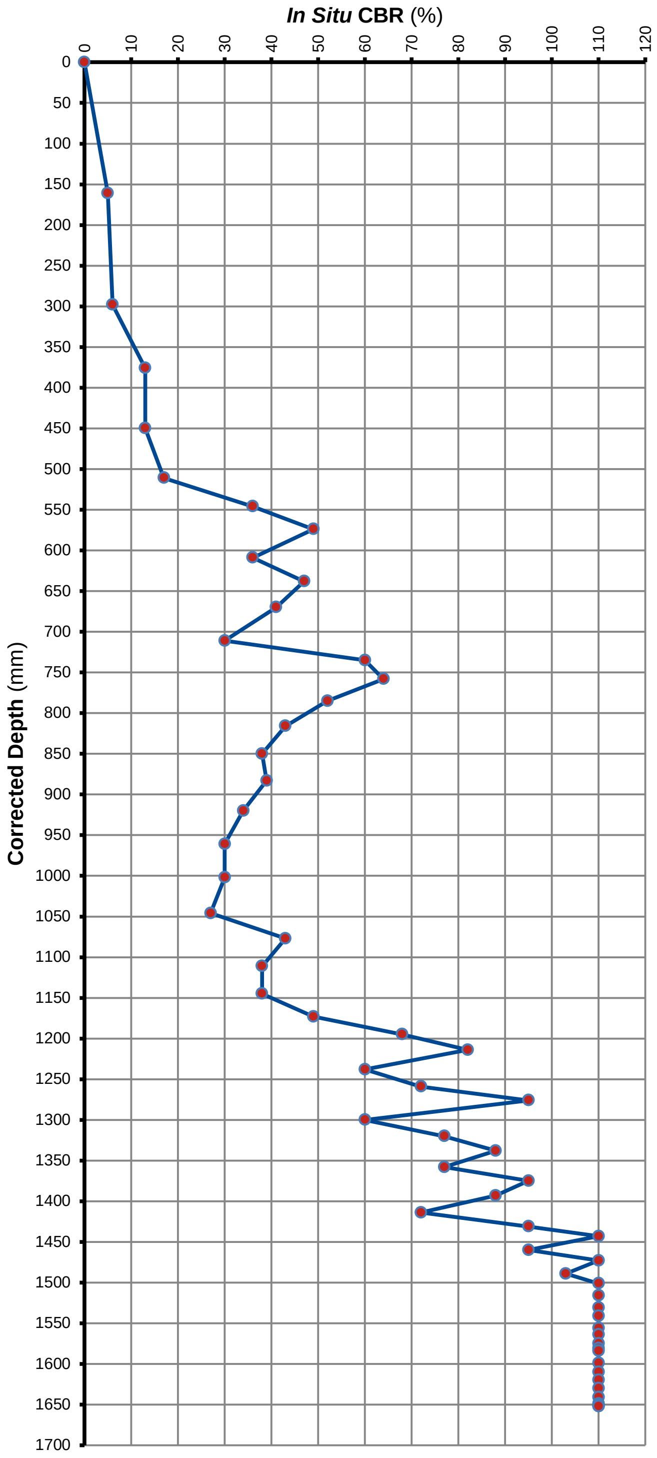
POSITION: DCP 49 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 50 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	10	0	-	-	-	-	-
5	105	95	95	19.0	Medium Dense	67	10
10	176	166	71	14.2	Medium Dense	81	14
15	248	238	72	14.4	Medium Dense	80	14
20	297	287	49	9.8	Dense	106	23
25	335	325	38	7.6	Dense	129	33
30	374	364	39	7.8	Dense	126	32
35	416	406	42	8.4	Dense	119	29
40	460	450	44	8.8	Dense	115	27
45	496	486	36	7.2	Dense	134	35
50	531	521	35	7.0	Dense	137	36
55	565	555	34	6.8	Dense	140	38
60	604	594	39	7.8	Dense	126	32
65	639	629	35	7.0	Dense	137	36
70	673	663	34	6.8	Dense	140	38
75	710	700	37	7.4	Dense	132	34
80	742	732	32	6.4	Dense	147	41
85	779	769	37	7.4	Dense	132	34
90	810	800	31	6.2	Dense	150	43
95	840	830	30	6.0	Dense	154	45
100	871	861	31	6.2	Dense	150	43
105	906	896	35	7.0	Dense	137	36
110	931	921	25	5.0	Very Dense	174	57
115	959	949	28	5.6	Dense	161	49
120	980	970	21	4.2	Very Dense	193	72
125	1002	992	22	4.4	Very Dense	188	68
130	1036	1026	34	6.8	Dense	140	38
135	1061	1051	25	5.0	Very Dense	174	57
140	1089	1079	28	5.6	Dense	161	49
145	1111	1101	22	4.4	Very Dense	188	68
150	1139	1129	28	5.6	Dense	161	49
155	1158	1148	19	3.8	Very Dense	> 200	82
160	1180	1170	22	4.4	Very Dense	188	68
165	1200	1190	20	4.0	Very Dense	200	77
170	1215	1205	15	3.0	Very Dense	> 200	> 110
175	1225	1215	10	2.0	Very Dense	> 200	> 110
180	1230	1220	5	1.0	Very Dense	> 200	> 110
185	1231	1221	1	0.2	Very Dense	> 200	> 110
190	1231	1221	0	0.0	Very Dense	> 200	> 110
195	Refusal						

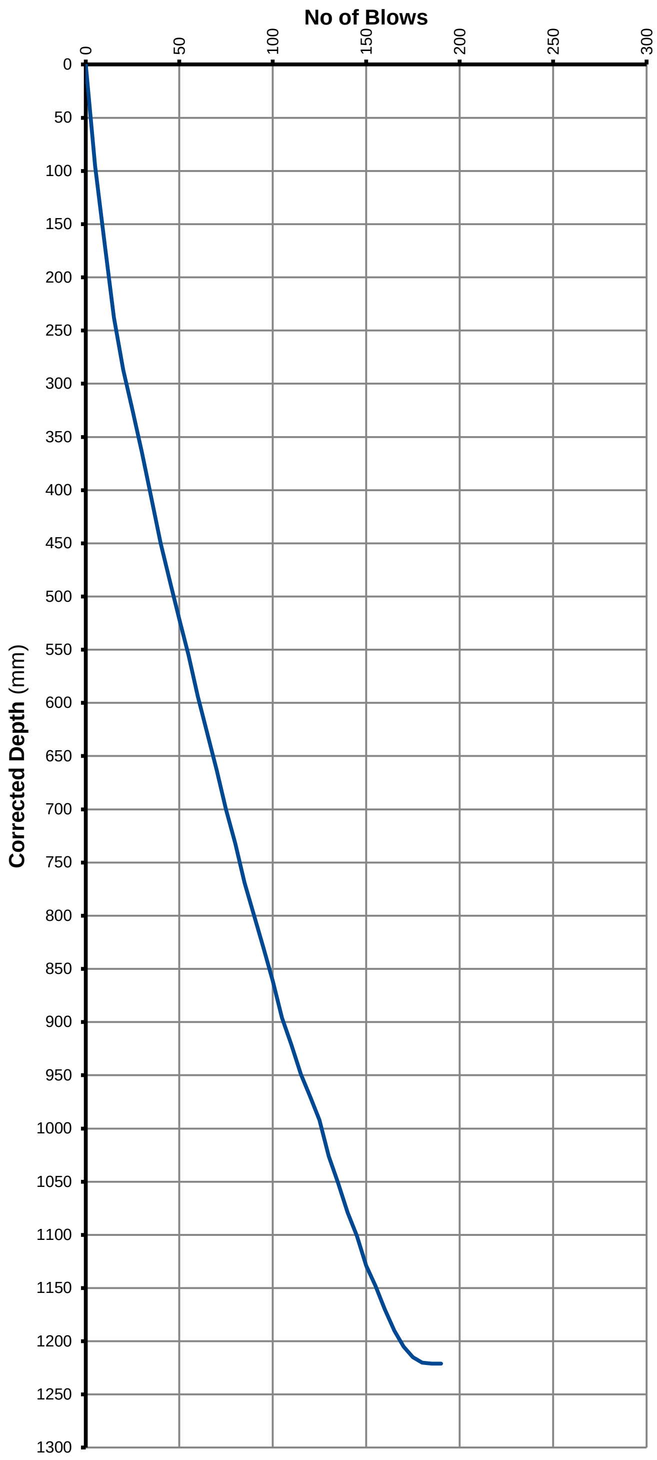
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

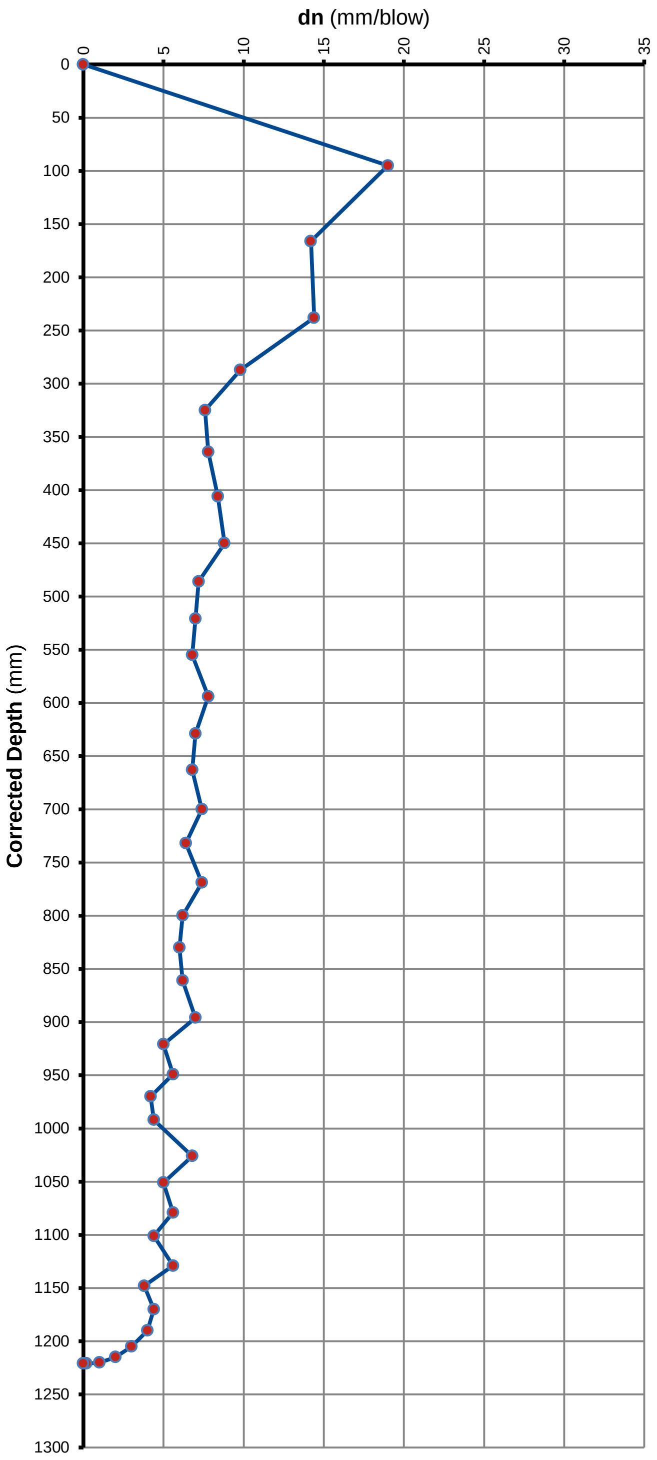
POSITION: DCP 50 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

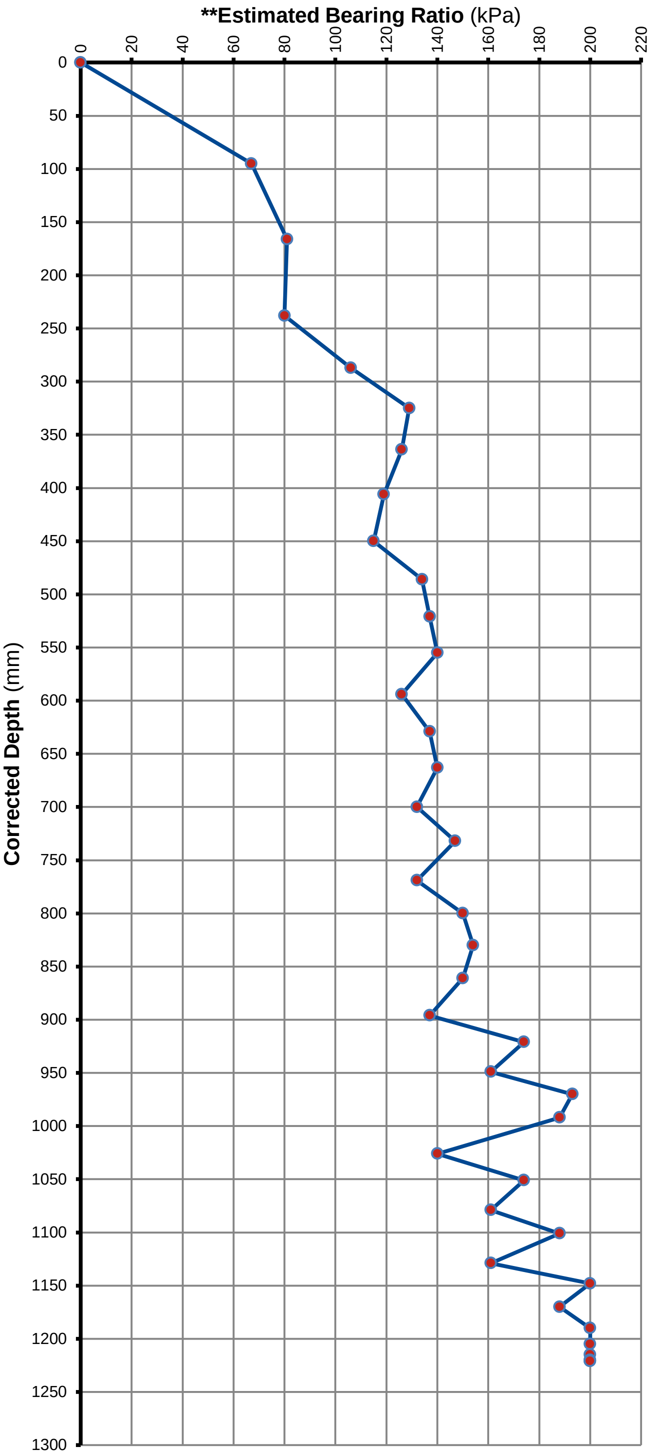


** According to Dr B van Wyk's Method

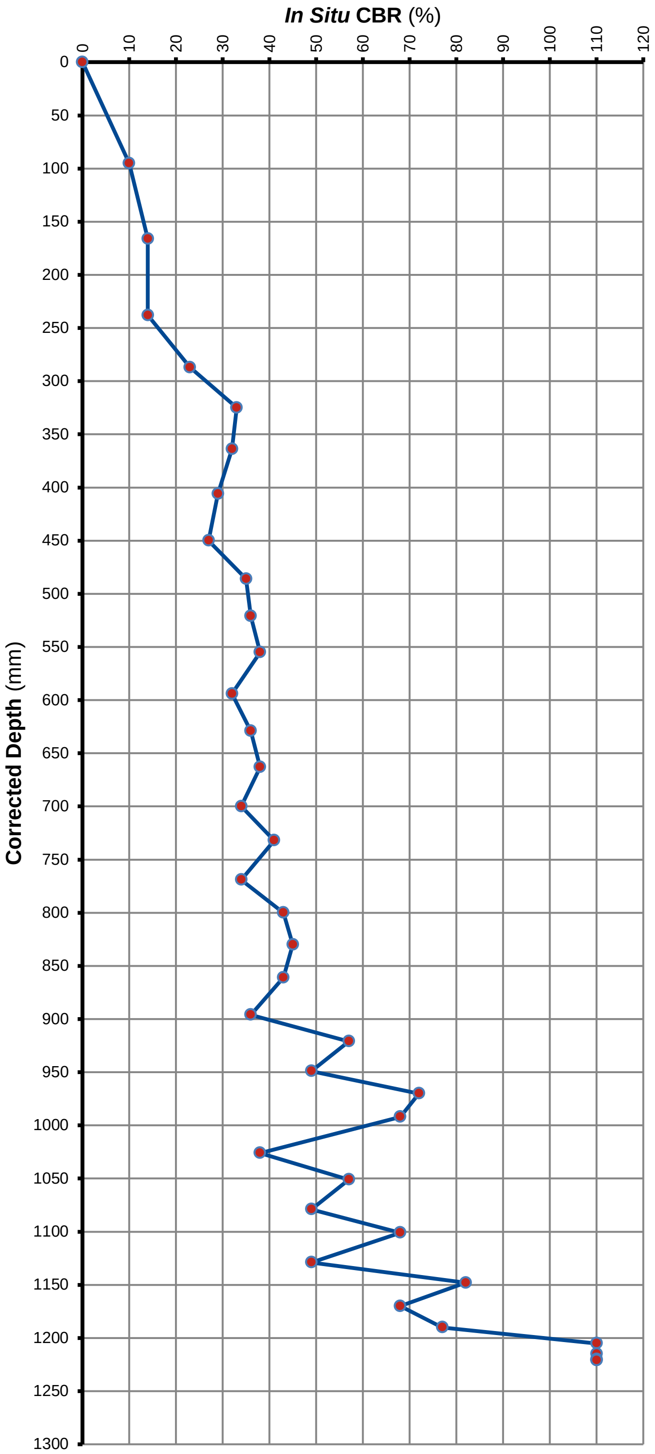
*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 50 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)



**Estimated Bearing Ratio VS Corrected Depth



In Situ CBR VS Corrected Depth

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 51 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	10	0	-	-	-	-	-
5	195	185	185	37.0	Loose	41	4
10	365	355	170	34.0	Loose	42	4
15	560	550	195	39.0	Loose	41	4
20	693	683	133	26.6	Medium Dense	50	6
25	755	745	62	12.4	Dense	89	17
30	798	788	43	8.6	Dense	117	28
35	833	823	35	7.0	Dense	137	36
40	863	853	30	6.0	Dense	154	45
45	889	879	26	5.2	Dense	169	54
50	918	908	29	5.8	Dense	157	47
55	937	927	19	3.8	Very Dense	> 200	82
60	960	950	23	4.6	Very Dense	183	64
65	980	970	20	4.0	Very Dense	200	77
70	1003	993	23	4.6	Very Dense	183	64
75	1024	1014	21	4.2	Very Dense	193	72
80	1044	1034	20	4.0	Very Dense	200	77
85	1061	1051	17	3.4	Very Dense	> 200	95
90	1080	1070	19	3.8	Very Dense	> 200	82
95	1100	1090	20	4.0	Very Dense	200	77
100	1121	1111	21	4.2	Very Dense	193	72
105	1139	1129	18	3.6	Very Dense	> 200	88
110	1150	1140	11	2.2	Very Dense	> 200	> 110
115	1163	1153	13	2.6	Very Dense	> 200	> 110
120	1180	1170	17	3.4	Very Dense	> 200	95
125	1194	1184	14	2.8	Very Dense	> 200	> 110
130	1210	1200	16	3.2	Very Dense	> 200	103
135	1221	1211	11	2.2	Very Dense	> 200	> 110
140	1235	1225	14	2.8	Very Dense	> 200	> 110
145	1244	1234	9	1.8	Very Dense	> 200	> 110
150	1253	1243	9	1.8	Very Dense	> 200	> 110
155	1261	1251	8	1.6	Very Dense	> 200	> 110
160	1270	1260	9	1.8	Very Dense	> 200	> 110
165	1280	1270	10	2.0	Very Dense	> 200	> 110
170	1281	1271	1	0.2	Very Dense	> 200	> 110
175	Refusal						

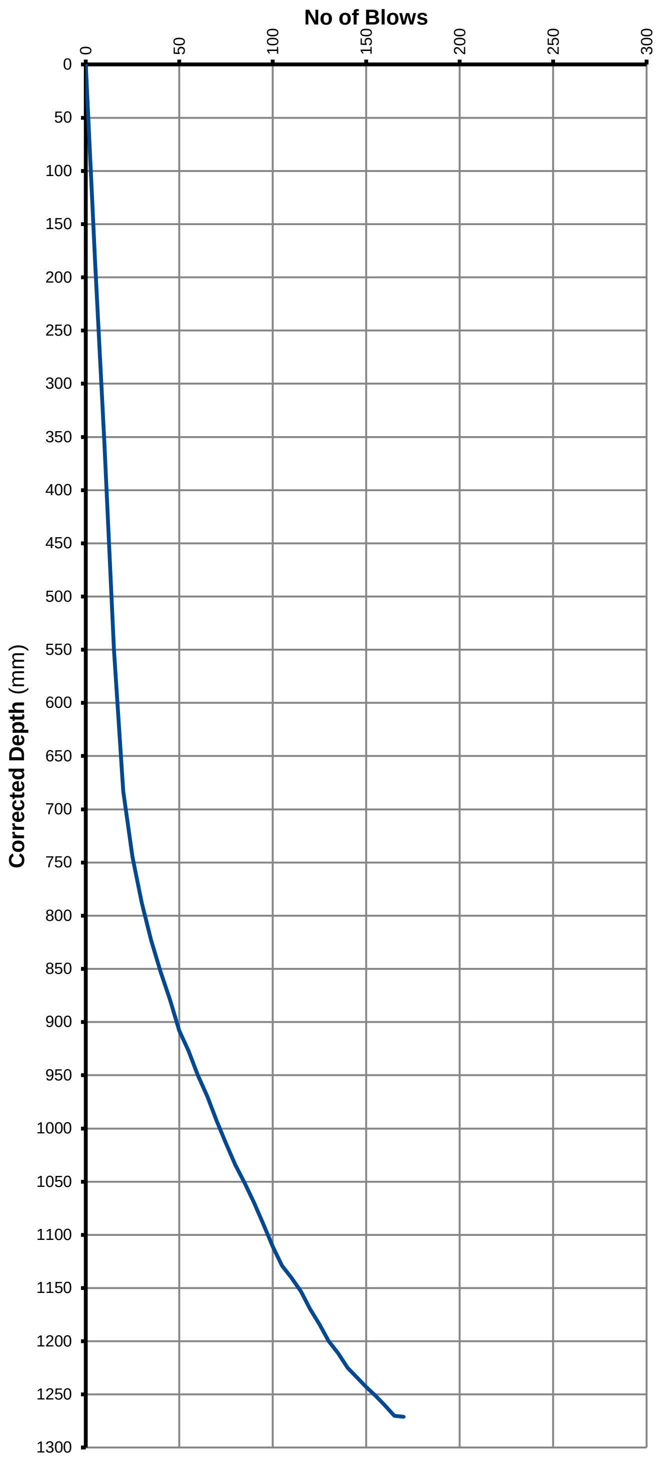
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

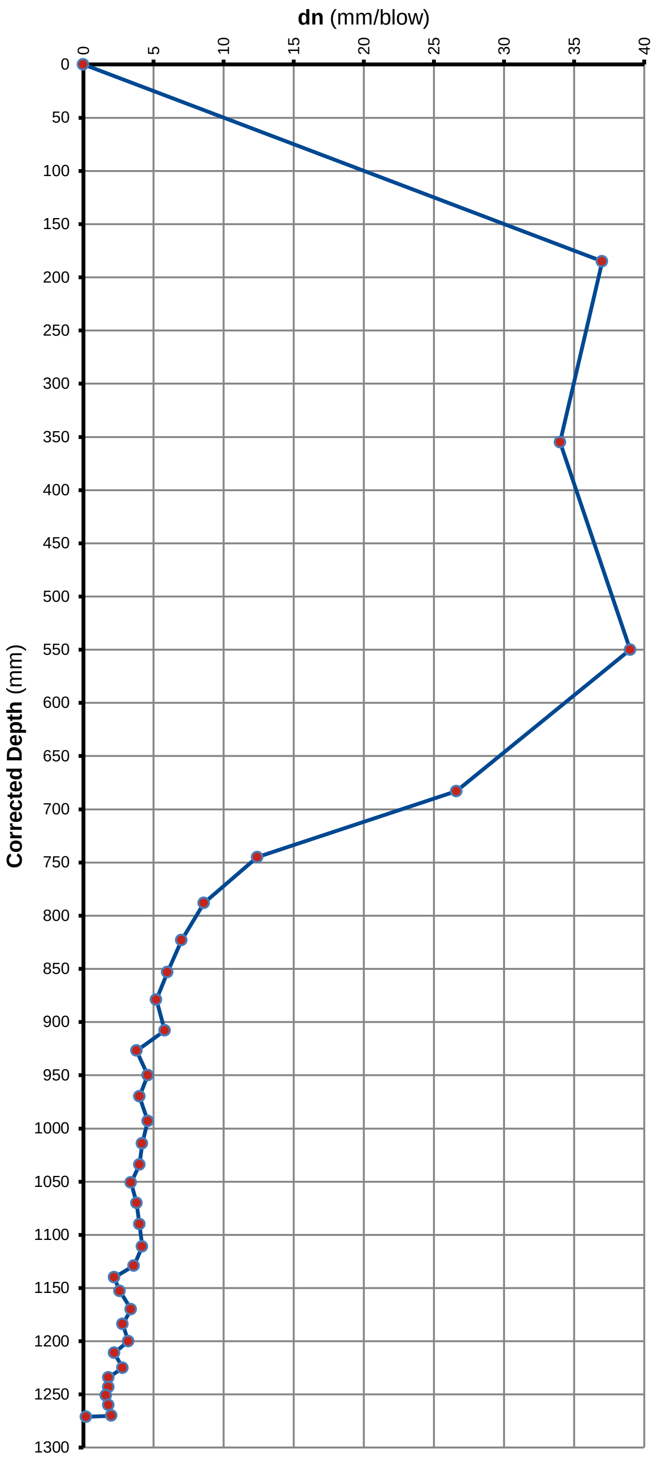
POSITION: DCP 51 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



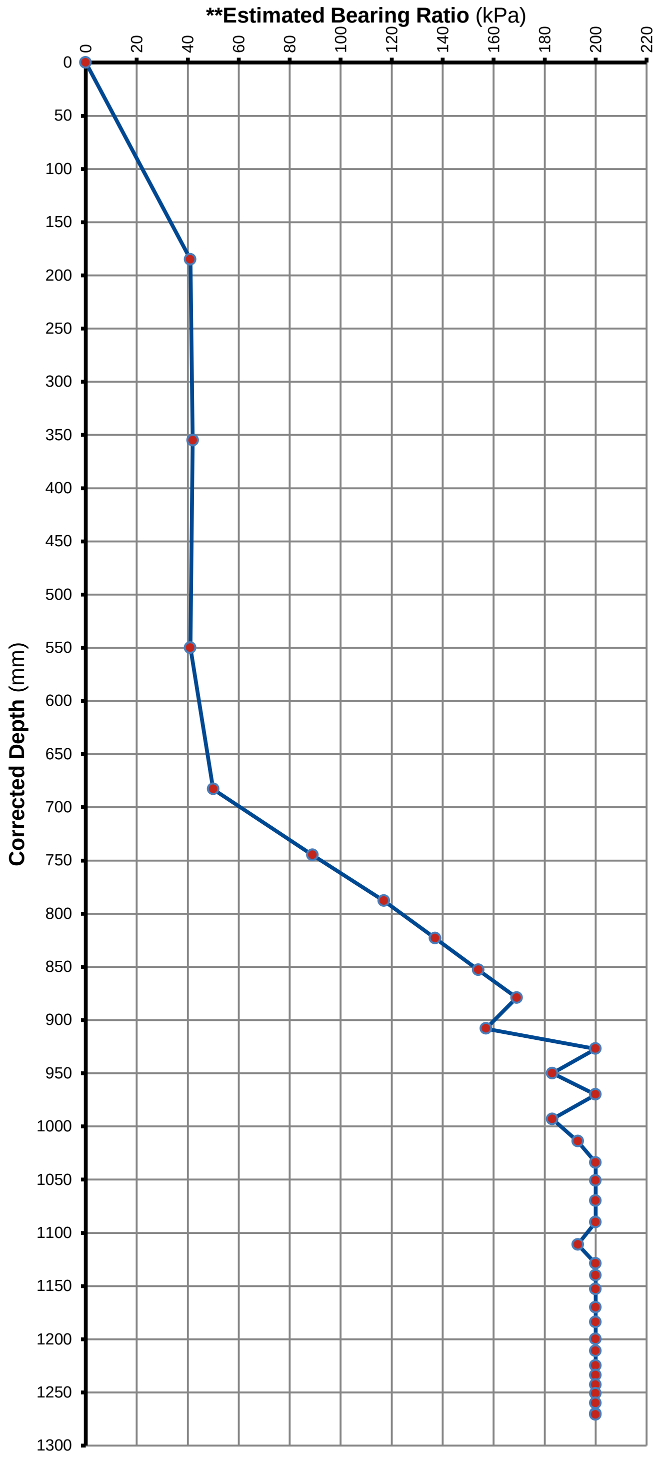
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

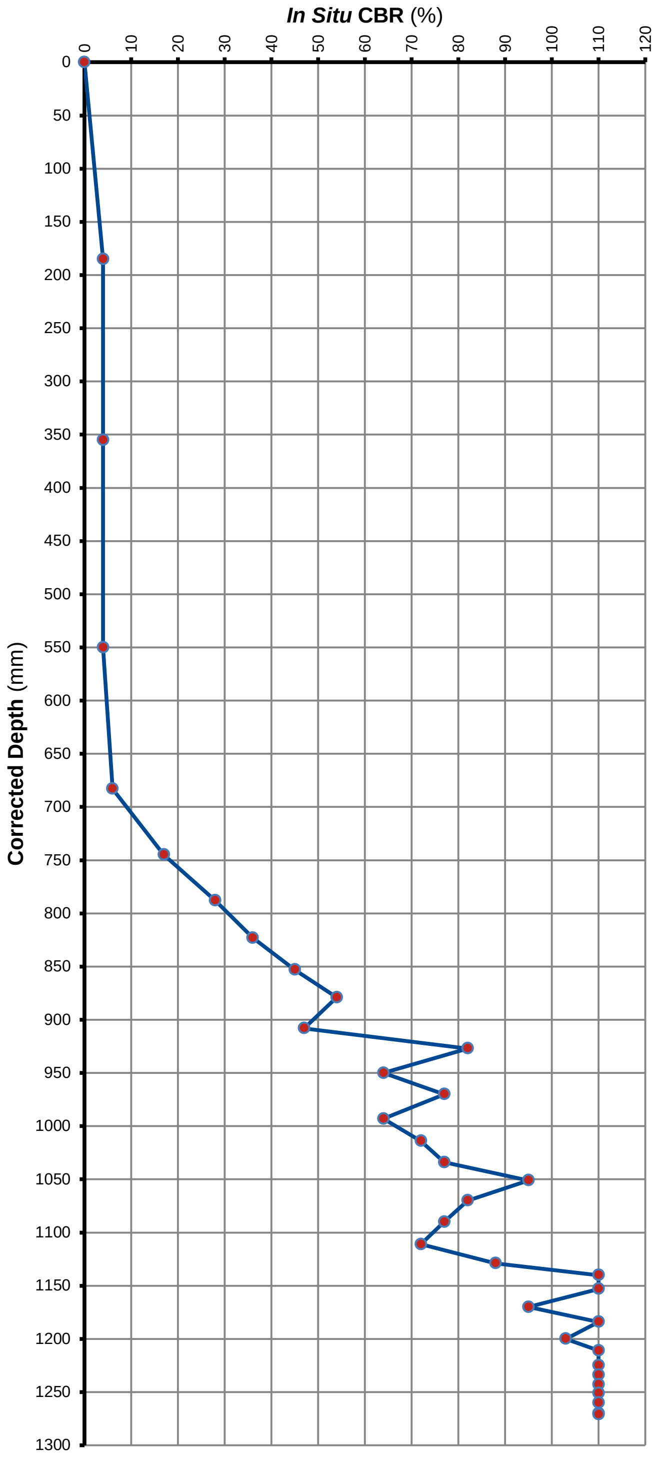
POSITION: DCP 51 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 52 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

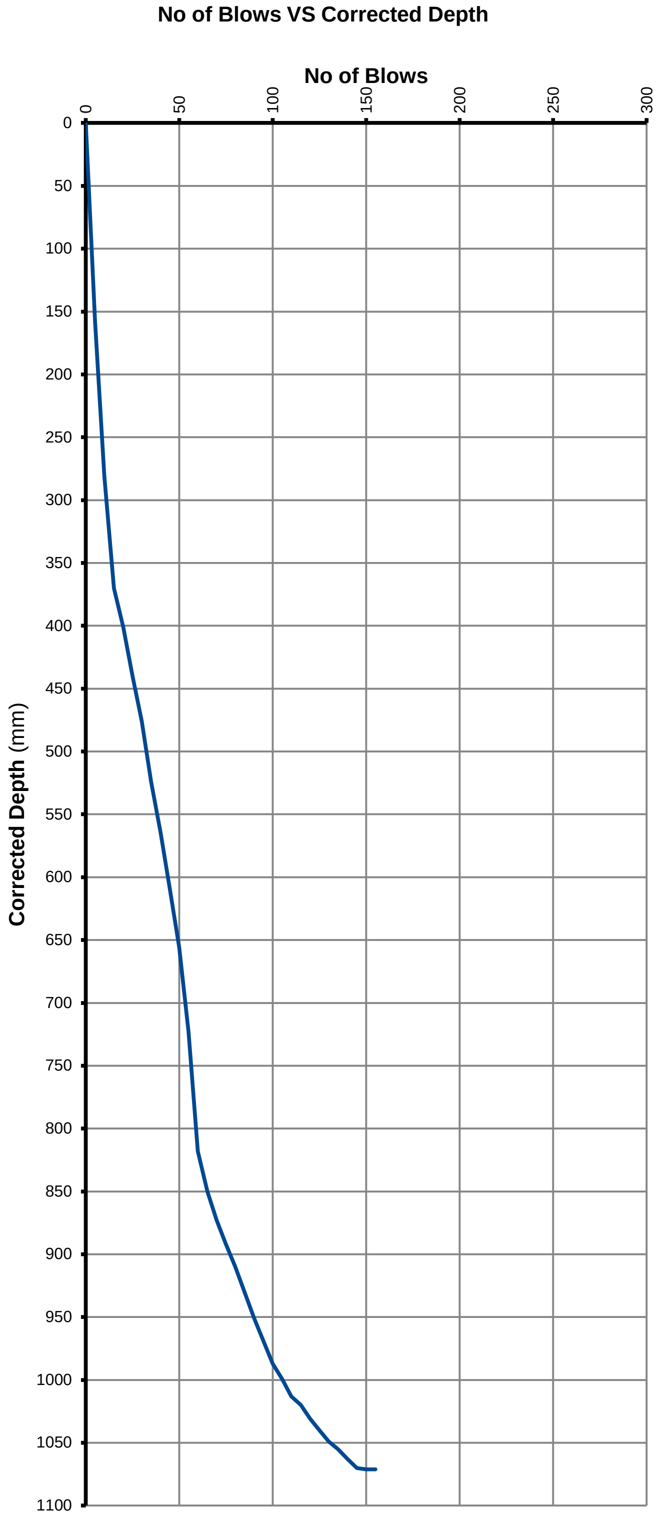
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	158	158	158	31.6	Loose	44	5
10	281	281	123	24.6	Medium Dense	54	7
15	370	370	89	17.8	Medium Dense	70	11
20	401	401	31	6.2	Dense	150	43
25	440	440	39	7.8	Dense	126	32
30	476	476	36	7.2	Dense	134	35
35	524	524	48	9.6	Dense	107	24
40	565	565	41	8.2	Dense	122	30
45	610	610	45	9.0	Dense	113	26
50	656	656	46	9.2	Dense	111	25
55	723	723	67	13.4	Medium Dense	84	15
60	818	818	95	19.0	Medium Dense	67	10
65	850	850	32	6.4	Dense	147	41
70	873	873	23	4.6	Very Dense	183	64
75	892	892	19	3.8	Very Dense	> 200	82
80	910	910	18	3.6	Very Dense	> 200	88
85	930	930	20	4.0	Very Dense	200	77
90	951	951	21	4.2	Very Dense	193	72
95	969	969	18	3.6	Very Dense	> 200	88
100	987	987	18	3.6	Very Dense	> 200	88
105	999	999	12	2.4	Very Dense	> 200	> 110
110	1013	1013	14	2.8	Very Dense	> 200	> 110
115	1020	1020	7	1.4	Very Dense	> 200	> 110
120	1031	1031	11	2.2	Very Dense	> 200	> 110
125	1040	1040	9	1.8	Very Dense	> 200	> 110
130	1049	1049	9	1.8	Very Dense	> 200	> 110
135	1055	1055	6	1.2	Very Dense	> 200	> 110
140	1063	1063	8	1.6	Very Dense	> 200	> 110
145	1070	1070	7	1.4	Very Dense	> 200	> 110
150	1071	1071	1	0.2	Very Dense	> 200	> 110
155	1071	1071	0	0.0	Very Dense	> 200	> 110
160	Refusal						

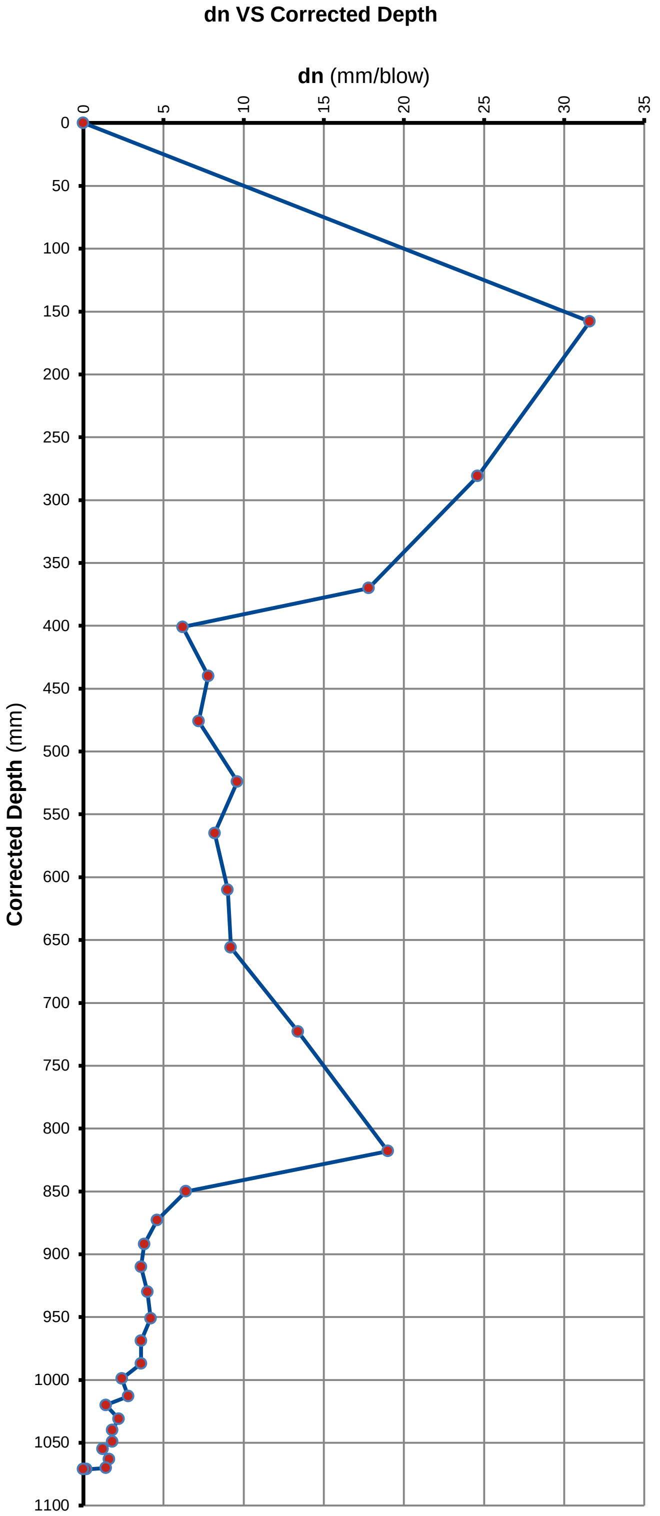
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 52 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

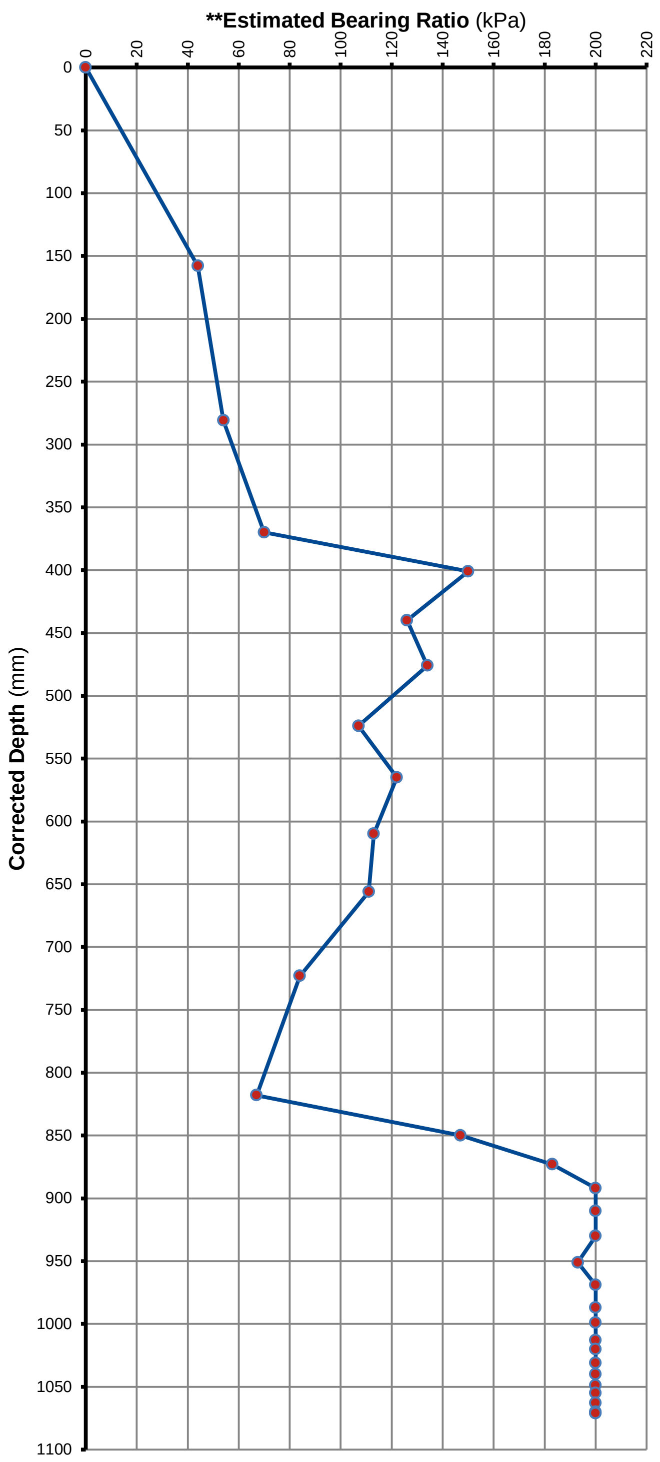
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

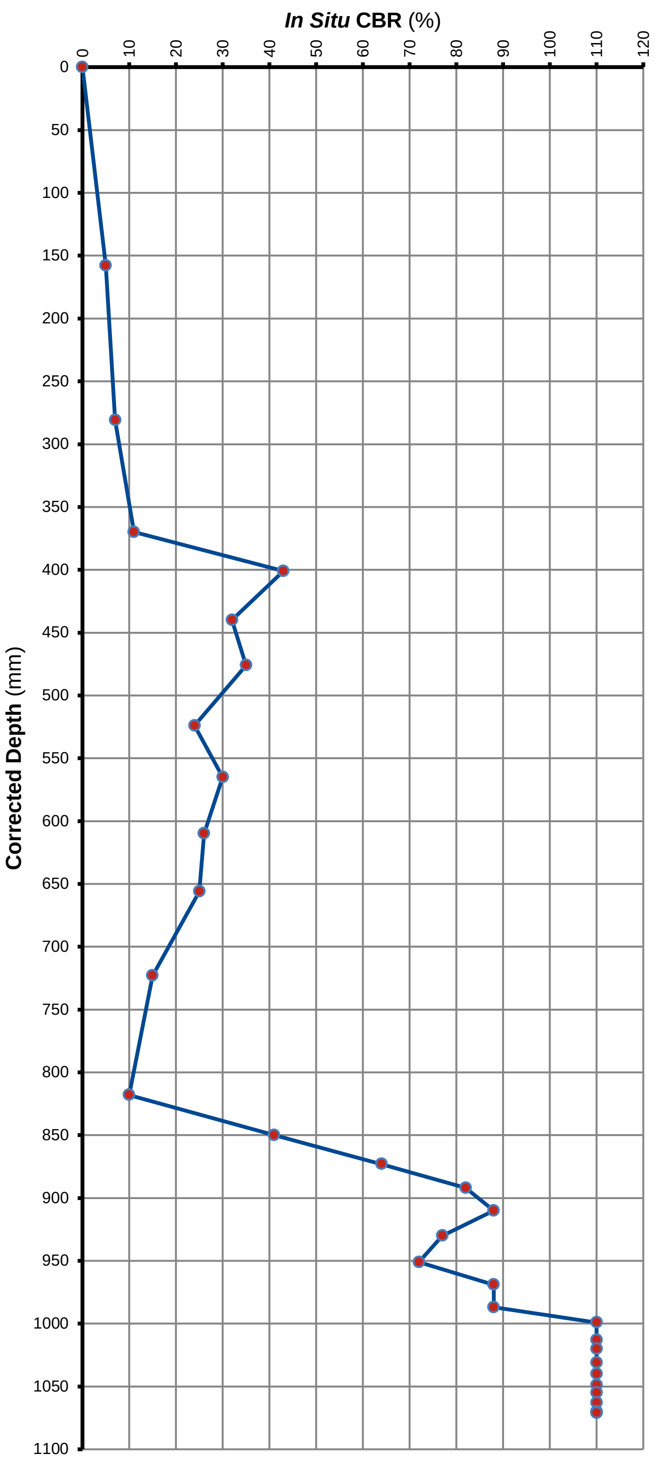
POSITION: DCP 52 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 53 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	130	0	-	-	-	-	-
5	235	105	105	21.0	Medium Dense	62	8
10	348	218	113	22.6	Medium Dense	58	8
15	432	302	84	16.8	Medium Dense	72	11
20	500	370	68	13.6	Medium Dense	83	15
25	559	429	59	11.8	Dense	92	18
30	600	470	41	8.2	Dense	122	30
35	639	509	39	7.8	Dense	126	32
40	671	541	32	6.4	Dense	147	41
45	701	571	30	6.0	Dense	154	45
50	721	591	20	4.0	Very Dense	200	77
55	738	608	17	3.4	Very Dense	> 200	95
60	758	628	20	4.0	Very Dense	200	77
65	780	650	22	4.4	Very Dense	188	68
70	791	661	11	2.2	Very Dense	> 200	> 110
75	809	679	18	3.6	Very Dense	> 200	88
80	813	683	4	0.8	Very Dense	> 200	> 110
85	826	696	13	2.6	Very Dense	> 200	> 110
90	835	705	9	1.8	Very Dense	> 200	> 110
95	848	718	13	2.6	Very Dense	> 200	> 110
100	856	726	8	1.6	Very Dense	> 200	> 110
105	863	733	7	1.4	Very Dense	> 200	> 110
110	864	734	1	0.2	Very Dense	> 200	> 110
115	864	734	0	0.0	Very Dense	> 200	> 110
120	Refusal						

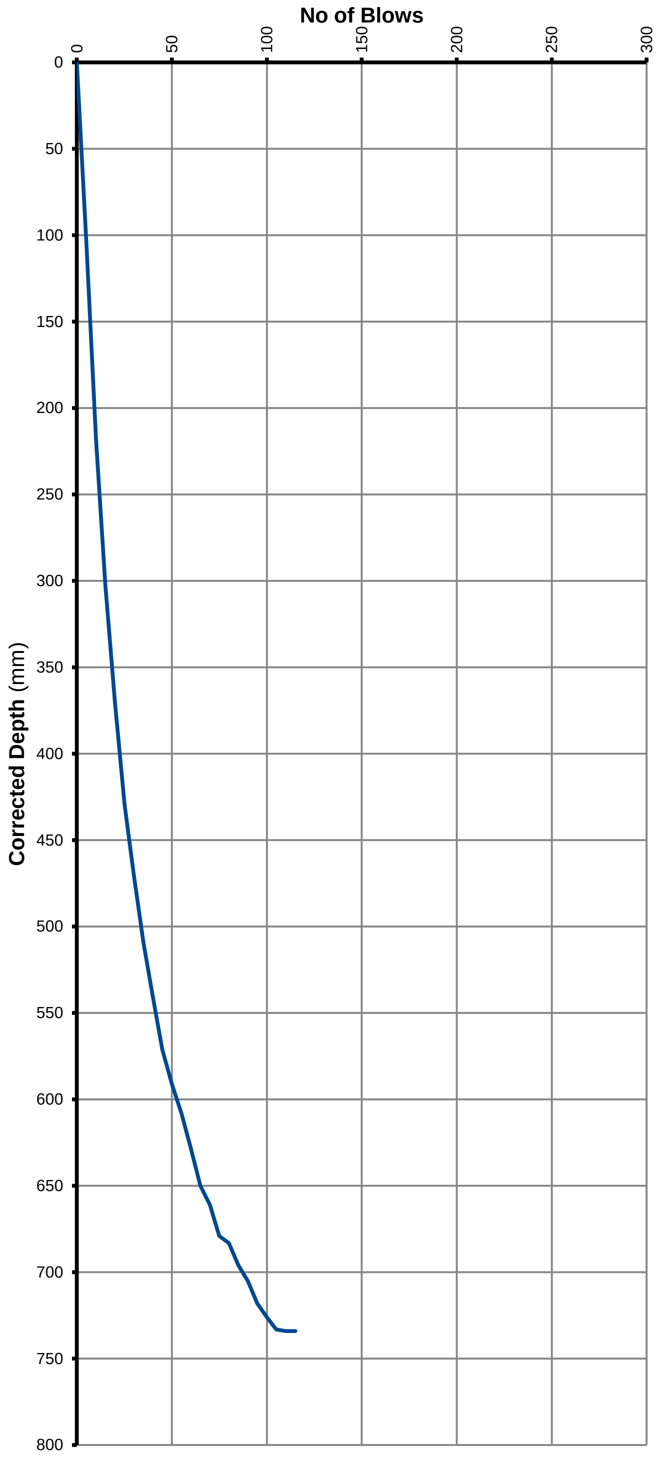
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

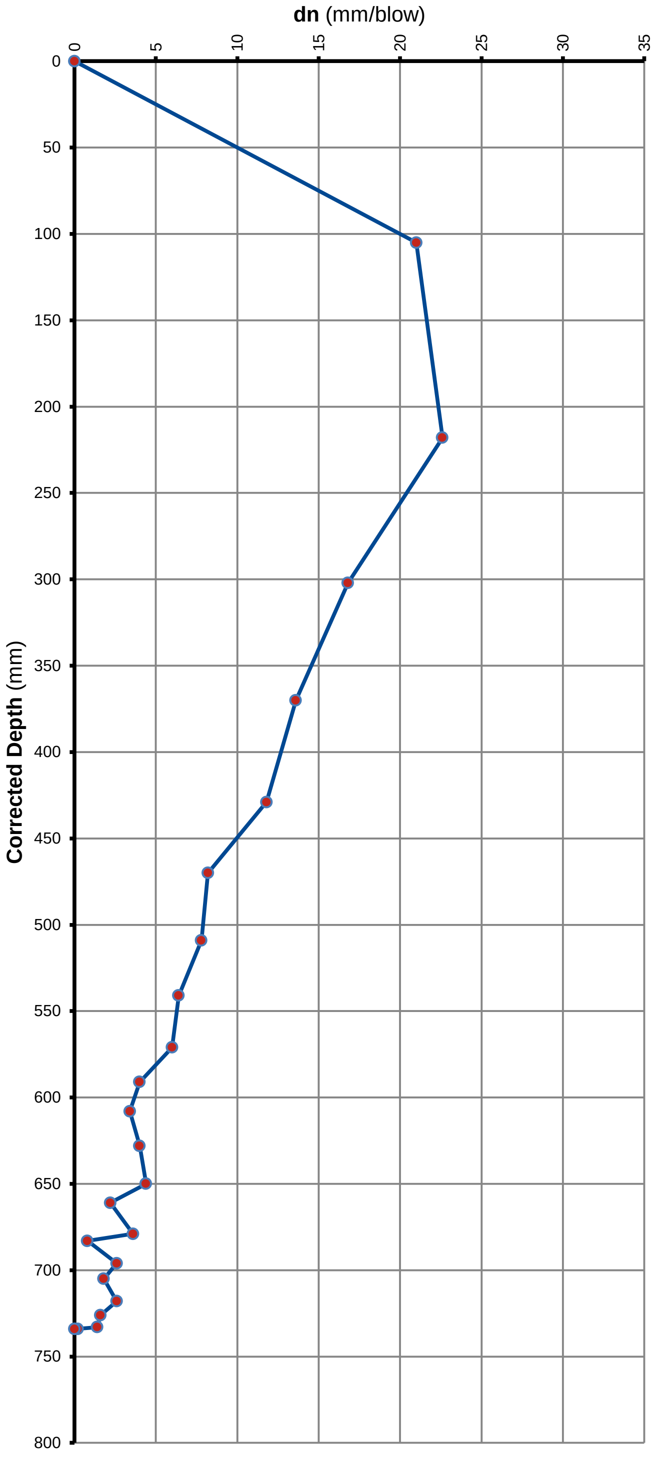
POSITION: DCP 53 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



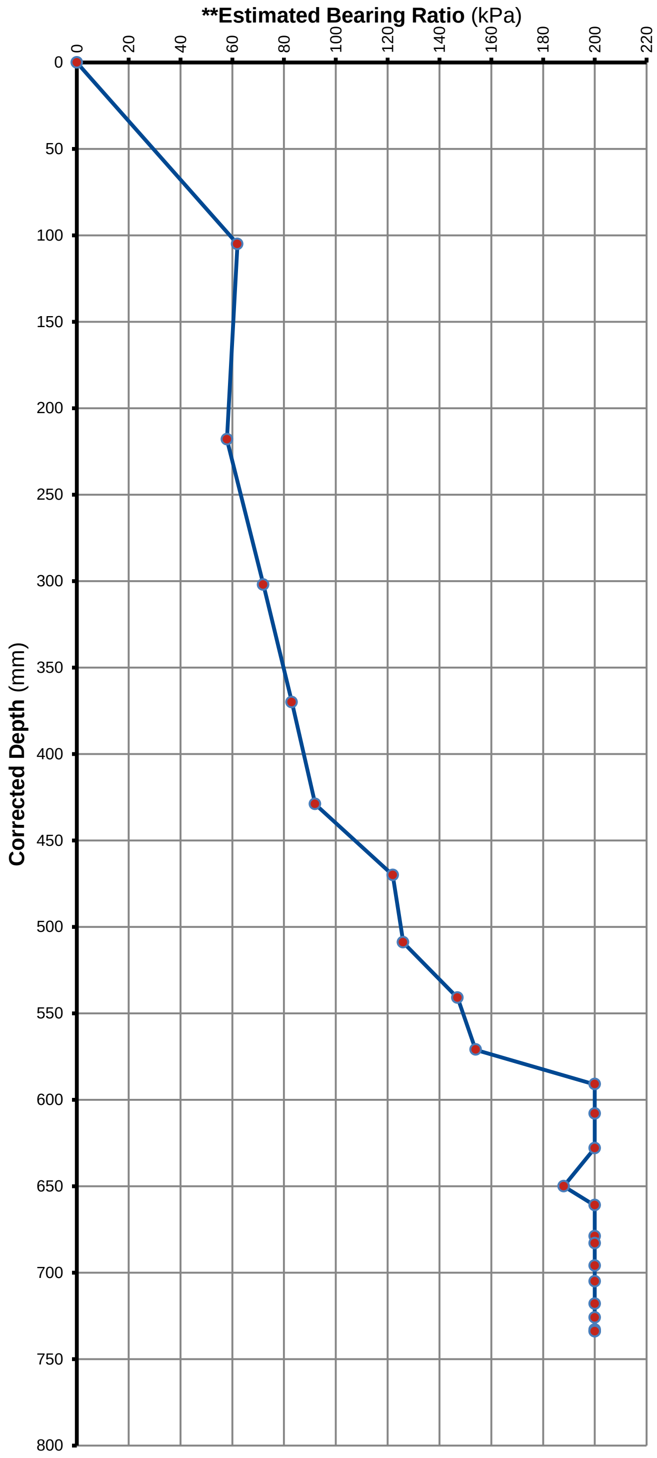
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

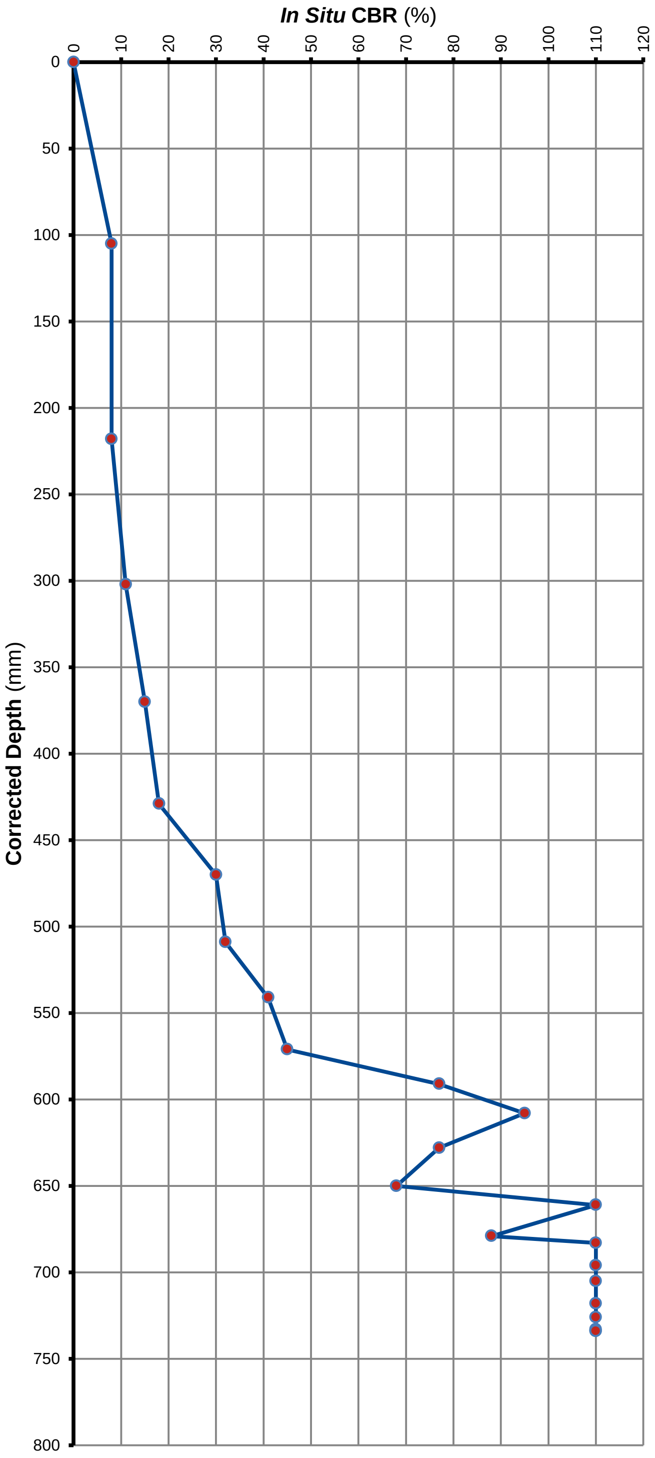
POSITION: DCP 53 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 54 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	134	0	-	-	-	-	-
5	300	166	166	33.2	Loose	43	5
10	371	237	71	14.2	Medium Dense	81	14
15	428	294	57	11.4	Dense	94	19
20	470	336	42	8.4	Dense	119	29
25	529	395	59	11.8	Dense	92	18
30	571	437	42	8.4	Dense	119	29
35	618	484	47	9.4	Dense	109	25
40	652	518	34	6.8	Dense	140	38
45	699	565	47	9.4	Dense	109	25
50	732	598	33	6.6	Dense	144	39
55	769	635	37	7.4	Dense	132	34
60	800	666	31	6.2	Dense	150	43
65	838	704	38	7.6	Dense	129	33
70	866	732	28	5.6	Dense	161	49
75	891	757	25	5.0	Very Dense	174	57
80	920	786	29	5.8	Dense	157	47
85	947	813	27	5.4	Dense	165	52
90	976	842	29	5.8	Dense	157	47
95	1005	871	29	5.8	Dense	157	47
100	1031	897	26	5.2	Dense	169	54
105	1053	919	22	4.4	Very Dense	188	68
110	1089	955	36	7.2	Dense	134	35
115	1111	977	22	4.4	Very Dense	188	68
120	1132	998	21	4.2	Very Dense	193	72
125	1154	1020	22	4.4	Very Dense	188	68
130	1171	1037	17	3.4	Very Dense	> 200	95
135	1190	1056	19	3.8	Very Dense	> 200	82
140	1200	1066	10	2.0	Very Dense	> 200	> 110
145	1213	1079	13	2.6	Very Dense	> 200	> 110
150	1225	1091	12	2.4	Very Dense	> 200	> 110
155	1235	1101	10	2.0	Very Dense	> 200	> 110
160	1248	1114	13	2.6	Very Dense	> 200	> 110
165	1255	1121	7	1.4	Very Dense	> 200	> 110
170	1263	1129	8	1.6	Very Dense	> 200	> 110
175	1273	1139	10	2.0	Very Dense	> 200	> 110
180	1289	1155	16	3.2	Very Dense	> 200	103
185	1305	1171	16	3.2	Very Dense	> 200	103
190	1320	1186	15	3.0	Very Dense	> 200	> 110
195	1332	1198	12	2.4	Very Dense	> 200	> 110
200	1349	1215	17	3.4	Very Dense	> 200	95
205	1363	1229	14	2.8	Very Dense	> 200	> 110
210	1378	1244	15	3.0	Very Dense	> 200	> 110
215	1390	1256	12	2.4	Very Dense	> 200	> 110
220	1409	1275	19	3.8	Very Dense	> 200	82
225	1425	1291	16	3.2	Very Dense	> 200	103
230	1445	1311	20	4.0	Very Dense	200	77
235	1470	1336	25	5.0	Very Dense	174	57
240	1489	1355	19	3.8	Very Dense	> 200	82
245	1500	1366	11	2.2	Very Dense	> 200	> 110
250	1521	1387	21	4.2	Very Dense	193	72

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 54 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1549	1415	28	5.6	Dense	161	49
260	1568	1434	19	3.8	Very Dense	> 200	82
265	1591	1457	23	4.6	Very Dense	183	64
270	1603	1469	12	2.4	Very Dense	> 200	> 110
275	1610	1476	7	1.4	Very Dense	> 200	> 110
280	1621	1487	11	2.2	Very Dense	> 200	> 110
285	1632	1498	11	2.2	Very Dense	> 200	> 110
290	1650	1516	18	3.6	Very Dense	> 200	88
295	1660	1526	10	2.0	Very Dense	> 200	> 110
300	1675	1541	15	3.0	Very Dense	> 200	> 110
305	1688	1554	13	2.6	Very Dense	> 200	> 110
310	1701	1567	13	2.6	Very Dense	> 200	> 110
315	1725	1591	24	4.8	Very Dense	178	60
320	1745	1611	20	4.0	Very Dense	200	77
325	1769	1635	24	4.8	Very Dense	178	60
330	1794	1660	25	5.0	Very Dense	174	57
335	1820	1686	26	5.2	Dense	169	54
340	1846	1712	26	5.2	Dense	169	54
345	1870	1736	24	4.8	Very Dense	178	60
350	1890	1756	20	4.0	Very Dense	200	77
355	1904	1770	14	2.8	Very Dense	> 200	> 110
360	1920	1786	16	3.2	Very Dense	> 200	103
365	1942	1808	22	4.4	Very Dense	188	68
370	1954	1820	12	2.4	Very Dense	> 200	> 110
375	1964	1830	10	2.0	Very Dense	> 200	> 110
380	1970	1836	6	1.2	Very Dense	> 200	> 110
385	1980	1846	10	2.0	Very Dense	> 200	> 110
390	1988	1854	8	1.6	Very Dense	> 200	> 110
395	1994	1860	6	1.2	Very Dense	> 200	> 110
400	2007	1873	13	2.6	Very Dense	> 200	> 110

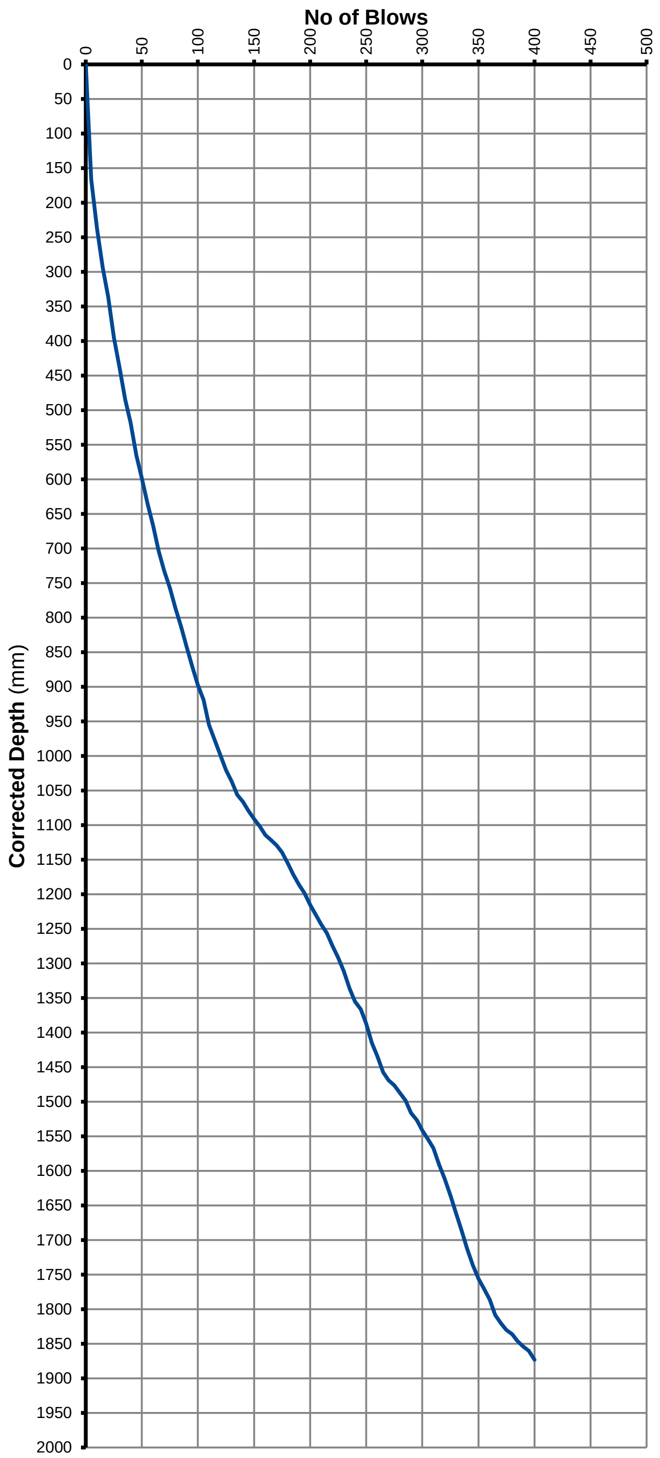
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

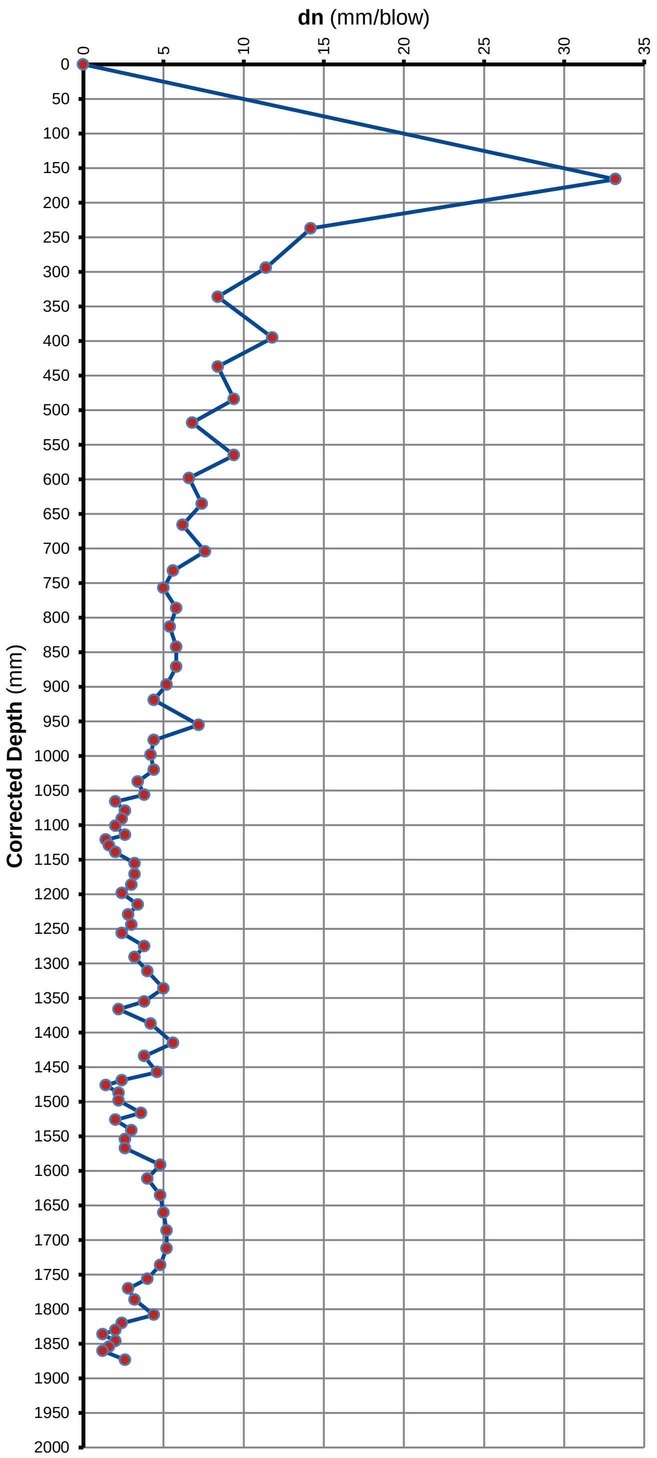
POSITION: DCP 54 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



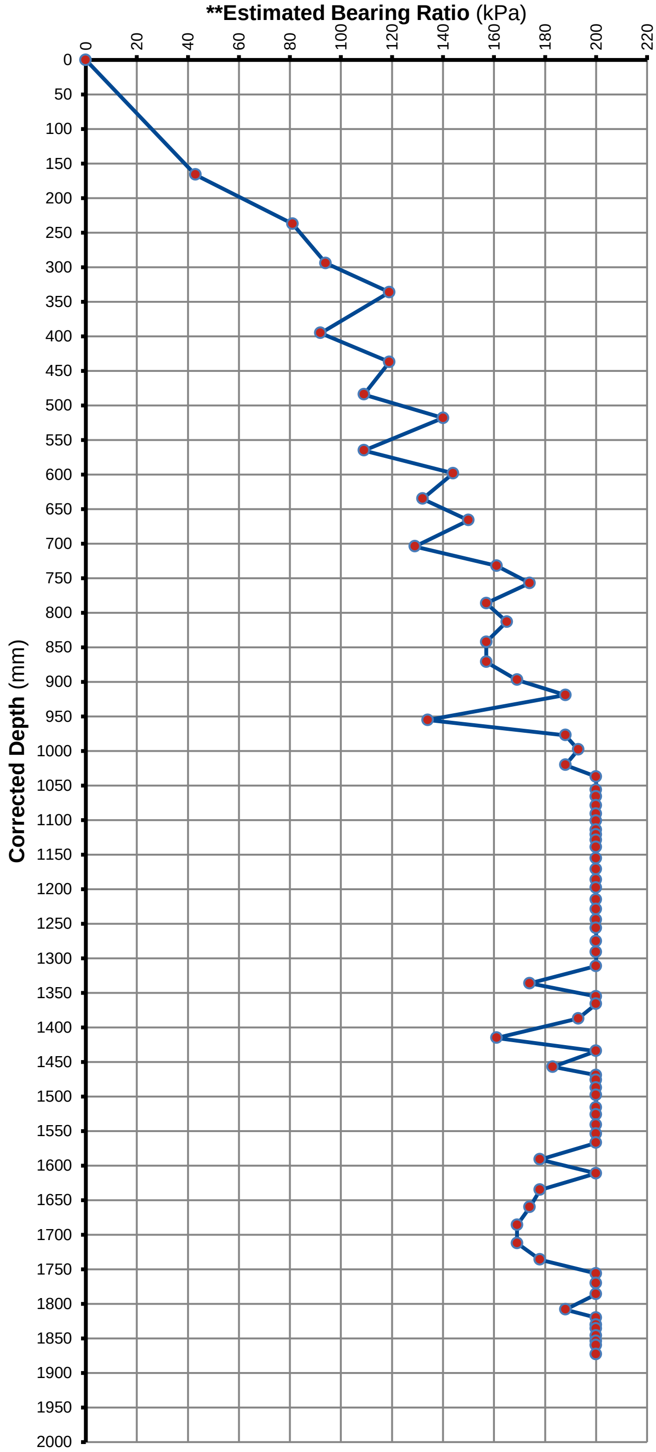
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

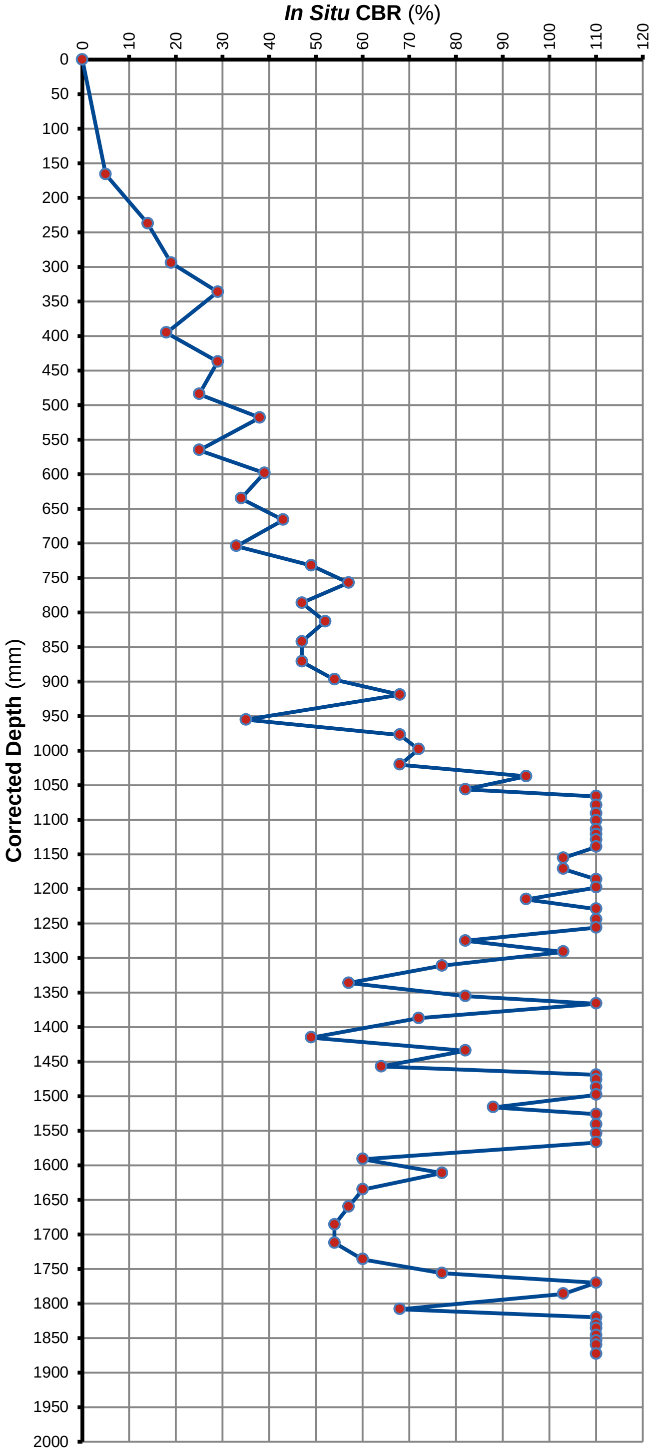
POSITION: DCP 54 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 55 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	124	0	-	-	-	-	-
5	390	266	266	53.2	Loose	17	2
10	455	331	65	13.0	Medium Dense	86	16
15	490	366	35	7.0	Dense	137	36
20	521	397	31	6.2	Dense	150	43
25	553	429	32	6.4	Dense	147	41
30	589	465	36	7.2	Dense	134	35
35	621	497	32	6.4	Dense	147	41
40	659	535	38	7.6	Dense	129	33
45	698	574	39	7.8	Dense	126	32
50	727	603	29	5.8	Dense	157	47
55	761	637	34	6.8	Dense	140	38
60	803	679	42	8.4	Dense	119	29
65	871	747	68	13.6	Medium Dense	83	15
70	900	776	29	5.8	Dense	157	47
75	938	814	38	7.6	Dense	129	33
80	965	841	27	5.4	Dense	165	52
85	997	873	32	6.4	Dense	147	41
90	1025	901	28	5.6	Dense	161	49
95	1052	928	27	5.4	Dense	165	52
100	1075	951	23	4.6	Very Dense	183	64
105	1108	984	33	6.6	Dense	144	39
110	1120	996	12	2.4	Very Dense	> 200	> 110
115	1138	1014	18	3.6	Very Dense	> 200	88
120	1162	1038	24	4.8	Very Dense	178	60
125	1180	1056	18	3.6	Very Dense	> 200	88
130	1198	1074	18	3.6	Very Dense	> 200	88
135	1221	1097	23	4.6	Very Dense	183	64
140	1225	1101	4	0.8	Very Dense	> 200	> 110
145	1245	1121	20	4.0	Very Dense	200	77
150	1263	1139	18	3.6	Very Dense	> 200	88
155	1280	1156	17	3.4	Very Dense	> 200	95
160	1300	1176	20	4.0	Very Dense	200	77
165	1318	1194	18	3.6	Very Dense	> 200	88
170	1331	1207	13	2.6	Very Dense	> 200	> 110
175	1348	1224	17	3.4	Very Dense	> 200	95
180	1360	1236	12	2.4	Very Dense	> 200	> 110
185	1372	1248	12	2.4	Very Dense	> 200	> 110
190	1380	1256	8	1.6	Very Dense	> 200	> 110
195	1395	1271	15	3.0	Very Dense	> 200	> 110
200	1400	1276	5	1.0	Very Dense	> 200	> 110
205	1414	1290	14	2.8	Very Dense	> 200	> 110
210	1426	1302	12	2.4	Very Dense	> 200	> 110
215	1439	1315	13	2.6	Very Dense	> 200	> 110
220	1450	1326	11	2.2	Very Dense	> 200	> 110
225	1460	1336	10	2.0	Very Dense	> 200	> 110
230	1470	1346	10	2.0	Very Dense	> 200	> 110
235	1481	1357	11	2.2	Very Dense	> 200	> 110
240	1489	1365	8	1.6	Very Dense	> 200	> 110
245	1498	1374	9	1.8	Very Dense	> 200	> 110
250	1503	1379	5	1.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 55 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1509	1385	6	1.2	Very Dense	> 200	> 110
260	1512	1388	3	0.6	Very Dense	> 200	> 110
265	1515	1391	3	0.6	Very Dense	> 200	> 110
270	1516	1392	1	0.2	Very Dense	> 200	> 110
275	1516	1392	0	0.0	Very Dense	> 200	> 110
280	Refusal						

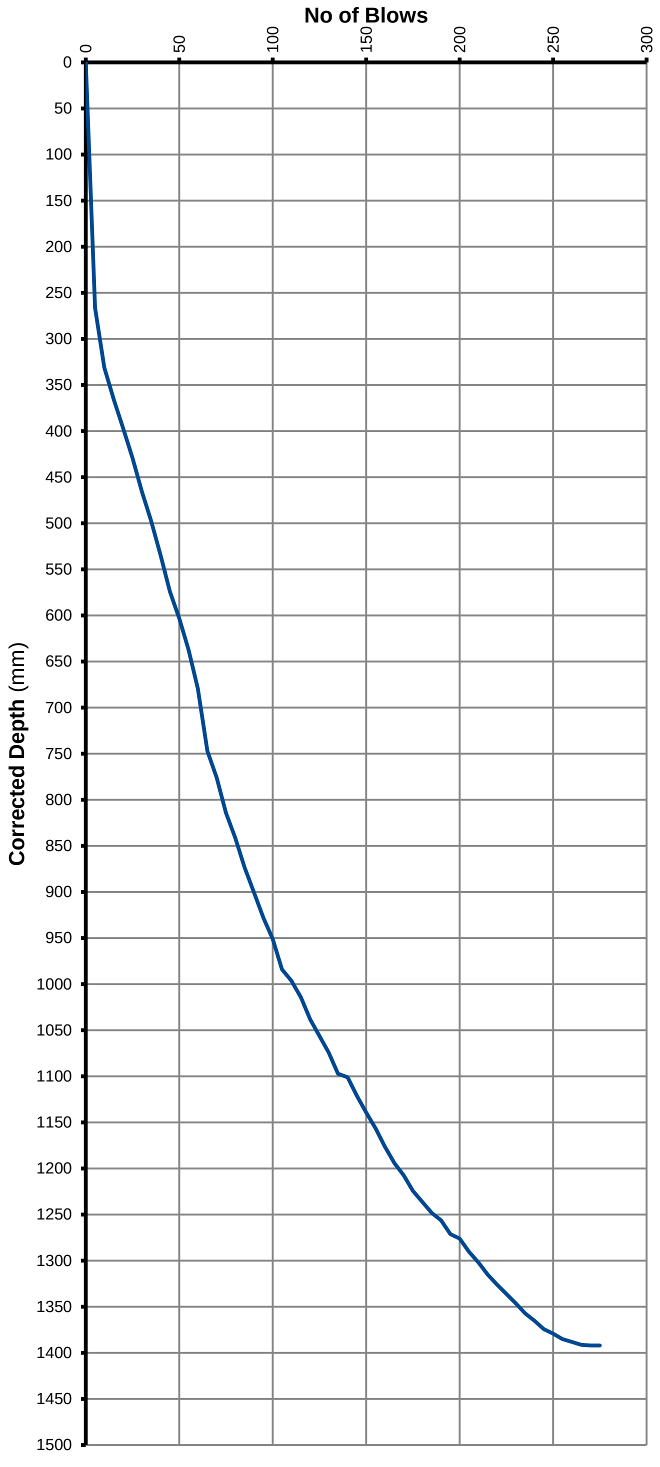
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

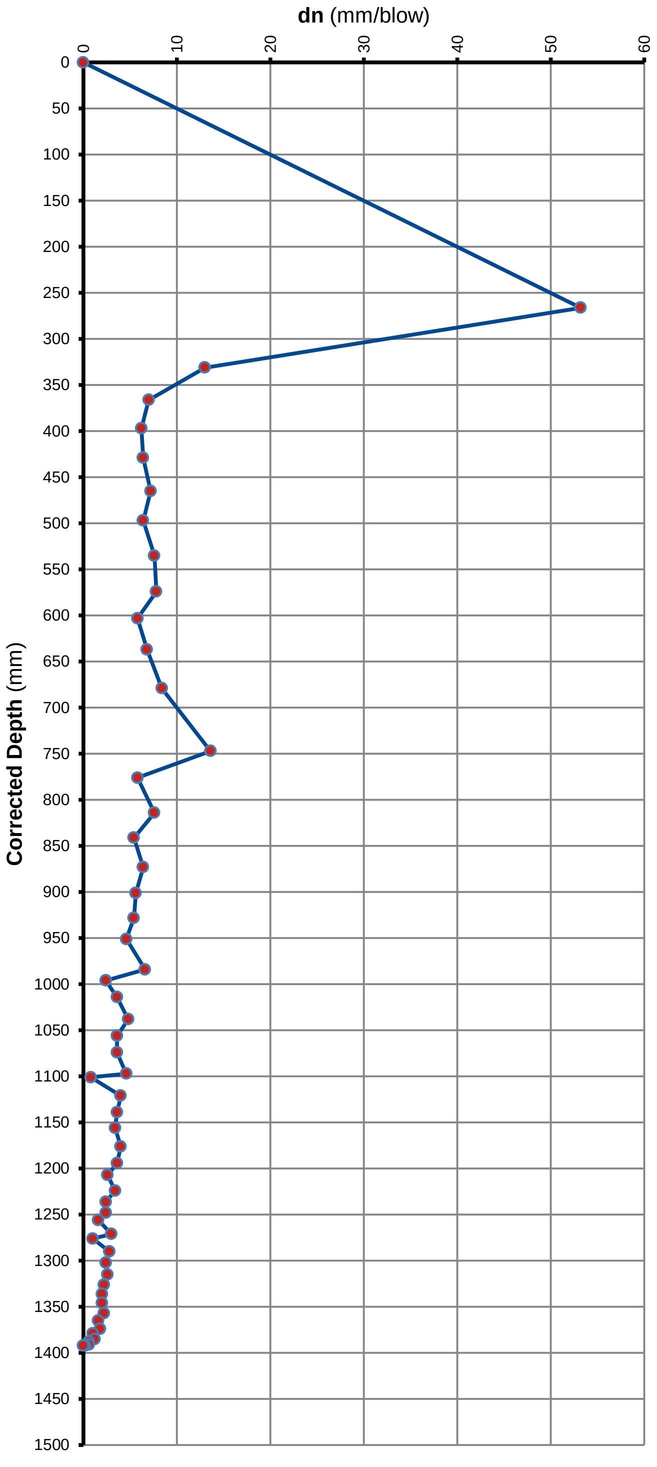
POSITION: DCP 55 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



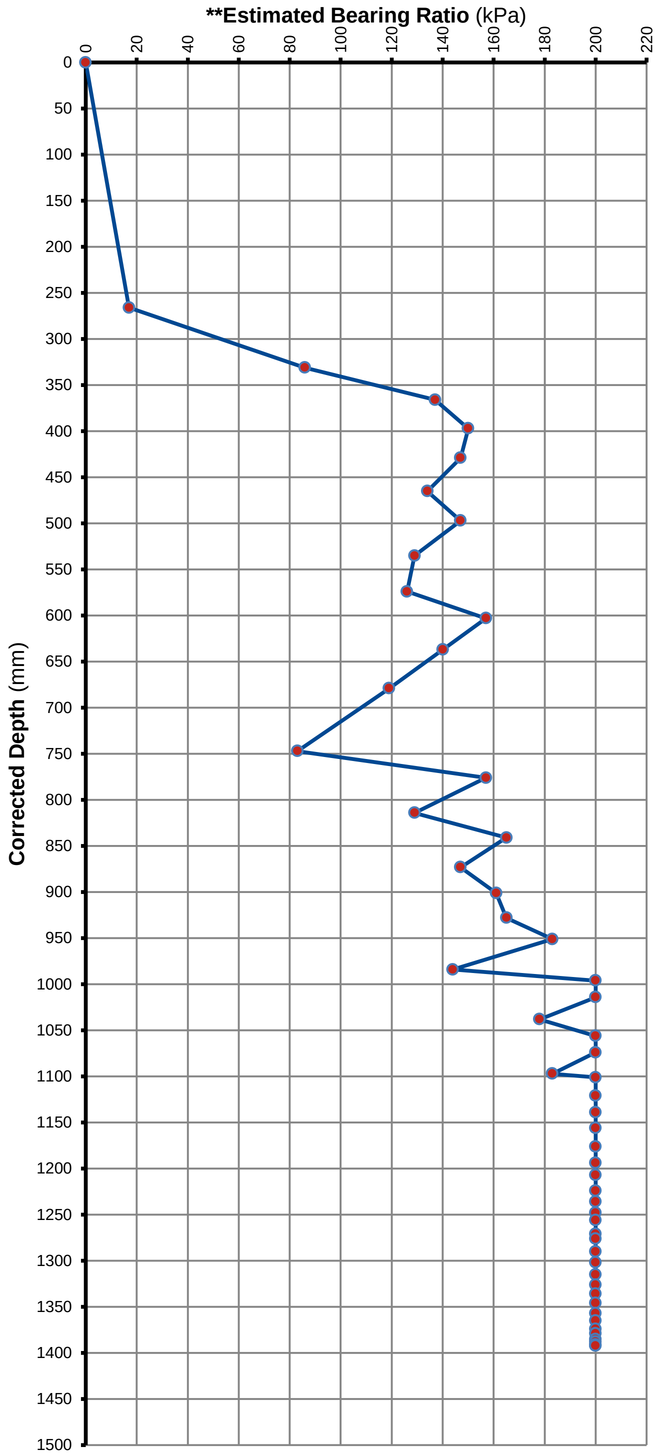
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

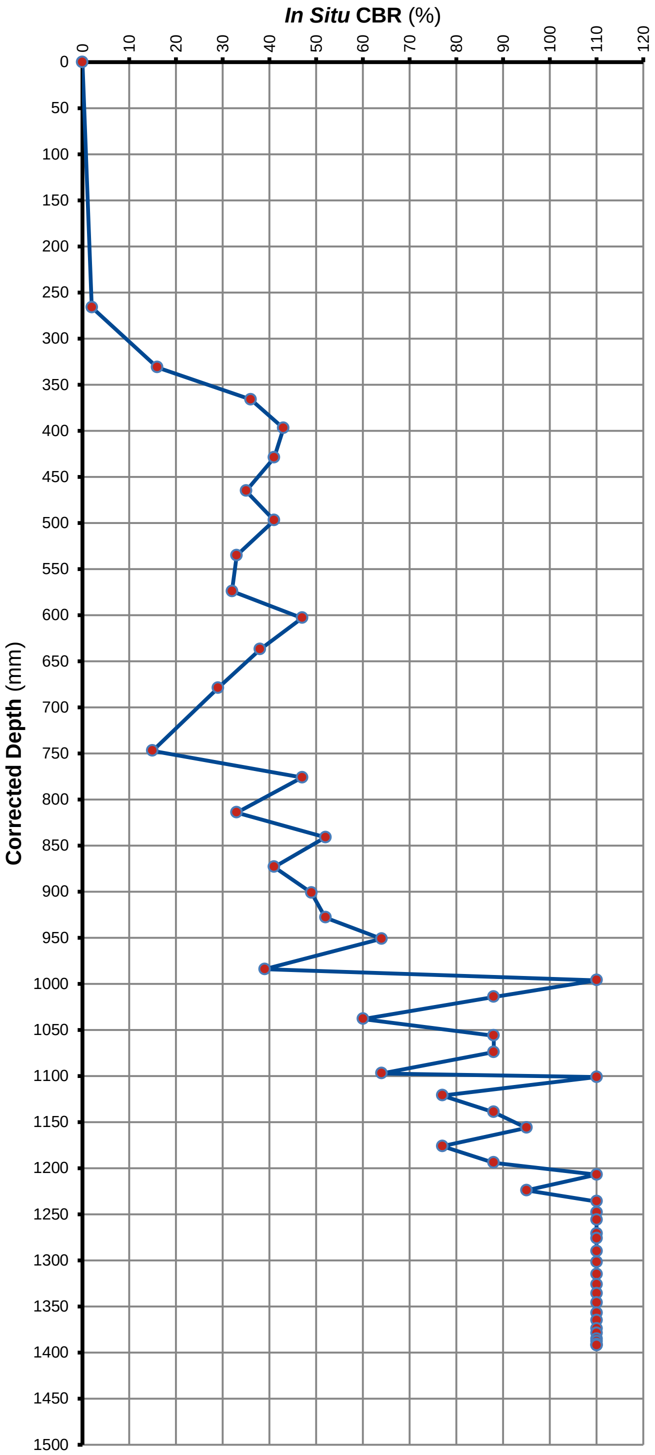
POSITION: DCP 55 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 56 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	140	0	-	-	-	-	-
5	335	195	195	39.0	Loose	41	4
10	502	362	167	33.4	Loose	42	5
15	642	502	140	28.0	Medium Dense	48	6
20	695	555	53	10.6	Dense	99	21
25	740	600	45	9.0	Dense	113	26
30	771	631	31	6.2	Dense	150	43
35	793	653	22	4.4	Very Dense	188	68
40	805	665	12	2.4	Very Dense	> 200	> 110
45	823	683	18	3.6	Very Dense	> 200	88
50	829	689	6	1.2	Very Dense	> 200	> 110
55	839	699	10	2.0	Very Dense	> 200	> 110
60	850	710	11	2.2	Very Dense	> 200	> 110
65	857	717	7	1.4	Very Dense	> 200	> 110
70	858	718	1	0.2	Very Dense	> 200	> 110
75	858	718	0	0.0	Very Dense	> 200	> 110
80	Refusal						

