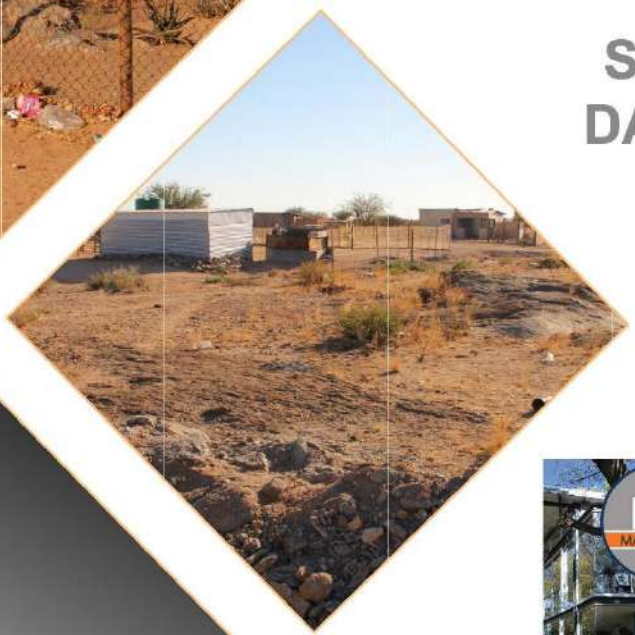
APPLICATION FOR LAND USE CHANGE ACCORDING TO THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (ACT 16 of 2013)

PLANGENI TOWNSHIP ESTABLISHMENT PROJECT:

SUBDIVISION, REZONING AND TOWNSHIP ESTABLISHMENT

PORTION 30 (PORTION 29) OF THE FARM BLAUWS KOP, NO.36, KENHARDT RD, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE



SUBMISSION DATE: MARCH 2021

MACROPLAN
TOWN & REGIONAL PLANNERS
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SUBMISSION DATE:
FEBRUARY 2021

PLANGENI TOWNSHIP ESTABLISHMENT PROJECT:

INVOLVED PROPERTY:
PORTION 30 (PORTION 29) OF THE FARM BLAUWS KOP, NO.36, KENHARDT RD, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

MACROPLAN
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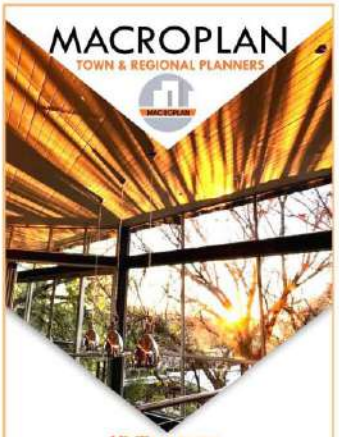

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KAI !GARIB
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Kakamas
8870

Application for Land Use amendment in terms of Spatial Planning and Land Use Management Act 16 of 2013.

Application for land use amendments

(give full details in the attached motivation report, if space provided is not enough)

SECTION 1

Details of Applicant (See Planning Profession Act, Act 36 of 2002)

Name:	Macroplan	**Contact person:**	Len Fourie JP Theron
Postal address:	P.O. Box 987 Upington	**Physical address:**	4A Murray Avenue Upington
Code:	8800		8801
Tel no:	054 332 3642	**Cell no:**	082 821 1025 082 821 1024
Fax no:	054 332 4283		
SACPLAN Reg No:	Len J. Fourie: Pr.Pln. A/1322/2006 J.P. Theron: Pr. Pln. A/2394/2016 (Annexure N)	**E-mail address:**	macroplan@mweb.co.za jptheron@mweb.co.za

Macroplan Town and Regional Planners, has been appointed by Barzani Development on behalf of the Department of Cooperative Governance, Human Settlements and Traditional Affairs (COGHSTA).

SECTION 2

Details of Land Owner (If different from Applicant)

Name:	Portion 30 (Portion of Portion 29) of the Farm Blauws Kop, No. 36.	**Contact person:**	Dr. Johnny Mackay
Postal address:	Private Bag X6 Kakamas 8870	**Physical address:**	11th Avenue Kakamas 8870
Tel no:	(054) 431 6300	**Cell no:**	078 802 8938
Fax no:	(054) 431 6301	**E-mail address:**	mackayj@kaigarib.gov.za

If the applicant is not the registered owner(s), attach a power of attorney from the registered owner(s) to the application. This also applies if the person applying is still busy obtaining the land unit and if the land unit is owned by a company or more than one person.

SECTION 3

Details of Property (In accordance with Title deed)

Erf / Farm No and portion description:	Portion 30 (Portion of Portion 29) of the Farm Blauws Kop, No. 36 (hence refer to as Portion 30 of the Farm Blauws Kop, No. 36).	**Area (m² or ha):**	50.0020ha
Physical address of erf/farm:	Plangeni is an informal township, therefore no individual addresses have been assigned to the existing informal stands.	**Existing Zoning:**	Agricultural Zone I
Location from nearest town:	The involved property can be located 15km east of Keimoes and 27km south-south-west of Upington.	**Existing land use:**	The majority of land that comprise the study area for this submission has been subject to informal township establishment.
Town/ suburb:	Situated on a rural locale.	**Area applicable to application:**	Entire extent of the involved property.
Registration Division:	Kenhardt RD	**Title deed no:**	T62545/2006

SECTION 4

Type of Application being Submitted (Mark with an X and give detail)

Application for:

(Please mark applicable block with a cross)

Rezoning from one zone to another:	**X**
Consolidation of land:	
Subdivision of land:	**X**
Township establishment (Human settlement planning and design)	**X**
Removal, suspension or amendment of Title Deed Restrictions:	
Permanent departure from any stipulations as determined in these regulations, including relaxing of Development Control stipulations:	
Temporary departure to allow the use of a building or land for a period of at most five years, for a purpose for which no specific zone has been provided for in these regulations:	
Secondary use as determined in these regulations:	
Consent use as determined in these regulations:	
The annulment, suspension of amendment of the original approval conditions as provided by the Responsible Authority:	
General Plan Cancellation:	
Closure of Park or Public Road:	
The extension of the approval period:	

Any other application in terms of provincial legislation or municipal by-law:	

Please give a short description of the scope of the project:

Our office, Macroplan Town and Regional Planners, has been appointed (See Annexure B) by Barzani Development on behalf of the Department of Cooperative Governance, Human Settlements and Traditional Affairs (hence referred to as COGHSTA), to facilitate the needed town planning procedures involved with a township establishment project for Plangeni.

The informal town of Plangeni has been created by the farmworkers that work on the surrounding farmland. The informal town of Plangeni has now grown to a point where formalisation is needed, as well as the provision of supporting land uses, such as schools, businesses, municipal infrastructure, recreational areas etc. The Kai !Garib Local Municipality has secured the property on which the community of Plangeni is established to register this town as a formally proclaimed township. The recent commitment by COGHSTA to address the ***housing backlog*** *within the Northern Cape presented the Kai !Garib Local Municipality with the ideal opportunity to undergo the necessary town planning processes to register Plangeni as a proclaimed township, with registered properties that can be allocated to individual ownership.*

The proposed Plangeni township establishment project entails the proclamation of Plangeni, formalisation of existing informal properties, provision of additional erven for future population growth, as well as the provision of supportive land uses normally associated with a township, such as institutional uses, municipal uses and business premises. The township establishment of Plangeni will facilitate the process of converting farmland to a township, during this process the proposed erven and zonings become valid. The proclamation of Plangeni is furthermore needed since no transfer of individual stands in the township will be allowed without proclamation.

In order for the planned Plangeni establishment project to take place, the following land use changes are required:

1. SUBDIVISION (See Figure 5):
   - 1.1. Subdivision of Portion 30 of the Farm Blauws Kop, No. 36, into 530 individual cadastral land units.

2. REZONING (See Figure 6):
   - 2.1. Rezoning of the newly created properties, thereby allocating appropriate land use rights to each of the newly created individual erven suitable to their future purpose within the Plangeni township establishment project. The proposed zonings, in terms of the newly adopted Kai !Garib Scheme Regulations, are as follow and should be read together with the final layout plan attached as Annexure E to this submission:

Zoning	Primary Use/s	Erven Amount
Residential Zone I	Residential House	500
Business Zone I	Business Premises	3
Institutional Zone I	Place of Instruction/ Educational	2
Institutional Zone II	Place of Worship	1
Open Space Zone II	Public Open Spaces	22
Transport Zone I	Public Road	1
Authority Zone I	Municipal Uses	1
Total		530

3. TOWNSHIP ESTABLISHMENT:
   - 3.1. The proclamation of Plangeni, in order to facilitate the conversion of farmland to a township and allow for the transfer of ownership of individual stands.

Please refer to Figures 5 & 6, Annexure E, §2.8 & §3.3 of this report for more information in this regard.