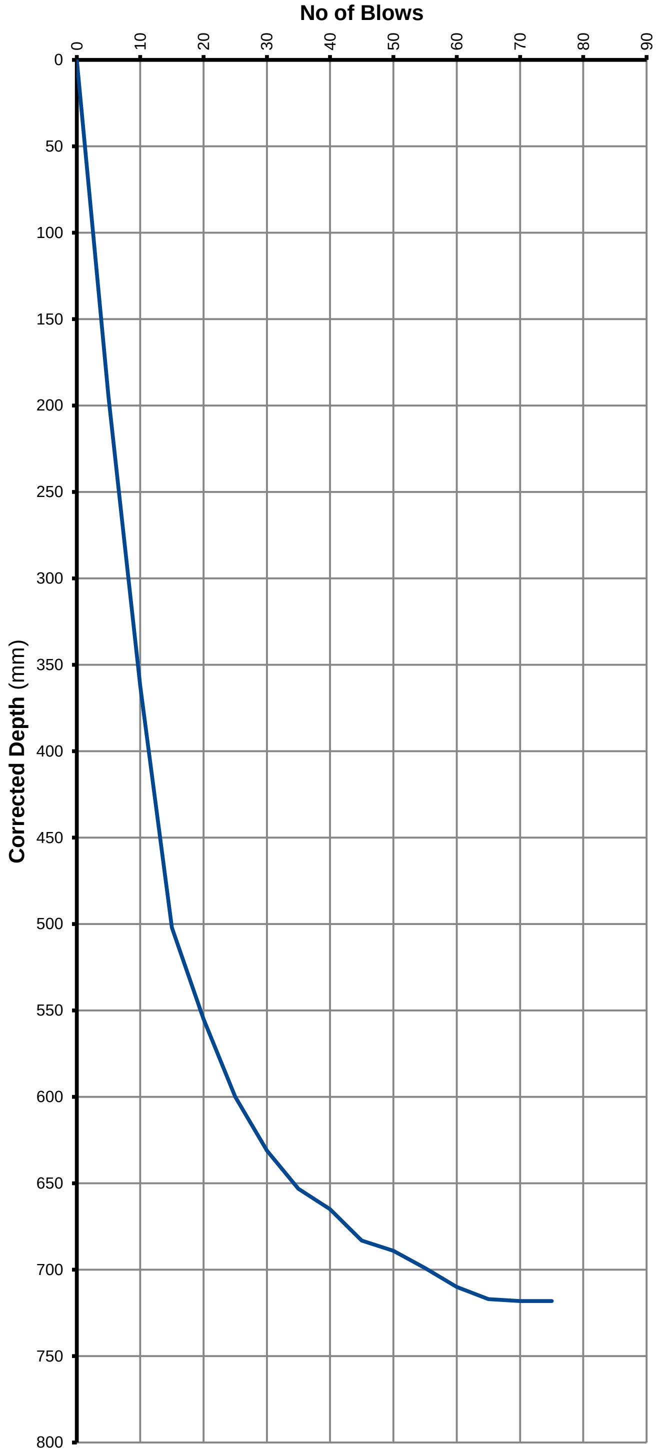
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

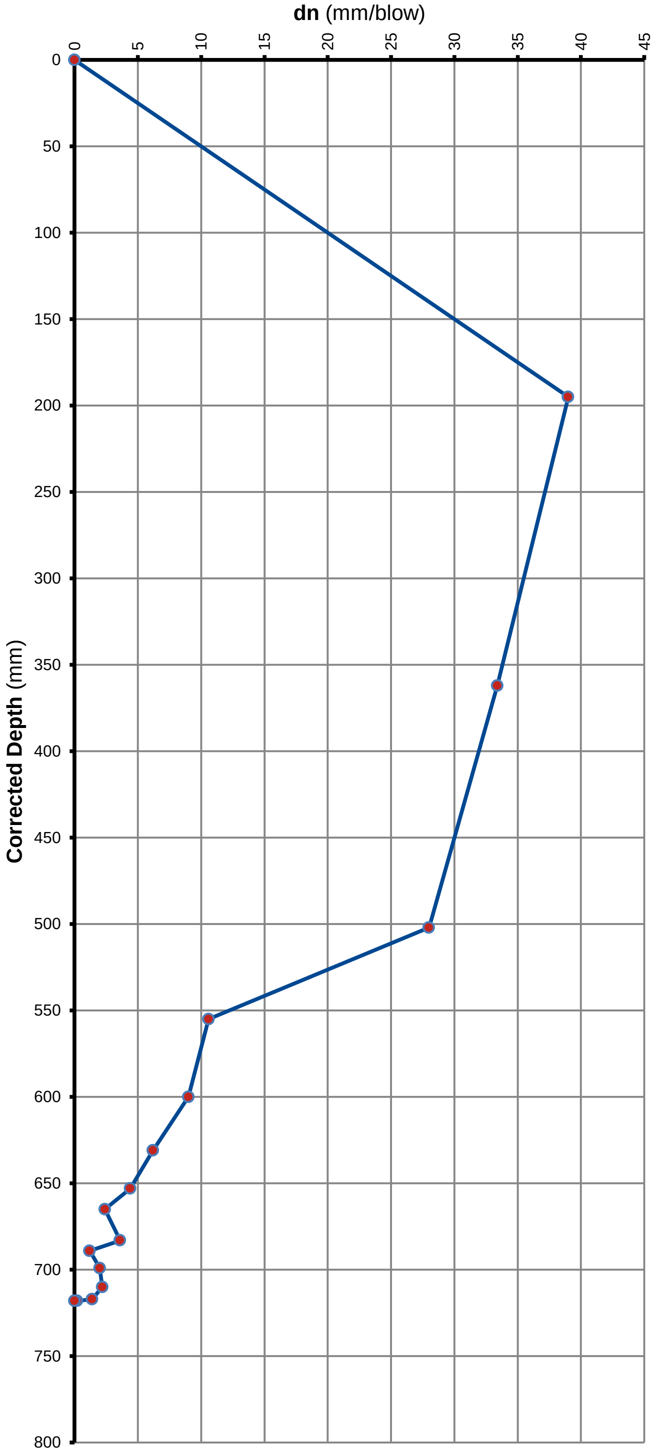
POSITION: DCP 56 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



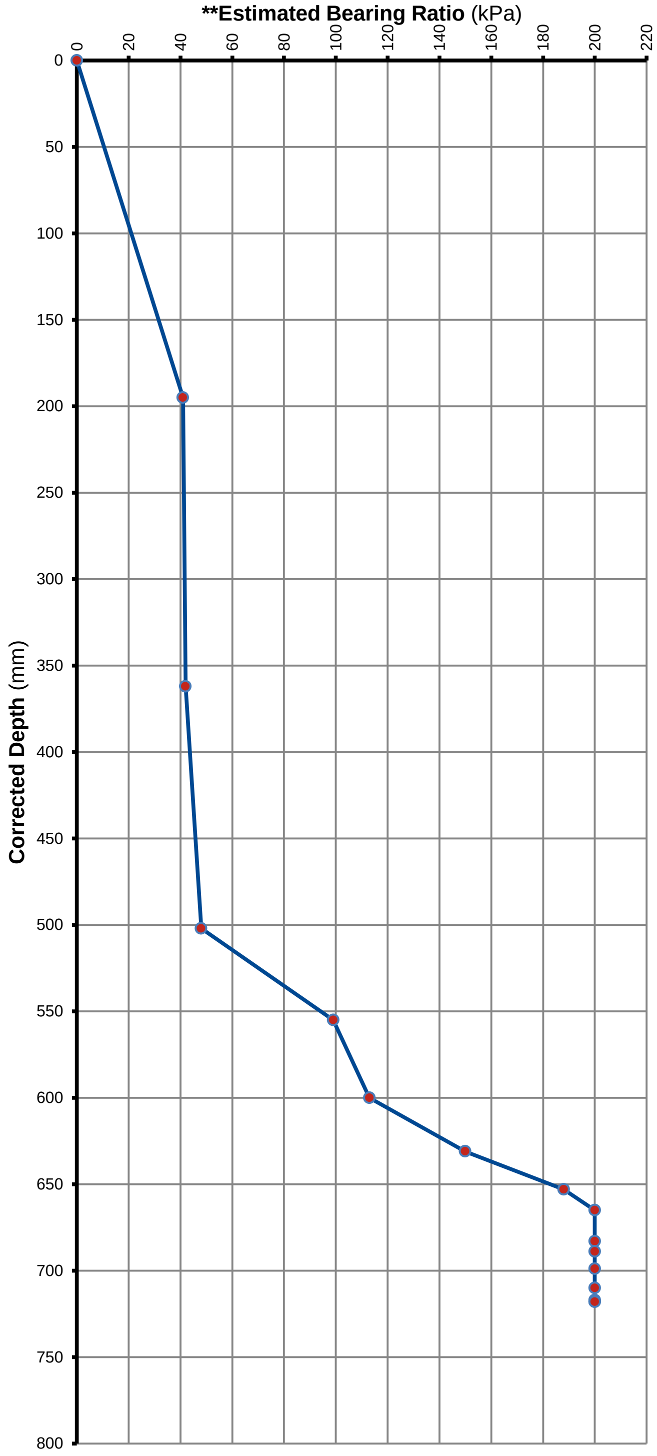
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

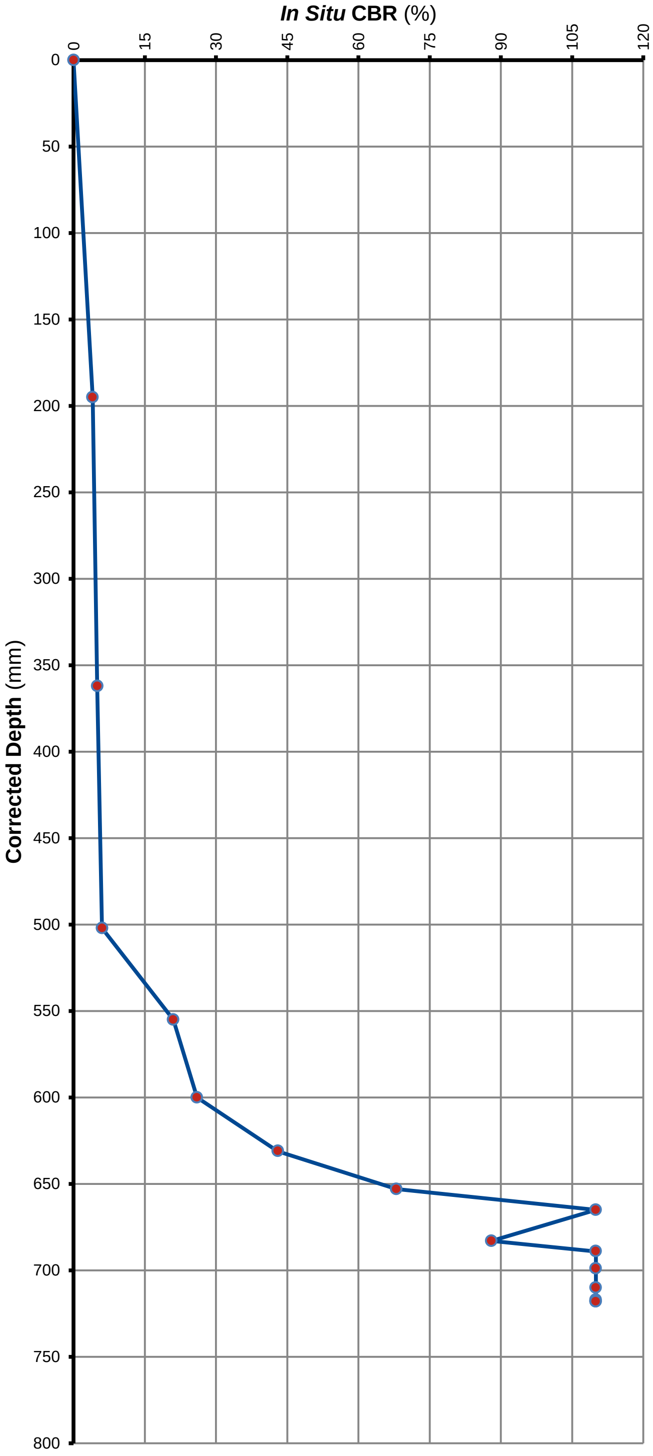
POSITION: DCP 56 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 57 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

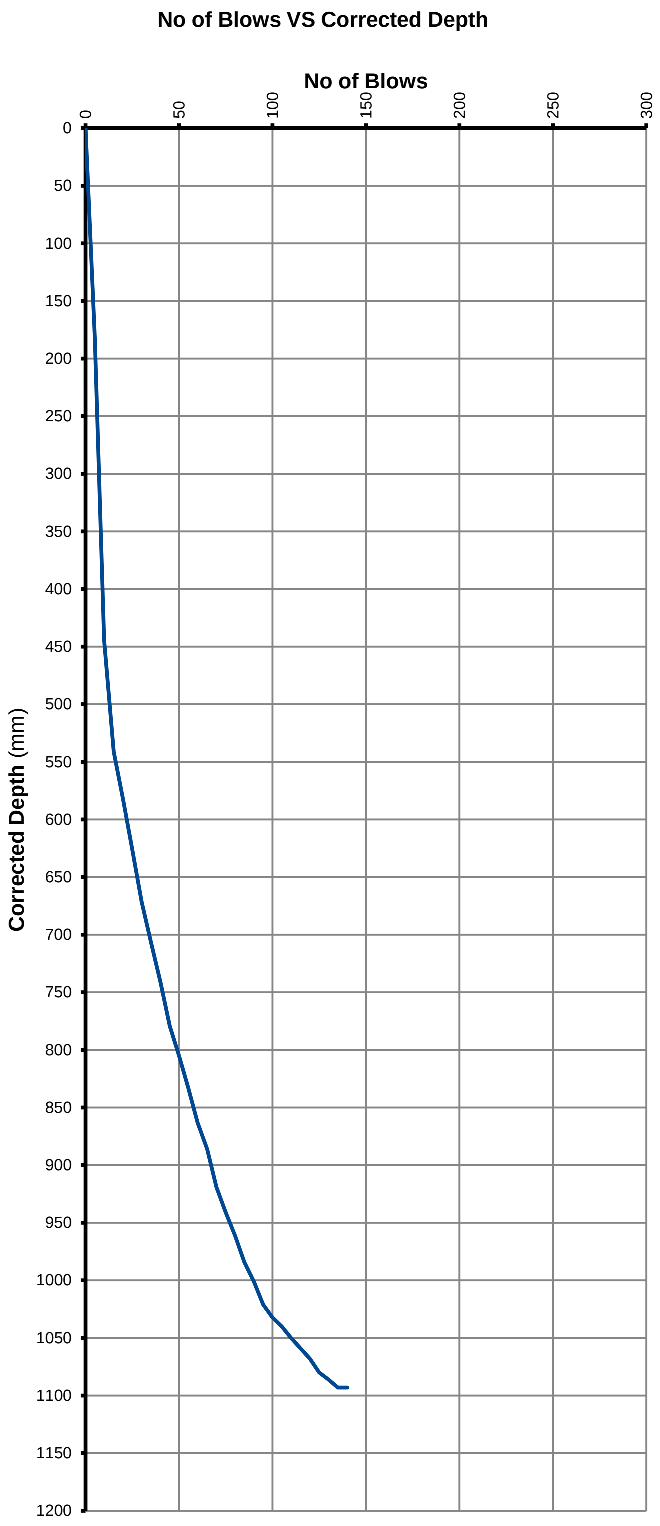
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	129	0	-	-	-	-	-
5	311	182	182	36.4	Loose	41	4
10	573	444	262	52.4	Loose	20	2
15	670	541	97	19.4	Medium Dense	66	9
20	711	582	41	8.2	Dense	122	30
25	755	626	44	8.8	Dense	115	27
30	800	671	45	9.0	Dense	113	26
35	835	706	35	7.0	Dense	137	36
40	870	741	35	7.0	Dense	137	36
45	908	779	38	7.6	Dense	129	33
50	934	805	26	5.2	Dense	169	54
55	962	833	28	5.6	Dense	161	49
60	992	863	30	6.0	Dense	154	45
65	1015	886	23	4.6	Very Dense	183	64
70	1048	919	33	6.6	Dense	144	39
75	1070	941	22	4.4	Very Dense	188	68
80	1090	961	20	4.0	Very Dense	200	77
85	1113	984	23	4.6	Very Dense	183	64
90	1130	1001	17	3.4	Very Dense	> 200	95
95	1150	1021	20	4.0	Very Dense	200	77
100	1161	1032	11	2.2	Very Dense	> 200	> 110
105	1169	1040	8	1.6	Very Dense	> 200	> 110
110	1179	1050	10	2.0	Very Dense	> 200	> 110
115	1188	1059	9	1.8	Very Dense	> 200	> 110
120	1197	1068	9	1.8	Very Dense	> 200	> 110
125	1209	1080	12	2.4	Very Dense	> 200	> 110
130	1215	1086	6	1.2	Very Dense	> 200	> 110
135	1222	1093	7	1.4	Very Dense	> 200	> 110
140	1222	1093	0	0.0	Very Dense	> 200	> 110
145	Refusal						

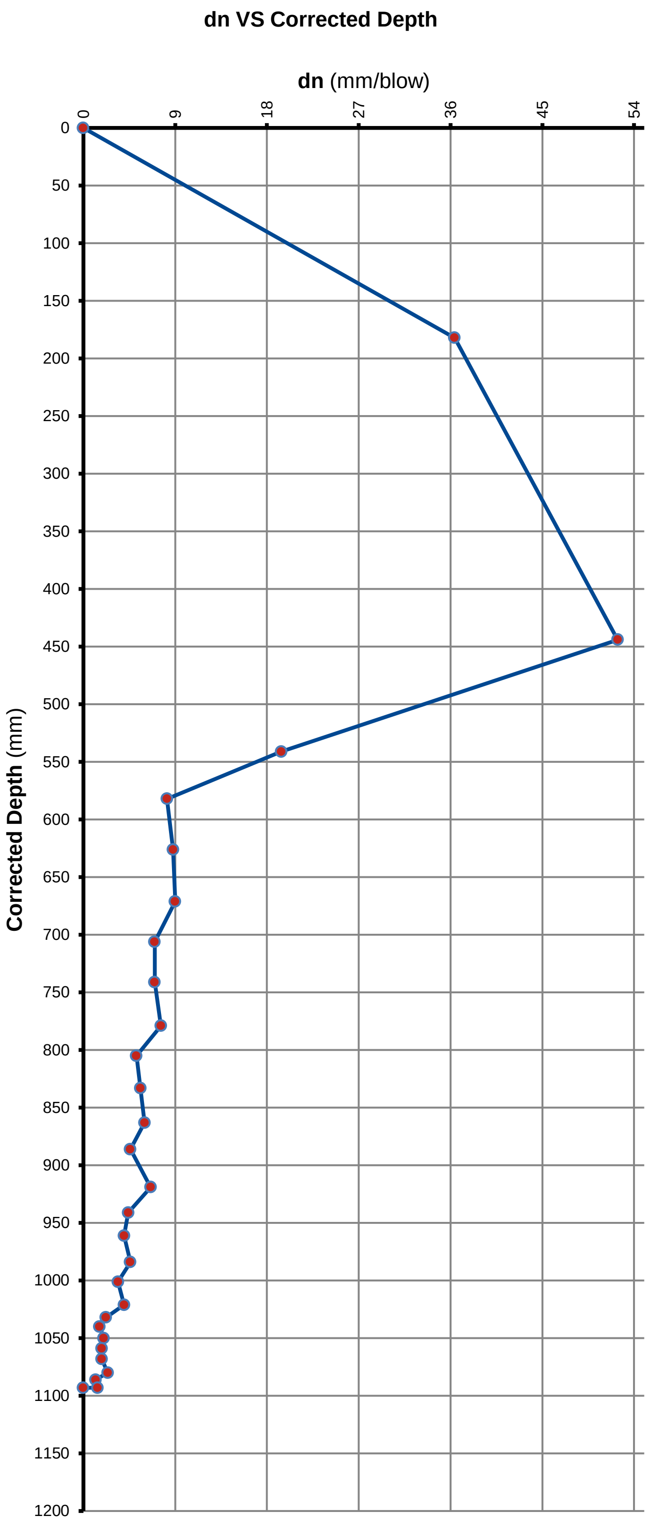
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 57 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

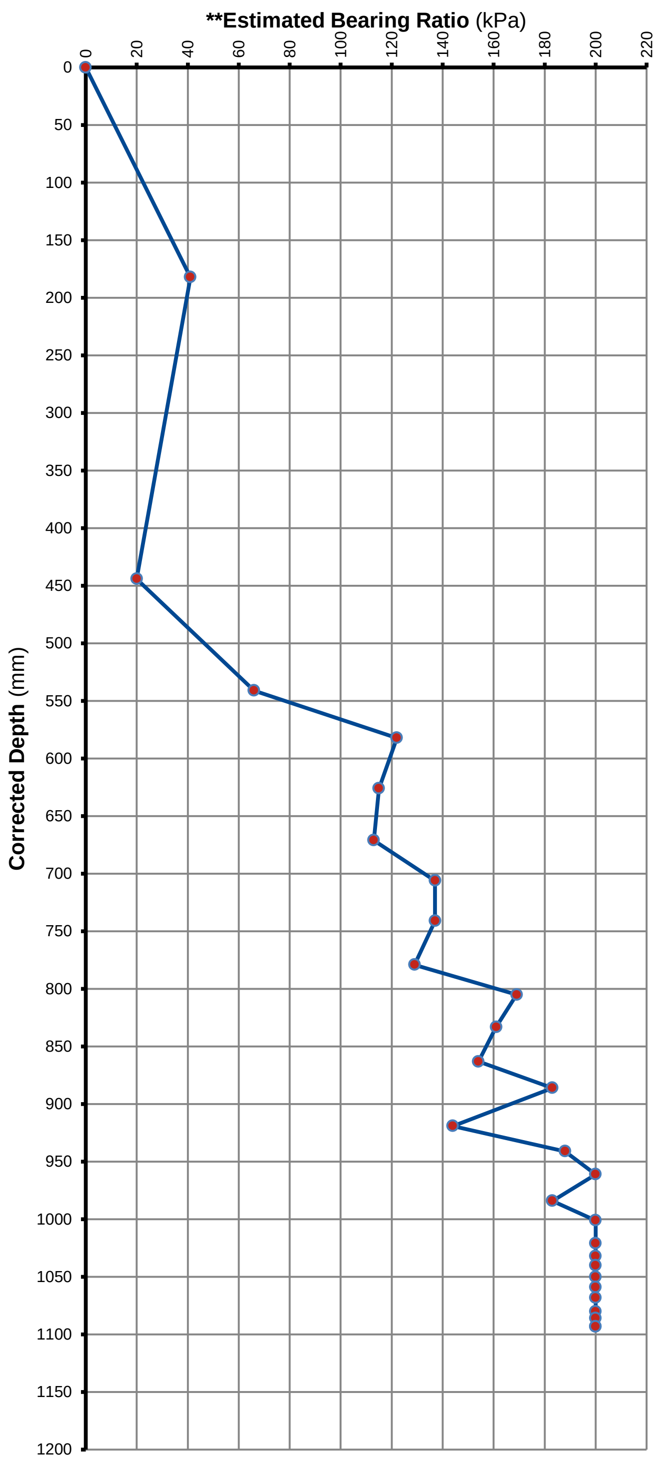
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

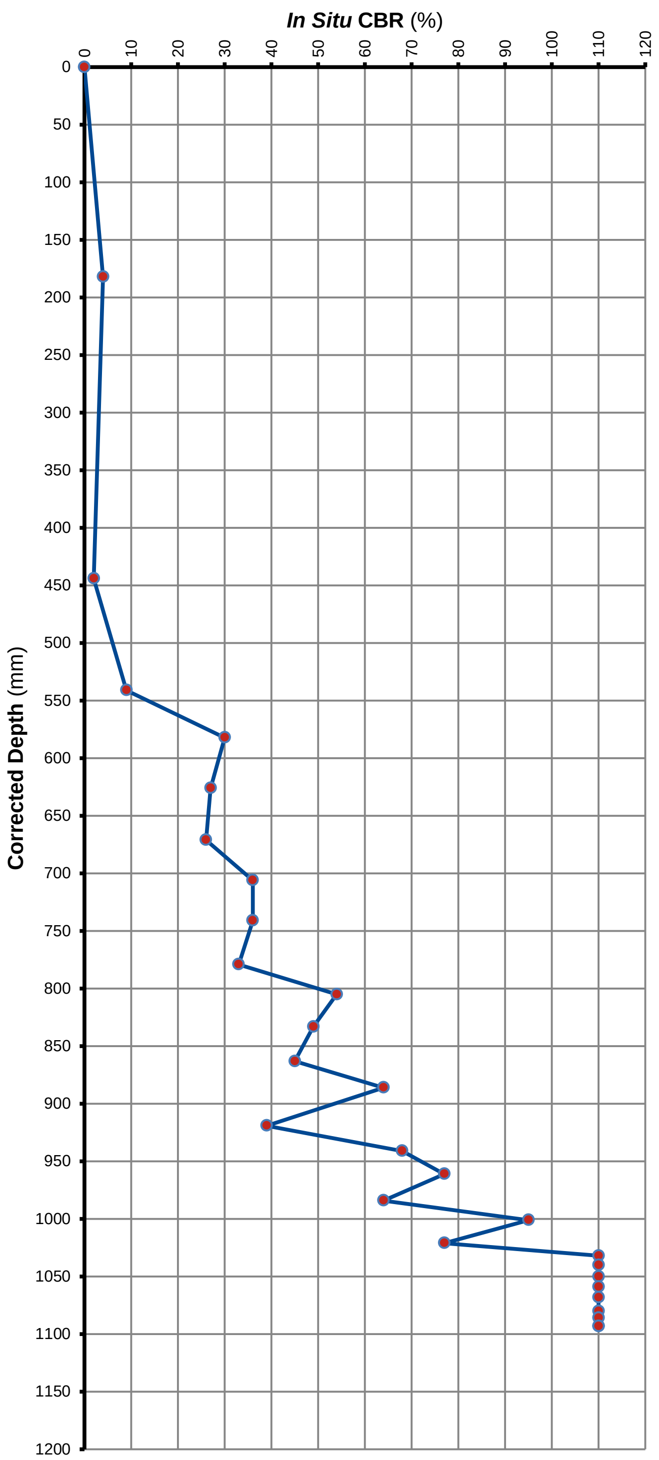
POSITION: DCP 57 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 58 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	20	0	-	-	-	-	-
5	64	44	44	8.8	Dense	115	27
10	102	82	38	7.6	Dense	129	33
15	138	118	36	7.2	Dense	134	35
20	176	156	38	7.6	Dense	129	33
25	232	212	56	11.2	Dense	95	20
30	300	280	68	13.6	Medium Dense	83	15
35	363	343	63	12.6	Medium Dense	88	17
40	430	410	67	13.4	Medium Dense	84	15
45	481	461	51	10.2	Dense	102	22
50	520	500	39	7.8	Dense	126	32
55	559	539	39	7.8	Dense	126	32
60	590	570	31	6.2	Dense	150	43
65	622	602	32	6.4	Dense	147	41
70	658	638	36	7.2	Dense	134	35
75	686	666	28	5.6	Dense	161	49
80	720	700	34	6.8	Dense	140	38
85	748	728	28	5.6	Dense	161	49
90	771	751	23	4.6	Very Dense	183	64
95	796	776	25	5.0	Very Dense	174	57
100	820	800	24	4.8	Very Dense	178	60
105	841	821	21	4.2	Very Dense	193	72
110	861	841	20	4.0	Very Dense	200	77
115	885	865	24	4.8	Very Dense	178	60
120	906	886	21	4.2	Very Dense	193	72
125	923	903	17	3.4	Very Dense	> 200	95
130	940	920	17	3.4	Very Dense	> 200	95
135	958	938	18	3.6	Very Dense	> 200	88
140	970	950	12	2.4	Very Dense	> 200	> 110
145	985	965	15	3.0	Very Dense	> 200	> 110
150	996	976	11	2.2	Very Dense	> 200	> 110
155	1004	984	8	1.6	Very Dense	> 200	> 110
160	1011	991	7	1.4	Very Dense	> 200	> 110
165	1019	999	8	1.6	Very Dense	> 200	> 110
170	1023	1003	4	0.8	Very Dense	> 200	> 110
175	1025	1005	2	0.4	Very Dense	> 200	> 110
180	1026	1006	1	0.2	Very Dense	> 200	> 110
185	Refusal						

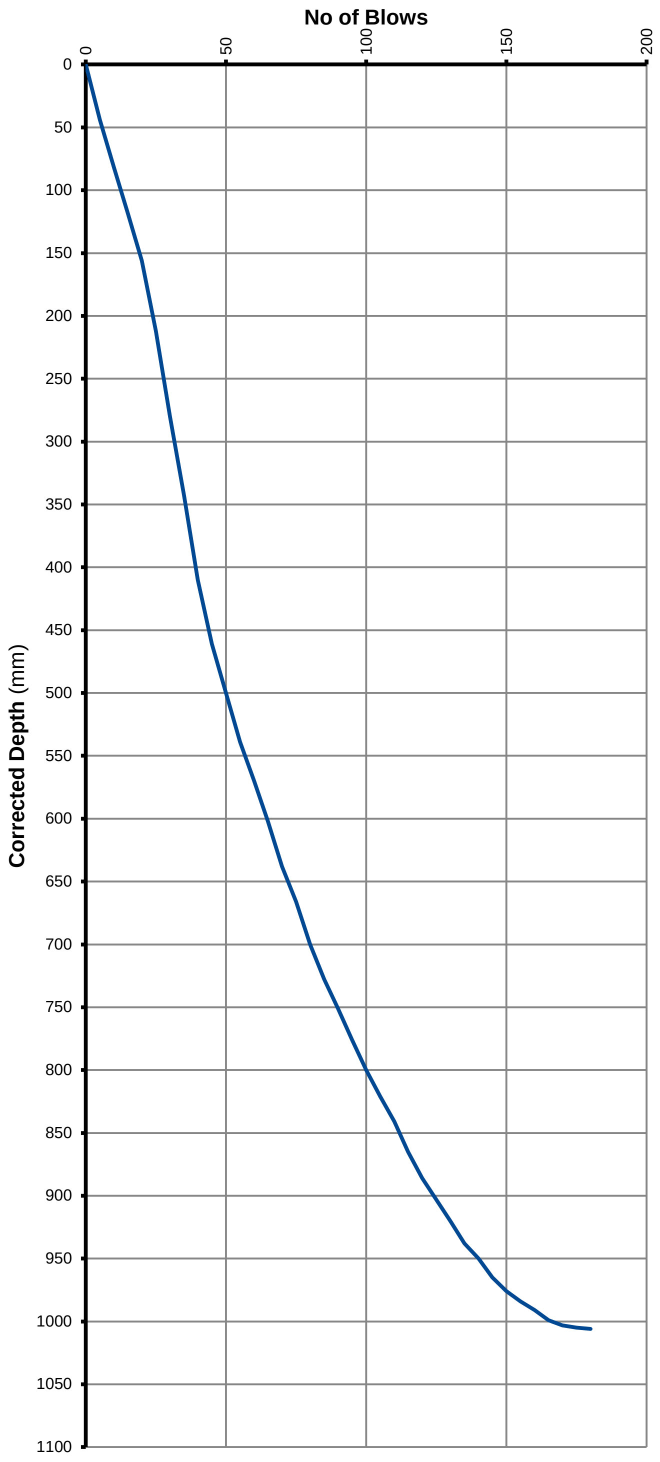
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

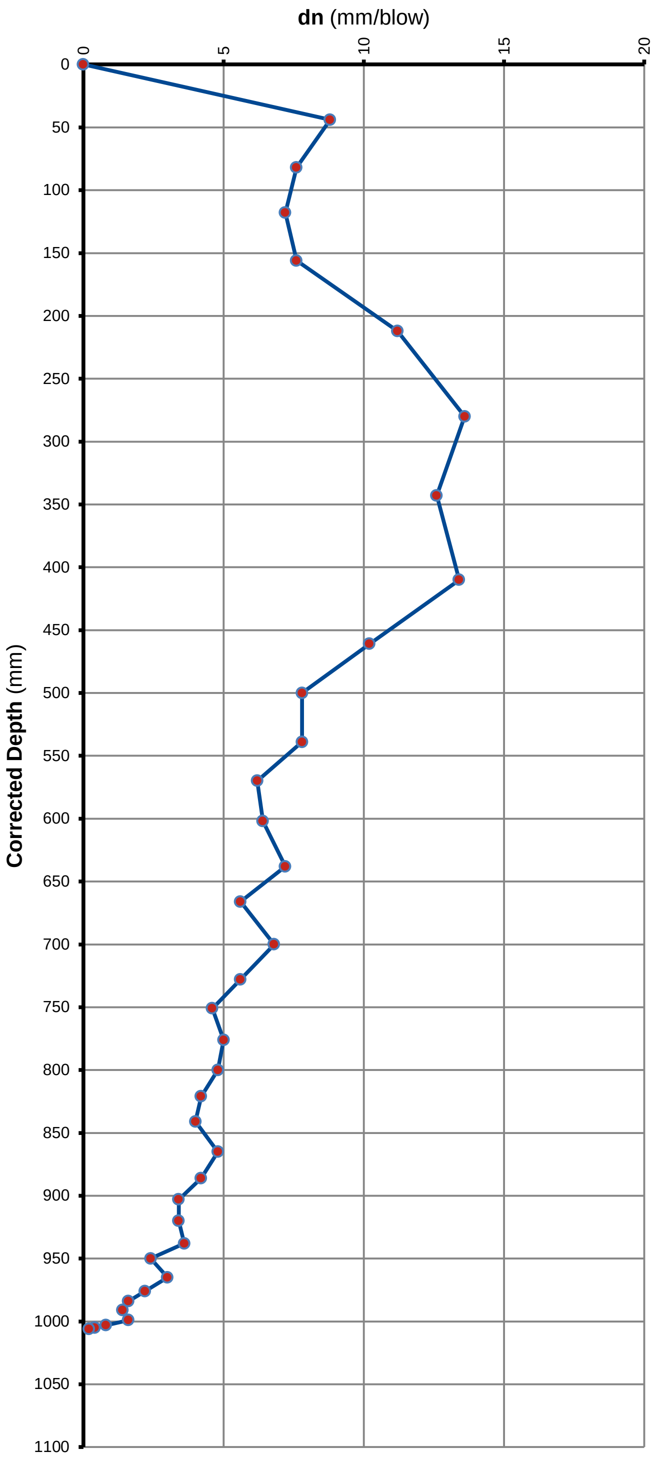
POSITION: DCP 58 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



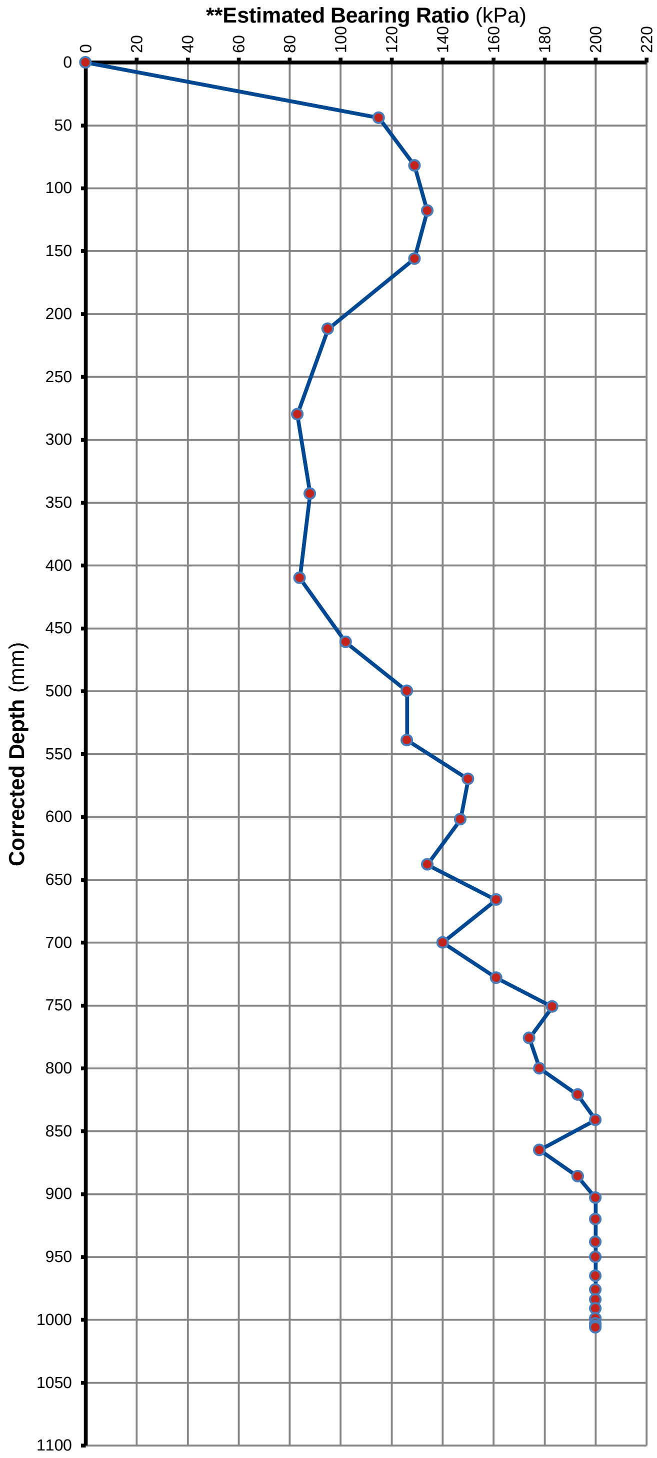
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

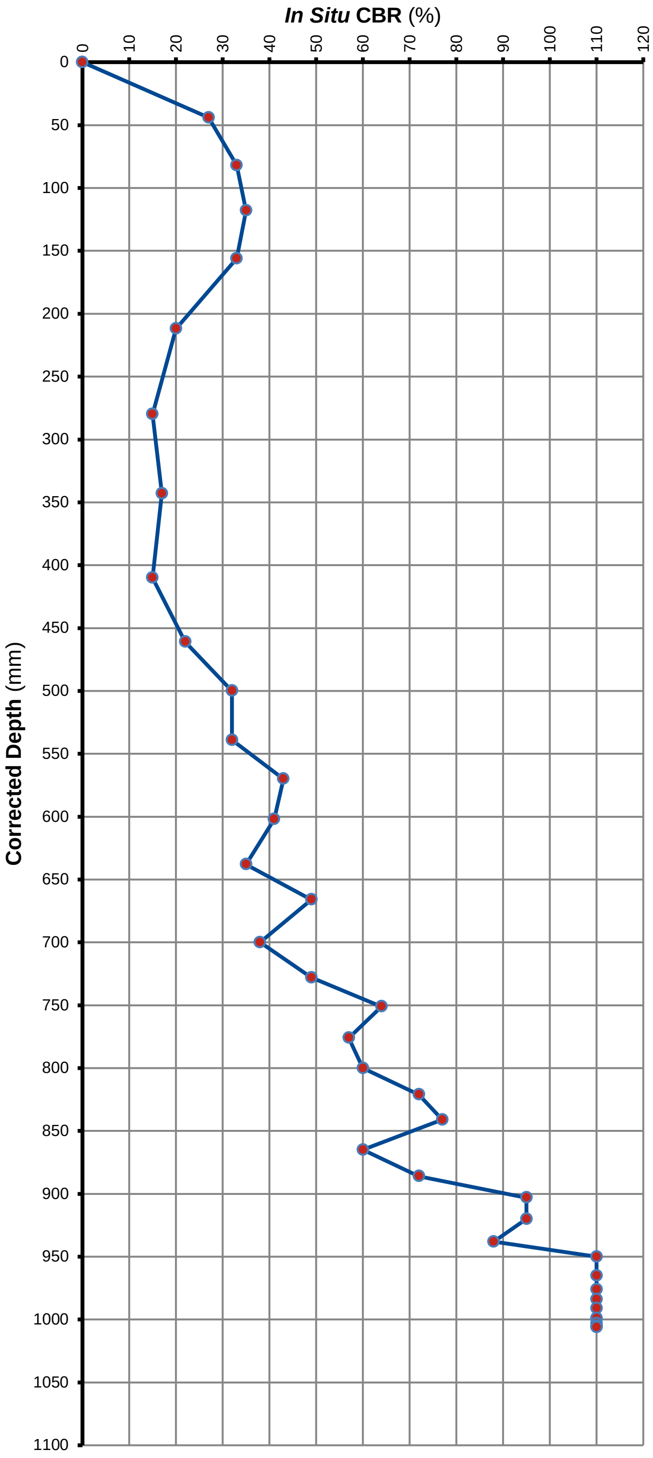
POSITION: DCP 58 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 59 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	65	65	65	13.0	Very Stiff	86	16
10	121	121	56	11.2	Very Stiff	95	20
15	198	198	77	15.4	Stiff	76	13
20	256	256	58	11.6	Very Stiff	93	19
25	293	293	37	7.4	Very Stiff	132	34
30	325	325	32	6.4	Very Stiff	147	41
35	361	361	36	7.2	Very Stiff	134	35
40	400	400	39	7.8	Very Stiff	126	32
45	439	439	39	7.8	Very Stiff	126	32
50	476	476	37	7.4	Very Stiff	132	34
55	513	513	37	7.4	Very Stiff	132	34
60	550	550	37	7.4	Very Stiff	132	34
65	595	595	45	9.0	Very Stiff	113	26
70	638	638	43	8.6	Very Stiff	117	28
75	676	676	38	7.6	Very Stiff	129	33
80	712	712	36	7.2	Very Stiff	134	35
85	750	750	38	7.6	Very Stiff	129	33
90	777	777	27	5.4	Very Stiff	165	52
95	803	803	26	5.2	Very Stiff	169	54
100	821	821	18	3.6	Very Stiff	> 200	88
105	839	839	18	3.6	Very Stiff	> 200	88
110	855	855	16	3.2	Very Stiff	> 200	103
115	864	864	9	1.8	Very Stiff	> 200	> 110
120	873	873	9	1.8	Very Stiff	> 200	> 110
125	881	881	8	1.6	Very Stiff	> 200	> 110
130	887	887	6	1.2	Very Stiff	> 200	> 110
135	893	893	6	1.2	Very Stiff	> 200	> 110
140	899	899	6	1.2	Very Stiff	> 200	> 110
145	901	901	2	0.4	Very Stiff	> 200	> 110
150	901	901	0	0.0	Very Stiff	> 200	> 110
155	REFUSAL						

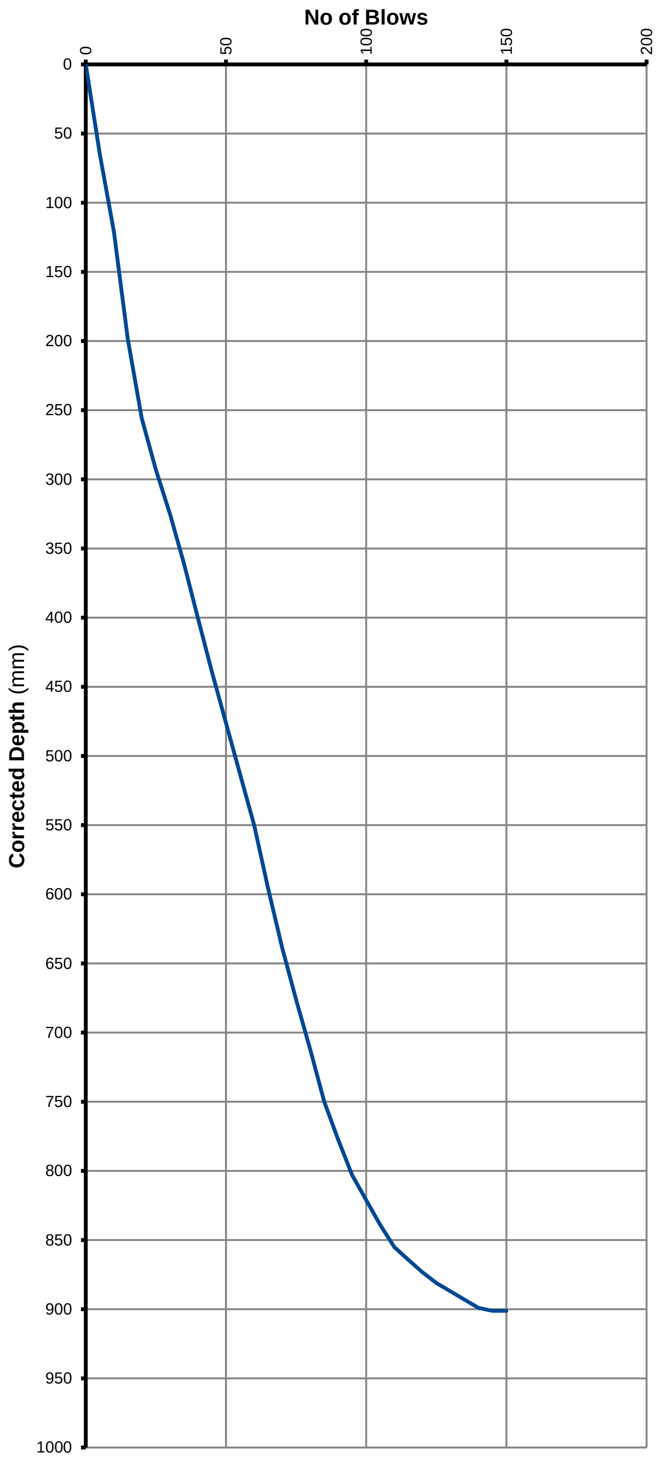
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

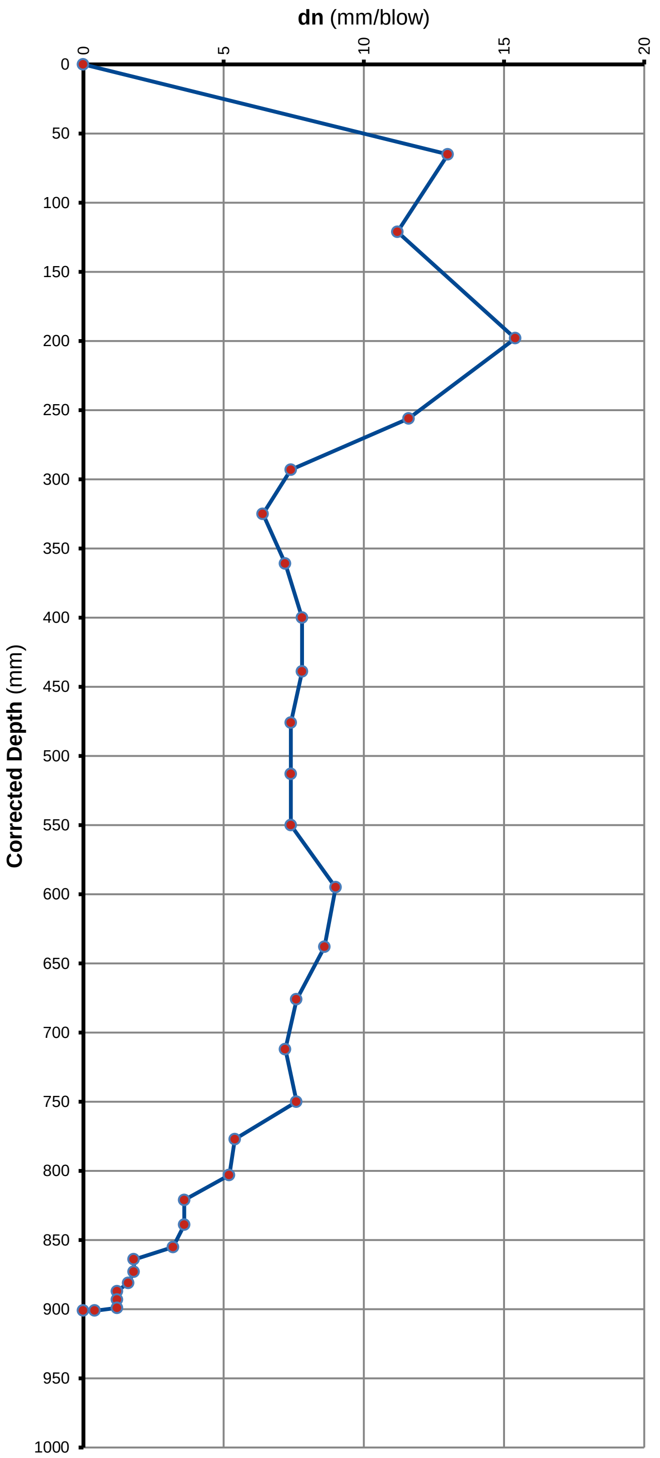
POSITION: DCP 59 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

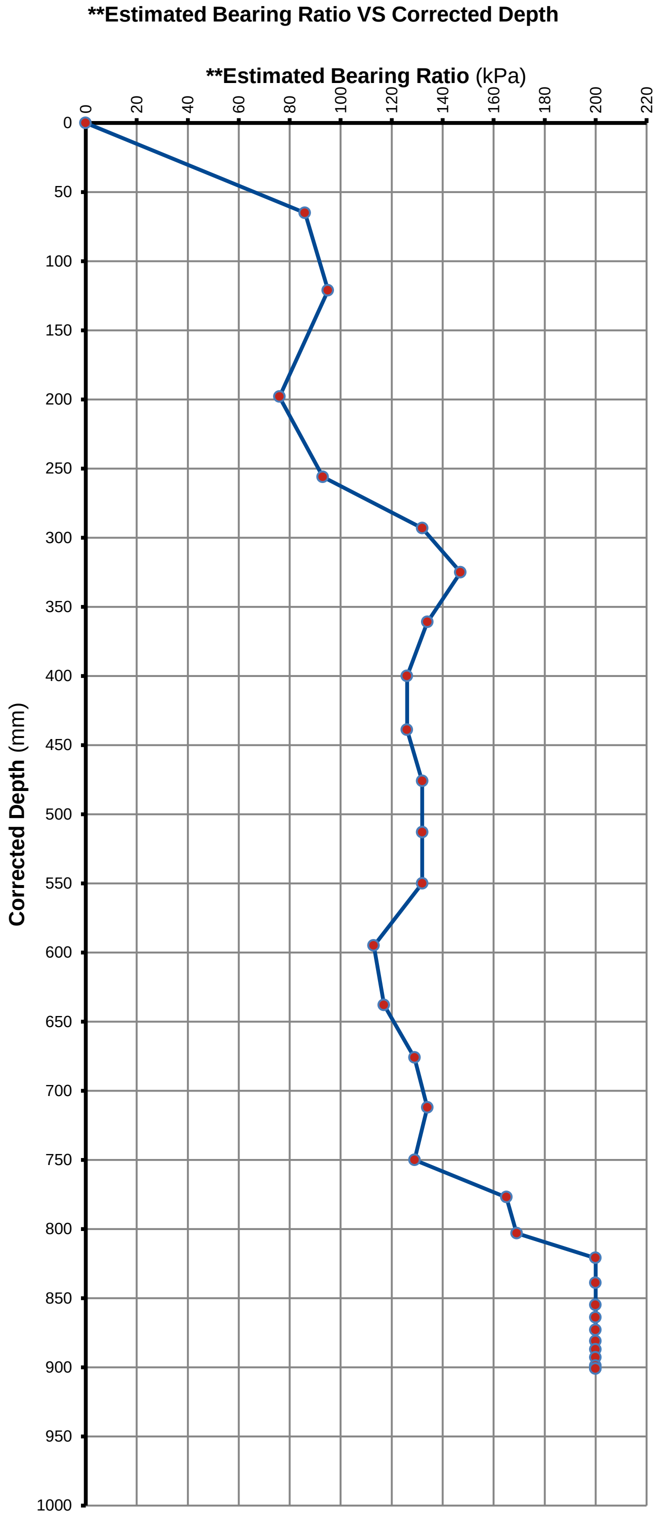


** According to Dr B van Wyk's Method

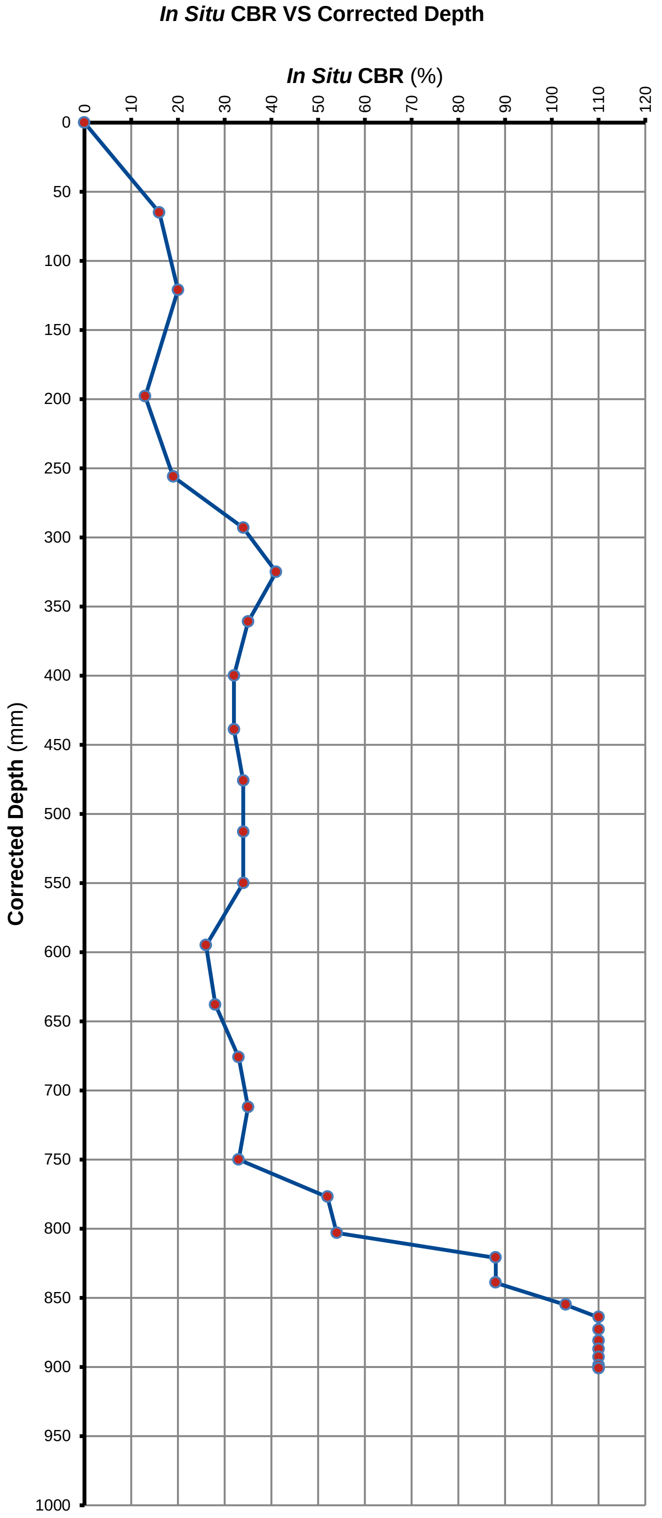
*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 59 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)



****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**

** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 60 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	0	0	-	-	-	-	-
5	45	45	45	9.0	Dense	113	26
10	114	114	69	13.8	Medium Dense	82	15
15	163	163	49	9.8	Dense	106	23
20	225	225	62	12.4	Dense	89	17
25	281	281	56	11.2	Dense	95	20
30	330	330	49	9.8	Dense	106	23
35	380	380	50	10.0	Dense	104	23
40	433	433	53	10.6	Dense	99	21
45	479	479	46	9.2	Dense	111	25
50	521	521	42	8.4	Dense	119	29
55	564	564	43	8.6	Dense	117	28
60	600	600	36	7.2	Dense	134	35
65	628	628	28	5.6	Dense	161	49
70	650	650	22	4.4	Very Dense	188	68
75	671	671	21	4.2	Very Dense	193	72
80	679	679	8	1.6	Very Dense	> 200	> 110
85	689	689	10	2.0	Very Dense	> 200	> 110
90	695	695	6	1.2	Very Dense	> 200	> 110
95	701	701	6	1.2	Very Dense	> 200	> 110
100	702	702	1	0.2	Very Dense	> 200	> 110
105	Refusal						

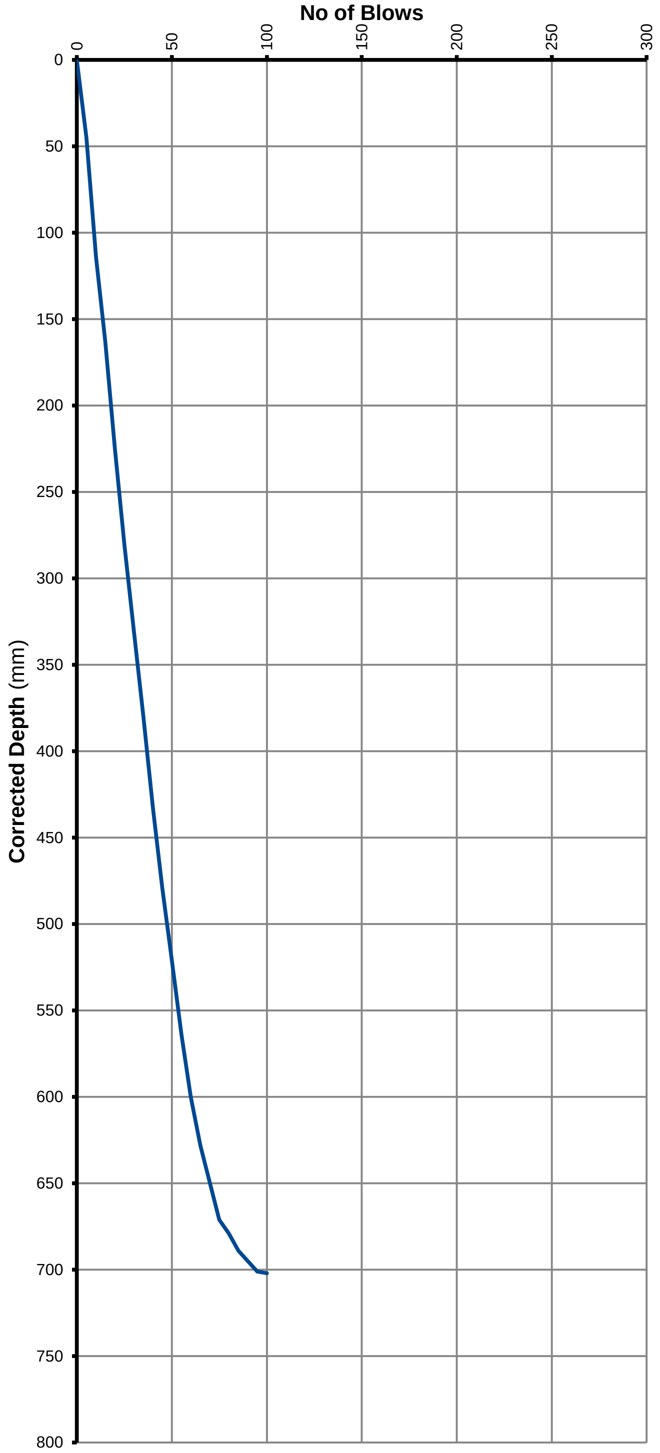
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

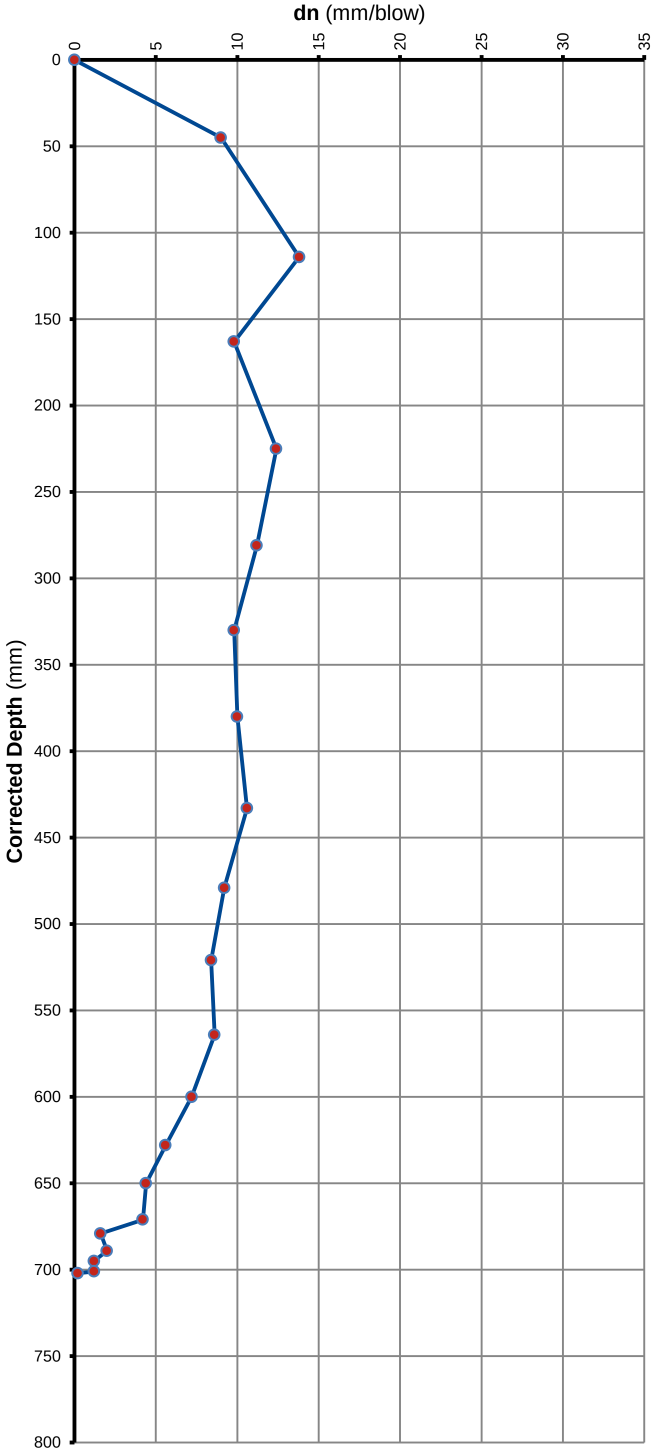
POSITION: DCP 60 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



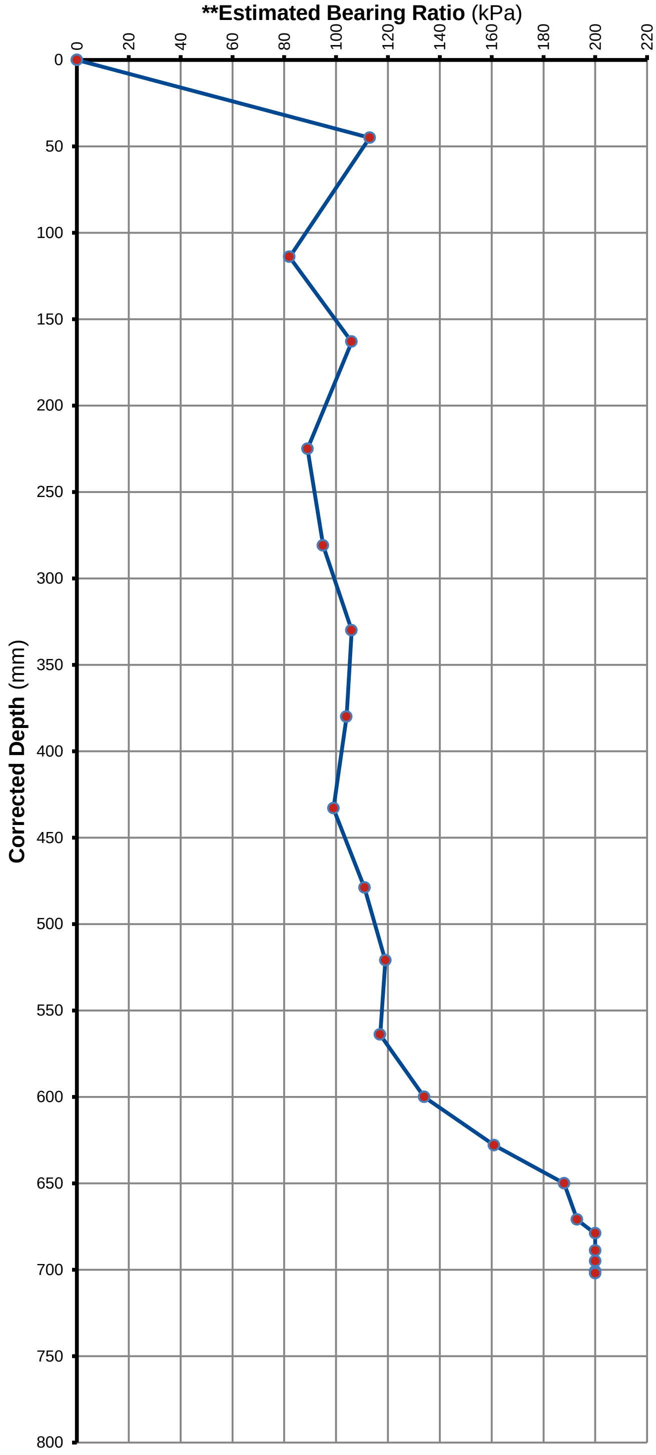
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

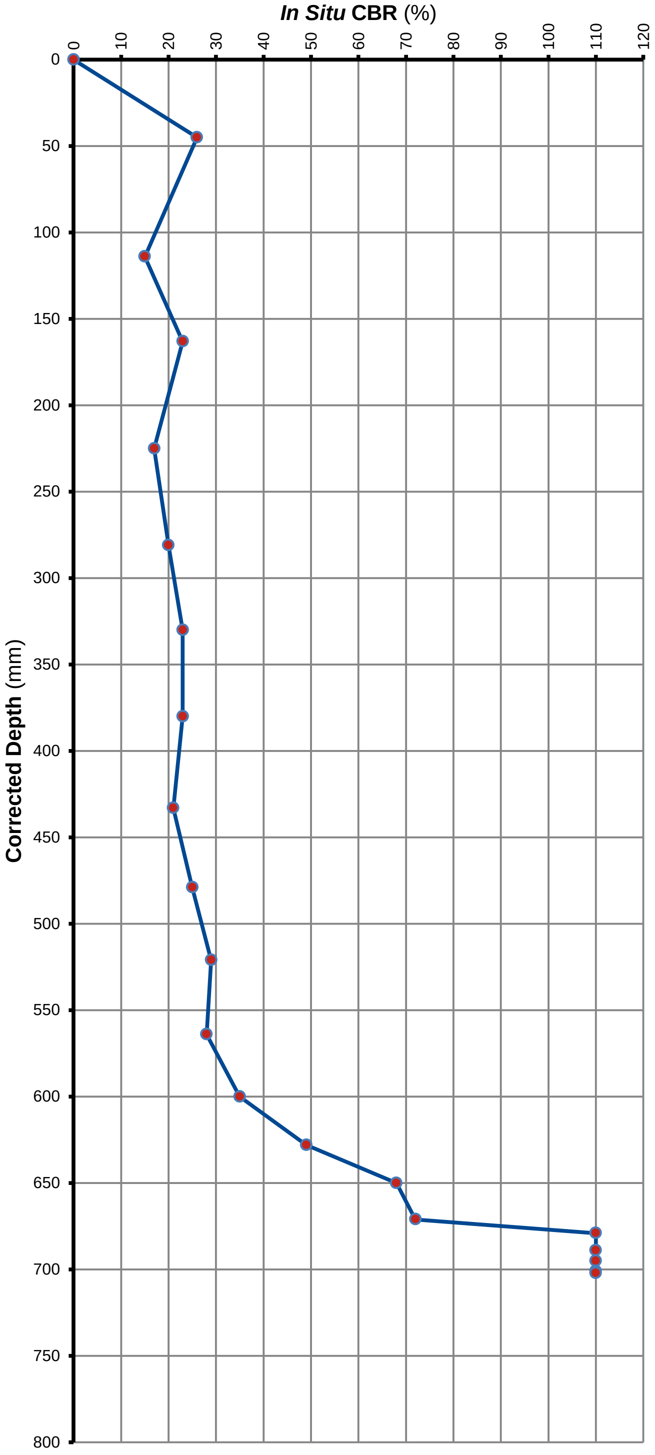
POSITION: DCP 60 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP61 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	10	0	-	-	-	-	-
5	157	147	147	29.4	Medium Dense	46	5
10	327	317	170	34.0	Loose	42	4
15	495	485	168	33.6	Loose	42	5
20	566	556	71	14.2	Medium Dense	81	14
25	591	581	25	5.0	Very Dense	174	57
30	609	599	18	3.6	Very Dense	> 200	88
35	622	612	13	2.6	Very Dense	> 200	> 110
40	634	624	12	2.4	Very Dense	> 200	> 110
45	641	631	7	1.4	Very Dense	> 200	> 110
50	652	642	11	2.2	Very Dense	> 200	> 110
55	660	650	8	1.6	Very Dense	> 200	> 110
60	668	658	8	1.6	Very Dense	> 200	> 110
65	673	663	5	1.0	Very Dense	> 200	> 110
70	680	670	7	1.4	Very Dense	> 200	> 110
75	684	674	4	0.8	Very Dense	> 200	> 110
80	689	679	5	1.0	Very Dense	> 200	> 110
85	691	681	2	0.4	Very Dense	> 200	> 110
90	692	682	1	0.2	Very Dense	> 200	> 110
95	Refusal						

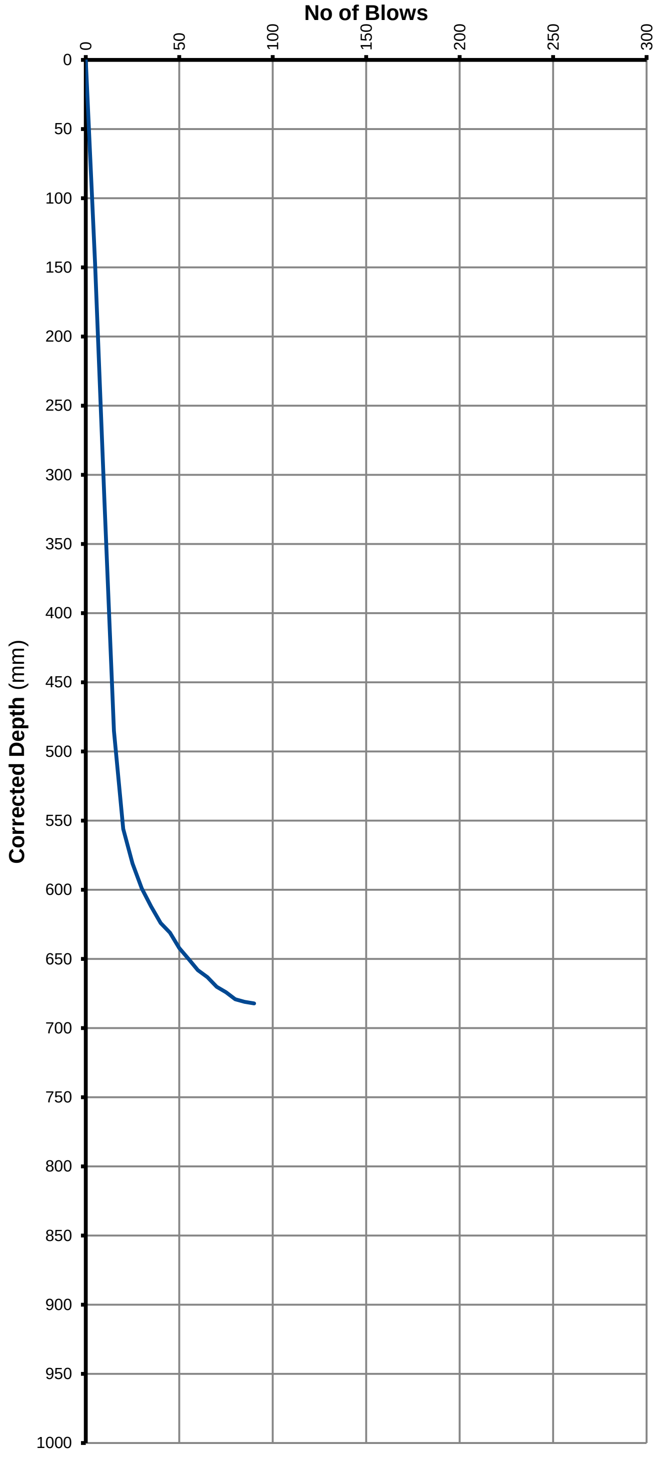
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

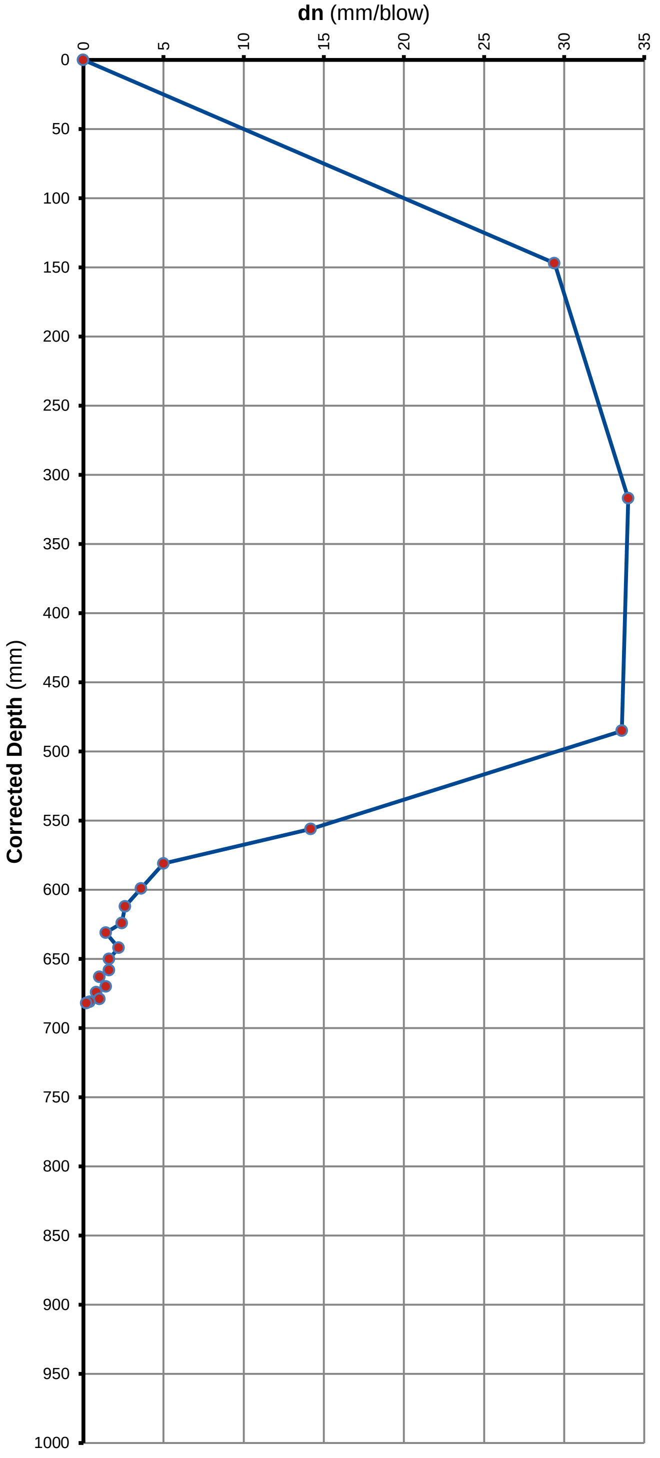
POSITION: DCP61 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



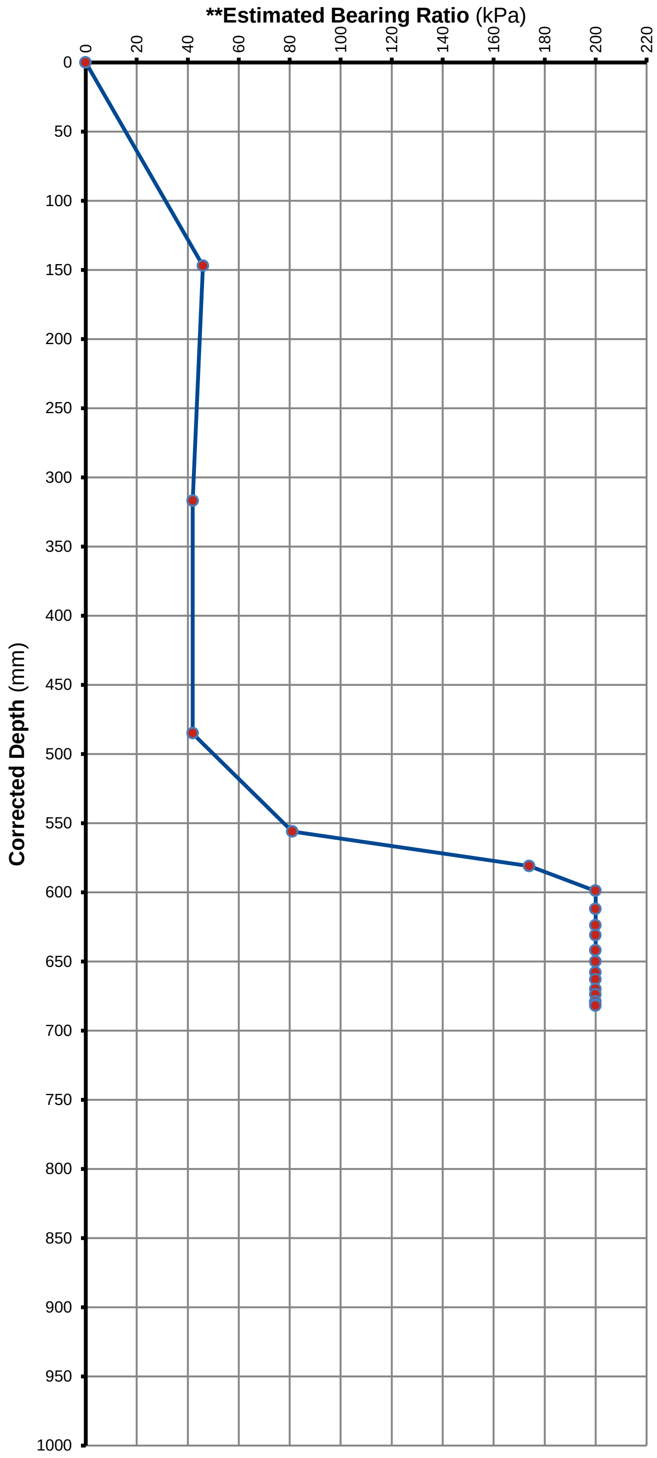
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

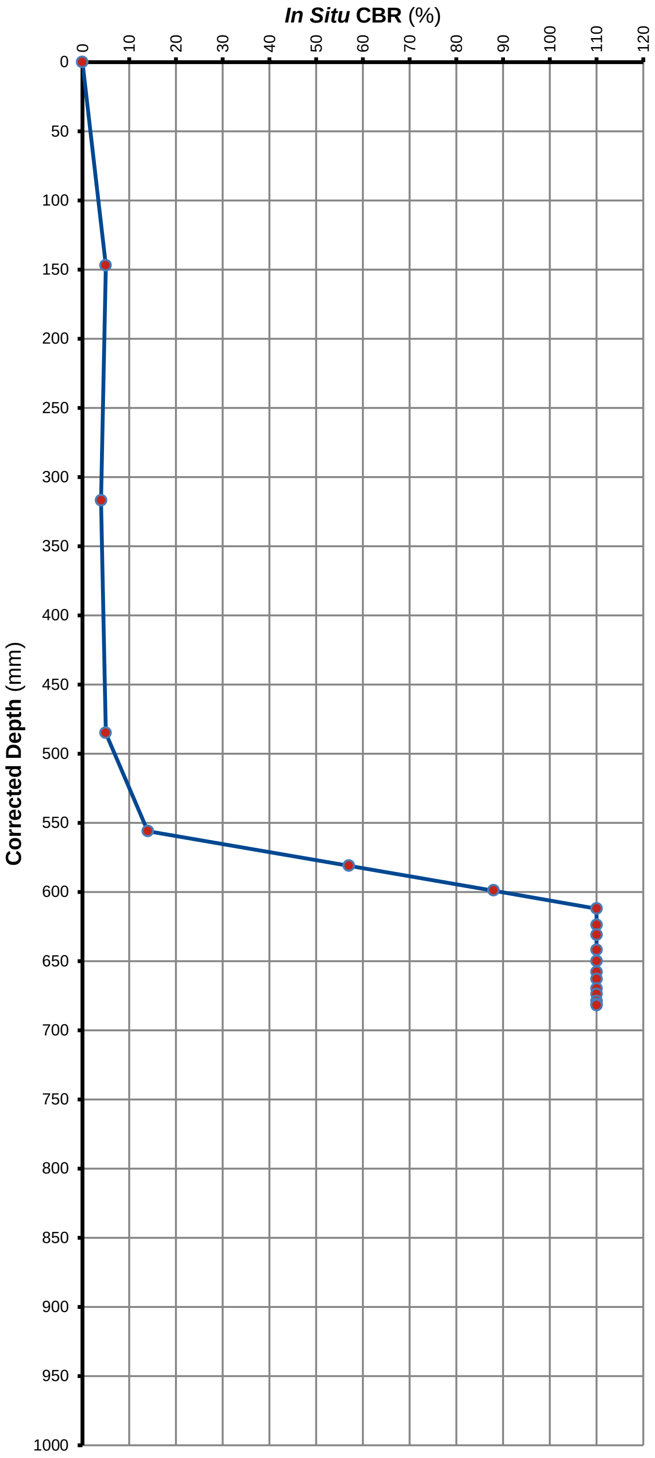
POSITION: DCP61 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 62 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	10	0	-	-	-	-	-
5	188	178	178	35.6	Loose	41	4
10	261	251	73	14.6	Medium Dense	79	14
15	310	300	49	9.8	Dense	106	23
20	360	350	50	10.0	Dense	104	23
25	397	387	37	7.4	Dense	132	34
30	435	425	38	7.6	Dense	129	33
35	471	461	36	7.2	Dense	134	35
40	501	491	30	6.0	Dense	154	45
45	536	526	35	7.0	Dense	137	36
50	566	556	30	6.0	Dense	154	45
55	599	589	33	6.6	Dense	144	39
60	628	618	29	5.8	Dense	157	47
65	659	649	31	6.2	Dense	150	43
70	695	685	36	7.2	Dense	134	35
75	723	713	28	5.6	Dense	161	49
80	756	746	33	6.6	Dense	144	39
85	787	777	31	6.2	Dense	150	43
90	815	805	28	5.6	Dense	161	49
95	846	836	31	6.2	Dense	150	43
100	873	863	27	5.4	Dense	165	52
105	898	888	25	5.0	Very Dense	174	57
110	920	910	22	4.4	Very Dense	188	68
115	943	933	23	4.6	Very Dense	183	64
120	965	955	22	4.4	Very Dense	188	68
125	981	971	16	3.2	Very Dense	> 200	103
130	996	986	15	3.0	Very Dense	> 200	> 110
135	1014	1004	18	3.6	Very Dense	> 200	88
140	1027	1017	13	2.6	Very Dense	> 200	> 110
145	1040	1030	13	2.6	Very Dense	> 200	> 110
150	1060	1050	20	4.0	Very Dense	200	77
155	1075	1065	15	3.0	Very Dense	> 200	> 110
160	1096	1086	21	4.2	Very Dense	193	72
165	1112	1102	16	3.2	Very Dense	> 200	103
170	1129	1119	17	3.4	Very Dense	> 200	95
175	1145	1135	16	3.2	Very Dense	> 200	103
180	1161	1151	16	3.2	Very Dense	> 200	103
185	1179	1169	18	3.6	Very Dense	> 200	88
190	1190	1180	11	2.2	Very Dense	> 200	> 110
195	1205	1195	15	3.0	Very Dense	> 200	> 110
200	1220	1210	15	3.0	Very Dense	> 200	> 110
205	1237	1227	17	3.4	Very Dense	> 200	95
210	1251	1241	14	2.8	Very Dense	> 200	> 110
215	1266	1256	15	3.0	Very Dense	> 200	> 110
220	1280	1270	14	2.8	Very Dense	> 200	> 110
225	1296	1286	16	3.2	Very Dense	> 200	103
230	1310	1300	14	2.8	Very Dense	> 200	> 110
235	1325	1315	15	3.0	Very Dense	> 200	> 110
240	1338	1328	13	2.6	Very Dense	> 200	> 110
245	1355	1345	17	3.4	Very Dense	> 200	95
250	1375	1365	20	4.0	Very Dense	200	77

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 62 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1387	1377	12	2.4	Very Dense	> 200	> 110
260	1402	1392	15	3.0	Very Dense	> 200	> 110
265	1415	1405	13	2.6	Very Dense	> 200	> 110
270	1430	1420	15	3.0	Very Dense	> 200	> 110
275	1443	1433	13	2.6	Very Dense	> 200	> 110
280	1459	1449	16	3.2	Very Dense	> 200	103
285	1459	1449	0	0.0	Very Dense	> 200	> 110
290	1480	1470	21	4.2	Very Dense	193	72
295	1488	1478	8	1.6	Very Dense	> 200	> 110
300	1495	1485	7	1.4	Very Dense	> 200	> 110
305	1503	1493	8	1.6	Very Dense	> 200	> 110
310	1514	1504	11	2.2	Very Dense	> 200	> 110
315	1529	1519	15	3.0	Very Dense	> 200	> 110
320	1541	1531	12	2.4	Very Dense	> 200	> 110
325	1551	1541	10	2.0	Very Dense	> 200	> 110
330	1563	1553	12	2.4	Very Dense	> 200	> 110
335	1574	1564	11	2.2	Very Dense	> 200	> 110
340	1585	1575	11	2.2	Very Dense	> 200	> 110
345	1592	1582	7	1.4	Very Dense	> 200	> 110
350	1601	1591	9	1.8	Very Dense	> 200	> 110
355	1603	1593	2	0.4	Very Dense	> 200	> 110
360	1604	1594	1	0.2	Very Dense	> 200	> 110
365	Refusal						

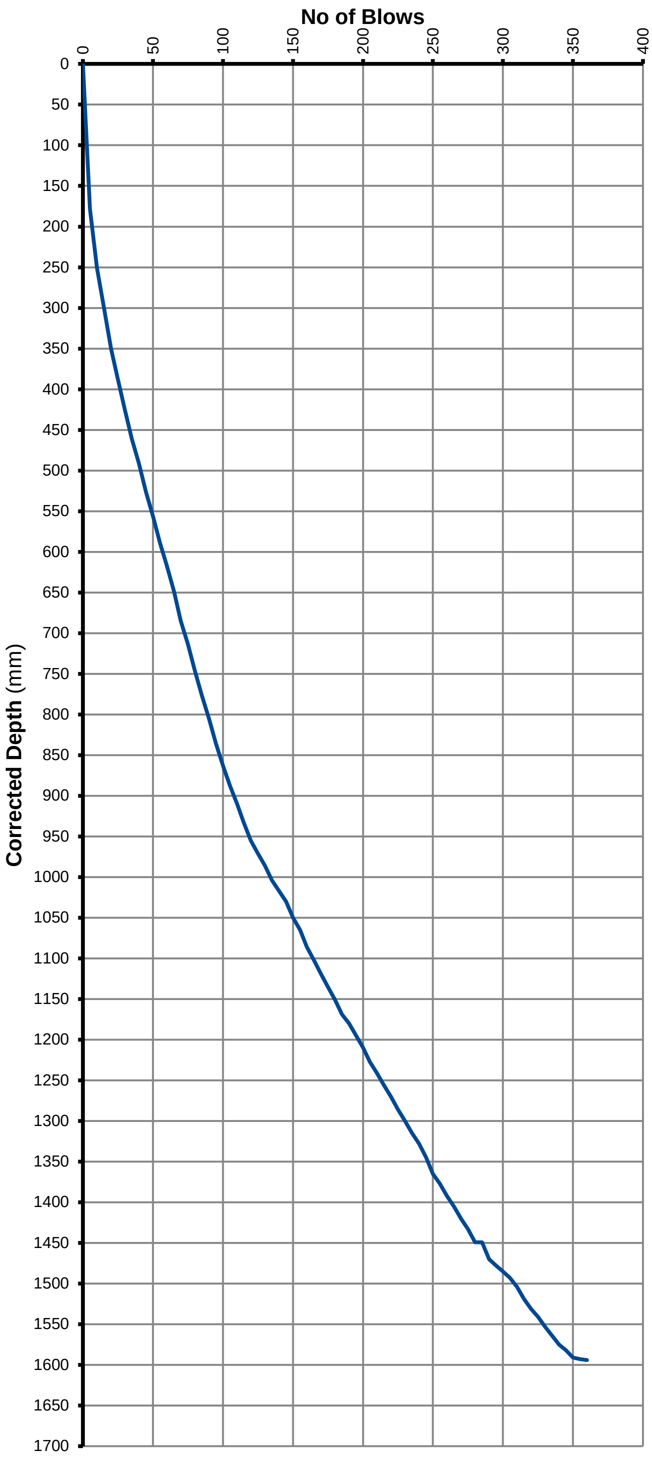
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

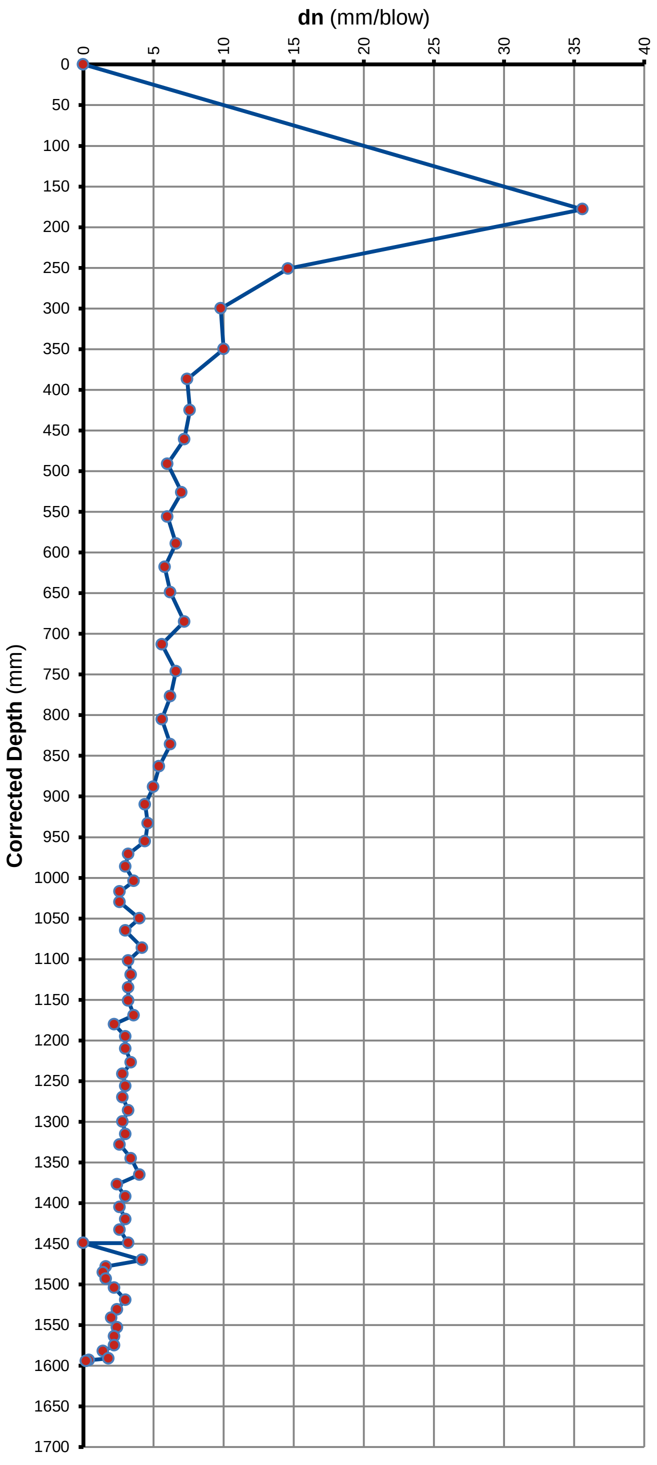
POSITION: DCP 62 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



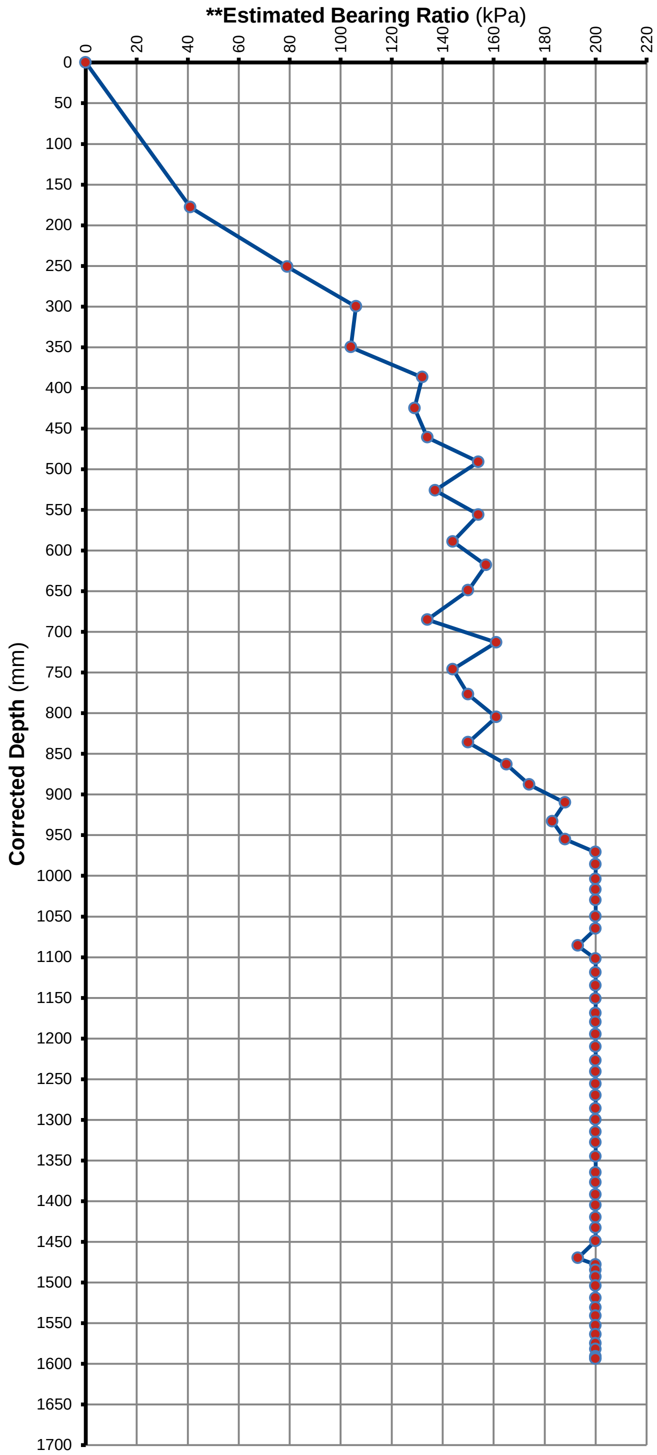
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

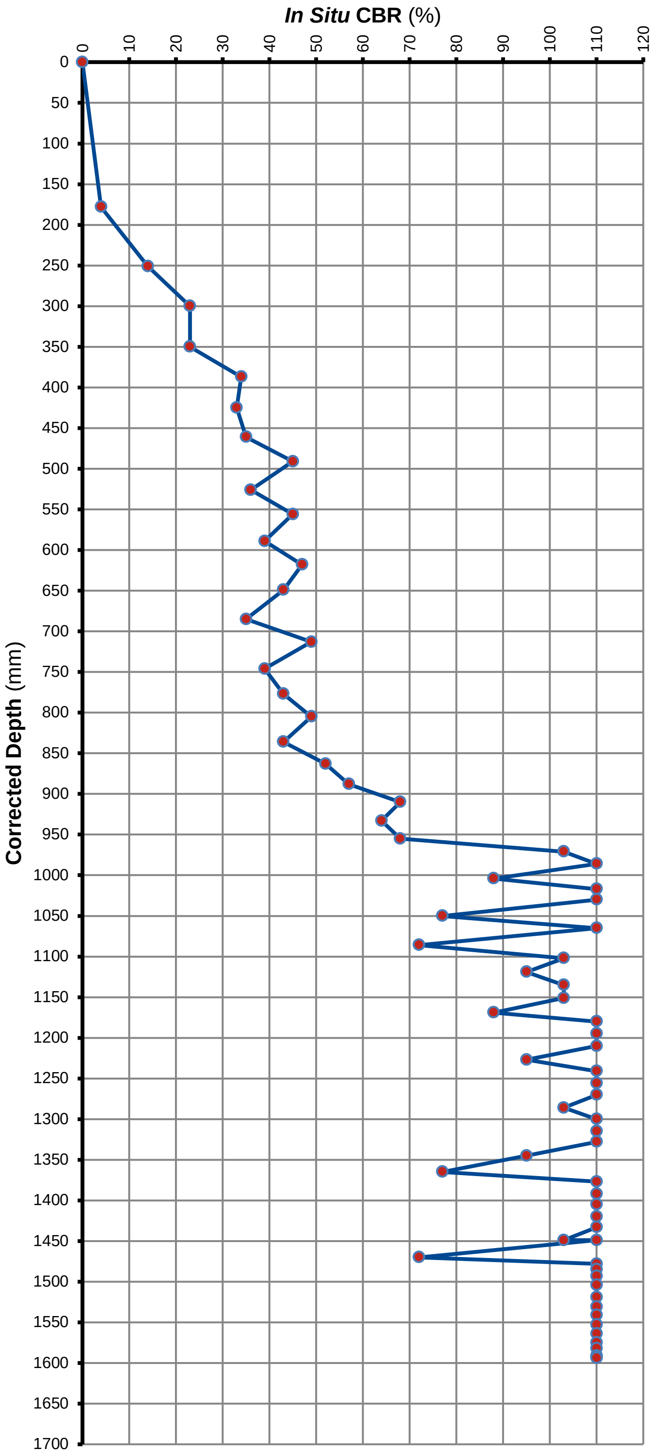
POSITION: DCP 62 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 63 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	78	78	78	15.6	Medium Dense	76	13
10	139	139	61	12.2	Dense	90	17
15	214	214	75	15.0	Medium Dense	78	13
20	263	263	49	9.8	Dense	106	23
25	282	282	19	3.8	Very Dense	> 200	82
30	306	306	24	4.8	Very Dense	178	60
35	334	334	28	5.6	Dense	161	49
40	355	355	21	4.2	Very Dense	193	72
45	374	374	19	3.8	Very Dense	> 200	82
50	398	398	24	4.8	Very Dense	178	60
55	419	419	21	4.2	Very Dense	193	72
60	441	441	22	4.4	Very Dense	188	68
65	466	466	25	5.0	Very Dense	174	57
70	500	500	34	6.8	Dense	140	38
75	529	529	29	5.8	Dense	157	47
80	565	565	36	7.2	Dense	134	35
85	598	598	33	6.6	Dense	144	39
90	631	631	33	6.6	Dense	144	39
95	662	662	31	6.2	Dense	150	43
100	689	689	27	5.4	Dense	165	52
105	730	730	41	8.2	Dense	122	30
110	770	770	40	8.0	Dense	124	31
115	802	802	32	6.4	Dense	147	41
120	839	839	37	7.4	Dense	132	34
125	870	870	31	6.2	Dense	150	43
130	899	899	29	5.8	Dense	157	47
135	927	927	28	5.6	Dense	161	49
140	952	952	25	5.0	Very Dense	174	57
145	971	971	19	3.8	Very Dense	> 200	82
150	998	998	27	5.4	Dense	165	52
155	1020	1020	22	4.4	Very Dense	188	68
160	1041	1041	21	4.2	Very Dense	193	72
165	1063	1063	22	4.4	Very Dense	188	68
170	1083	1083	20	4.0	Very Dense	200	77
175	1104	1104	21	4.2	Very Dense	193	72
180	1130	1130	26	5.2	Dense	169	54
185	1150	1150	20	4.0	Very Dense	200	77
190	1171	1171	21	4.2	Very Dense	193	72
195	1191	1191	20	4.0	Very Dense	200	77
200	1210	1210	19	3.8	Very Dense	> 200	82
205	1231	1231	21	4.2	Very Dense	193	72
210	1252	1252	21	4.2	Very Dense	193	72
215	1273	1273	21	4.2	Very Dense	193	72
220	1292	1292	19	3.8	Very Dense	> 200	82
225	1315	1315	23	4.6	Very Dense	183	64
230	1334	1334	19	3.8	Very Dense	> 200	82
235	1351	1351	17	3.4	Very Dense	> 200	95
240	1375	1375	24	4.8	Very Dense	178	60
245	1392	1392	17	3.4	Very Dense	> 200	95
250	1410	1410	18	3.6	Very Dense	> 200	88

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 63 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

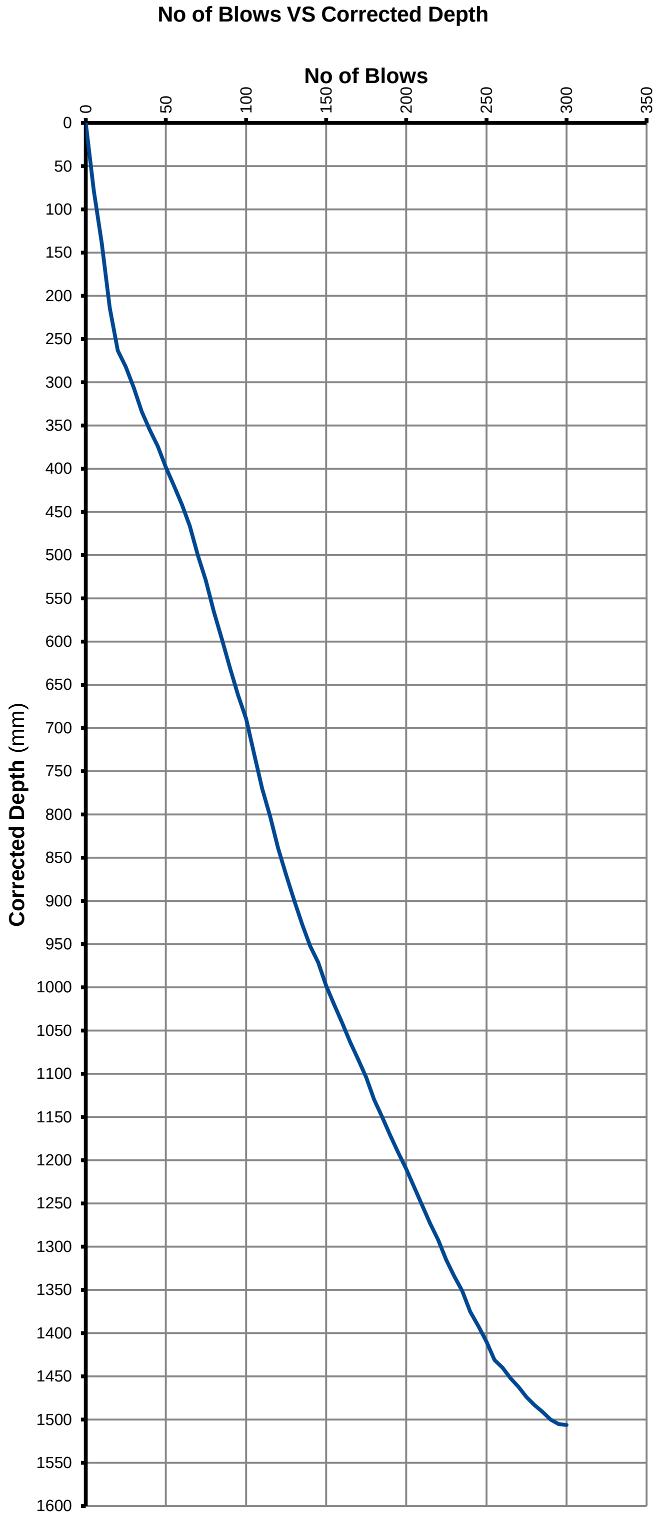
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1431	1431	21	4.2	Very Dense	193	72
260	1440	1440	9	1.8	Very Dense	> 200	> 110
265	1452	1452	12	2.4	Very Dense	> 200	> 110
270	1462	1462	10	2.0	Very Dense	> 200	> 110
275	1474	1474	12	2.4	Very Dense	> 200	> 110
280	1483	1483	9	1.8	Very Dense	> 200	> 110
285	1491	1491	8	1.6	Very Dense	> 200	> 110
290	1500	1500	9	1.8	Very Dense	> 200	> 110
295	1505	1505	5	1.0	Very Dense	> 200	> 110
300	1506	1506	1	0.2	Very Dense	> 200	> 110
305	Refusal						

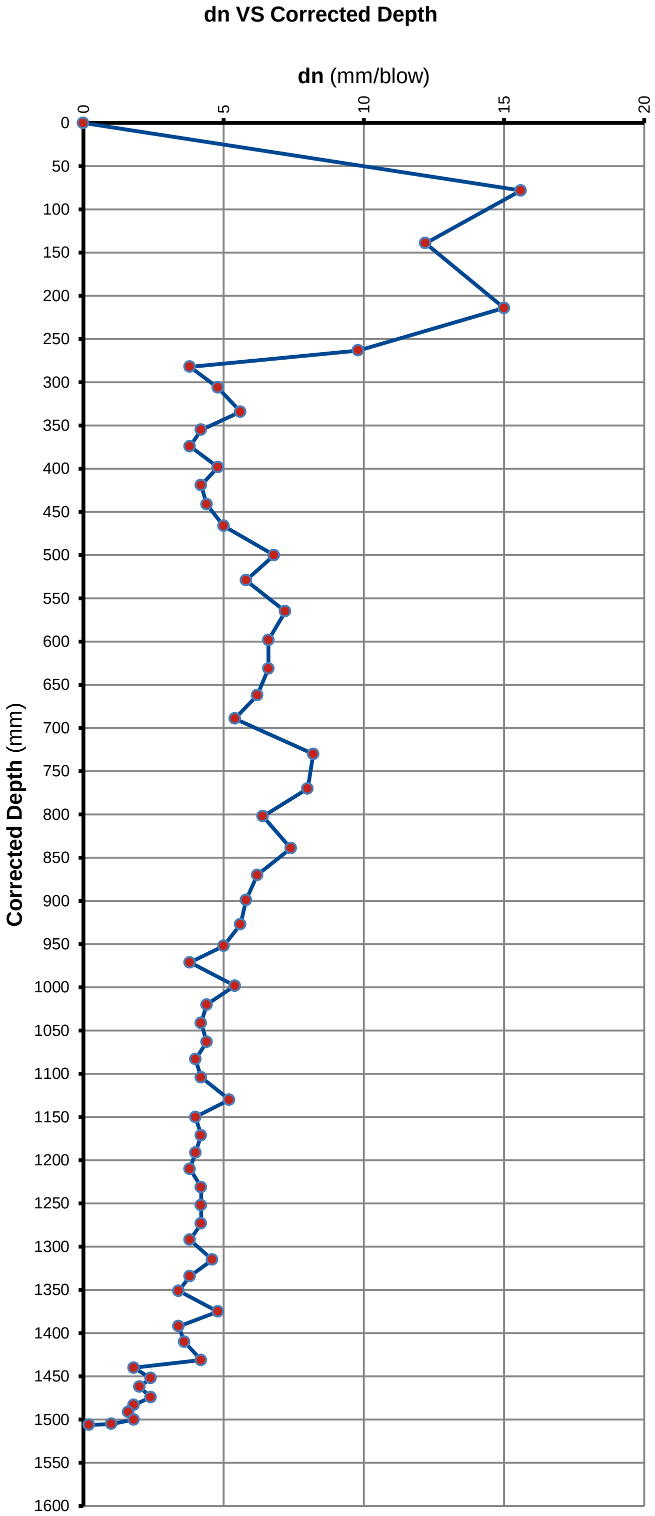
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 63 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





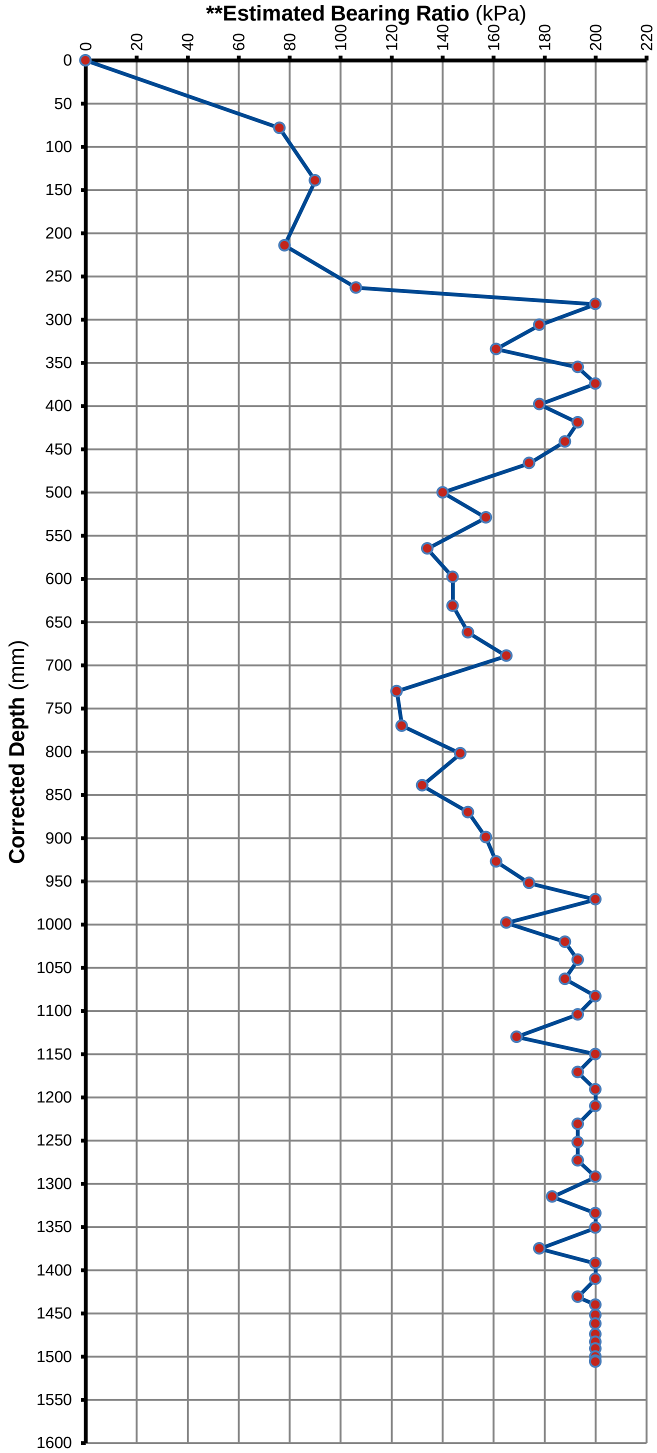
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

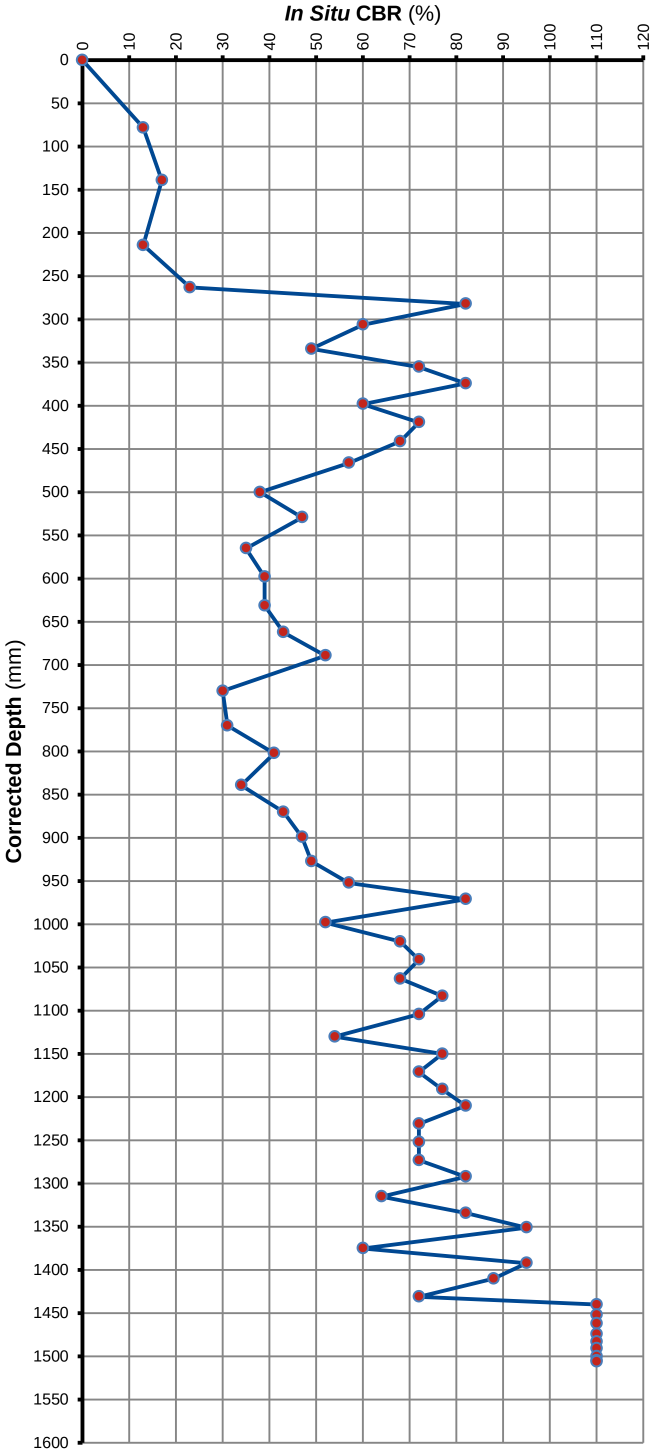
POSITION: DCP 63 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 64 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	10	0	-	-	-	-	-
5	91	81	81	16.2	Medium Dense	74	12
10	145	135	54	10.8	Dense	98	20
15	200	190	55	11.0	Dense	97	20
20	253	243	53	10.6	Dense	99	21
25	302	292	49	9.8	Dense	106	23
30	337	327	35	7.0	Dense	137	36
35	365	355	28	5.6	Dense	161	49
40	399	389	34	6.8	Dense	140	38
45	431	421	32	6.4	Dense	147	41
50	474	464	43	8.6	Dense	117	28
55	522	512	48	9.6	Dense	107	24
60	576	566	54	10.8	Dense	98	20
65	615	605	39	7.8	Dense	126	32
70	645	635	30	6.0	Dense	154	45
75	674	664	29	5.8	Dense	157	47
80	683	673	9	1.8	Very Dense	> 200	> 110
85	700	690	17	3.4	Very Dense	> 200	95
90	711	701	11	2.2	Very Dense	> 200	> 110
95	723	713	12	2.4	Very Dense	> 200	> 110
100	735	725	12	2.4	Very Dense	> 200	> 110
105	745	735	10	2.0	Very Dense	> 200	> 110
110	762	752	17	3.4	Very Dense	> 200	95
115	772	762	10	2.0	Very Dense	> 200	> 110
120	784	774	12	2.4	Very Dense	> 200	> 110
125	796	786	12	2.4	Very Dense	> 200	> 110
130	810	800	14	2.8	Very Dense	> 200	> 110
135	824	814	14	2.8	Very Dense	> 200	> 110
140	841	831	17	3.4	Very Dense	> 200	95
145	855	845	14	2.8	Very Dense	> 200	> 110
150	866	856	11	2.2	Very Dense	> 200	> 110
155	879	869	13	2.6	Very Dense	> 200	> 110
160	891	881	12	2.4	Very Dense	> 200	> 110
165	907	897	16	3.2	Very Dense	> 200	103
170	923	913	16	3.2	Very Dense	> 200	103
175	939	929	16	3.2	Very Dense	> 200	103
180	956	946	17	3.4	Very Dense	> 200	95
185	975	965	19	3.8	Very Dense	> 200	82
190	994	984	19	3.8	Very Dense	> 200	82
195	1010	1000	16	3.2	Very Dense	> 200	103
200	1025	1015	15	3.0	Very Dense	> 200	> 110
205	1040	1030	15	3.0	Very Dense	> 200	> 110
210	1055	1045	15	3.0	Very Dense	> 200	> 110
215	1068	1058	13	2.6	Very Dense	> 200	> 110
220	1085	1075	17	3.4	Very Dense	> 200	95
225	1103	1093	18	3.6	Very Dense	> 200	88
230	1120	1110	17	3.4	Very Dense	> 200	95
235	1132	1122	12	2.4	Very Dense	> 200	> 110
240	1148	1138	16	3.2	Very Dense	> 200	103
245	1165	1155	17	3.4	Very Dense	> 200	95
250	1179	1169	14	2.8	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 64 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1190	1180	11	2.2	Very Dense	> 200	> 110
260	1205	1195	15	3.0	Very Dense	> 200	> 110
265	1217	1207	12	2.4	Very Dense	> 200	> 110
270	1228	1218	11	2.2	Very Dense	> 200	> 110
275	1240	1230	12	2.4	Very Dense	> 200	> 110
280	1250	1240	10	2.0	Very Dense	> 200	> 110
285	1260	1250	10	2.0	Very Dense	> 200	> 110
290	1267	1257	7	1.4	Very Dense	> 200	> 110
295	1275	1265	8	1.6	Very Dense	> 200	> 110
300	1281	1271	6	1.2	Very Dense	> 200	> 110
305	1282	1272	1	0.2	Very Dense	> 200	> 110
310	1282	1272	0	0.0	Very Dense	> 200	> 110
315	Refusal						

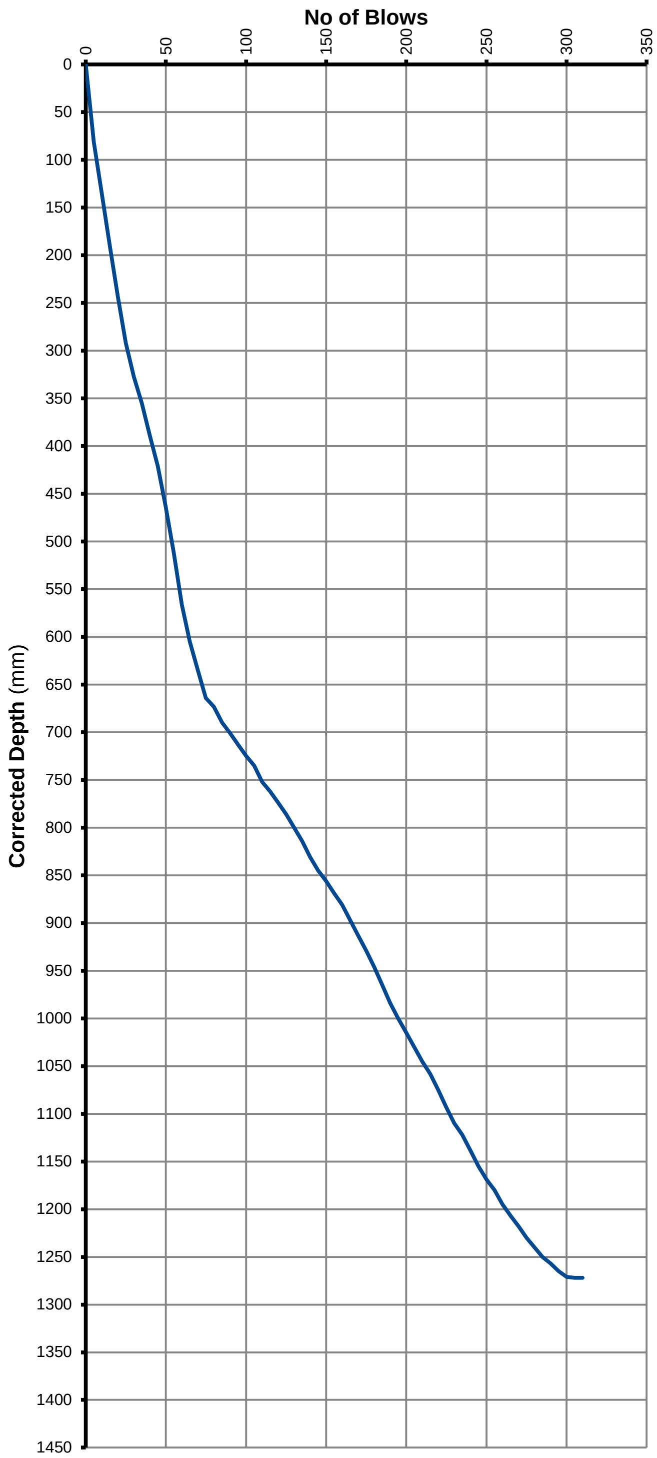
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

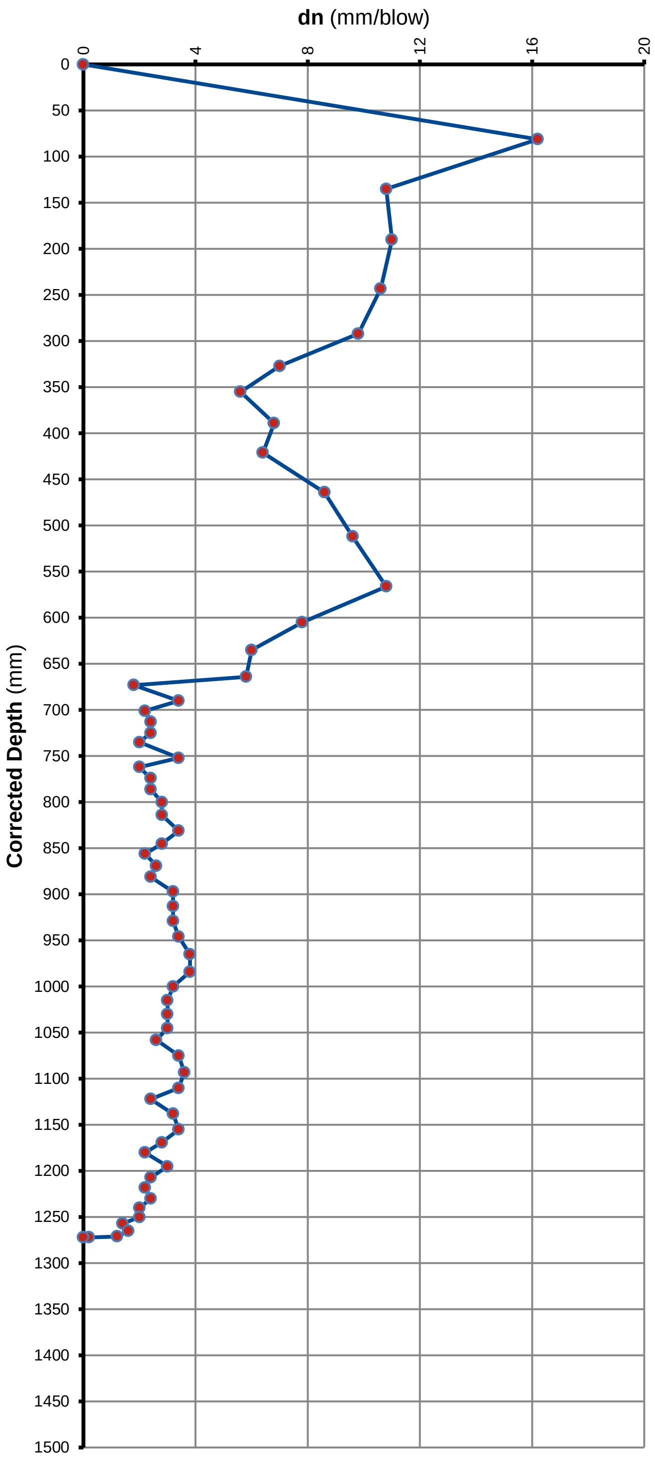
POSITION: DCP 64 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



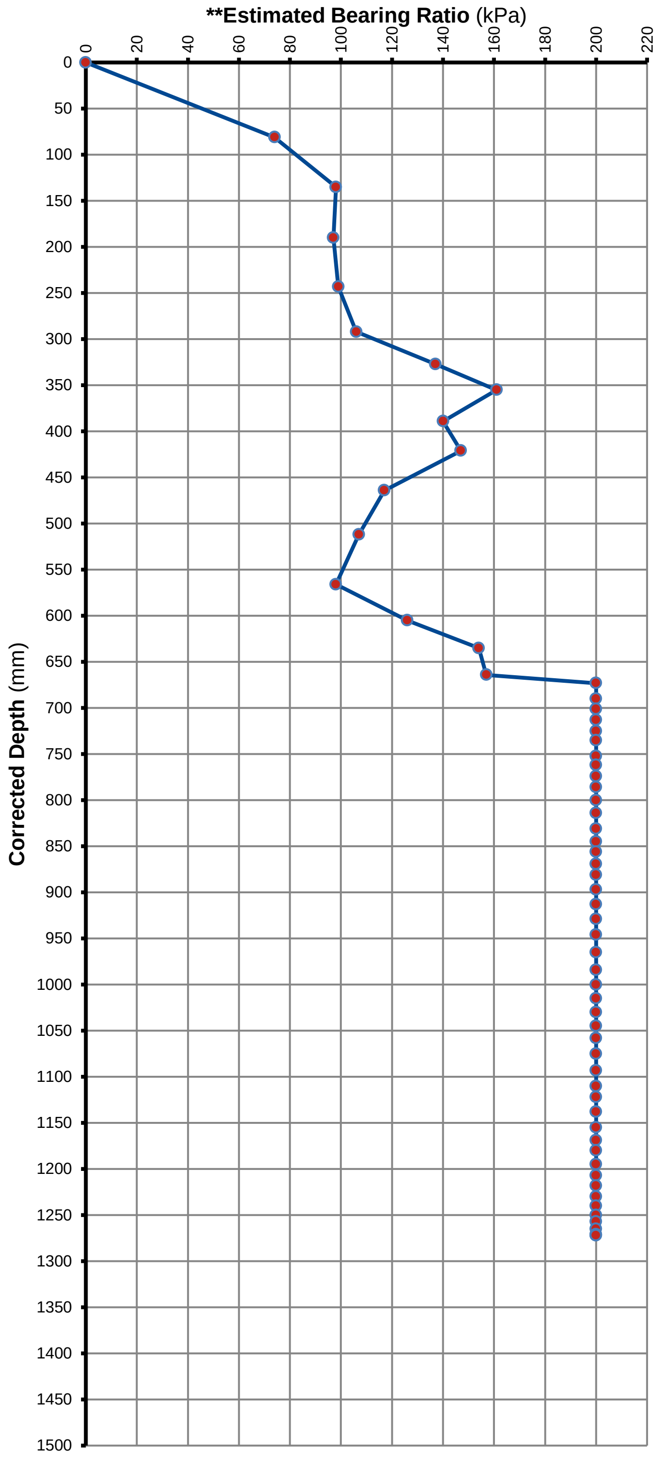
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

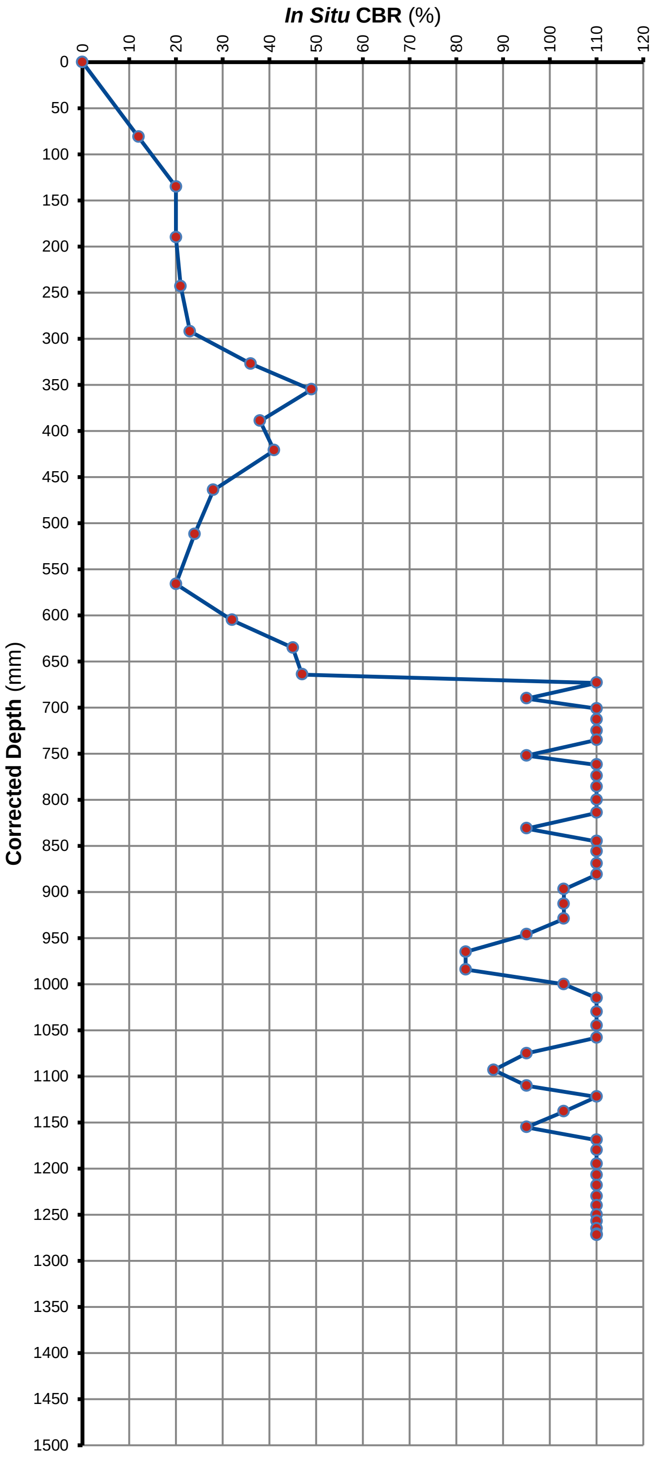
POSITION: DCP 64 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 65 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	20	0	-	-	-	-	-
5	174	154	154	30.8	Loose	45	5
10	253	233	79	15.8	Medium Dense	75	12
15	285	265	32	6.4	Dense	147	41
20	313	293	28	5.6	Dense	161	49
25	343	323	30	6.0	Dense	154	45
30	369	349	26	5.2	Dense	169	54
35	395	375	26	5.2	Dense	169	54
40	420	400	25	5.0	Very Dense	174	57
45	456	436	36	7.2	Dense	134	35
50	500	480	44	8.8	Dense	115	27
55	541	521	41	8.2	Dense	122	30
60	590	570	49	9.8	Dense	106	23
65	634	614	44	8.8	Dense	115	27
70	674	654	40	8.0	Dense	124	31
75	725	705	51	10.2	Dense	102	22
80	761	741	36	7.2	Dense	134	35
85	796	776	35	7.0	Dense	137	36
90	828	808	32	6.4	Dense	147	41
95	864	844	36	7.2	Dense	134	35
100	900	880	36	7.2	Dense	134	35
105	925	905	25	5.0	Very Dense	174	57
110	950	930	25	5.0	Very Dense	174	57
115	978	958	28	5.6	Dense	161	49
120	997	977	19	3.8	Very Dense	> 200	82
125	1013	993	16	3.2	Very Dense	> 200	103
130	1029	1009	16	3.2	Very Dense	> 200	103
135	1042	1022	13	2.6	Very Dense	> 200	> 110
140	1055	1035	13	2.6	Very Dense	> 200	> 110
145	1062	1042	7	1.4	Very Dense	> 200	> 110
150	1068	1048	6	1.2	Very Dense	> 200	> 110
155	1069	1049	1	0.2	Very Dense	> 200	> 110
160	1069	1049	0	0.0	Very Dense	> 200	> 110
165	Refusal						

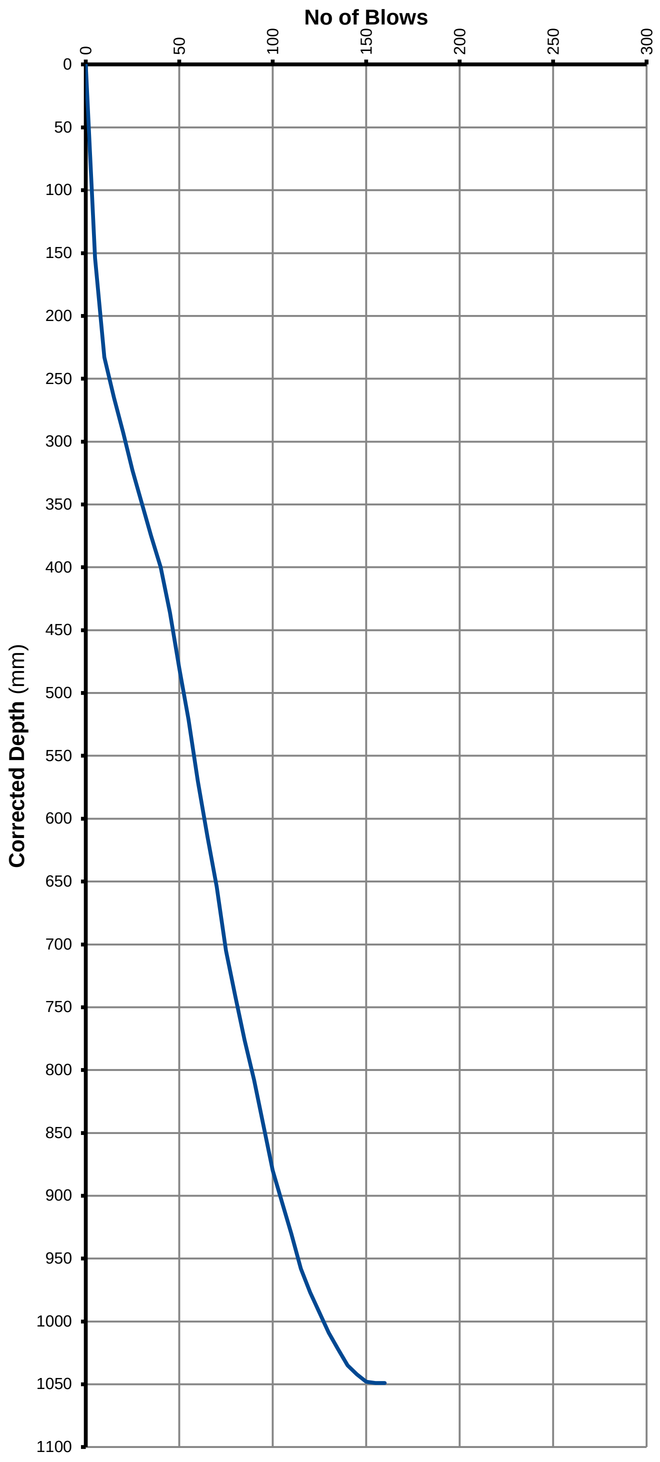
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

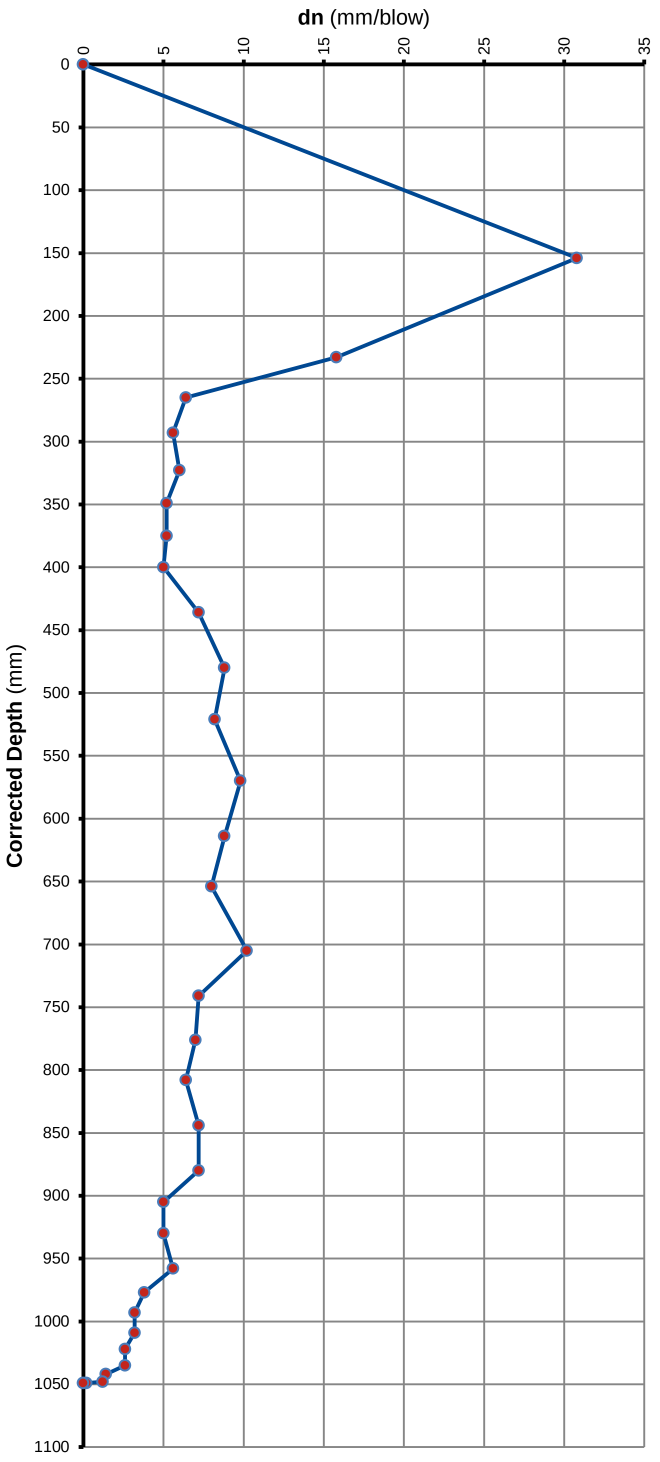
POSITION: DCP 65 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



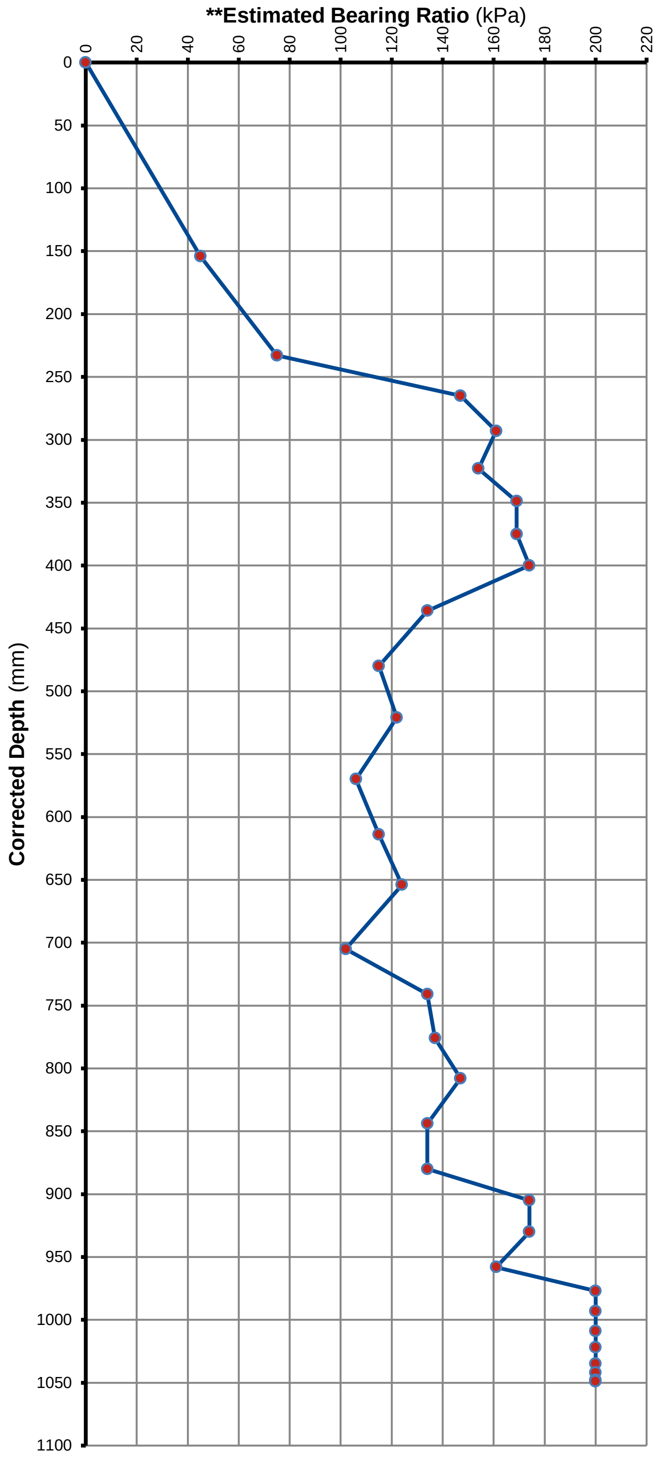
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

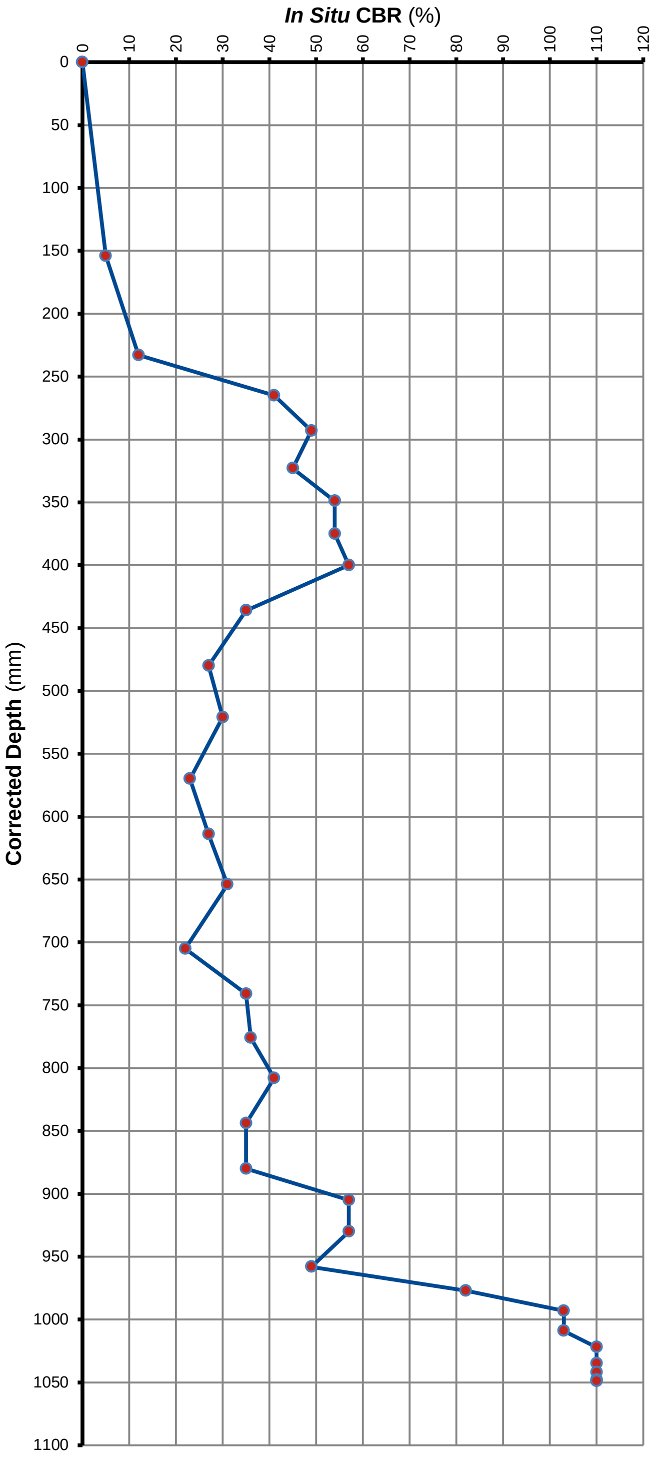
POSITION: DCP 65 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 66 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	30	0	-	-	-	-	-
5	153	123	123	24.6	Medium Dense	54	7
10	301	271	148	29.6	Medium Dense	46	5
15	391	361	90	18.0	Medium Dense	69	10
20	440	410	49	9.8	Dense	106	23
25	472	442	32	6.4	Dense	147	41
30	500	470	28	5.6	Dense	161	49
35	526	496	26	5.2	Dense	169	54
40	557	527	31	6.2	Dense	150	43
45	595	565	38	7.6	Dense	129	33
50	639	609	44	8.8	Dense	115	27
55	675	645	36	7.2	Dense	134	35
60	719	689	44	8.8	Dense	115	27
65	761	731	42	8.4	Dense	119	29
70	810	780	49	9.8	Dense	106	23
75	862	832	52	10.4	Dense	101	22
80	912	882	50	10.0	Dense	104	23
85	956	926	44	8.8	Dense	115	27
90	990	960	34	6.8	Dense	140	38
95	1011	981	21	4.2	Very Dense	193	72
100	1040	1010	29	5.8	Dense	157	47
105	1061	1031	21	4.2	Very Dense	193	72
110	1080	1050	19	3.8	Very Dense	> 200	82
115	1096	1066	16	3.2	Very Dense	> 200	103
120	1120	1090	24	4.8	Very Dense	178	60
125	1133	1103	13	2.6	Very Dense	> 200	> 110
130	1149	1119	16	3.2	Very Dense	> 200	103
135	1160	1130	11	2.2	Very Dense	> 200	> 110
140	1162	1132	2	0.4	Very Dense	> 200	> 110
145	1163	1133	1	0.2	Very Dense	> 200	> 110
150	Refusal						

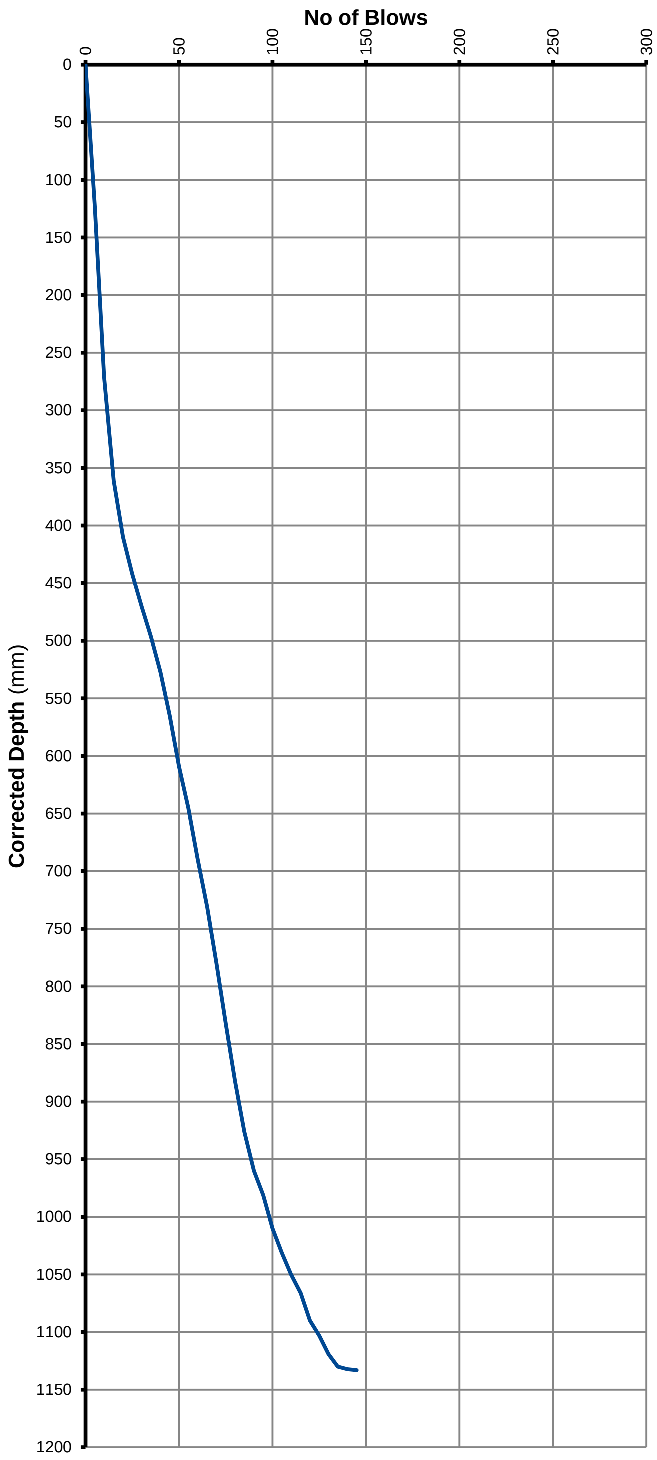
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

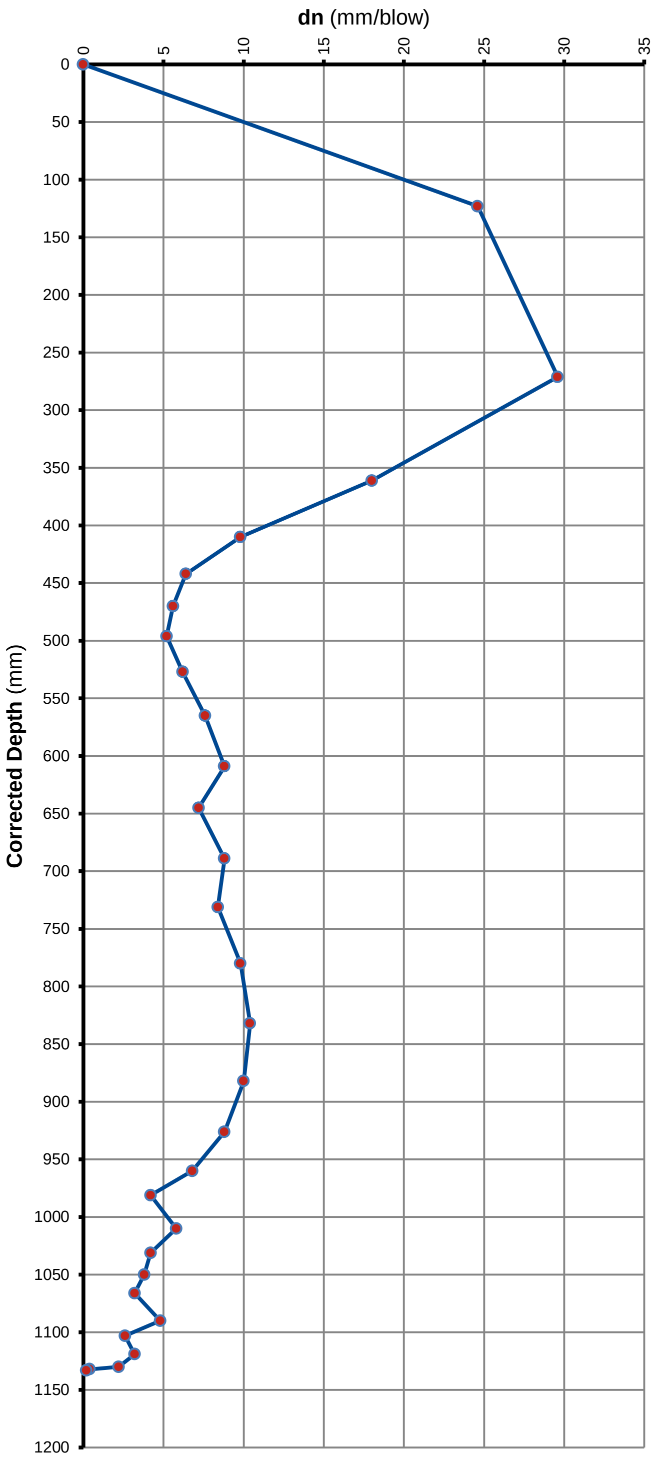
POSITION: DCP 66 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

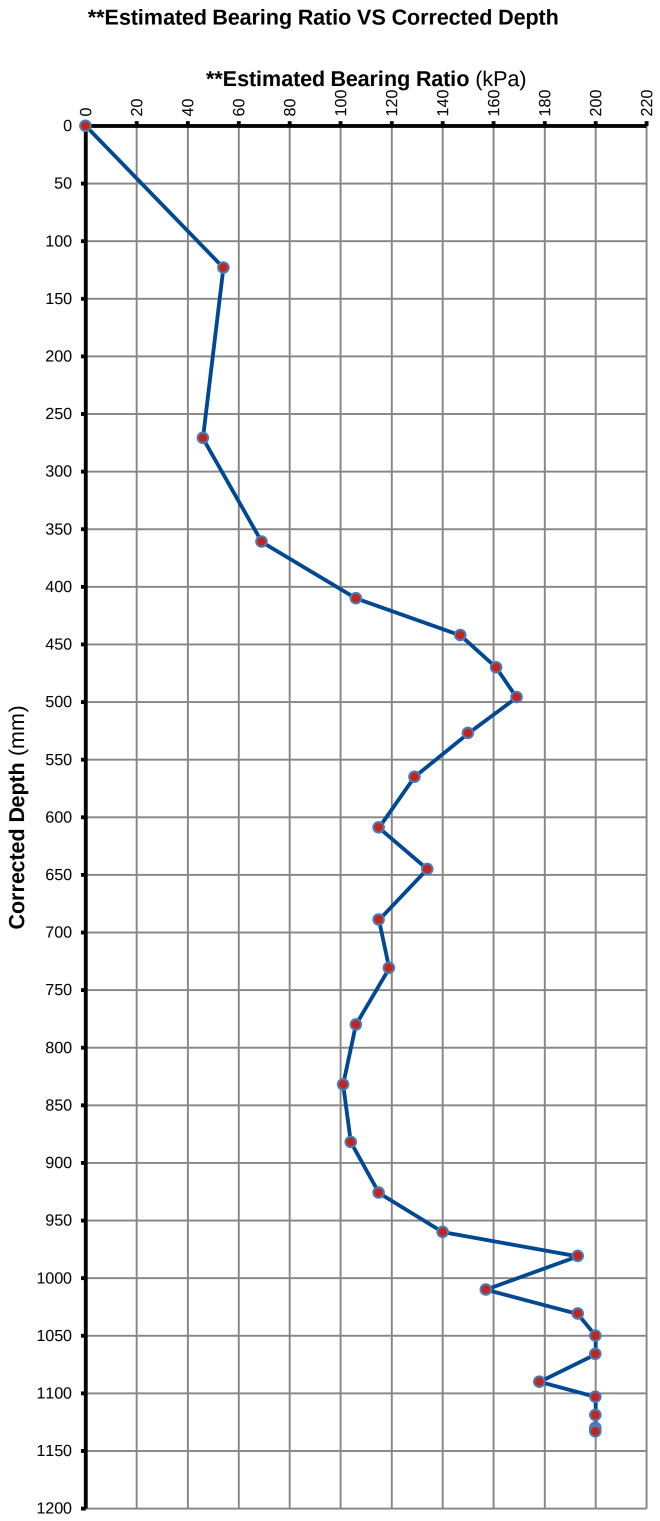


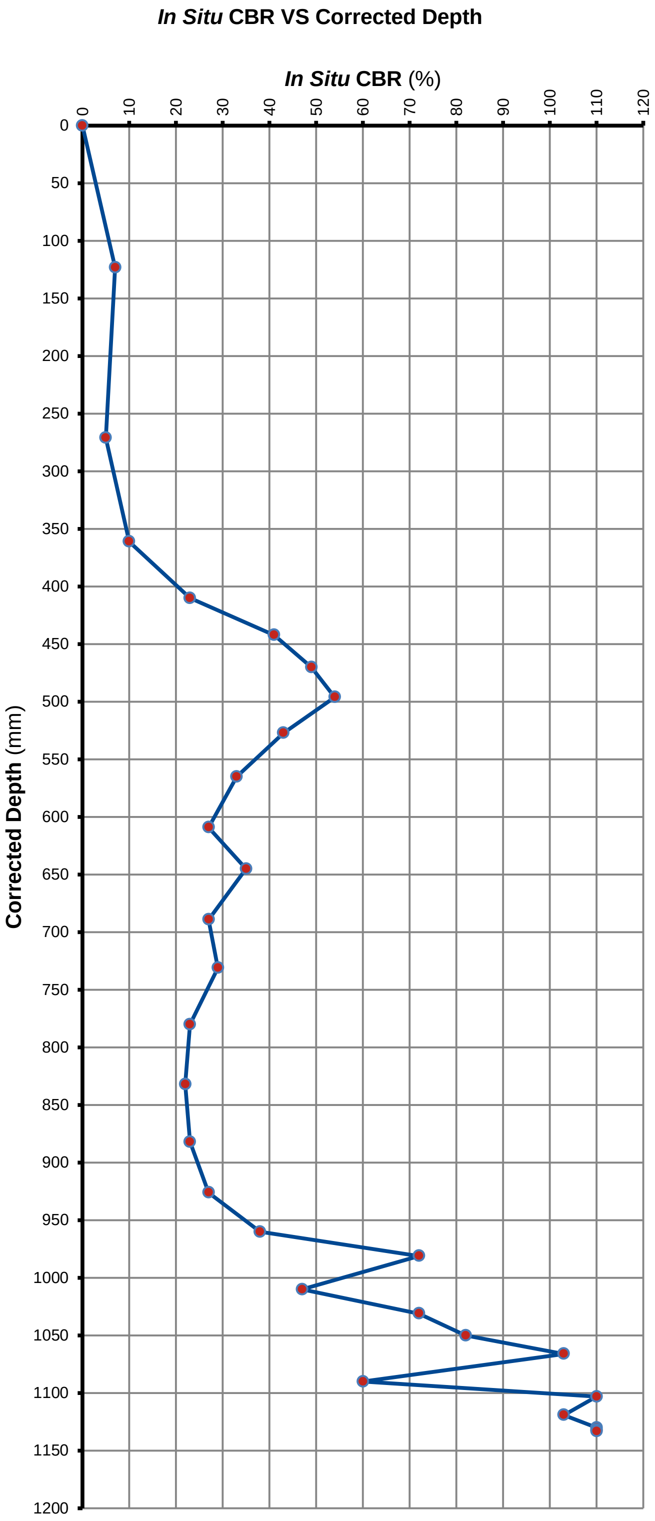
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 66 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


Estimated Bearing Ratio VS Corrected Depth


In Situ CBR VS Corrected Depth

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 67 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	10	0	-	-	-	-	-
5	100	90	90	18.0	Medium Dense	69	10
10	200	190	100	20.0	Medium Dense	64	9
15	275	265	75	15.0	Medium Dense	78	13
20	320	310	45	9.0	Dense	113	26
25	351	341	31	6.2	Dense	150	43
30	383	373	32	6.4	Dense	147	41
35	412	402	29	5.8	Dense	157	47
40	443	433	31	6.2	Dense	150	43
45	481	471	38	7.6	Dense	129	33
50	521	511	40	8.0	Dense	124	31
55	555	545	34	6.8	Dense	140	38
60	597	587	42	8.4	Dense	119	29
65	630	620	33	6.6	Dense	144	39
70	661	651	31	6.2	Dense	150	43
75	689	679	28	5.6	Dense	161	49
80	716	706	27	5.4	Dense	165	52
85	740	730	24	4.8	Very Dense	178	60
90	759	749	19	3.8	Very Dense	> 200	82
95	789	779	30	6.0	Dense	154	45
100	800	790	11	2.2	Very Dense	> 200	> 110
105	823	813	23	4.6	Very Dense	183	64
110	841	831	18	3.6	Very Dense	> 200	88
115	857	847	16	3.2	Very Dense	> 200	103
120	880	870	23	4.6	Very Dense	183	64
125	902	892	22	4.4	Very Dense	188	68
130	921	911	19	3.8	Very Dense	> 200	82
135	938	928	17	3.4	Very Dense	> 200	95
140	950	940	12	2.4	Very Dense	> 200	> 110
145	972	962	22	4.4	Very Dense	188	68
150	987	977	15	3.0	Very Dense	> 200	> 110
155	1005	995	18	3.6	Very Dense	> 200	88
160	1015	1005	10	2.0	Very Dense	> 200	> 110
165	1026	1016	11	2.2	Very Dense	> 200	> 110
170	1036	1026	10	2.0	Very Dense	> 200	> 110
175	1045	1035	9	1.8	Very Dense	> 200	> 110
180	1059	1049	14	2.8	Very Dense	> 200	> 110
185	1070	1060	11	2.2	Very Dense	> 200	> 110
190	1081	1071	11	2.2	Very Dense	> 200	> 110
195	1090	1080	9	1.8	Very Dense	> 200	> 110
200	1100	1090	10	2.0	Very Dense	> 200	> 110
205	1105	1095	5	1.0	Very Dense	> 200	> 110
210	1106	1096	1	0.2	Very Dense	> 200	> 110
215	1107	1097	1	0.2	Very Dense	> 200	> 110
220	Refusal						

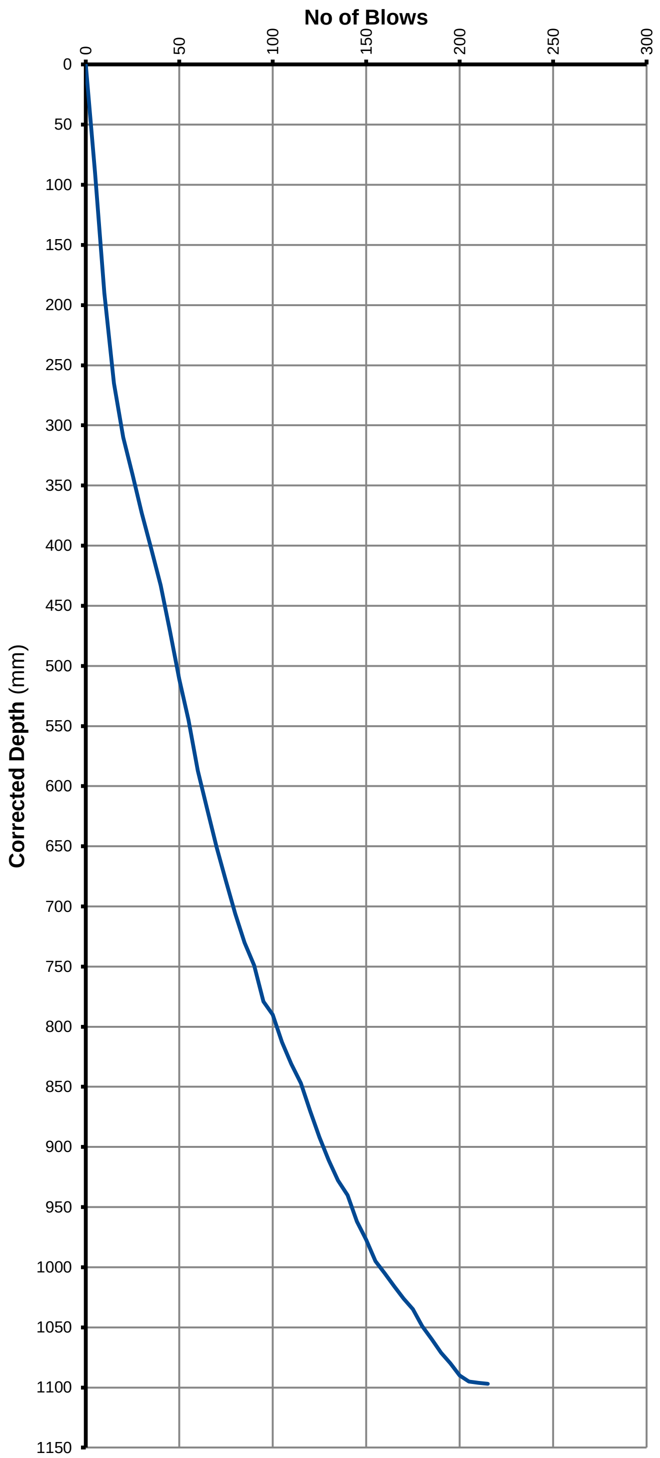
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

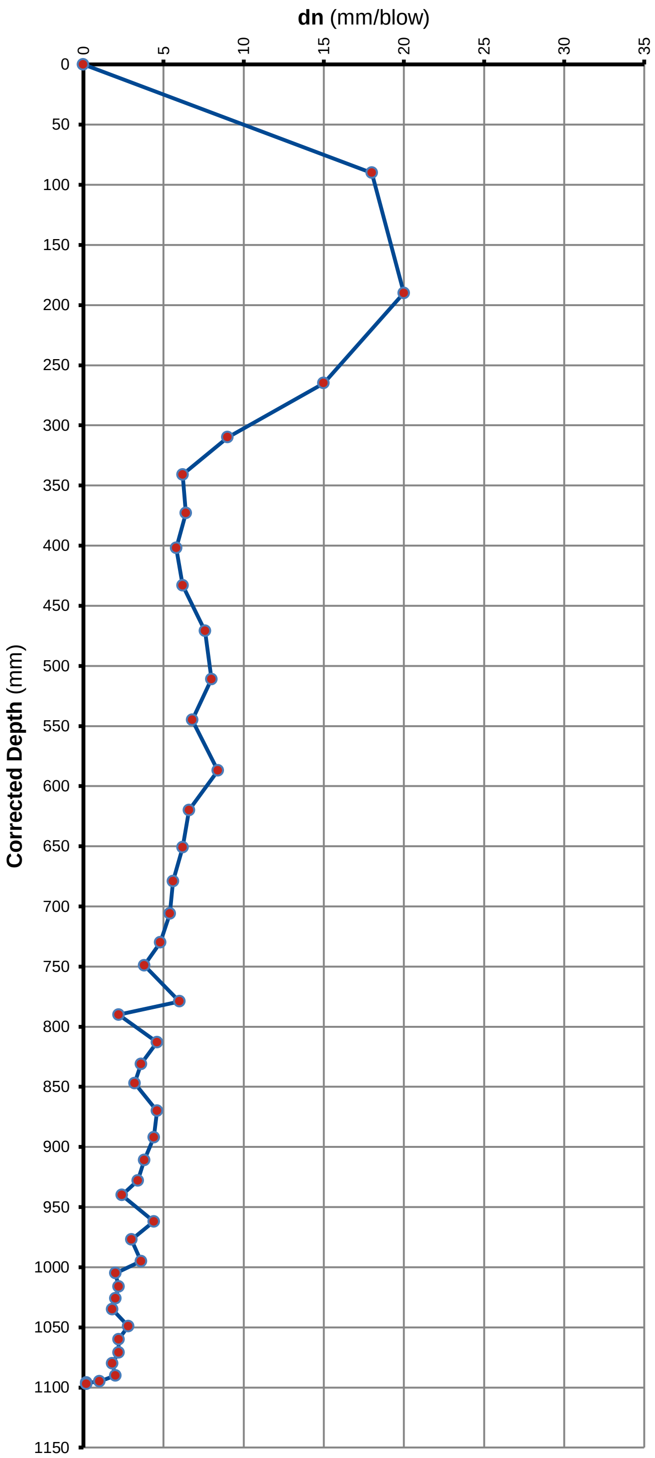
POSITION: DCP 67 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



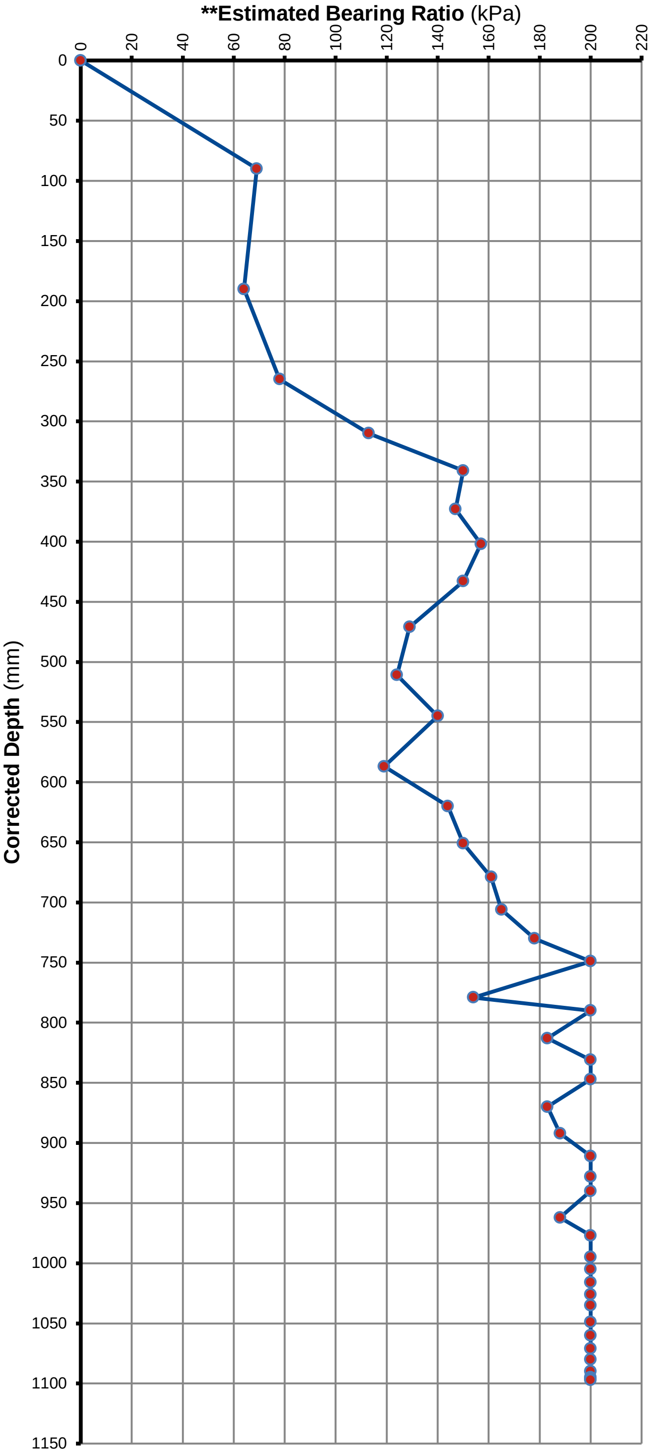
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

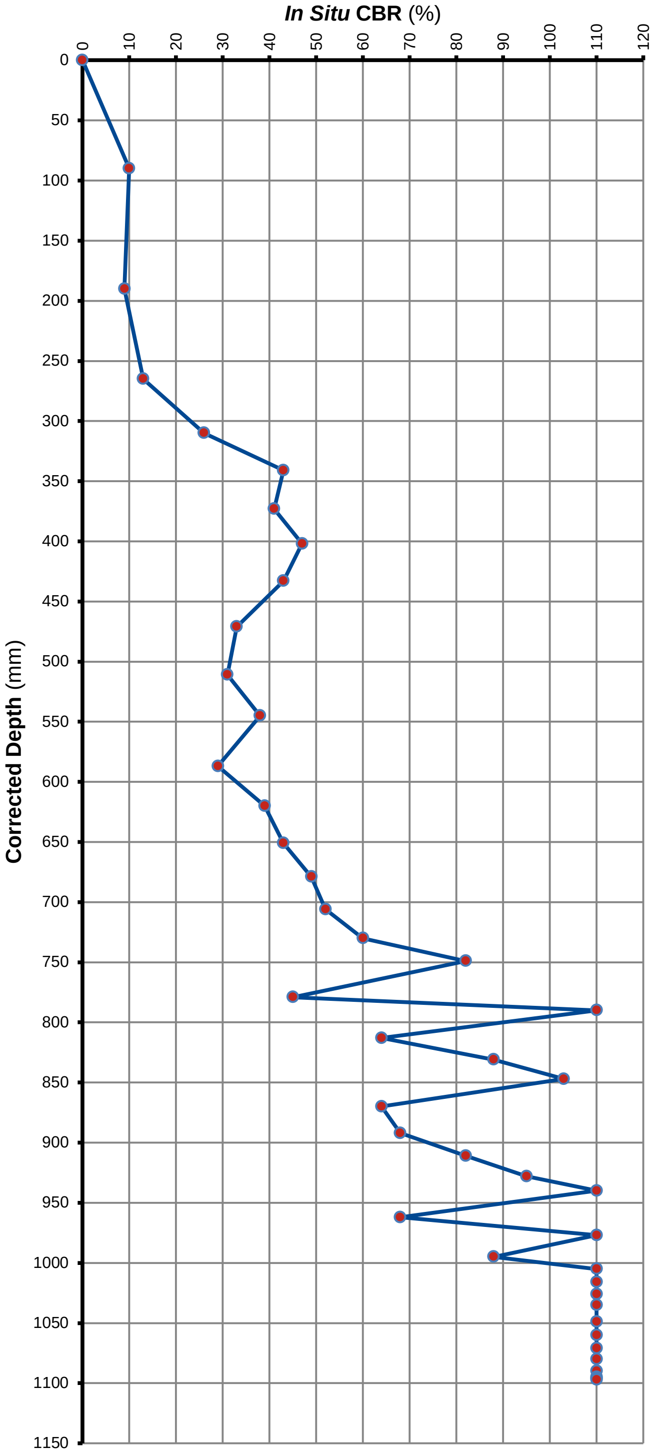
POSITION: DCP 67 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 68 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

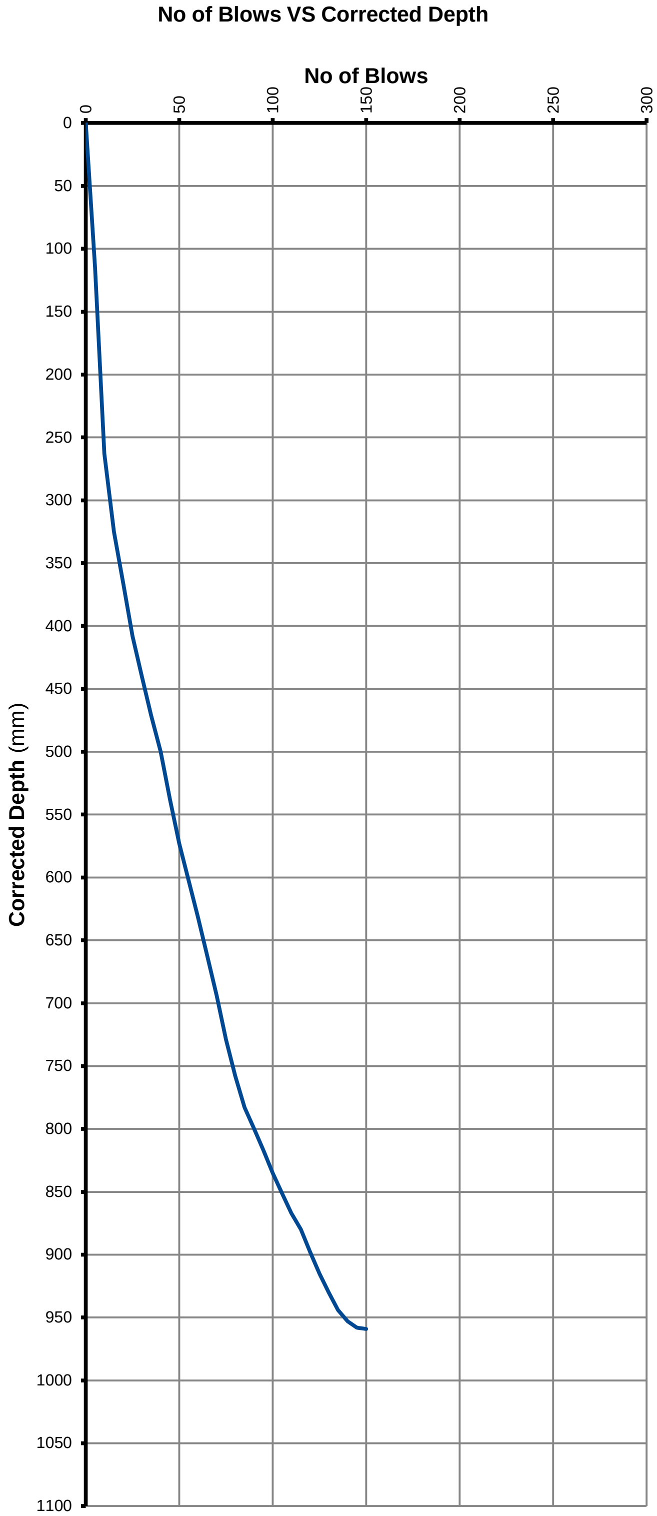
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	10	0	-	-	-	-	-
5	125	115	115	23.0	Medium Dense	57	7
10	273	263	148	29.6	Medium Dense	46	5
15	335	325	62	12.4	Dense	89	17
20	376	366	41	8.2	Dense	122	30
25	418	408	42	8.4	Dense	119	29
30	450	440	32	6.4	Dense	147	41
35	481	471	31	6.2	Dense	150	43
40	510	500	29	5.8	Dense	157	47
45	548	538	38	7.6	Dense	129	33
50	583	573	35	7.0	Dense	137	36
55	612	602	29	5.8	Dense	157	47
60	641	631	29	5.8	Dense	157	47
65	673	663	32	6.4	Dense	147	41
70	704	694	31	6.2	Dense	150	43
75	739	729	35	7.0	Dense	137	36
80	768	758	29	5.8	Dense	157	47
85	793	783	25	5.0	Very Dense	174	57
90	810	800	17	3.4	Very Dense	> 200	95
95	827	817	17	3.4	Very Dense	> 200	95
100	845	835	18	3.6	Very Dense	> 200	88
105	861	851	16	3.2	Very Dense	> 200	103
110	877	867	16	3.2	Very Dense	> 200	103
115	890	880	13	2.6	Very Dense	> 200	> 110
120	908	898	18	3.6	Very Dense	> 200	88
125	925	915	17	3.4	Very Dense	> 200	95
130	940	930	15	3.0	Very Dense	> 200	> 110
135	954	944	14	2.8	Very Dense	> 200	> 110
140	963	953	9	1.8	Very Dense	> 200	> 110
145	968	958	5	1.0	Very Dense	> 200	> 110
150	969	959	1	0.2	Very Dense	> 200	> 110
155	Refusal						

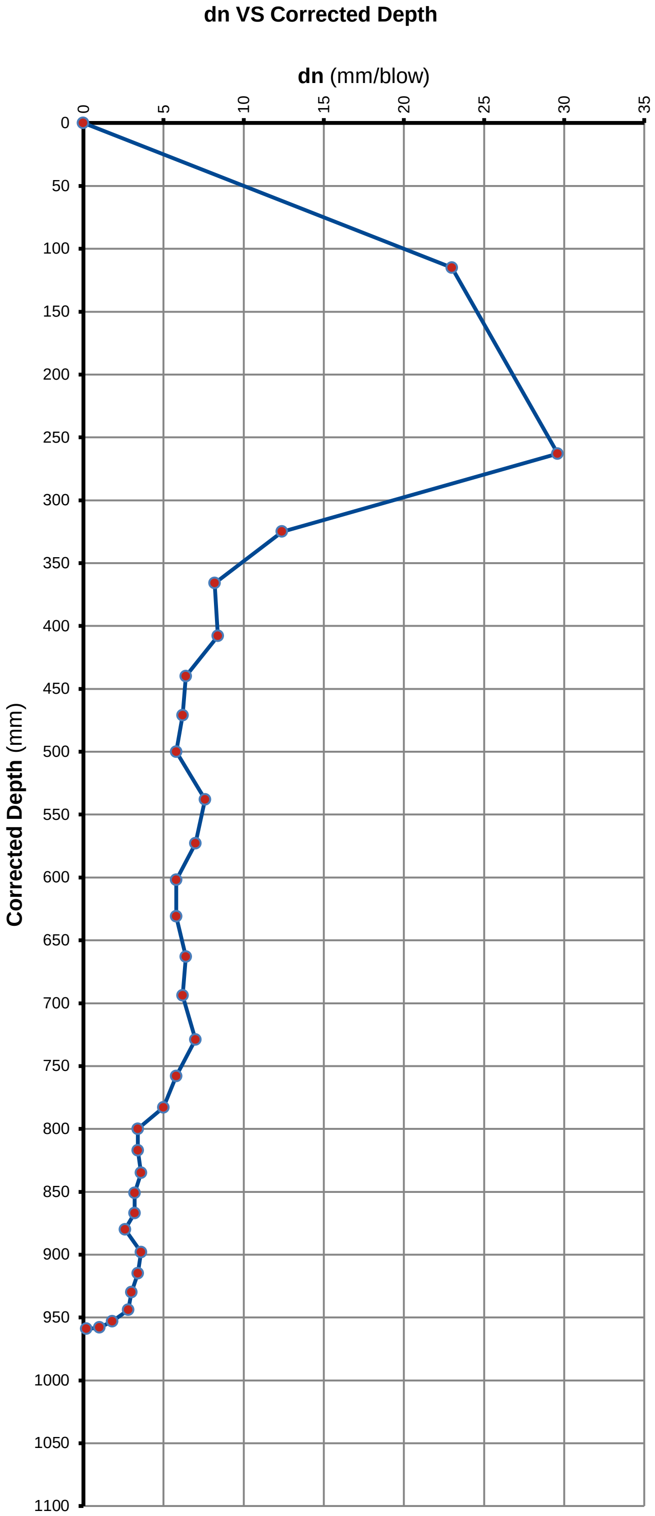
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 68 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