SECTION 5

Detail of application (Mark with an X and give detail where applicable)

Is the land unit currently developed (buildings etc.)?	YES		If answered YES, what is the nature & condition of the developments / improvements?	The Plangeni informal community, which comprise of different land uses, can be located on the study area. This application seeks to formalise these uses.
Is the current zoning of the land utilised?		NO	If answered NO, what is the application / use of the land?	The land use rights presently allocated to the involved farm portion do not support the current land uses that are associated with the informal community of Plangeni. This application is lodged to acquire the suitable land use rights for the formalisation of Plangeni.
Is the property burdened by a bond?		NO	If answered YES, attach the bondholder's consent to the application:	Not applicable
Has an application for subdivision/ rezoning/ consent use/ departure on the property previously been considered?		NO	If answered YES, when and provide particulars, including all authority reference numbers and decisions:	To the knowledge of this office no formal land use changes have been undertaken on the involved portion of land in the past.
Does the proposal apply to the entire land unit?	YES		If answered NO, indicate the size of the portion of the land unit concerned, as well as what it will be used for and the same for the remaining extent:	Not Applicable
Are there any restrictions, such as servitudes, rights, bonds, etc. with regard to the land unit in terms of the deed of transfer that should be lifted, as it might have an influence on this application?		NO	If answered YES, please provide detail description:	Not Applicable
Are there any physical restrictions (e.g. steep inclines, unstable land formations, marshes, etc.) that might influence the intended development?	YES		If answered YES, name full particulars and state how the problem will be solved and submit detail layout plan:	A myriad of specialist studies has been conducted on account of the formalisation of the informal community of Plangeni. For the most part the physiography of the study area is ideal for township

				establishment, however, the following should be noted: 1. The Botanical Assessment Report (See Annexure F) identified numerous protected vegetation and the impact on the environment will be medium-low, but can be reduced to low through mitigation. Mitigation entails that the necessary permits from the relevant authorities be obtained for the removal of this vegetation prior to site clearance and construction; 2. The Geological Report (See Annexure G) identified patches of land that fall under Geological Zone VI, with these areas characterised by rocky outcrops. These rocky areas have been accommodated within open spaces for the most part.; 3. Fresh Water Report (See Annexure I) concluded that a general authorisation for the planned housing development can be issued; 4. The Heritage Impact Assessment (Annexure H) identified no significant heritage resources that will be impacted negatively by the proposed development.
Is any portion of the land unit in a flood plain of a river beneath the 1:50 annual flood-line, or subject to any flooding?		NO	If answered YES, please provide detail description:	Not Applicable
Is any other approval that falls outside of this Act, necessary for the implementing of the intended development?	YES		If answered YES, please provide detail description:	Various approvals/ no objections/ authorisations have to be obtained in relation to the proposed formalisation, which include Environmental Authorisation, no-objection from the Department of Road and Public Works (DRPW) and no-objection from the Blauwskop

				Irrigation Association. This application is however compiled and submitted without the mentioned no-objections/ approvals, with the sole purpose of commencing with the public participation process. At the time of writing the progress regarding the feedback from the interested and affected parties are as follow: • Environmental Authorisation: The final scoping report (Annexure I) has been submitted to DENC. DENC is in the process of reviewing the final scoping report; • DRPW: DRPW has been furnished with a formal notification letter (Annexure J) for review on the 15th of February 2021. The feedback from DRPW is still outstanding; • Blauwskop Irrigation Association: Blauwskop Irrigation Association has been furnished with a formal notification letter (Annexure K) for review on the 22nd of February 2021. The feedback from the Blauwskop Irrigation Association is still outstanding.
What arrangements will be made regarding the following services for the development? (Full Engineering Reports must be supplied, where applicable). If services will be provided by the Municipality, proof of input from departments must be included as Annexure to the application.	Water supply:		Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed services report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the services report for the provision of water are as follow: • The proposed development will require authorisation under the National Water Act (Act no. 36 of 1998) to abstract water from the Orange River. • The only sustainable abstraction will be from the Orange River. Servitudes	

		over private owned land will be required. • A purification plant with capacity 350m/day is required for the proposed township.
	Electricity supply:	Heyns van Rooyen Consulting Electrical Engineers, as sub-consultant of Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed electrical report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the electrical report for the provision of electricity are as follow: It is the conclusion of this services report that: • Eskom will be the supply authority for the proposed township. • The township can be supplied with electricity by Eskom given available capacity. • The bulk services can be installed from the Eskom MV line to the township about 6 km away. A voltage regulator will have to be installed to ensure the voltage does not fall below the voltage limit of the MV line. • No problems are foreseen that can hamper the supply of electricity to the proposed township. • A few key administrative processes will have to be concluded by the municipality before Eskom can take the process further. • All costs needed to supply electricity to the proposed township can be funded through INEP. • The existing overhead line will be decommissioned and removed once new electrical infrastructure has been built.
	Sewerage and waste-water:	Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed services report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the services report for the handling of sewerage and waste-water are as follow: • Grey Water to be disposed on site; • Black water to be disposed on site utilising VIP`s or double put holes; • Septic tanks may be constructed, but the service cost if the tanks will be very expensive.
	Storm-Water:	Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed services report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed

		upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the services report for the handling of storm-water are as follow: • **The three drainage lines on the proposed area are mostly dry, with water only during rains and perhaps shortly thereafter. During the odd-thunder storm, drainage lines can com down in flood. Because rainfall events are far apart, the flooding drainage line is not an obstacle for the proposed development,**
	Road Network:	The informal community of Plangeni, located on Portion 30 of the Farm Blauws Kop, No. 36, received access from an approved access road that links to the R359 provincial road. After the formalisation of Plangeni this will remain to be the case. DRPW has been informed of the planned formalisation, but to date no feedback has yet been received. In terms of the internal road network of Plangeni, the community has adopted an incoherent road network due to the presence of numerous rocky outcrops and storm water furrows. The proposed layout is based on the existing informal road network with the exemption of creating through roads for better traffic movement.

SECTION 6

List of Attachments and supporting information required / submitted with checklist for Municipal use (Mark with an X / number annexure)

Checklist (for the completion by the Applicant only)				Checklist (for the use of Responsible Authority only)		
YES	NO	ANNEXURE	DOCUMENT ATTACHED	YES	NO	N/A
x		**Section A**	Completed Comprehensive Application form			
x		**Section B**	Complete Motivation Report			
x		**§2.3**	Alignment to the Provincial, District and Municipal SDFs			
	x		Public participation report (minutes of meetings, copies of advertisement, etc.)			
x		**Annexure B**	Power of Attorney (Board of Directors' / Trustees' resolution / consent)			
x		**Annexure A**	Copy of Title Deed(s)			
	x		Mortgage holder's consent			
x		**Annexure A**	Cadastral information – diagram/General Plan including servitudes, lease areas, etc.			
	x		Status report from Surveyor General – street closure or state owned land			
x		**Figure 4**	Topographic map/ aerial map			
x		**Figure 1 & 2**	Locality Map			
x		**Annexure E**	Site Plan			
x		**Figure 3**	Zoning Map			

	x		Zoning Certificate			
x		**Figure 4**	Land Use Map			
	x		Conveyancer's certificate			
	x		Special endorsement/proxy			
	x		Home Owners' Association consent			
x		**Annexure E**	Proposed design/layout plan			
x		**Figure 5**	Proposed subdivision plan			
	x		Proposed consolidation plan			
	x		Proposed development plan			
	x		Mineral rights certificate (together with mineral holder's consent) and/or prospecting contract			
	x		Mineral impact assessment (MIA)			
x		**Annexure I** *(Final Scoping Report)*	Environmental Impact Assessment (EIA – EA) including Heritage Impact Assessment (approval from Dept Sport, Arts and Culture) and Archaeological Impact Assessment (AIA) (approval from relevant Department - SAHRA)			
	x		Detail Engineering Services report (Bulk and internal)			
x		**Annexure J**	Traffic impact study **(DRPW notification letter)**			
x		**Annexure G**	Geo-technical report (including geology) report (NHRB Standards)			
	x		Social impact assessment			
	x		Flood line assessment (1:50 and 1:100 years)			
	x		Coastal setback report (consent from Dept of Environmental Affairs)			
	x		Subdivision of agricultural land (consent of the Dept of Agriculture)			
	x		List of sections in Title Deed conditions to be removed /amended			
x		**Annexure N**	Adherence to planning legislation including the Planning Profession Act 36 of 2002			
x			**At least three (3)** sets of full colour documentation copies			

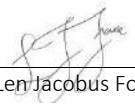
SECTION 7

Declaration

Note: *If application is made by a person other than the owner, a Power of Attorney is compulsory. If the property is owned by more than one person, the signature of each owner is compulsory. Where the property is owned by a company, trust, or other juristic person, a certified copy of the Board of Directors/Trustees' resolution is compulsory.*

I hereby certify the information supplied in this application form to be complete and correct and that I am properly authorised to make this application.

Applicant's / Owner's Signature:		Date:	2	0	2	1	0	3	0	1
Full name (print):	Justus Petrus Theron									
Professional capacity:	Professional Town and Regional Planner									
Applicant's ref:	Pr. Pln. A/2394/2016									

Applicant's / Owner's Signature:		Date:	2	0	2	1	0	3	0	1
Full name (print):	Len Jacobus Fourie									
Professional capacity:	Professional Town and Regional Planner – Senior Town Planner									
Applicant's ref:	Pr.Pln. A/1322/2006									

SECTION 8

Prescribed Notice and advertisement procedures

(for the completion and use of Responsible Authority only)

Checklist for required advertisement procedure			Checklist for required proof of advertisement		
YES	NO	DOCUMENTATION AND STEPS TO BE TAKEN	YES	NO	DOCUMENTATION TO BE PROVIDED AS PROOF
		Notice to be placed in the Local Newspaper			**Proof of Notice in Local Newspaper** Note: The original newspaper advertisement or full colour copy, indicating page number and date.
		Notice to be placed in the Provincial Gazette (for 2 consecutive weeks)			**Proof of Notice in the Provincial Gazette** Note: The original newspaper advertisement or full colour copy, indicating page number and date.
		Notices to neighbours Note: The map indicating the neighbouring erven and list of neighbours will be provided. If the applicant chooses to deliver the notices per hand (Option 1), two copies of the notice must be provided on or before the date of the notice to each neighbour. One copy of the notice must be signed by the respective party (neighbour) to be handed back to the Responsible Authority. Alternatively (Option 2), the notices can be sent via registered post.			**Proof of Notice to neighbours** Note: Option 1: The signed notices of all surrounding neighbours, as identified by the Responsible Authority, must be provided. Note: Option 2: The proof of the registered mail must be provided to the Responsible Authority
		Notice to be placed on the site Note: The notice provided must be placed on the site in a laminated A3 format (two language formats separate on A3) on or before the date of the notice.			**Proof of Notice in site** Two colour photos of the notice on site must be provided of which one is close up and the other one is taken from a distance in order to see the placing on the site itself.
		Public Meeting Note: The holding of a public meeting in order to inform the general public of the application.			**Proof of Public Meeting** The applicant must provide proof of the agenda, the attendance register and minutes of the meeting to the Responsible Authority.
		Any Additional components:			**Proof of additional components:**

SECTION B: MOTIVATIONAL REPORT

1. INTRODUCTION

1.1. BACKGROUND

GENERAL BACKGROUND

Economic development in the Northern Cape has seen a steady increase over the past decade with a 2.1% growth figure and contributing 2.0% to the growth of South Africa's GDP (StatsSA). The Kai !Garib Municipality is situated at the very heart of the province, stretched across the banks of the Orange River. This locale allows the municipality to enjoy a strong agricultural economy that thrives on the exportation of summer fruit, production of wine and the expansive availability of game and stock farming. Besides the presence of these economic drivers, the municipality has also seen an increased interest in the development of renewable energy facilities, brought about by the unique climatic factors that the region has to offer. Economic growth in the municipality is furthermore stimulated by major roads (N14, R27 and R359) that allow linkage to larger economic hubs in the Northern Cape and the rest of the country.