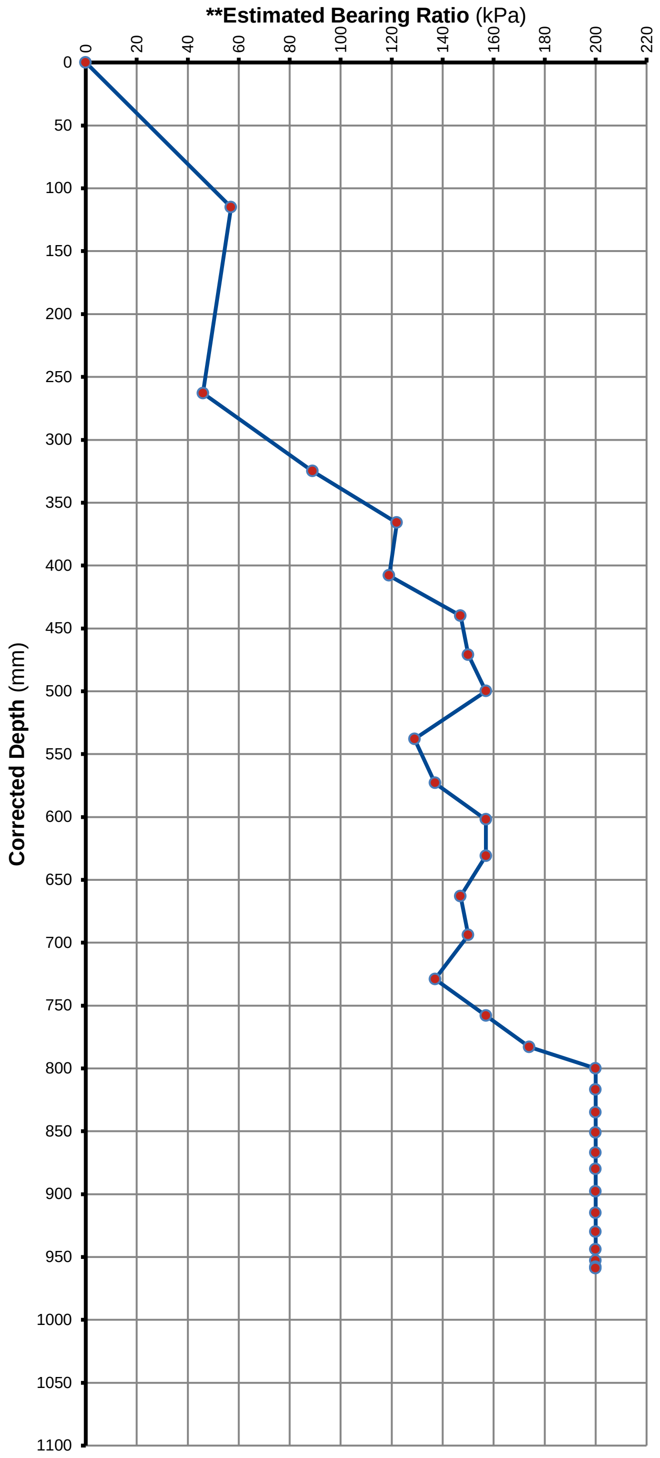
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

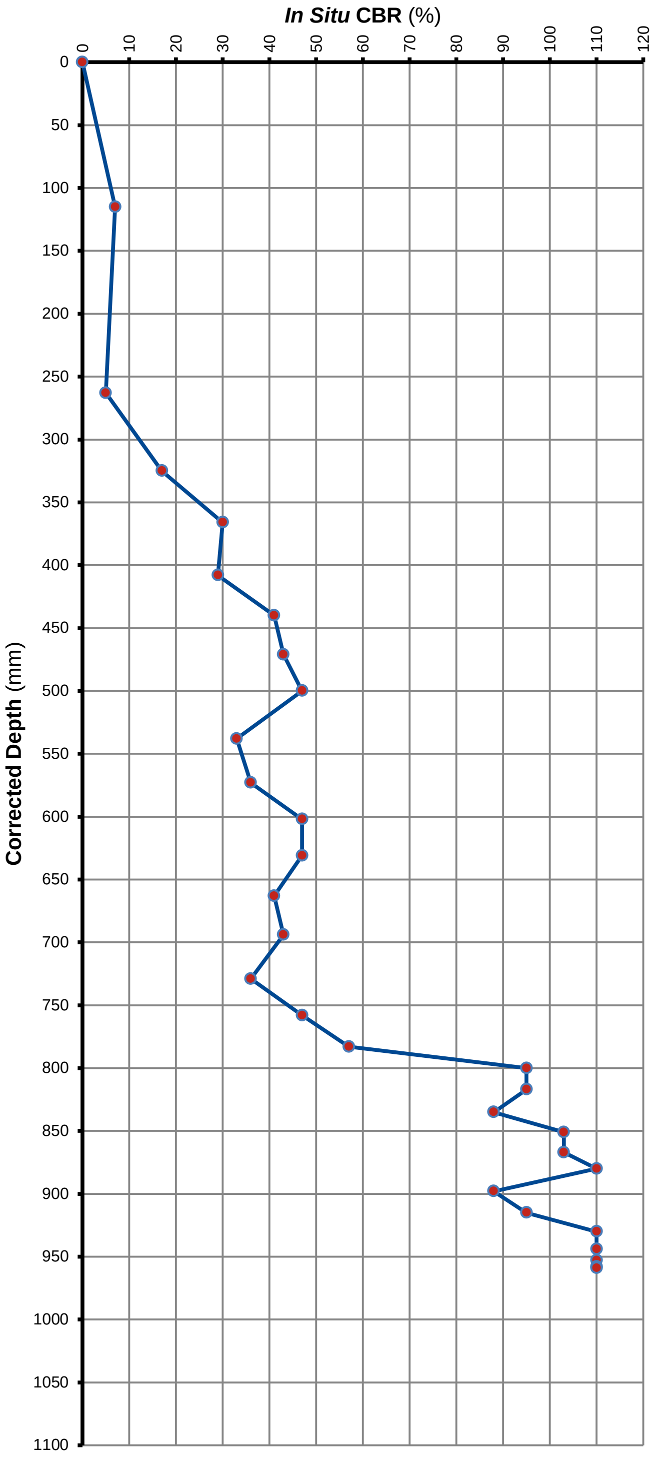
POSITION: DCP 68 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 69 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

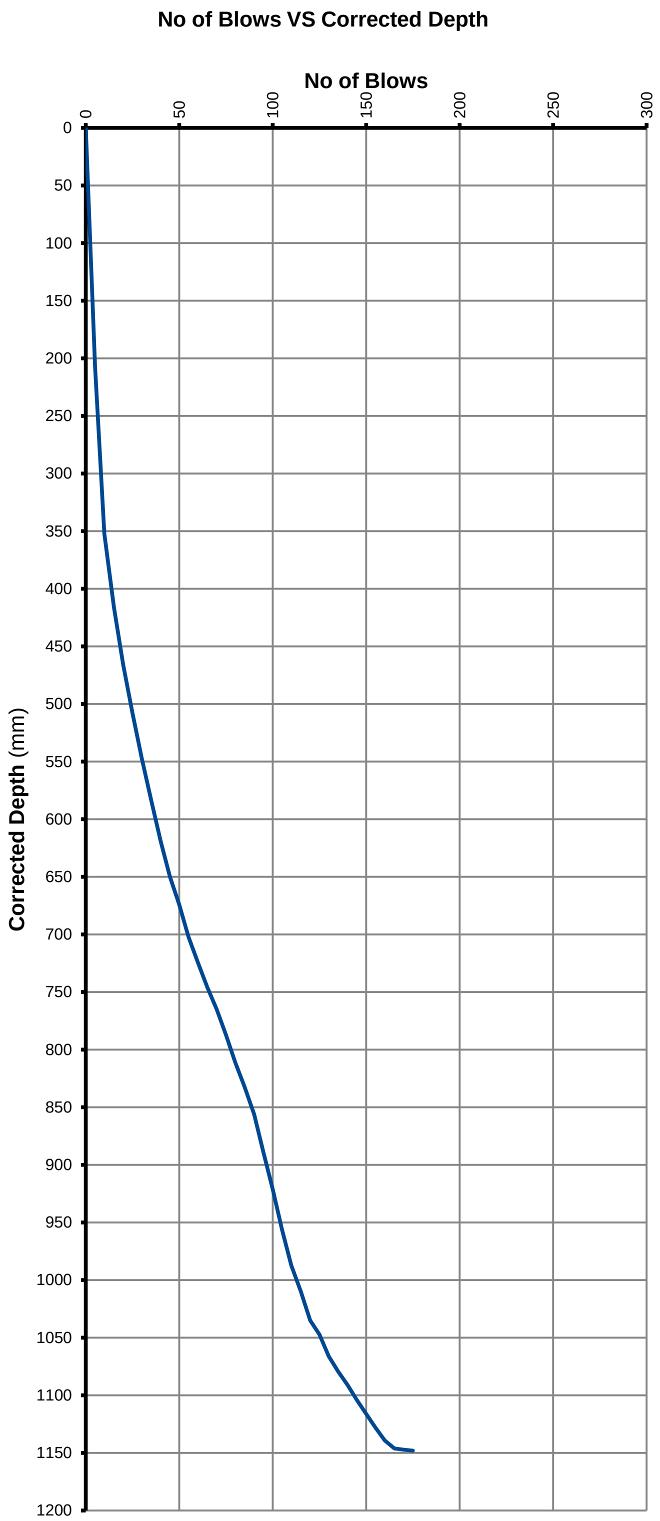
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	24	0	-	-	-	-	-
5	231	207	207	41.4	Loose	40	3
10	376	352	145	29.0	Medium Dense	47	5
15	440	416	64	12.8	Medium Dense	87	16
20	490	466	50	10.0	Dense	104	23
25	532	508	42	8.4	Dense	119	29
30	571	547	39	7.8	Dense	126	32
35	607	583	36	7.2	Dense	134	35
40	643	619	36	7.2	Dense	134	35
45	674	650	31	6.2	Dense	150	43
50	698	674	24	4.8	Very Dense	178	60
55	726	702	28	5.6	Dense	161	49
60	748	724	22	4.4	Very Dense	188	68
65	770	746	22	4.4	Very Dense	188	68
70	789	765	19	3.8	Very Dense	> 200	82
75	811	787	22	4.4	Very Dense	188	68
80	835	811	24	4.8	Very Dense	178	60
85	856	832	21	4.2	Very Dense	193	72
90	880	856	24	4.8	Very Dense	178	60
95	913	889	33	6.6	Dense	144	39
100	945	921	32	6.4	Dense	147	41
105	980	956	35	7.0	Dense	137	36
110	1011	987	31	6.2	Dense	150	43
115	1034	1010	23	4.6	Very Dense	183	64
120	1059	1035	25	5.0	Very Dense	174	57
125	1071	1047	12	2.4	Very Dense	> 200	> 110
130	1090	1066	19	3.8	Very Dense	> 200	82
135	1103	1079	13	2.6	Very Dense	> 200	> 110
140	1115	1091	12	2.4	Very Dense	> 200	> 110
145	1128	1104	13	2.6	Very Dense	> 200	> 110
150	1140	1116	12	2.4	Very Dense	> 200	> 110
155	1152	1128	12	2.4	Very Dense	> 200	> 110
160	1163	1139	11	2.2	Very Dense	> 200	> 110
165	1170	1146	7	1.4	Very Dense	> 200	> 110
170	1171	1147	1	0.2	Very Dense	> 200	> 110
175	1172	1148	1	0.2	Very Dense	> 200	> 110
180	Refusal						

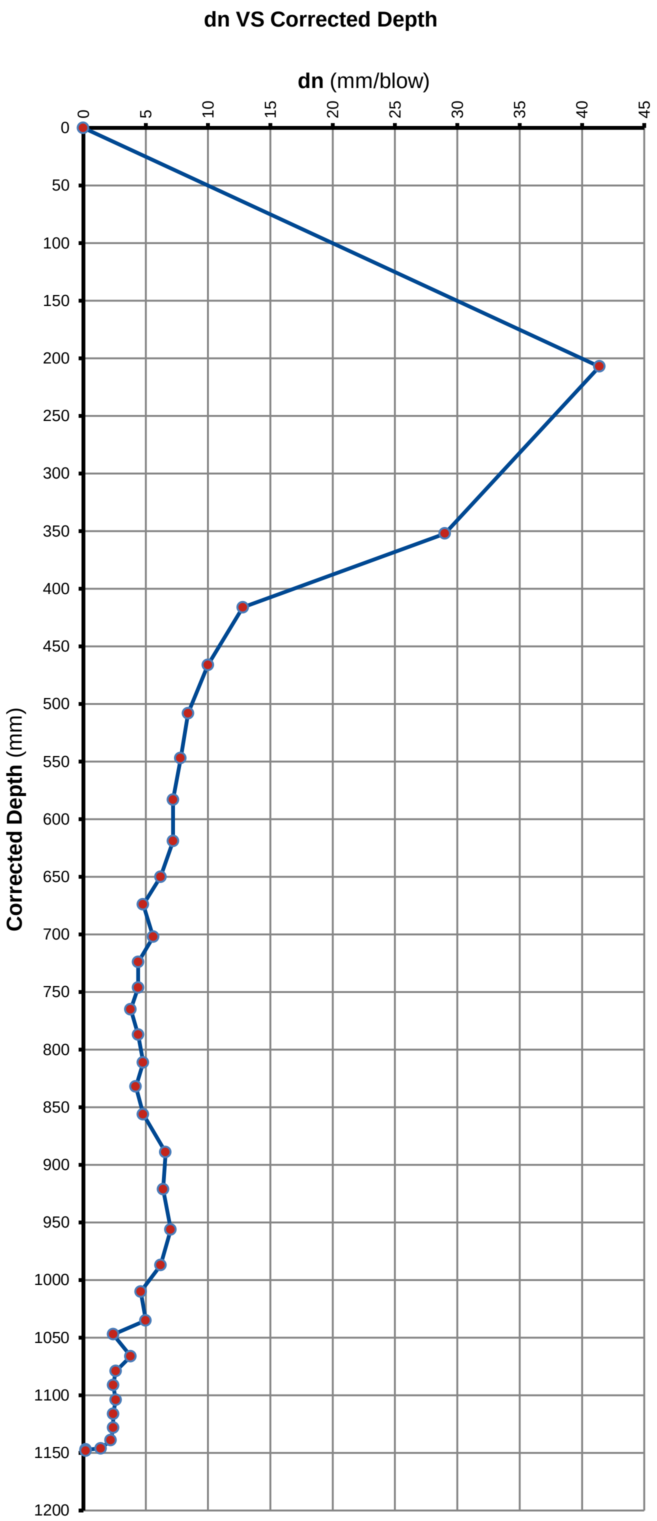
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 69 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





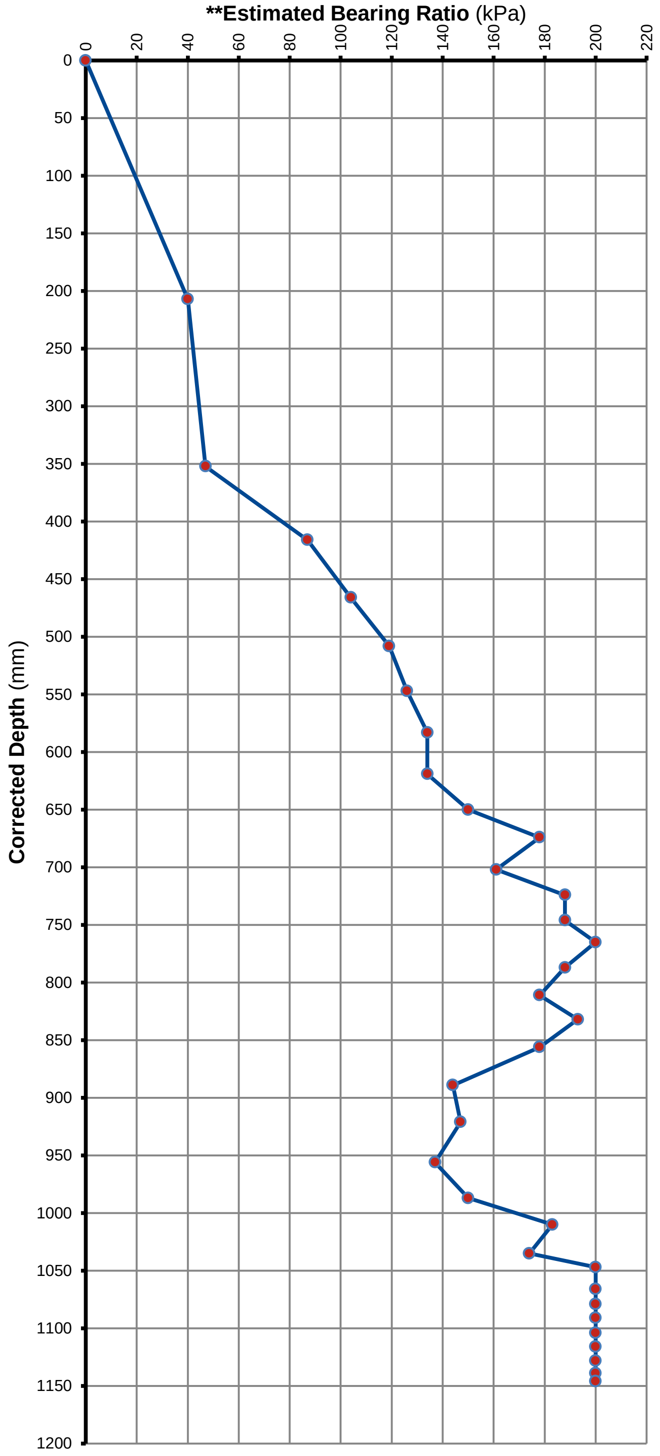
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

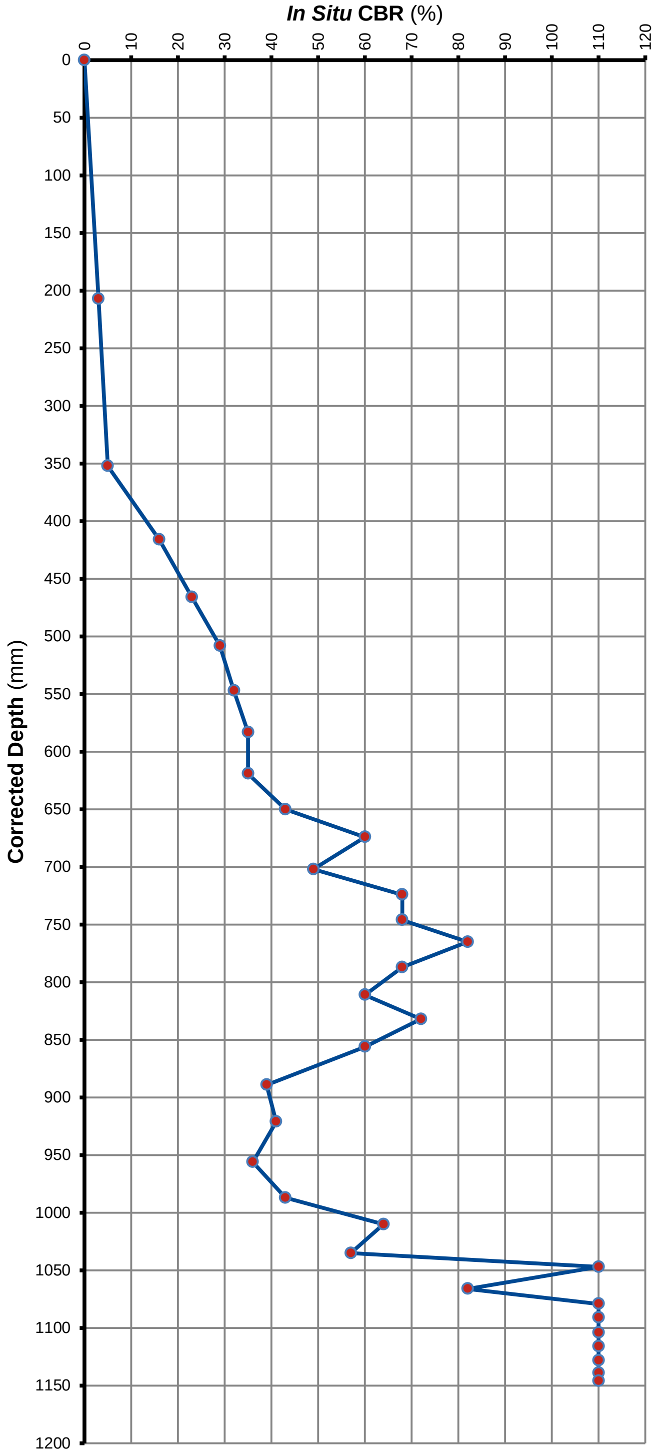
POSITION: DCP 69 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 70 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	31	0	-	-	-	-	-
5	120	89	89	17.8	Medium Dense	70	11
10	220	189	100	20.0	Medium Dense	64	9
15	286	255	66	13.2	Medium Dense	85	16
20	341	310	55	11.0	Dense	97	20
25	385	354	44	8.8	Dense	115	27
30	417	386	32	6.4	Dense	147	41
35	445	414	28	5.6	Dense	161	49
40	471	440	26	5.2	Dense	169	54
45	498	467	27	5.4	Dense	165	52
50	525	494	27	5.4	Dense	165	52
55	555	524	30	6.0	Dense	154	45
60	583	552	28	5.6	Dense	161	49
65	610	579	27	5.4	Dense	165	52
70	641	610	31	6.2	Dense	150	43
75	667	636	26	5.2	Dense	169	54
80	692	661	25	5.0	Very Dense	174	57
85	721	690	29	5.8	Dense	157	47
90	750	719	29	5.8	Dense	157	47
95	776	745	26	5.2	Dense	169	54
100	803	772	27	5.4	Dense	165	52
105	830	799	27	5.4	Dense	165	52
110	859	828	29	5.8	Dense	157	47
115	887	856	28	5.6	Dense	161	49
120	911	880	24	4.8	Very Dense	178	60
125	935	904	24	4.8	Very Dense	178	60
130	964	933	29	5.8	Dense	157	47
135	992	961	28	5.6	Dense	161	49
140	1014	983	22	4.4	Very Dense	188	68
145	1043	1012	29	5.8	Dense	157	47
150	1074	1043	31	6.2	Dense	150	43
155	1102	1071	28	5.6	Dense	161	49
160	1134	1103	32	6.4	Dense	147	41
165	1155	1124	21	4.2	Very Dense	193	72
170	1170	1139	15	3.0	Very Dense	> 200	> 110
175	1192	1161	22	4.4	Very Dense	188	68
180	1220	1189	28	5.6	Dense	161	49
185	1229	1198	9	1.8	Very Dense	> 200	> 110
190	1243	1212	14	2.8	Very Dense	> 200	> 110
195	1256	1225	13	2.6	Very Dense	> 200	> 110
200	1278	1247	22	4.4	Very Dense	188	68
205	1289	1258	11	2.2	Very Dense	> 200	> 110
210	1300	1269	11	2.2	Very Dense	> 200	> 110
215	1311	1280	11	2.2	Very Dense	> 200	> 110
220	1321	1290	10	2.0	Very Dense	> 200	> 110
225	1329	1298	8	1.6	Very Dense	> 200	> 110
230	1339	1308	10	2.0	Very Dense	> 200	> 110
235	1341	1310	2	0.4	Very Dense	> 200	> 110
240	1353	1322	12	2.4	Very Dense	> 200	> 110
245	1361	1330	8	1.6	Very Dense	> 200	> 110
250	1371	1340	10	2.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 70 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

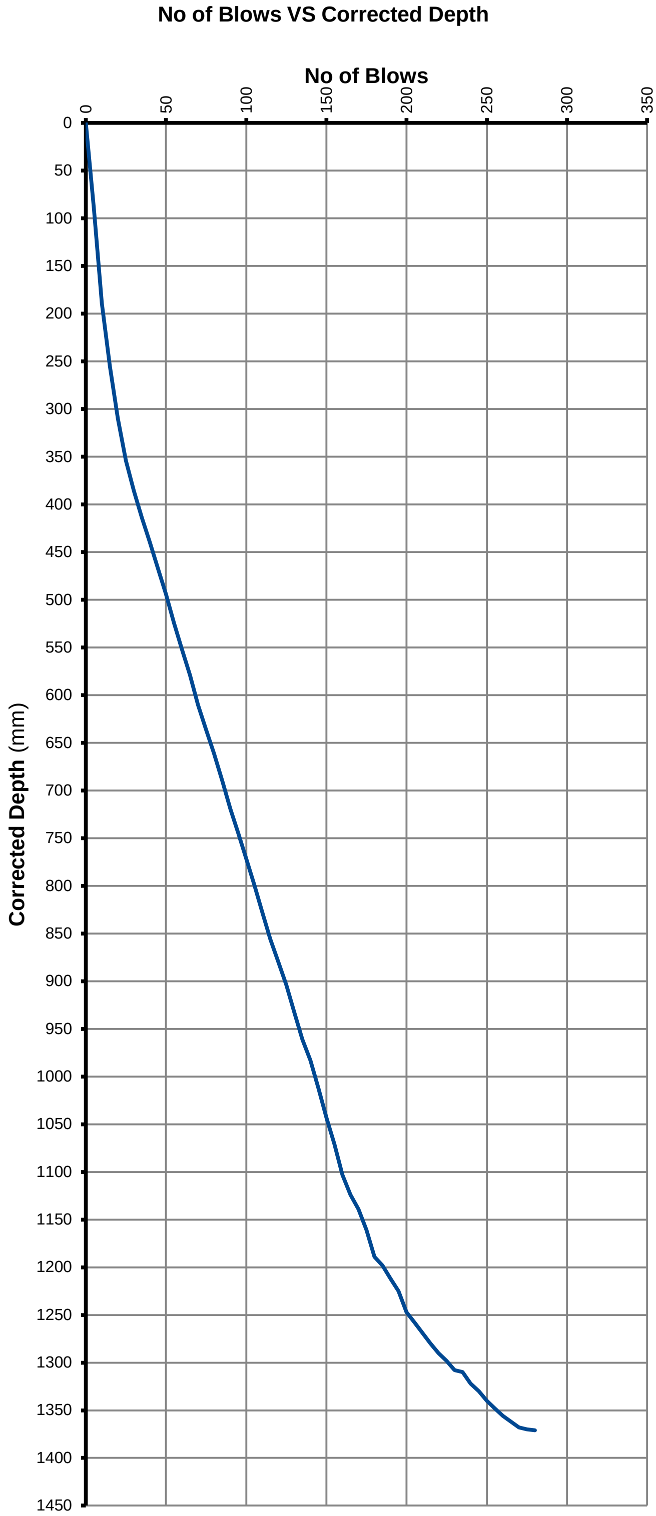
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
255	1379	1348	8	1.6	Very Dense	> 200	> 110
260	1387	1356	8	1.6	Very Dense	> 200	> 110
265	1393	1362	6	1.2	Very Dense	> 200	> 110
270	1399	1368	6	1.2	Very Dense	> 200	> 110
275	1401	1370	2	0.4	Very Dense	> 200	> 110
280	1402	1371	1	0.2	Very Dense	> 200	> 110
285	Refusal						

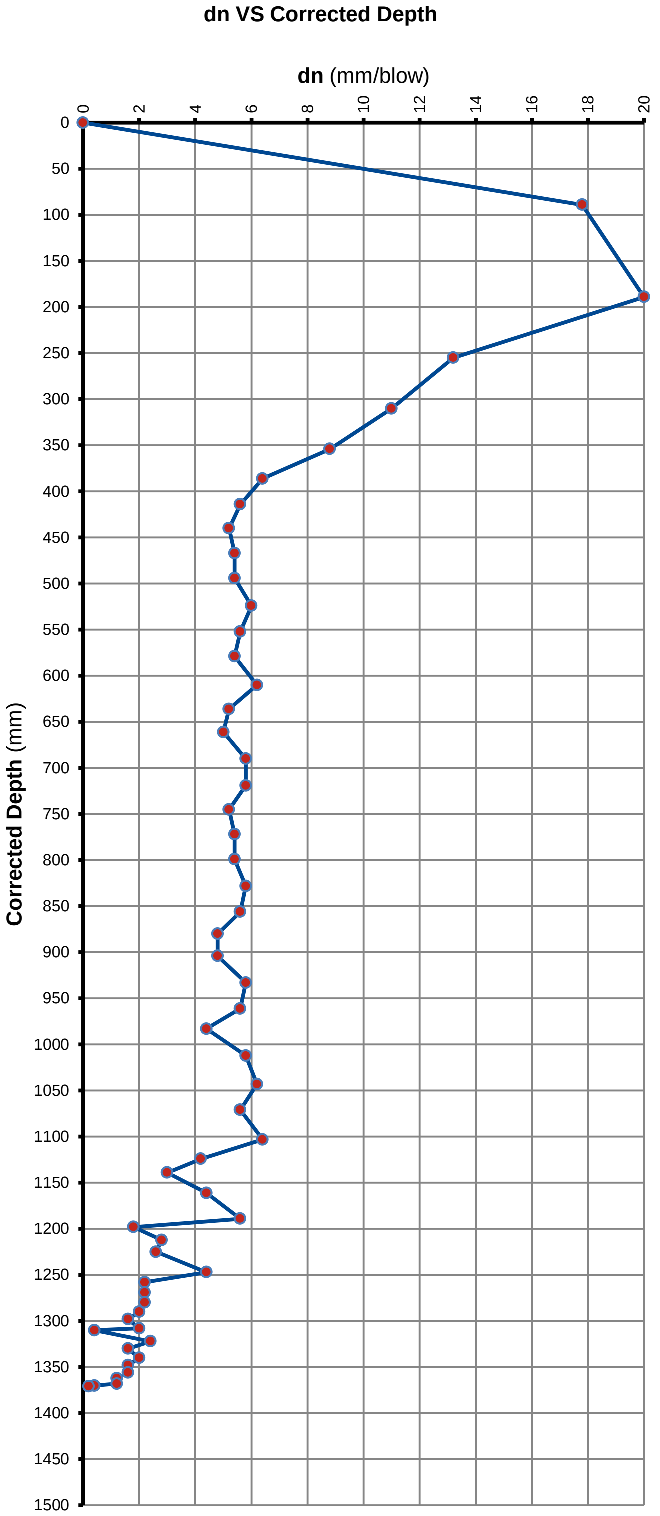
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 70 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth

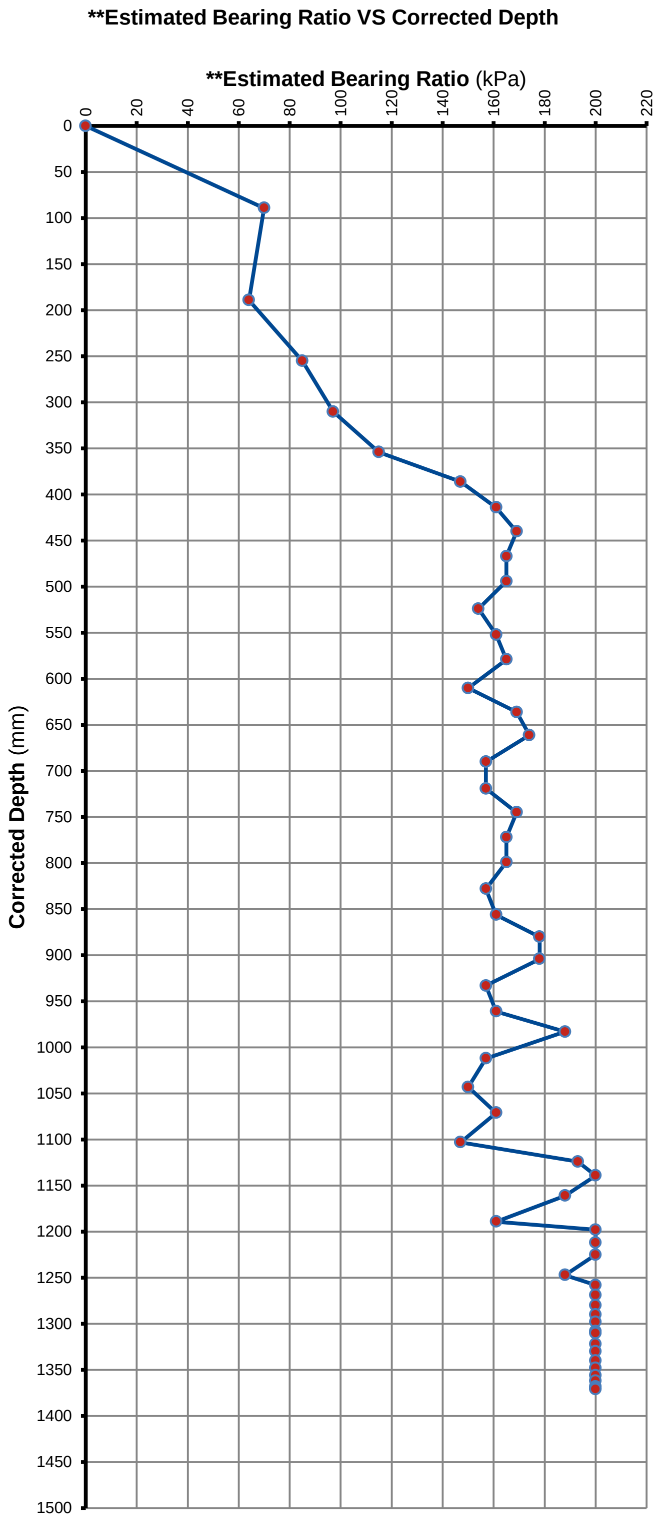

dn VS Corrected Depth

** According to Dr B van Wyk's Method

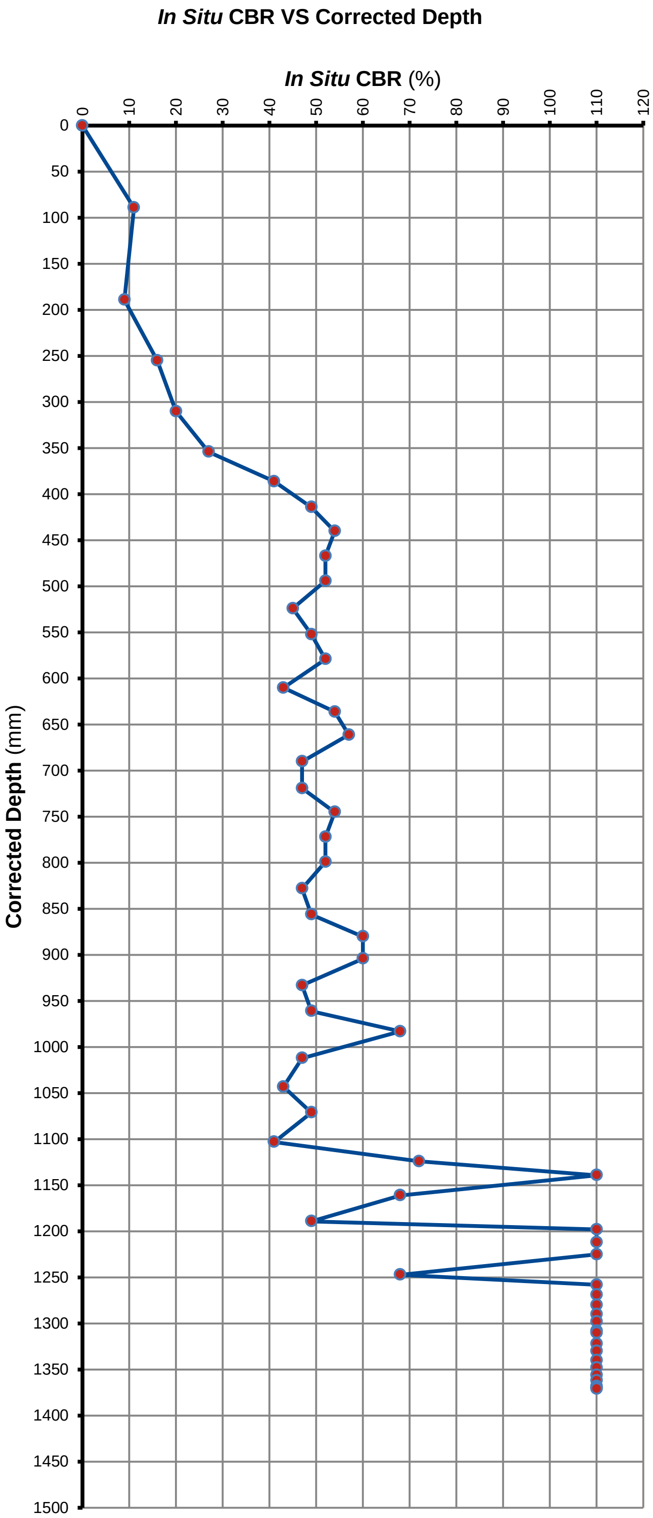
*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 70 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)



****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 71 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	10	0	-	-	-	-	-
5	140	130	130	26.0	Medium Dense	52	6
10	198	188	58	11.6	Dense	93	19
15	246	236	48	9.6	Dense	107	24
20	290	280	44	8.8	Dense	115	27
25	331	321	41	8.2	Dense	122	30
30	369	359	38	7.6	Dense	129	33
35	402	392	33	6.6	Dense	144	39
40	432	422	30	6.0	Dense	154	45
45	460	450	28	5.6	Dense	161	49
50	478	468	18	3.6	Very Dense	> 200	88
55	495	485	17	3.4	Very Dense	> 200	95
60	515	505	20	4.0	Very Dense	200	77
65	529	519	14	2.8	Very Dense	> 200	> 110
70	541	531	12	2.4	Very Dense	> 200	> 110
75	555	545	14	2.8	Very Dense	> 200	> 110
80	570	560	15	3.0	Very Dense	> 200	> 110
85	583	573	13	2.6	Very Dense	> 200	> 110
90	596	586	13	2.6	Very Dense	> 200	> 110
95	604	594	8	1.6	Very Dense	> 200	> 110
100	609	599	5	1.0	Very Dense	> 200	> 110
105	612	602	3	0.6	Very Dense	> 200	> 110
110	613	603	1	0.2	Very Dense	> 200	> 110
115	Refusal						

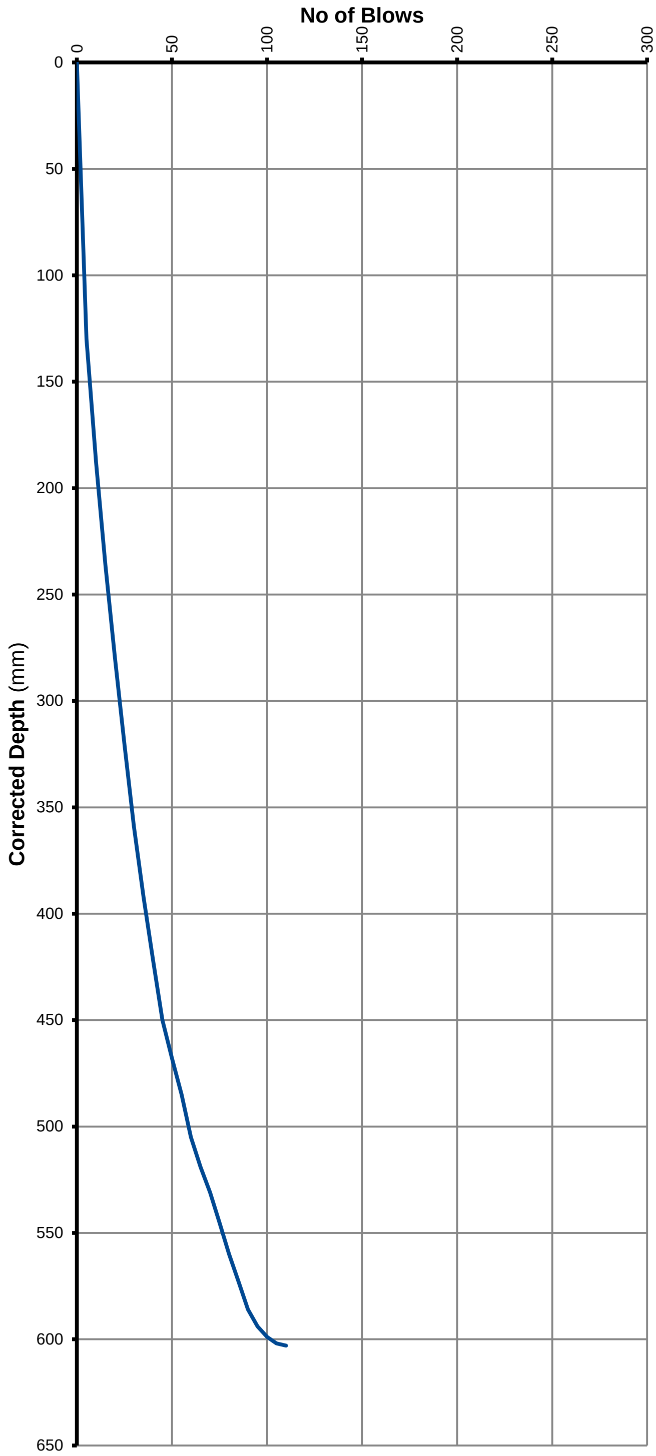
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

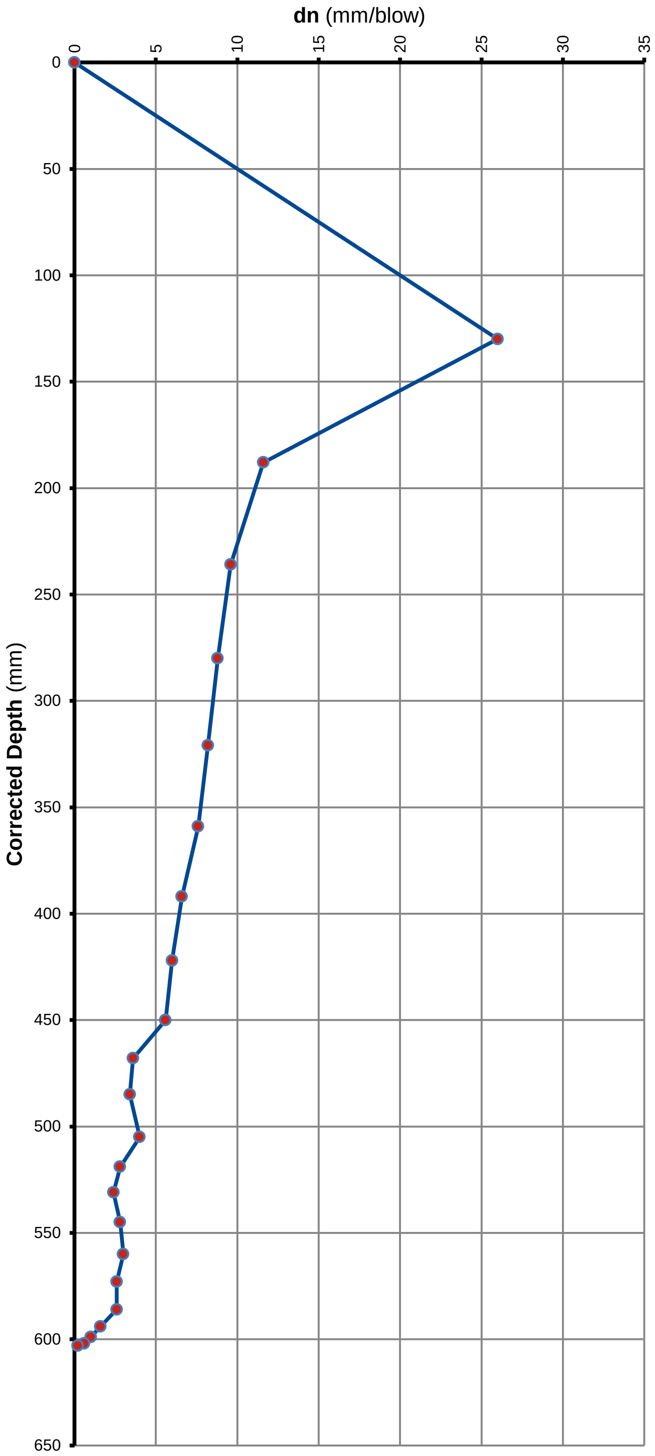
POSITION: DCP 71 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



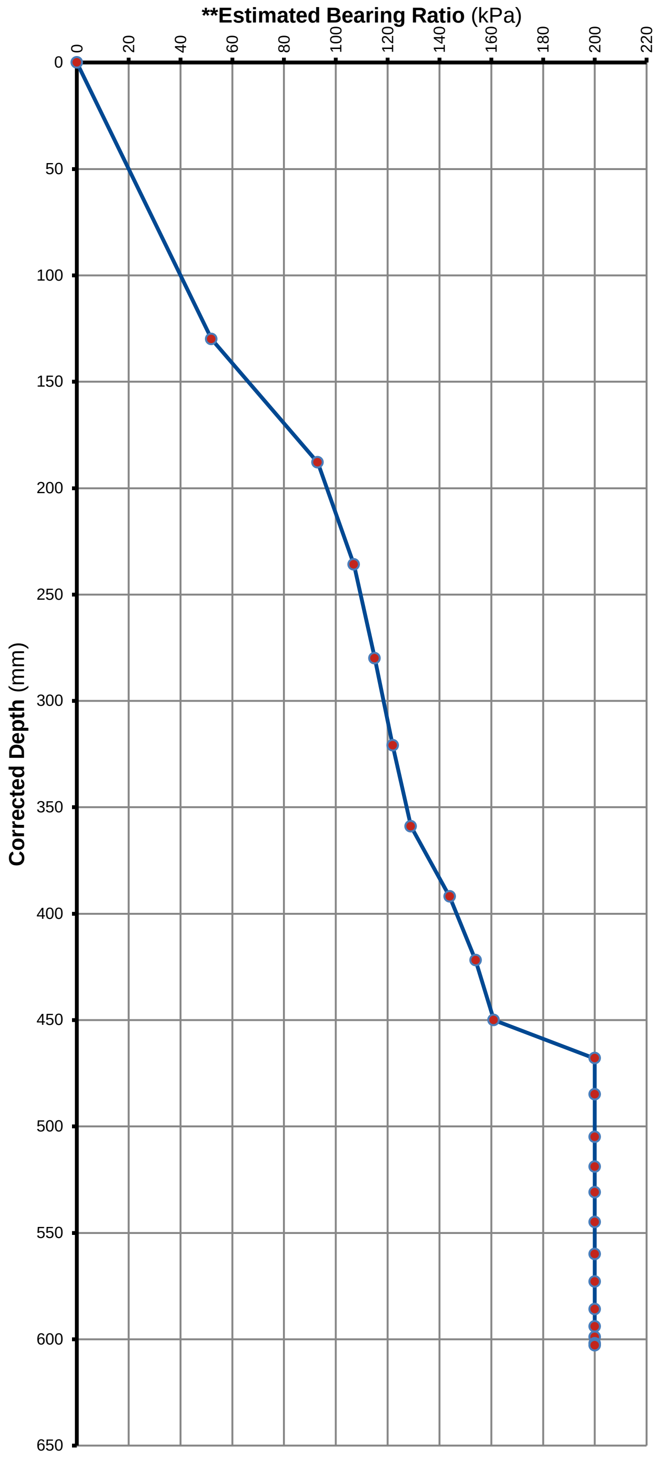
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

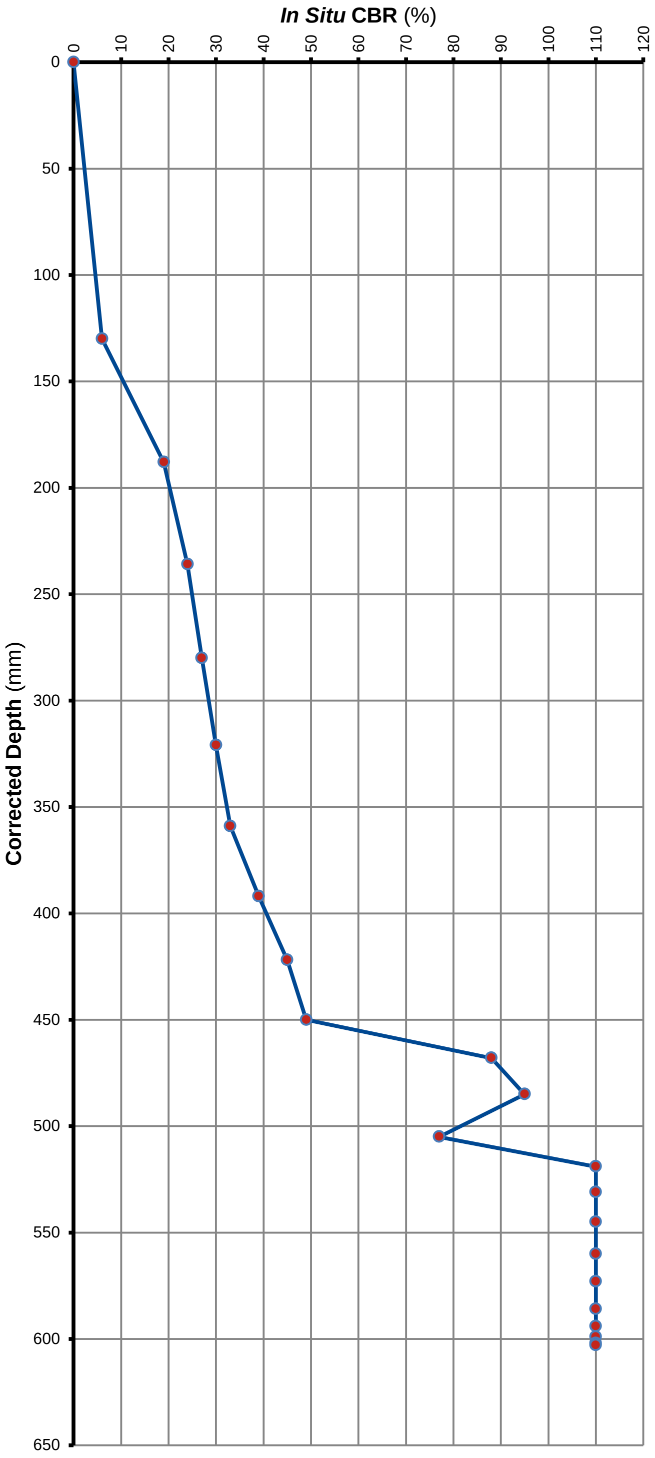
POSITION: DCP 71 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 72 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	20	0	-	-	-	-	-
5	150	130	130	26.0	Medium Dense	52	6
10	357	337	207	41.4	Loose	40	3
15	540	520	183	36.6	Loose	41	4
20	591	571	51	10.2	Dense	102	22
25	635	615	44	8.8	Dense	115	27
30	676	656	41	8.2	Dense	122	30
35	710	690	34	6.8	Dense	140	38
40	739	719	29	5.8	Dense	157	47
45	765	745	26	5.2	Dense	169	54
50	780	760	15	3.0	Very Dense	> 200	> 110
55	800	780	20	4.0	Very Dense	200	77
60	813	793	13	2.6	Very Dense	> 200	> 110
65	822	802	9	1.8	Very Dense	> 200	> 110
70	831	811	9	1.8	Very Dense	> 200	> 110
75	845	825	14	2.8	Very Dense	> 200	> 110
80	856	836	11	2.2	Very Dense	> 200	> 110
85	866	846	10	2.0	Very Dense	> 200	> 110
90	871	851	5	1.0	Very Dense	> 200	> 110
95	873	853	2	0.4	Very Dense	> 200	> 110
100	875	855	2	0.4	Very Dense	> 200	> 110
105	Refusal						

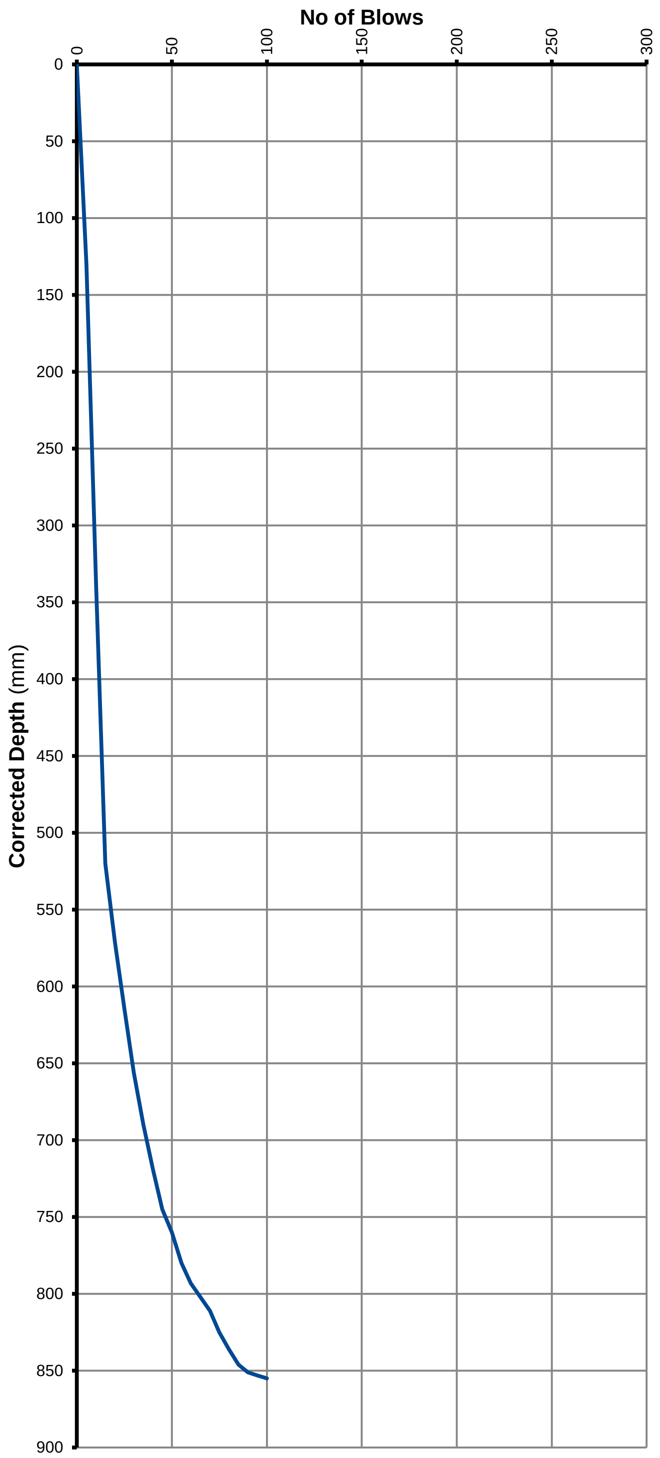
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

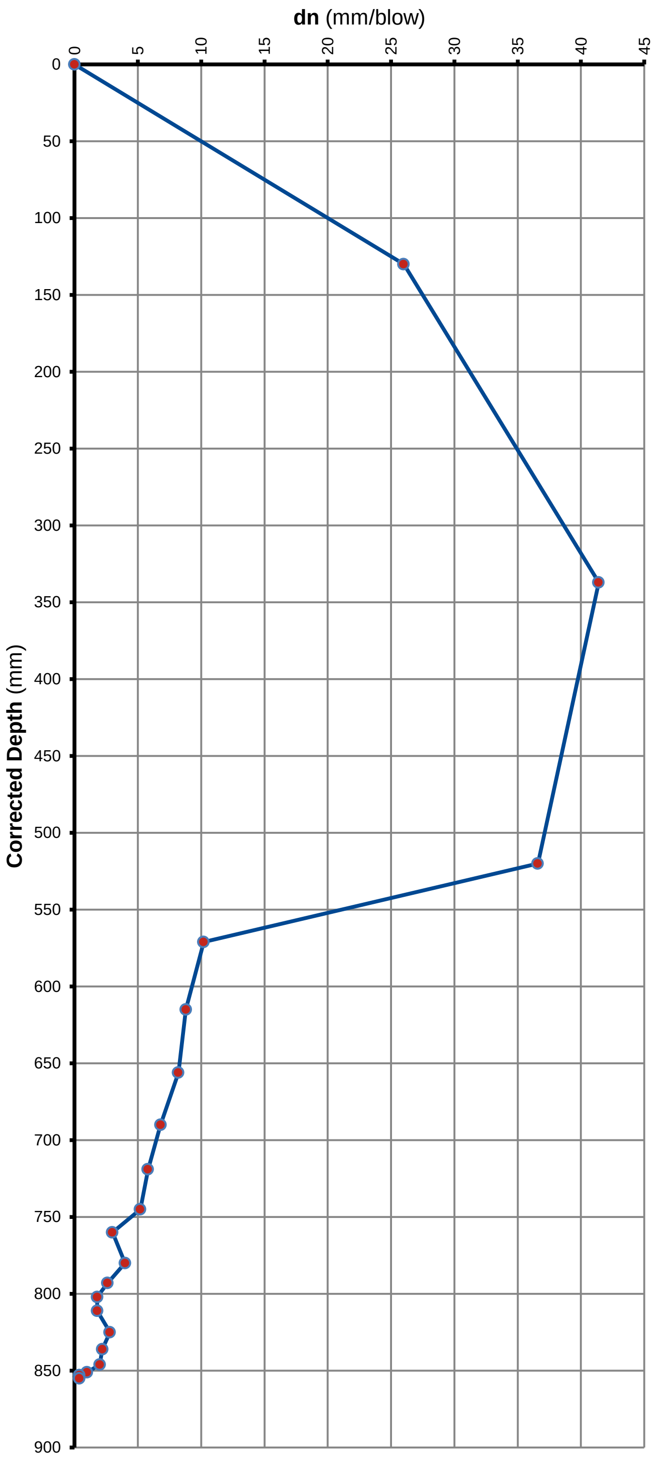
POSITION: DCP 72 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



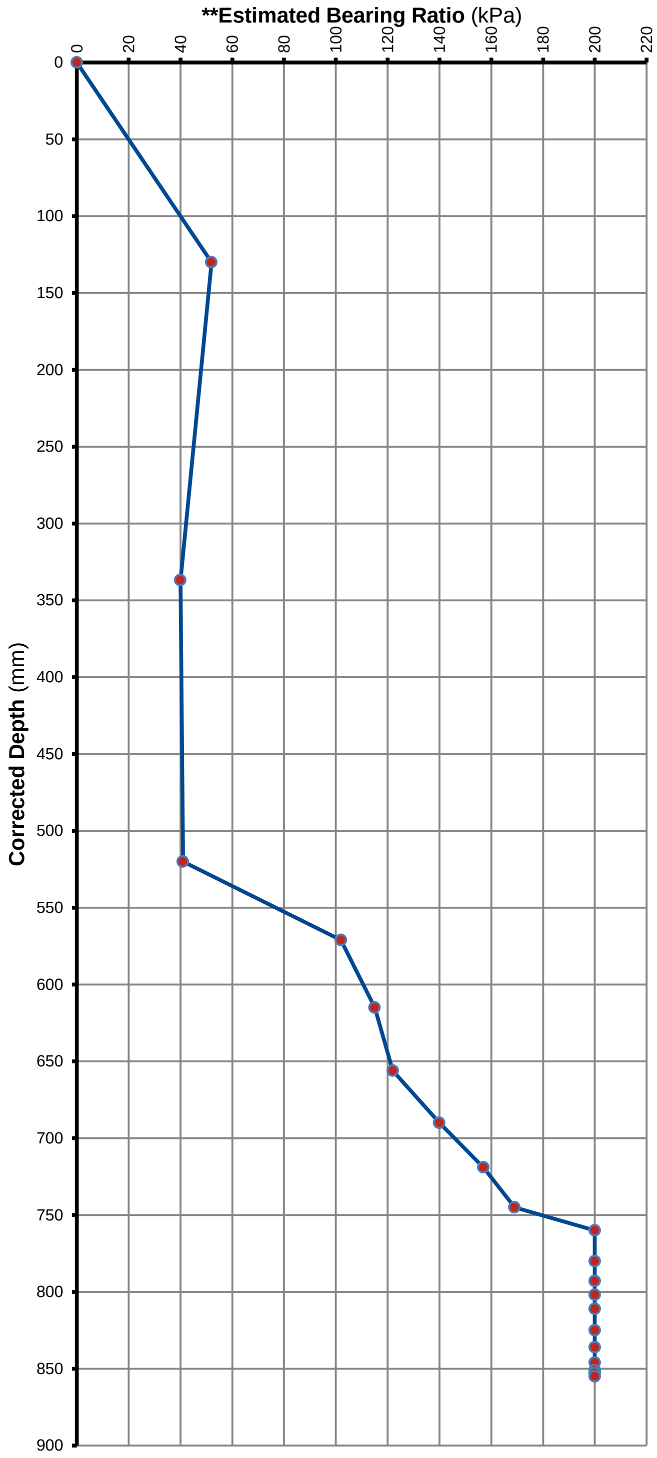
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

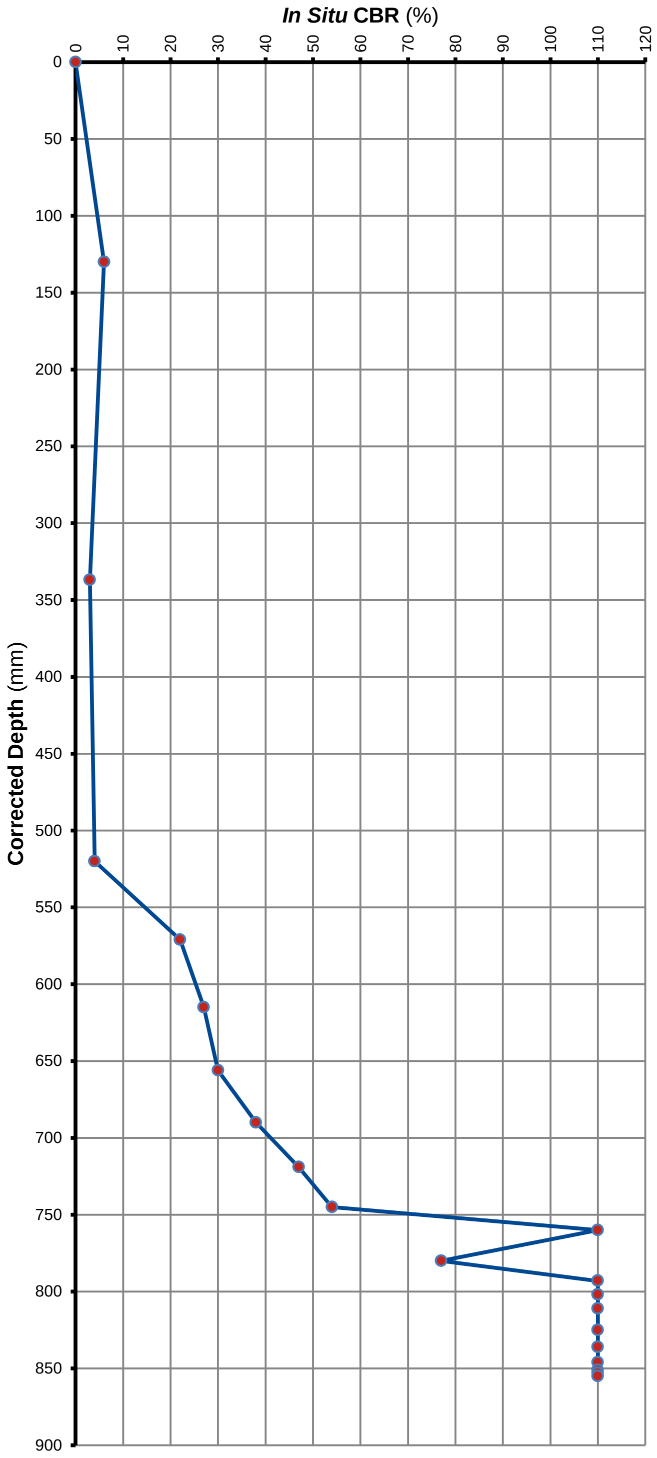
POSITION: DCP 72 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

**Estimated Bearing Ratio VS Corrected Depth



In Situ CBR VS Corrected Depth



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 73 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	15	0	-	-	-	-	-
5	146	131	131	26.2	Medium Dense	51	6
10	290	275	144	28.8	Medium Dense	47	6
15	346	331	56	11.2	Dense	95	20
20	379	364	33	6.6	Dense	144	39
25	400	385	21	4.2	Very Dense	193	72
30	425	410	25	5.0	Very Dense	174	57
35	448	433	23	4.6	Very Dense	183	64
40	470	455	22	4.4	Very Dense	188	68
45	498	483	28	5.6	Dense	161	49
50	525	510	27	5.4	Dense	165	52
55	555	540	30	6.0	Dense	154	45
60	578	563	23	4.6	Very Dense	183	64
65	578	563	0	0.0	Very Dense	> 200	> 110
70	579	564	1	0.2	Very Dense	> 200	> 110
75	Refusal						

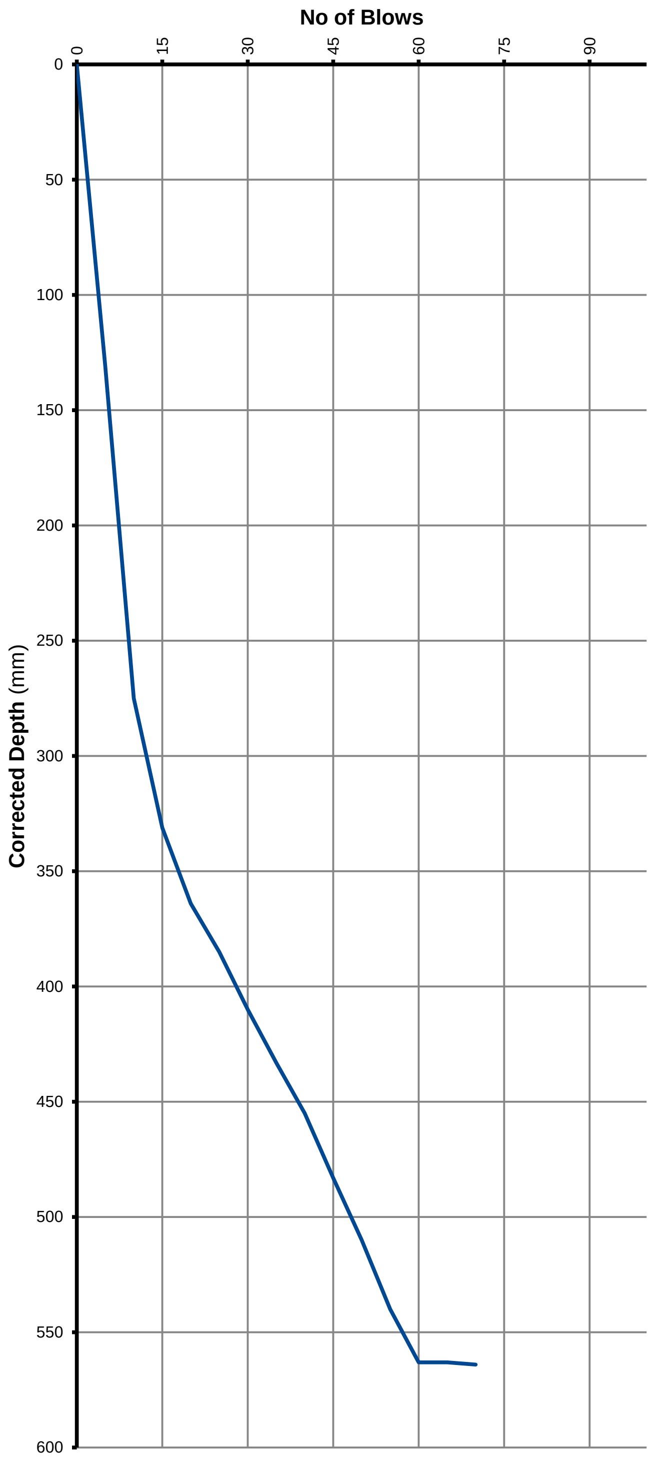
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

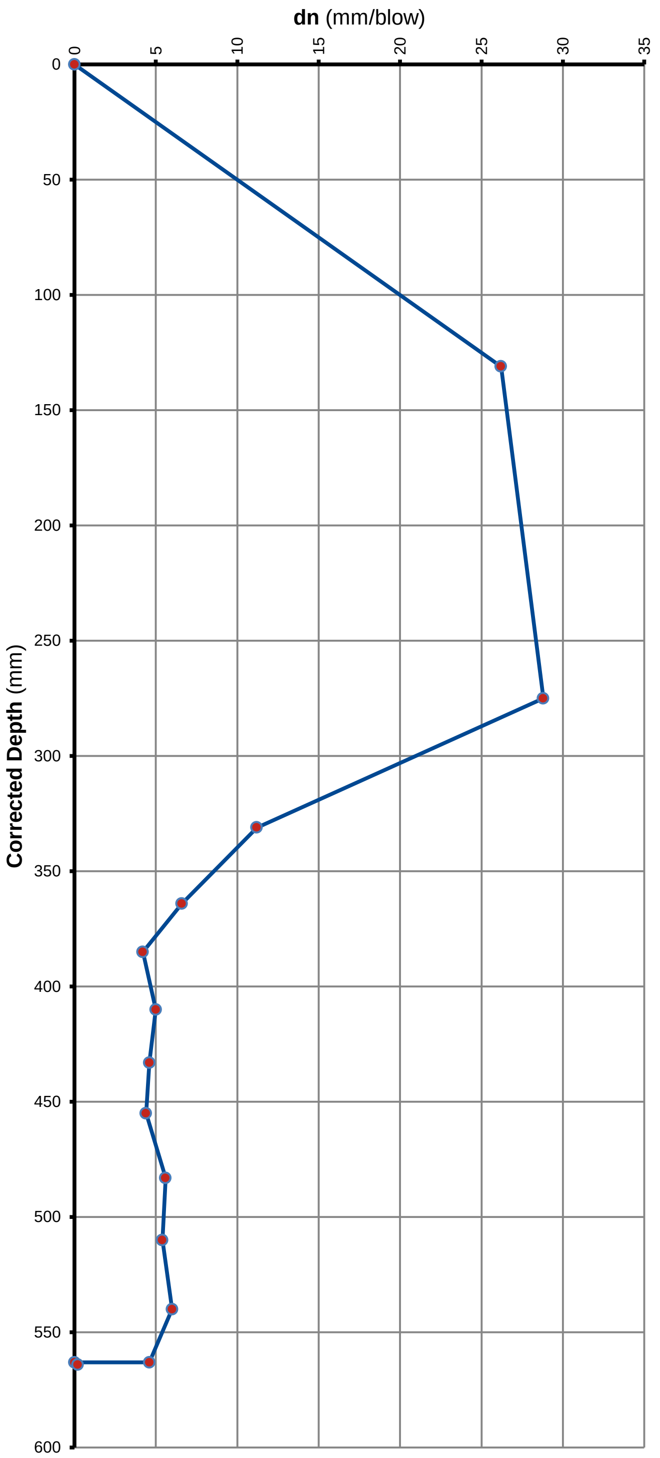
POSITION: DCP 73 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



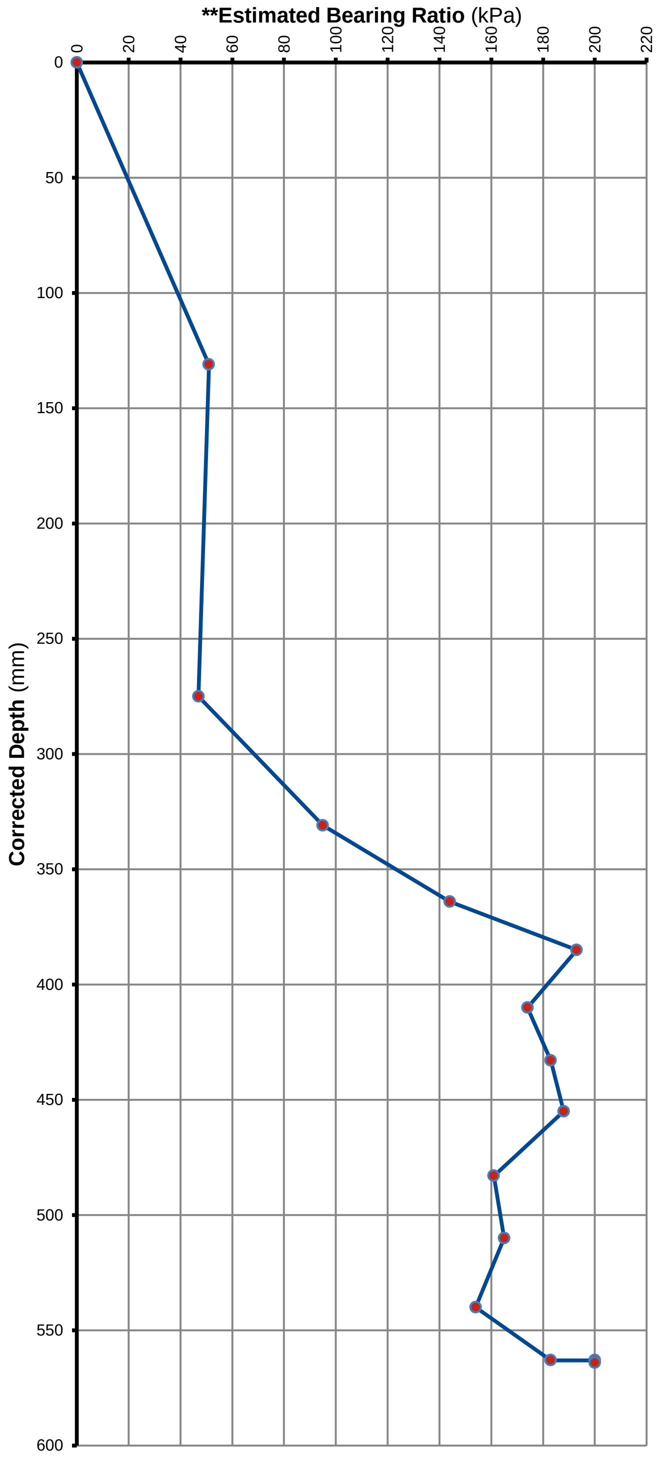
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

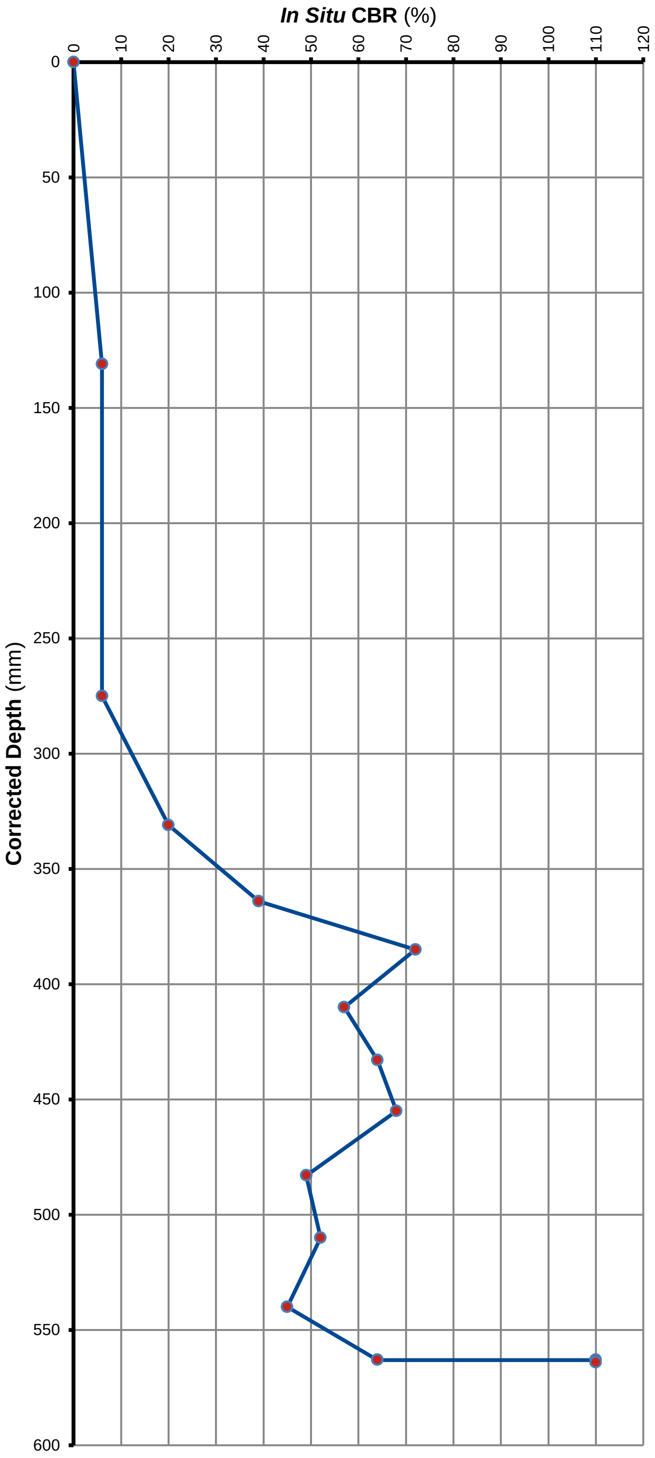
POSITION: DCP 73 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 74 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	10	0	-	-	-	-	-
5	115	105	105	21.0	Medium Dense	62	8
10	144	134	29	5.8	Dense	157	47
15	182	172	38	7.6	Dense	129	33
20	253	243	71	14.2	Medium Dense	81	14
25	306	296	53	10.6	Dense	99	21
30	332	322	26	5.2	Dense	169	54
35	360	350	28	5.6	Dense	161	49
40	381	371	21	4.2	Very Dense	193	72
45	402	392	21	4.2	Very Dense	193	72
50	427	417	25	5.0	Very Dense	174	57
55	450	440	23	4.6	Very Dense	183	64
60	468	458	18	3.6	Very Dense	> 200	88
65	485	475	17	3.4	Very Dense	> 200	95
70	506	496	21	4.2	Very Dense	193	72
75	534	524	28	5.6	Dense	161	49
80	560	550	26	5.2	Dense	169	54
85	579	569	19	3.8	Very Dense	> 200	82
90	610	600	31	6.2	Dense	150	43
95	634	624	24	4.8	Very Dense	178	60
100	657	647	23	4.6	Very Dense	183	64
105	675	665	18	3.6	Very Dense	> 200	88
110	683	673	8	1.6	Very Dense	> 200	> 110
115	696	686	13	2.6	Very Dense	> 200	> 110
120	708	698	12	2.4	Very Dense	> 200	> 110
125	720	710	12	2.4	Very Dense	> 200	> 110
130	735	725	15	3.0	Very Dense	> 200	> 110
135	758	748	23	4.6	Very Dense	183	64
140	780	770	22	4.4	Very Dense	188	68
145	801	791	21	4.2	Very Dense	193	72
150	815	805	14	2.8	Very Dense	> 200	> 110
155	820	810	5	1.0	Very Dense	> 200	> 110
160	821	811	1	0.2	Very Dense	> 200	> 110
165	822	812	1	0.2	Very Dense	> 200	> 110
170	Refusal						

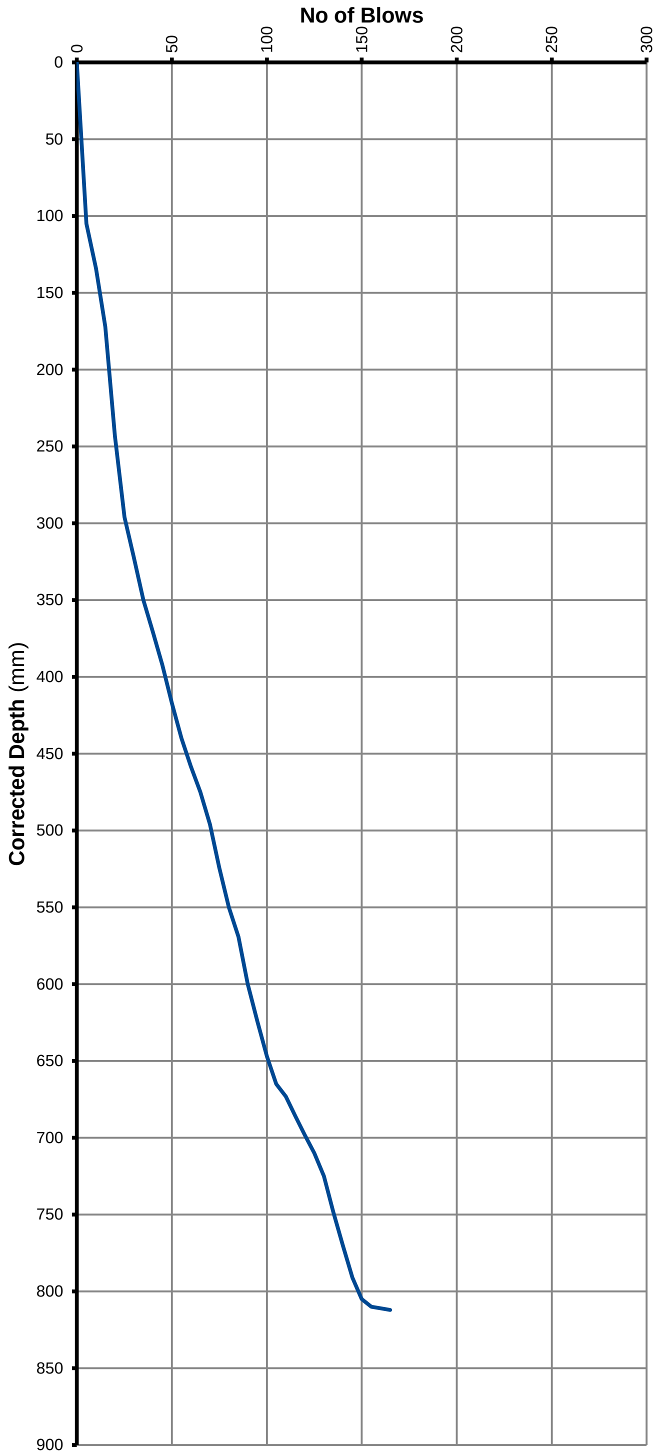
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

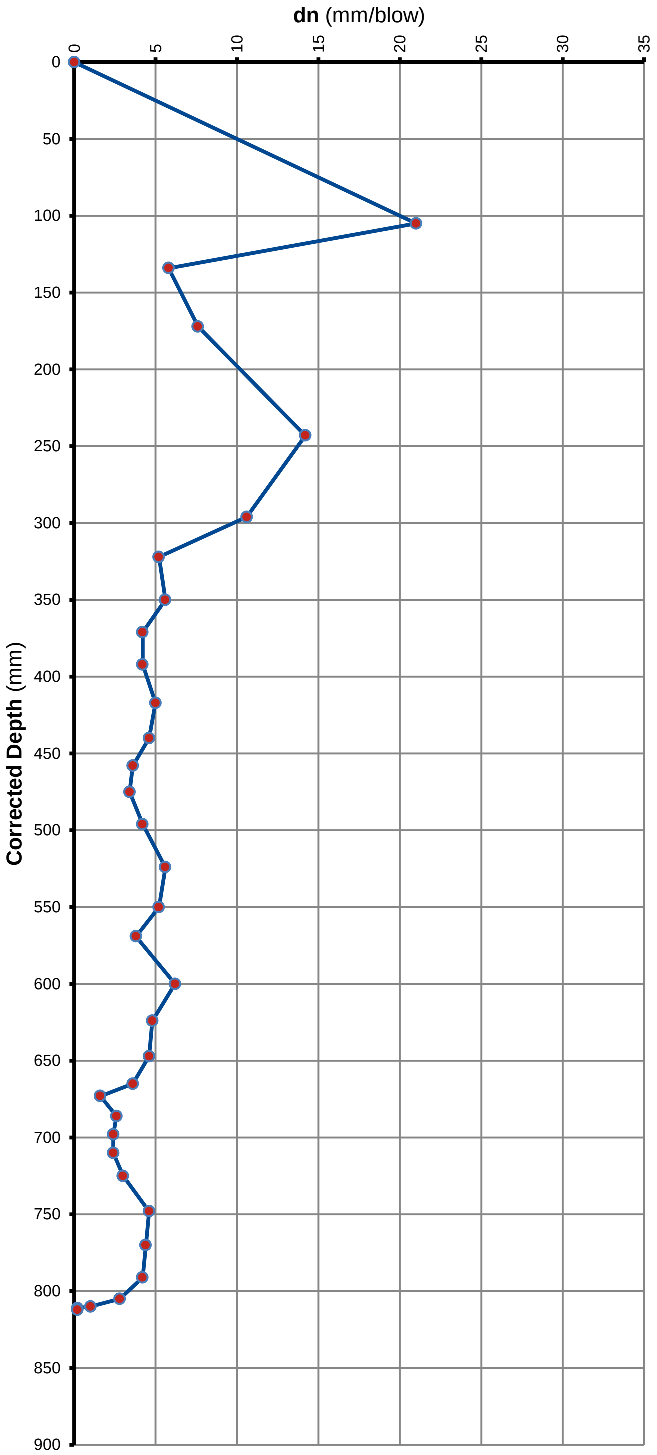
POSITION: DCP 74 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



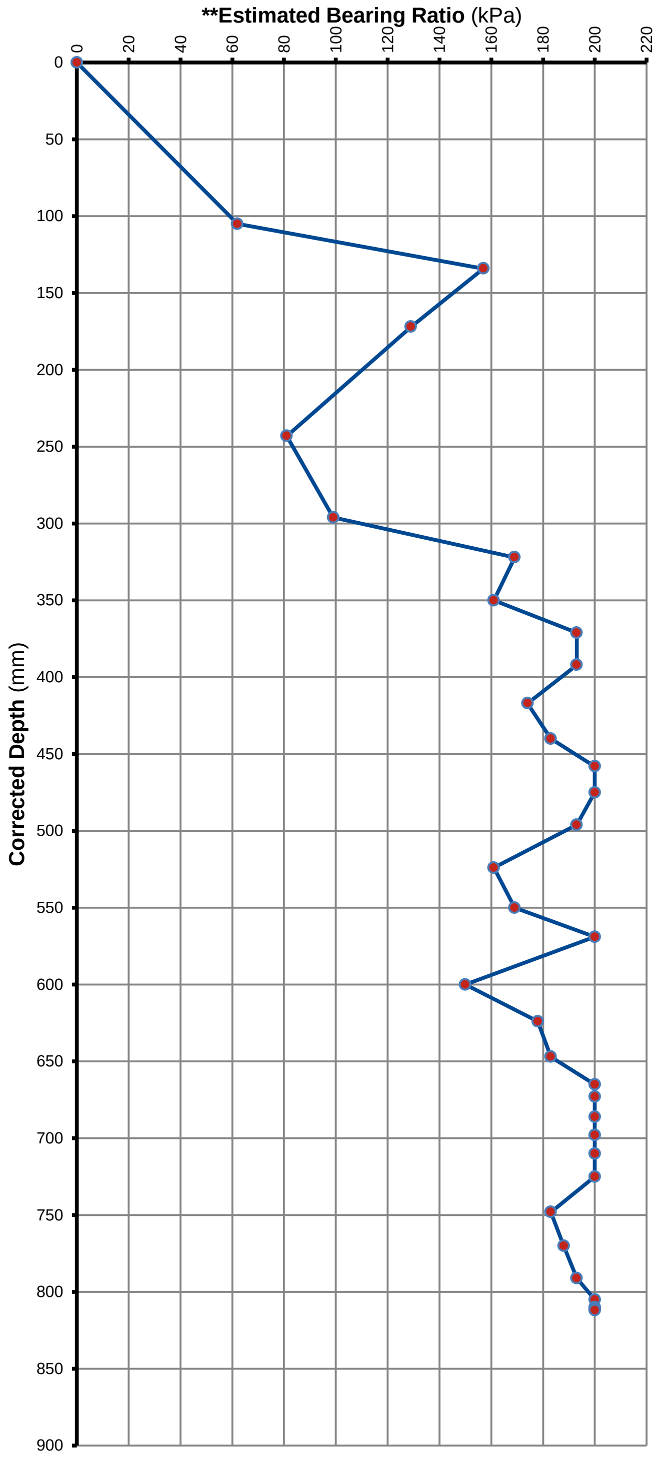
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

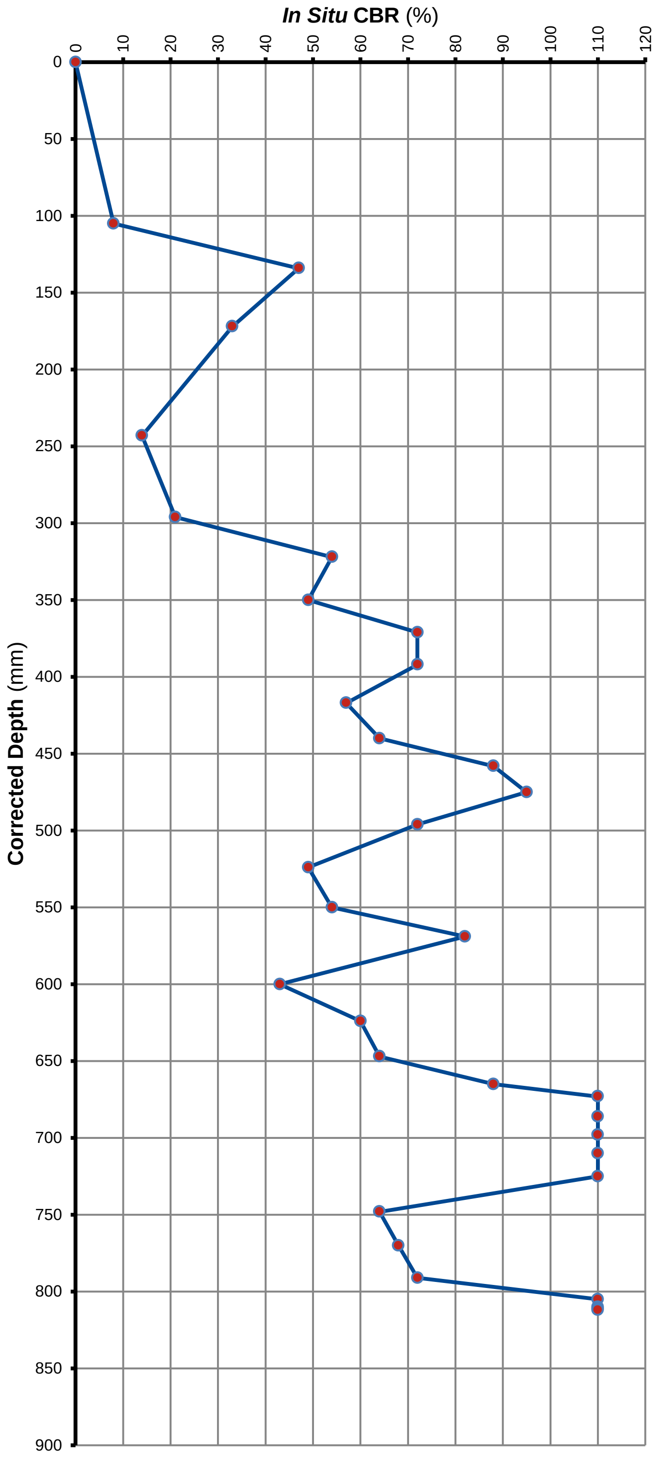
POSITION: DCP 74 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 75 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	10	0	-	-	-	-	-
5	144	134	134	26.8	Medium Dense	50	6
10	291	281	147	29.4	Medium Dense	46	5
15	356	346	65	13.0	Medium Dense	86	16
20	400	390	44	8.8	Dense	115	27
25	440	430	40	8.0	Dense	124	31
30	476	466	36	7.2	Dense	134	35
35	510	500	34	6.8	Dense	140	38
40	537	527	27	5.4	Dense	165	52
45	570	560	33	6.6	Dense	144	39
50	600	590	30	6.0	Dense	154	45
55	624	614	24	4.8	Very Dense	178	60
60	640	630	16	3.2	Very Dense	> 200	103
65	649	639	9	1.8	Very Dense	> 200	> 110
70	656	646	7	1.4	Very Dense	> 200	> 110
75	657	647	1	0.2	Very Dense	> 200	> 110
80	658	648	1	0.2	Very Dense	> 200	> 110
85	Refusal						

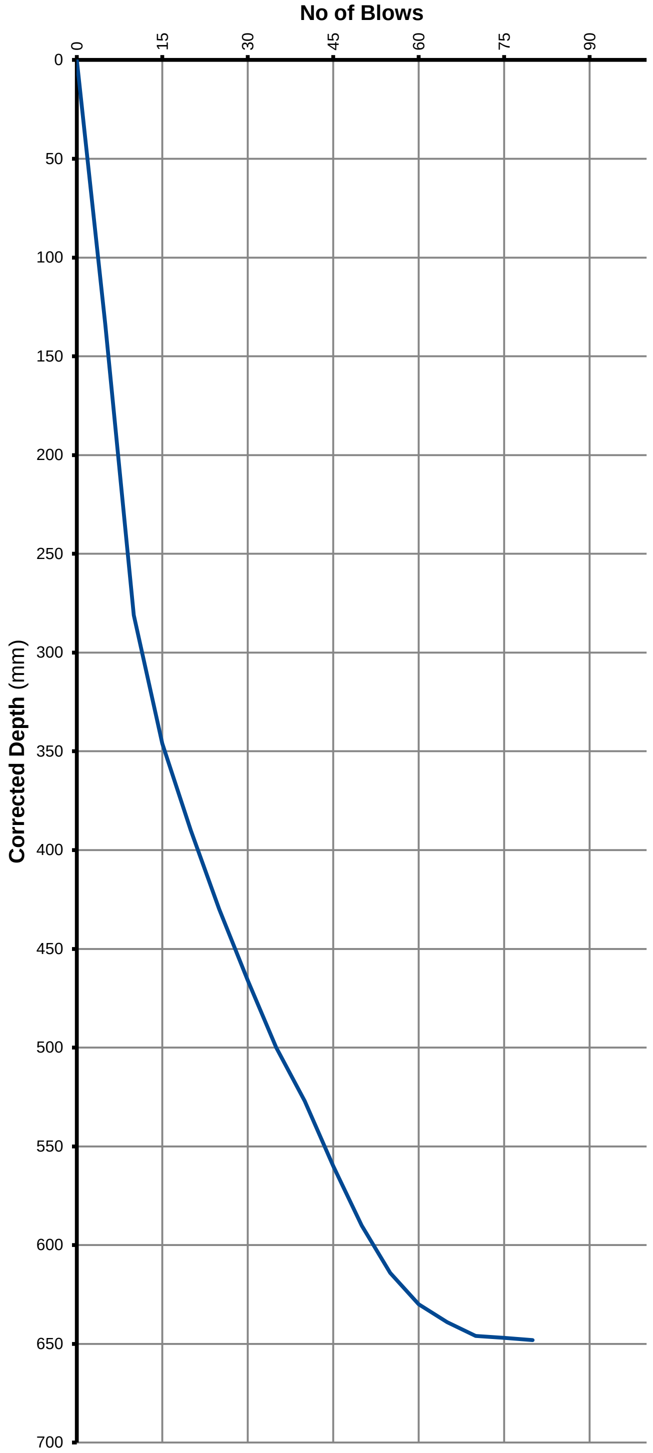
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

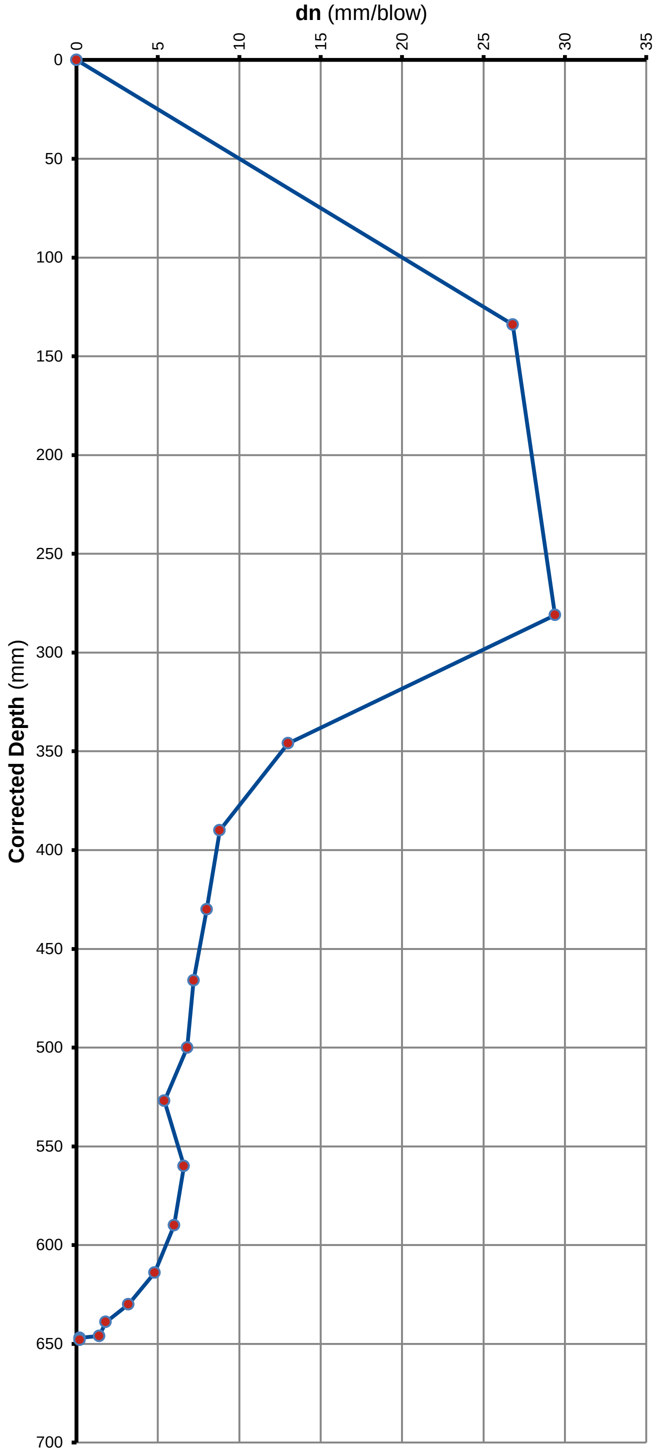
POSITION: DCP 75 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth

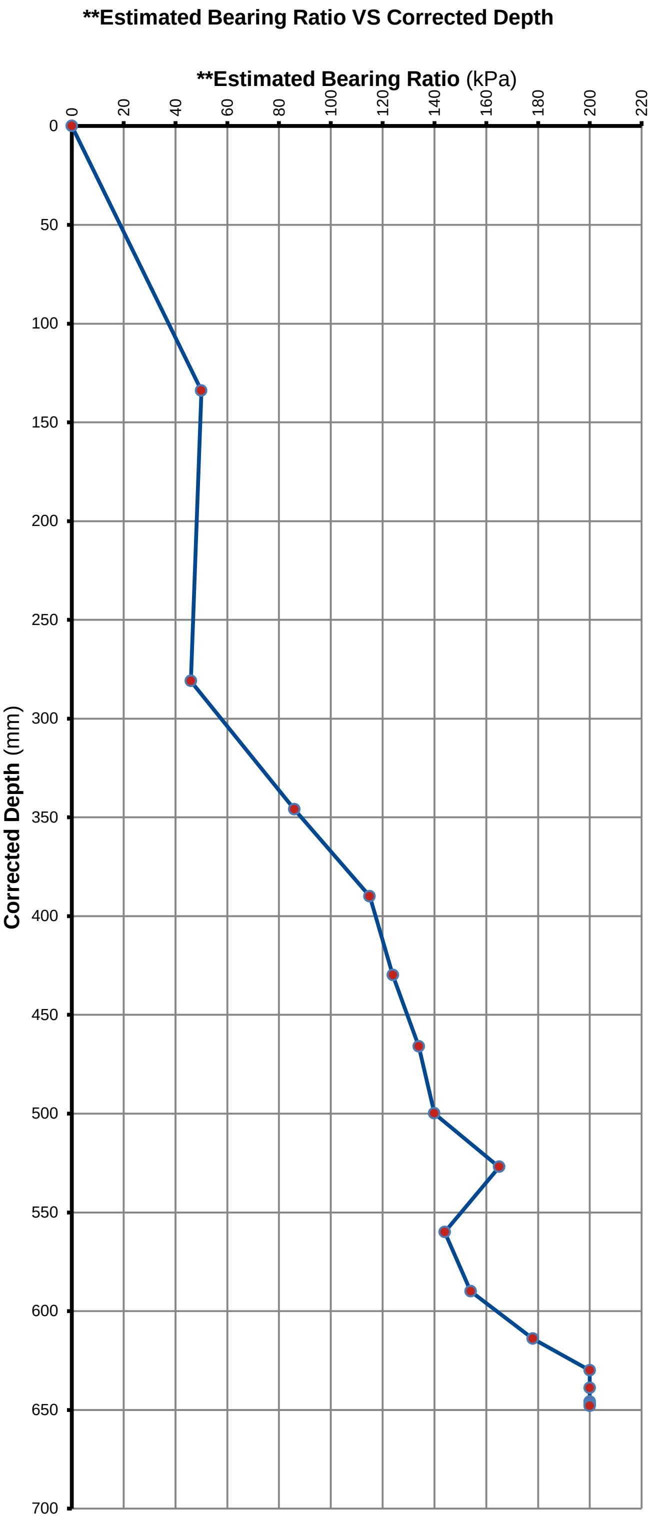


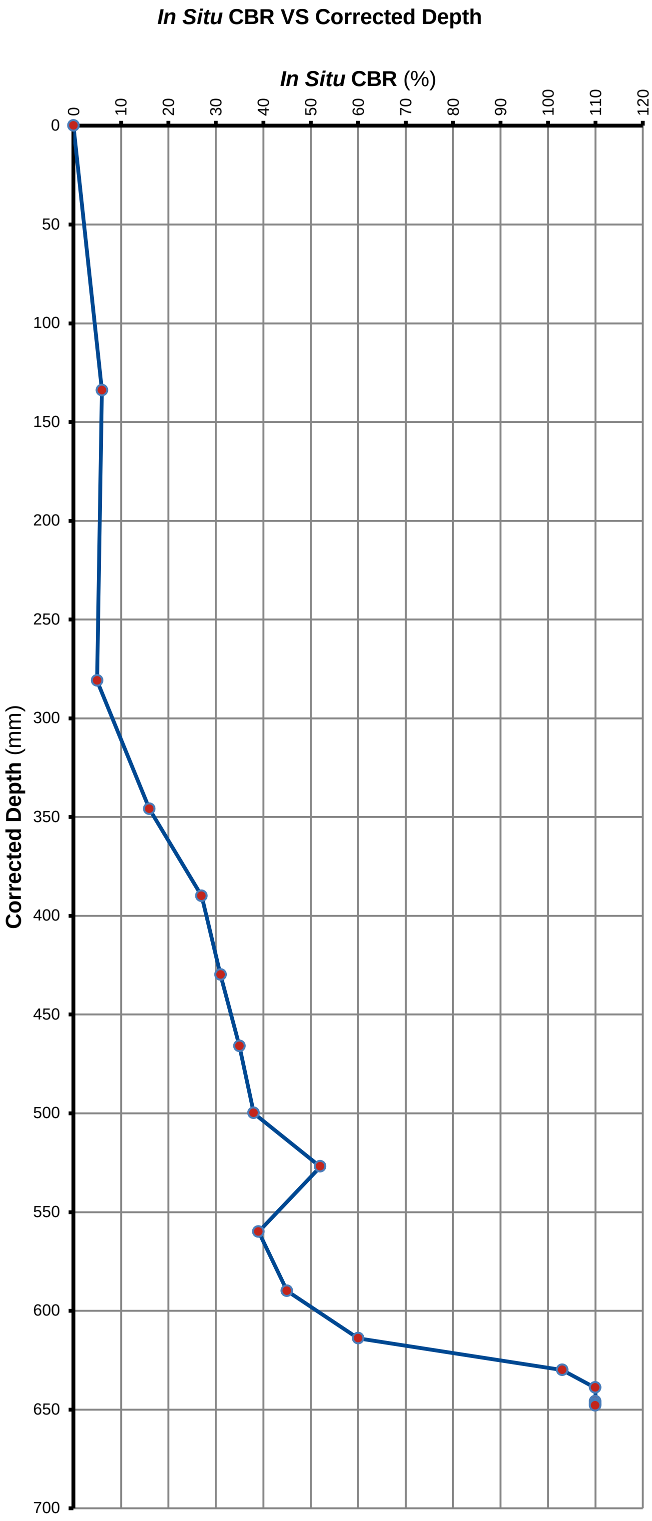
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 75 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 76 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

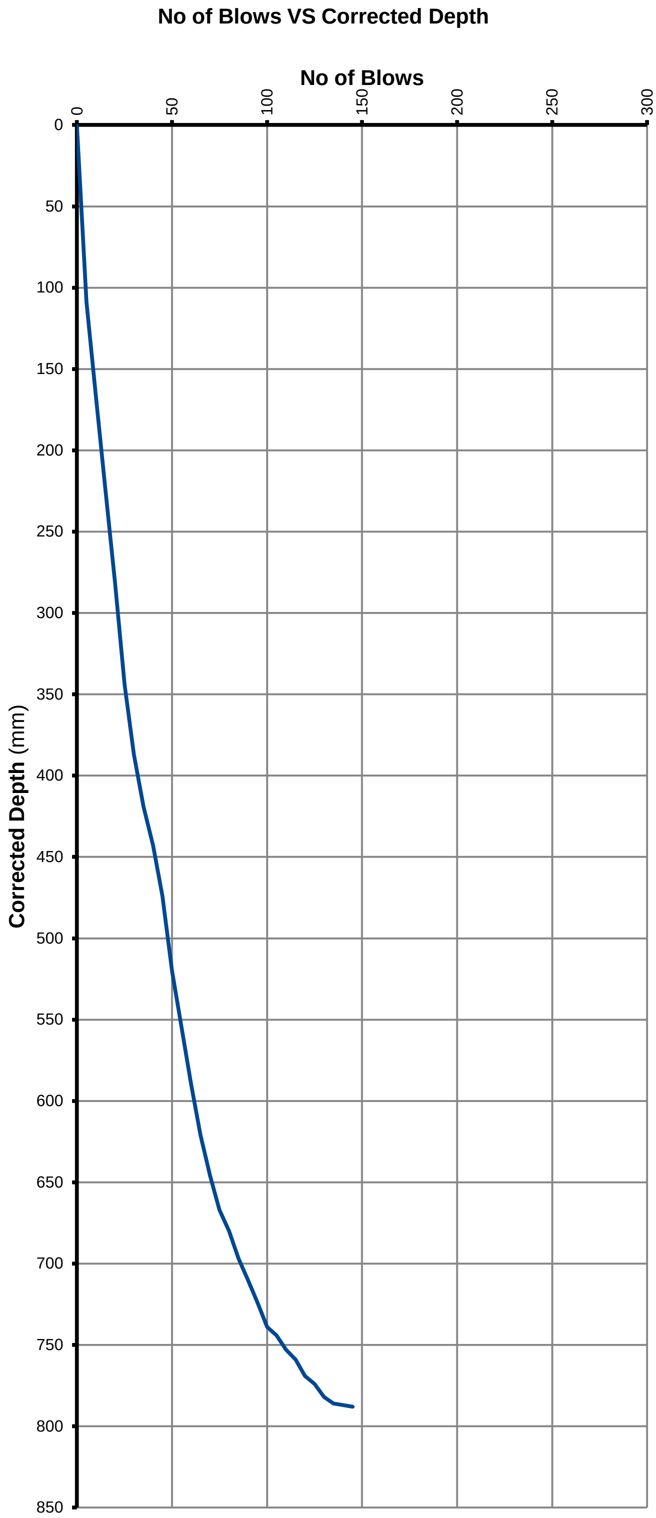
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	21	0	-	-	-	-	-
5	130	109	109	21.8	Medium Dense	60	8
10	189	168	59	11.8	Dense	92	18
15	245	224	56	11.2	Dense	95	20
20	302	281	57	11.4	Dense	94	19
25	365	344	63	12.6	Medium Dense	88	17
30	408	387	43	8.6	Dense	117	28
35	440	419	32	6.4	Dense	147	41
40	464	443	24	4.8	Very Dense	178	60
45	495	474	31	6.2	Dense	150	43
50	541	520	46	9.2	Dense	111	25
55	576	555	35	7.0	Dense	137	36
60	610	589	34	6.8	Dense	140	38
65	642	621	32	6.4	Dense	147	41
70	667	646	25	5.0	Very Dense	174	57
75	688	667	21	4.2	Very Dense	193	72
80	701	680	13	2.6	Very Dense	> 200	> 110
85	718	697	17	3.4	Very Dense	> 200	95
90	731	710	13	2.6	Very Dense	> 200	> 110
95	745	724	14	2.8	Very Dense	> 200	> 110
100	760	739	15	3.0	Very Dense	> 200	> 110
105	765	744	5	1.0	Very Dense	> 200	> 110
110	774	753	9	1.8	Very Dense	> 200	> 110
115	780	759	6	1.2	Very Dense	> 200	> 110
120	790	769	10	2.0	Very Dense	> 200	> 110
125	795	774	5	1.0	Very Dense	> 200	> 110
130	803	782	8	1.6	Very Dense	> 200	> 110
135	807	786	4	0.8	Very Dense	> 200	> 110
140	808	787	1	0.2	Very Dense	> 200	> 110
145	809	788	1	0.2	Very Dense	> 200	> 110
150	Refusal						

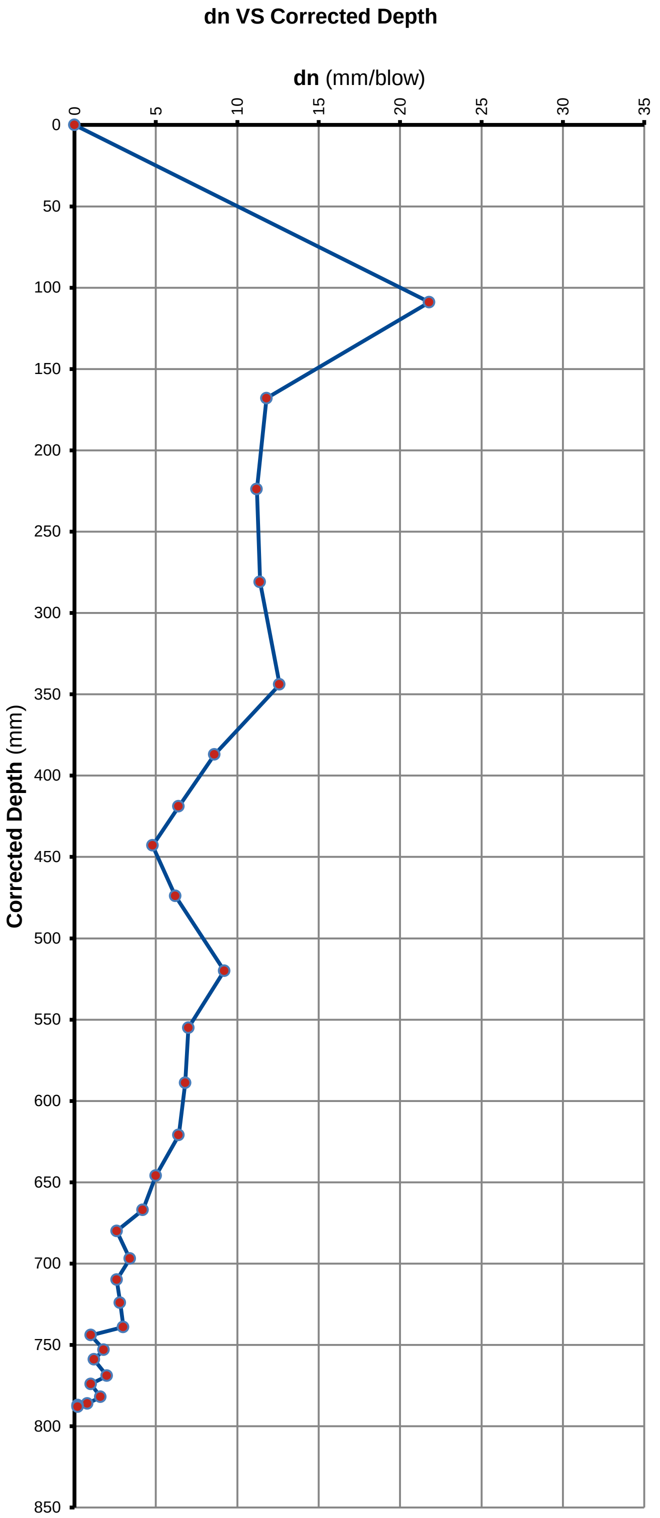
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 76 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

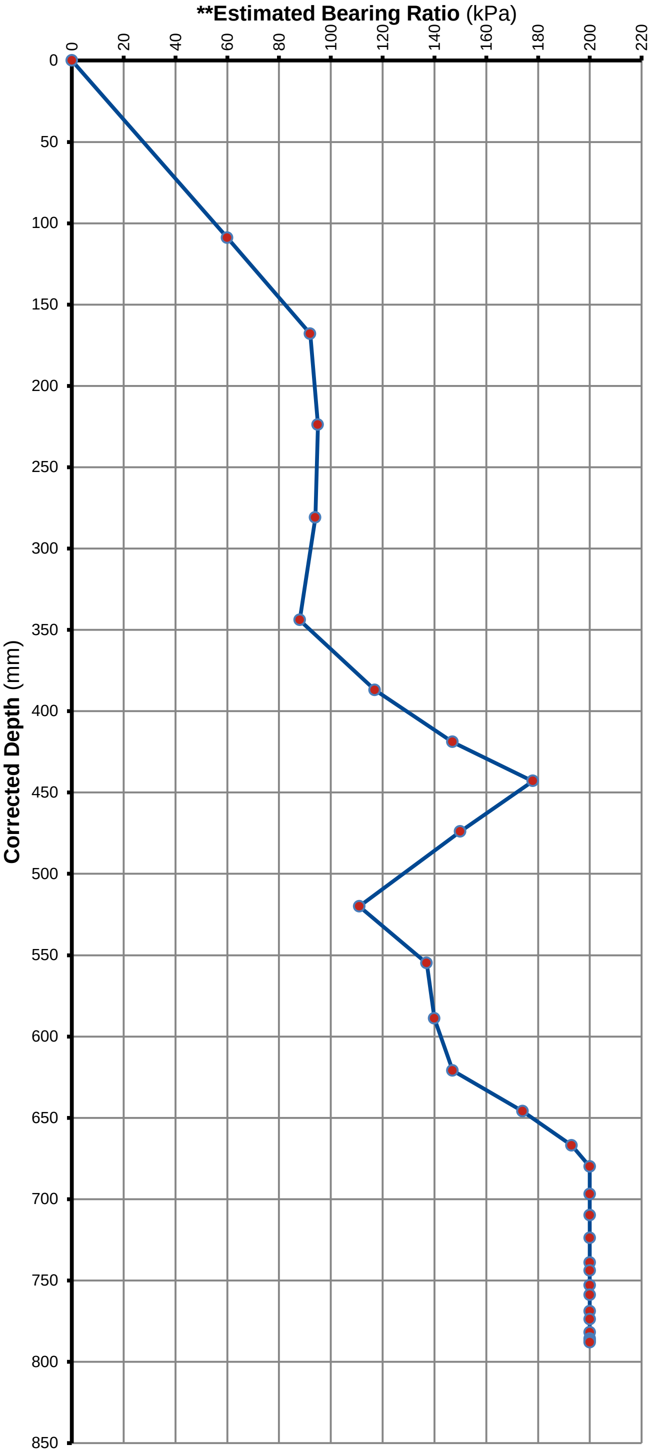
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

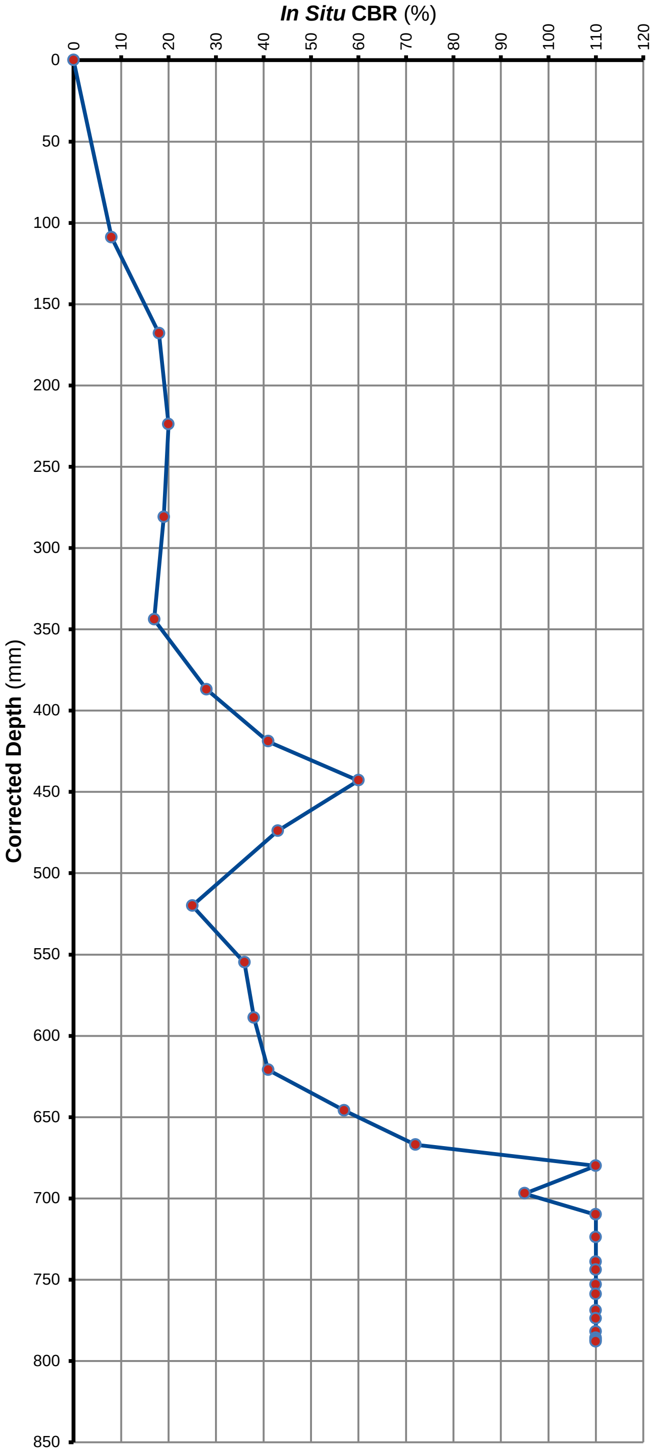
POSITION: DCP 76 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 77 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

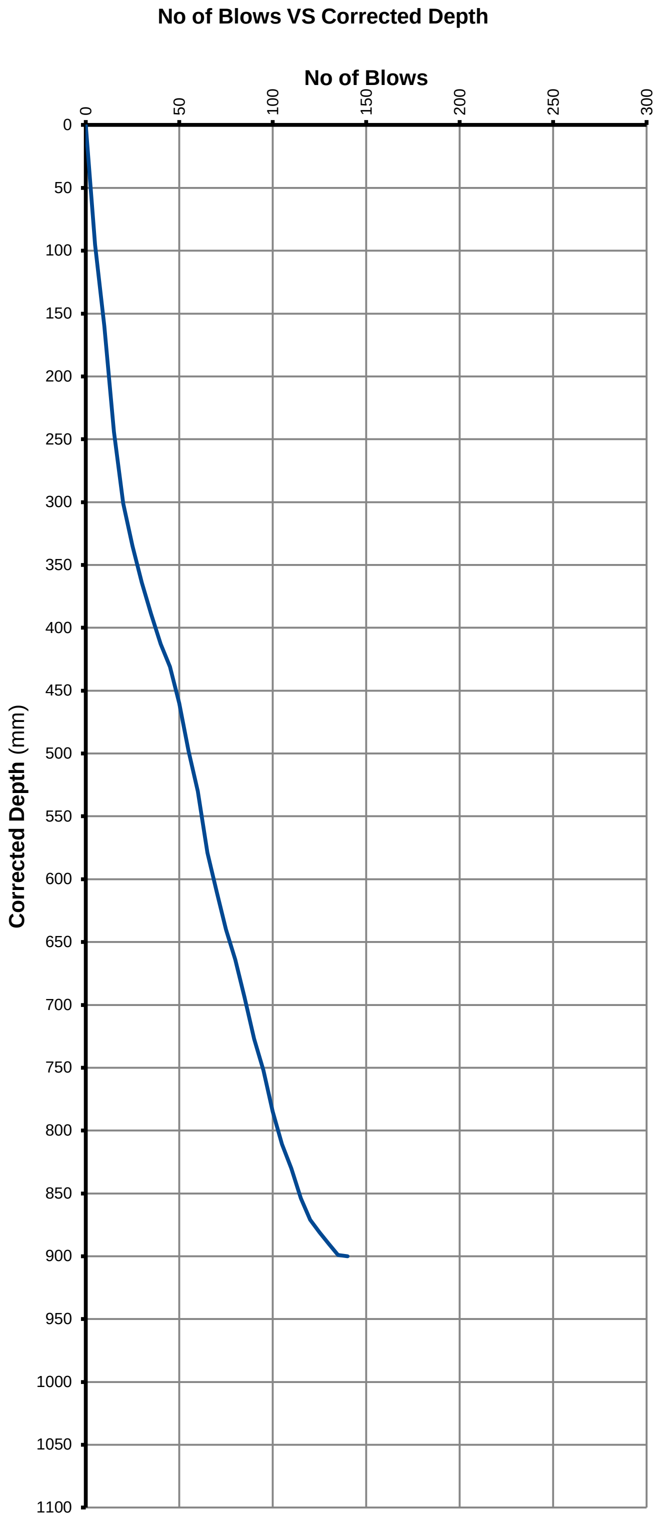
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	0	0	-	-	-	-	-
5	95	95	95	19.0	Medium Dense	67	10
10	160	160	65	13.0	Medium Dense	86	16
15	244	244	84	16.8	Medium Dense	72	11
20	301	301	57	11.4	Dense	94	19
25	335	335	34	6.8	Dense	140	38
30	364	364	29	5.8	Dense	157	47
35	389	389	25	5.0	Very Dense	174	57
40	413	413	24	4.8	Very Dense	178	60
45	431	431	18	3.6	Very Dense	> 200	88
50	460	460	29	5.8	Dense	157	47
55	498	498	38	7.6	Dense	129	33
60	530	530	32	6.4	Dense	147	41
65	579	579	49	9.8	Dense	106	23
70	610	610	31	6.2	Dense	150	43
75	640	640	30	6.0	Dense	154	45
80	664	664	24	4.8	Very Dense	178	60
85	694	694	30	6.0	Dense	154	45
90	727	727	33	6.6	Dense	144	39
95	752	752	25	5.0	Very Dense	174	57
100	785	785	33	6.6	Dense	144	39
105	811	811	26	5.2	Dense	169	54
110	830	830	19	3.8	Very Dense	> 200	82
115	854	854	24	4.8	Very Dense	178	60
120	871	871	17	3.4	Very Dense	> 200	95
125	881	881	10	2.0	Very Dense	> 200	> 110
130	890	890	9	1.8	Very Dense	> 200	> 110
135	899	899	9	1.8	Very Dense	> 200	> 110
140	900	900	1	0.2	Very Dense	> 200	> 110
145	Refusal						

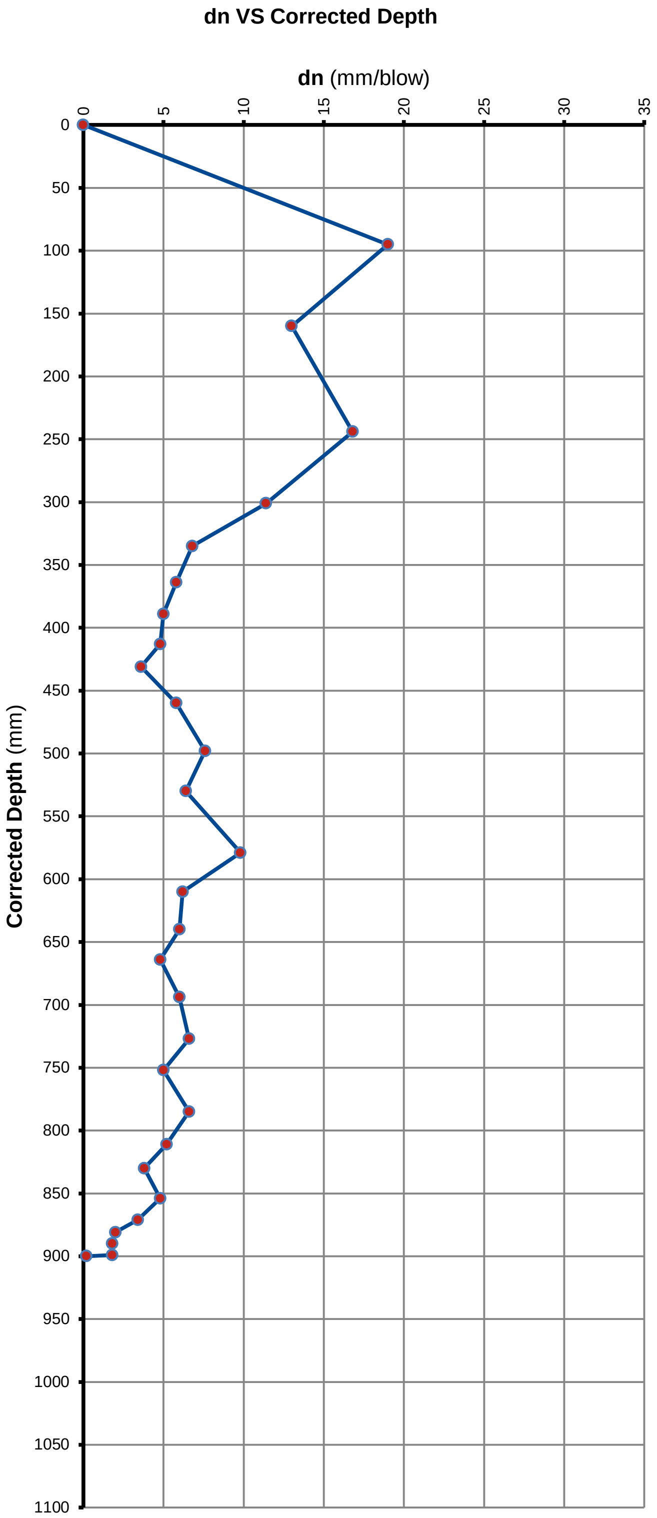
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 77 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)





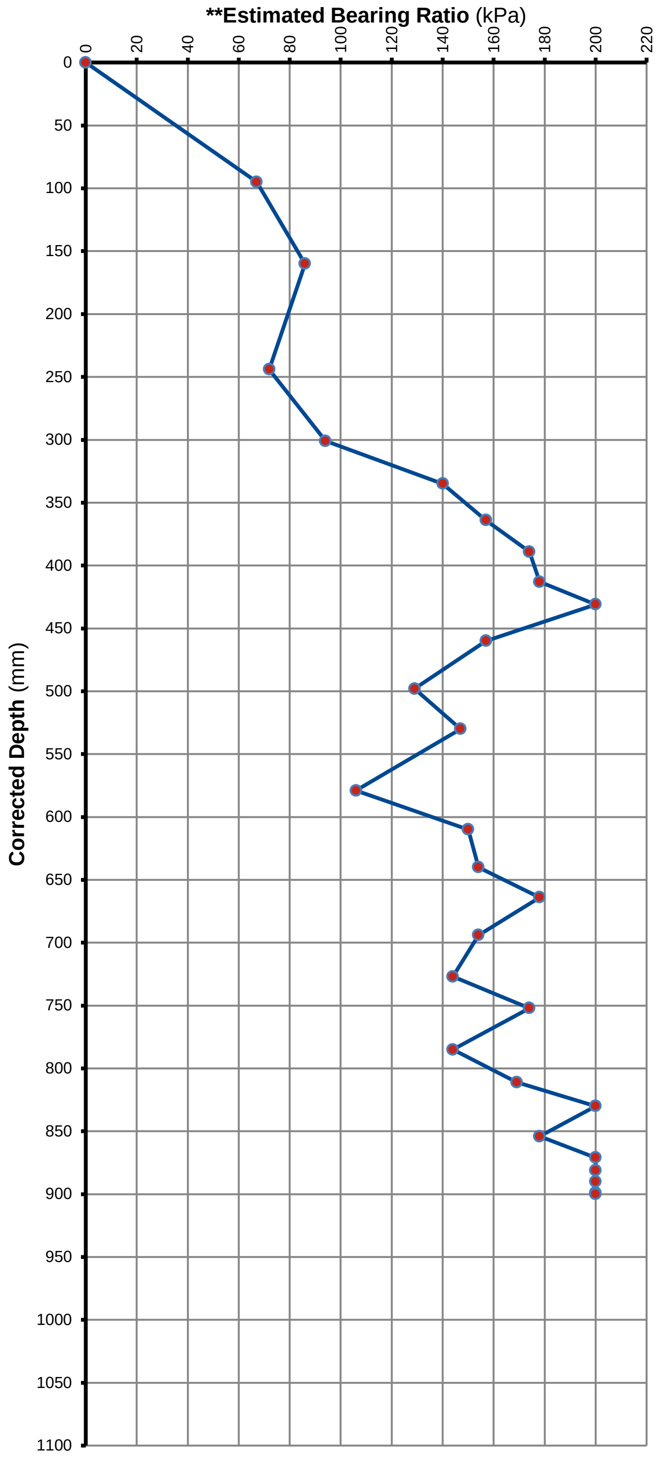
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

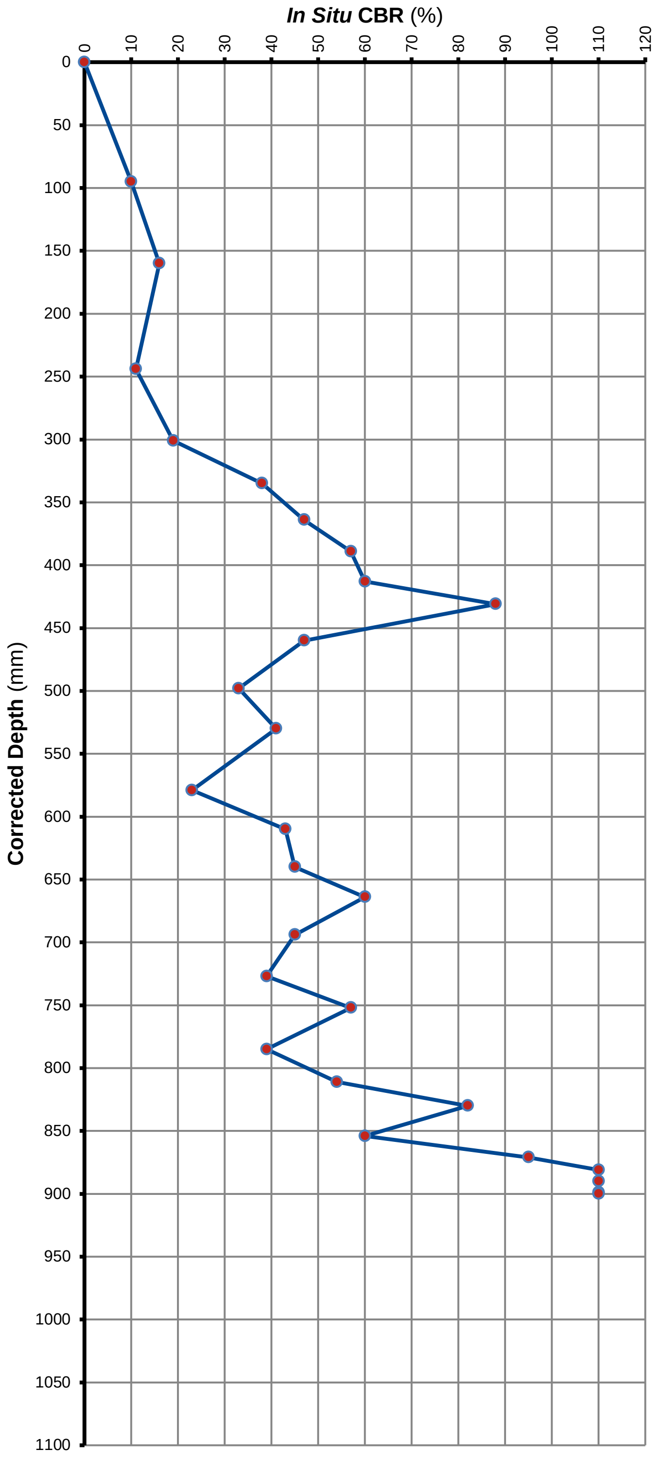
POSITION: DCP 77 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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T0455
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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 78 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	20	0	-	-	-	-	-
5	98	78	78	15.6	Medium Dense	76	13
10	161	141	63	12.6	Medium Dense	88	17
15	269	249	108	21.6	Medium Dense	61	8
20	390	370	121	24.2	Medium Dense	55	7
25	447	427	57	11.4	Dense	94	19
30	481	461	34	6.8	Dense	140	38
35	512	492	31	6.2	Dense	150	43
40	545	525	33	6.6	Dense	144	39
45	575	555	30	6.0	Dense	154	45
50	614	594	39	7.8	Dense	126	32
55	645	625	31	6.2	Dense	150	43
60	680	660	35	7.0	Dense	137	36
65	713	693	33	6.6	Dense	144	39
70	735	715	22	4.4	Very Dense	188	68
75	754	734	19	3.8	Very Dense	> 200	82
80	770	750	16	3.2	Very Dense	> 200	103
85	786	766	16	3.2	Very Dense	> 200	103
90	802	782	16	3.2	Very Dense	> 200	103
95	820	800	18	3.6	Very Dense	> 200	88
100	841	821	21	4.2	Very Dense	193	72
105	860	840	19	3.8	Very Dense	> 200	82
110	880	860	20	4.0	Very Dense	200	77
115	898	878	18	3.6	Very Dense	> 200	88
120	908	888	10	2.0	Very Dense	> 200	> 110
125	921	901	13	2.6	Very Dense	> 200	> 110
130	936	916	15	3.0	Very Dense	> 200	> 110
135	951	931	15	3.0	Very Dense	> 200	> 110
140	972	952	21	4.2	Very Dense	193	72
145	990	970	18	3.6	Very Dense	> 200	88
150	1010	990	20	4.0	Very Dense	200	77
155	1025	1005	15	3.0	Very Dense	> 200	> 110
160	1047	1027	22	4.4	Very Dense	188	68
165	1064	1044	17	3.4	Very Dense	> 200	95
170	1080	1060	16	3.2	Very Dense	> 200	103
175	1091	1071	11	2.2	Very Dense	> 200	> 110
180	1101	1081	10	2.0	Very Dense	> 200	> 110
185	1112	1092	11	2.2	Very Dense	> 200	> 110
190	1122	1102	10	2.0	Very Dense	> 200	> 110
195	1138	1118	16	3.2	Very Dense	> 200	103
200	1145	1125	7	1.4	Very Dense	> 200	> 110
205	1160	1140	15	3.0	Very Dense	> 200	> 110
210	1172	1152	12	2.4	Very Dense	> 200	> 110
215	1188	1168	16	3.2	Very Dense	> 200	103
220	1200	1180	12	2.4	Very Dense	> 200	> 110
225	1205	1185	5	1.0	Very Dense	> 200	> 110
230	1218	1198	13	2.6	Very Dense	> 200	> 110
235	1230	1210	12	2.4	Very Dense	> 200	> 110
240	1240	1220	10	2.0	Very Dense	> 200	> 110
245	1251	1231	11	2.2	Very Dense	> 200	> 110
250	1261	1241	10	2.0	Very Dense	> 200	> 110

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 78 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1276	1256	15	3.0	Very Dense	> 200	> 110
260	1282	1262	6	1.2	Very Dense	> 200	> 110
265	1289	1269	7	1.4	Very Dense	> 200	> 110
270	1298	1278	9	1.8	Very Dense	> 200	> 110
275	1298	1278	0	0.0	Very Dense	> 200	> 110
280	1299	1279	1	0.2	Very Dense	> 200	> 110
285	Refusal						

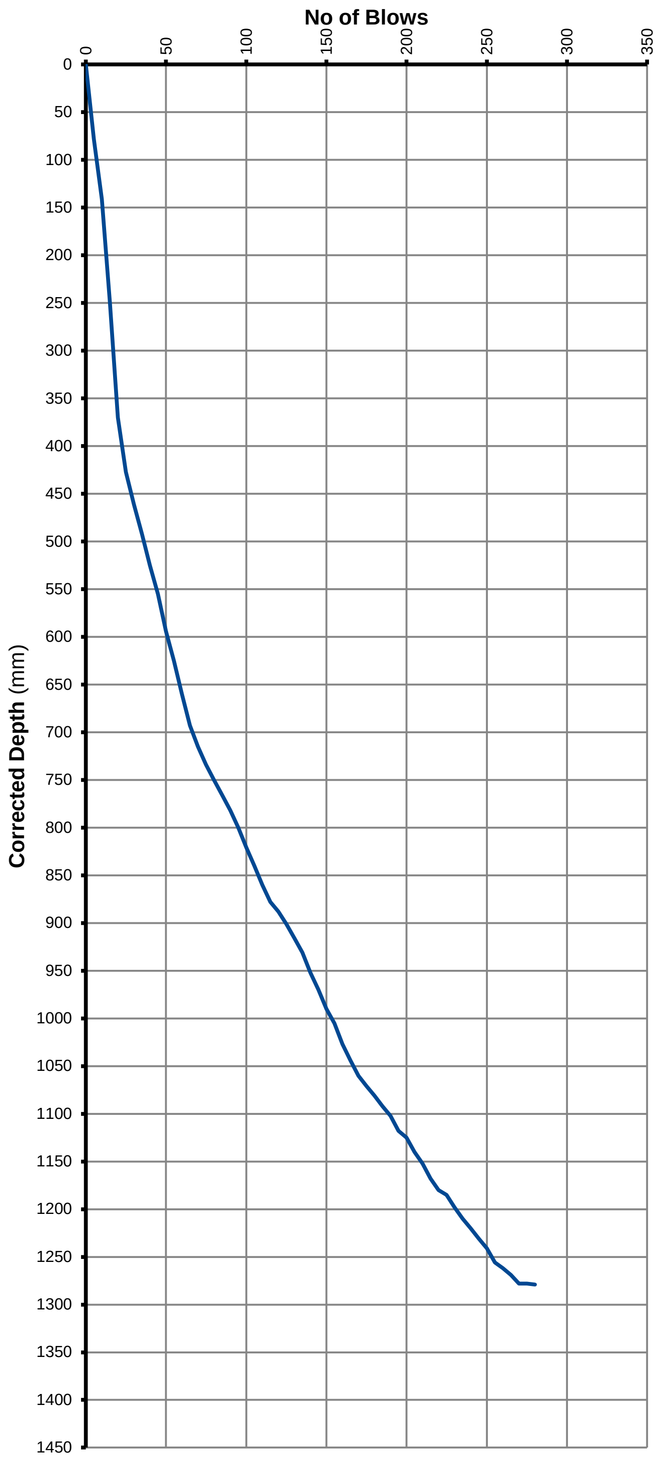
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

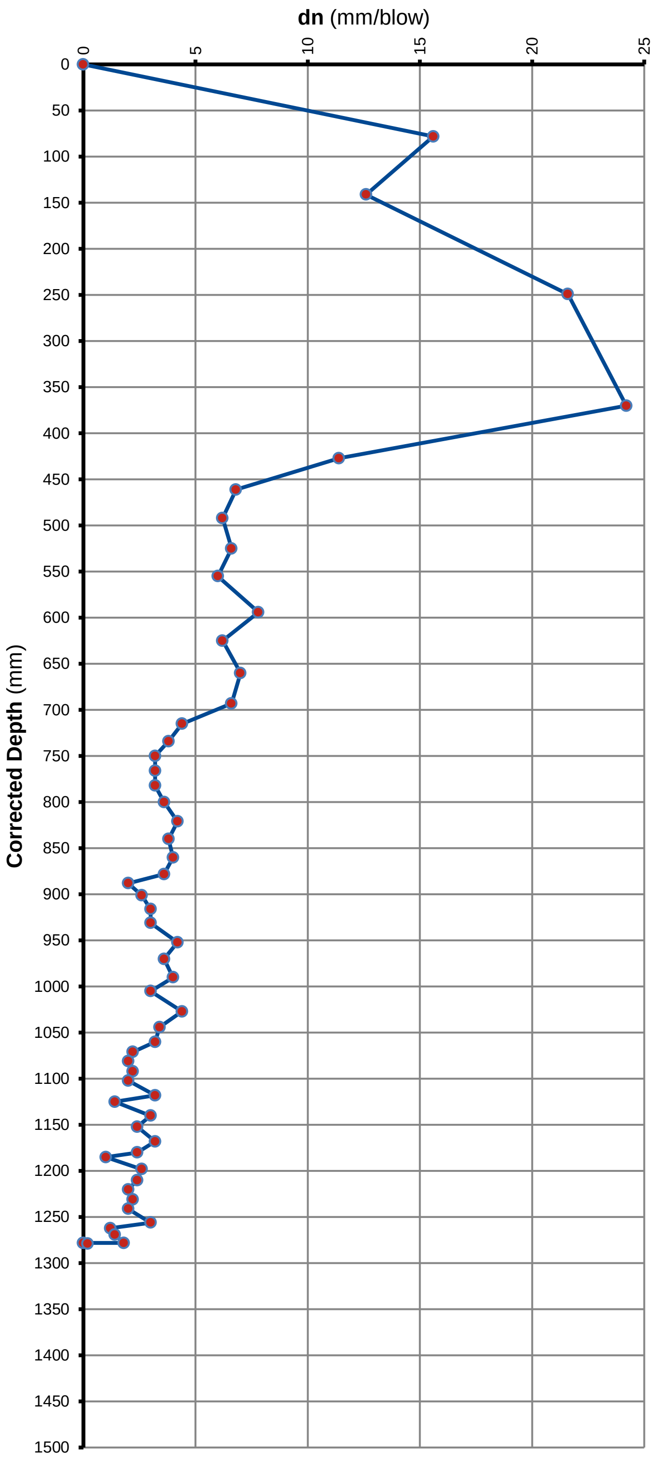
POSITION: DCP 78 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



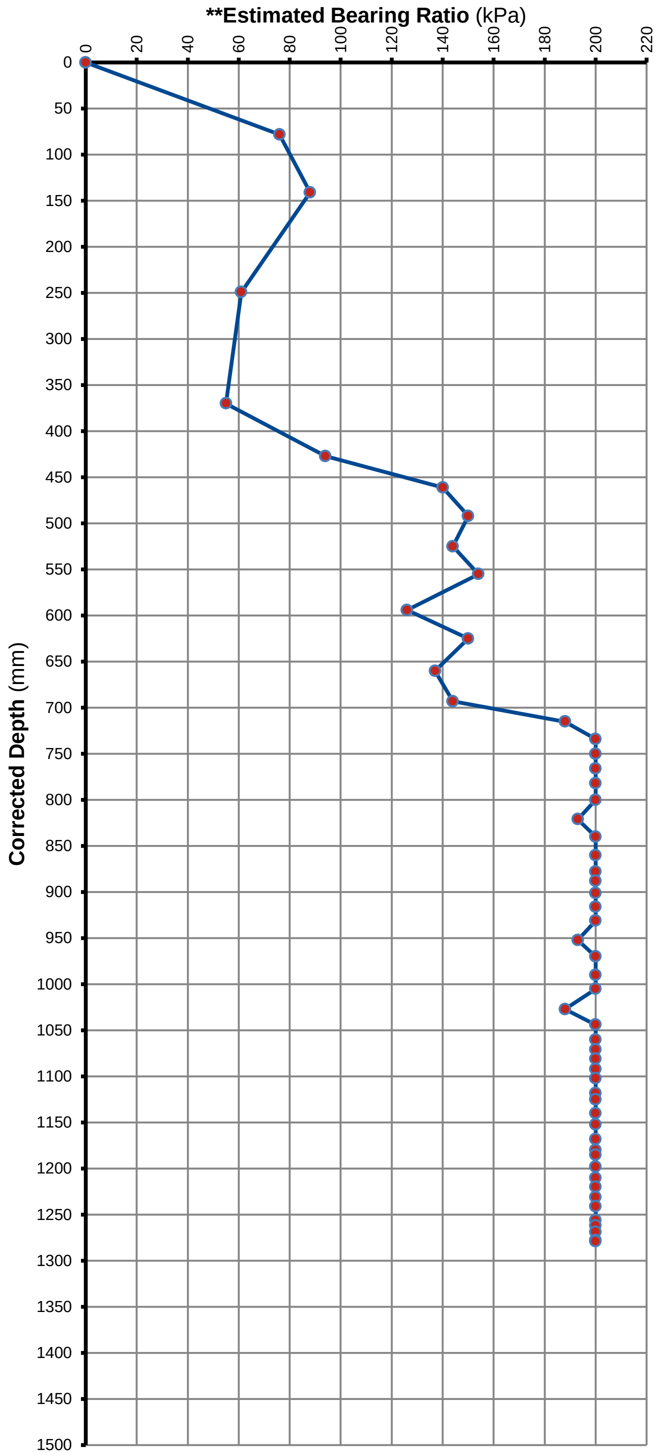
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

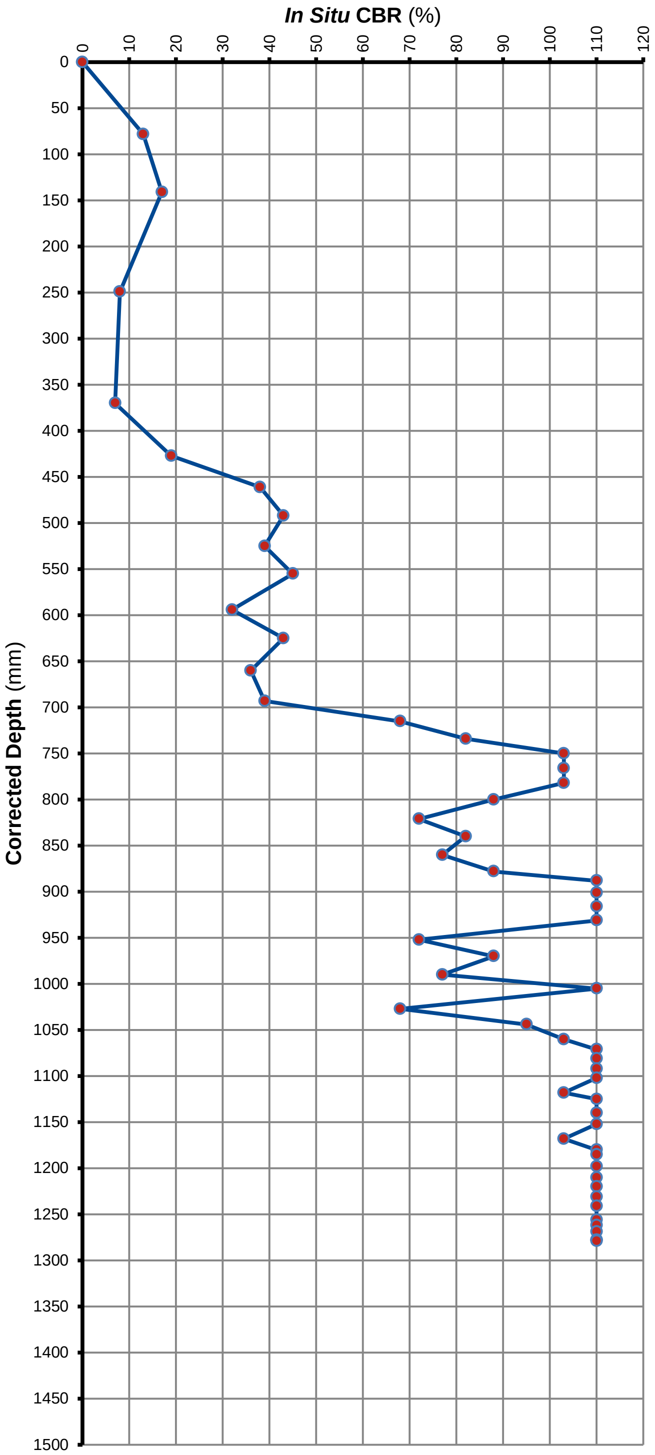
POSITION: DCP 78 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

**Estimated Bearing Ratio VS Corrected Depth



In Situ CBR VS Corrected Depth



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP79 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	30	0	-	-	-	-	-
5	135	105	105	21.0	Medium Dense	62	8
10	278	248	143	28.6	Medium Dense	47	6
15	337	307	59	11.8	Dense	92	18
20	390	360	53	10.6	Dense	99	21
25	418	388	28	5.6	Dense	161	49
30	442	412	24	4.8	Very Dense	178	60
35	460	430	18	3.6	Very Dense	> 200	88
40	486	456	26	5.2	Dense	169	54
45	501	471	15	3.0	Very Dense	> 200	> 110
50	527	497	26	5.2	Dense	169	54
55	542	512	15	3.0	Very Dense	> 200	> 110
60	561	531	19	3.8	Very Dense	> 200	82
65	590	560	29	5.8	Dense	157	47
70	621	591	31	6.2	Dense	150	43
75	632	602	11	2.2	Very Dense	> 200	> 110
80	639	609	7	1.4	Very Dense	> 200	> 110
85	644	614	5	1.0	Very Dense	> 200	> 110
90	650	620	6	1.2	Very Dense	> 200	> 110
95	657	627	7	1.4	Very Dense	> 200	> 110
100	663	633	6	1.2	Very Dense	> 200	> 110
105	668	638	5	1.0	Very Dense	> 200	> 110
110	671	641	3	0.6	Very Dense	> 200	> 110
115	678	648	7	1.4	Very Dense	> 200	> 110
120	685	655	7	1.4	Very Dense	> 200	> 110
125	691	661	6	1.2	Very Dense	> 200	> 110
130	703	673	12	2.4	Very Dense	> 200	> 110
135	715	685	12	2.4	Very Dense	> 200	> 110
140	722	692	7	1.4	Very Dense	> 200	> 110
145	725	695	3	0.6	Very Dense	> 200	> 110
150	729	699	4	0.8	Very Dense	> 200	> 110
155	730	700	1	0.2	Very Dense	> 200	> 110
160	732	702	2	0.4	Very Dense	> 200	> 110
165	735	705	3	0.6	Very Dense	> 200	> 110
170	740	710	5	1.0	Very Dense	> 200	> 110
175	741	711	1	0.2	Very Dense	> 200	> 110
180	743	713	2	0.4	Very Dense	> 200	> 110
185	Refusal						

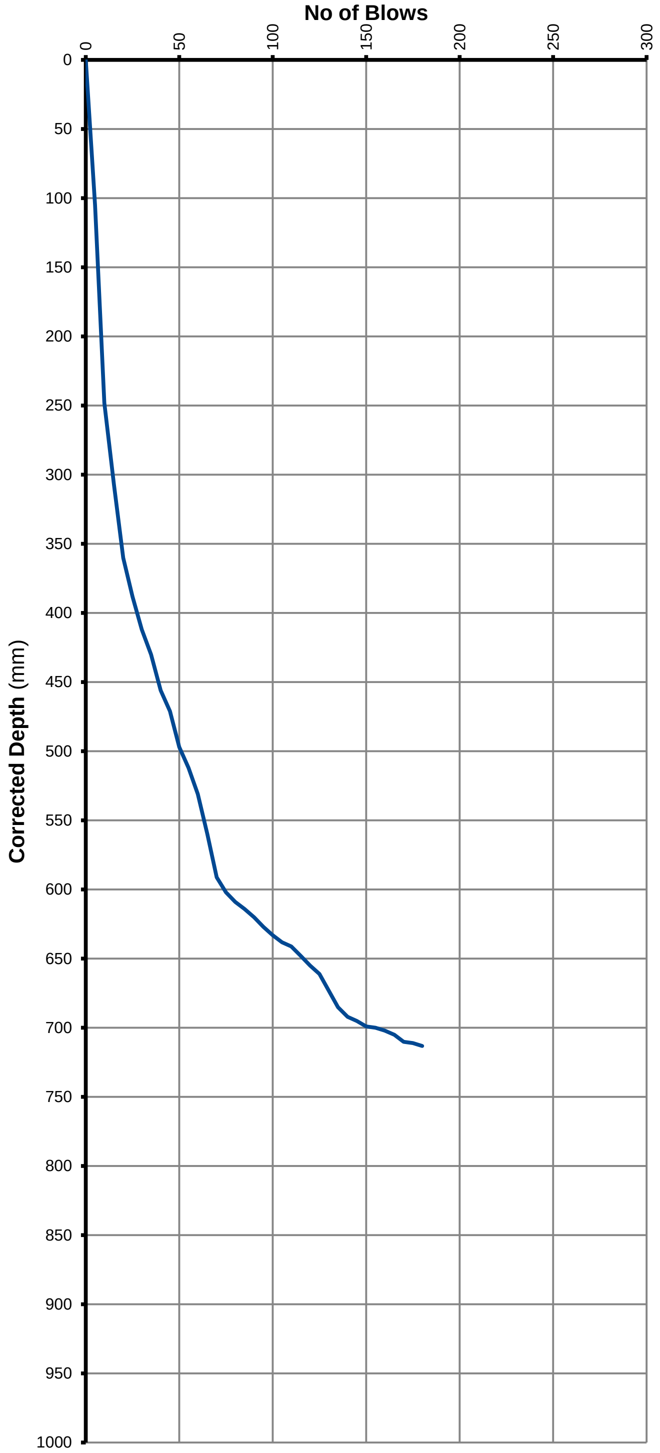
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

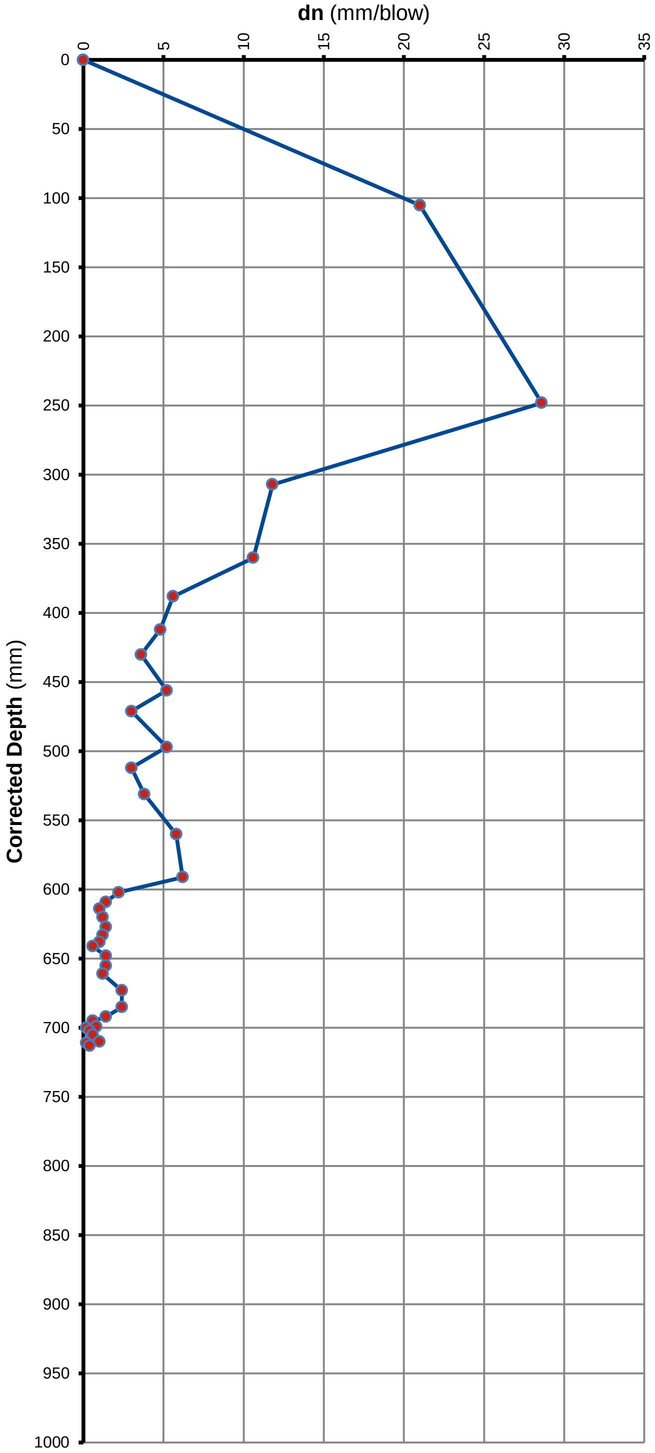
POSITION: DCP79 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



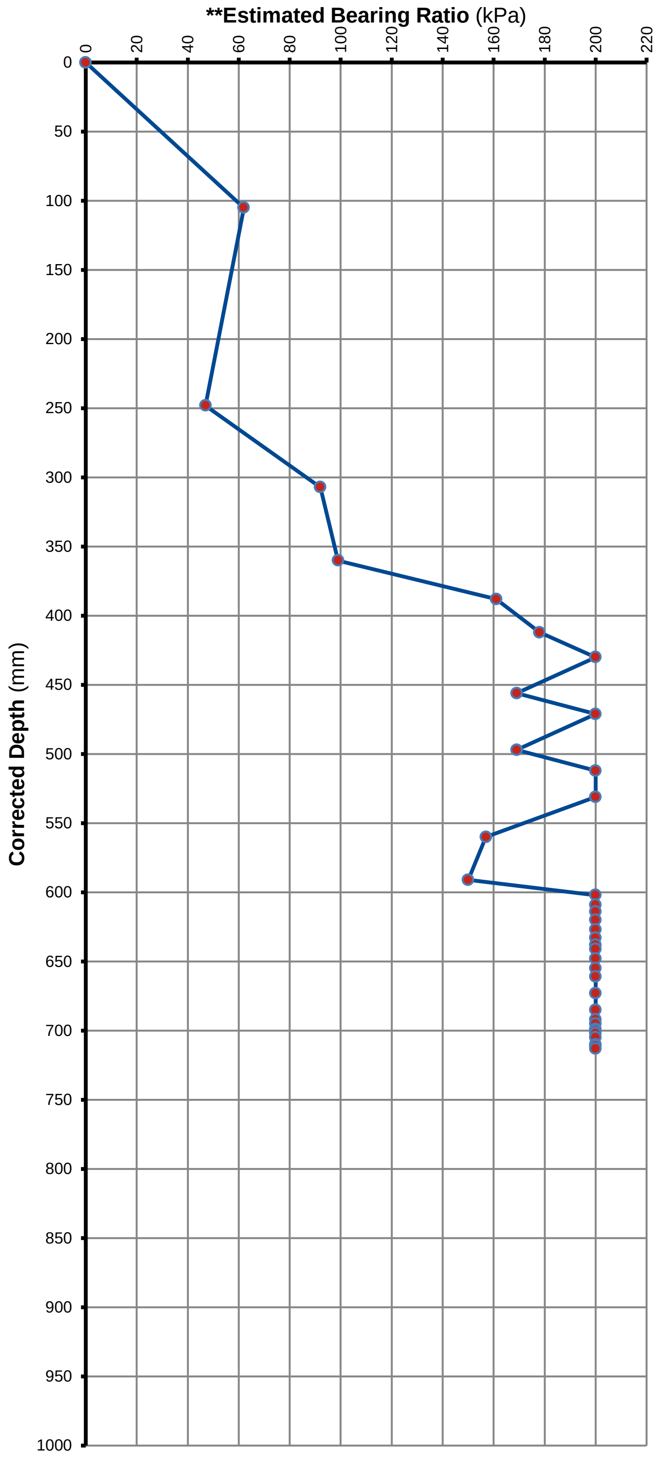
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

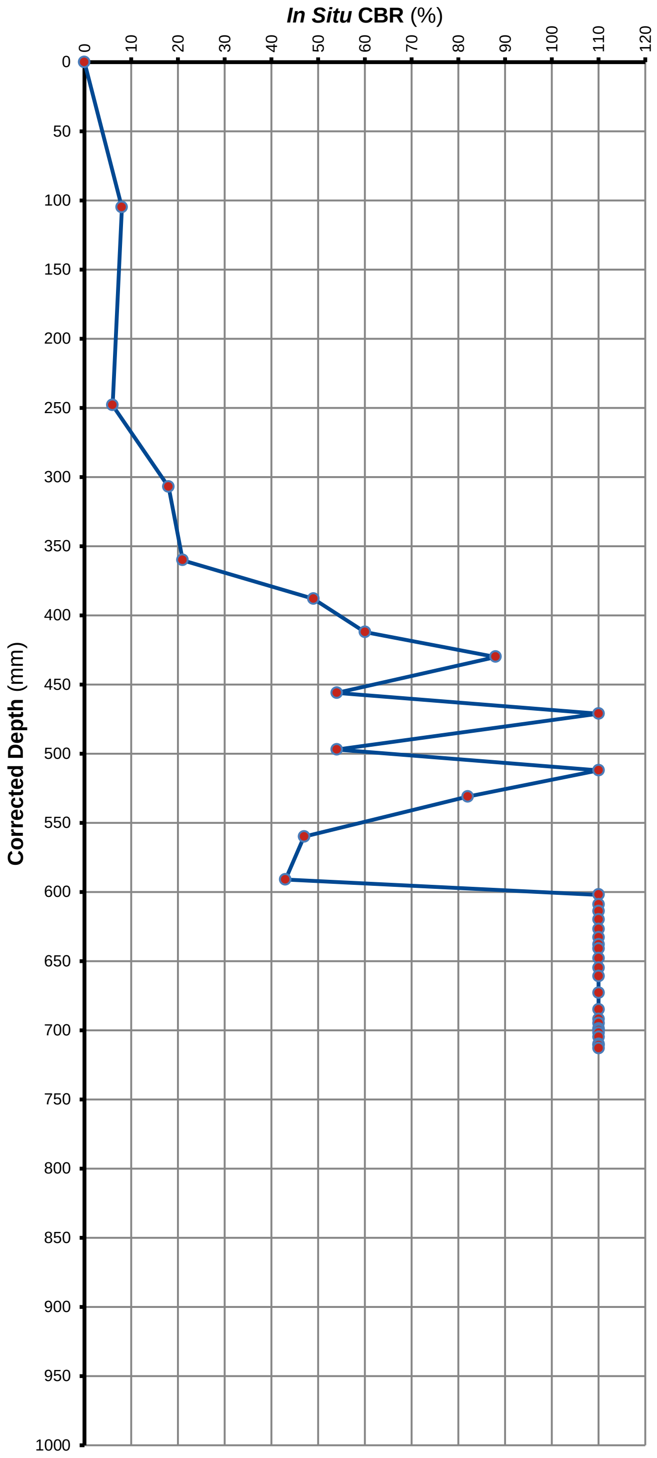
POSITION: DCP79 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 81 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

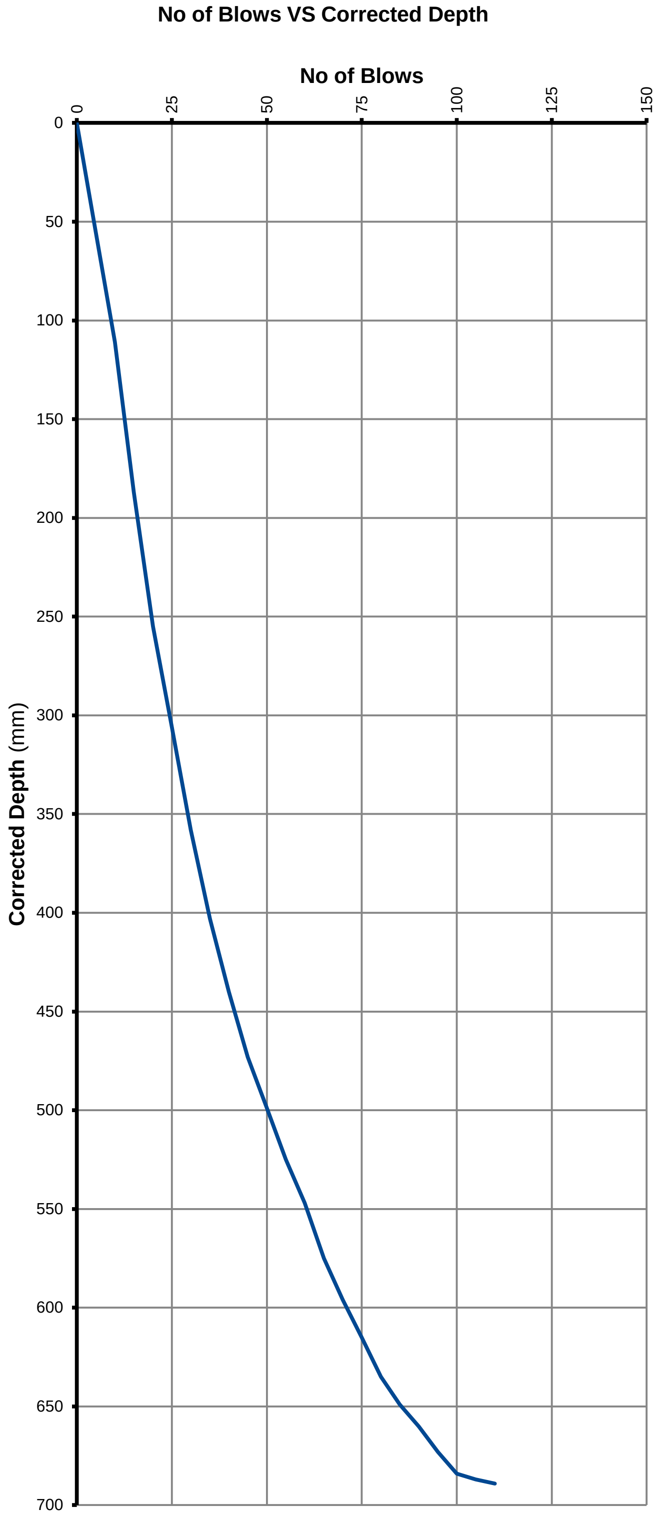
No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	15	0	-	-	-	-	-
5	71	56	56	11.2	Dense	95	20
10	126	111	55	11.0	Dense	97	20
15	202	187	76	15.2	Medium Dense	77	13
20	270	255	68	13.6	Medium Dense	83	15
25	321	306	51	10.2	Dense	102	22
30	373	358	52	10.4	Dense	101	22
35	418	403	45	9.0	Dense	113	26
40	455	440	37	7.4	Dense	132	34
45	488	473	33	6.6	Dense	144	39
50	514	499	26	5.2	Dense	169	54
55	540	525	26	5.2	Dense	169	54
60	562	547	22	4.4	Very Dense	188	68
65	590	575	28	5.6	Dense	161	49
70	611	596	21	4.2	Very Dense	193	72
75	630	615	19	3.8	Very Dense	> 200	82
80	650	635	20	4.0	Very Dense	200	77
85	664	649	14	2.8	Very Dense	> 200	> 110
90	675	660	11	2.2	Very Dense	> 200	> 110
95	688	673	13	2.6	Very Dense	> 200	> 110
100	699	684	11	2.2	Very Dense	> 200	> 110
105	702	687	3	0.6	Very Dense	> 200	> 110
110	704	689	2	0.4	Very Dense	> 200	> 110
115	705	690	1	0.2	Very Dense	> 200	> 110
120	Refusal						

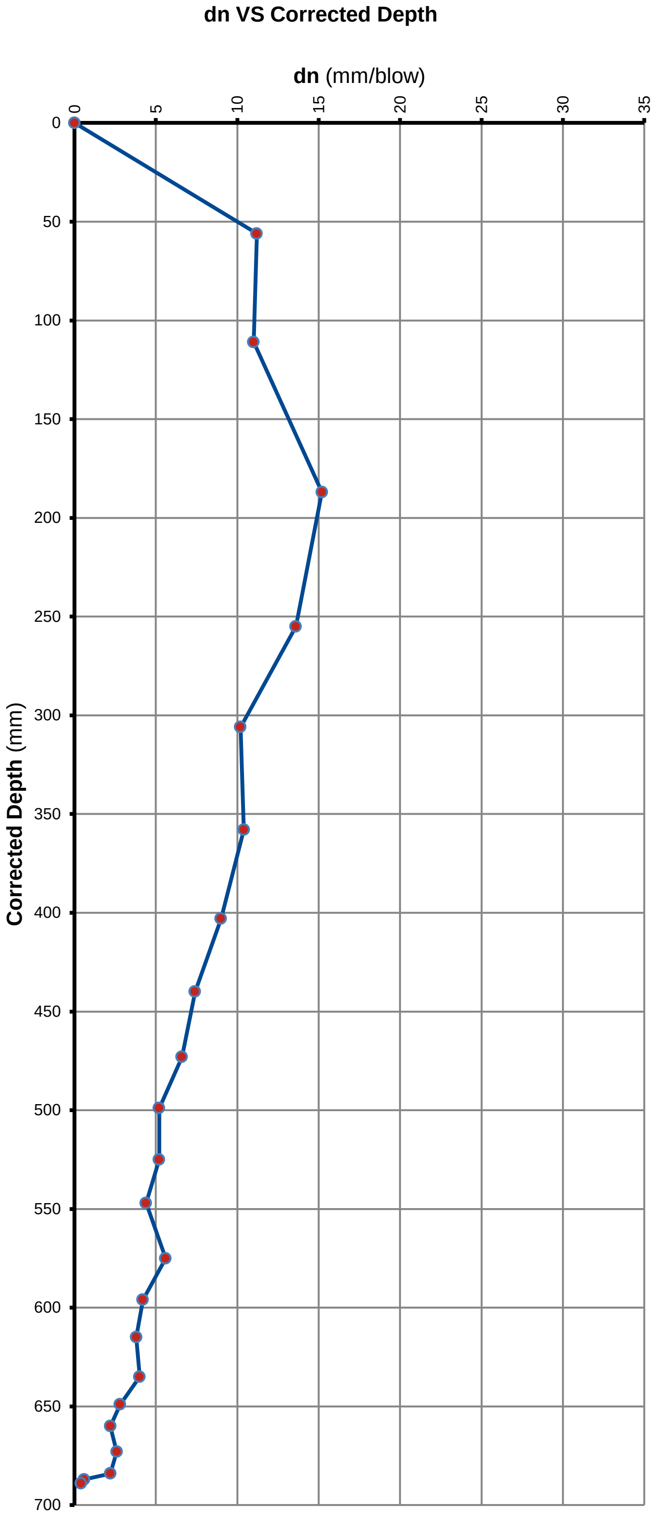
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 81 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

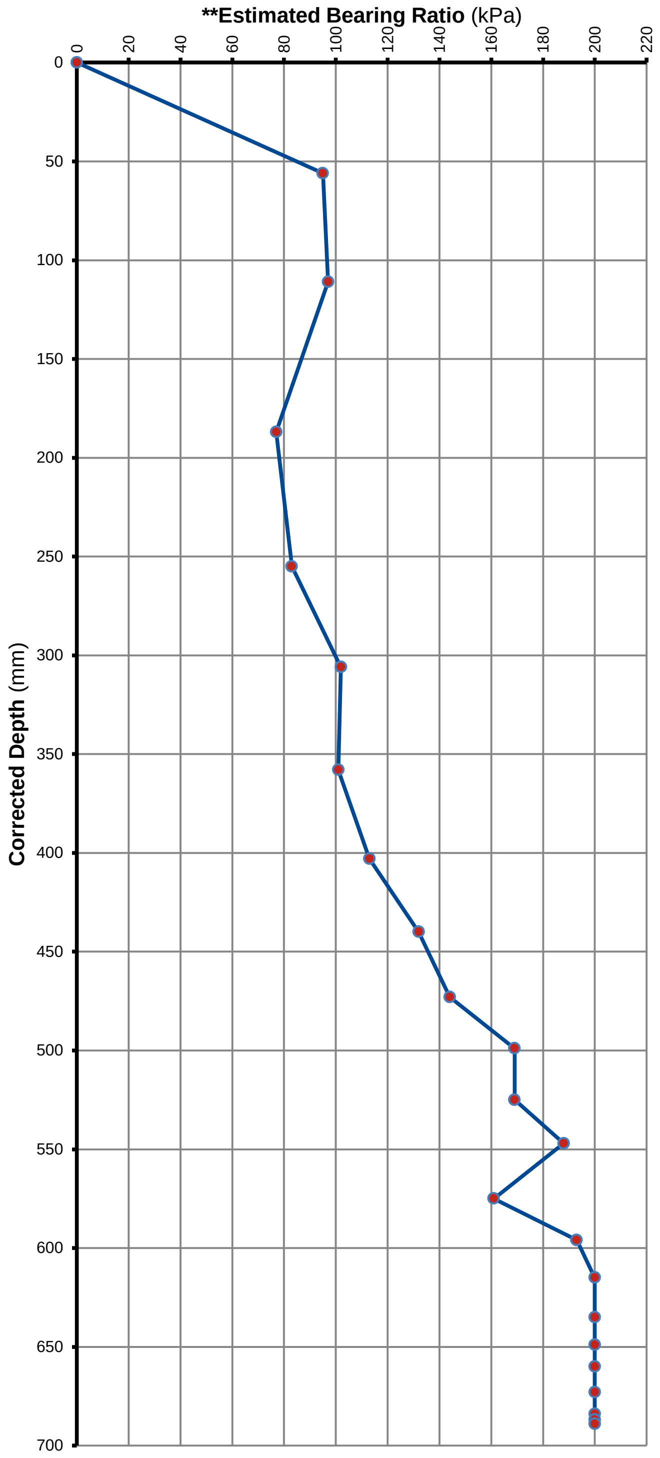
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

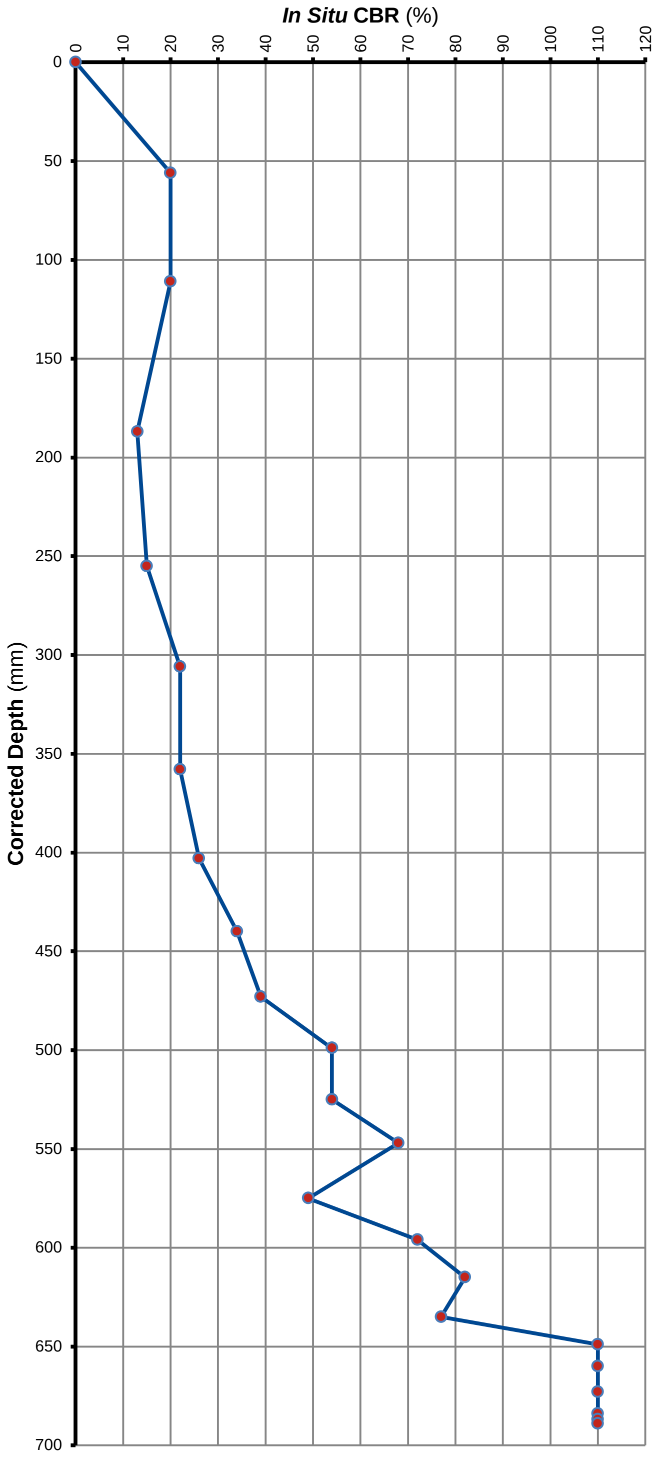
POSITION: DCP 81 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 80 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
0	18	0	-	-	-	-	-
5	98	80	80	16.0	Medium Dense	75	12
10	180	162	82	16.4	Medium Dense	73	12
15	261	243	81	16.2	Medium Dense	74	12
20	328	310	67	13.4	Medium Dense	84	15
25	373	355	45	9.0	Dense	113	26
30	419	401	46	9.2	Dense	111	25
35	460	442	41	8.2	Dense	122	30
40	494	476	34	6.8	Dense	140	38
45	530	512	36	7.2	Dense	134	35
50	574	556	44	8.8	Dense	115	27
55	618	600	44	8.8	Dense	115	27
60	656	638	38	7.6	Dense	129	33
65	683	665	27	5.4	Dense	165	52
70	705	687	22	4.4	Very Dense	188	68
75	722	704	17	3.4	Very Dense	> 200	95
80	740	722	18	3.6	Very Dense	> 200	88
85	752	734	12	2.4	Very Dense	> 200	> 110
90	765	747	13	2.6	Very Dense	> 200	> 110
95	780	762	15	3.0	Very Dense	> 200	> 110
100	798	780	18	3.6	Very Dense	> 200	88
105	806	788	8	1.6	Very Dense	> 200	> 110
110	811	793	5	1.0	Very Dense	> 200	> 110
115	815	797	4	0.8	Very Dense	> 200	> 110
120	825	807	10	2.0	Very Dense	> 200	> 110
125	840	822	15	3.0	Very Dense	> 200	> 110
130	844	826	4	0.8	Very Dense	> 200	> 110
135	845	827	1	0.2	Very Dense	> 200	> 110
140	846	828	1	0.2	Very Dense	> 200	> 110
145	Refusal						

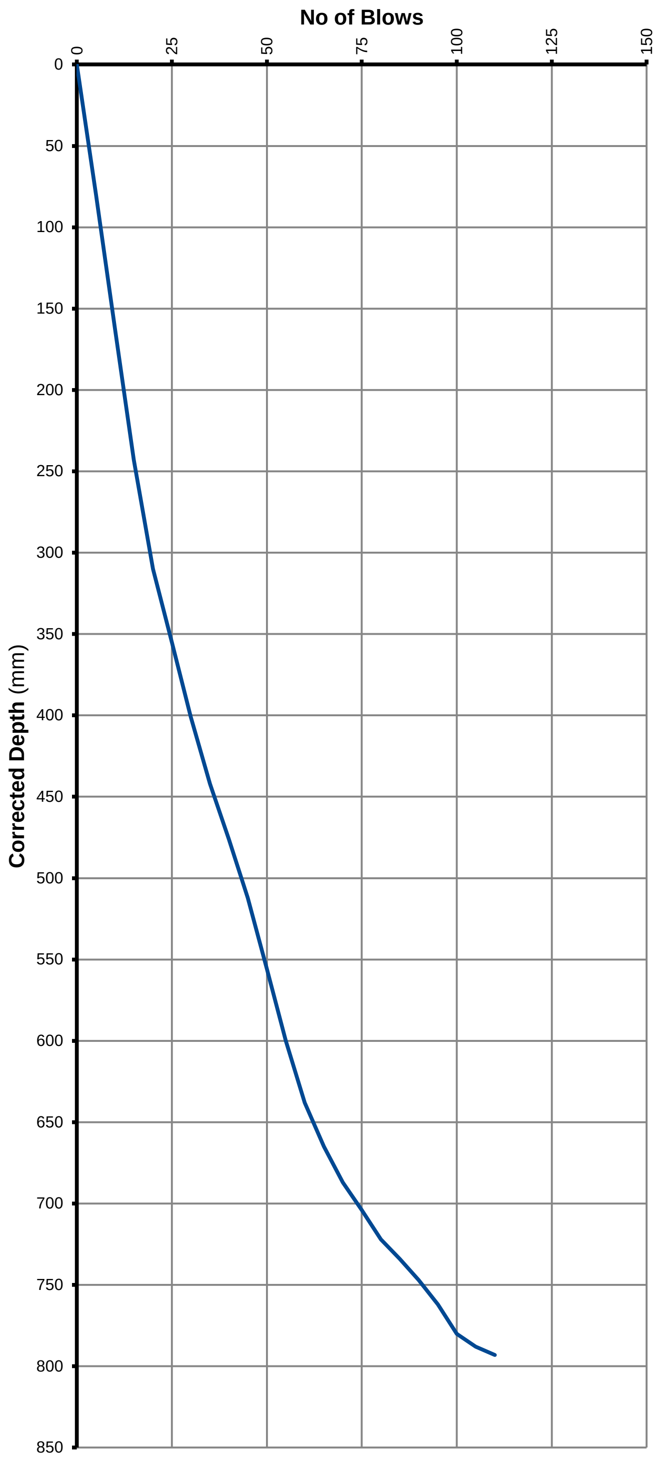
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