The intensive nature of the farming practices on the banks of the Orange River has led to the establishment of various notable urban centres along its banks, with Keimoes and Kakamas being the economic powerhouses of the Kai !Garib Municipality. These 2 urban centres, notwithstanding the status of Kenhardt as a node of importance as well, have continued to show economic growth potential and investment possibility. Populations are increasing and with the growing economic opportunity of the towns, housing opportunity has become a development factor of critical importance. In addition to the agricultural sector of the Kai !Garib Municipality, smaller, less significant economic sectors also play an important role within the municipal area and contribute to the economy's well-being of the !Kai !Garib Municipality. The growth in population in rural areas also results in the congregation of people on farmland, in order to reside in close proximity of their place of work, in the case of Plangeni agricultural practices.

FOCUS OF THIS APPLICATION:

The informal town of Plangeni has been created by the farmworkers that work on the surrounding farmland. The informal town of Plangeni has now grown to a point where formalisation is needed, as well as the provision of supporting land uses, such as schools, businesses, municipal infrastructure, recreational areas etc. The Kai !Garib Local Municipality has secured the property on which the community of Plangeni is established to register this town as a formally proclaimed township. The recent commitment by COGHSTA to address the housing backlog within the Northern Cape, presented the Kai !Garib Local Municipality with the ideal opportunity to undergo the necessary town planning processes to register Plangeni as a proclaimed township, with registered properties that can be allocated to individual ownership.

This land use change application, compiled within the clear context of the Spatial Planning and Land Use Management Act (Act 16 of 2013), forms the legal framework under which the proclamation of Plangeni, the formalisation of existing informal properties and the provision of additional erven, through sub-economic erven are proposed. The application seeks to obtain the necessary land use change approval for the creation of 500 residential properties, in order to formalise existing informal residential stands, provide additional erven for future population growth, as well as include supportive land uses as requested by the Plangeni community.

It is important that all developments must align with the provisions of the Spatial Development Framework (SDF) of the local or district municipality, as well as the applicable scheme regulations of a municipality. In cases where a development proposal does not align with the provisions of the SDF, site specific motivations need to be provided to allow the District Municipal Planning Tribunal to make informed decisions.

1.2. CURRENT REALITY

The undertaking of the formalisation of the Plangeni Community by Macroplan derives from an indirect appointment by COGHSTA and is, therefore, a project of national and provincial importance. The Plangeni Informal community can be found on Portion 30 of the Farm Blauws Kop, No. 36 with this property held under the ownership of the Kai !Garib Local Municipality. The proposed township establishment project will provide sub-economic housing with the end goal of securing ownership of land for the current residents. An estimate of approximately 350 informal stands currently exists in the town of Plangeni that will be formalised as part of this township establishment project, whilst an additional 150 erven will be created for the future expansion of the community. A small fraction of the development scope will cater to middle-income housing, which will provide much-needed income tax to the local municipality.

The objectives of this application, which is handled in the terms of the provisions of the Spatial Planning and Land Use Management Act (Act 16 of 2013), Kai !Garib SPLUMA By-laws & the Kai !Garib Land Management Scheme are as follow:

1. Convert Plangeni from farmland to a township, through the process of township establishment.
2. Formalise the existing informal stands currently established on the study area;
3. Provide additional residential properties for future population increases;
4. Incorporate land uses normally associated with residential expansion, such as institutional, recreational and business uses;
5. Create a coherent internal road network.

The following table provides a breakdown of the involved land portion, in terms of size, land use and zoning:

Property Description	Property Size	Land Use	Zoning Status Quo
Portion 30 of the Farm Blauws Kop, No. 36, Kenhardt RD	50.0020ha	Largely occupied by informal residential stands.	Agricultural Zone I

Table 1: Breakdown of property information.

The title deed of the involved property has been scrutinised to determine if there are any restrictive conditions that needs to be removed in order for the land use change process to take place. No such restrictive title deed conditions have been identified within the property deed (Annexure A).

In order to achieve the objective of township establishment and formalising the informal community of Plangeni, this formal land use change application, pertaining to township establishment, subdivision & rezoning, is submitted to the Kai !Garib Local Municipality as municipality of first instance. This application for land use change is therefore submitted to the Kai !Garib Municipality in order to ensure legal compliance with the clear context of the Spatial Planning and Land use Management Act (Act 16 of 2013).

1.3. ASSIGNMENT

Our office, Macroplan Town and Regional Planners, has been appointed by Barzani Development on behalf of COGHSTA, to facilitate the needed town planning procedures involved with the township establishment of the Plangeni Community. The appointment letter from Barzani Development, as well as the preceding appointment letter from the Kai !Garib Municipality, serve as the power of attorney for this application for land use change. Please refer to Annexure B of this submission for the said authorising documentation.

1.4. OBJECTIVE

The objectives of this report are as follow:

1. SUBDIVISION (See Figure 5):
   1.1. Subdivision of Portion 30 of the Farm Blauws Kop, No. 36, into 530 individual cadastral land units.

2. REZONING (See Figure 6):
   2.1. Rezoning of the newly created properties, thereby allocating appropriate land use rights to each of the newly created individual erven suitable to their future purpose within the Plangeni township establishment project. The proposed zonings, in terms of the newly adopted Kai !Garib Scheme Regulations, are as follow and should be read together with the final layout plan attached as Annexure E to this submission:

Zoning	Primary Use/s	Erven Amount
Residential Zone I	Residential House	500
Business Zone I	Business Premises	3
Institutional Zone I	Place of Instruction/ Educational	2
Institutional Zone II	Place of Worship	1
Open Space Zone II	Public Open Spaces	22
Transport Zone I	Public Road	1
Authority Zone I	Municipal Uses	1
Total		530

3. TOWNSHIP ESTABLISHMENT:
   3.1. The proclamation of Plangeni, in order to facilitate the conversion of farmland to a township and allow for the transfer of ownership of individual stands.

4. To serve as a support system for the Kai !Garib Local Municipality, in order for all the formalities to be handled correctly.

Project Name: PLANGENI TOWNSHIP ESTABLISHMENT

Title:

Figure 1
Locality Map: Region

Description:

PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Study Area
- National Road
- Provincial Road
- Municipal Boundary
- Registered Cadastral Land Units
- Surveyed Cadastral Land Units

Municipality:

KAI !GARIB MUNISIPALITEIT/MUNICIPALITY

Postal Address:
Private Bag X6
Kakamas
8870

Tel No: 054 461 6700
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Consultant:

MACROPLAN
TOWN & REGIONAL PLANNERS
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054 332 3642
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Reference

(FIG1.REZ) 210215 Ptn. 30 of the Farm Blauws Kop, No. 36

Designed	Date
JP Theron	February 2021
Drawn	**Scale**
JP Theron	1: 80 000

Project Name: PLANGENI TOWNSHIP ESTABLISHMENT

Title:

Figure 2
Locality Map: Local

Description: PORTION 30 VAN DIE PLAAS BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Study Area
- National Road
- Provincial Road
- Municipal Boundary
- Registered Cadastral Land Units
- Surveyed Cadastral Land Units

Municipality:

KAI !GARIB MUNISIPALITEIT-MUNICIPALITY

Postal Address:
Private Bag X6
Kakamas
8870

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Reference: (FIG2.REZ) 210215 Ptn 30 of the Farm Blauws Kop, No. 36

Designed	Date
JP Theron	February 2021
Drawn	Scale
JP Theron	1:50 000

1.5. JURISDICTION

According to §26 of the Spatial Planning Land Use Management Act (Act 16 of 2013), the MEC delegated the powers to approve the land use change application, to the JMPT. This application will be evaluated in terms of the Kai !Garib Scheme Regulations of 2007.

§26 of SPLUMA, which states the following:

(2) Land may be used for the purposes permitted –

(a) By a land use scheme;

(b) By a town planning scheme, until such scheme is replaced by a land use scheme;

With the enactment of SPLUMA, the delegations of jurisdictions in terms of the decision making on land use change matters are, however, interpreted as follow:

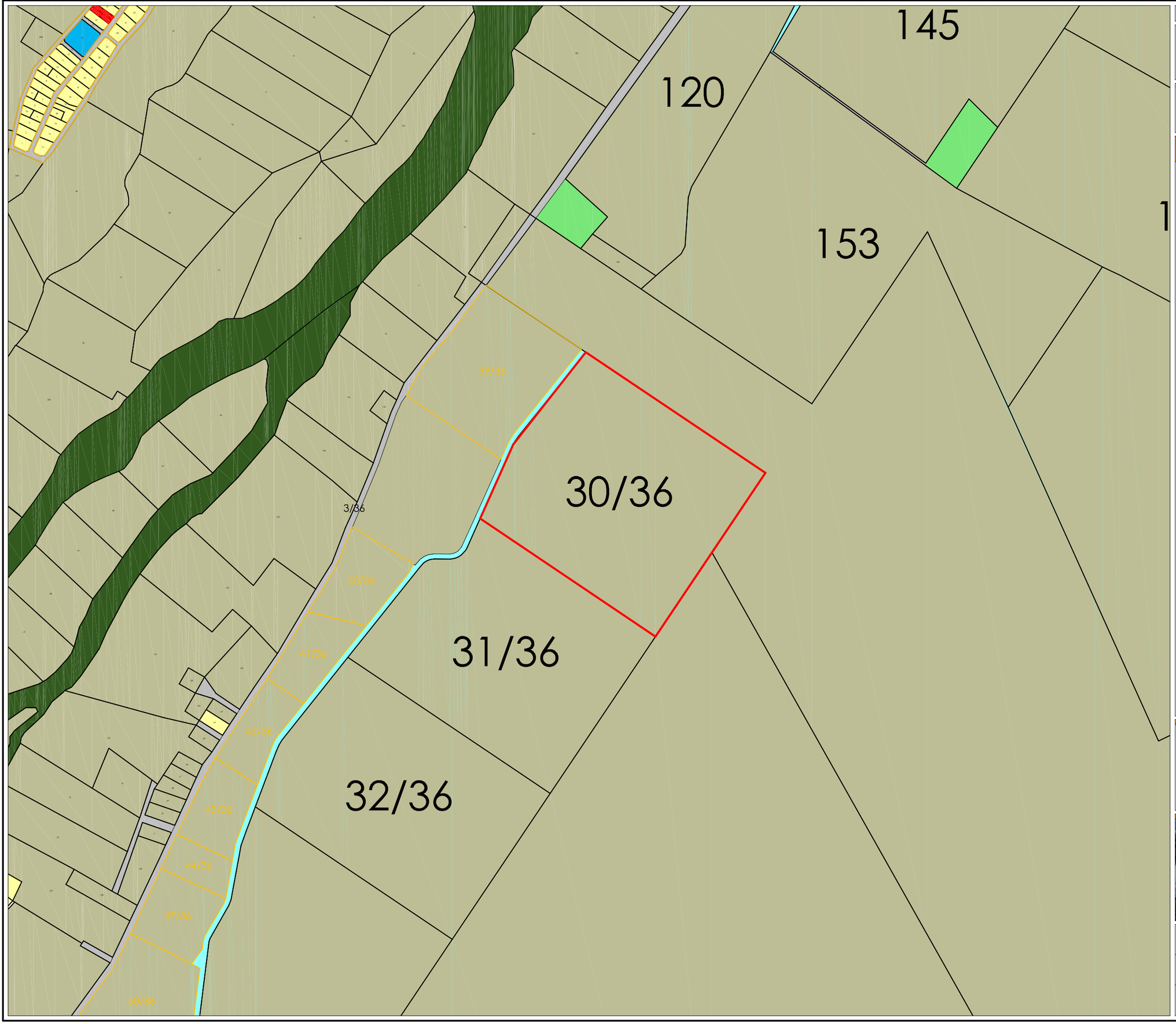
§26 (4)
A permitted land use may, despite any other law to the contrary, be changed with the approval of a Municipal Planning Tribunal in terms of this Act.

§33 (1)
…all land development applications must be submitted to a municipality as the authority of first instance.

§34 (2)
A district municipality may, with the agreement of the local municipalities within the area of such district municipality, establish a Municipal Planning Tribunal to receive and dispose of land development applications and land use applications within the district area.

§35 (1)
A municipality must, in order to determine land use and land development applications within its municipal area, establish a Municipal Planning Tribunal.

In light of the above, this land use application is submitted to the Kai !Garib Municipality as the authority of first instance, for processing, administration and for the subsequent referral to the Joint Municipal Planning Tribunal, overseen by the ZF Mgcawu District Municipality.



Project Name: PLANGENI TOWNSHIP ESTABLISHMENT

Title:

Figure 3
Zoning Extract

Description: PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Open Space Zone I
- Open Space Zone II
- Open Space Zone III
- Agricultural Zone I
- Agricultural Zone II
- Resort Zone II
- Residential Zone I
- Residential Zone II
- Residential Zone III
- Residential Zone IV
- Residential Zone V
- Residential Zone VI
- Institutional Zone I
- Institutional Zone II
- Institutional Zone III
- Authority Zone I
- Authority Zone II
- Special Zone
- Undetermined Zone
- Business Zone I
- Business Zone II
- Business Zone III
- Business Zone IV
- Business Zone V
- Business Zone VI
- Industrial Zone I
- Industrial Zone II
- Industrial Zone IV
- Industrial Zone IV
- Utility Zone I
- Utility Zone II
- Utility Zone III
- Transport Zone I
- Transport Zone II
- Transport Zone III
- Study Area

Municipality:

KAI !GARIB MUNICIPALITY

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Kakamas
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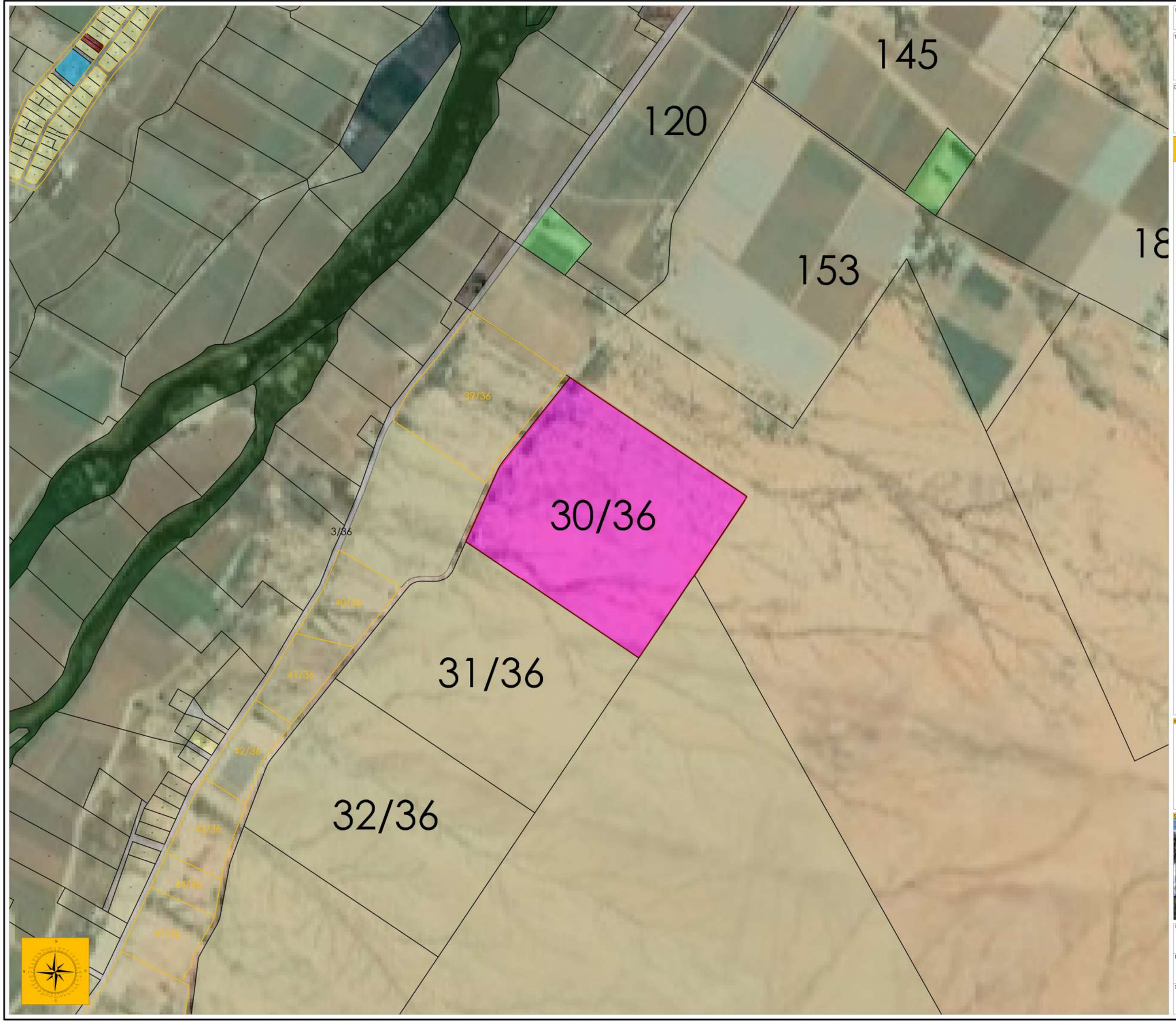
Reference: (FIG1.REZ) 210215 Ptn. 30 of the Farm Blauws Kop, No. 36

Designed	Date
JP Theron	February 2021
Drawn	Scale
JP Theron	1: 12000



Project Name:
PLANGENI TOWNSHIP ESTABLISHMENT

Title:
Figure 4
General Land Uses

Description:
PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Study Area
- Agricultural uses
- Vacant
- Rural Settlements
- Residential uses
- Public uses
- Institutional uses
- Transport uses

Municipality:

KAI !GARIB

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Drawn	Scale
JP Theron	1: 12000

Photo 1: Access Road to the Community of Plangeni

The existing access road from the R359 that provide access to the community of Plangeni can be seen in the image above, as seen from a north-westerly direction. DRPW has been informed of the planned township establishment of Plangeni and their no-objection is attached as Annexure G to this submission.

Photo 2: Plangeni in relation to Canal.

The community of Plangeni is being bordered by the canal to the north-west. The Blauwskop Settlement Irrigation Association has been informed of the planned township establishment of Plangeni and after due consideration a no-objection (Annexure H) has been granted for the planned actions of land use change.