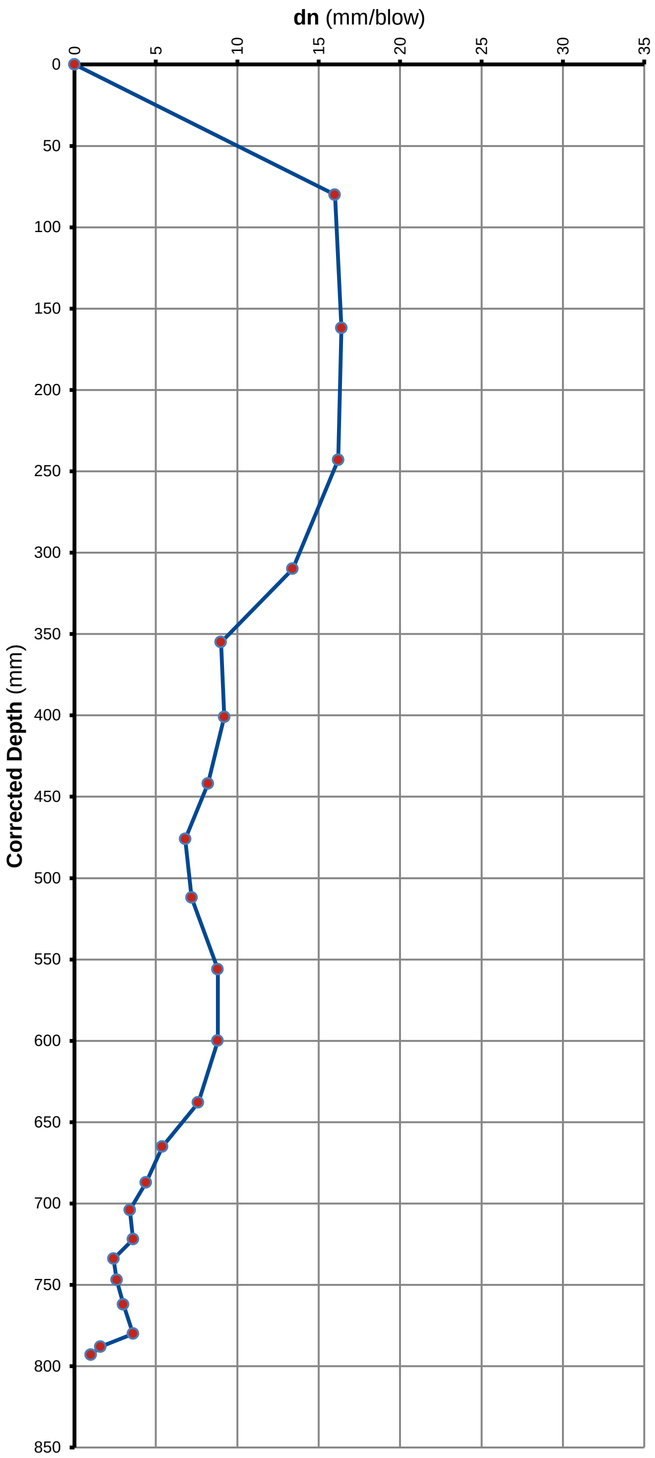
POSITION: DCP 80 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



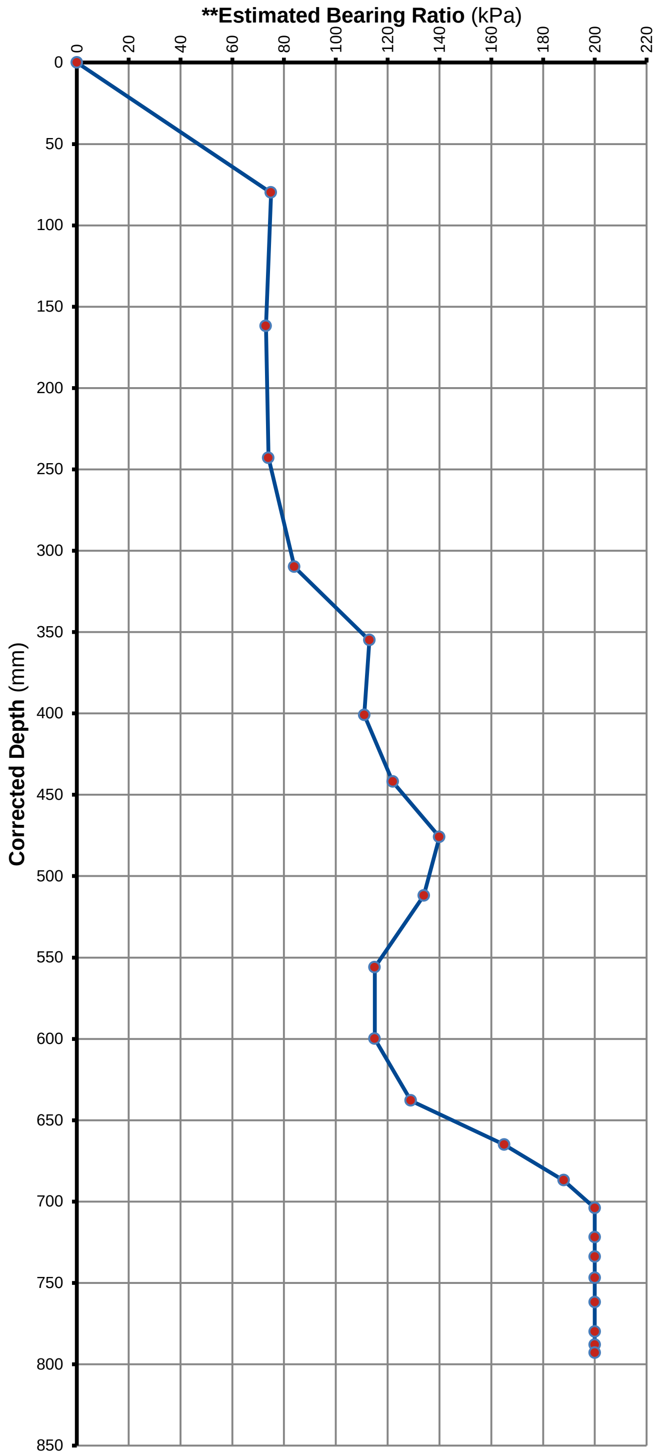
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

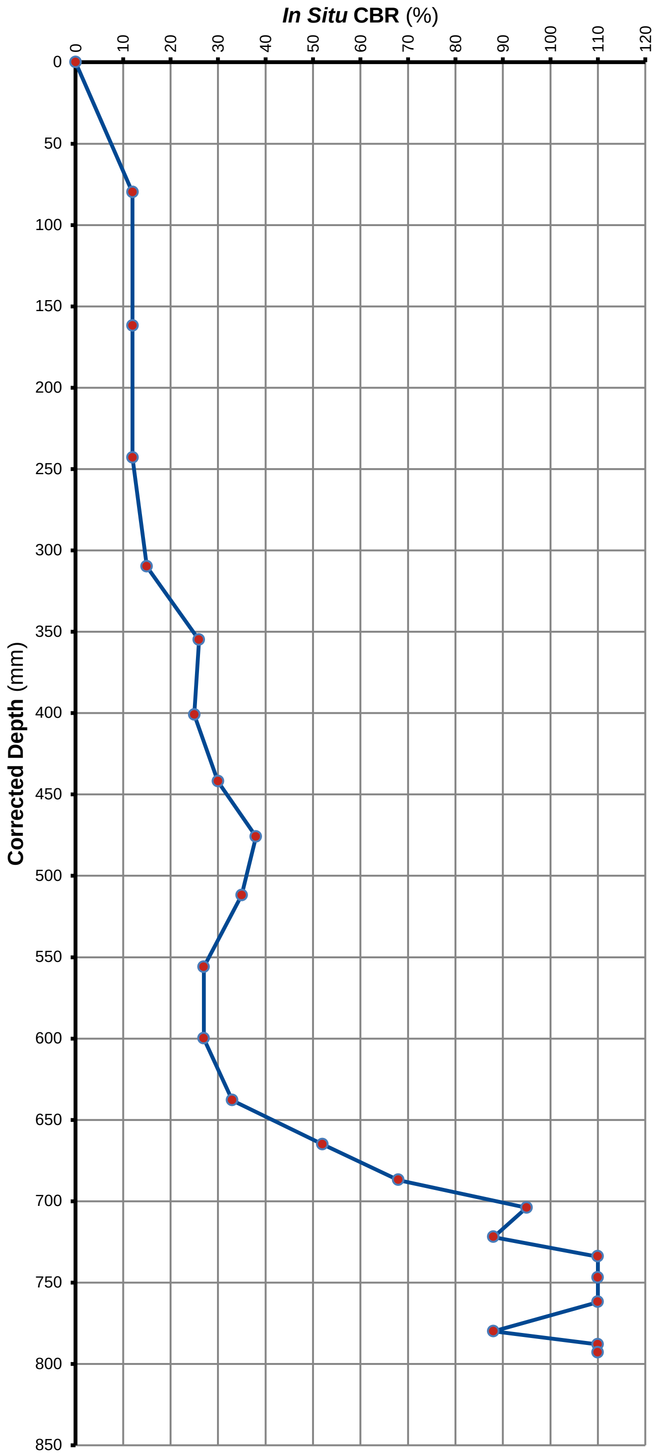
POSITION: DCP 80 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

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*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 83 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

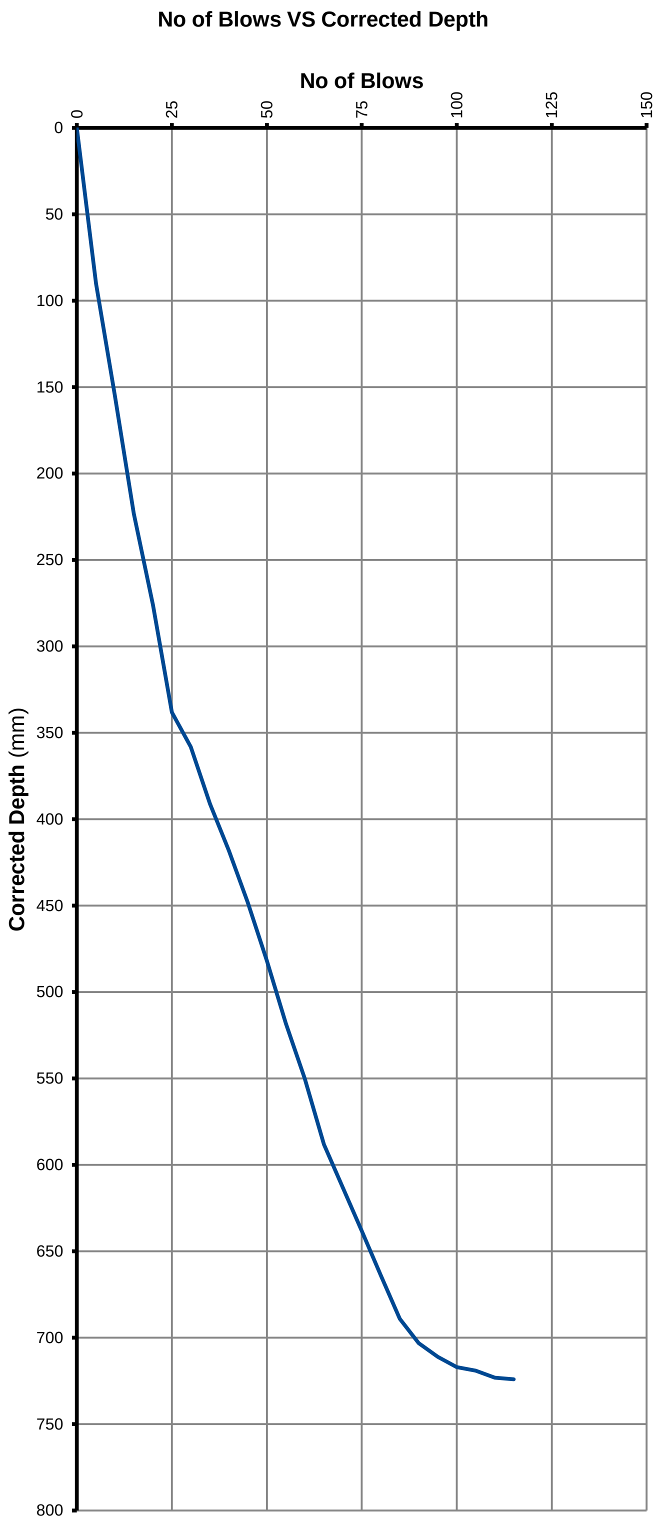
No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	12	0	-	-	-	-	-
5	102	90	90	18.0	Medium Dense	69	10
10	167	155	65	13.0	Medium Dense	86	16
15	235	223	68	13.6	Medium Dense	83	15
20	288	276	53	10.6	Dense	99	21
25	350	338	62	12.4	Dense	89	17
30	370	358	20	4.0	Very Dense	200	77
35	403	391	33	6.6	Dense	144	39
40	430	418	27	5.4	Dense	165	52
45	460	448	30	6.0	Dense	154	45
50	494	482	34	6.8	Dense	140	38
55	530	518	36	7.2	Dense	134	35
60	562	550	32	6.4	Dense	147	41
65	600	588	38	7.6	Dense	129	33
70	625	613	25	5.0	Very Dense	174	57
75	650	638	25	5.0	Very Dense	174	57
80	676	664	26	5.2	Dense	169	54
85	701	689	25	5.0	Very Dense	174	57
90	715	703	14	2.8	Very Dense	> 200	> 110
95	723	711	8	1.6	Very Dense	> 200	> 110
100	729	717	6	1.2	Very Dense	> 200	> 110
105	731	719	2	0.4	Very Dense	> 200	> 110
110	735	723	4	0.8	Very Dense	> 200	> 110
115	736	724	1	0.2	Very Dense	> 200	> 110
120	Refusal						

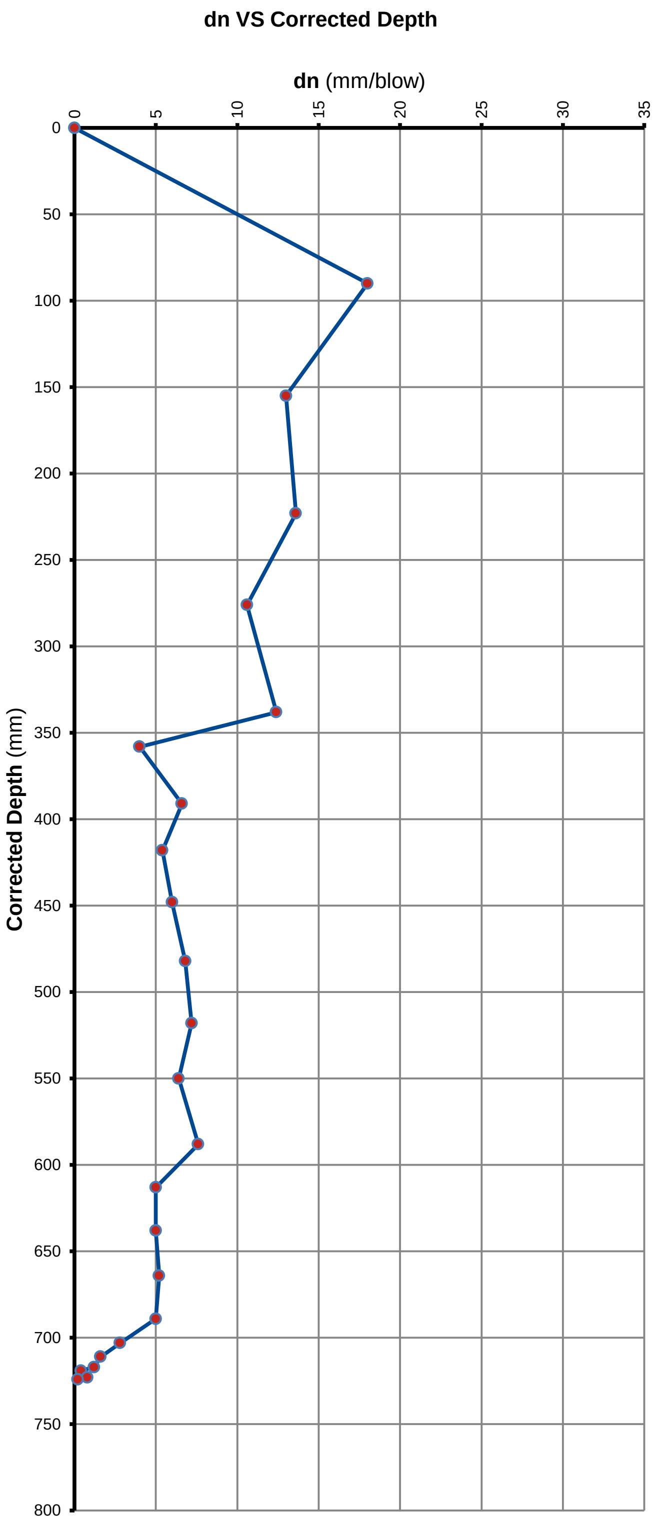
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 83 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)


No of Blows VS Corrected Depth


dn VS Corrected Depth

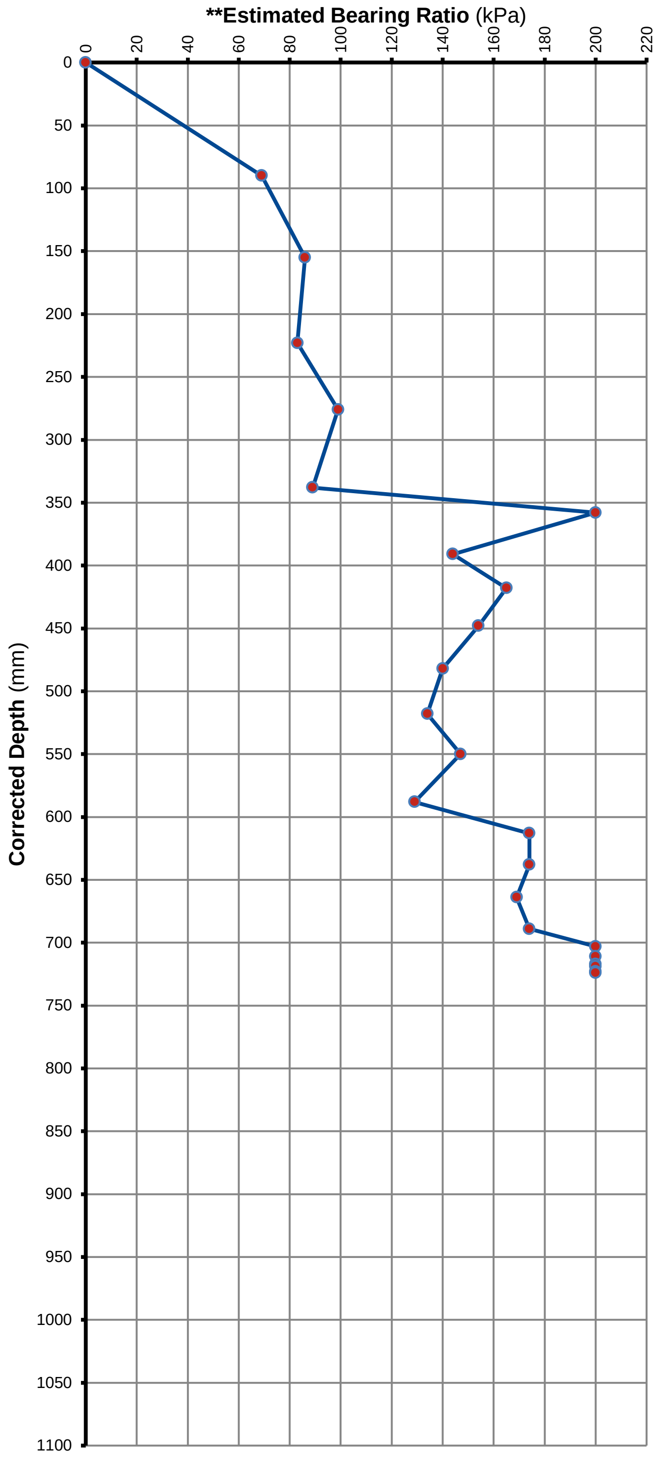
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

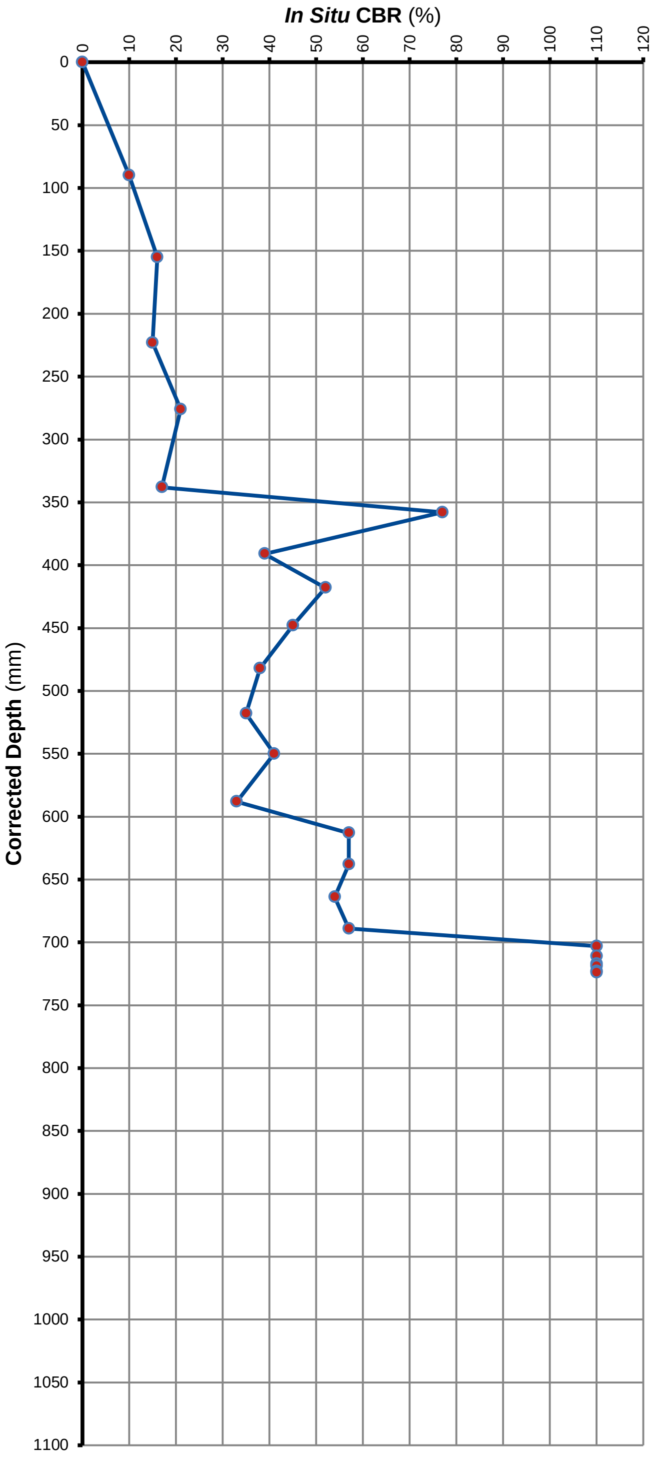
POSITION: DCP 83 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 84 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	20	0	-	-	-	-	-
5	125	105	105	21.0	Medium Dense	62	8
10	243	223	118	23.6	Medium Dense	56	7
15	303	283	60	12.0	Dense	91	18
20	355	335	52	10.4	Dense	101	22
25	400	380	45	9.0	Dense	113	26
30	437	417	37	7.4	Dense	132	34
35	470	450	33	6.6	Dense	144	39
40	502	482	32	6.4	Dense	147	41
45	534	514	32	6.4	Dense	147	41
50	571	551	37	7.4	Dense	132	34
55	590	570	19	3.8	Very Dense	> 200	82
60	622	602	32	6.4	Dense	147	41
65	650	630	28	5.6	Dense	161	49
70	677	657	27	5.4	Dense	165	52
75	700	680	23	4.6	Very Dense	183	64
80	729	709	29	5.8	Dense	157	47
85	750	730	21	4.2	Very Dense	193	72
90	779	759	29	5.8	Dense	157	47
95	801	781	22	4.4	Very Dense	188	68
100	830	810	29	5.8	Dense	157	47
105	851	831	21	4.2	Very Dense	193	72
110	885	865	34	6.8	Dense	140	38
115	910	890	25	5.0	Very Dense	174	57
120	933	913	23	4.6	Very Dense	183	64
125	956	936	23	4.6	Very Dense	183	64
130	988	968	32	6.4	Dense	147	41
135	1020	1000	32	6.4	Dense	147	41
140	1045	1025	25	5.0	Very Dense	174	57
145	1074	1054	29	5.8	Dense	157	47
150	1100	1080	26	5.2	Dense	169	54
155	1122	1102	22	4.4	Very Dense	188	68
160	1160	1140	38	7.6	Dense	129	33
165	1181	1161	21	4.2	Very Dense	193	72
170	1203	1183	22	4.4	Very Dense	188	68
175	1216	1196	13	2.6	Very Dense	> 200	> 110
180	1240	1220	24	4.8	Very Dense	178	60
185	1259	1239	19	3.8	Very Dense	> 200	82
190	1278	1258	19	3.8	Very Dense	> 200	82
195	1298	1278	20	4.0	Very Dense	200	77
200	1315	1295	17	3.4	Very Dense	> 200	95
205	1330	1310	15	3.0	Very Dense	> 200	> 110
210	1350	1330	20	4.0	Very Dense	200	77
215	1363	1343	13	2.6	Very Dense	> 200	> 110
220	1378	1358	15	3.0	Very Dense	> 200	> 110
225	1394	1374	16	3.2	Very Dense	> 200	103
230	1411	1391	17	3.4	Very Dense	> 200	95
235	1432	1412	21	4.2	Very Dense	193	72
240	1454	1434	22	4.4	Very Dense	188	68
245	1475	1455	21	4.2	Very Dense	193	72
250	1501	1481	26	5.2	Dense	169	54

** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 84 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	**Depth** (mm)	**Corrected Depth** (mm)	**Penetration Tempo**	**dn** (mm/blow)	**Consistency**	****Estimated Bearing Ratio** (kPa)	***In Situ* CBR**
255	1530	1510	29	5.8	Dense	157	47
260	1545	1525	15	3.0	Very Dense	> 200	> 110
265	1561	1541	16	3.2	Very Dense	> 200	103
270	1575	1555	14	2.8	Very Dense	> 200	> 110
275	1593	1573	18	3.6	Very Dense	> 200	88
280	1609	1589	16	3.2	Very Dense	> 200	103
285	1628	1608	19	3.8	Very Dense	> 200	82
290	1640	1620	12	2.4	Very Dense	> 200	> 110
295	1657	1637	17	3.4	Very Dense	> 200	95
300	1675	1655	18	3.6	Very Dense	> 200	88
305	1687	1667	12	2.4	Very Dense	> 200	> 110
310	1699	1679	12	2.4	Very Dense	> 200	> 110
315	1719	1699	20	4.0	Very Dense	200	77
320	1738	1718	19	3.8	Very Dense	> 200	82
325	1750	1730	12	2.4	Very Dense	> 200	> 110
330	1761	1741	11	2.2	Very Dense	> 200	> 110
335	1776	1756	15	3.0	Very Dense	> 200	> 110
340	1790	1770	14	2.8	Very Dense	> 200	> 110
345	1799	1779	9	1.8	Very Dense	> 200	> 110
350	1817	1797	18	3.6	Very Dense	> 200	88
355	1831	1811	14	2.8	Very Dense	> 200	> 110
360	1845	1825	14	2.8	Very Dense	> 200	> 110
365	1864	1844	19	3.8	Very Dense	> 200	82
370	1880	1860	16	3.2	Very Dense	> 200	103
375	1897	1877	17	3.4	Very Dense	> 200	95
380	1910	1890	13	2.6	Very Dense	> 200	> 110
385	1921	1901	11	2.2	Very Dense	> 200	> 110
390	1940	1920	19	3.8	Very Dense	> 200	82
395	1958	1938	18	3.6	Very Dense	> 200	88
400	1970	1950	12	2.4	Very Dense	> 200	> 110
405	1984	1964	14	2.8	Very Dense	> 200	> 110
410	1997	1977	13	2.6	Very Dense	> 200	> 110

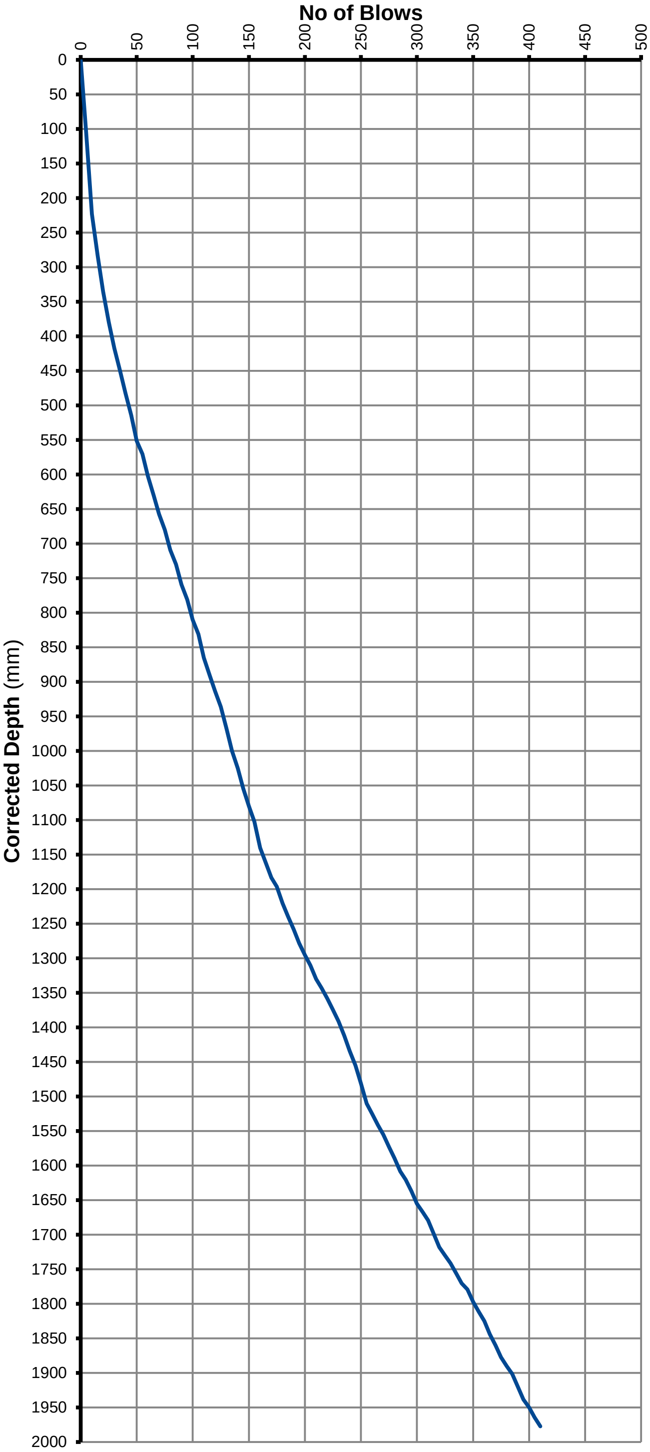
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 84 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



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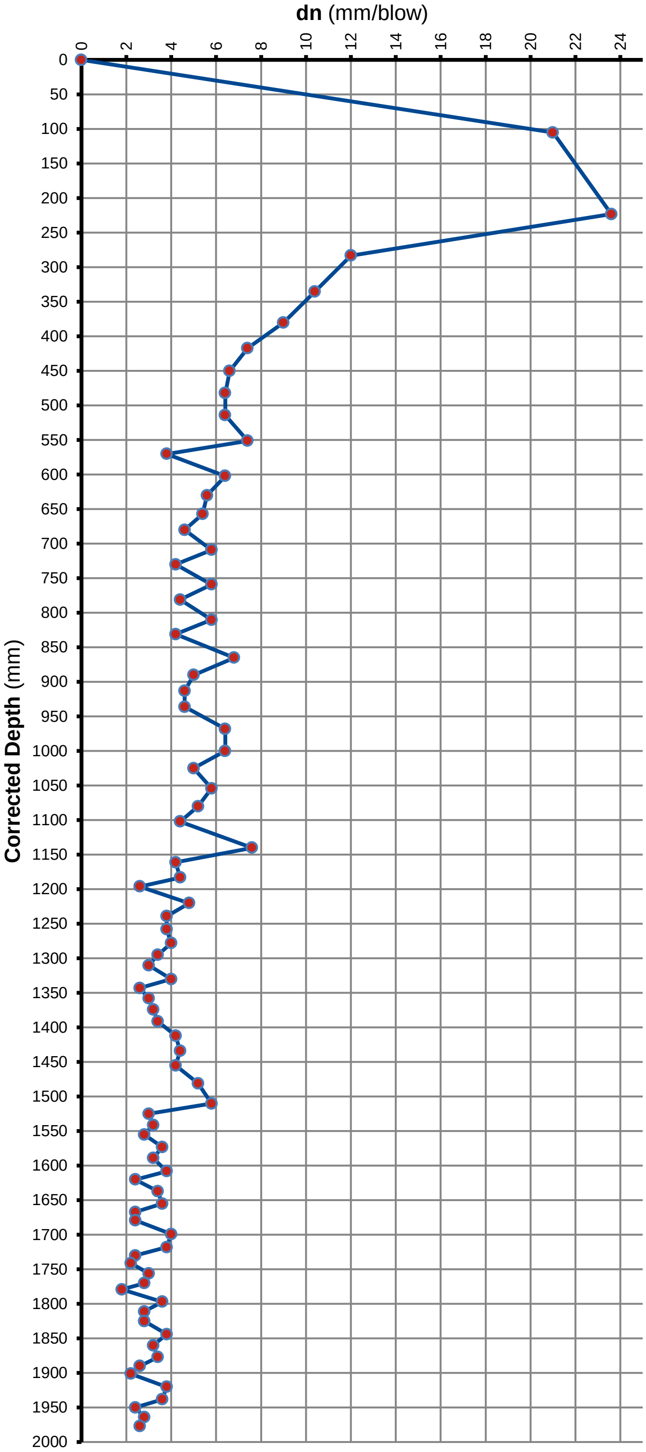


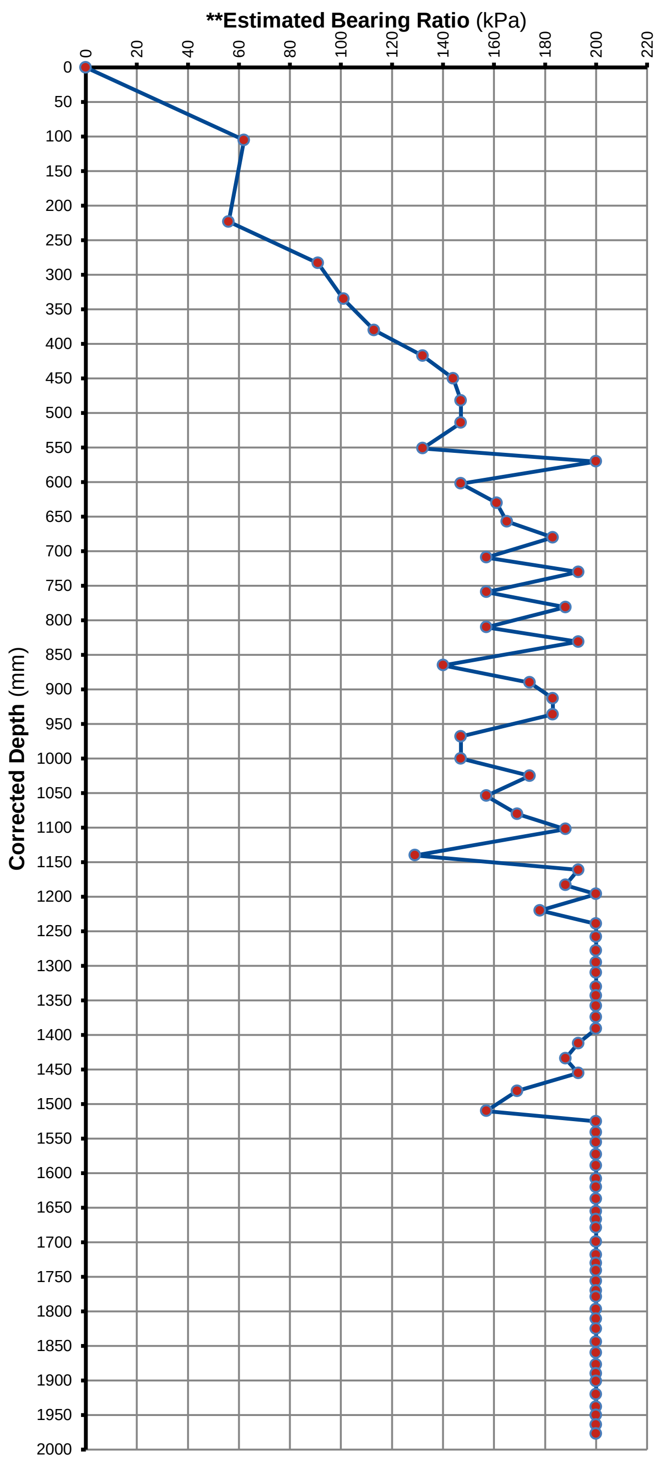
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

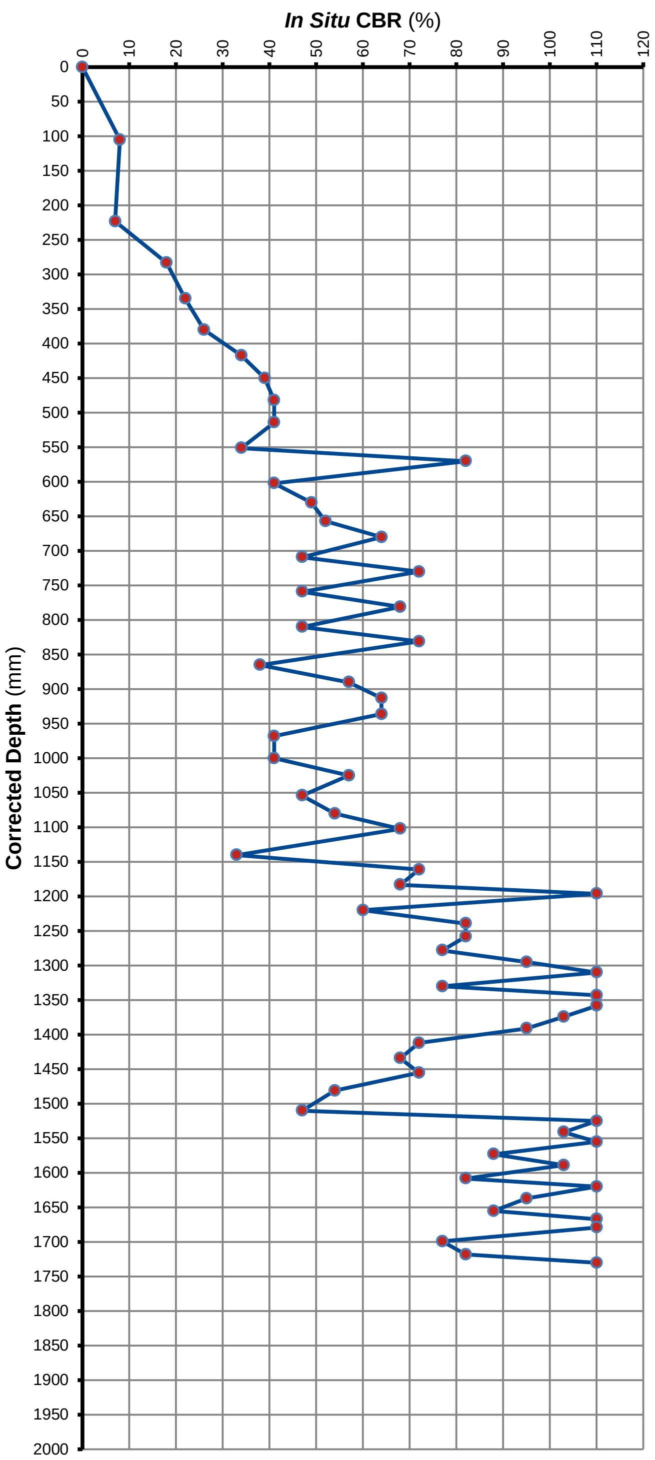
POSITION: DCP 84 **DEPTH BELOW NGL:** 0.000m

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

POSITION: DCP 85 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows	Depth (mm)	Corrected Depth (mm)	Penetration Tempo	dn (mm/blow)	Consistency	**Estimated Bearing Ratio (kPa)	*In Situ* CBR
0	13	0	-	-	-	-	-
5	90	77	77	15.4	Medium Dense	76	13
10	173	160	83	16.6	Medium Dense	73	12
15	262	249	89	17.8	Medium Dense	70	11
20	310	297	48	9.6	Dense	107	24
25	356	343	46	9.2	Dense	111	25
30	387	374	31	6.2	Dense	150	43
35	409	396	22	4.4	Very Dense	188	68
40	430	417	21	4.2	Very Dense	193	72
45	455	442	25	5.0	Very Dense	174	57
50	510	497	55	11.0	Dense	97	20
55	565	552	55	11.0	Dense	97	20
60	620	607	55	11.0	Dense	97	20
65	660	647	40	8.0	Dense	124	31
70	691	678	31	6.2	Dense	150	43
75	724	711	33	6.6	Dense	144	39
80	740	727	16	3.2	Very Dense	> 200	103
85	759	746	19	3.8	Very Dense	> 200	82
90	761	748	2	0.4	Very Dense	> 200	> 110
95	768	755	7	1.4	Very Dense	> 200	> 110
100	773	760	5	1.0	Very Dense	> 200	> 110
105	778	765	5	1.0	Very Dense	> 200	> 110
110	780	767	2	0.4	Very Dense	> 200	> 110
115	781	768	1	0.2	Very Dense	> 200	> 110
120	Refusal						

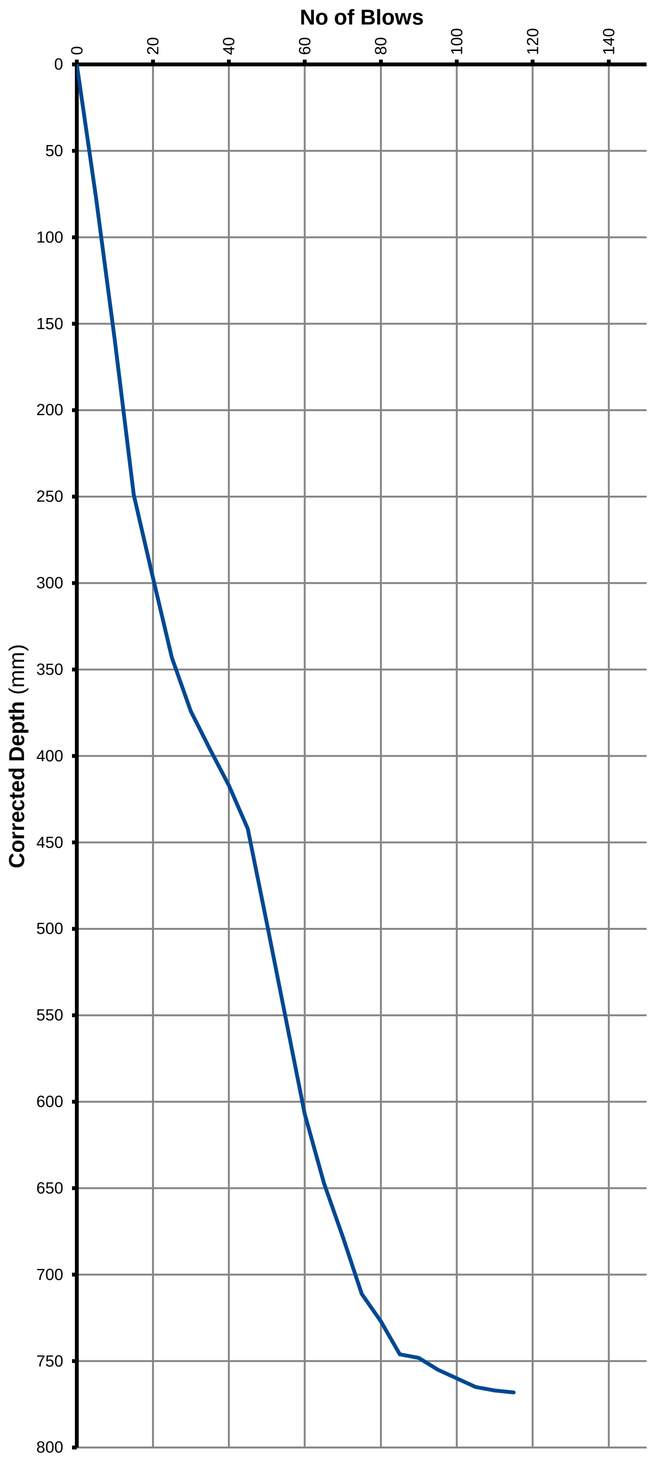
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

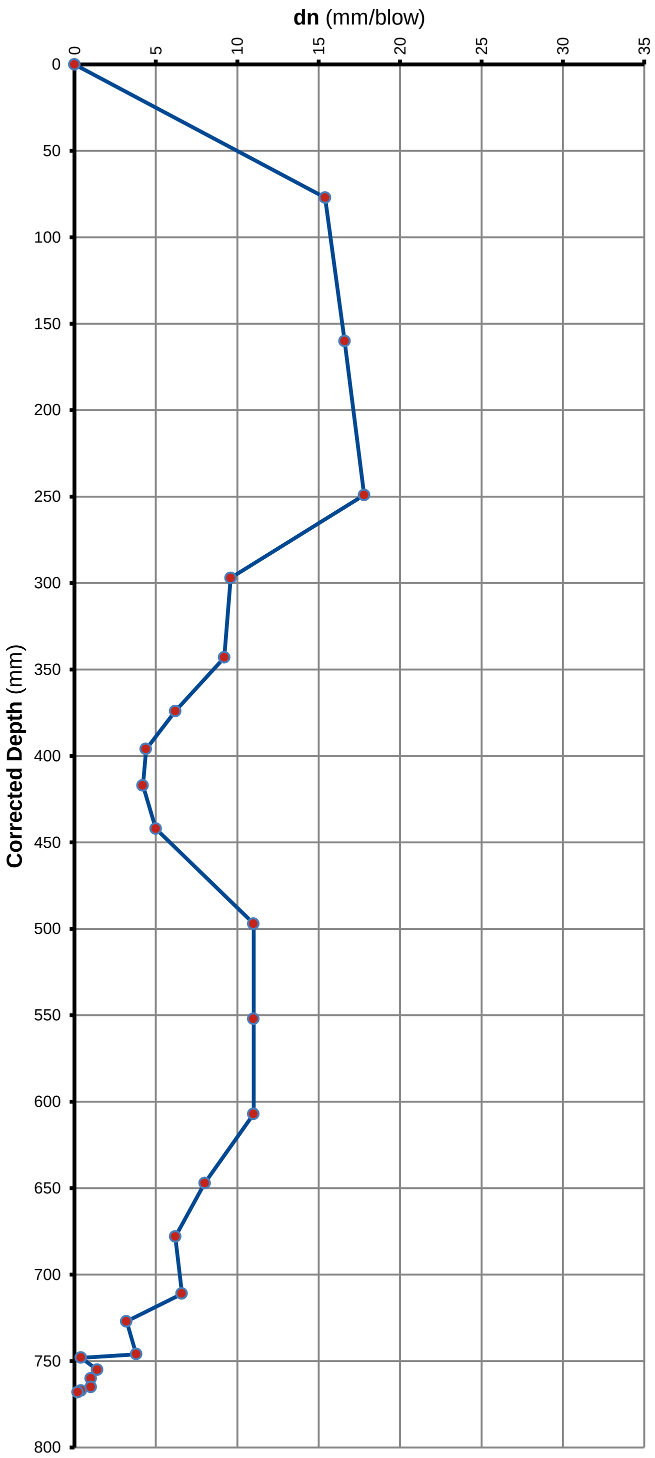
POSITION: DCP 85 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

No of Blows VS Corrected Depth



dn VS Corrected Depth



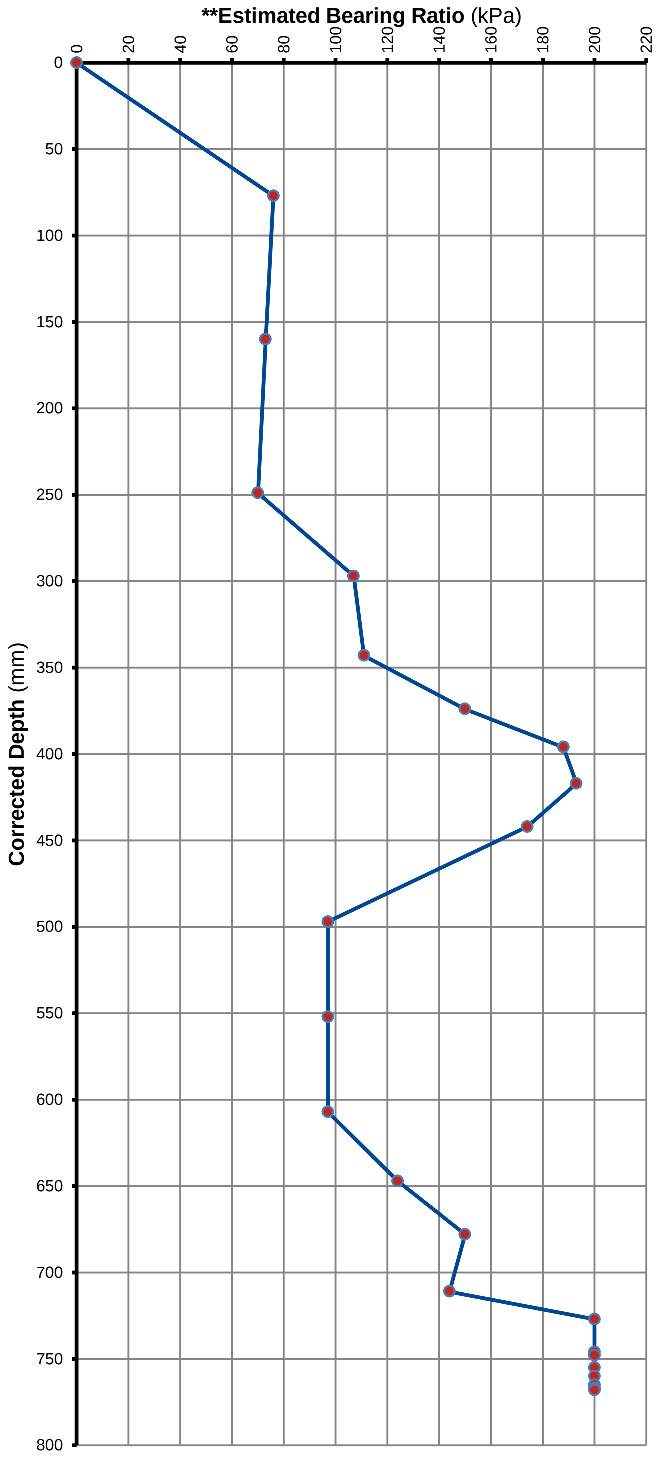
** According to Dr B van Wyk's Method

*DYNAMIC CONE PENETROMETER (DCP) TEST

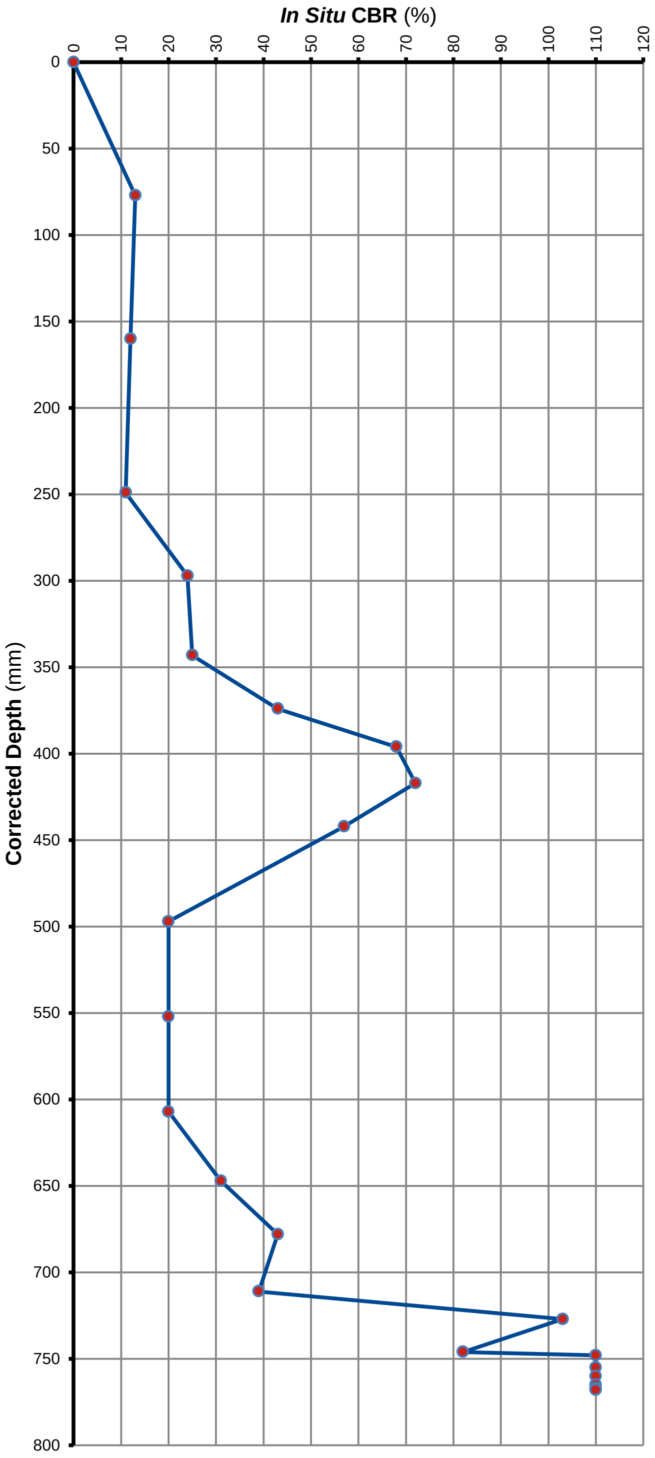
POSITION: DCP 85 **DEPTH BELOW NGL:** 0

*DYNAMIC CONE PENETROMETER TEST RESULT SUMMARY (TMH 6: 1984, METHOD ST6)

****Estimated Bearing Ratio VS Corrected Depth**



***In Situ* CBR VS Corrected Depth**



** According to Dr B van Wyk's Method

APPENDIX F

TEST PIT PHOTOS

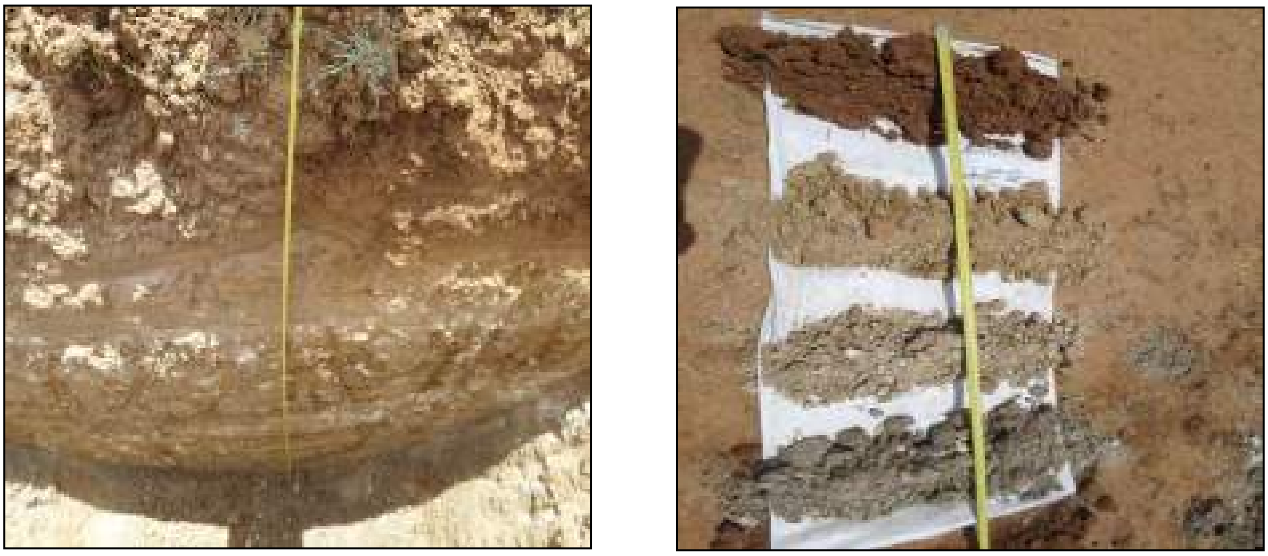
Simlab
(EDMS) BEPERK GEOTEGNIESE DIENSTE
(PTY) LIMITED GEOTECHNICAL SERVICES
sanas Testing Laboratory
T0455
REG. No. 1987/004282/07
VLA No. 2012/187
6249, BLOEMFONTEIN, 9300, SOUTH AFRICA. Cnr. Lunn Road & Grey Street, Hilton, BLOEMFONTEIN, 9301
+27 (0) 51 447 02245, +27 (0) 82 821 9435, +27 (0) 51 448 8329, simbfn@simlab.co.za

TEST PIT PHOTOS

TEST PIT 1

TEST PIT 2

TEST PIT PHOTOS



TEST PIT 3

TEST PIT 4

TEST PIT PHOTOS

TEST PIT 5

TEST PIT 6

TEST PIT PHOTOS

TEST PIT 7

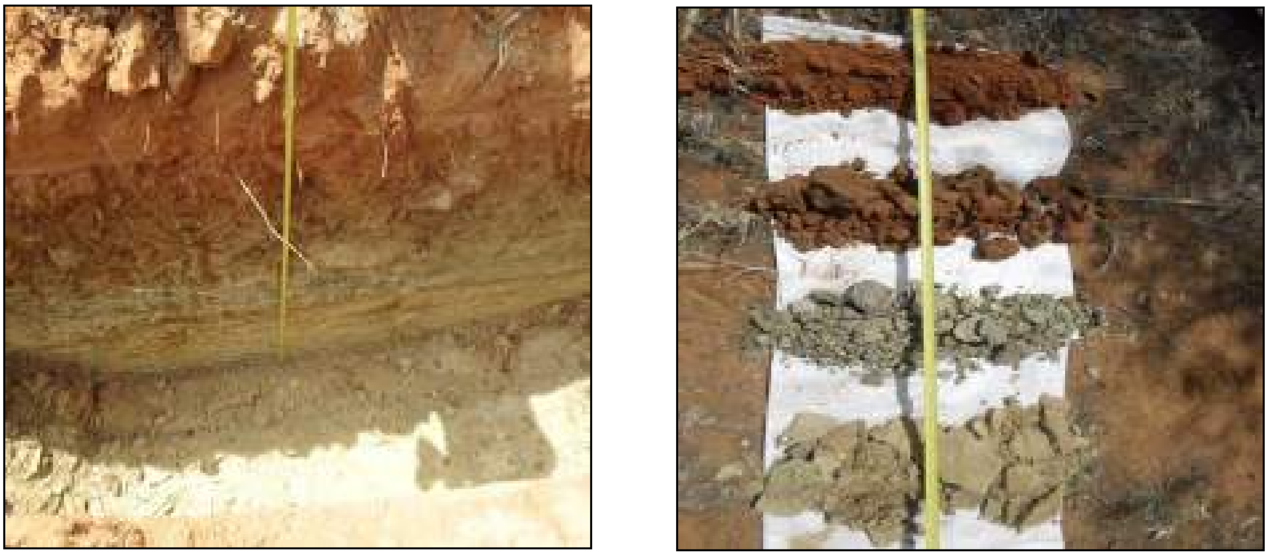
TEST PIT 8

TEST PIT PHOTOS

TEST PIT 9

TEST PIT 10

TEST PIT PHOTOS



TEST PIT 11

TEST PIT 15

TEST PIT PHOTOS

TEST PIT 17

TEST PIT 19

TEST PIT PHOTOS

TEST PIT 20

TEST PIT 22

TEST PIT PHOTOS

TEST PIT 23

TEST PIT 24

TEST PIT PHOTOS

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TEST PIT PHOTOS

TEST PIT 29

TEST PIT 30

TEST PIT PHOTOS


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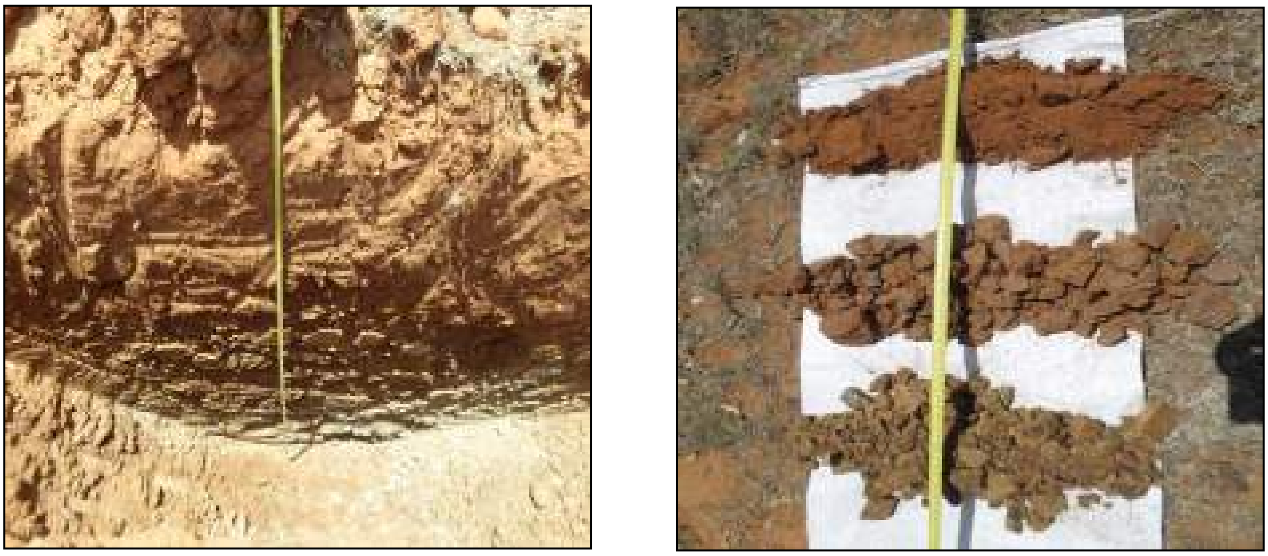
TEST PIT 34

TEST PIT PHOTOS

TEST PIT 36

TEST PIT 37

TEST PIT PHOTOS



TEST PIT 39

TEST PIT 40

TEST PIT PHOTOS

TEST PIT 44

TEST PIT 45

TEST PIT PHOTOS

TEST PIT 50

TEST PIT 51

TEST PIT PHOTOS

TEST PIT 52

TEST PIT 53

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TEST PIT 86

TEST PIT 89

TEST PIT PHOTOS

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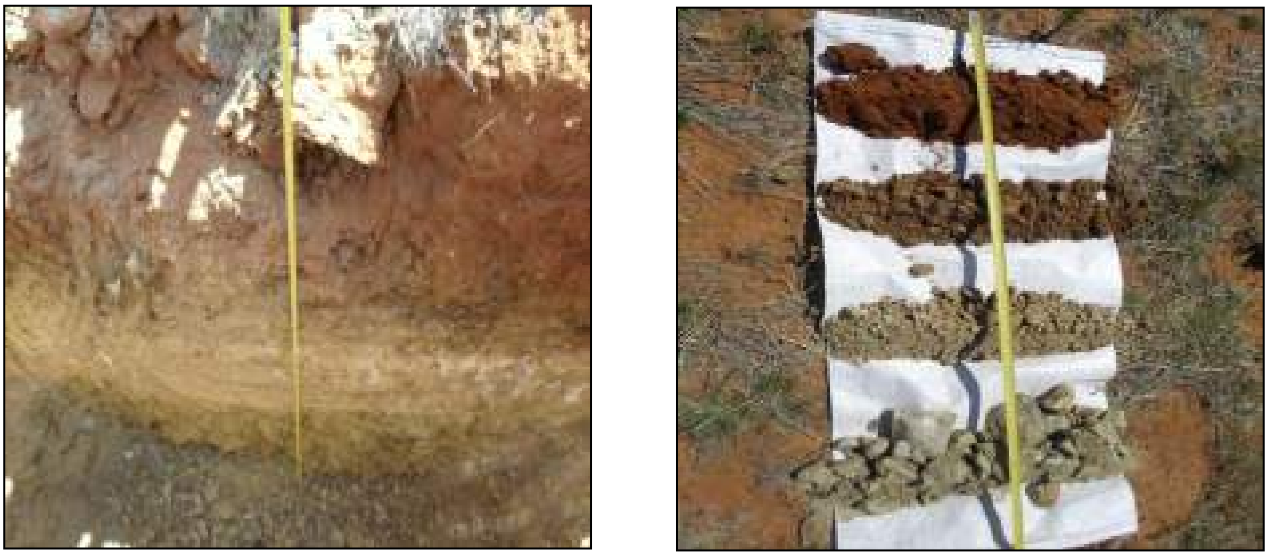
TEST PIT PHOTOS

TEST PIT 95

TEST PIT 96

TEST PIT PHOTOS



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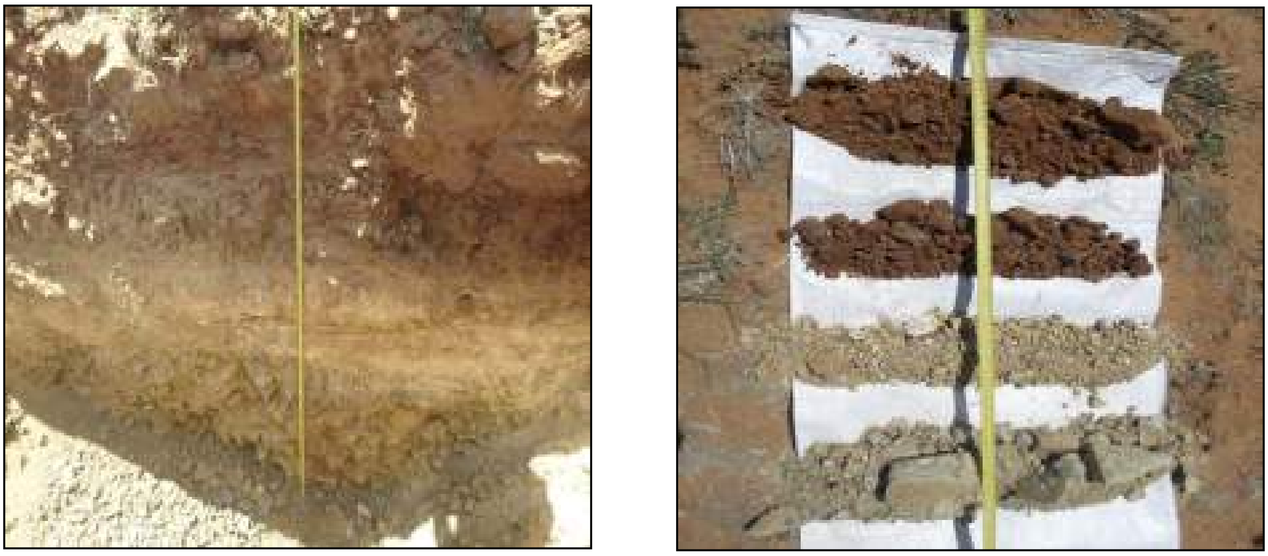
TEST PIT 98

TEST PIT PHOTOS



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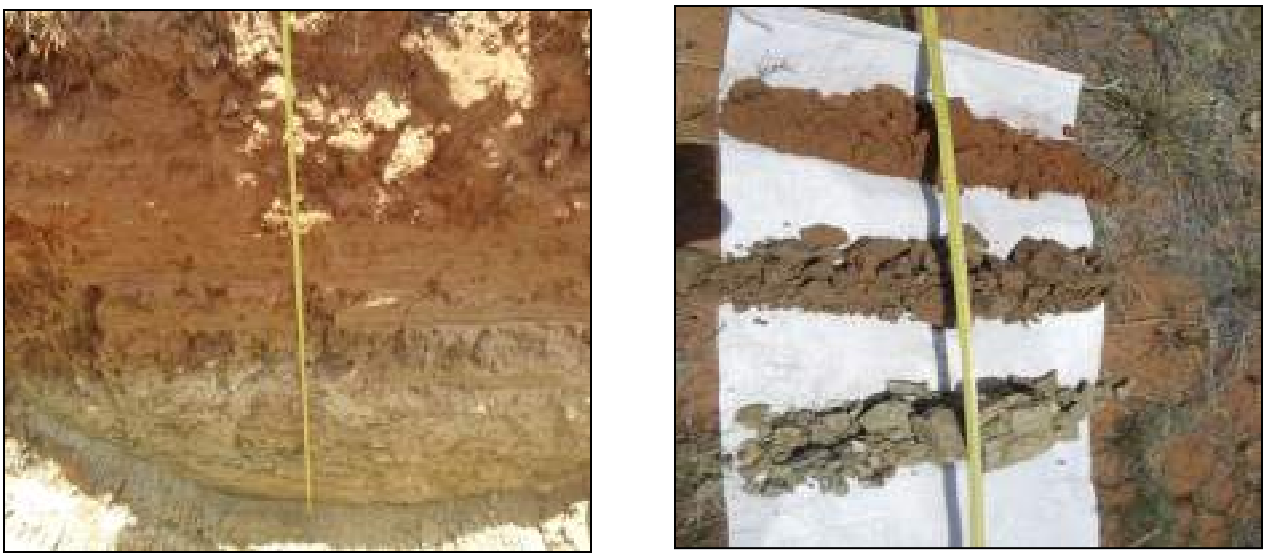

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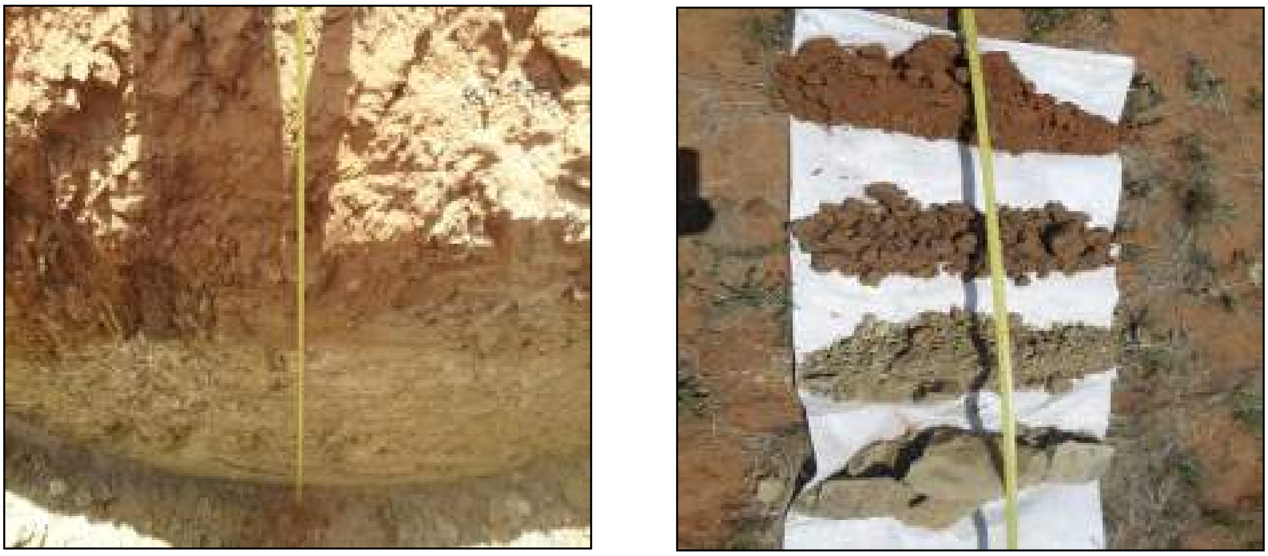

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TEST PIT PHOTOS

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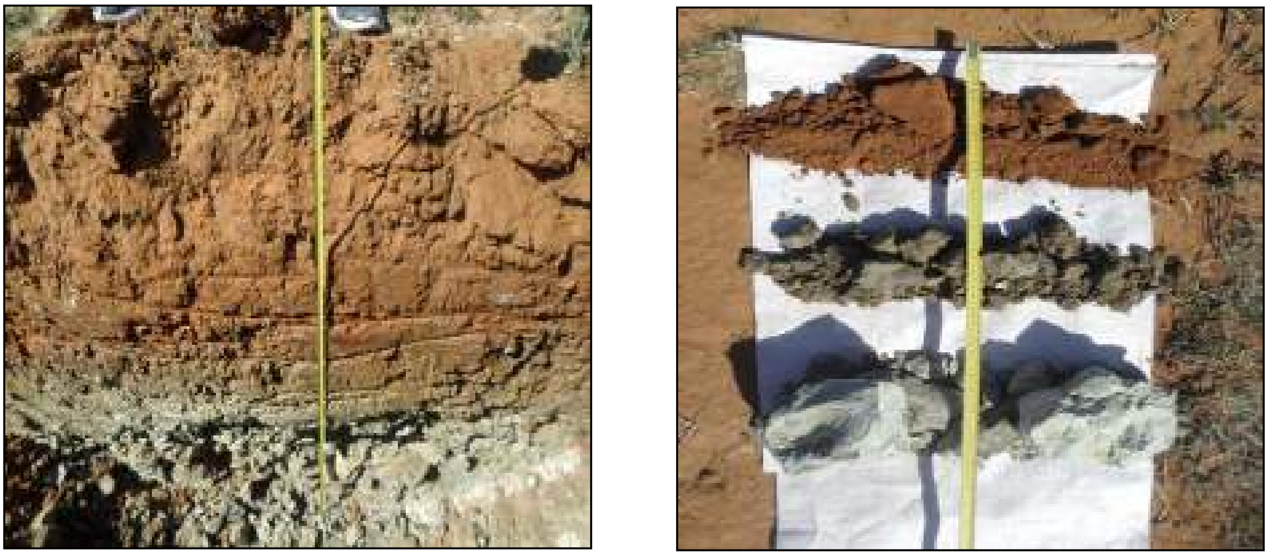
TEST PIT 104

TEST PIT PHOTOS

TEST PIT 105

TEST PIT 109

TEST PIT PHOTOS



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TEST PIT 111

TEST PIT PHOTOS

TEST PIT 112

TEST PIT 113

TEST PIT PHOTOS

TEST PIT 114

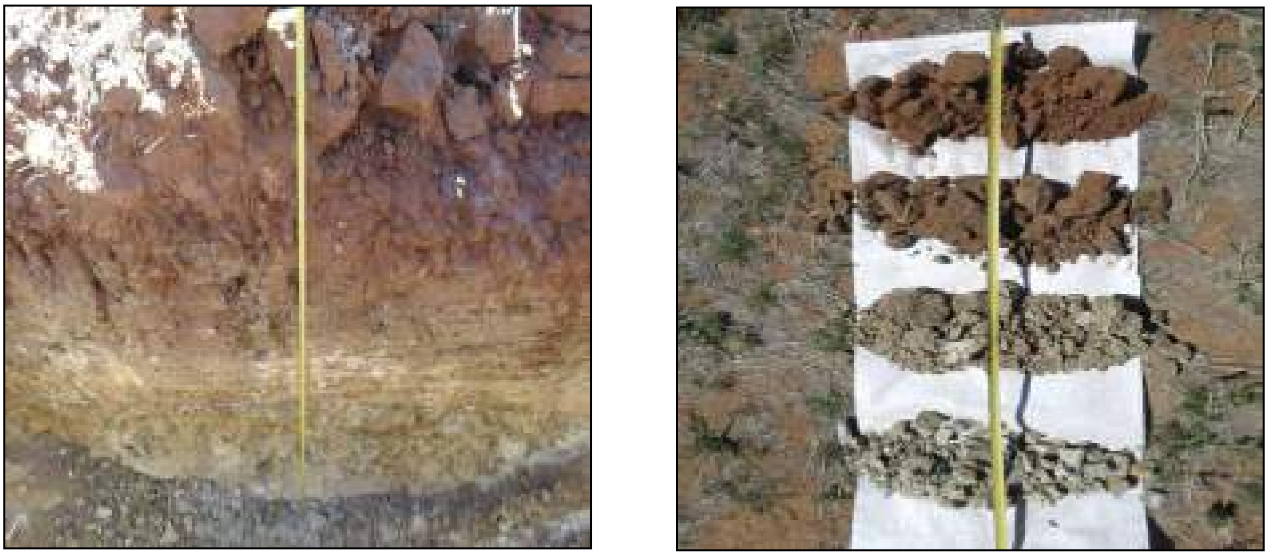
TEST PIT 116

TEST PIT PHOTOS


TEST PIT 117


TEST PIT 118

TEST PIT PHOTOS



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TEST PIT 121

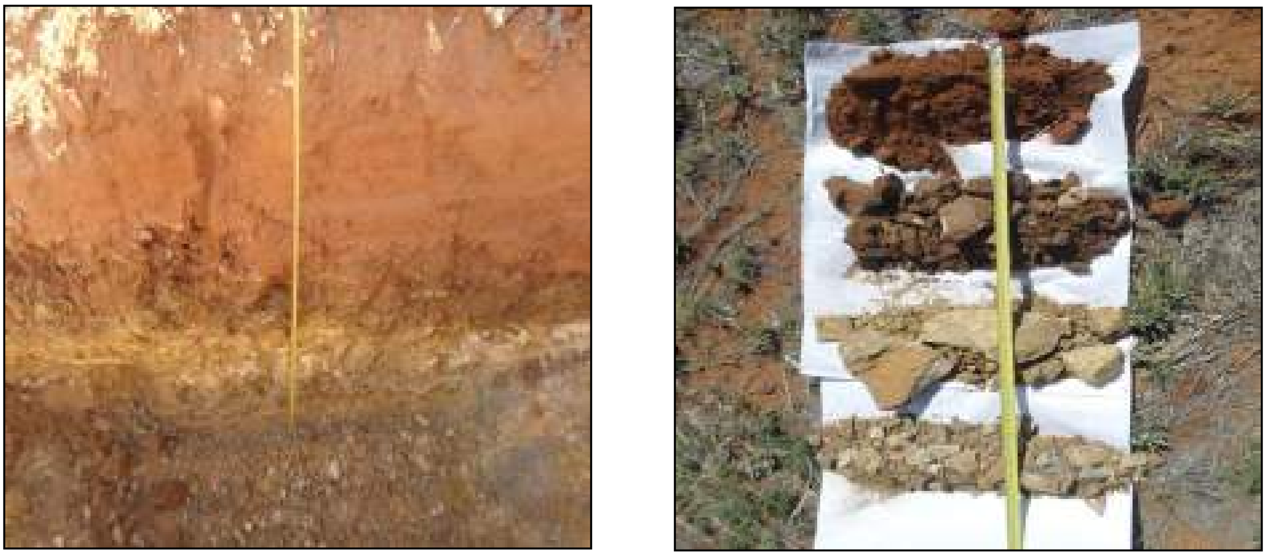
TEST PIT PHOTOS

TEST PIT 122

TEST PIT 124

TEST PIT PHOTOS

TEST PIT 126



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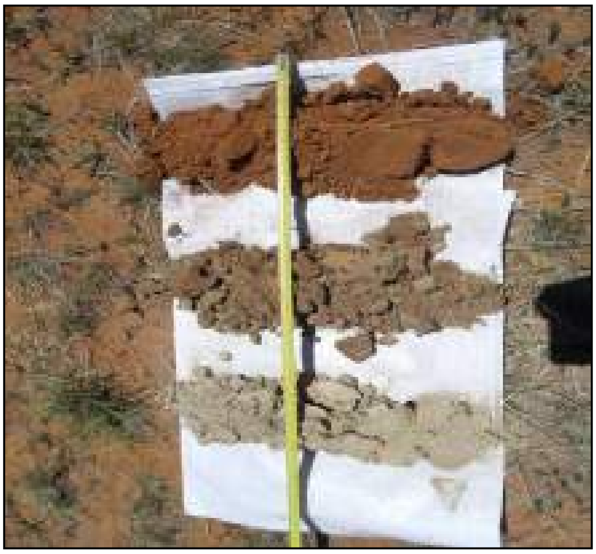
TEST PIT PHOTOS

TEST PIT 129

TEST PIT 130

TEST PIT PHOTOS

TEST PIT 131



TEST PIT 132

TEST PIT PHOTOS

TEST PIT 133

TEST PIT 135

TEST PIT PHOTOS

TEST PIT 136

TEST PIT 137

TEST PIT PHOTOS

TEST PIT 139

APPENDIX G

SITE PHOTOS

SITE PHOTOS

TEST PIT 1

TEST PIT 2

SITE PHOTOS

TEST PIT 3

TEST PIT 4

SITE PHOTOS

TEST PIT 5

TEST PIT 6

SITE PHOTOS

TEST PIT 7

TEST PIT 8

SITE PHOTOS

TEST PIT 9

TEST PIT 10

SITE PHOTOS

TEST PIT 11

TEST PIT 15

SITE PHOTOS

TEST PIT 17

TEST PIT 19

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TEST PIT 22

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TEST PIT 24

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TEST PIT 26

TEST PIT 27

SITE PHOTOS

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TEST PIT 31

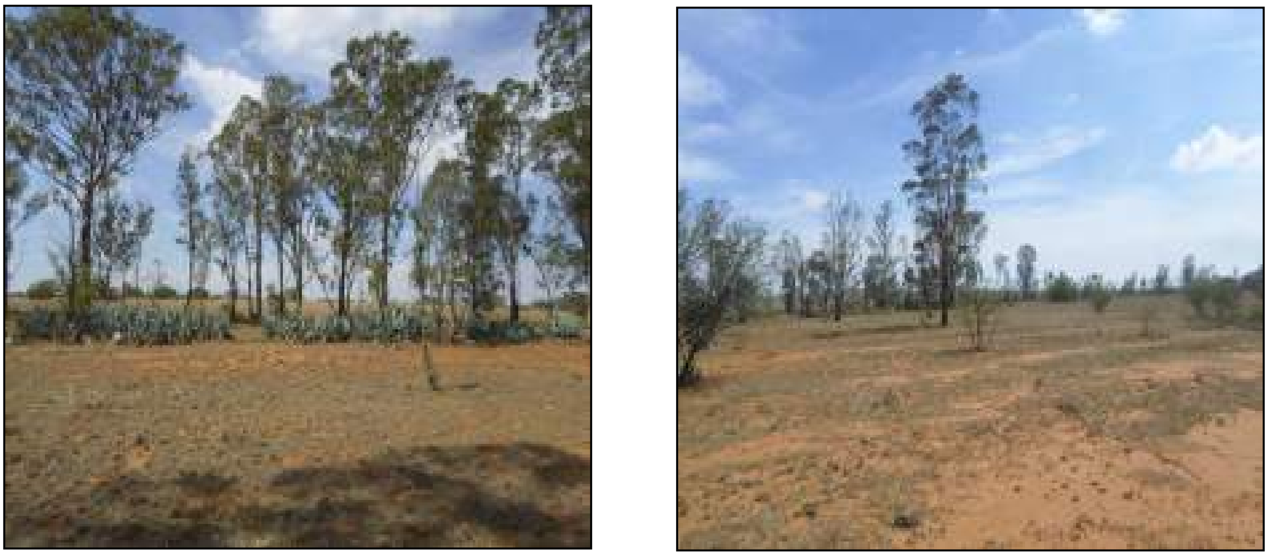
TEST PIT 32

SITE PHOTOS

TEST PIT 33

TEST PIT 34

SITE PHOTOS



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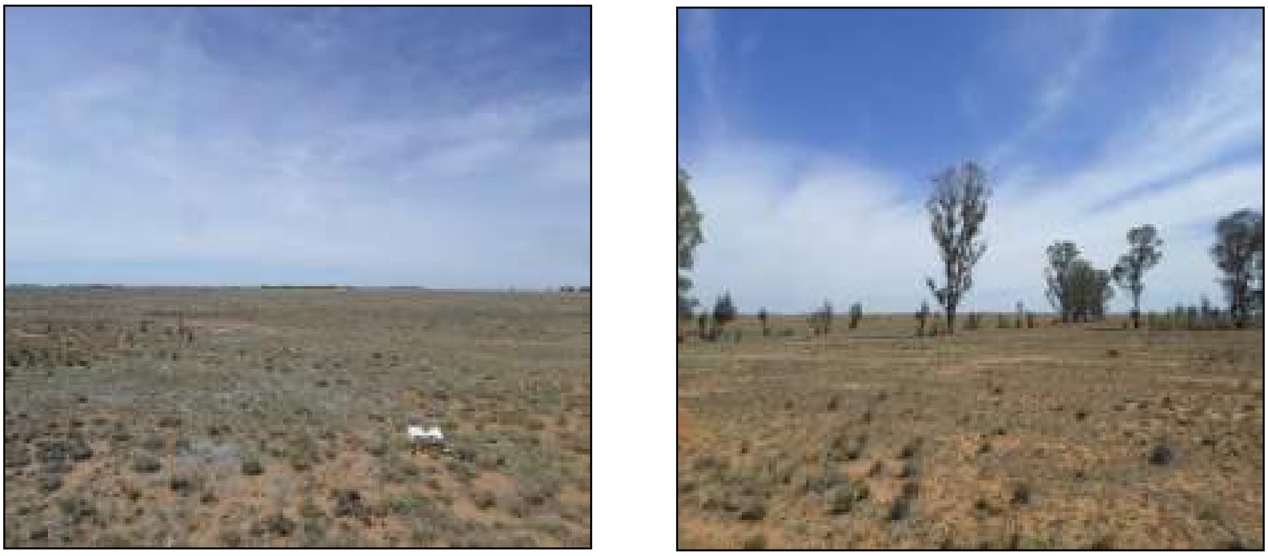
TEST PIT 37

SITE PHOTOS

TEST PIT 39

TEST PIT 40

SITE PHOTOS



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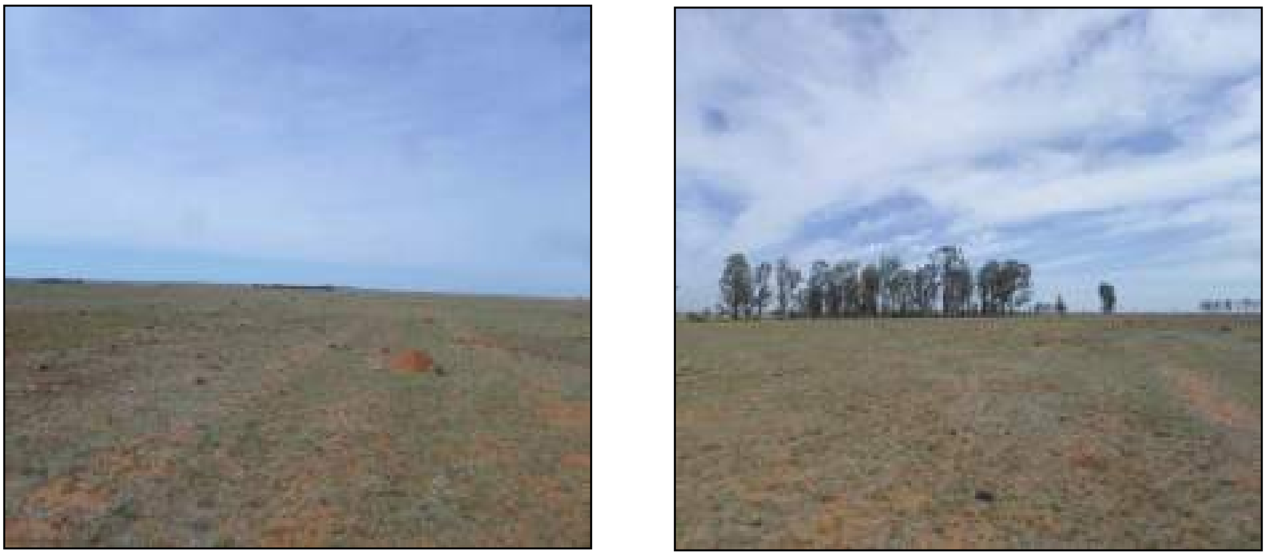

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SITE PHOTOS

TEST PIT 50

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SITE PHOTOS

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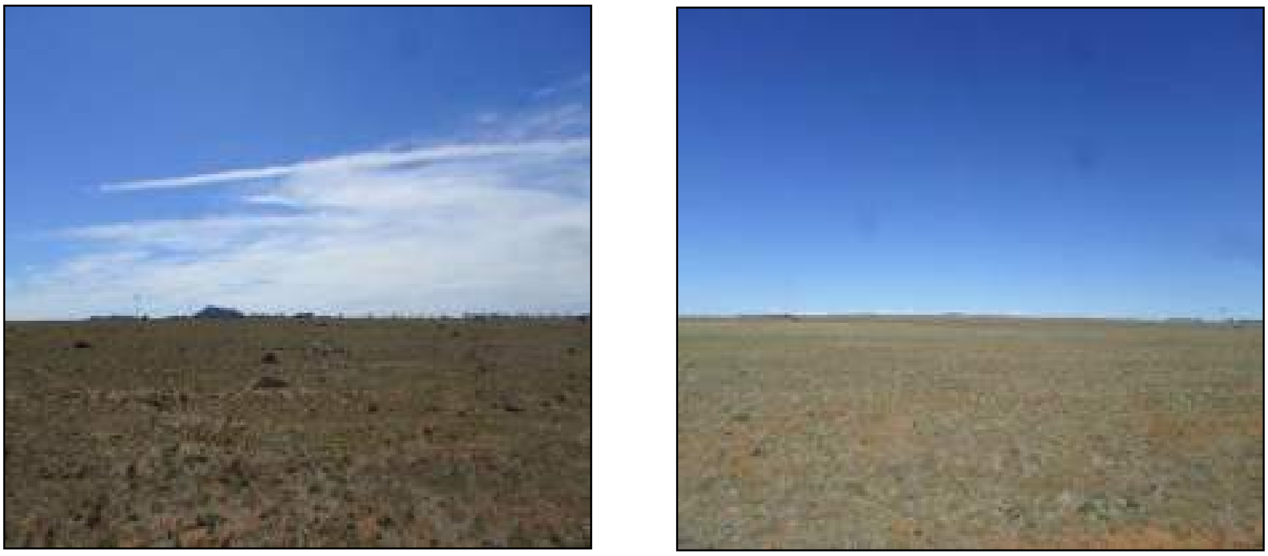
TEST PIT 85

SITE PHOTOS

TEST PIT 86

TEST PIT 89

SITE PHOTOS



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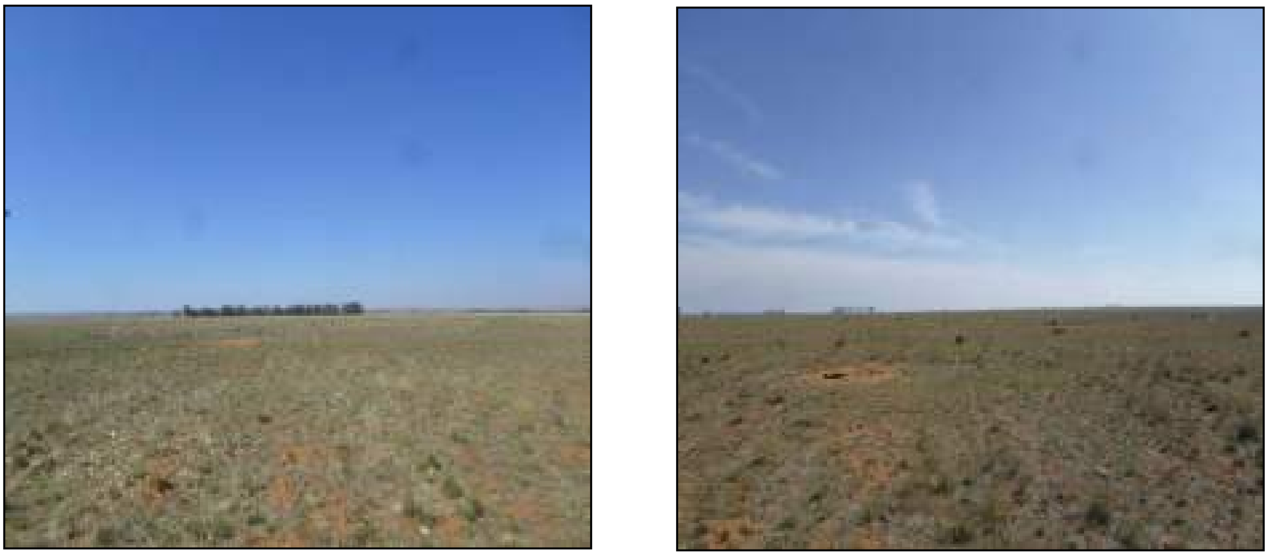
TEST PIT 92