Photo 3: Oldest informal houses of Plangeni

The oldest informal houses of Plangeni can be seen in the image above, as seen from the main road of Plangeni. During the preparation of the layout for the Plangeni township establishment project it became apparent that some of these informal stands are smaller than 250m², as such the relocation of these houses to larger cadastral land units will be required.

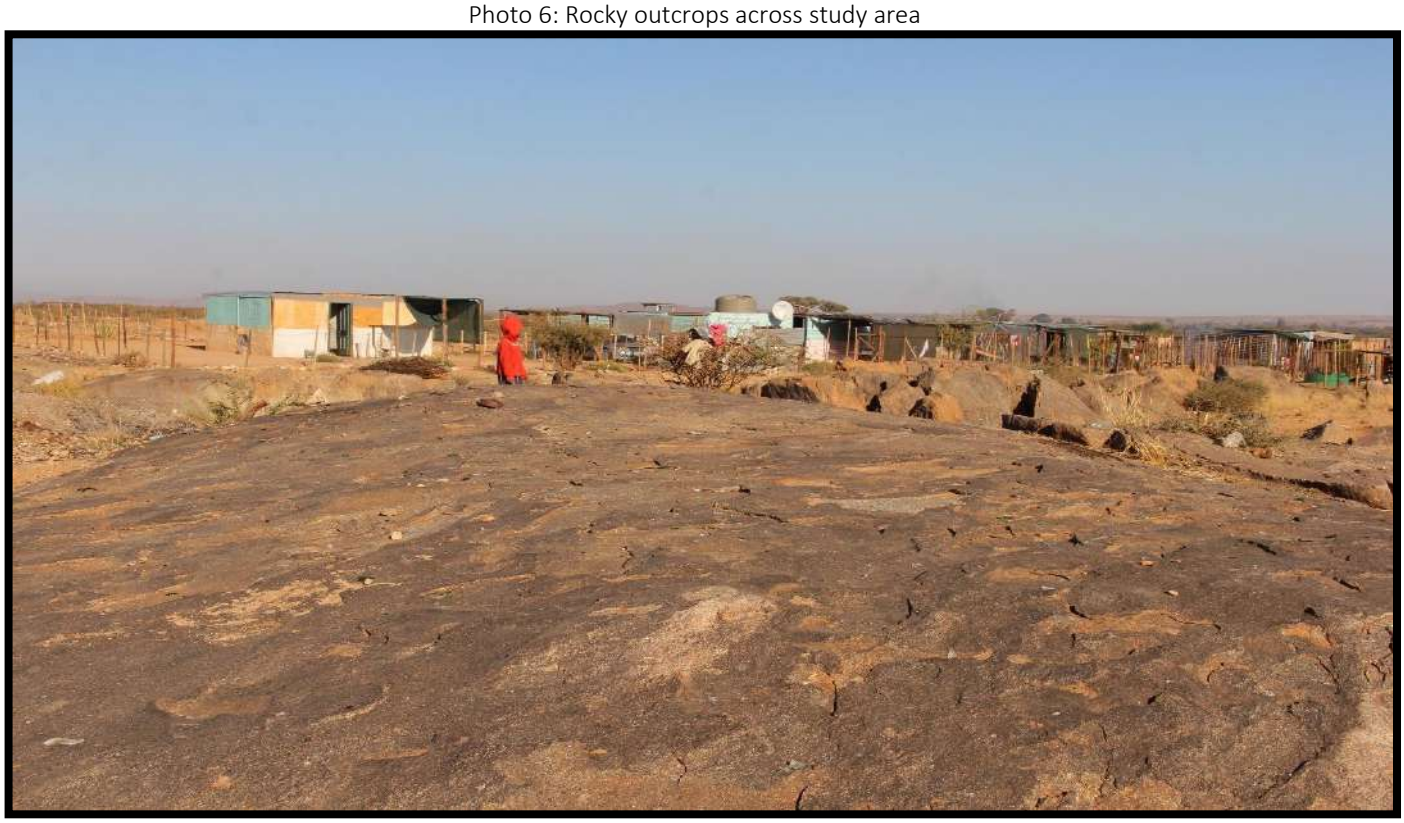
Photo 4: Formalisation of business

The proposed layout of Plangeni seeks to formalise all other uses in their current location, with the informal shop that is visible in the image above as an example thereof.

Photo 5: Existing water infrastructure

Temporary infrastructure, such as the water storage tanks, has been provided for the community of Plangeni to supply water to the residents of this community. Detail services reports (Annexure D) have been compiled for the purpose of the Plangeni township establishment with these reports adequately addressing the bulk services needs for a sustainable community.

Photo 6: Rocky outcrops across study area



The study area, comprising an area of 50ha, can be characterised by numerous sections of rocky outcrops that were captured during the geotechnical study. These rocky outcrops pose development constraints as such most of these rocky outcrops have been accommodated within open spaces.

Photo 7: Informal houses of Plangeni

The informal houses of the Plangeni Community can be seen in the image above, as constructed in the center of the study area. The proposed layout will accommodate most of the existing informal houses on their existing location.

Photo 8: Informal Houses – Continued Growth

The community of Plangeni continues to grow with new informal houses being constructed on a regular basis. In the image above, the new stands that have been chosen by members of the community that are being fenced off with new houses to be developed in due course.

1.6. COMPLIANCE WITH PRINCIPLES

SPLUMA sets out certain development principles (§7) to guide the development of land in the republic and any land use application should be considered with due cognisance of these principles. These principles may be briefly listed as follows:

1. THE PRINCIPLE OF SPATIAL JUSTICE;
2. SPATIAL SUSTAINABILITY;
3. EFFICIENCY;
4. SPATIAL RESILIENCE; AND
5. GOOD ADMINISTRATION.

The following sub-paragraphs may be highlighted in terms of this application, along with an explanation of their relevance:

(a) The principle of spatial justice, whereby –

(i) Past spatial and other development imbalances must be redressed though improved access to and use of land;

Relevance: This application for township establishment, formalisation of existing informal properties and provision of additional residential erven will address past spatial and other development imbalance, since access to and the use of land will be improved.

(ii) Spatial development frameworks and policies at all spheres of government must address the inclusion of persons and areas that were previously excluded, with an emphasis on informal settlements, former homeland areas and areas characterised by widespread poverty and depravation;

Relevance: This component is applicable to public entities such as municipalities and government departments; it is therefore not the responsibility of an applicant to adhere thereto.

(iii) Spatial planning mechanisms, including land use schemes, must incorporate provisions that enable redress in access to land by disadvantaged communities and persons;

Relevance: This component is applicable to public entities such as municipalities and government departments; it is therefore not the responsibility of an applicant to adhere thereto.

(iv) Land use management systems must include all areas of a municipality and specifically include provisions that are flexible and appropriate for the management of disadvantaged areas, informal settlements and former homeland areas.

Relevance: This component is applicable to public entities such as municipalities and government departments; it is therefore not the responsibility of an applicant to adhere thereto.

(v) Land development procedures must include provisions that accommodate access to secure tenure and the incremental upgrading of informal areas; and

Relevance: This component is applicable to public entities such as municipalities and government departments; it is therefore not the responsibility of an applicant to adhere thereto.

(vi) A Municipal Planning Tribunal considering an application before it, may not be impeded or restricted in the exercise of its discretion solely on the ground that the value of land or property is affected by the outcome of the application.

Relevance: This component is applicable to public entities such as municipalities and government departments; it is therefore not the responsibility of an applicant to adhere thereto.

(b) The principle of spatial sustainability, whereby spatial planning and land use management systems must –

(i) Promote land development that is within the fiscal, institutional and administrative means of the Republic;

Relevance: It is the opinion of this office that the proposed development will not place an unreasonable amount of stress on the fiscal, institutional and administrative capabilities of the area in which it will be situated, seeing as this request for township expansion will incorporate various uses that will address the additional pressure that such an expansion may cause; fiscally, institutionally and administratively speaking.

(ii) Ensure that special consideration is given to the protection of prime and unique agricultural land;

Relevance: The Kai !Garib Municipality is the registered landowner of the land unit involved in this submission for land use change, as such the involved property is exempted from the provision of the Act 70 of 1970 as clearly described in the definition of agricultural land which reads as follow:

"Agricultural land" means any land, except-

(a) land situated in the area of jurisdiction of a municipal council, city council, town council, village council, village management board, village management council, local board, health board or health committee, and land forming part of, in the province of the Cape of Good Hope, a local area established under section 6(1)(i) of the Divisional Councils Ordinance, 1952 (Ordinance 15 of 1952 of that province), and, in the province of Natal, a public health area as defined in section I of the Local Health Commission (Public Health Areas Control) Ordinance, 1941 (Ordinance 20 of 1941 of the last-mentioned province), and in the province of the Transvaal, an area in respect of which a local area committee has been established under section 21(1) of the Transvaal Board for the Development of Peri-Urban Areas.

(b)Ordinance, 1943 (Ordinance 20 of 1943 of the Transvaal), and, in South-West Africa, a peri-urban area established under section 9 of the Peri-Urban Development Board Ordinance, 1970 (Ordinance 19 of 1970 of South-West Africa), but excluding any such land declared by the Minister after consultation with the executive committee concerned and by notice in the Gazette to be agricultural land for the purposes of this Act;

(c) land of which the State or the administration of the territory of South-West Africa is the owner or which is held in trust by the State or a Minister or the Administrator of the said territory for any person;

For further clarity, this office consulted with the appointed land surveyor and confirmation was received that no formal feedback from the Dept. of Agriculture will be required during the registration of the general plan at the office of the Chief Surveyor General.

(iii) Uphold consistency of land use measures in accordance with environmental management instruments;

Relevance: The magnitude of the proposed housing development necessitates the undertaking of an Environmental Impact Assessment (EIA), under the guidance of the National Environmental Management Act (107 of 1998). At present the EIA is still in process, due to the constraints brought forth by the Covid-19 pandemic. The Environmental Authorisation will be provided to the Kai !Garib Local Municipality and the ZF Mgcawu District Municipal Planning Tribunal upon receipt thereof.

(iv) Promote and stimulate the effective and equitable functioning of land markets;

Relevance: It is the opinion of this office that the proposed development will contribute to the value of land in the area surrounding thereto, but that it will not necessarily unfairly increase the cost thereof.

(v) Consider all current and future costs to all parties for the provision of infrastructure and social services in land developments;

Relevance: This application for the formalisation of the informal community of Plangeni falls under the jurisdiction of the Kai !Garib Municipality, as such the provision of this services will be the responsibility of the Kai !Garib Municipality. Services reports (Annexure D) was compiled on the basis of the proposed formalisation of Plangeni, with the general findings being that the existing bulk service infrastructure is not sufficient to accommodate the additional erven that will comprise the formalised community of Plangeni. The Kai !Garib Local Municipality will be responsible for procuring funding from the various bulk services infrastructure grants.

(vi) Promote land development in locations that are sustainable and limit urban sprawl; and

Relevance: The area that comprise the community of Plangeni is included in an urban edge, since provision for this community has been made during the compilation of the Kai !Garib SDF in 2012.

(vii) Result in communities that are viable.

Relevance: This application proposes the proclamation of Plangeni, which consist of numerous informal stands, as such the individual transfer of ownership will be legal. Additionally, supportive land use normal associated with township development will also be provided to cater to the needs of the community. On the long term sufficient bulk service infrastructure will be available to promote a sustainable community. The purpose of this application in essence is to create a viable community.

(c) The principle of spatial efficiency, whereby –

(i) Land development optimises the use of existing resources and infrastructure;

Relevance: Please refer to §2.5 of this submission for details regarding the rendering of services;

(ii) Decision-making procedures are designed to minimise negative financial, social, economic or environmental impacts; and

Relevance: The SPLUMA By-laws of the Kai !Garib Local Municipality indicates the specific procedures that are to be followed with a land use change application such as this. This will ensure that both the Municipality, the relevant community and our client will be guarded against negative social, economic and environmental impacts.

(iii) Development application procedures are efficient and streamlined and timeframes are adhered to by all parties.

Relevance: As the applicant in this instance, our office will do our very best to adhere to the timelines set by the local municipality. If this is not possible we will, if need be, endeavour to consult the municipality in these matters and find a solution thereto.

(d) The principle of spatial resilience, whereby flexibility in spatial plans, policies and land use management systems are accommodated to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks.

Relevance: This component is applicable to public entities such as municipalities and government departments, it is therefore not the responsibility of an applicant to adhere thereto.

(e) The principle of good administration, whereby –

(i) All spheres of government ensure an integrated approach to land use and land development that is guided by the spatial planning and land use management systems as embodied in this Act;

Relevance: This component is applicable to public entities such as municipalities and government departments, it is therefore not the responsibility of an applicant to adhere thereto.

(ii) All government departments must provide their sector inputs and comply with any other prescribed requirements during the preparation or amendment of spatial development frameworks;

Relevance: This component is applicable to public entities such as municipalities and government departments, it is therefore not the responsibility of an applicant to adhere thereto.

(iii) The requirements of any law relating to land development and land use are met timeously;

Relevance: Various approvals/ no objections/ authorisations have to be obtained in relation to the proposed formalisation, which include Environmental Authorisation, no-objection from the Department of Road and Public Works (DRPW) and no-objection from the Blauwskop Irrigation Association. This application is however compiled and submitted without the mentioned no-objections/ approvals, with the sole purpose of commencing with the public participation process. At the time of writing the progress regarding the feedback from the interested and affected parties are as follow:

- *Environmental Authorisation: The final scoping report (Annexure I) has been submitted to DENC. DENC is in the process of reviewing the final scoping report;*

- *DRPW: Sanral has been furnished with a formal notification letter (Annexure J) for review on the 15th of February 2021. The feedback from DRPW is still outstanding;*
- *Blauwskop Irrigation Association: Blauwskop Irrigation Association has been furnished with a formal notification letter (Annexure K) for review on the 22nd of February 2021. The feedback from the Blauwskop Irrigation Association is still outstanding.*

(iv) The preparation and amendment of spatial plans, policies, land use schemes as well as procedures for development applications, include transparent processes of public participation that afford all parties the opportunity to provide inputs on matters affecting them; and

Relevance: The By-laws of the Kai !Garib Local Municipality stipulates that the applicant (in this case our office) will be responsible for the application procedures that is to follow the submission of an application. Our office takes public participation very seriously and will follow all the by-law stipulations very closely to ensure full compliance, which will result in a completely transparent process.

(v) Policies, legislation and procedures must be clearly set in order to inform and empower members of the public.

Relevance: This component is applicable to public entities such as municipalities and government departments; it is therefore not the responsibility of an applicant to adhere thereto.

2. PLANNING CONSIDERATIONS

2.1. LOCATION OF STUDY AREA

The Kai !Garib Municipality is situated in the central sections of the Northern Cape Province, within the ZF Mgcawu District Municipality, and may be described as being one of the westernmost municipalities in the district. The urban hearts of the municipality may be described as being Keimoes and Kakamas, which are located in the center of the municipality on the banks of the Orange River.

This application for land use change pertains to the small rural community of Plangeni, with this settlement enjoying an easterly locale within the Kai !Garib Local Municipality. Plangeni is furthermore located 15km east of Keimoes and 27km south-south-west of Upington. The coordinates for the center of the study area are as follows:

Lat: 28°40'7.59"S
Long: 21° 6'7.97"E

Please refer to the figures attached to this submission for a visual interpretation regarding the locality of the study area.

2.2. PHYSIOGRAPHY

The physiography of the area within which the study area is located is discussed briefly.

2.2.1. TOPOGRAPHY

The proposed formalisation of Plangeni necessitated the completion of numerous specialist studies that inform the Environmental Impact Assessment. The assessment has scrutinised the area earmarked for formalisation and further development, thereby addressing the physiography in more detail. The final scoping report, as well as other specialist studies, are attached as Annexures to this submission. No problems are anticipated in this regard.

2.2.2. SOIL/GEOLOGICAL CONDITIONS

The undertaking of a geotechnical investigation was required for the formalisation of the Plangeni Community. The Geological Report (Annexure G) for the most part indicated that the study area is suitable for normal township expansion, however patches of land have been identified that fall under Geological Zone VI, with these areas characterised by rock outcrops. These rocky areas have been incorporated within the layout as open spaces with no development permitted thereon.

2.2.3. FAUNA AND FLORA

The proposed formalisation of Plangeni necessitated the completion of numerous specialist studies that inform the Environmental Impact Assessment. It is worth mentioning that the Botanical Assessment (See Annexure F) identified numerous protected species and proposes that a NFA permit, as well as a NCNCA permit be acquired for the removal of these species. The final scoping report, as well as other specialist studies, are attached as Annexures to this submission for further scrutiny. No problems are anticipated in this regard.

The final scoping report, as well as other specialist studies, are attached as Annexures to this submission. No problems are anticipated in this regard.

2.3. INTEGRATED PLANNING

The Spatial Planning and Land Use Development Act (Act 16 of 2013) stipulates that each Municipality must prepare a spatial development framework (SDF) that interpret and represent the spatial development vision of the competent Authority. All proposed developments, specifically pertaining to land use change applications within a municipality, must be measured against an approved Spatial Development Framework (SDF) of such a municipality, which may be seen as the spatial translation of the Integrated Development Plan (IDP). The planning legislation states that no land development decision can be made if the proposed development is inconsistent with the municipal spatial development framework. However, the Joint Municipal Planning Tribunal may depart from the provisions of the SDF only if site-specific circumstances justify a departure from the provisions of such SDF, as envisaged in §22 (2).

KAI !GARIB SPATIAL DEVELOPMENT FRAMEWORK:

The Kai !Garib SDF was approved and adopted in 2012 and as such is a valid and weight bearing document. The SDF of the Kai !Garib Municipality adheres to the requirements as stipulated in the Spatial Planning and Land Use Management Act (Act 16 of 2013), therefore providing potential investors with adequate information to plan a development in accordance with the spatial vision of the municipality, as to allow the Joint Municipal Planning Tribunal to make an informed decision regarding this application for land use change.

The Kai !Garib Municipal SDF is well-equipped, in terms of spatial planning categories, spatial planning objectives and restructuring elements. The informal community of Plangeni was captured (See Annexure M) during the compilation of the Kai !Garib SDF of 2012 and the Spatial Planning Category of D.m Mixed Use Development Areas were assigned thereto. The community of Plangeni has furthermore been earmarked for township establishment through project number P1.8 on the Kai !Garib SDF map. The large scope of the Plangeni community necessitates the inclusion of land uses that are normally associated with residential areas, since these uses contribute to a sustainable community and increase the livelihood of its residents. The proposed layout for the formalisation of Plangeni includes the following supportive land uses: Institutional uses (churches and school), business nodes, recreational uses (sport ground) and municipal uses (community hall or similar uses).

INTEGRATED DEVELOPMENT PLAN 2020/2021:

In terms of Key Performance Areas, the Plangeni community has been listed as one of the projects under priority 2: Lack of Housing/ Existing informal settlements/ Lack of Land Ownership in the Kai !Garib Integrated Development Plan 2020/2021. The project breakdown is as follows:

Nr	Project Name	Location	Target Dates	Possible Funders	Status Quo	EIA
pd/h/011	Development of Settlement 500 erven	Blaauwskop (50 ha)	2015/20	COGHSTA	Planning	In process

In light of the above mentioned, the proposed formalisation of Plangeni is in-line with the provisions of the Kai !Garib Spatial Development Framework and has been prioritised as a key project within the IDP and SDF and can therefore be seriously considered for approval by the Joint Municipal Planning Tribunal. It should furthermore be noted that this application derives from an indirect appointment of COGHSTA and is therefore a project of provincial and national importance.