SITE PHOTOS

TEST PIT 93

TEST PIT 94

SITE PHOTOS



TEST PIT 95

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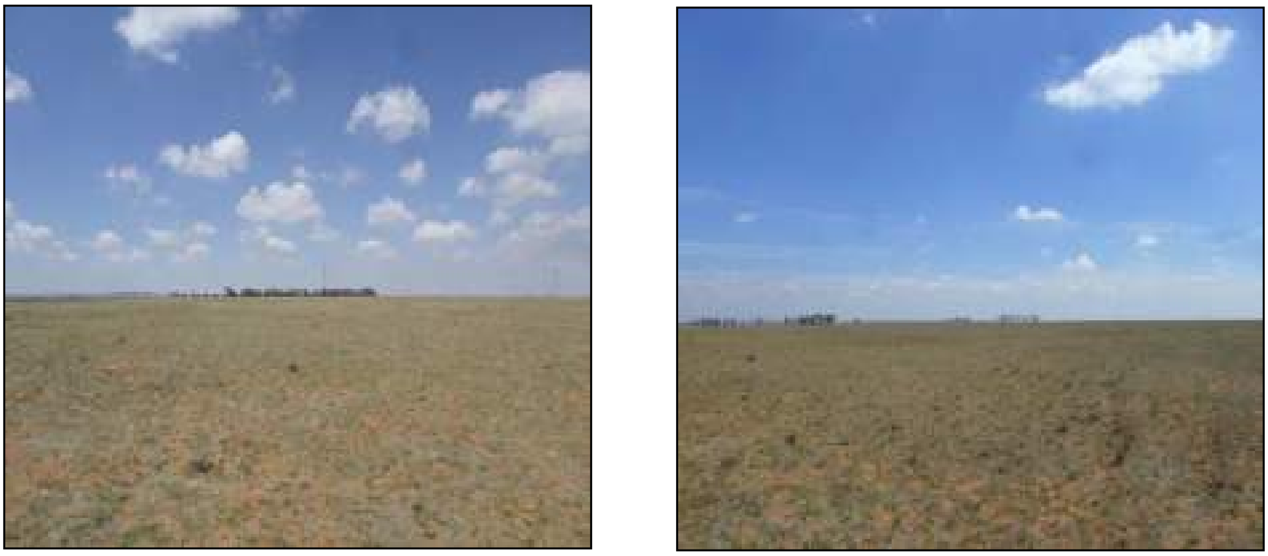
SITE PHOTOS



TEST PIT 97

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SITE PHOTOS

TEST PIT 99

TEST PIT 100

SITE PHOTOS

TEST PIT 101

TEST PIT 102

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TEST PIT 104

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TEST PIT 105

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TEST PIT 110

TEST PIT 111

SITE PHOTOS

TEST PIT 112

TEST PIT 113

SITE PHOTOS

TEST PIT 114

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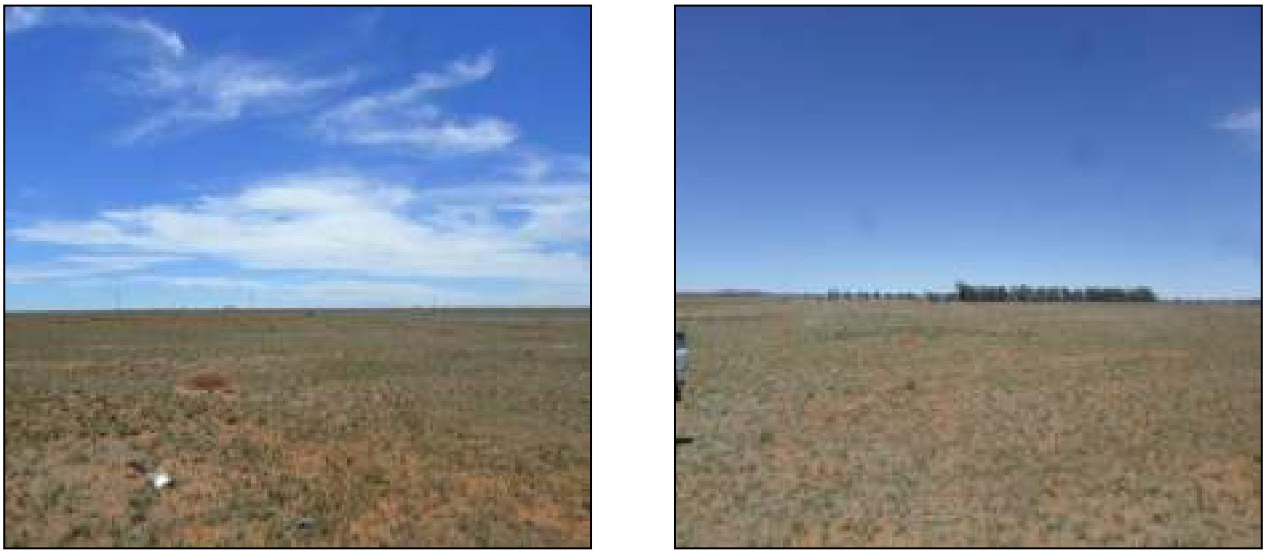
SITE PHOTOS

TEST PIT 120

TEST PIT 121

SITE PHOTOS

TEST PIT 122



TEST PIT 124

SITE PHOTOS

TEST PIT 126

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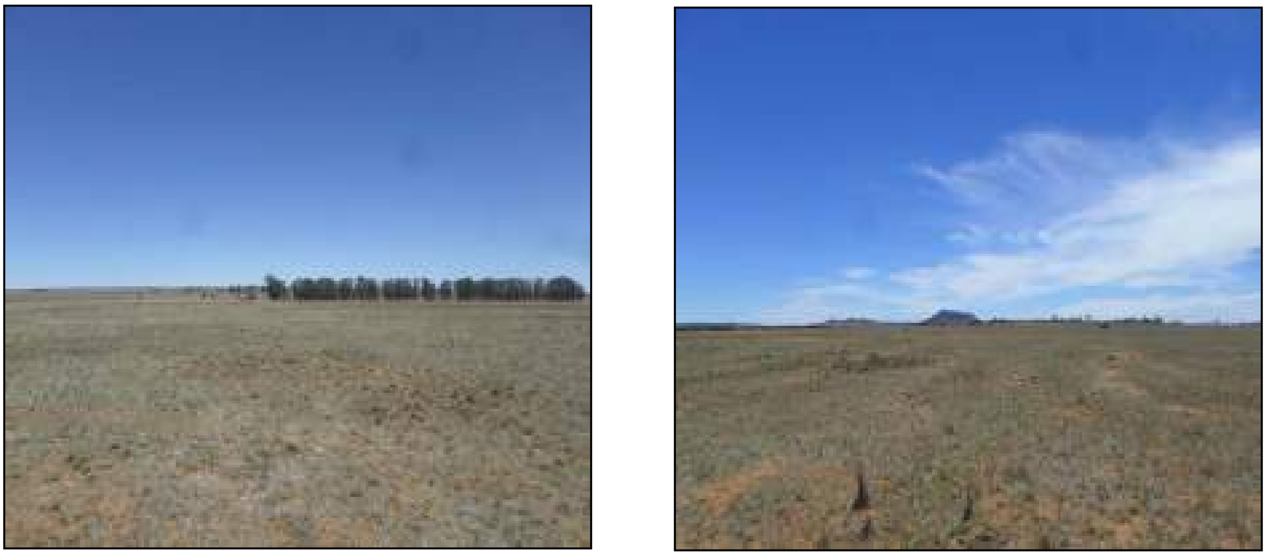
SITE PHOTOS

TEST PIT 129

TEST PIT 130

SITE PHOTOS

TEST PIT 131



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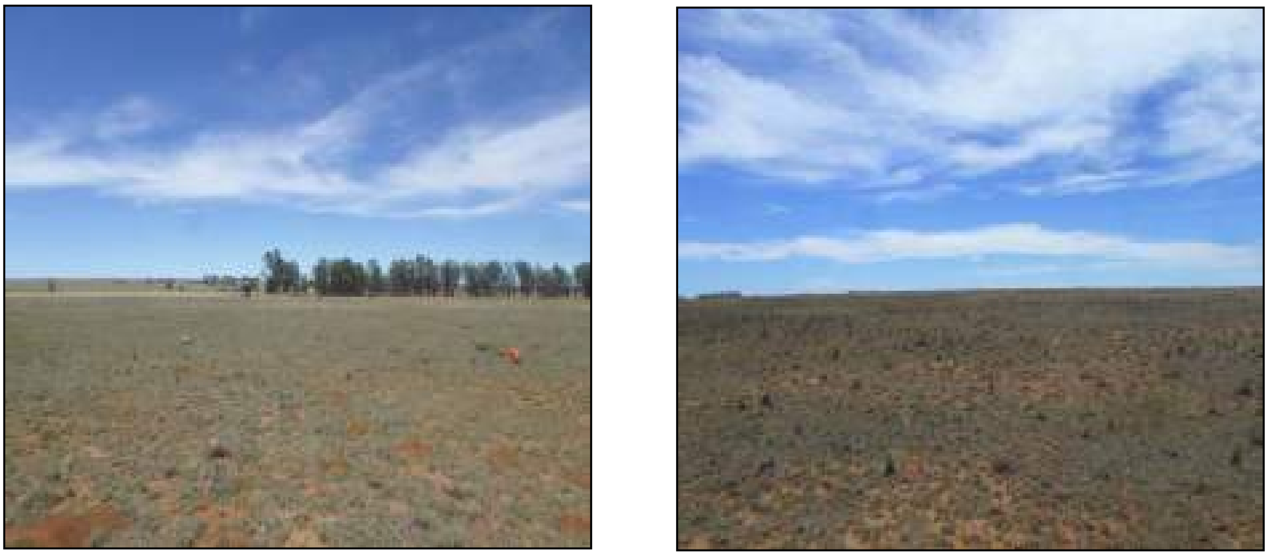
SITE PHOTOS



TEST PIT 133

TEST PIT 135

SITE PHOTOS

TEST PIT 136

TEST PIT 137

SITE PHOTOS

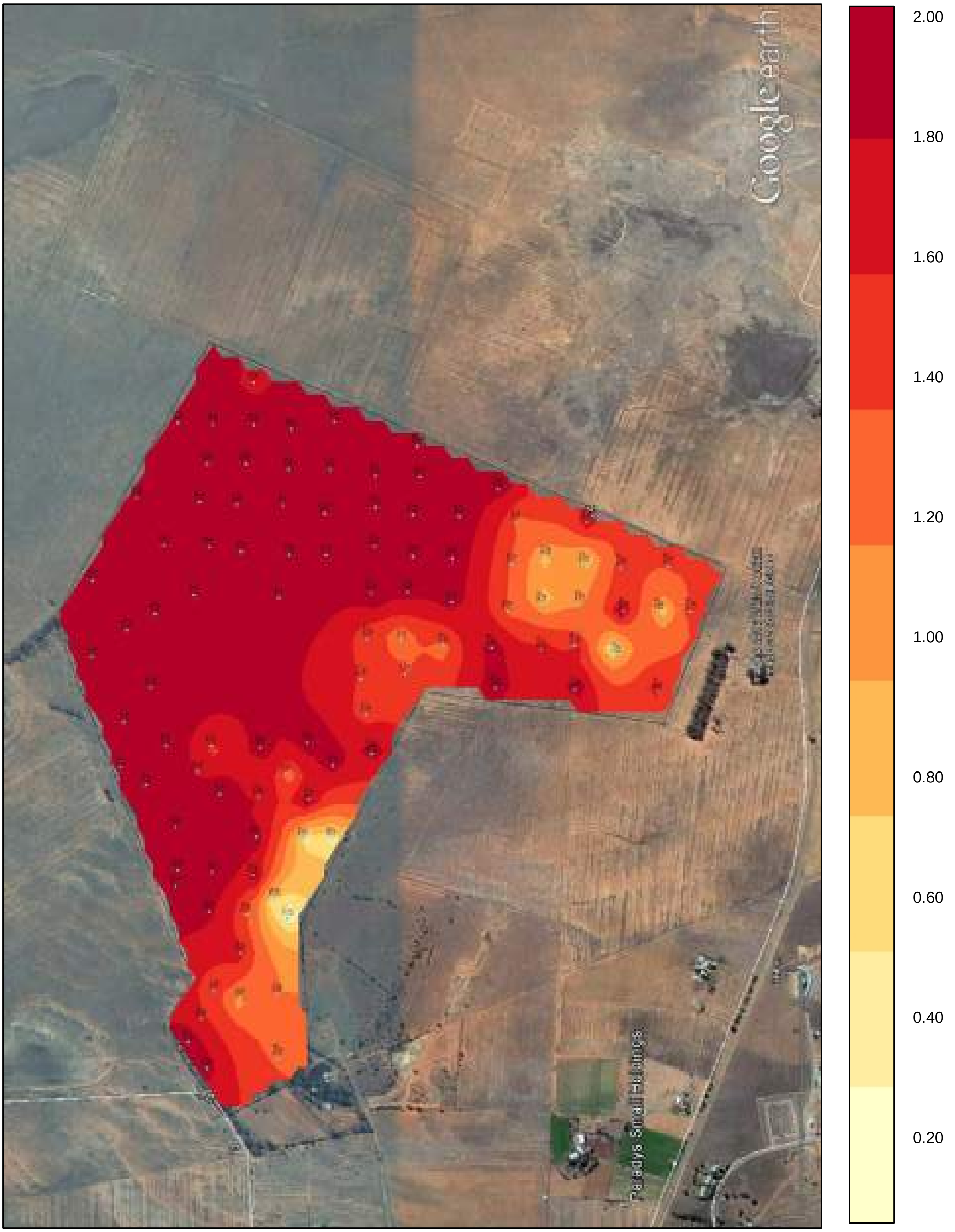
TEST PIT 139

APPENDIX H

LAYOUT PLAN / SITE ZONING PLAN

LAYOUT PLAN

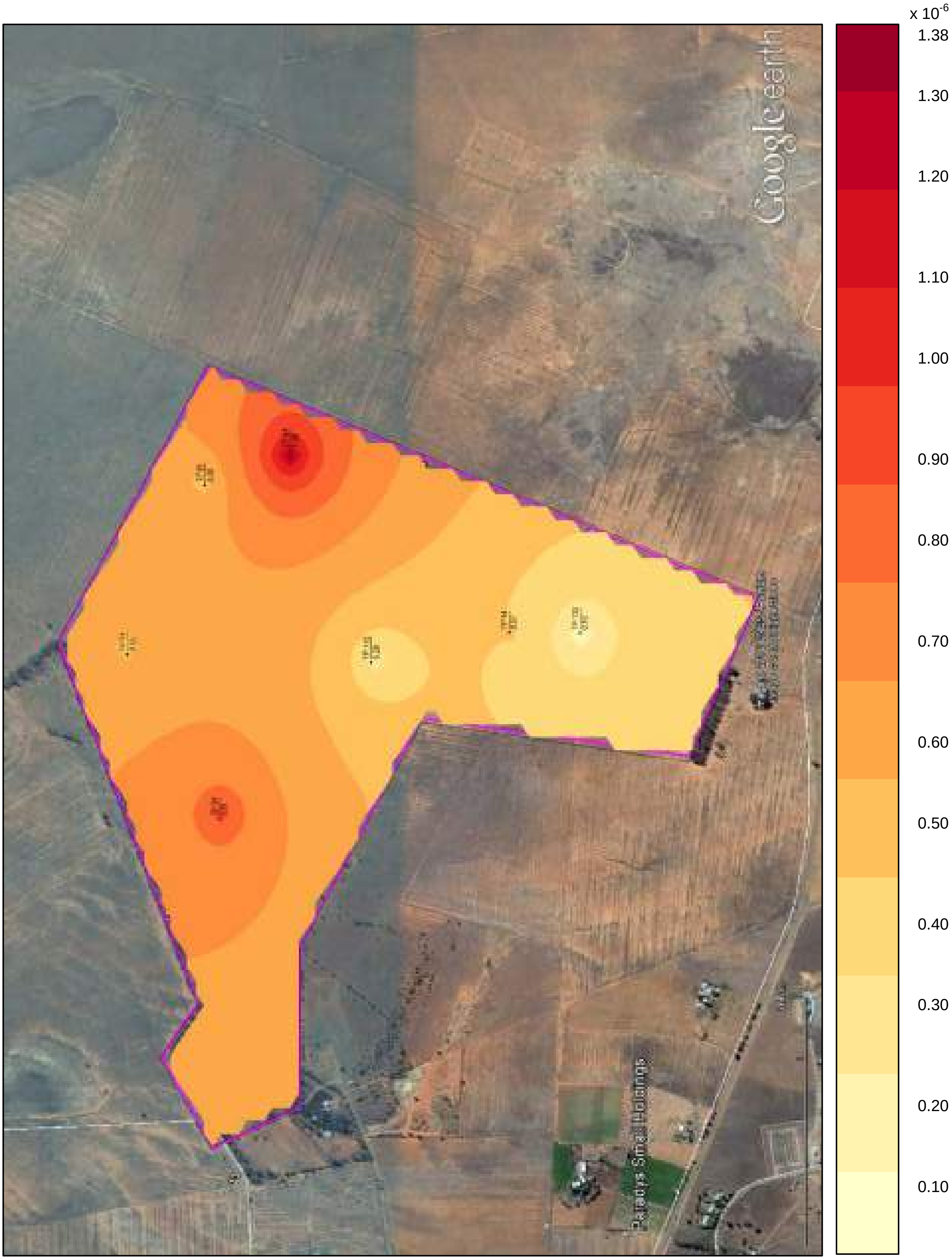
DEPTH ZONING PLAN



SITE ZONING PLAN

🟧	H2
🟨	H1/S
☐	H/S

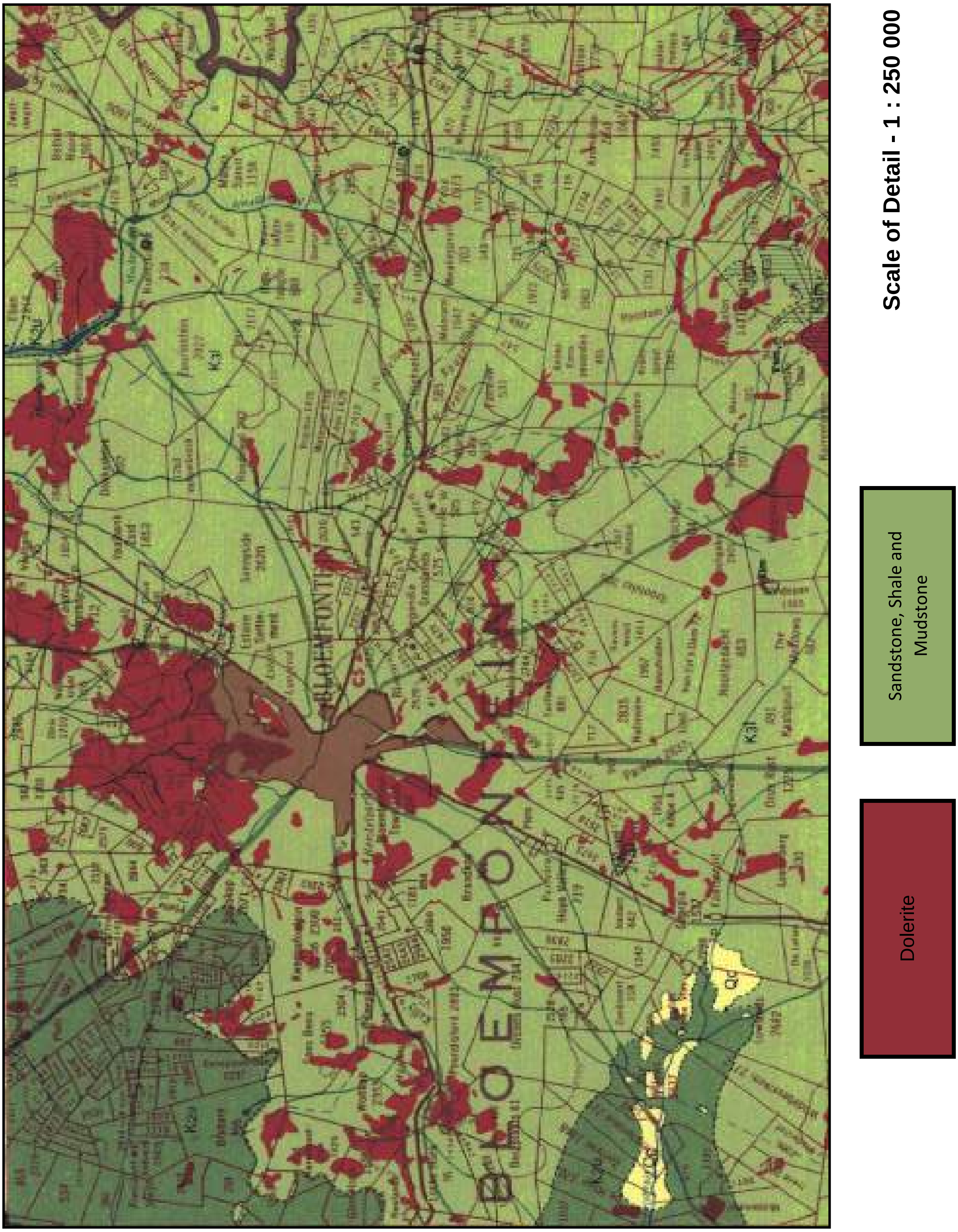
PERMEABILITY ZONING PLAN



APPENDIX J

GEOLOGICAL PLAN

GEOLOGICAL PLAN



Phase 1 Heritage Impact Assessment of a proposed new cemetery site on the Remainder of the farm Nalisview 2835 near Bloemfontein, Free State Province.

Lloyd Rossouw
National Museum
PO Box 266
Bloemfontein

17 / 04 / 2017

Executive Summary

A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. Outcrop visibility is generally poor along the footprint, but fine- to coarse-grained, sandstone outcrop is occasionally exposed. The survey also revealed no evidence of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, Anglo Boer War sites, graves or buildings with historical significance older than 60 years within the boundaries of the study area. There are no major archaeological grounds to suspend excavation activities within the proposed development footprint. The proposed development footprint is assigned a site rating of Generally Protected C (GP.C). Excavations related to the digging of graves may have an adverse affect on subsurface bedrock sediments that may well be of palaeontological interest. Even so, the likelihood of palaeontological impact is considered low, because of the low relief terrain. There are no major palaeontological grounds to suspend the proposed development, but in the unlikely event that fossils are encountered during such excavations, it must be protected and their locality marked. The South African Heritage Resources Agency or National Museum in Bloemfontein should then be notified immediately so that the appropriate steps can be taken to collect and remove the material. The access road footprint forms part of an existing road and will not affect palaeontological or archaeological heritage, but an existing tree gum grove may be of historical interest. Trees associated with historical settlements or farmsteads, that are older than 60 years old, are generally protected as heritage sites with cultural significance. Their removal or destruction will require the appropriate consent and a destruction permit from SAHRA. While many of the trees appear to be younger than 60 years old, the age of several specimens may well be older. It is advised that, as a prerequisite, specialist input is obtained from a botanist in order to ascertain the age of the trees located within the proposed impact zone.

Table of Contents

Introduction

A Phase 1 Heritage Impact Assessment was carried out for a proposed new cemetery on the Remainder of the farm Nalisview 2835 near Bloemfontein in the Free State Province (**Fig. 1**). The region's unique and non-renewable archaeological and palaeontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources including archaeological and palaeontological sites in the area to be developed, and that make recommendations for protection or mitigation of the impact of the sites.

The primary legal trigger for identifying when heritage specialist involvement is required in the Environmental Impact Assessment process is the National Heritage Resources (NHR) Act (Act No 25 of 1999). The NHR Act requires that all heritage resources, that is, all places or objects of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance are protected. Thus any assessment should make provision for the protection of all these heritage components, including archaeology, shipwrecks, battlefields, graves, and structures over 60 years of age, living heritage and the collection of oral histories, historical settlements, landscapes, geological sites, palaeontological sites and objects. The Act identifies what is defined as a heritage resource, the criteria for establishing its significance and lists specific activities for which a heritage specialist study may be required. In this regard, categories of development listed in Section 38 (1) of the NHR Act are:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of the site

a) exceeding 5000 m² in extent; or

b) involving three or more existing erven or subdivisions thereof; or

c) involving three or more subdivisions thereof which have been consolidated within the past five years;

- The rezoning of a site exceeding 10 000 m²; or
- Any other category of development provided for in regulations by the South African Heritage Resources Agency (SAHRA).

If a heritage resource is likely to be impacted by a development listed in Section 38 (1) of the NHR Act a heritage assessment will be required either as a separate HIA or as the heritage specialist component (AIA or PIA) of an EIA.

A range of contexts can be identified which typically have high or potential cultural significance and which would require some form of heritage specialist involvement (**Table 1**). This may include formally protected heritage sites or unprotected, but potentially significant sites or landscapes (**Table 2**). The involvement of the heritage specialist in such a process is usually necessary when a proposed development may affect a heritage resource, whether it is formally protected or unprotected, known or unknown. In many cases, the nature and degree of heritage significance is largely unknown pending further investigation (e.g. capped sites, assemblages or subsurface fossil remains). On the other hand, it is also possible that a site may contain heritage resources (e.g. structures older than 60 years), with little or no conservation value.

Methodology

The archaeological significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature. This was followed by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant archaeological information, aerial photographs and site records were consulted and integrated with data acquired during the on-site inspection.

Terms of Reference:

- Identify and map possible heritage sites and occurrences using available resources.
- Determine and assess the potential impacts of the proposed development on potential heritage resources;

- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Field Rating

Site significance classification standards as prescribed by SAHRA (2005) for archaeological sites were used for the purpose of this report (**Table 3**).

Locality data

1 : 50 000 scale topographic map: 2926 AA Bloemfontein

1 : 250 000 scale geological map 2924 Bloemfontein

The study area is located on the Remainder of the farm Nalisview 2835, about 13 km south of the Bloemfontein CBD and east of the N6 national road, on route to Reddersburg (**Fig. 2 & 3**).

General site coordinates (**Fig. 2**):

A) 29°14'30.41"S 26°13'45.01"E

B) 29°14'22.11"S 26°14'7.74"E

C) 29°14'34.74"S 26°14'40.44"E

D) 29°15'23.14"S 26°14'18.39"E

E) 29°15'19.09"S 26°14'0.24"E

F) 29°14'56.38"S 26°14'2.18"E

G) 29°14'49.88"S 26°13'44.60"E

Background

Palaeontology

According to the 1 : 250 000 scale geological map 2924 Bloemfontein, Nalisview 2835 is situated within the Beaufort Group, Adelaide Subgroup (Karoo Supergroup), which is primarily represented by late Permian sedimentary rocks, made up of alternating sandstone and mudstone layers (*Pa*) associated with stream and floodplain deposits (Theron 1963; Johnson *et al.* 2006). Jurassic-age dolerite intrusions, in the form of sills and dykes, occur extensively around the area (*Jd*). Quaternary to recent residual deposits, comprising unconsolidated soils, alluvial sediments and sheet wash deposits, cover the underlying sedimentary rocks. The sedimentary rocks are generally accepted to be Late Permian in age and are assigned to the *Dicynodon* Assemblage Zone (Kitching 1995). The *Dicynodon* AZ is characterized by the co-occurence of two therapsids, *Dicynodon* and *Theriognathus* as well as a diversity of less dominant vertebrate taxa, while trace fossils of invertebrates and vertebrates as well as *Glossopteris* flora plants have also been described (**Fig. 4**).

Archaeology

The Stone Age archaeological record of the Bloemfontein region spans back to the Middle Stone Age. Prehistoric archaeological remains previously recorded in the region include numerous occurrences of *in situ* Middle and Later Stone Age artefacts eroding out of the overbank sediments where they are often found in association large mammal fossil remains (Broom 1909; Churchill *et al*. 2000; Rossouw 1999, 2000, 2006). Stone tools and mammal vertebrate fossils have been recorded from various alluvial contexts along the nearby Modder River north and east of Bloemfontein and include the extinct species *Equus capensis*, *Megalotragus priscus, Pelorovis antiquus*, *Antidorcas* fossil remains from sealed and or exposed alluvial contexts. Cranial remains of *Pelorovis antiquus* have also been recorded in overbank sediments of the Tierpoort River south of the study area. The incidence of surface scatters usually decreases away from localized areas such as alluvial contexts and dolerite-shale contact zones when stone tools largely occur as contextually derived individual finds in the open veld. Stone tools are mostly made of hornfels, a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area. As a result, stone tool factory sites are commonly found near dolerite-shale contact zones. The study area is located outside the south-western periphery of distribution of Late Iron Age stone-walled settlements in the Free State (Maggs 1976).

Field Assessment

The site is characterized by flat, open grassland that shows signs of past crop farming activities on modern substrate comprised of light brown to red calcareous soils of varying depth (**Fig. 5**). A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. Outcrop visibility is generally poor along the footprint, but fine- to coarse-grained, sandstone outcrop is occasionally exposed (**Fig. 6**). The survey also revealed no evidence of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, Anglo Boer War sites, graves or buildings with historical significance older than 60 years within the boundaries of the study area.

Impact Statement and Recommendation

The nature of the proposed development will almost certainly have an adverse affect on residual topsoils (Quaternary sediments) that are largely degraded as a result of prior farming activities. While it is considered unlikely that the proposed development will result in any significant archaeological impact, excavations related to the digging of graves may have an adverse affect on subsurface bedrock sediments and may well be of palaeontological interest. Even so, the likelihood of palaeontological impact is considered low, because of the low relief terrain. There are no major palaeontological grounds to suspend the proposed development, but in the unlikely event that fossils are encountered during such excavations, it must be protected and their locality marked. The South African Heritage Resources Agency or National Museum in Bloemfontein should then be notified immediately so that the appropriate steps can be taken to collect and remove the material. There are no major archaeological grounds to suspend excavation activities within the proposed development footprint. The proposed development footprint is assigned a site rating of Generally Protected C (GP.C).

The access road footprint forms part of an existing road and will not affect palaeontological or archaeological heritage, but an existing tree gum grove (see **Fig. 2 A- B**), also indicated on a historical topographic map of the area, may be of historical interest (**Figs. 2 A-B, 7 & 8**). Trees associated with historical settlements or farmsteads, that are older than 60 years old, are generally protected as heritage sites with cultural significance. Their removal or destruction will require the appropriate consent and a destruction permit from SAHRA. While many of the trees appear to be younger than 60 years old, the age of several specimens may well be older. It is advised that, as a prerequisite, specialist input is obtained from a botanist in order to ascertain the age of the trees located within the proposed impact zone.

References

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Rossouw, L. 2006. Florisian mammal fossils from erosional gullies along the Modder River at Mitasrust farm, central Free State, South Africa. *Navorsinge van die Nasionale Museum* 22(6): 145-162.

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Theron, J.C. 1963. Geology of Bloemfontein area. Dept. of Mines. Government Printer, Pretoria.

DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project and have no conflicting interests in the undertaking of the activity.

L Rossouw

17 / 04 / 2017

Tables and Figures

Table 1: Relationship between different heritage contexts, heritage resources likely to occur within these contexts, and likely sources of heritage impacts in the Free State.

Heritage Context	Heritage Resources	Impact
Palaeontology	• Palaeozoic and Mesozoic fossil remains, e.g. Karoo Supergroup. • Neogene regolith, e.g. Quaternary alluvial deposits, lacustrine sediments, natural springs, pans	Subsurface excavations including ground levelling, landscaping & foundation preparation, road cuttings, quarries, mining development, bridge and pipeline construction , new cemeteries, construction of electrical infrastructure and alternative energy facilities, township development, demolition or alteration work.
Archaeology Early Stone Age Middle Stone Age LSA - Herder	• Localized Stone Age sites, containing cultural remains, animal and human remains found near or at *inter alia* the following: river courses and natural springs; pans and natural deflation hollows; stone tool making sites (e.g. dolerite contact zones); cave sites and rock shelters; freshwater shell middens; • Ancient, kraals and stonewalled complexes; • Abandoned areas of past human settlement and burials sites over 100 years old	
Historical	• Historical sites and structures older than 60 years old, including rubbish dumps/middens; • Objects, including industrial machinery, older than 60 years; • Burial sites, e.g. concentration camps; • Burial architecture older than 60 years; • Graves (marked or unmarked, known or unknown); • Places associated with social identity/displacement, e.g. Witsieshoek Cave; • Mission settlements, e.g. Bethulie and Beersheba	
Natural Landscapes	• Formally proclaimed nature reserves • Evidence of pre-colonial occupation • Scenic resources, e.g. view corridors, viewing sites, • Historical structures/settlements older than 60 years • Geological sites of cultural significance.	
Relic Landscapes	• Battle /military sites and graveyards • Pre-colonial settlements	

Table 2. Examples of heritage resources located in the Free State Province.

Historically, archaeologically and palaeontologically significant heritage sites & landscapes	**Examples**
Landscapes with unique geological or palaeontological history	Karoo Basin Beaufort Group sedimentary strata Vredefort Dome World Heritage Site.
Landscapes characterised by certain geomorphological attributes where a range of archaeological and palaeontological sites could be located.	Vaal, Modder and Riet River valleys Pans, pandunes and natural springs of the Free State panveld.
Relic landscapes with evidence of past, now discontinued human activities	Cave sites in the Maluti Drakensberg region Southern Highveld pre-colonial settlement complexes.
Landscapes containing concentrations of historical structures.	Concentration camps & cemeteries from the South African War.
Historical towns, historically significant farmsteads, settlements & routes	Batho historical township area in Mangaung (Bloemfontein).
Battlefield Sites, burial grounds and grave sites older than 60 years.	

Table 3. Field rating categories as prescribed by SAHRA.

Field Rating	**Grade**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

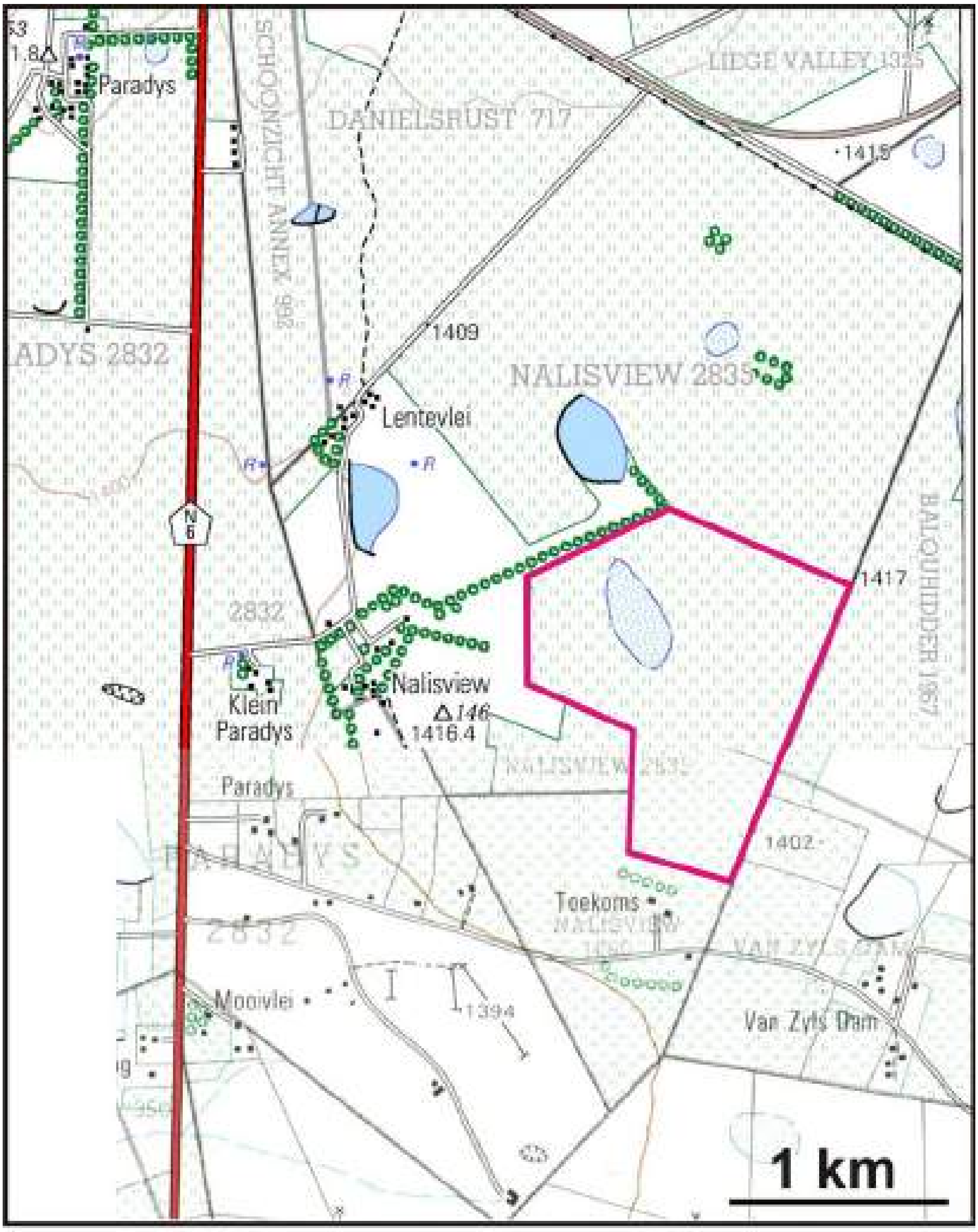

Figure 1. Remainder of Nalisview 2835 (portion of 1:50 000 scale topographic map 2926AA Bloemfontein & 2926AC Tierpoort Dam).

Figure 2. Aerial view of the study area.

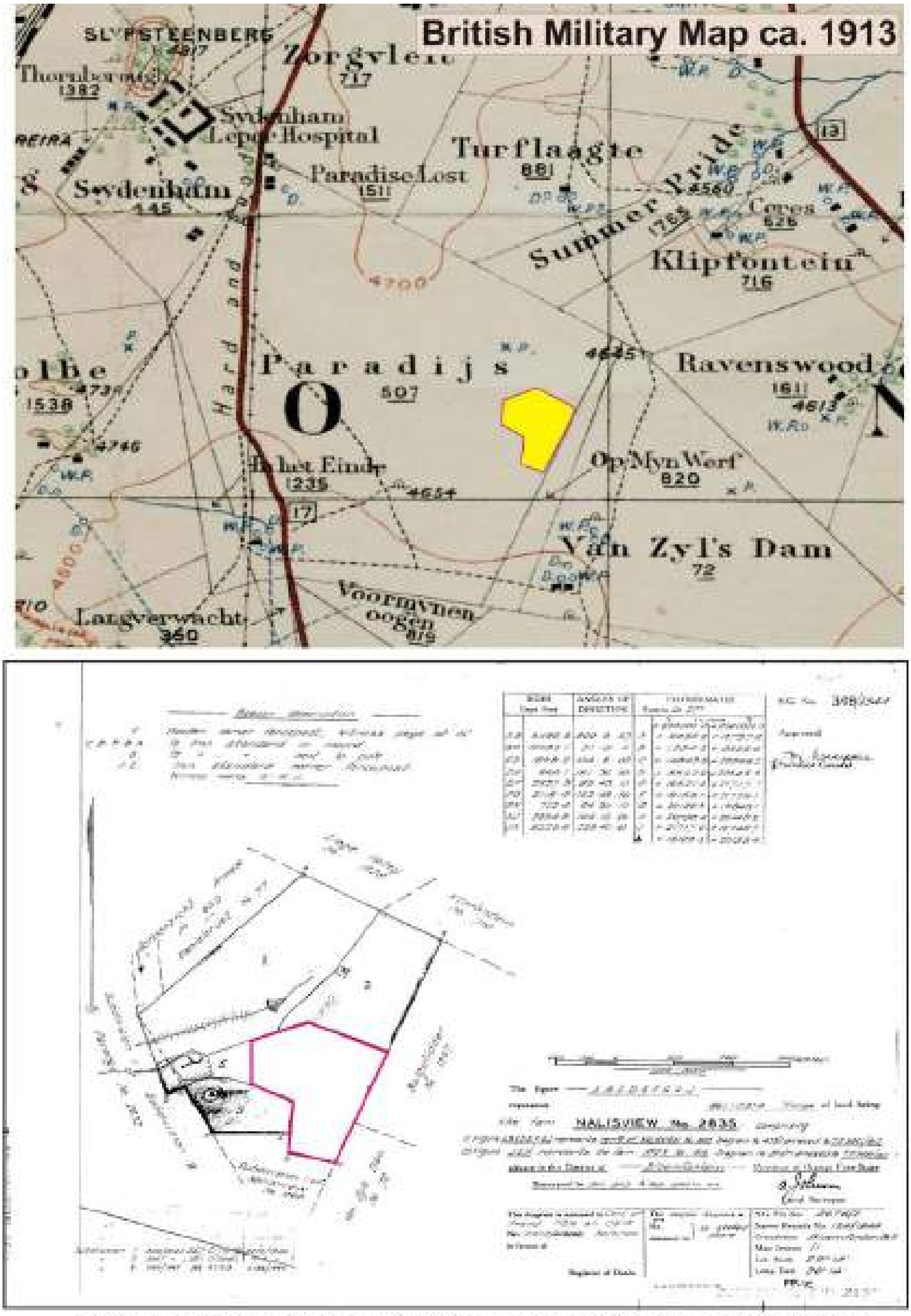

Figure 3. Historical map of the study area ca. 1913 (top) and layout on a subdivisional diagram of Nalisview 2835 registered in 1944 (bottom).

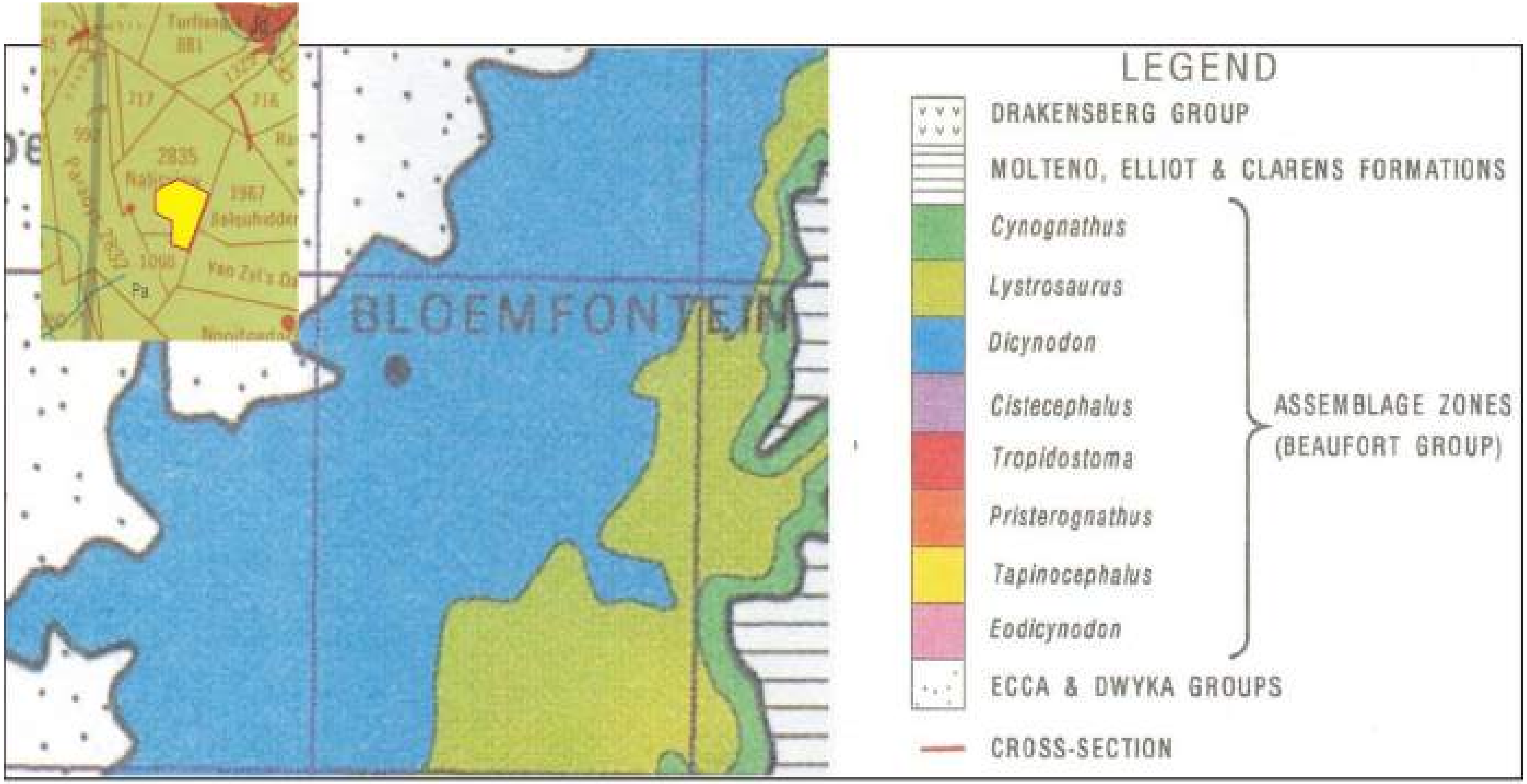

Figure 4. Distribution of vertebrate biozones of the Beaufort Group (after Rubidge 1995) and extract of geological map 2926 Bloemfontein with layout of the development footprint (inset).

Figure 5. Outcrop visibility is generally poor as a result of the low topography terrain, with fine- to coarse-grained, sandstone outcrop only occasionally exposed.

Figure 6. General view of the study area looking east (top) and northeast (below).

Figure 7 Existing access road and tree gum grove (right).

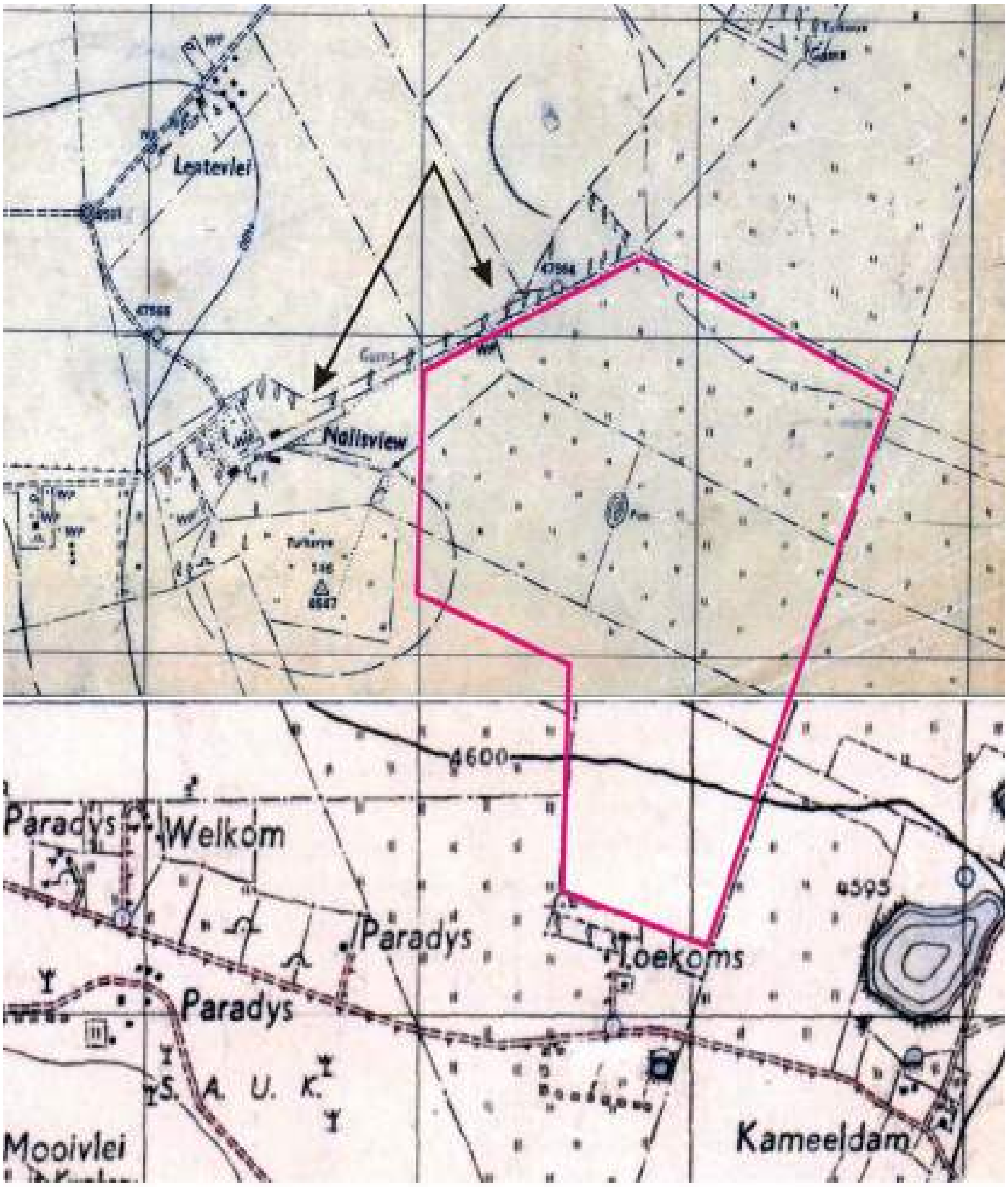

Figure 8. Layout of the proposed footprint indicated on portion of 1:18000 scale topographic maps 2926 EF2 Kafferrivier and 2926 C1 Bloemfontein ca. 1948. Tree gum grove indicated by arrows.

Phase 1 Heritage Impact Assessment: proposed extension of a new cemetery site on the farm Nalisview 1060, Bloemfontein, Free State Province.

Paleo Field Services
PO Box 38806
Langenhoven Park
Bloemfontein
9330

07 / 05 / 2020

Summary

A Phase 1 Heritage Impact Assessment was carried out for the proposed extension of a new cemetery site on the farm Nalisview 1060, near Bloemfontein in the Free State Province. The study area is located on a 15 ha section of previously used agricultural land situated on the farm Nalisview 1060, about 13 km south of the Bloemfontein CBD and 2km due east of the N6 national road, on route to Reddersburg. A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. Outcrop visibility is generally poor along the footprint, and sandstone outcrop is rarely exposed. The likelihood of palaeontological impact is considered low, because of the low relief terrain. The survey also revealed no evidence of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art, prehistoric structures, graves or well-preserved building structures with historical significance older than 60 years within the boundaries of the study area. The ruins of an old homestead marked as *Toekoms* on the 1:50 000 topographical map is clearly visible at the site (GPS coordinates 29°15'27.15"S 26°14'7.03"E). Map evidence indicates that the *Toekoms* homestead existed at least as far back as 1962, along with a forerunner of an existing eucalyptus grove that is located near the ruins. It is the opinion of this author that the ruins of the homestead are assigned a site rating of *Generally Protected B (GP.B*). The eucalyptus grove is assigned a site rating of *Local Significance, Grade 3B.* The rest of the rest of the study area is is assigned a site rating of *Generally Protected C*. It is advised that for the homestead, the developer follow proper procedures as stipulated in Section 34(1) of the National Heritage Resources Act 25 of 1999 *["No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority"*], by applying for a destruction permit from the Free State Heritage authority; the layout of the Toekoms homestead is properly mapped and photographed before destruction takes place and that the eucalyptus grove is left intact and included as a feature within the proposed development.

Table of Contents

Introduction

A Phase 1 Heritage Impact Assessment was carried out for a proposed extension of a new cemetery site on the farm Nalisview 1060, near Bloemfontein in the Free State Province (**Fig. 1**). The region's unique and non-renewable archaeological and palaeontological heritage sites are 'Generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. As many such heritage sites are threatened daily by development, both the environmental and heritage legislation require impact assessment reports that identify all heritage resources including archaeological and palaeontological sites in the area to be developed, and that make recommendations for protection or mitigation of the impact of the sites.

If a heritage resource is likely to be impacted by a development listed in Section 38 (1) of the NHR Act a heritage assessment will be required either as a separate HIA or as the heritage specialist component (AIA or PIA) of an EIA.

A range of contexts can be identified which typically have high or potential cultural significance and which would require some form of heritage specialist involvement. In many cases, the nature and degree of heritage significance is largely unknown pending further investigation (e.g. capped sites, assemblages or subsurface fossil remains). On the other hand, it is also possible that a site may contain heritage resources (e.g. structures older than 60 years), with little or no conservation value.

Methodology

The archaeological significance of the affected area was evaluated through a desktop study and carried out on the basis of existing field data, database information and published literature. This was followed by a field assessment by means of a pedestrian survey. A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes. Relevant archaeological information, aerial photographs and site records were consulted and integrated with data acquired during the on-site inspection.

<u>Terms of Reference</u>:

- Identify and map possible heritage sites and occurrences using available resources.

- Determine and assess the potential impacts of the proposed development on potential heritage resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Field Rating

Site significance classification standards as prescribed by SAHRA (2005) for archaeological sites were used for the purpose of this report (**Table 1**).

Locality data

1 : 50 000 scale topographic map: 2926 AA Bloemfontein

1 : 250 000 scale geological map 2924 Bloemfontein

The study area is located on a 15 ha section of previously used agricultural land situated on the farm Nalisview 1060, about 13 km south of the Bloemfontein CBD and 2km due east of the N6 national road, on route to Reddersburg (**Fig. 2 & 3**).

Site coordinates of area surveyed (**Fig. 2**):

29°15'19.36"S	26°13'59.96"E
29°15'23.46"S	26°14'18.73"E
29°15'32.17"S	26°14'14.54"E
29°15'31.95"S	26°13'59.26"E

Background

Palaeontology

According to the 1 : 250 000 scale geological map 2924 Bloemfontein, the site is situated within the Beaufort Group, Adelaide Subgroup (Karoo Supergroup), which is primarily represented by late Permian sedimentary rocks, made up of alternating sandstone and mudstone layers (*Pa*) associated with stream and floodplain deposits (Theron 1963; Johnson *et al.* 2006) (**Fig. 4**). Jurassic-age dolerite intrusions, in the form of sills and dykes, occur extensively around the area (*Jd*). Quaternary to recent residual deposits, comprising unconsolidated soils, alluvial sediments and sheet wash deposits, cover the underlying sedimentary rocks. The sedimentary rocks are generally accepted to be Late Permian in age and are assigned to the *Dicynodon* Assemblage Zone (Kitching 1995). The *Dicynodon* AZ is characterized by the co-occurence of two therapsids, *Dicynodon* and *Theriognathus* as well as a diversity of less dominant vertebrate taxa, while trace fossils of invertebrates and vertebrates as well as *Glossopteris* flora plants have also been described.

Archaeology

The Stone Age archaeological record of the Bloemfontein region spans back to the Middle Stone Age. Prehistoric archaeological remains previously recorded in the region include numerous occurrences of *in situ* Middle and Later Stone Age artefacts eroding out of the overbank sediments where they are often found in association large mammal fossil remains (Broom 1909; Churchill *et al*. 2000; Rossouw 1999, 2000, 2006). Stone tools and mammal vertebrate fossils have been recorded from various alluvial contexts along the nearby Modder River north and east of Bloemfontein. Cranial remains of *Pelorovis antiquus* have also been recorded in overbank sediments of the Tierpoort River south of the study area. The incidence of surface scatters usually decreases away from localized areas such as alluvial contexts and dolerite-shale contact zones when stone tools largely occur as contextually derived individual finds in the open veld. Stone tools are mostly made of hornfels, a fine-grained isotropic rock found in the hot-contact zone between the dolerites and shales in the area. As a result, stone tool factory sites are commonly found near dolerite-shale contact zones. The study area is located outside the south-western periphery of distribution of Late Iron Age stone-walled settlements in the Free State (Maggs 1976).

Field Assessment

The site is characterized by flat, open grassland that shows signs of past crop farming activities on modern substrate comprised of light brown to red calcareous soils of varying depth. A foot survey of the terrain revealed no evidence for the accumulation and preservation of intact fossil material within these superficial Quaternary sediments. Outcrop visibility is generally poor along the footprint, and sandstone outcrop is rarely exposed.

The survey also revealed no evidence of *in situ* Stone Age archaeological material, capped or distributed as surface scatters on the landscape. There are also no indications of rock art (engravings on dolerite outcrop), prehistoric structures, graves or well-preserved building structures with historical significance older than 60 years within the boundaries of the study area.

The ruins of an old homestead marked as *Toekoms* on the 1:50 000 topographical map is clearly visible at the site (GPS coordinates 29°15'27.15"S 26°14'7.03"E). The Deed of Transfer for Nalisview 1060 was issued in 1912, and map evidence indicate that the *Toekoms* homestead existed at least as far back as 1962 (**Fig. 5 - 8**). The main house has been fixed up until fairly recently (**Fig. 9**). Map data also suggests that a forerunner of an existing eucalyptus grove that is located near the ruins, was already established by 1962 (GPS coordinates from 29°15'22.13"S 26°14'0.03"E to 29°15'24.20"S 26°14'9.00"E; **Fig. 10).**

Impact Statement and Recommendation

Palaeontology

The nature of the proposed development will almost certainly have an adverse affect on residual topsoils (Quaternary sediments) that are largely degraded as a result of prior farming activities. While it is considered unlikely that the proposed development will result in any significant archaeological impact, excavations related to the digging of graves may have an adverse affect on subsurface bedrock sediments and may well be of palaeontological interest. Even so, the likelihood of palaeontological impact is considered low, because of the low relief terrain. There are no major palaeontological grounds to suspend the proposed development, but in the unlikely event that fossils are encountered during such excavations, it must be protected and their locality marked. The South African Heritage Resources Agency or National Museum in Bloemfontein should then be notified immediately so that the appropriate steps can be taken to collect and remove the material.

Archaeology

The main house recorded as the old *Toekoms* homestead is possibly around 60 years old or maybe mid-20th century in origin, but its original character was altered by subsequent renovations. All structures have been severely damaged by neglect and vandalism. It is the opinion of this author that these ruins are not historically significant enough to require preservation. It is assigned a site rating of *Generally Protected B (GP.B*) (**Table 1**). The eucalyptus grove is assigned a site rating of *Local Significance, Grade 3B.* Trees associated with historical settlements or farmsteads, that are older than 60 years old, are generally protected as heritage sites with cultural significance. Their removal or destruction will require the appropriate consent and a destruction permit from SAHRA. While many of the trees appear to be younger than 60 years old, the age of several specimens may well be older. The rest of the rest of the study area is is assigned a site rating of *Generally Protected C.*

It is advised that

- for the homestead, the developer follow proper procedures as stipulated in Section 34(1) of the National Heritage Resources Act 25 of 1999 *[“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority”*], by applying for a destruction permit from the Free State Heritage authority;
- the layout of the Toekoms homestead is properly mapped and photographed before destruction takes place;
- the eucalyptus grove is left intact and included as a feature within the proposed development.

References

Broom, R. 1909 a. On a large extinct species of Bubbalus. *Annals of the South African Museum* 7:219 - 280

Broom, R. 1909 b. On the evidence of a large horse recently extinct in South Africa. *Annals of the South African* 7.28l -282.

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DECLARATION OF INDEPENDENCE

I, Lloyd Rossouw, declare that I act as an independent specialist consultant. I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference. I have no interest in secondary or downstream developments as a result of the authorization of this project and have no conflicting interests in the undertaking of the activity.

L Rossouw

07/ 05 / 2020

Tables and Figures

T**able 1.** Field rating categories as prescribed by SAHRA.

Field Rating	**Grade**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

Figure 1. Map of the study area on farm Nalisview 1060 (purple polygon, portion of 1:50 000 scale topographic map 2926 AC Tierpoort Dam).

Figure 2. Aerial view of the site (yellow polygon)

Figure 3. General view of the site, looking east.

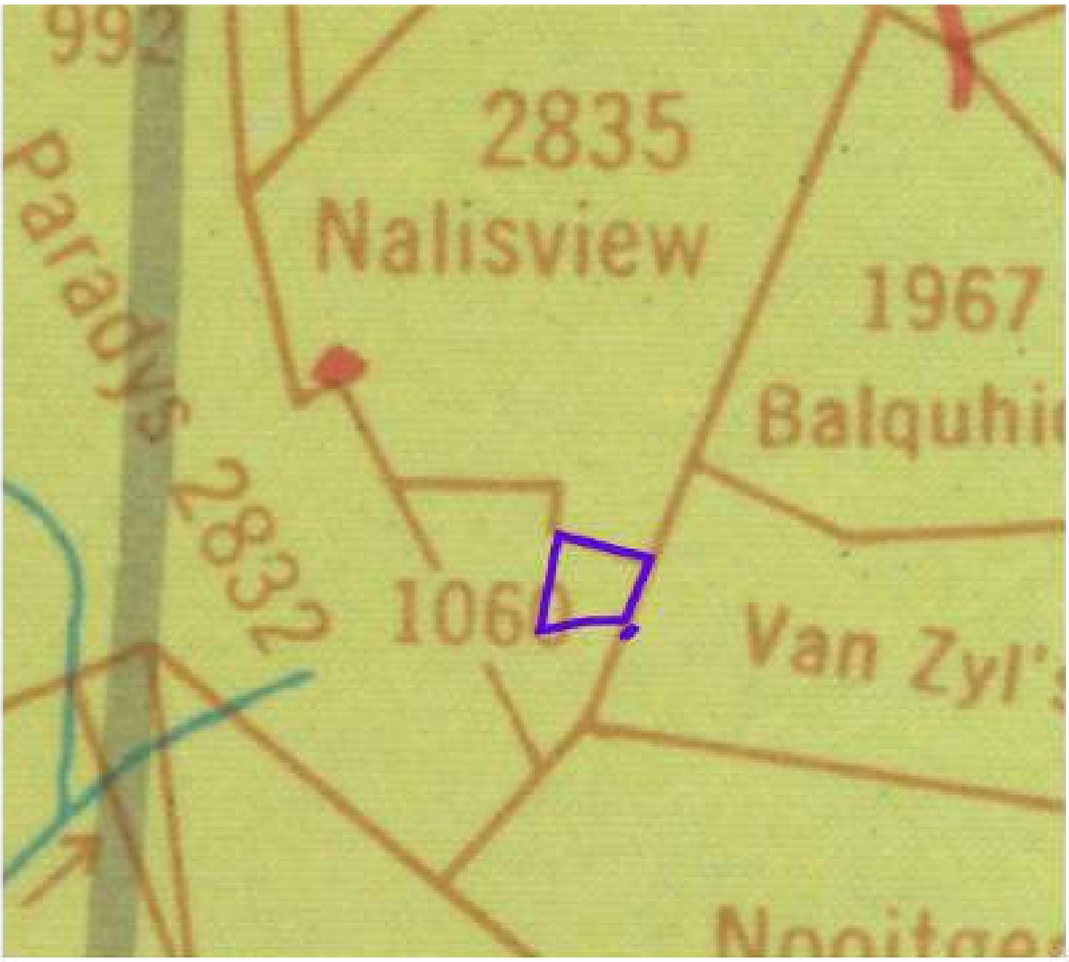
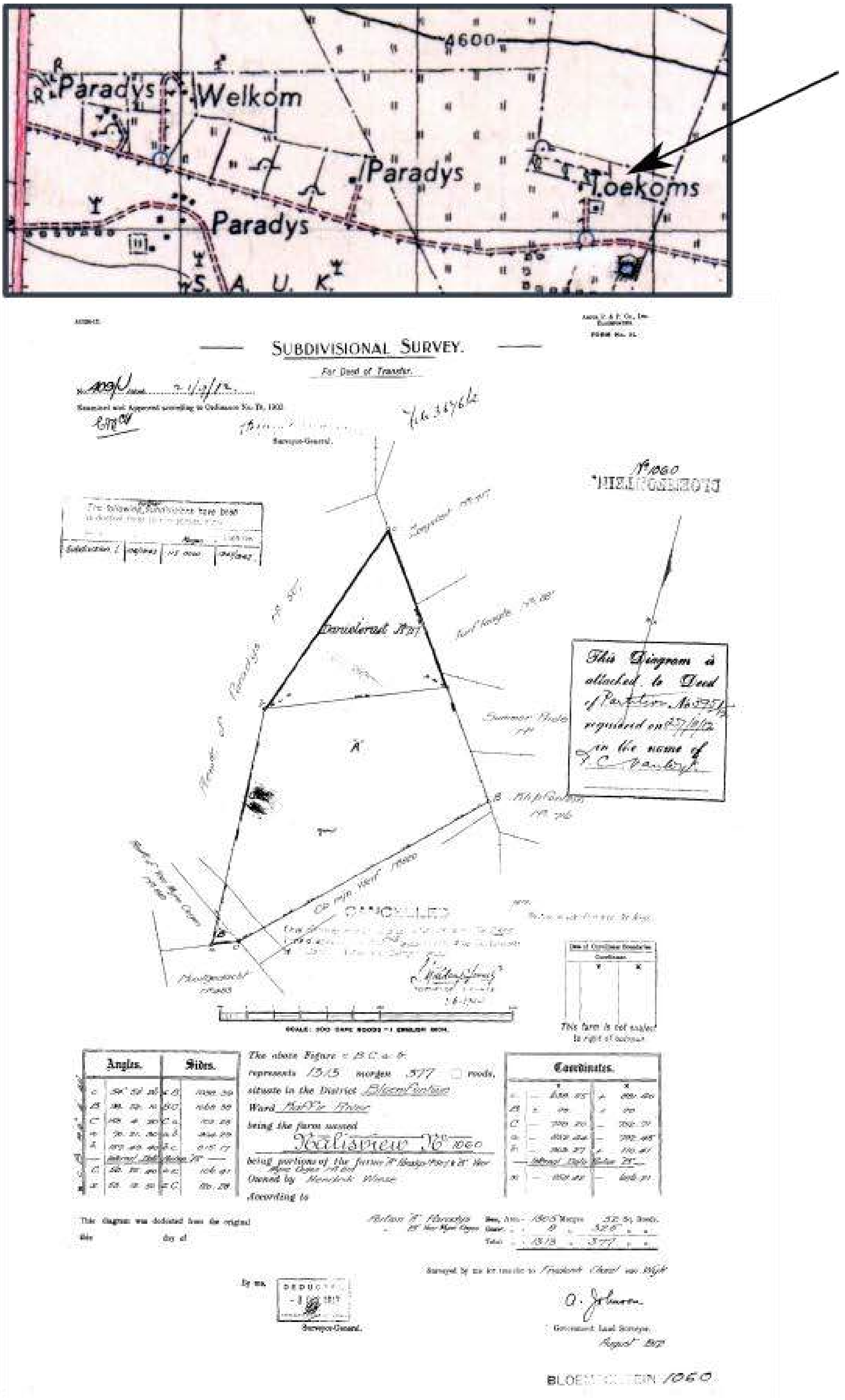


Figure 4. According to the 1 : 250 000 scale geological map 2924 Bloemfontein, the site is situated within the Beaufort Group, Adelaide Subgroup (Karoo Supergroup), which is primarily represented by late Permian sedimentary rocks, made up of alternating sandstone and mudstone layers (Pa) associated with stream and floodplain deposits



SUBDIVISIONAL SURVEY.

For Deed of Transfer.

Surveyor-General.

No. 1060

This Diagram is attached to Deed

CANCELLED

SCALE: 500 CAPE ROODS = 1 ENGLISH INCH.

This farm is not subject to right of outspan

Angles.	Sides.

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Ward

being the farm named

Nalisview No. 1060

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Owned by

According to

Coordinates.

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Total 1315 377

Surveyed by me for transfer to

By me,

DEDUCTED

Surveyor-General.

O. Johnson

Government Land Surveyor.

August 1912

BLOEMFONTEIN 1060

Figure 5. Portion of 1:18000 scale topographic map of the farm, dated 1962 (above). Arrow shows position of Toekoms homestead. Nalisview deed of transfer, dated 1912 (below).

Figure 6. Western (above) and eastern (below) aspects of the main house.

Figure 7. Southern (above) and northern aspects of the main house.

Figure 8. Ruins at the Toekoms homestead.

Figure 9. Modern alterations, interior of the main house.

Figure 10. A eucalyptus grove located near the north-western boundary of the site.

Appendix H5:

EMPr

ENVIRONMENTAL MANAGEMENT PROGRAMME

The proposed expansion of a cemetery on the Remainder of the farm Nalisview 2835 & Portion 1 of the farm Nalisview 1060 Bloemfontein, Free State Province

Proponent: Mangaung Metropolitan Municipality
MDA Ref No: 40727
Date: April 2020

mda
Town & Regional Planners,
Environmental & Development
Consultants

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1. INTRODUCTION

1.1 Project and associated construction activities

The proposed project entails the expansion of a cemetery and associated infrastructure, including the provision of running water and sanitation facilities on site. The proposed construction activities will take place on the remainder of the farm Nalisview 2835 and Portion 1 of the farm Nalisview 1060, Bloemfontein, Free State Province.

Please refer to the map in Appendix A for an indication on the locality of the proposed activities.

1.2 Objectives of the EMPr

The EMPr aims to fulfill the requirements in terms of the National Environmental Management Act (Act 107 of 1998), with the following objectives:

- To identify, predict and evaluate actual and potential impacts on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimizing negative impacts, maximizing benefits and promoting compliance with the principles of environmental management;
- To identify and employ the modes of environmental management best suited to ensuring that the activity is pursued in accordance with best environmental management practices;
- To be able to respond to unforeseen events; and
- To provide feedback on compliance.

1.3 Implementation of the EMPr

The proponent, namely Mangaung Metropolitan Municipality is responsible for the implementation of the EMPr. All contractors should be supplied with a copy of the EMPr and should ensure that construction staff adheres to the mitigation measures.

2. PREPARATION OF THE EMPR

2.1 Person(s) who prepared the EMPr

i) Mr Neil Devenish
ii) Me Hanlie Stander

MDA
P.O. Box 100982
Brandhof
Bloemfontein
9324
Tel: 051 447 1583
Fax: 051 448 9839

2.2 Expertise of the person(s) who prepared the EMPr

i) Mr Neil Devenish

Key qualifications:

- Key competencies and experience include development control applications (applications and appeals pertaining to rezoning, consolidations, subdivisions etc.) township establishment applications, environmental management and control applications.

Education:

- B. A. (Sociology, Geography) University of the Free State, SA, 1994
- Master of Town and Regional Planning, University of the Free State, SA, 1996
- Managing the Environmental Impact Assessment Process, Environmental Management Unit, PU for CHE, 2000
- Environmental Management Consulting, South African Institute of Ecologists & Environmental Scientists, 2001
- Water Law of South Africa, The South African Institution of Civil Engineers (SAICE), 2006

ii) Me Hanlie Stander

Key qualifications:

- Key competencies and experience include environmental management and research in zoology and environmental management.

Education:

- B.Sc. (Zoology), University of the Free State, South Africa, 2005
- B.Sc. Honors (Zoology), University of the Free State, South Africa, 2006
- M.Sc. (Zoology), University of the Free State, South Africa, 2012

3. RECOMMENDED MANAGEMENT AND MITIGATION MEASURES

3.1 Planning phase and Construction phase

i) Permits need to be obtained for the removal / transplantation of protected species (if any) located within the proposed development area. Care must be taken to prevent unnecessary damage to vegetation near to construction activities.

ii) The necessary Water Use Authorisations should be obtained before any delineated surface water boundaries are disturbed (i.e. the wetland) / water is abstracted for use as potable water.

iii) The necessary precautions with regard to road safety should be implemented by construction vehicles.

iv) Proper sanitation, water and waste facilities should be in place for construction workers.

v) Washing and chemical toilet facilities must be provided on site during the construction phase. Chemical toilets should be cleaned regularly.

vi) Clean water should be made available daily to workers on site.

vii) Fire-fighting equipment should be available on site, where applicable.

viii) If artefacts or graves are uncovered during construction activities, work in the immediate vicinity is to be stopped until the project Archaeologist has been consulted.

ix) A blasting permit will be obtained should blasting activities be undertaken.

x) Adjacent landowners will be notified of proposed blasting, 24 hours prior to blasting events.

xi) Grave selection is dependent on the Depth of Excavation of the in situ materials, the depth ranges from 2m over the majority of the area to 0.2m around the fringes of the site.

xii) Grave selection is also dependent on Permeability: Material suitability ranges from unsuitable to ideal.

xiii) It is recommended that a groundwater sample from at least two of the existing boreholes downstream of the proposed site is taken, before the proposed development takes place. The chlorine concentration value of the groundwater should also be determined, by means of sampling.

xiv) Some of the existing boreholes can be utilised to monitor the groundwater quality. In order to establish an early detection system, one monitoring borehole can be drilled adjacent to the proposed site. The monitoring boreholes should be yield tested in order to obtain the necessary aquifer parameters such as hydraulic conductivity for input in the numerical groundwater flow and transport model, if needed.

xv) A water monitoring plan should be established and it should be revised on a regular basis to incorporate the changes in the water flow regime.

xvi) Laboratory analysis techniques will comply with SABS guidelines. Laboratories must be accredited. Data must be stored electronically. It is suggested that a well-known database such as WISH, Aquabase or Access be used. A backup of the data base must be stored in a safe place. Backups should be made every time the database is updated. On the completion of every sampling run a monitoring report must be written. Included in the report must be time series trends, Piper and Durov diagrams. These will be used to determine if there are any changes in the system. These changes must be flagged and explained in the report.

3.2 Water resources

i) Due to the nature of the materials, erodibility is a concern, especially during high rainfall as the materials have the possibility to be washed away. Surface drainage control will therefore need to be implemented during the development of the site. Caution should be exerted when introducing mudstone (if found on site) to water, sunlight and air, as this will speed up the weathering process of Mudstone.

ii) The natural slope of the investigated area may not be steep enough to drain away the rainwater. Some rainwater may collect and form ponds until it has seeped into the in situ materials. These ponds may subject the area to surface flooding during abnormal rainfall. Therefore the surface drainage of the site should be improved. Provision should be made for drainage structures underground or at the surface, where applicable. Drainage canals must be constructed to channel the water from structures after construction.

iii) It is of high priority to preserve and protect potable water resources from contamination by potentially harmful organisms originating from cemeteries.

iv) Caution must be taken to ensure that construction materials are not dumped or stored within the waterway(s) and or their -buffer zone(s) as indicated by the ecological specialist.

v) Emergency plans must be in place in case of spillages into the water resource(s).

vi) Erosion control must be implemented so as to reduce erosion and sedimentation into the water source(s).

vii) Any construction activities near the waterway(s) should be limited through proper demarcation and appropriate environmental awareness training. The Contractor is responsible to inform all staff of the need to be vigilant against any practice that will have a harmful effect on waterways.

viii) Infilling, excavation, drainage and hardening of surfaces should not occur unnecessarily in waterway(s) (i.e. permanent, seasonal or temporary), or within their buffer zones. The buffer zone should be extended in areas where slope in combination with rainfall will potentially provide conditions for the transportation and deposition of materials within the water resource(s).

ix) The design of drainage systems must ensure there is no contamination, eutrophication or increased erosion of the waterway(s). Drainage systems should be maintained regularly in order to minimize the runoff of harmful chemical substances into the waterway(s).

x) It should be ensured that the proposed activities have minimal effect on the flow of water through the waterway(s).

xi) All no-go areas must be demarcated under guidance of the Environmental Control Officer (ECO).

3.3 Handling and storage of materials

i) All chemicals used during the development, including fuel for the construction vehicles, should be stored in a proper storeroom or protected area to prevent pollution.

ii) Vehicles should be serviced at designated areas. No oil, diesel or other chemicals may be spilled or discharged anywhere.

iii) Where applicable, the contractors must ensure that all relevant national, regional and local legislation regarding storage, transport, use and disposal of petroleum, chemical, harmful or hazardous substances and materials are adhered to, where required.

iv) Cement and concrete mixing, if applicable, should only take place within the construction site. No concrete may be mixed directly on the ground.

v) All environmental problems occurring on the site such as chemical spillage, wasteful water disposal, etc. should be reported to the ECO.

3.4 Waste management

i) Waste refers to all construction debris and domestic waste generated due to construction activities.

ii) The contractor will be responsible for the removal of construction waste.

iii) Suitable containers should be placed on site to collect all solid waste. These should be emptied regularly.

iv) No littering is permitted. During the construction period the site shall be maintained in a neat and tidy condition.

v) All solid waste produced should be disposed of at an authorized landfill site.

vi) No dumping, burning or burying of waste may take place on site.

vii) All hazardous waste (if any) should be disposed of at an authorized hazardous landfill site. Re-usable hazardous material should be re-used or sold to recycling contractors, where possible.

3.5 Soil, erosion and vegetation management

i) Construction activities should be limited to designated construction areas to prevent peripheral impacts on surrounding natural habitats. Construction vehicles should also keep to constructed roads where possible, so that natural vegetation is not destroyed unnecessarily.

ii) All human movement and activities must be contained within designated construction areas in order to prevent peripheral impacts on surrounding natural habitat.

iii) Erosion management is important. Rehabilitation of disturbed areas is important to help the recovery of the vegetation.

iv) Removed topsoil is to be stockpiled in an area where it will not be disturbed. For example, one layer of bricks or stones can be placed around the stockpiled topsoil to protect topsoil from washing away during rainstorms.

v) Topsoil is to be placed on the disturbed areas once construction is completed. Re-spreading is preferably to be done to its natural level or to a maximum of 10 cm.

vi) An alien control and monitoring programme must be developed, starting during the construction phase and to be carried over into the operational phase.

vii) Any proclaimed weed or alien species that germinates during the contract period must be cleared by hand / approved chemicals before flowering thereof.

viii) Imported fill material should be monitored during and after construction for the presence of any alien species. Any such species should be removed immediately.

ix) No open fires allowed. Provision should be made that no accidental fires are started.

x) No firewood shall be collected on site or in surrounding areas, without written consent from the landowner.

xi) Firefighting equipment must be available on site.

xii) Species, especially grasses, trees and shrubs occurring in the region must be used to rehabilitate disturbed areas.

3.6 Noise control

i) The noise levels will be kept to an acceptable level and comply with the standards as per legislation.

ii) Construction activities should be limited to normal daytime hours, where possible.

iii) Noise levels should be kept as low as possible during the construction phase in order not to disturb adjacent landowners.

3.7 Air pollution

i) Dust will be controlled during the construction phase, when necessary.

ii) Construction activities should be limited to normal daytime hours, where possible.

iii) The operation of construction vehicles will be limited to 35km/hour to limit the formation of dust.

iv) Dust will also be controlled during the operational phase, when necessary. The operation of TLBs etc. will be limited to 35km/hour to limit the formation of dust.

3.8 Safety and security

i) The contractors must comply with the Occupational Health and Safety Act, National Building Regulations and any other national, regional or local regulations with regard to safety on site.

ii) Construction contracts must include safety and security measures for staff.

iii) Precautions to ensure that construction staff and sites are visible should be implemented.

iv) Proper PPE should be provided to the employees and used correctly by employees.

v) Fire extinguishers must be available on site and in the construction camp (if any).

3.9 Heritage management

i) Known heritage resources (if any) must be avoided as far as possible.

ii) Employees should be encouraged and informed of the need to be on the look-out for potential fossils / buried archaeological material.

iii) In the case of the discovery of any stone tools or other archaeological or palaentological material, the work in the immediate vicinity should temporarily cease and reported to the archaeologist and SAHRA. Should any human remains be exposed, the archaeologist as well as the local SAPS should be notified.

iv) Appropriate measures should be undertaken by the ECO until the archaeologist / SAPS visits the site. This should include the following:
- Site should be fenced with 'danger tape'
- Position of finding should be recorded
- Depth of finding should be recorded
- Digital image of the finding should be taken

v) Note that no information on the findings may be made public without the consent of the archaeologist / SAPS.

vi) Construction activities in the area may only continue after approval from the archaeologist and SAHRA.

3.10 Site clean-up and rehabilitation

i) Temporary structures and office sites (if any) shall be dismantled and removed after completion of the construction phase of the project.

ii) All waste, equipment, materials, etc. used during construction must be cleared from the site. The contractors must ensure that the site is cleared and rehabilitated to the satisfaction of the ECO.

iii) An alien plant control and monitoring programme should be implemented.

iv) Re-vegetation of disturbed areas must be undertaken with site indigenous species.

4. OPERATIONAL PHASE

i) Soil erosion occurrences should be attended to immediately.

ii) Regular monitoring should be undertaken to ensure that no pollution occurs within the wetland / its buffer area.

iii) An action plan should be implemented immediately, in case pollution occurs at the wetland area.

iv) The noise levels will be kept to an acceptable level and comply with the standards as per legislation.

v) Air pollution will be mitigated.

vi) Storm water infrastructures will be inspected regularly and proper mitigation measures will be implemented, should it be required.

vii) No littering is allowed on site. The site should be kept clean and tidy at all instances. Bins should be available for the collection of general waste. Waste should be removed from site on a regular basis.

viii) The groundwater quality is of good quality therefore all necessary precautions should be taken to prevent contamination of the aquifer.

ix) A groundwater monitoring plan should be drafted which include an early warning system to highlight contamination, should it occur.

x) Some of the existing boreholes can be utilised to monitor the groundwater quality. In order to establish an early detection system, one monitoring borehole can be drilled adjacent to the proposed site.

xi) The monitoring boreholes should be yield tested in order to obtain the necessary aquifer parameters like transmissivity and hydraulic conductivity for input in the numerical groundwater flow and transport model, if needed.

xii) The water monitoring plan should be revised on a regular basis to incorporate the changes in the water flow regime.

xiii) Laboratory analysis techniques will comply with SABS guidelines. Laboratories must be accredited.

xiv) Data must be stored electronically. It is suggested that a well-known database such as WISH, Aquabase or Access be used. A backup of the data base must be stored in a safe place. Backups should be made every time the database is updated.

xv) On the completion of every sampling run a monitoring report must be completed. Included in the report must be time series trends, Piper and Durov diagrams. These will be used to determine if there are any changes in the system. These changes must be flagged and explained in the report.

5. DECOMMISSIONING /CLOSURE

It is not anticipated that the proposed project will cease in the nearby future. However, if decommissioning is decided upon, a rehabilitation plan will be developed and submitted for approval. The end-use of the area will be kept in mind during the compilation of the rehabilitation plan.

i) Activities associated with the decommissioning phase of the project (i.e. expansion of a cemetery), will be limited to the rehabilitation of areas disturbed during the construction phase. All disturbed areas will be rehabilitated according to best practices.

ii) All temporary infrastructure related to the construction phase will be removed from site.

iii) Temporary concrete surfaces (if any) will be removed and compacted areas ripped.

iv) The establishment of natural occurring vegetation will be encouraged, where applicable.

v) No waste will be dumped on site and any waste occurring on site will be removed and disposed of according to best practices.

vi) Establishment of extensive alien vegetation species will be monitored.

vii) A rehabilitation plan will be developed, if it is decided to decommission the cemetery, before the cessation of the operation aspects of the proposed project.

viii) The rehabilitation plan will include management and mitigation measures to be implemented during the decommissioning of the project.

6. COMPLIANCE AND MONITORING

i) The proponent should ensure that the contractors adhere to the recommendations of the EMPr and conditions of the Environmental Authorisation during construction.

ii) An Environmental Control Officer (ECO) can be appointed separately or can be part of the contractor’s team to monitor the construction phase.

iii) Regular monitoring and / or spot inspections at least every fortnight during the construction phase is recommended.

iv) Inspections should be documented and any shortcomings addressed immediately.

v) An independent ECO should be appointed to undertake a monitoring audit at least every 3 months during construction, unless otherwise stated in the EA.

SUMMARY OF RECOMMENDED MANAGEMENT AND MITIGATION MEASURES

ECO - Environmental Control Officer / IECO - Independent Environmental Control Officer / SO - Safety Officer

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
General measures to consider	1.1.	Any construction is disruptive and the environment must be given consideration with every activity undertaken	Applicant / Contractor	Contractor / ECO	On-going	At all phases
	1.2.	All relevant standards relating to legislation should be adhered to (including waste emissions, waste disposal, noise regulations, etc.)	Applicant / Contractor	Contractor / ECO	On-going	At all phases
	1.3.	According to Section 28 of the NEMA Act 107, every person who cause, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring and if it can't be avoided or stopped, to minimize and rectify such pollution or degradation of the environment.	Applicant / Contractor	Contractor / ECO	On-going	At all phases
	1.4.	The pollution control provision in Section 19(1) of the National Water Act (Act 36 of 1998) should be adhered to at all times.	Applicant / Contractor	Contractor / ECO	On-going	At all phases

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
Planning phase	2.1.	Permits will be obtained for the removal / transplantation of protected species (if any) that are located within the construction area where no alternatives are possible. Care will be taken to prevent unnecessary damage to vegetation near to construction activities.	Contractor	Applicant / ECO	Once off	Before site preparation / construction activities are undertaken
	2.2.	Water Use Authorisations will be obtained before any delineated surface water boundaries are disturbed.	Applicant	Contractor / ECO	Once off	Before site preparation / construction activities are undertaken
	2.3.	The necessary Environmental Authorisation will be obtained before any activities listed in the Regulations (Regulations 982, 983, 984 and / or 985 of 2014) are undertaken.	Applicant	Contractor / ECO	Once off	Before site preparation / construction activities are undertaken
	2.4.	The necessary precautions with regard to road safety will be implemented for construction work to be undertaken within road crossings. Regulation of traffic should be implemented, where necessary.	Contractor	SO / ECO	Continual	Before site preparation / construction activities are undertaken

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	2.5.	Proper sanitation, potable water and waste facilities will be in place before construction activities are undertaken.	Contractor	SO / ECO	Continual	Before site preparation / construction activities are undertaken
	2.6.	A blasting permit will be obtained before blasting activities is undertaken (if any).	Applicant	Contractor / ECO / SO	Once off	Before site preparation / construction activities are undertaken
Construction phase - general	3.1.	Care will be taken to prevent unnecessary damage to vegetation near to construction activities.	Contractor	ECO	On-going	Throughout construction phase
	3.2.	The necessary Water Use Authorisations will be available on site (if any).	Contractor	ECO	On-going	Throughout construction phase
	3.3.	The necessary precautions with regard to road safety will be implemented for construction work within road crossings (if any).	Contractor	ECO / SO	On-going	Throughout construction phase
	3.4	Proper sanitation, water and waste facilities will be in place for construction workers throughout the construction phase.	Contractor	ECO	On-going	Throughout construction phase
	3.5	Chemical toilets will be cleaned and serviced regularly and proof thereof will be available on site.	Contractor	ECO	On-going	Throughout construction phase
	3.6.	Potable water will be made available daily to workers on site.	Contractor	ECO / SO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	3.7.	Fire-fighting equipment will be available on site, where applicable.	Contractor	ECO / SO	On-going	Throughout construction phase
	3.8.	If artefacts or graves are uncovered during construction activities, work in the immediate vicinity will be stopped until the project Archaeologist and SAHRA has been consulted.	Contractor	ECO	On-going	Throughout construction phase
	3.9.	Adjacent landowners will be notified of proposed blasting, 24 hours prior to blasting activities.	Contractor	ECO / SO	On-going	Throughout construction phase
Water resources	4.1.	No activities will be undertaken within a watercourse, its buffer area or within the 1:100 year floodline, without the necessary authorisations (for example from DESTEA and DWS).	Contractor	ECO	On-going	Throughout construction phase
	4.2.	Caution will be taken to ensure that construction materials are not dumped or stored within the waterway(s) and -buffer zone(s).	Contractor	ECO	On-going	Throughout construction phase
	4.3.	Emergency plans will be in place in case of spillages into the water resource(s).	Contractor	ECO	On-going	Throughout construction phase
	4.4.	All no-go areas will be demarcated under guidance of the Environmental Control Officer (ECO).	ECO	IECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	4.5.	The design of drainage systems will ensure there is no contamination, eutrophication or increased erosion of the waterway(s). Drainage systems will be maintained regularly in order to minimize the runoff of harmful chemical substances into the waterway(s).	Contractor	ECO	On-going	Throughout construction phase
	4.6.	It will be ensured that the construction activities have minimal effects on the flow of water through the waterway(s).	Contractor	ECO	On-going	Throughout construction phase
Handling and Storage of materials	5.1.	All chemicals used during the development, including fuel for the construction vehicles, will be stored in a proper storeroom or protected area to prevent pollution.	Contractor	ECO	On-going	Throughout construction phase
	5.2.	Vehicles will be serviced at designated areas. No oil, diesel or other chemicals may be spilled or discharged anywhere.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	5.3.	Where applicable, the contractors will ensure that all relevant national, regional and local legislation regarding storage, transport, use and disposal of petroleum, chemical, harmful or hazardous substances and materials are adhered to, where necessary.	Contractor	ECO	On-going	Throughout construction phase
	5.4.	Cement and concrete mixing, if applicable, will only take place within the construction site. No concrete will be mixed directly on the ground.	Contractor	ECO	On-going	Throughout construction phase
	5.5.	All environmental problems occurring on the site such as chemical spillage, wasteful water disposal, etc. will be reported to the ECO. The ECO should implement best practices to rectify the impacts thereof on the environment.	Contractor / ECO	IECO	On-going	Throughout construction phase
	5.6.	Spill response equipment must be available during the handling and loading of hazardous material, including waste (if any)	Contractor / ECO	IECO	On-going	Throughout construction phase
	5.7.	Hazardous substances to be stored in bunded area. Bund walls will have a capacity of at least 110% of the total capacity of the stored volume.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	5.8.	No oil, diesel or other chemicals may be spilled or discharged anywhere and contact with bare soil should be avoided at all cost.	Contractor	ECO	On-going	Throughout construction phase
	5.9.	Drip trays will be used during the servicing of vehicles as well as the transfer of chemicals / substances from transportation vehicles.	Contractor	ECO	On-going	Throughout construction phase
	5.10.	All environmental problems occurring on the site such as chemical spillage, wasteful water disposal, etc. will be reported to the ECO. The ECO should implement best practices to rectify the impacts thereof on the environment.	Contractor	ECO	On-going	Throughout construction phase
Waste Management (Note that waste refers to all construction debris and domestic waste generated due to construction activities)	6.1.	The contractor is responsible for the removal of construction waste.	Contractor	ECO	On-going	Throughout construction phase
	6.2.	Suitable containers will be placed on site to collect all solid waste. These will be emptied regularly.	Contractor	ECO	On-going	Throughout construction phase
	6.3.	No littering is permitted. During the construction period the site will be maintained in a neat and tidy condition.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	6.4.	All solid waste produced will be disposed of at an authorized landfill site. Recyclable waste may also be sold to recycling contractors.	Contractor	ECO	On-going	Throughout construction phase
	6.5.	No dumping, burning or burying of waste will be undertaken on site.	Contractor	ECO	On-going	Throughout construction phase
	6.6.	All hazardous waste will be disposed of at an authorized hazardous landfill site. Recyclable hazardous waste may also be re-used or sold to recycling contractors.	Contractor	ECO	On-going	Throughout construction phase
	6.7.	Recyclable waste will be sold / re-used, where possible.	Contractor	ECO	On-going	Throughout construction phase
	6.8.	A waste management plan will be compiled and designed to ensure adequate waste management activities	Contractor	ECO	On-going	Throughout construction phase
	6.9.	Areas used for waste storage and loading of materials should be lined and bund walls have to be erected to contain any spills that might occur.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
Soil, erosion and vegetation management	7.1.	Construction activities will be limited to designated construction areas to prevent peripheral impacts on surrounding natural habitats. Construction vehicles will also keep to constructed roads where possible, so that natural vegetation is not destroyed unnecessarily.	Contractor	ECO	On-going	Throughout construction phase
	7.2.	Access roads or temporary crossings must be non-erosive, structurally stable and not induce flooding / safety hazard.	Contractor	ECO	On-going	Throughout construction phase
	7.3.	If any access road or temporary crossing is impaired, it will be repaired immediately to prevent any future / further damage.	Contractor	ECO	On-going	Throughout construction phase
	7.4.	All human movement and activities will be contained within designated construction areas in order to prevent peripheral impacts on surrounding natural habitat.	Contractor	ECO	On-going	Throughout construction phase
	7.5.	Erosion management is important. Rehabilitation of disturbed areas will be undertaken to help the recovery of the vegetation.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	7.6.	Stockpiled material will be stockpiled in an area where it will not be disturbed by vehicles.	Contractor	ECO	On-going	Throughout construction phase
	7.7.	Stockpiled material will be protected from washing away during rainstorms. For example, one layer of bricks or stones can be placed around the stockpiled topsoil.	Contractor	ECO	On-going	Throughout construction phase
	7.8.	Stockpiled material will be placed on the cleared areas once construction is completed. Re-spreading of topsoil is preferably to be done to a maximum of 10 cm.	Contractor	ECO	On-going	Throughout construction phase
	7.9.	An alien control and monitoring programme will be developed starting during the construction phase and will be carried over into the operational phase.	Contractor	ECO	On-going	Throughout construction phase and operational phase
	7.10.	Any proclaimed weed or alien species that germinates during the contract period will be cleared by hand / approved chemicals before flowering thereof.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	7.11.	Imported fill material will be monitored during and after construction for the presence of any alien species. Any such species will be removed immediately.	Contractor	ECO	On-going	Throughout construction phase and during operational phase
	7.12.	No open fires allowed. Provision will be made that no accidental fires are started.	Contractor	ECO	On-going	Throughout construction phase
	7.13.	No firewood will be collected on site or in surrounding areas.	Contractor	ECO	On-going	Throughout construction phase
	7.14.	Fire fighting equipment will be available on site.	Contractor	ECO / SO	On-going	Throughout construction phase
	7.15.	Species, especially grasses, trees and shrubs occurring in the region will be used to rehabilitate disturbed areas.	Contractor	ECO	On-going	Throughout construction phase
	7.16.	No animals may be harmed / captured / trapped and / or hunted. This must be strictly enforced.	Contractor	ECO	On-going	Throughout construction phase
	7.17.	Animals found at the construction site will be removed and relocated to a suitable area by a suitable person.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	7.18.	Compacted soils (such as dirt tracks not to be utilised during the operational phase) must be ripped to ensure the establishment of natural occurring vegetation.	Contractor	ECO	On-going	Throughout construction phase
Noise and dust control	8.1.	Construction activities will be limited to normal daytime hours.	Contractor	ECO	On-going	Throughout construction phase
	8.2.	Noise levels will be kept as low as possible during the construction phase in order not to disturb adjacent landowners.	Contractor	ECO / SO	On-going	Throughout construction phase
	8.3.	Proper mitigation measures will be implemented to limit noise (e.g. the installation of silencers, where required).	Contractor	ECO / SO	On-going	Throughout construction phase
	8.4.	Proper mitigation measures will be implemented to limit the formation of dust (e.g. wetting of construction area, when required).	Contractor	ECO	On-going	Throughout construction phase
	8.5.	The speed of the construction vehicles will be limited to avoid dangerous conditions, the formation of dust and the excessive deterioration of roads being used.	Contractor	ECO	On-going	Throughout construction phase
Safety and Security	9.1.	The contractors will comply with the Occupational Health and Safety	Contractor	ECO / SO	On-going	Throughout construction

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
		Act, National Building Regulations and any other national, regional or local regulations with regard to safety on site. Construction contracts will include safety and security measures for staff.				phase
	9.2.	Precautions to ensure that construction staff and sites are visible and proper PPE will be provided to all employees.	Contractor	ECO / SO	On-going	Throughout construction phase
	9.3.	Construction work within road reserves will accommodate road users as far as possible. This includes the following:	Contractor	ECO / SO	On-going	Throughout construction phase
	9.3.1.	Roads will be crossed in half widths at a time to minimise the impact on vehicular traffic, where possible.	Contractor	ECO / SO	On-going	Throughout construction phase
	9.3.2.	Construction along and across existing roads will be executed in such a manner that both pedestrian and vehicular traffic is accommodated at all times.	Contractor	ECO / SO	On-going	Throughout construction phase
	9.3.3.	The contractor will be required to maintain adequate access to all public and private property at all times.	Contractor	ECO / SO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	9.3.4.	Contractor will supply, erect and maintain road signs for all work areas conforming to the prescribed layout and requirement of the South African Road Traffic Signs Manual and other relevant notices.	Contractor	ECO / SO	On-going	Throughout construction phase
	9.4.	Fire extinguishers will be available on site and in the construction camp (if any).	Contractor	ECO / SO	On-going	Throughout construction phase
Heritage Management	10.1.	In the case of the discovery of any heritage, archaeological or palaeontological significance, the work in the area will be stopped and reported to the archaeologist and SAHRA. Any construction activities in the nearby vicinity may only commence after approval is obtained from SAHRA as well as the ECO.	Contractor	ECO	On-going	Throughout construction phase
Site Clean-up and Rehabilitation	11.1.	Temporary structures and office sites (if any) will be dismantled and removed after completion of the construction phase of the project.	Contractor	ECO	On-going	Throughout construction phase
	11.2.	All waste, equipment, materials, etc. used during construction will be cleared from the site. The contractors will ensure that the site is cleared and rehabilitated to the satisfaction of the ECO.	Contractor	ECO	On-going	Throughout construction phase

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	11.3.	An alien plant control and monitoring programme will be implemented.	Contractor	ECO	On-going	Throughout construction phase
	11.4.	Re-vegetation of disturbed areas will be undertaken with site indigenous species. Hydroseeding will be implemented if the establishment of natural occurring vegetation does not occur within reasonable time.	Contractor	ECO	On-going	Throughout construction phase
	11.5.	After completion of the construction phase, a waterway monitoring program will be initiated that ensure that all are adequately rehabilitated.	Contractor	ECO	On-going	Throughout construction phase
Operational Phase	12.1.	Soil erosion occurrences will be attended to immediately.	Applicant	DESTEA / DWS	Maintenance inspections should be undertaken every six months.	During operation
	12.2	Regular site inspections / water samples will be taken from the wetland to determine if any seepage from the cemetery, towards the wetland occur. Best practices will be implemented should any pollution at the wetland occur	Applicant	DESTEA / DWS	Monthly	During operation

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	12.3	Regular water samples will be taken from the boreholes used for human consumption to determine if any seepage from the cemetery, towards the groundwater table occurs. Best practices will be implemented should any pollution of the groundwater occur.	Applicant	DESTEA / DWS	Monthly	During operation
Decommissioning / Closure	13.1.	It is not anticipated that the proposed project will cease in the nearby future. However, if decommissioning is decided upon, a rehabilitation plan will be developed and submitted for approval. The end-use of the area will be kept in mind during the compilation of the rehabilitation plan.	Applicant	DESTEA	Six months before the proposed decommissioning is undertaken	During operation
Compliance and Monitoring	14.1.	The applicant will ensure that the contractors adhere to the recommendations of the EMPr and conditions of the Environmental Authorisation during construction.	Applicant	ECO	On-going	During site preparation as well as construction phase
	14.2.	An Environmental Control Officer (ECO) will be appointed to monitor the construction phase. Note that the ECO may be appointed separately or can be part of the contractor’s team.	Contractor	Applicant	Before construction activities are undertaken	The ECO will be employed until rehabilitation of the site is completed.