2.4. CHARACTER OF THE AREA

As mentioned throughout this report, the community of Plangeni has a rural locate as a result of farmworkers in the area decision to reside in close proximity to the surrounding farmland. The existing community of Plangeni comprise of approximately 350 informal stands, a sport field and dirt roads. Electrical infrastructure and a water storage tank have been installed to provide in the basic needs of the community. This application will provide additional land uses to improve the livelihood of the community and promote sustainability.

2.5. INFRASTRUCTURE

2.5.1. WATER

Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed services report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the services report for the provision of water are as follow:

- The proposed development will require authorisation under the National Water Act (Act no. 36 of 1998) to abstract water from the Orange River.
- The only sustainable abstraction will be from the Orange River. Servitudes over private owned land will be required.
- A purification plant with capacity 350m/day is required for the proposed township.

2.5.2. SEWERAGE

Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed services report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the services report for the handling of sewerage and waste-water are as follow:

- Grey Water to be disposed on site;
- Black water to be disposed on site utilising VIP`s or double put holes;
- Septic tanks may be constructed, but the service cost if the tanks will be very expensive.

2.5.3. ELECTRICITY

Heyns van Rooyen Consulting Electrical Engineers, as sub-consultant of Stabilis, has been appointed to conduct a detailed electrical report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the electrical report for the provision of electricity are as follow:

- It is the conclusion of this services report that:
- Eskom will be the supply authority for the proposed township.
- The township can be supplied with electricity by Eskom given available capacity.
- The bulk services can be installed from the Eskom MV line to the township about 6 km away. A voltage regulator will have to be installed to ensure the voltage does not fall below the voltage limit of the MV line.
- No problems are foreseen that can hamper the supply of electricity to the proposed township.
- A few key administrative processes will have to be concluded by the municipality before Eskom can take the process

further.

- All costs needed to supply electricity to the proposed township can be funded through INEP.
- The existing overhead line will be decommissioned and removed once new electrical infrastructure has been built.

2.5.4. STORM WATER

Stabilis Development (Pty) Ltd. has been appointed to conduct a detailed services report (Annexure D) for the formalisation of Plangeni. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the Plangeni community and sought solutions to obtain the required funding to implement the necessary upgrades to the bulk services infrastructure. The findings of the services report for the handling of storm-water are as follow:

- The three drainage lines on the proposed area are mostly dry, with water only during rains and perhaps shortly thereafter. During the odd-thunder storm, drainage lines can come down in flood. Because rainfall events are far apart, the flooding drainage line is not an obstacle for the proposed development,

2.5.5. ROAD NETWORK

The informal community of Plangeni, located on Portion 30 of the Farm Blauws Kop, No. 36, received access from an approved access road that links to the R359 provincial road. After the formalisation of Plangeni this will remain to be the case. DRPW has been informed of the planned formalisation, but to date no feedback has yet been received.

In terms of the internal road network of Plangeni, the community has adopted an incoherent road network due to the presence of numerous rocky outcrops and storm water furrows. The proposed layout is based on the existing informal road network with the exemption of creating through roads for better traffic movement.

2.6. SIZE, ZONINGS AND REGULATIONS

The formalisation process pertains to Portion 30 of the Farm Blauws Kop, No. 36, Kenhardt RD, with this property held under the ownership of the Kai !Garib Local Municipality. The proposed formalisation will provide sub economic & middle income housing with the end goal of securing ownership of land for current and future residents. The Plangeni community currently houses an estimate of between 350 informal stands.

The following table provides a breakdown of the involved land portion, in terms of size, land use and zoning:

Property Description	Property Size	Land Use	Zoning Status Quo
Portion 30 of the Farm Blauws Kop, No. 36, Kenhardt RD	50.0020ha	Largely occupied by informal residential stands.	Agricultural Zone I

Table 2: Breakdown of property information.

The proposed Plangeni township establishment project entails the proclamation of Plangeni, formalisation of existing informal properties, provision of additional erven for future population growth, as well as the provision of supportive land uses normally

associated with a township, such as institutional uses, municipal uses and business premises. The township establishment of Plangeni will facilitate the process of converting farmland to a township, during this process the proposed erven and zonings become valid. The proclamation of Plangeni is furthermore needed, since no transfer of individual stands in the township will be allowed without proclamation.

In order to achieve the mentioned objectives, this formal land use change application, pertaining to township establishment, subdivision & rezoning, is submitted to the Kai !Garib Local Municipality as municipality of first instance.

1. SUBDIVISION (See Figure 5):
   1.1. Subdivision of Portion 30 of the Farm Blauws Kop, No. 36, into 530 individual cadastral land units.

2. REZONING (See Figure 6):
   2.1. Rezoning of the newly created properties, thereby allocating appropriate land use rights to each of the newly created individual erven suitable to their future purpose within the Plangeni township establishment project. The proposed zonings, in terms of the newly adopted Kai !Garib Scheme Regulations, are as follow and should be read together with the final layout plan attached as Annexure E to this submission:

Zoning	Primary Use/s	Erven Amount
Residential Zone I	Residential House	500
Business Zone I	Business Premises	3
Institutional Zone I	Place of Instruction/ Educational	2
Institutional Zone II	Place of Worship	1
Open Space Zone II	Public Open Spaces	22
Transport Zone I	1	1
Authority Zone I	Municipal Uses	1
Total		530

3. TOWNSHIP ESTABLISHMENT:
   3.1. The proclamation of Plangeni, in order to facilitate the conversion of farmland to a township and allow for the transfer of ownership of individual stands.

2.7. SUMMARY

During the consideration of the approval of this application, it is necessary to keep the following in mind:

a) This application is in line with the principles set out in Chapter 2, §7 of the Spatial Planning and Land Use Management Act, Act 16 of 2013;

b) This application complies with the provisions of the Kai !Garib Land Use Management Scheme;

c) Addressing the backlog of housing as encountered within numerous settlements in the Northern Cape Province;

d) This application complies with the general principles as prescribed in Chapter 1 of the Spatial Planning Land Use Management Act (Act 16 of 2013);

e) The proposed formalisation of the Plangeni informal community aligns with the provisions of the Kai !Garib SDF;

f) The proposed formalisation of the Plangeni informal community has been captured as a priority project within the Kai !Garib Integrated Development Plan of 2020/2021.

2.8. LAYOUT PRINCIPLES

LOW-COST HOUSING

The Plangeni township establishment project will make provision for 500 sub economic properties, ranging between 250m² to 350m². A small fraction of the development scope will cater to middle-income housing, which will provide much needed income tax to the local municipality.

SUPPORTING LAND USES

The Plangeni township establishment project proposes only a few additional land uses, as requested by the community during the community engagement with the Kai !Garib Local Municipality. These uses include ad hoc business premises on collector or arterial roads, religious properties and a municipal property for uses such as a community hall.

STORM WATER FURROWS & ROCKY OUTCROPS

The study area is being traverse by significant storm water furrows that have been adequately accommodated within the town planning layout, by means of the internal road network and public open spaces. As mentioned throughout this application rocky outcrops can also be found on the involved property that further reduce the development potential of the study area. These rocky outcrops have been accommodated by means of open spaces.

ROAD NETWORK

The informal community of Plangeni, located on Portion 30 of the Farm Blauws Kop, No. 36, received access from an approved access road that links to the R359 provincial road. After the formalisation of Plangeni this will remain to be the case. DRPW has been informed of the planned formalisation, but to date no feedback has yet been received.

In terms of the internal road network of Plangeni, the community has adopted an incoherent road network due to the presence of numerous rocky outcrops and storm water furrows. The proposed layout is based on the existing informal road network with the exemption of creating through roads for better traffic movement.

3. PROPOSED LAND USE CHANGE

3.1. PLANNING APPROACH

<u>During the motivation of the project, the following objectives were kept in mind:</u>

- *Addressing housing backlog and providing housing opportunity for the future population growth of Plangeni;*
- *The physiography, as evident by the findings of the geotechnical report, botanical Assessment report and the freshwater report, of the area is capable to accommodate the planned housing development;*

- *Convert Plangeni from farmland to a township, through the process of township establishment.*
- *Formalising existing informal stands situated within the town of Plangeni;*
- *Providing supporting land uses that will contribute to a sustainable community;*
- *Incorporating land uses derived by community engagement with the Kai !Garib Municipality;*
- *Complying with any provisions that the Municipality may enforce on the application;*
- *The proposed layout complies with the findings and recommendations of the specialist studies.*

3.2. PUBLIC PARTICIPATION

As contemplated in SPLUMA and the Kai !Garib Municipal By-laws, a land use change implies an amendment to the Scheme and where an amendment to a scheme is to be considered, according to §28(2), a public participation process must be undertaken to ensure that all affected parties have the opportunity to make representations on, object to and appeal the decision. For the purpose of land use applications in the Kai !Garib Municipality at this stage, we will be guided by the requirements of the Municipality and we anticipate these to include:

1. Notice placed in local print media, which will be followed by a limited 30 day period within which any member of the public may provide inputs and/or objections with regard to the proposed development at the local municipality. No late inputs will be considered relevant with the cut-off date being clearly indicated in the public notice.

2. The same notice published in the local print media will be placed at the entrance to the involved property, at the same time as publication, allowing an expanded audience to be reached by the notice.

3. The said notice will be forwarded to the surrounding land owners via registered mail or hand delivery, further expanding the audience for inputs.

4. The formalisation of Plangeni will also include an transparent community engagement process, that will be done with the assistance of the Kai !Garib Housing Department and the Ward Councillors.

Should any inputs be received by the office of the Kai !Garib Municipality, it would be the responsibility of the receiving official to place the date stamp of the Municipality on the received input, proving that it was acquired within the limited timeframe. Upon the closure of the 30 day public participation period, any inputs received must be forwarded to the applicant whereupon the applicant will have a maximum of 30 days to provide a written response to these inputs. The application will then be forwarded to the decision-making body for consideration.