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	14.3.	Regular monitoring and / or spot inspections at least every fortnight during the construction phase is recommended.	ECO / Contractor	IECO	At least every two weeks	During site preparation as well as construction phase
	14.4.	Inspections should be documented and any shortcomings addressed immediately.	ECO / Contractor	IECO	Shortcomings should be addressed immediately	During site preparation, construction phase as well as operational phase
	14.5.	An independent ECO will be appointed to monitor the construction phase. A report will be provided to the contractor upon completion thereof. The findings thereof will be made available to DESTEA, should it be requested.	Independent ECO	DESTEA	3 monthly, or as indicated in the Environmental Authorisation	During site preparation and construction phase
	14.6.	Any emergency or unforeseen impact will be reported to the relevant environmental department within 24 hours after identification for telephonic approval and will be confirmed in writing.	Contractor / ECO	ECO / IECO	On-going	At all times

Objective	Nr	Mitigation measure	Executing party	Monitoring party	Timeframe	Project Stage
	14.7.	During the operational phase all infrastructure must be routinely audited and maintenance schedule adjusted accordingly in order to prevent / limit any negative environmental impacts.	Applicant	DESTEA / DWS	On-going	During the operational phase

Annexure 5.

Eskom

STANDARD CONDITIONS OF SUPPLY FOR SMALL SUPPLIES WITH CONVENTIONAL METERING

IMPORTANT NOTICE

DISCLOSURE NOTICE IN TERMS OF SECTION 49 OF THE CONSUMER PROTECTION ACT 68 OF 2008

By signing directly below, the intended customer ________ [MANGAUNG METROPOLITAN MUNICIPALITY] confirms that this notice was provided to it, that it had time to study this notice, the intended electricity supply agreement and its annexures, prior to it signing and agreeing to the terms and annexures of the said electricity supply agreement, and that it understands, generally, the potential effect of all of the provisions of the intended electricity supply agreement, but specifically, the highlighted clauses further explained in the next paragraph.

This notice is to draw the attention of the intended customer to the specific clauses highlighted in bold font, in the intended electricity supply agreement and its annexures that may contain a limitation of risk or liability or an indemnification of Eskom Holdings SOC Ltd or constitute an assumption of risk or liability by the intended customer. The intended customer will also initial at each of these clauses as proof that the intended customer has been made aware of the specific content of these clauses. Clauses containing obligations of the intended customer are not summarily highlighted but are as important as all the provisions of the intended electricity supply agreement and its annexures.

Signed at ____________________ on ____________________ date

MANGAUNG METROPOLITAN MUNICIPALITY
Intended customer

ACC NUM 6364280926

ANNEXURE 'A'
(Rev May 2017)

1 INTERPRETATION

1.1 In this Agreement, unless stated otherwise, expressions which indicate
   1.1.1 a gender includes the other gender and neuter.
   1.1.2 the singular includes the plural, and vice versa.
   1.1.3 any reference to any law, rules, regulations, schedules, standards, licences or codes, shall include any amendments, modifications or extensions and shall mean any replacements or re-enactments thereof in force at the applicable time.
   1.1.4 any reference to 'writing' or 'written' shall include all methods of reproducing words in a legible and non-transitory form,
   1.1.5 any reference to 'persons' shall include natural or juristic persons, firms, joint ventures, trusts, unincorporated associations and organisations, partnerships and any other entities, irrespective of whether such entity has a separate legal personality.
   1.1.6 days shall refer to calendar days unless business days are specified.
   1.1.7 reference to a number of days will be calculated with exclusion of the first day and inclusion of the last day.
   1.1.8 where figures are referred to in numerals and in words and there is any conflict between them the words shall prevail
1.2 The rule that a contract should be interpreted against the party responsible for the drafting or preparation thereof or who would benefit from the insertion of a clause, does not apply to this Agreement

2. DEFINITIONS

2.1 'Agreement' or 'this Agreement' means the electricity supply contract between ESKOM and the CUSTOMER, comprising the Electricity Supply Agreement for the applicable Tariff, Annexure "A" (Standard Conditions of Supply) and Annexure "B" (Schedule of Standard Prices).
2.2 'Approved Credit Rating' means a South African long-term unsecured foreign currency debt rating no worse than BBB- (as determined by Standard and Poor's Rating Group or Fitch Ratings) or Baa3 (as determined by Moody's Investor Services, Inc.) or equivalent rating (as determined by ESKOM or a rating agency approved by ESKOM;
2.3 'Business Day' means any day other than Saturday, Sunday or a public holiday in South Africa.
2.4 'Cash Deposit' has the meaning ascribed to it in subclause 16.1
2.5 'Code(s)' means the Distribution Code, the South African Grid Code, the Grid Connection Code for Renewable Power Plants or any other code, published by NERSA, as applicable to ESKOM
2.6 'Connection Charge' means a customer-specific, allocated capital contribution recovering connection costs associated with the provision of capacity, payable in addition to the Tariff.
2.7 'Contractor' means any entity appointed as an independent contractor to execute work on the Premises in the exercise of the Rights as set out herein.
2.8 'CUSTOMER' means the person identified on the first page of the Electricity Supply Agreement
2.9 'Customer Interface Unit (CIU)' means the device forming part of a Metering Installation that is used to display information pertaining to the CUSTOMER's electricity usage, meter readings and/or applicable Tariff time periods at any given time of the day
2.10 'Disconnection' means a termination by ESKOM of the electricity supply to a CUSTOMER in accordance with the provisions of this Agreement
2.11 'Discontinuation' means a termination by ESKOM of the electricity supply to a CUSTOMER at the request of the CUSTOMER
2.12 'Due Date' has the meaning ascribed to it in subclause 15.1
2.13 'Electricity Regulation Act' means the Electricity Regulation Act 4 of 2006
2.14 'ESKOM' means Eskom Holdings SOC Ltd, registration number 2002/015527/30, a state-owned company with limited liability incorporated in terms of the laws of the Republic of South Africa, with its registered office at Megawatt Park, Maxwell Drive, Sandton
2.15 'Force Majeure Event' means any act, event or circumstance or any combination of acts, events or circumstances which
   2.15.1 is beyond the reasonable control of a Party affected by it (the 'Affected Party');
   2.15.2 is without fault or negligence on the part of the Affected Party and is not the direct or indirect result of a breach or failure by the Affected Party to perform any of its obligations under this Agreement;
   2.15.3 was not foreseeable or, if foreseeable, could not have been avoided or overcome by the Affected Party (including by reasonable anticipation) taking reasonable action
   2.15.4 prevents, hinders or delays the Affected Party in its performance of all (or part) of its obligations under this Agreement

   Without limiting the generality of the aforegoing, a Force Majeure Event may include any of the following acts, events or circumstances, but only to the extent that it satisfies the requirements set out in subclauses 2.15.1 to 2.15.4 above
   (i) war, hostilities, belligerence, blockade, acts of terrorism, sabotage, civil commotion, riot, revolution or insurrection occurring in South Africa.
   (ii) any laws, decrees or regulations of governmental authorities.
   (iii) strikes that are widespread, nationwide or political in nature (but excluding strikes, lockouts and other industrial disturbances of the Affected Party's employees which are not part of a wider industrial dispute materially affecting other employees within South Africa);
   (iv) drought, fire, earthquake, volcanic eruption, landslide, flood, storm, cyclone, tornado, typhoon or other natural disasters
   (v) epidemic or plague
   (vi) fire, explosion, or radioactive or chemical contamination;
   (vii) air crash, shipwreck or train crash; and
   (viii) any act, event or circumstance of a nature analogous to any of the aforegoing

   A Force Majeure Event does not include shortage of cash, any inability or failure to pay money, any inability to raise finance or any changes in price and market conditions or strikes, lockouts and other industrial disturbances of the Affected Party's employees which are not part of a wider industrial dispute materially affecting other employees within South Africa
2.16 'Guarantee' means a guarantee substantially in the form set out in Annexure C (Form of Guarantee) and initially for the amount stated therein (and as amended per the terms of this Agreement) which is issued by a financial institution which (a) holds an Approved Credit Rating, (b) is registered under applicable law to carry on the business of a bank in South Africa, and (c) constitutes an on demand, unconditional and irrevocable commitment by the issuer to pay
2.17 'Goods' mean all structures, conductors, cables, appliances and, without limitation, everything else as may be necessary or convenient in exercising the Rights
2.18 'Interrupt' or 'Interruption' means a temporary interruption of the supply of electricity to the CUSTOMER by ESKOM due to, and for the duration of, emergency or agreed events, and planned or unplanned events
2.19 'Metering Installation' means a metering system installed by ESKOM and consists of at least a meter, fittings, equipment, wiring and installations used for measuring the flow of electricity and may include a CIU
2.20 'Monthly Connection Charge' means a Connection Charge that is payable monthly whether any electricity is consumed in any month or not.
2.21 'NERSA' means the National Energy Regulator or its successor-in-title, established in terms of the National Energy Regulation Act (No 40 of 2004)
2.22 'NMD' means the definition of NMD in the Schedule of Standard Prices.
2.23 'Parties' means ESKOM or the CUSTOMER and includes their successors in-title or assigns and cessionaries
2.24 'Point of Delivery' has the meaning as ascribed to it in clause 6.1
2.25 'Premises' means the property described in this Agreement and to which a supply of electricity is required by the CUSTOMER.
2.26 'Reasonable and Prudent Person' means a person acting in good faith in the performance of its contractual obligations and in the general conduct of its business, exercising that degree of skill, diligence, prudence, responsibility and foresight which would reasonably and ordinarily be expected from a skilled and experienced person complying with all legal requirements, engaged in the same or a similar type of business, in the same or similar circumstances and conditions
2.27 'Schedule of Standard Prices' means ESKOM's published Tariff charges and the NMD Rules referenced therein, whether approved by ESKOM or NERSA, Annexure B of this Agreement.
2.28 'Standard Connection' means a connection that meets the specifications of the Distribution Code and applicable standards for a minimum technically acceptable solution

ANNEXURE A

2.29 'Standard Connection Charge' means that portion of the Connection Charge that is payable for the costs associated with a Standard Connection
2.30 'Supply Size' means the NMD or maximum capacity that ESKOM will supply
2.31 'Tariff' means the tariff as stipulated in this Agreement

Initial:

3. GENERAL AGREEMENT

3.1 ESKOM agrees to supply to the CUSTOMER and the CUSTOMER agrees to take from ESKOM all the electricity required by the CUSTOMER for the Premises on the terms and conditions set out in this Agreement, subject to the provisions of the Codes, the Electricity Regulation Act, rules issued by NERSA in terms thereof and regulations, and ESKOM's licences issued by NERSA, and any other applicable law.
3.2 The CUSTOMER agrees that ESKOM may install or provide the CUSTOMER with a CIU, which the CUSTOMER will use as intended in the user instructions.
3.3 Should the CUSTOMER have multiple electricity supply contracts with ESKOM, ESKOM shall have a right to transfer a debt arising from any of the CUSTOMER's terminated electricity supply contracts to any of the same CUSTOMER's existing electricity supply contract(s).
3.4 Notwithstanding the provisions of subclause 3.3 above, ESKOM shall not provide a supply of electricity to the CUSTOMER at any new Point of Delivery or increase the Supply Size at the CUSTOMER's existing Point of Delivery while the CUSTOMER is indebted to ESKOM in terms of any existing electricity supply contract.

4 FORM OF ELECTRICITY SUPPLIED

4.1 ESKOM will use its reasonable endeavours to furnish the CUSTOMER with a reliable supply of electricity and maintain the quality of supply at the Point(s) of Supply in compliance with the requirements prescribed in NRS 048-2. The requirements of NRS 048-2 define the voltage quality that shall be supplied under normal circumstances (as defined in NRS 048-2). In accordance with NRS 048 it is incumbent on the CUSTOMER to design and operate its equipment so that its equipment will function normally within these requirements.
4.2 However, it is not practicable for ESKOM to guarantee that the requirements of NRS 048-2 will under all contingencies be adhered to. It is therefore incumbent on the CUSTOMER to take adequate measures to protect its business and electrical installation against any losses and/or damage arising from frequency deviations, supply interruptions, voltage variations (including voltage dips), voltage harmonics, interharmonics, voltage flicker, voltage unbalance, voltage swells and transients, undervoltages and overvoltages in the supply to its electrical installation.
4.3 ESKOM shall use its reasonable endeavours to minimise the number of interruptions that occur on its system. It is incumbent on the CUSTOMER to take reasonable measures to protect its electrical installation against losses and/or damage.

Initial:

5. USE OF ELECTRICITY

5.1 The CUSTOMER shall only use electricity on the Premises up to the Supply Size as specified in this Agreement.
5.2 The CUSTOMER shall not use the electricity supplied other than at the Premises and shall not supply such electricity to any third party.
5.3 The CUSTOMER shall so use the supply as not to interfere with an efficient and economical supply to other customers of ESKOM, and shall at all times ensure that any effects on the supply voltage caused by the CUSTOMER's load shall not exceed the limits specified in Table 1, unless otherwise agreed to in writing between the Parties.

Table 1

Unbalance	0,3% (3-phase supplies)
Flicker (Pst)	0,38
Harmonics (THD)	1%
Rapid voltage changes:	
r = no. of changes per hour	Magnitude (%)
r≤1	4
1 < r ≤ 10	3
10 < r ≤ 100	2
100 < r ≤ 1000	1,25

6. POINT(S) OF DELIVERY

6.1 The Point(s) of Delivery for the supply of electricity to the Premises shall be decided by ESKOM and shall be
    6.1.1 where ESKOM makes use of a distribution kiosk on a pavement for installation of the meter, at the point on the boundary of the Premises where ESKOM's service cable is joined to that of the CUSTOMER's equipment; or
    6.1.2 where an overhead connection exists, at the terminals of ESKOM's service conductor connected to the insulators or other equipment installed by the CUSTOMER on the Premises in a position approved by ESKOM; or
    6.1.3 in all other cases, at the terminals of ESKOM's equipment where ESKOM's meter and circuit breaker are installed. The meter shall then be located as ESKOM may decide, which may be a point on the Premises.

Initial:

7. EQUIPMENT PROVIDED BY ESKOM

7.1 ESKOM shall provide the equipment required for the supply of electricity to the CUSTOMER at the Point of Delivery, together with the necessary connection from ESKOM's electricity system, all of which shall remain ESKOM's property irrespective of where in the electrical circuit the Metering Installation is installed.
7.2 Should the Point of Delivery be located within the Premises, ESKOM shall provide a service connection to the Point of Delivery on and/or across the Premises along a route to be agreed between ESKOM and the CUSTOMER.
7.3 Where ESKOM installs or provides the CUSTOMER with a CIU, such unit shall remain the property of ESKOM. The CUSTOMER shall be responsible for the safe accommodation of the CIU and shall report all faults relating thereto to ESKOM.
7.4 The CUSTOMER shall be liable for the loss of or any damage to the CIU not attributable to normal wear and tear.
7.5 The CUSTOMER may not tamper with the equipment provided by ESKOM, irrespective of whether ESKOM remains the owner thereof or not.
7.6 The CUSTOMER notes and agrees that ESKOM cannot install protective equipment on its own system which will ensure in all cases that motors and/or other equipment on the CUSTOMER's side will be protected in the event of frequency deviations, voltage variations, voltage harmonics, voltage flicker, voltage unbalance, voltage dips, voltage surges, voltage transients, undervoltages and overvoltages, or an Interruption or a Disconnection of the supply of electricity. The CUSTOMER shall take adequate measures to protect its motors and/or equipment against damage that may arise in such cases.

8 EQUIPMENT PROVIDED BY THE CUSTOMER

8.1 The CUSTOMER shall at its expense supply, erect, connect, operate and maintain any equipment required to connect its electrical installation at the Point of Delivery, provided that this equipment shall be approved by ESKOM before it is connected to the Point of Delivery.
8.2 The equipment of the CUSTOMER and the wiring of the Premises shall be of sound and fit for purpose design and construction, properly installed and maintained by the CUSTOMER, and shall in all respects comply with any applicable law.
8.3 ESKOM has the right to inspect a copy of the CUSTOMER's certificate of compliance.
8.4 The CUSTOMER must ascertain from ESKOM the type of protection to be provided on the supply.

9 ACCESS TO PREMISES

9.1 If requested by ESKOM, the CUSTOMER shall provide to ESKOM, at the CUSTOMER's expense, suitable and secured accommodation for the equipment installed by ESKOM.

9.2 ESKOM's authorised representatives shall have at all reasonable times, save in the case of an emergency, when more immediate access may be required, unfettered access to the Premises for any purpose required in terms of this Agreement.

10. METER-READINGS AND RENDERING OF ACCOUNTS

10.1 ESKOM shall operate and maintain the Metering Installation to be used for measuring the electricity supplied by ESKOM to the CUSTOMER. The Metering Installation shall comply with the requirements of the accuracy class as specified in SANS 474.

10.2 The meter(s) shall be read at such intervals as ESKOM may decide and accounts shall be rendered on the basis of such meter-reading, provided that in the event of the period between successive meter-readings being longer than 30 (thirty) days, an estimated account shall be rendered to the CUSTOMER. An adjustment account shall be rendered after the meters are next read based on the actual consumption of electricity as measured.

10.3 In cases where meters are manually read, the CUSTOMER can inform ESKOM timeously of the actual meter-readings on which to base ESKOM's account.

10.4 ESKOM will take reasonable efforts to ensure that the account is then issued on the basis of these meter-readings but retains the discretion whether to do so or not, and in any event any subsequent meter-reading by ESKOM subsequent to such an account, will prevail as proof of consumption.

10.5 In cases where meter-reading are automated, the account will generally be based on actual meter-readings. Where actual meter-readings are not available for any reason, an estimated meter-reading will be used to generate an account.

10.6 An account is payable irrespective of actual receipt by the CUSTOMER and the CUSTOMER must enquire if it has not received an account, and also irrespective of whether the consumption was based on actual meter-readings or estimations.

10.7 The records of the meter-readings shall at all reasonable times be open for inspection by the CUSTOMER or its authorised representative.

11. TESTING OF METERING INSTALLATION

11.1 ESKOM may test the Metering Installation at any time. If the CUSTOMER requests ESKOM in writing to test the Metering Installation, and after payment of a meter test fee, ESKOM shall test the Metering Installation.

11.2 If the test shows an inaccuracy to be in excess of the percentage accuracy as specified in SANS 474, the same shall, in the absence of evidence to the contrary, be deemed to have existed since the date the error or fault can be reasonably shown to have occurred, and (i) where applicable the test fee shall be refunded to the CUSTOMER, (ii) the Metering Installation or any part thereof shall be repaired or replaced as necessary, (iii) the electricity consumption of the CUSTOMER shall be estimated in accordance with NRS 047 and (iv) the account shall be adjusted in accordance with subclauses 15.2 to 15.6 below in the first account rendered after the inaccuracy has been ascertained.

11.3 ESKOM shall notify the CUSTOMER of the estimated electricity consumption, which notification will be binding on the CUSTOMER save in the case of a manifest error.

11.4 If the test shows an inaccuracy to be less than the percentage accuracy specified in SANS 474, the account(s) shall stand as rendered and where applicable the meter test fees paid by the CUSTOMER shall be forfeited and any additional actual costs that ESKOM incurred in testing the Metering Installation shall be charged to the CUSTOMER's account.

Initial:

12 RIGHT(S)-OF-WAY

12.1 THE RIGHTS

12.1.1 The CUSTOMER grants, generally, an irrevocable right (the "Rights"), in perpetuity and free of charge, to ESKOM and over the Premises, for the distribution and transmission of electricity and related purposes, substantially along a route to be agreed between the Parties, and comprising an area on either side of the centre line of the Goods, once they are built (the "Wayleave Area"), per Table 2, and the Rights include those set out herein.

Table 2:

Voltage	Area on either side of the centre line of the Goods
1 All voltages below 22kV	9 metres
2 22kV	9 metres
3 33kV	11 metres
4 44kV	11 metres
5 66kV	11 metres
6 88kV	11 metres
7 132kV and Delta construction 275kV	20 metres

12.1.2 The Rights, specifically, include the rights to:

- 12.1.2.1 convey electricity and telecommunication across the Premises;
- 12.1.2.2 erect structures, conductors, cables, appliances and, without limitation, everything else as may be necessary or convenient in exercising the Rights (the "Goods") and the CUSTOMER agrees that structure-supporting mechanisms may reasonably extend beyond the Wayleave Area where it is necessary to safely secure the Goods;
- 12.1.2.3 enter and be upon the Premises, subject to the CUSTOMER's health and safety policies and procedures, at any time in order to construct, erect, operate, use, maintain, repair, re-erect, alter or inspect the Goods or in order to gain access to any adjacent premises in the exercise of rights similar to the Rights;
- 12.1.2.4 have these Goods remain on the Premises for so long as either ESKOM or the CUSTOMER requires them to;
- 12.1.2.5 extend the Goods to other customers, suppliers or contracting parties of ESKOM over the Premises;
- 12.1.2.6 use existing roads and gates giving access to and running across the Premises and to erect on any fence such gates as may be necessary or convenient to gain access to or exit from the Premises and the Goods or in order to gain access to any adjacent premises in the exercise of rights similar to the Rights;
- 12.1.2.7 remove any material or structures, and cut or trim any tree, bush or grass within the Wayleave Area or to the extent necessary where the Goods extends beyond the Wayleave Area, in order to comply with the restrictions referred to in clause 12.2.2 hereof; and
- 12.1.2.8 every ancillary right necessary or convenient for the proper exercise of the Rights granted to ESKOM.

12.1.3 The Rights shall apply to all electricity infrastructure on the Premises and the area which such infrastructure covers shall be deemed to be included in the Wayleave Area and/or Restricted Area. It is agreed that the CUSTOMER herewith grants permission for all electricity infrastructure on the Premises to remain on the Premises.

12.1.4 Any expenses to be incurred, which are necessitated by a change to or removal of the Goods in the Wayleave Area, required by the CUSTOMER or the registered owner of the Premises, are for the CUSTOMER's account and must be paid for by the CUSTOMER in advance. ESKOM shall effect such changes or removals after receipt of such payment, if such changes or removal are technically possible.

12.1.5 The Contractor may exercise any of the Rights.

12.1.6 ESKOM may:

- 12.1.6.1 let any portion of the Goods to any third party on such conditions as ESKOM may deem fit;
- 12.1.6.2 cede all or any of the Rights to any third party.

12.2 THE OBLIGATIONS

12.2.1 ESKOM must:

12.2.1.1 ensure that any of ESKOM's gates that it has used is closed after use

12.2.1.2 pay reasonable compensation for intentional damage or damage caused through a negligent act or omission, caused by ESKOM, its employees or agents in pursuit of the Rights, save where ESKOM is acting in accordance with subclause 12.1.2.7, and subject to the provisions of clause 21.

12.2.1.3 where a Contractor exercises the Rights, ensure that the Contractor complies with the obligations contained in this subclause 12.2.1.

12.2.2 The CUSTOMER must ensure that no:

12.2.2.1 building or structure is erected or installed above or below the surface of the ground within the Wayleave Area and no tree or bush is planted within the Wayleave Area or within the metres per Table 2 above, from any structure-supporting mechanism (the "Restricted Area");

12.2.2.2 tree, which could grow to a height in excess of the horizontal distance of that tree from the nearest conductor of any power line is planted or allowed to continue growing, regardless that it is outside of the Wayleave or Restricted Area.

12.2.2.3 material which may in the opinion of ESKOM endanger any electricity infrastructure is placed within the Wayleave or Restricted Area.

12.2.3 The CUSTOMER must bring the existence of these Rights to the attention of any purchaser or other transferee of the Premises (or of any portion of the Premises) before the Premises (or any portion thereof) is sold and/or transferred to such purchaser or transferee, or where the CUSTOMER grants any further rights in or to the Premises to any other third party, to such third party.

12.2.4 The CUSTOMER must inform ESKOM in writing if it is going to sell the Premises or knows that the Premises will be sold.

12.2.5 If the CUSTOMER is not the registered owner of the property, per the Deeds' Office records, it must, in favour of ESKOM, obtain the permission of the registered owner of the Premises to grant to ESKOM the Rights.

12.2.6 The CUSTOMER's attention is drawn to the provisions of section 10.17.1 of the regulations promulgated in terms of the Explosives Act 26 of 1956, which prescribes that when blasting is to be done within 500 (five hundred) metres of any electricity infrastructure, written confirmation must first be obtained from ESKOM concerning the protection of electricity infrastructure.

13. COMMENCEMENT OF SUPPLY

The supply of electricity shall be made available by ESKOM, subject to the CUSTOMER complying with ESKOM's conditions for providing supply, on a date to be advised to the CUSTOMER by ESKOM, or as soon thereafter as practicable.

14. TARIFF AND OTHER CHARGES

14.1 Prices to be charged:

14.1.1 The prices payable by the CUSTOMER for consumption and the supply of electricity shall be the prices set out in the Tariff as specified in the Schedule of Standard Prices.

14.1.2 Should the CUSTOMER be on a Tariff with no fixed charge, and no electricity is consumed in any period of 6 (six) consecutive months, ESKOM may terminate this Agreement on notice and remove all of its equipment.

14.2 Connection Charges:

14.2.1 In addition to the prices to be paid, the CUSTOMER must pay, if applicable the Standard and Premium Connection Charge and/or the Monthly Connection Charge until its expiry date as set out in this Agreement.

15. PAYMENT OF ELECTRICITY ACCOUNTS

15.1 Accounts for all charges payable by the CUSTOMER shall be sent to the CUSTOMER as soon as possible after the end of each month. The account is due and payable within 7 (seven) days of the date of the account, irrespective of the date or fact of actual receipt (the "Due Date").

15.2 Should payment not be received within a period of 23 (twenty three) days from the Due Date, ESKOM may Disconnect the supply in accordance with clause 19.3. ESKOM shall charge interest compounded monthly from the Due Date to the date of payment, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited plus 5% (five percent) subject to limitations imposed by prevailing legislation.

15.3 Should the CUSTOMER dispute an account, it shall, before the next account is issued, give ESKOM written notice of the dispute. However, the CUSTOMER shall not be entitled to reduce or set off its debt or defer payment thereof beyond the period of grace allowed for in subclause 15.2, in any event. Only if a manifest error is evident, shall the CUSTOMER be entitled to pay in lieu of the amount due an amount equal to the average of the accounts rendered for the preceding 3 (three) consecutive months.

15.4 Should the CUSTOMER be incorrectly charged for any amount(s) payable in terms of this Agreement, ESKOM shall inform the CUSTOMER of the correct amount(s) payable and the reasons therefor, in an adjustment account.

15.5 In the case of the CUSTOMER having been overcharged and having paid such overcharged amount, ESKOM shall as soon as practicable credit the CUSTOMER's account with the total amount overcharged with interest compounded monthly in arrears from the date the CUSTOMER has paid the overcharged amount up to the date ESKOM has credited the CUSTOMER's account, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited minus 4% (four percent).

15.6 In the case of the CUSTOMER being undercharged, ESKOM shall debit the CUSTOMER's account with the total amount undercharged and such amount shall be payable by the CUSTOMER. If the CUSTOMER cannot pay the full amount then due, it must enter into a separate payment deferral arrangement, and the repayment term may not extend beyond 6 (six) months, or the period for which the CUSTOMER was undercharged, whichever is the least number of months. The amount outstanding shall bear interest, if it is not paid with the next account, compounded monthly, from the date the CUSTOMER's account was debited in terms of this Agreement to date of payment, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited plus 5% (five percent) subject to limitations imposed by prevailing legislation.

15.7 In the case of the CUSTOMER being undercharged as a result of tampering by the CUSTOMER, the total amount undercharged calculated from the date of tampering shall be payable by the CUSTOMER and shall bear interest, compounded monthly, from the date the CUSTOMER's account was debited in terms of this Agreement to date of payment, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited plus 5% (five percent), subject to limitations imposed by prevailing legislation.

15.8 A certificate under the signature of a duly authorised employee of ESKOM setting out the amount due and payable by the CUSTOMER at any time in terms of this Agreement, shall be *prima facie* proof, of the amount due by the CUSTOMER.

16. SECURITY – ELECTRICITY ACCOUNTS

16.1 As security for the due payment of its accounts, the CUSTOMER shall, on signing this Agreement and prior to supply being made available, deposit with ESKOM a sum of money (the Cash Deposit) or furnish ESKOM with a Guarantee in an amount calculated by ESKOM to represent at least 3 (three) months' anticipated consumption during the highest annual consumption period.

16.2 ESKOM shall have the right to call upon the CUSTOMER at any time to vary the amount of the Cash Deposit or the Guarantee, so that the amount of the security shall always be sufficient to cover the estimated amount payable by the CUSTOMER for electricity during any period of 3 (three) consecutive months during the highest annual consumption period, to be provided by the CUSTOMER within 30 (thirty) days of being called upon to do so.

16.3 ESKOM shall have the right at any time to allocate the whole or any portion of the Cash Deposit or the proceeds of the Guarantee towards the payment of any amounts payable by the CUSTOMER for electricity supplied and which are in arrears. If ESKOM so applies the Cash Deposit or the proceeds of the Guarantee, the CUSTOMER must ensure that the Guarantee or the Cash Deposit is immediately reinstated to the required amount.

16.4 If and whenever the Guarantee provided by the CUSTOMER in accordance with this clause ceases (for any reason whatsoever) to be in full force and effect or otherwise to comply with this clause, the CUSTOMER shall promptly upon the occurrence of such event provide ESKOM with a new Guarantee which meets the requirements of this clause.

16.5 Should the CUSTOMER fail to comply with the provisions of sub-clauses 16.1, 16.3, and 16.4 above, ESKOM shall be entitled to Disconnect the supply in accordance with clause 18.3.

16.6 The balance of the Cash Deposit shall be returned to the CUSTOMER upon termination of this Agreement and final settlement of any amounts owing to ESKOM.

16.7 The Cash Deposit shall bear interest, capitalised annually, at the prevailing rate as determined by ESKOM from time to time.

Initial:

17. EMERGENCY CONDITIONS AND CONSTRAINTS

17.1 ESKOM may interrupt the supply of electricity to the CUSTOMER or require the CUSTOMER to reduce its demand for the supply of electricity, if ESKOM has a shortage of generation and/or transmission and/or distribution capacity.

17.2 In addition, the CUSTOMER is requested to use energy efficient technologies and equipment in accordance with best international practice on specific applications e.g. lighting, heating/cooling, induction loads, by way of example.

18. DISCONNECTION, AND TERMINATION OF THIS AGREEMENT

18.1 ESKOM may Disconnect the electricity supply to the CUSTOMER immediately if:

- 18.1.1 the CUSTOMER is causing or can reasonably be expected to cause ESKOM to be in immediate breach of any applicable law, rules, regulations, schedules, licences, codes, or any approvals, where such breach requires Disconnection;
- 18.1.2 the CUSTOMER is causing or can reasonably be expected to cause personal injury to ESKOM's agents, directors or employees, the CUSTOMER, its agents, directors or employees or any third party;
- 18.1.3 the CUSTOMER is causing or can reasonably be expected to cause immediate material damage to the assets of ESKOM or other customers connected to the ESKOM network;
- 18.1.4 the supply of electricity to the CUSTOMER is used anywhere other than at the Premises;
- 18.1.5 the CUSTOMER supplies electricity to a third party;
- 18.1.6 the CUSTOMER tampers with or permits tampering with the Metering Installation or any other ESKOM equipment; or
- 18.1.7 the CUSTOMER allows the electricity supply to bypass the Metering Installation.

18.2 Should the electricity supply be Disconnected as provided for in subclause 18.1, ESKOM shall notify the CUSTOMER in writing of the Disconnection, the reasons therefor and reconnection requirements.

18.3 ESKOM may Disconnect the supply after having given the CUSTOMER 14 (fourteen) days' notice to rectify a breach, if the CUSTOMER breaches this Agreement other than as set out in subclause 18.1, or if the CUSTOMER breaches the terms of any repayment agreement, as amended or re-negotiated from time to time.

18.4 If ESKOM Disconnects the CUSTOMER as intended in subclauses 18.1 and 18.3, ESKOM may, in addition, on written notice, terminate this Agreement with the CUSTOMER, and remove its equipment from the Premises. For the purposes of this clause, sections 12 and 13 of the Electronic Communication and Transaction Act 25 of 2002, do not apply save that the intended notice may be scanned after manual signature and then sent electronically.

18.5 Before the supply of electricity which has been Disconnected, and if this Agreement has not been terminated as intended in subclause 18.4, is reconnected, the CUSTOMER shall pay all arrears due to ESKOM, including loss of revenue, costs of repairing or replacing any damaged equipment or Metering Installation and any applicable charges associated with the Disconnection.

18.6 The Parties consent to the jurisdiction of the Magistrate's Court in respect of any action or proceedings which may be brought by one Party against the other under or in connection with this Agreement.

18.7 Should either Party commit any breach of this Agreement and a Party resorts to litigation, the losing Party may be awarded attorney and client costs incurred by the other Party as a result of such litigation.

Initial:

19 PERIOD OF AGREEMENT

19.1 This Agreement shall come into effect on the date of signing hereof and shall remain in force subject to clauses 18 and 20, or 1 (one) month's written notice of termination by either Party.

19.2 Should this Agreement be terminated prior to the expiry of any period for which any Monthly Connection Charges are due, or before the expiry of any minimum liability period, then:

- 19.2.1 in the case of the Monthly Connection Charge, the CUSTOMER shall pay the balance of the outstanding Monthly Connection Charge, and/or
- 19.2.2 in the case of a minimum liability period, the CUSTOMER shall pay all fixed network charges (as defined in the Distribution Code) of the Tariff for the remaining period,

within 30 (thirty) days of being advised in writing by ESKOM of the amount/s due in respect thereof.

20 DISPUTES AND DISPUTE RESOLUTION

20.1 This clause does not apply to disputes arising out of clause 12.

20.2 The Parties shall endeavour to resolve by informal negotiation any dispute between them in connection with or arising from the construction, interpretation, performance or non performance or termination of this Agreement and any related or subsequent agreement or amendments thereto.

20.3 However, if agreement cannot be reached and the value of the claim exceeds the monetary jurisdiction limit of the Magistrates Courts at the time that the dispute arises, such dispute shall be finally resolved in terms of the rules of the Arbitration Foundation of Southern Africa (AFSA) by an arbitrator formally appointed by the said foundation. Should arbitration be required in terms of this clause 20.3, either Party may still approach a court for interim relief.

20.4 Where clause 20.3 applies:

- 20.4.1 Either Party can refer the dispute to AFSA for the appointment of an arbitrator, and if the Parties cannot agree on one within 30 (thirty) days of any Party making suggestions to the other Party for the said appointment;
- 20.4.2 The language of the arbitration shall be English and such arbitration shall be held in Johannesburg, unless the Parties agree otherwise.
- 20.4.3 The costs and expenses of the arbitrator shall be paid by such Party or Parties and in such proportions as the arbitrator determines to be appropriate and each Party shall bear its own costs and expenses incurred in any such proceedings.

20.5 While the resolution of any dispute is still pending, the Parties shall continue to perform their respective obligations under this Agreement until such dispute has been finally resolved by arbitration.

20.6 This clause is severable from the rest of this Agreement and will remain in effect even if this Agreement is terminated, lapses or is declared invalid for any reason.

Initial:

21 DAMAGES

21.1 ESKOM shall not be liable to the CUSTOMER for any damages incurred by the CUSTOMER as a result of any action or omission related to the design, construction, operation or maintenance of ESKOM's power system unless such loss or damage is due to the negligence of ESKOM.

21.2 ESKOM shall not be liable for damages caused to the CUSTOMER by an Interruption, Disconnection or Discontinuation, or any variation of voltage or frequency, unless such is due to the negligence of ESKOM but it is agreed between the Parties that an Interruption to ESKOM's customers generally due to any constraint on ESKOM's system, and in terms of clause 17, is not due to Eskom's negligence.

21.3 Neither Party is liable to the other for consequential damages, which includes, but is not be limited to, loss of production and loss of profit.

21.4 The maximum liability of ESKOM to the CUSTOMER in respect of any single event shall not exceed 1/12 (one twelfth) of the amount paid by the CUSTOMER during the preceding 12 (twelve) months, and the maximum aggregate liability of ESKOM to the CUSTOMER in respect of any events occurring in any preceding 12 (twelve) months shall not exceed the amount paid by the CUSTOMER during the preceding 12 (twelve) months.

21.5 The Parties' liability to each other in respect of any claim that arises pursuant to this Agreement, whether under delict or contract shall be as detailed in this Agreement, and no Party shall have any additional liability to the other Party in respect of such claim.

21.6 Notwithstanding any provision of this Agreement, the CUSTOMER shall fully indemnify ESKOM against any claim or action instituted by a third party due to the failure of the electricity supply to the CUSTOMER, whether emanating from contract, delict or any area of law.

22. CESSION AND DELEGATION OF RIGHTS AND OBLIGATIONS

22.1 Neither Party hereto may cede and/or delegate any of its rights and/or obligations under this Agreement to any person without the written consent of the other, subject thereto that ESKOM may on written notice to the CUSTOMER cede and/or delegate its rights and/or obligations under this Agreement to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the electricity supply and distribution industry.

23. FORCE MAJEURE

23.1 If a Party ("the Affected Party") is unable to perform all or part of its obligations in terms of this Agreement due to a Force Majeure Event, the Affected Party shall, as soon as reasonably practicable but no later than 48 (forty eight hours) of it becoming aware of the Force Majeure Event notify the other Party in writing (a "Force Majeure Notice") setting out:
  23.1.1 full particulars of the Force Majeure Event;
  23.1.2 the impact of the Force Majeure Event on the Affected Party's obligations under this Agreement;
  23.1.3 the Affected Party's reasonable estimate of the length of time which its performance has been and will be affected by such Force Majeure Event; and
  23.1.4 the steps which it is taking or intends to take to remove and mitigate the adverse consequences of the Force Majeure Event on its performance.

23.2 The Affected Party shall prove both the existence of any Force Majeure Event and the effect (both as to nature and extent) which any such Force Majeure Event has on its performance.

23.3 If the Parties are, on the basis of the Force Majeure Notice and any supporting documentation, unable to agree as to the existence or as to the effect of a Force Majeure Event by the date falling sixty (60) days after the receipt by the non-Affected Party of the Force Majeure Notice, either Party shall be entitled to refer the matter to arbitration in accordance with clause 17 of this Agreement.

23.4 If it is agreed or determined that a Force Majeure Event has occurred, the Affected Party shall, provided that it has complied with the requirements of this clause 23, not be liable for any failure to perform an obligation under this Agreement to the extent that
  23.4.1 such performance is prevented, hindered or delayed by a Force Majeure Event; and
  23.4.2 such failure could not have been mitigated by the Affected Party (acting as a Reasonable and Prudent Person).

23.5 The Affected Party shall use all reasonable efforts to mitigate, rectify and overcome the effects of any Force Majeure Event(s) and to minimise the effect on the other Party and shall give the other Party (i) regular reports on the progress of the mitigation measures and (ii) prompt notice on the cessation of the Force Majeure Event(s).

23.6 If the Force Majeure Event subsists for more than 90 (ninety) consecutive days, the non-Affected Party shall have the right to terminate this Agreement after having given the other Party 14 days written notice without prejudice to any claim either Party may have in terms of this Agreement.

24. NOTICES

24.1 Any notice to the CUSTOMER required or necessitated by this Agreement shall at ESKOM's option be served at the Premises, or at the alternative physical address of the CUSTOMER, or at the CUSTOMER's postal address, e-mail address or fax number set out in this Agreement or as notified to ESKOM by the CUSTOMER.

24.2 Posted notices shall be deemed to have been received by the addressee on the 7th (seventh) day after the date of the notice, hand-delivered notices on the date of delivery, facsimile or e-mailed notices or any other electronic medium acceptable to both Parties, on the first Business Day following the date of transmission.

24.3 The CUSTOMER [illegible] legal proceedings at the Premises or the alternative physical address furnished by the CUSTOMER.

24.4 ESKOM [illegible] legal proceedings at Megawatt Park, Maxwell Drive, Sunninghill Ext. 3, Sandton.

25. GENERAL

25.1 This Agreement constitutes the sole and entire agreement between the Parties and supersedes all previous negotiations, arrangements or agreements in respect of the subject-matter of this Agreement, other than separate agreements or documents relating to rights-of-way and/or servitudes or repayment of past debt.

25.2 No variation, modification, waiver, failure, delay, relaxation or indulgence of any provision of this Agreement, or consent to any departure therefrom, shall in any way be of any force or effect unless confirmed in writing and signed by both Parties.

Appendix H_6:
Specialist Declaration

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department of
economic, small business development,
tourism and environmental affairs
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DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorisation, integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Expansion of the Nalisview Cemetery: Section24G Application

Specialist:	Ecological		
Contact person:	Darius van Rensburg		
Postal address:	P.O. Box 12726 Brandhof		
Postal code:	9324	Cell:	0834100770
Telephone:		Fax:	
E-mail:	Darius@dprecologists.co.za		
Professional affiliation(s) (if any)	South African Council for Natural Scientific Professions (SACNASP): Professional Natural Scientist in Ecological Science (400284/13)		

Project Consultant:	MDA		
Contact person:	Neil Devenish		
Postal address:	P.O. Box 100982, Brandhof, Bloemfontein		
Postal code:	9324	Cell:	
Telephone:	051 447 1583	Fax:	086 455 2568
E-mail:	neil@mdagroup.co.za		

ENVIRONMENTAL MANAGEMENT
Private Bag X20801 Tel: 051-400 4817/19
Bloemfontein Fax: 051-400 4842/11
9300 E-mail: sellom@dteea.fs.gov.za

www.detea.fs.gov.za

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4.2 The specialist appointed in terms of the Regulations_

I, D van Rensburg, declare that --

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48

Signature of the specialist:

DPR Ecologists and Environmental

Name of company (if applicable):

12/05/2020

Date:

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department of
economic, small business development,
tourism and environmental affairs
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DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for environmental authorisation, integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Expansion of the Nalisview Cemetery: Section24G Application

Specialist:	Archaeologist		
Contact person:	L. Rossouw		
Postal address:	National Museum, c/o Aliwal and Charles Street, Bloemfontein		
Postal code:	9300	Cell:	
Telephone:	051 447 9609	Fax:	
E-mail:	Lloyd.rossouw@gmail.com		
Professional affiliation(s) (if any)	PhD		

Project Consultant:	MDA		
Contact person:	Neil Devenish		
Postal address:	P.O. Box 100982, Brandhof, Bloemfontein		
Postal code:	9324	Cell:	
Telephone:	051 447 1583	Fax:	086 455 2568
E-mail:	neil@mdagroup.co.za		

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4.2 The specialist appointed in terms of the Regulations_

I, LLOYD ROSSOUW, declare that --

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48

L Rossouw

Signature of the specialist:

Paleo Field Services

Name of company (if applicable):

12/05/2020

Date:

Appendix H7:

EAP Declaration

the detea
the department of economic
development, tourism and
environmental affairs
FREE STATE PROVINCE

DETAILS OF EAP AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Expansion of the Nalisview Cemetery: Section 24G Application

Environmental Assessment Practitioner (EAP):[1]	MDA		
Contact person:	Neil Devenish		
Postal address:	P.O. Box 100982, Brandhof, Bloemfontein		
Postal code:	9324	Cell:	
Telephone:	051 447 1583	Fax:	086 455 2568
E-mail:	neil@mdagroup.co.za		
Professional affiliation(s) (if any)			

Project Consultant:			
Contact person:			
Postal address:			
Postal code:		Cell:	
Telephone:		Fax:	
E-mail:			

4.2 The Environmental Assessment Practitioner

I, **Neil Devenish**, declare that –

General declaration:

- I act as the independent environmental practitioner in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in regulation **8** of the regulations when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- I will ensure that the comments of all interested and affected parties are considered and recorded in reports that are submitted to the competent authority in respect of the application, provided that comments that are made by interested and affected parties in respect of a final report that will be submitted to the competent authority may be attached to the report without further amendment to the report;
- I will keep a register of all interested and affected parties that participated in a public participation process; and
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- all the particulars furnished by me in this form are true and correct;
- will perform all other obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I realise that a false declaration is an offence in terms of regulation 71 and is punishable in terms of section 24F of the Act.

the detea
the department of economic
development, tourism and
environmental affairs
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Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2010;

Signature of the environmental assessment practitioner:

MDA
Name of company:

6 May 2020
Date:

Appendix H$_8$:
ESKOM Confirmation

Annexure 5.

STANDARD CONDITIONS OF SUPPLY FOR SMALL SUPPLIES WITH CONVENTIONAL METERING

IMPORTANT NOTICE

DISCLOSURE NOTICE IN TERMS OF SECTION 49 OF THE CONSUMER PROTECTION ACT 68 OF 2008

By signing directly below, the intended customer ______________________________ [MANGAUNG METROPOLITAN MUNICIPALITY], confirms that this notice was provided to it, that it had time to study this notice, the intended electricity supply agreement and its annexures, prior to it signing and agreeing to the terms and annexures of the said electricity supply agreement, and that it understands, generally, the potential effect of all of the provisions of the intended electricity supply agreement, but specifically, the highlighted clauses further explained in the next paragraph.

This notice is to draw the attention of the intended customer to the specific clauses highlighted in **bold** font, in the intended electricity supply agreement and its annexures, that may contain a limitation of risk or liability or an indemnification of Eskom Holdings SOC Ltd, or constitute an assumption of risk or liability by the intended customer. The intended customer will also initial at each of these clauses as proof that the intended customer has been made aware of the specific content of these clauses Clauses containing obligations of the intended customer are not summarily highlighted but are as important as all the provisions of the intended electricity supply agreement and its annexures.

Signed at ______________________ on ______________________ date

MANGAUNG METROPOLITAN MUNICIPALITY
Intended customer

ACC NUM: **6364280928**

ANNEXURE 'A'
(Rev May 2017)

1. INTERPRETATION

1.1 In this Agreement, unless stated otherwise, expressions which indicate:
  1.1.1 a gender includes the other gender and neuter;
  1.1.2 the singular includes the plural, and *vice versa*;
  1.1.3 any reference to any law, rules, regulations, schedules, standards, licences or codes, shall include any amendments, modifications or extensions and shall mean any replacements or re-enactments thereof in force at the applicable time;
  1.1.4 any reference to 'writing' or 'written' shall include all methods of reproducing words in a legible and non-transitory form;
  1.1.5 any reference to 'persons' shall include natural or juristic persons, firms, joint ventures, trusts, unincorporated associations and organisations, partnerships and any other entities, irrespective of whether such entity has a separate legal personality;
  1.1.6 days shall refer to calendar days unless business days are specified;
  1.1.7 reference to a number of days will be calculated with exclusion of the first day and inclusion of the last day;
  1.1.8 where figures are referred to in numerals and in words and there is any conflict between them the words shall prevail.
1.2 The rule that a contract should be interpreted against the party responsible for the drafting or preparation thereof or who would benefit from the insertion of a clause, does not apply to this Agreement.

2. DEFINITIONS

2.1 **'Agreement'** or **'this Agreement'** means the electricity supply contract between ESKOM and the CUSTOMER, comprising the Electricity Supply Agreement for the applicable Tariff, Annexure "A" (Standard Conditions of Supply) and Annexure "B" (Schedule of Standard Prices).
2.2 **'Approved Credit Rating'** means a South African long-term unsecured foreign currency debt rating no worse than BBB- (as determined by Standard and Poor's Rating Group or Fitch Ratings) or Baa3 (as determined by Moody's Investor Services, Inc.) or equivalent rating (as determined by ESKOM or a rating agency approved by ESKOM).
2.3 **'Business Day'** means any day other than Saturday, Sunday or a public holiday in South Africa.
2.4 **'Cash Deposit'** has the meaning ascribed to it in subclause 16.1.
2.5 **'Code(s)'** means the Distribution Code, the South African Grid Code, the Grid Connection Code for Renewable Power Plants or any other code, published by NERSA, as applicable to ESKOM.
2.6 **'Connection Charge'** means a customer-specific, allocated capital contribution, recovering connection costs associated with the provision of capacity, payable in addition to the Tariff.
2.7 **'Contractor'** means any entity appointed as an independent contractor to execute work on the Premises in the exercise of the Rights, as set out herein.
2.8 **'CUSTOMER'** means the person identified on the first page of the Electricity Supply Agreement.
2.9 **'Customer Interface Unit (CIU)'** means the device forming part of a Metering Installation that is used to display information pertaining to the CUSTOMER's electricity usage, meter readings and/or applicable Tariff time periods at any given time of the day.
2.10 **'Disconnection'** means a termination by ESKOM of the electricity supply to a CUSTOMER in accordance with the provisions of this Agreement.
2.11 **'Discontinuation'** means a termination by ESKOM of the electricity supply to a CUSTOMER, at the request of the CUSTOMER.
2.12 **'Due Date'** has the meaning ascribed to it in subclause 15.1.
2.13 **'Electricity Regulation Act'** means the Electricity Regulation Act 6 of 2006.
2.14 **'ESKOM'** means Eskom Holdings SOC Ltd, registration number 2002/015527/30, a state-owned company with limited liability incorporated in terms of the laws of the Republic of South Africa, with its registered office at Megawatt Park, Maxwell Drive, Sandton.
2.15 **'Force Majeure Event'** means any act, event or circumstance or any combination of acts, events or circumstances which:
  2.15.1 is beyond the reasonable control of a Party affected by it (the 'Affected Party');
  2.15.2 is without fault or negligence on the part of the Affected Party and is not the direct or indirect result of a breach or failure by the Affected Party to perform any of its obligations under this Agreement;
  2.15.3 was not foreseeable or, if foreseeable, could not have been avoided or overcome by the Affected Party (including by reasonable anticipation) taking reasonable action;
  2.15.4 prevents, hinders or delays the Affected Party in its performance of all (or part) of its obligations under this Agreement.

Without limiting the generality of the aforegoing, a Force Majeure Event may include any of the following acts, events or circumstances, but only to the extent that it satisfies the requirements set out in subclauses 2.15.1 to 2.15.4 above:
(i) war, hostilities, belligerence, blockade, acts of terrorism, sabotage, civil commotion, riot, revolution or insurrection occurring in South Africa;
(ii) any laws, decrees or regulations of governmental authorities;
(iii) strikes that are widespread, nationwide or political in nature (but excluding strikes, lockouts and other industrial disturbances of the Affected Party's employees which are not part of a wider industrial dispute materially affecting other employees within South Africa),
(iv) drought, fire, earthquake, volcanic eruption, landslide, flood, storm, cyclone, tornado, typhoon or other natural disasters;
(v) epidemic or plague;
(vi) fire, explosion, or radioactive or chemical contamination;
(vii) air crash, shipwreck or train crash; and
(viii) any act, event or circumstance of a nature analogous to any of the aforegoing.

A Force Majeure Event does not include shortage of cash, any inability or failure to pay money, any inability to raise finance or any changes in price and market conditions or strikes, lockouts and other industrial disturbances of the Affected Party's employees which are not part of a wider industrial dispute materially affecting other employees within South Africa.

2.16 **'Guarantee'** means a guarantee substantially in the form set out in Annexure C (Form of Guarantee) and initially for the amount stated therein (and as amended per the terms of this Agreement), which is issued by a financial institution which (a) holds an Approved Credit Rating, (b) is registered under applicable law to carry on the business of a bank in South Africa, and (c) constitutes an on demand, unconditional and irrevocable commitment by the issuer to pay.
2.17 **'Goods'** mean all structures, conductors, cables, appliances and, without limitation, everything else as may be necessary or convenient in exercising the Rights.
2.18 **'Interrupt'** or **'Interruption'** means a temporary interruption of the supply of electricity to the CUSTOMER by ESKOM due to, and for the duration of, emergency or agreed events, and planned or unplanned events.
2.19 **'Metering Installation'** means a metering system installed by ESKOM and consists of at least a meter, fittings, equipment, wiring and installations used for measuring the flow of electricity and may include a CIU.
2.20 **'Monthly Connection Charge'** means a Connection Charge that is payable monthly whether any electricity is consumed in any month or not.
2.21 **'NERSA'** means the National Energy Regulator or its successor-in-title, established in terms of the National Energy Regulation Act (No 40 of 2004).
2.22 **'NMD'** means the definition of NMD in the Schedule of Standard Prices.
2.23 **'Parties'** means ESKOM or the CUSTOMER and includes their successors-in-title or assigns and delegees.
2.24 **'Point of Delivery'** has the meaning as ascribed to it in clause 6 .
2.25 **'Premises'** means the property described in this Agreement and to which a supply of electricity is required by the CUSTOMER.
2.26 **'Reasonable and Prudent Person'** means a person acting in good faith in the performance of its contractual obligations and in the general conduct of its business, exercising that degree of skill, diligence, prudence, responsibility and foresight which would reasonably and ordinarily be expected from a skilled and experienced person complying with all legal requirements, engaged in the same or a similar type of business, in the same or similar circumstances and conditions.
2.27 **'Schedule of Standard Prices'** means ESKOM's published Tariff charges and the NMD Rules referenced therein, whether approved by ESKOM or NERSA, Annexure B of this Agreement.
2.28 **'Standard Connection'** means a connection that meets the specifications of the Distribution Code and applicable standards for a minimum technically acceptable solution.

ANNEXURE H

2.29 **'Standard Connection Charge'** means that portion of the Connection Charge that is payable for the costs associated with a Standard Connection.
2.30 **'Supply Size'** means the NMD, or maximum capacity that ESKOM will supply.
2.31 **'Tariff'** means the tariff as stipulated in this Agreement.

Initial:

3. GENERAL AGREEMENT

3.1 ESKOM agrees to supply to the CUSTOMER and the CUSTOMER agrees to take from ESKOM all the electricity required by the CUSTOMER for the Premises on the terms and conditions set out in this Agreement, subject to the provisions of the Codes, the Electricity Regulation Act, rules issued by NERSA in terms thereof, and regulations, and ESKOM's licences issued by NERSA, and any other applicable law.
3.2 The CUSTOMER agrees that ESKOM may install or provide the CUSTOMER with a CIU, which the CUSTOMER will use as intended in the user instructions.
3.3 **Should the CUSTOMER have multiple electricity supply contracts with ESKOM, ESKOM shall have a right to transfer a debt arising from any of the CUSTOMER's terminated electricity supply contracts to any of the same CUSTOMER's existing electricity supply contract(s).**
3.4 **Notwithstanding the provisions of subclause 3.3 above, ESKOM shall not provide a supply of electricity to the CUSTOMER at any new Point of Delivery or increase the Supply Size at the CUSTOMER's existing Point of Delivery while the CUSTOMER is indebted to ESKOM in terms of any existing electricity supply contract.**

4. FORM OF ELECTRICITY SUPPLIED

4.1 ESKOM will use its reasonable endeavours to furnish the CUSTOMER with a reliable supply of electricity and maintain the quality of supply at the Point(s) of Supply in compliance with the requirements prescribed in NRS 048-2. The requirements of NRS 048-2 define the voltage quality that shall be supplied under normal circumstances (as defined in NRS 048-2). In accordance with NRS 048 it is incumbent on the CUSTOMER to design and operate its equipment so that its equipment will function normally within these requirements.
4.2 However, it is not practicable for ESKOM to guarantee that the requirements of NRS 048-2 will under all contingencies be adhered to. It is therefore incumbent on the CUSTOMER to take adequate measures to protect its business and electrical installation against any losses and/or damage arising from frequency deviations, supply interruptions, voltage variations (including voltage dips), voltage harmonics, interharmonics, voltage flicker, voltage unbalance, voltage swells and transients, undervoltages and overvoltages in the supply to its electrical installation.
4.3 ESKOM shall use its reasonable endeavours to minimise the number of Interruptions that occur on its system. It is incumbent on the CUSTOMER to take reasonable measures to protect its electrical installation against losses and/or damage.

Initial:

5. USE OF ELECTRICITY

5.1 The CUSTOMER shall only use electricity on the Premises up to the Supply Size as specified in this Agreement.
5.2 The CUSTOMER shall not use the electricity supplied other than at the Premises and shall not supply such electricity to any third party.
5.3 **The CUSTOMER shall so use the supply as not to interfere with an efficient and economical supply to other customers of ESKOM, and shall at all times ensure that any effects on the supply voltage caused by the CUSTOMER's load shall not exceed the limits specified in Table 1, unless otherwise agreed to in writing between the Parties.**

Table 1:

Unbalance	**0,3% (3-phase supplies)**
Flicker (Pst)	**0,36**
Harmonics (THD)	**1%**
Rapid voltage changes:	
r = no. of changes per hour	**Magnitude (%)**
r<1	**4**
1 < r ≤ 10	**3**
10 < r ≤ 100	**2**
100 < r ≤ 1000	**1,25**

6. POINT(S) OF DELIVERY

6.1 The Point(s) of Delivery for the supply of electricity to the Premises shall be decided by ESKOM and shall be:
  6.1.1 where ESKOM makes use of a distribution kiosk on a pavement for installation of the meter, at the point on the boundary of the Premises where ESKOM's service cable is joined to that of the CUSTOMER's equipment; or
  6.1.2 where an overhead connection exists, at the terminals of ESKOM's service conductor connected to the insulators or other equipment installed by the CUSTOMER on the Premises, in a position approved by ESKOM; or
  6.1.3 in all other cases, at the terminals of ESKOM's equipment where ESKOM's meter and circuit breaker are installed. The meter shall then be located as ESKOM may decide, which may be a point on the Premises.

Initial:

7. EQUIPMENT PROVIDED BY ESKOM

7.1 ESKOM shall provide the equipment required for the supply of electricity to the CUSTOMER at the Point of Delivery, together with the necessary connection from ESKOM's electricity system, all of which shall remain ESKOM's property irrespective of where in the electrical circuit the Metering Installation is installed.
7.2 Should the Point of Delivery be located within the Premises, ESKOM shall provide a service connection to the Point of Delivery on and/or across the Premises along a route to be agreed between ESKOM and the CUSTOMER.
7.3 Where ESKOM installed or provided the CUSTOMER with a CIU, such unit shall remain the property of ESKOM. The CUSTOMER shall be responsible for the safe accommodation of the CIU and shall report all faults relating thereto to ESKOM.
7.4 **The CUSTOMER shall be liable for the loss of or any damage to the CIU not attributable to normal wear and tear.**
7.5 The CUSTOMER may not tamper with the equipment provided by ESKOM, irrespective of whether ESKOM remains the owner thereof or not.
7.6 **The CUSTOMER notes and agrees that ESKOM cannot install protective equipment on its own system which will ensure in all cases that motors and/or other equipment on the CUSTOMER's side will be protected in the event of frequency deviations, voltage variations, voltage harmonics, voltage flicker, voltage unbalance, voltage dips, voltage surges, voltage transients, undervoltages and overvoltages or an Interrruption or a Disconnection of the supply of electricity. The CUSTOMER shall take adequate measures to protect its motors and/or equipment against damage that may arise in such cases.**

8. EQUIPMENT PROVIDED BY THE CUSTOMER

8.1 The CUSTOMER shall at its expense supply, erect, connect, operate and maintain any equipment required to connect its electrical installation at the Point of Delivery, provided that this equipment shall be approved by ESKOM before it is connected to the Point of Delivery.
8.2 The equipment of the CUSTOMER and the wiring of the Premises, shall be of sound and fit for purpose design and construction, properly installed and maintained by the CUSTOMER, and shall in all respects comply with any applicable law.
8.3 ESKOM has the right to inspect a copy of the CUSTOMER's certificate of compliance.
8.4 The CUSTOMER must ascertain from ESKOM the type of protection to be provided on the supply.

9. ACCESS TO PREMISES

9.1 If requested by ESKOM, the CUSTOMER shall provide to ESKOM, at the CUSTOMER's expense, suitable and secured accommodation for the equipment installed by ESKOM.

9.2 ESKOM's authorised representatives shall have at all reasonable times, save in the case of an emergency, when more immediate access may be required, unfettered access to the Premises for any purpose required in terms of this Agreement.

10. METER-READINGS AND RENDERING OF ACCOUNTS

10.1 ESKOM shall operate and maintain the Metering Installation to be used for measuring the electricity supplied by ESKOM to the CUSTOMER. The Metering Installation shall comply with the requirements of the accuracy class as specified in SANS 474.

10.2 The meter(s) shall be read at such intervals as ESKOM may decide and accounts shall be rendered on the basis of such meter-reading, provided that in the event of the period between successive meter-readings being longer than 30 (thirty) days, an estimated account shall be rendered to the CUSTOMER. An adjustment account shall be rendered after the meters are next read based on the actual consumption of electricity as measured.

10.3 In cases where meters are manually read, the CUSTOMER can inform ESKOM timeously of the actual meter-readings on which to base ESKOM's account.

10.4 ESKOM will take reasonable efforts to ensure that the account is then issued on the basis of these meter-readings but retains the discretion whether to do so or not, and in any event any subsequent meter-reading by ESKOM subsequent to such an account, will prevail as proof of consumption.

10.5 In cases where meter-reading are automated, the account will generally be based on actual meter-readings. Where actual meter-readings are not available for any reason, an estimated meter-reading will be used to generate an account.

10.6 An account is payable irrespective of actual receipt by the CUSTOMER and the CUSTOMER must enquire if it has not received an account, and also irrespective of whether the consumption was based on actual meter-readings or estimations.

10.7 The records of the meter-readings shall at all reasonable times be open for inspection by the CUSTOMER or its authorised representative.

11. TESTING OF METERING INSTALLATION

11.1 ESKOM may test the Metering Installation at any time. If the CUSTOMER requests ESKOM in writing to test the Metering Installation, and after payment of a meter test fee, ESKOM shall test the Metering Installation.

11.2 If the test shows an inaccuracy to be in excess of the percentage accuracy as specified in SANS 474, the same shall, in the absence of evidence to the contrary, be deemed to have existed since the date the error or fault can be reasonably shown to have occurred, and (i) where applicable the test fee shall be refunded to the CUSTOMER, (ii) the Metering Installation or any part thereof shall be repaired or replaced as necessary, (iii) the electricity consumption of the CUSTOMER shall be estimated in accordance with NRS 047 and (iv) the account shall be adjusted in accordance with subclauses 15.3 to 15.6 below, in the first account rendered after the inaccuracy has been ascertained.

11.3 ESKOM shall notify the CUSTOMER of the estimated electricity consumption, which notification will be binding on the CUSTOMER save in the case of a manifest error.

11.4 If the test shows an inaccuracy to be less than the percentage accuracy specified in SANS 474, the account(s) shall stand as rendered and where applicable the meter test fees paid by the CUSTOMER shall be forfeited and any additional, actual costs that ESKOM incurred in testing the Metering Installation shall be charged to the CUSTOMER's account.

Initial

12. RIGHT(S)-OF-WAY

12.1 THE RIGHTS

12.1.1 The CUSTOMER grants, generally, an irrevocable right (the "Rights"), in perpetuity and free of charge, to ESKOM and over the Premises, for the distribution and transmission of electricity and related purposes, substantially along a route to be agreed between the Parties, and comprising an area on either side of the centre line of the Goods, once they are built (the "Wayleave Area"), per Table 2, and the Rights include those set out herein.

Table 2:

Voltage	Area on either side of the centre line of the Goods
1. All voltages below 22kV	9 metres
2. 22kV	9 metres
3. 33kV	11 metres
4. 44kV	11metres
5. 66kV	11 metres
6. 88kV	11 metres
7. 132kV and Delta construction 275kV	20 metres

12.1.2 The Rights, specifically, include the rights to:

- **12.1.2.1 convey electricity and telecommunication across the Premises;**
- **12.1.2.2 erect structures, conductors, cables, appliances and, without limitation, everything else as may be necessary or convenient in exercising the Rights (the "Goods") and the CUSTOMER agrees that structure-supporting mechanisms may reasonably extend beyond the Wayleave Area where it is necessary to safely secure the Goods;**
- **12.1.2.3 enter and be upon the Premises, subject to the CUSTOMER's health and safety policies and procedures, at any time in order to construct, erect, operate, use, maintain, repair, re-erect, alter or inspect the Goods or in order to gain access to any adjacent premises in the exercise of rights similar to the Rights;**
- **12.1.2.4 have these Goods remain on the Premises for so long as either ESKOM or the CUSTOMER requires them to;**
- **12.1.2.5 extend the Goods to other customers, suppliers or contracting parties of ESKOM, over the Premises;**
- **12.1.2.6 use existing roads and gates giving access to and running across the Premises and to erect in any fence such gates as may be necessary or convenient to gain access to or exit from the Premises and the Goods or in order to gain access to any adjacent premises in the exercise of rights similar to the Rights;**
- **12.1.2.7 remove any material or structures, and cut or trim any tree, bush or grass within the Wayleave Area or to the extent necessary where the Goods extends beyond the Wayleave Area, in order to comply with the restrictions referred to in clause 12.2.2 hereof; and**
- **12.1.2.8 every ancillary right necessary or convenient for the proper exercise of the Rights granted to ESKOM.**

12.1.3 The Rights shall apply to all electricity infrastructure on the Premises and the area which such infrastructure covers shall be deemed to be included in the Wayleave Area and/or Restricted Area. It is agreed that the CUSTOMER herewith grants permission for all electricity infrastructure on the Premises to remain on the Premises.

12.1.4 Any expenses to be incurred, which are necessitated by a change to or removal of the Goods in the Wayleave Area, required by the CUSTOMER or the registered owner of the Premises, are for the CUSTOMER's account and must be paid for by the CUSTOMER in advance. ESKOM shall effect such changes or removals after receipt of such payment, if such changes or removal are technically possible.

12.1.5 The Contractor may exercise any of the Rights.

12.1.6 ESKOM may:

- **12.1.6.1 let any portion of the Goods to any third party on such conditions as ESKOM may deem fit;**
- **12.1.6.2 cede all or any of the Rights to any third party.**

12.2 THE OBLIGATIONS

12.2.1 ESKOM must:

12.2.1.1 ensure that any of ESKOM's gates that it had used is closed after use;

12.2.1.2 pay reasonable compensation for intentional damage or damage caused through a negligent act or omission, caused by ESKOM, its employees or agents in pursuit of the Rights, save where ESKOM is acting in accordance with subclause 12.1.2.7; and subject to the provisions of clause 21.

12.2.1.3 where a Contractor exercises the Rights, ensure that the Contractor complies with the obligations contained in this subclause 12.2.1.

12.2.2 The CUSTOMER must ensure that no:

12.2.2.1 building or structure is erected or installed above or below the surface of the ground within the Wayleave Area and no tree or bush is planted within the Wayleave Area or within the metres per Table 2 above, from any structure-supporting mechanism (the "Restricted Area");

12.2.2.2 tree, which could grow to a height in excess of the horizontal distance of that tree from the nearest conductor of any power line is planted or allowed to continue growing, regardless that it is outside of the Wayleave or Restricted Area;

12.2.2.3 material which may in the opinion of ESKOM endanger any electricity infrastructure is placed within the Wayleave or Restricted Area.

12.2.3 The CUSTOMER must bring the existence of these Rights to the attention of any purchaser or other transferee of the Premises (or of any portion of the Premises) before the Premises (or any portion thereof) is sold and/or transferred to such purchaser or transferee, or, where the CUSTOMER grants any further rights in or to the Premises to any other third party, to such third party.

12.2.4 The CUSTOMER must inform ESKOM in writing if it is going to sell the Premises or knows that the Premises will be sold.

12.2.5 If the CUSTOMER is not the registered owner of the property, per the Deeds' Office records, it must, in favour of ESKOM, obtain the permission of the registered owner of the Premises to grant to ESKOM the Rights.

12.2.6 The CUSTOMER's attention is drawn to the provisions of section 10.17.1 of the regulations promulgated in terms of the Explosives Act 26 of 1956, which prescribes that when blasting is to be done within 500 (five hundred) metres of any electricity infrastructure, written confirmation must first be obtained from ESKOM concerning the protection of electricity infrastructure.

13. COMMENCEMENT OF SUPPLY

The supply of electricity shall be made available by ESKOM, subject to the CUSTOMER complying with ESKOM's conditions for providing supply, on a date to be advised to the CUSTOMER by ESKOM, or as soon thereafter as practicable.

14. TARIFF AND OTHER CHARGES

14.1 Prices to be charged:

14.1.1 The prices payable by the CUSTOMER for consumption and the supply of electricity shall be the prices set out in the Tariff as specified in the Schedule of Standard Prices.

14.1.2 Should the CUSTOMER be on a Tariff with no fixed charge, and no electricity is consumed in any period of 6 (six) consecutive months, ESKOM may terminate this Agreement on notice and remove all of its equipment.

14.2 Connection Charges:

14.2.1 In addition to the prices to be paid, the CUSTOMER must pay, if applicable the Standard and Premium Connection Charge and/or the Monthly Connection Charge until its expiry date as set out in this Agreement.

15. PAYMENT OF ELECTRICITY ACCOUNTS

15.1 Accounts for all charges payable by the CUSTOMER shall be sent to the CUSTOMER as soon as possible after the end of each month. The account is due and payable within 7 (seven) days of the date of the account, irrespective of the date or fact of actual receipt (the "Due Date").

15.2 Should payment not be received within a period of 23 (twenty-three) days from the Due Date, ESKOM may Disconnect the supply in accordance with clause 18.3. ESKOM shall charge interest compounded monthly from the Due Date to the date of payment, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited plus 5% (five percent) subject to limitations imposed by prevailing legislation.

15.3 Should the CUSTOMER dispute an account, it shall, before the next account is issued, give ESKOM written notice of the dispute. However, the CUSTOMER shall not be entitled to reduce or set off its debt or defer payment thereof beyond the period of grace allowed for in subclause 15.2, in any event. . Only if a manifest error is evident, shall the CUSTOMER be entitled to pay in lieu of the amount due an amount equal to the average of the accounts rendered for the preceding 3 (three) consecutive months.

15.4 Should the CUSTOMER be incorrectly charged for any amount(s) payable in terms of this Agreement, ESKOM shall inform the CUSTOMER of the correct amount(s) payable and the reasons therefor, in an adjustment account.

15.5 In the case of the CUSTOMER having been overcharged and having paid such overcharged amount, ESKOM shall as soon as practicable credit the CUSTOMER's account with the total amount overcharged with interest compounded monthly in arrears from the date the CUSTOMER has paid the overcharged amount up to the date ESKOM has credited the CUSTOMER's account , at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited minus 4% (four percent).

15.6 In the case of the CUSTOMER being undercharged, ESKOM shall debit the CUSTOMER's account with the total amount undercharged and such amount shall be payable by the CUSTOMER. If the CUSTOMER cannot pay the full amount then due, it must enter into a separate payment deferral arrangement, and the repayment term may not extend beyond 6 (six) months, or the period for which the CUSTOMER was undercharged, whichever is the least number of months. The amount outstanding shall bear interest, if it is not paid with the next account, compounded monthly, from the date the CUSTOMER's account was debited in terms of this Agreement to date of payment, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited plus 5% (five percent) subject to limitations imposed by prevailing legislation.

15.7 In the case of the CUSTOMER being undercharged,as a result of tampering by the CUSTOMER, the total amount undercharged calculated from the date of tampering shall be payable by the CUSTOMER and shall bear interest, compounded monthly, from the date the CUSTOMER's account was debited in terms of this Agreement to date of payment, at a rate per annum equal to the prevailing prime overdraft rate charged by First National Bank of Southern Africa Limited plus 5% (five percent) subject to limitations imposed by prevailing legislation.

15.8 A certificate under the signature of a duly authorised employee of ESKOM setting out the amount due and payable by the CUSTOMER at any time in terms of this Agreement, shall be *prima facie* proof, of the amount due by the CUSTOMER.

16. SECURITY – ELECTRICITY ACCOUNTS

16.1 As security for the due payment of its accounts, the CUSTOMER shall, on signing this Agreement and prior to supply being made available, deposit with ESKOM a sum of money ('the Cash Deposit') or furnish ESKOM with a Guarantee in an amount calculated by ESKOM to represent at least 3 (three) months' anticipated consumption during the highest annual consumption period.

16.2 ESKOM shall have the right to call upon the CUSTOMER at any time to vary the amount of the Cash Deposit or the Guarantee, so that the amount of the security shall always be sufficient to cover the estimated amount payable by the CUSTOMER for electricity during any period of 3 (three) consecutive months during the highest annual consumption period, to be provided by the CUSTOMER within 30 (thirty) days of being called upon to do so.

16.3 ESKOM shall have the right at any time to allocate the whole or any portion of the Cash Deposit or the proceeds of the Guarantee towards the payment of any amounts payable by the CUSTOMER for electricity supplied and which are in arrears. If ESKOM so applies the Cash Deposit or the proceeds of the Guarantee, the CUSTOMER must ensure that the Guarantee or the Cash Deposit is immediately reinstated to the required amount.

16.4 If and whenever the Guarantee provided by the CUSTOMER in accordance with this clause ceases (for any reason whatsoever) to be in full force and effect or otherwise to comply with this clause, the CUSTOMER shall promptly upon the occurrence of such event provide ESKOM with a new Guarantee which meets the requirements of this clause.

16.5 Should the CUSTOMER fail to comply with the provisions of sub-clauses 16.1, 16.3, and 16.4 above, ESKOM shall be entitled to Disconnect the supply in accordance with clause 18.3.

16.6 The balance of the Cash Deposit shall be returned to the CUSTOMER upon termination of this Agreement and final settlement of any amounts owing to ESKOM.

16.7 The Cash Deposit shall bear interest, capitalised annually, at the prevailing rate as determined by ESKOM from time to time.

Initial:

17. EMERGENCY CONDITIONS AND CONSTRAINTS

17.1 ESKOM may interrupt the supply of electricity to the CUSTOMER or require the CUSTOMER to reduce its demand for the supply of electricity, if ESKOM has a shortage of generation and/or transmission and/or distribution capacity.

17.2 In addition, the CUSTOMER is requested to use energy efficient technologies and equipment in accordance with best international practice on specific applications e.g. lighting, heating/cooling, induction loads, by way of example.

18. DISCONNECTION, AND TERMINATION OF THIS AGREEMENT

18.1 ESKOM may Disconnect the electricity supply to the CUSTOMER immediately if:
  18.1.1 the CUSTOMER is causing or can reasonably be expected to cause ESKOM to be in immediate breach of any applicable law, rules, regulations, schedules, licences, codes, or any approvals, where such breach requires Disconnection;
  18.1.2 the CUSTOMER is causing or can reasonably be expected to cause personal injury to ESKOM's agents, directors or employees, the CUSTOMER, its agents, directors or employees or any third party;
  18.1.3 the CUSTOMER is causing or can reasonably be expected to cause immediate material damage to the assets of ESKOM or other customers connected to the ESKOM network;
  18.1.4 the supply of electricity to the CUSTOMER is used anywhere other than at the Premises;
  18.1.5 the CUSTOMER supplies electricity to a third party;
  18.1.6 the CUSTOMER tampers with or permits tampering with the Metering Installation or any other ESKOM equipment; or
  18.1.7 the CUSTOMER allows the electricity supply to bypass the Metering Installation.

18.2 Should the electricity supply be Disconnected as provided for in subclause 18.1, ESKOM shall notify the CUSTOMER in writing of the Disconnection, the reasons therefor and reconnection requirements.

18.3 ESKOM may Disconnect the supply after having given the CUSTOMER 14 (fourteen) days' notice to rectify a breach, if the CUSTOMER breaches this Agreement other than as set out in subclause 18.1, or if the CUSTOMER breaches the terms of any repayment agreement, as amended or re-negotiated from time to time.

18.4 If ESKOM Disconnects the CUSTOMER as intended in subclauses 18.1 and 18.3, ESKOM may, in addition, on written notice, terminate this Agreement with the CUSTOMER, and remove its equipment from the Premises. For the purposes of this clause, sections 12 and 13 of the Electronic Communication and Transaction Act 25 of 2002, do not apply save that the intended notice may be scanned after manual signature and then sent electronically.

18.5 Before the supply of electricity which has been Disconnected, and if this Agreement has not been terminated as intended in subclause 18.4, is reconnected, the CUSTOMER shall pay all arrears due to ESKOM, including loss of revenue, costs of repairing or replacing any damaged equipment or Metering Installation and any applicable charges associated with the Disconnection.

18.6 The Parties consent to the jurisdiction of the Magistrate's Court in respect of any action or proceedings which may be brought by one Party against the other, under or in connection with this Agreement.

18.7 Should either Party commit any breach of this Agreement and a Party resorts to litigation, the losing Party may be awarded attorney and client costs incurred by the other Party as a result of such litigation.

Initial:

19. PERIOD OF AGREEMENT

19.1 This Agreement shall come into effect on the date of signing hereof and shall remain in force subject to clauses 18 and 20, or 1 (one) month's written notice of termination by either Party.

19.2 Should this Agreement be terminated prior to the expiry of any period for which any Monthly Connection Charges are due, or before the expiry of any minimum liability period, then:
  19.2.1 in the case of the Monthly Connection Charge, the CUSTOMER shall pay the balance of the outstanding Monthly Connection Charge, and/or
  19.2.2 in the case of a minimum liability period, the CUSTOMER shall pay all fixed network charges (as defined in the Distribution Code) of the Tariff for the remaining period,

within 30 (thirty) days of being advised in writing by ESKOM of the amount/s due in respect thereof.

20. DISPUTES AND DISPUTE RESOLUTION

20.1 This clause does not apply to disputes arising out of clause 12.

20.2 The Parties shall endeavour to resolve by informal negotiation any dispute between them in connection with or arising from the construction, interpretation, performance or non-performance or termination of this Agreement and any related or subsequent agreement or amendments thereto.

20.3 However,if agreement cannot be reached and the value of the claim exceeds the monetary jurisdiction limit of the Magistrates' Courts at the time that the dispute arises, such dispute shall be finally resolved in terms of the rules of the Arbitration Foundation of Southern Africa (AFSA) by an arbitrator formally appointed by the said foundation. Should arbitration be required in terms of this clause 20.3, either Party may still approach a court for interim relief.

20.4 Where clause 20.3 applies:
  20.4.1 Either Party can refer the dispute to AFSA for the appointment of an arbitrator, and if the Parties cannot agree on one within 30 (thirty) days of any Party making suggestions to the other Party for the said appointment;
  20.4.2 The language of the arbitration shall be English and such arbitration shall be held in Johannesburg, unless the Parties agree otherwise.
  20.4.3 The costs and expenses of the arbitrator shall be paid by such Party or Parties and in such proportions as the arbitrator determines to be appropriate and each Party shall bear its own costs and expenses incurred in any such proceedings.

20.5 While the resolution of any dispute is still pending, the Parties shall continue to perform their respective obligations under this Agreement until such dispute has been finally resolved by arbitration.

20.6 This clause is severable from the rest of this Agreement and will remain in effect even if this Agreement is terminated, lapses or is declared invalid for any reason.

Initial:

21. DAMAGES

21.1 ESKOM shall not be liable to the CUSTOMER for any damages incurred by the CUSTOMER as a result of any action or omission related to the design, construction, operation or maintenance of ESKOM's power system unless such loss or damage is due to the negligence of ESKOM.

21.2 ESKOM shall not be liable for damages caused to the CUSTOMER by an Interruption, Disconnection or Discontinuation,or any variation of voltage or frequency, unless such is due to the negligence of ESKOM but it is agreed between the Parties that an Interruption to ESKOM's customers generally due to any constraint on ESKOM's system, and in terms of clause 14, is not due to Eskom's negligence.

21.3 Neither Party is liable to the other for consequential damages, which includes, but is not be limited to, loss of production and loss of profit.

21.4 The maximum liability of ESKOM to the CUSTOMER in respect of any single event shall not exceed 1/12 (one twelfth) of the amount paid by the CUSTOMER during the preceding 12 (twelve) months, and the maximum aggregate liability of ESKOM to the CUSTOMER in respect of any events occurring in any preceding 12 (twelve) months shall not exceed the amount paid by the CUSTOMER during the preceding 12 (twelve) months.

21.5 The Parties' liability to each other in respect of any claim that arises pursuant to this Agreement, whether under delict or contract shall be as detailed in this Agreement, and no Party shall have any additional liability to the other Party in respect of such claim.

21.6 Notwithstanding any provision of this Agreement, the CUSTOMER shall fully indemnify ESKOM against any claim or action instituted by a third party due to the failure of the electricity supply to the CUSTOMER, whether emanating from contract, delict or any area of law.

22. CESSION AND DELEGATION OF RIGHTS AND OBLIGATIONS

22.1 Neither Party hereto may cede and/or delegate any of its rights and/or obligations under this Agreement to any person without the written consent of the other, subject thereto that ESKOM may on written notice to the CUSTOMER cede and/or delegate its rights and/or obligations under this Agreement to any of its subsidiaries or any of its present divisions or operations which may be converted into separate legal entities as a result of the restructuring of the electricity supply and distribution industry.

23. FORCE MAJEURE

23.1 If a Party ('the Affected Party') is unable to perform all or part of its obligations in terms of this Agreement due to a Force Majeure Event, the Affected Party shall, as soon as reasonably practicable but no later than 48 (forty-eight hours) of it becoming aware of the Force Majeure Event, notify the other Party in writing (a 'Force Majeure Notice') setting out:

- 23.1.1 full particulars of the Force Majeure Event;
- 23.1.2 the impact of the Force Majeure Event on the Affected Party's obligations under this Agreement;
- 23.1.3 the Affected Party's reasonable estimate of the length of time which its performance has been and will be affected by such Force Majeure Event; and
- 23.1.4 the steps which it is taking or intends to take to remove and mitigate the adverse consequences of the Force Majeure Event on its performance.

23.2 The Affected Party shall prove both the existence of any Force Majeure Event and the effect (both as to nature and extent) which any such Force Majeure Event has on its performance.

23.3 If the Parties are, on the basis of the Force Majeure Notice and any supporting documentation, unable to agree as to the existence or as to the effect of a Force Majeure Event by the date falling sixty (60) days after the receipt by the non-Affected Party of the Force Majeure Notice, either Party shall be entitled to refer the matter to arbitration in accordance with clause 17 of this Agreement.

23.4 If it is agreed or determined that a Force Majeure Event has occurred, the Affected Party shall, provided that it has complied with the requirements of this clause 23, not be liable for any failure to perform an obligation under this Agreement to the extent that:

- 23.4.1 such performance is prevented, hindered or delayed by a Force Majeure Event; and
- 23.4.2 such failure could not have been mitigated by the Affected Party (acting as a Reasonable and Prudent Person).

23.5 The Affected Party shall use all reasonable efforts to mitigate, rectify and overcome the effects of any Force Majeure Event(s) and to minimise the effect on the other Party and shall give the other Party (i) regular reports on the progress of the mitigation measures and (ii) prompt notice on the cessation of the Force Majeure Event(s).

23.6 If the Force Majeure Event subsists for more than 90 (ninety) consecutive days, the non-Affected Party shall have the right to terminate this Agreement after having given the other Party 14 days written notice without prejudice to any claim either Party may have in terms of this Agreement

24. NOTICES

24.1 Any notice to the CUSTOMER required or necessitated by this Agreement shall at ESKOM's option be served at the Premises, or at the alternative physical address of the CUSTOMER, or at the CUSTOMER's postal address, e-mail address or fax number set out in this Agreement or communicated to ESKOM by the CUSTOMER.

24.2 Posted notices shall be deemed to have been received by the addressee on the 7th (seventh) day after the date of the notice, hand-delivered notices on the date of delivery, facsimile or e-mailed notices or any other electronic medium acceptable to both Parties, on the first Business Day following the date of transmission

24.3 The CUSTOMER may be cited in legal proceedings at the Premises or the alternative physical address furnished by the CUSTOMER.

24.4 ESKOM may be cited in legal proceedings at Megawatt Park, Maxwell Drive, Sunninghill Ext. 3, Sandton.

25. GENERAL

25.1 This Agreement constitutes the sole and entire agreement between the Parties and supersedes all previous negotiations, arrangements or agreements in respect of the subject-matter of this Agreement, other than separate agreements or documents relating to rights-of-way and/or servitudes, or repayment of past debt.

25.2 No variation, modification, waiver, failure, delay, relaxation or indulgence of any provision of this Agreement, or consent to any departure therefrom, shall in any way be of any force or effect unless confirmed in writing and signed by both Parties.