3.3. PROPOSED LAND USES

After approval, the following land uses will be established on the study area in terms of the Kai !Garib Scheme Regulations – Please refer to Annexure E for the Detail Layout:

Residential Zone I	Indication on map: colour	**Yellow**	
	Primary use/s	**Dwelling House / Residential House**	Means a building containing only one residential unit – a self-contained interlinking group of rooms for the accommodation and housing of a single family, or a maximum of four persons who do not satisfy the definition of a "family", together with such outbuildings as are ordinarily used therewith.

500 land units created will be given this zoning with the objective of formalising the existing residential houses development on the study area, as well as make provision for future residents.

Business Zone I	Indication on map: colour	**Red**	
	Primary use/s	**Business Building / Premises**	Means a site and/or building or part thereof used or intended to be used as shops and/or offices and it includes hotels, restaurants, dry-cleaners, financial institutions, professional offices, places of assembly, doctors consulting rooms, stock or product exchanges, put-put course, flats above ground floor and buildings for similar uses, but it excludes bottle stores, taverns, places of entertainment, a casino, adult entertainment, institutional buildings, funeral parlours, public garages, service stations, repairing or related replacing functions, industrial buildings, offensive industries, heavy vehicle overnight facilities or any wholesale business.

3 land units created will be given this zoning within the layout, providing economic prosperity to the residents of Plangeni.

Institutional Zone I	Indication on map: colour	**Light Blue**	
	Primary use/s	**Place of Instruction / Educational building**	Means a school (both primary, secondary, special and private schools), college, technical institute, academy, university, lecture hall or other centre of instruction, and includes a hostel appertaining thereto, and a convent, dormitory, public library, art gallery, museum, gymnasium, training centre and creche, but does not include a building used or intended to be used wholly or primarily as a certified reformatory or industrial school or as a school for the mentally handicapped;

2 land units created will be given this zoning within the layout, providing educational opportunities for the residents of Plangeni.

	Indication on map: colour	**Light Blue**	

Institutional Zone II	Primary use/s	**Place of Worship**	Means a church, synagogue, mosque, temple, chapel or other place for practising religion. This includes any building in connection therewith, for instance a hall, Sunday school classes or parsonage, but does not include funeral parlours (Office & Facility), including chapels forming part of such funeral parlours;

1 land units created will be given this zoning within the layout, providing religious properties for the residents of Plangeni.

Open Space Zone II	Indication on map: colour	**Green**	
	Primary use/s	**Public open space**	*Means any land which falls under, or is intended to come under the ownership of the local authority, which is not leased or intended to be leased on a long-term basis, and which is utilised by the public as an open space, park, garden, picnic site, square, playground or recreational site, whether it appears on an approved general plan or not.*

22 land units created will be given this zoning within the layout, accommodating storm-water furrows & protective vegetation.

Open Space Zone III	Indication on map: colour	**Light Green**	
	Primary use/s	**Private open space**	Means any land which has been set aside in this scheme for use as a private site for sport, playing, rest and recreation facilities or as an ornamental garden or pleasure-garden, provided that the land is under the long-term management of a private person or authority, and also a cemetery or show grounds, whether public or private.

1 land unit created will be given this zoning within the layout, providing recreational activities for the residents of Plangeni.

Transport Zone I	Indication on map: colour	**Light Grey**	
	Primary use/s	**Public Street**	Means any land indicated on a plan or diagram or is specified within this zoning scheme, reserved for street purposes and where the ownership as such vests in a competent authority and includes facilities for public transport.

1 land unit created will be given this zoning within the layout, accommodating the internal road network.

	Indication on map: colour	**Light Red**	

Authority Zone I	Primary use/s	Municipal Use	Means land/erven and buildings utilised by Local and District Municipality to carry out its mandatory functions, of which the extent thereof is of such nature that is cannot be classified or defined under any other usage in these regulations and include uses such as stores, warehouses, cemeteries, commonage, nursery, waste disposal site and water purification works, etc. The land/erven zoned for this purpose must be registered in the name of the Municipality.

1 land unit created will be given this zoning within the layout, providing community related uses.

4. RECOMMENDATION

It is thus evident from the previous discussions that this application for land use change (Township Establishment, Subdivision and Rezoning) for township establishment, formalisation and expansion of Plangeni is desirable for development within the Kai !Garib Local Municipality and should be positively considered for approval by the JMPT.

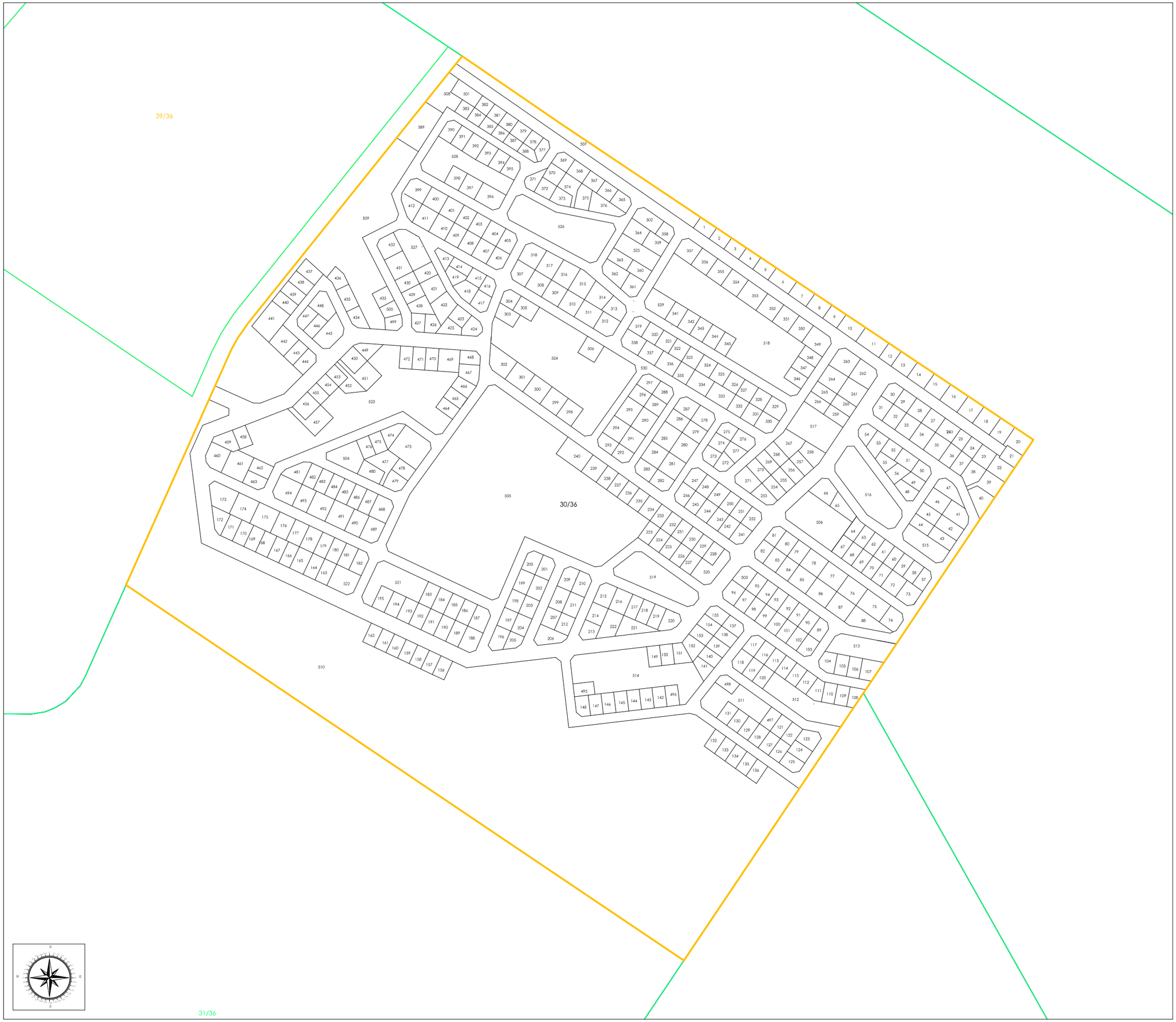
4.1. APPROVAL OF THE APPLICATION

The Kai !Garib Municipality is therefore requested to:

1. Give the go-ahead for advertising the application according to and in terms of the procedures adopted by themselves as part of their commitment to the provisions of the Spatial Planning and Land Use Management Act, Act 16 of 2013. The public participation process will be handled by this office and proof thereof will be sent to the Municipality.
2. Communicate the relevant Administrative fee to this office after accepting the application and stipulating its requirements.
3. Recommend the approval of this land use application to the JMPT after the closure of the public participation process.

The JMPT is therefore requested to:

1. Favourably consider this application for subdivision, consolidation and rezoning by means of approving it in terms of the recommendation from the office of the Kai !Garib Municipality.



Page: 38

Title:

Figure 5
Proposed Subdivision

Description:

PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Ptn. 30 of the Farm Blauws Kop, No. 36
- Subdivision Lines

Municipality:

KAI !GARIB MUNISIPALITEIT-MUNICIPALITY

Postal Address:
Private Bag X6
Kakamas
8870

Tel No: 054 461 6700
Fax No: 054 461 6401

Consultant:

MACROPLAN
TOWN & REGIONAL PLANNERS
YOUR PARTNERS IN PROFESSIONAL PLANNING SERVICES

054 332 3642
4A Murray Avenue, Upington 8801 macroplan@mweb.co.za
PO Box 987, Upington 8800 www.macroplan.info

Reference

(FIG5.SUB 210301 Ptn 30 of the Farm Blauws Kop, No. 36

Designed	Date
JP Theron	March 2021
Drawn	**Scale**
JP Theron	1: 3750

PLANGENI TOWNSHIP
FIGURE 6: PROPOSED REZONING

Design:	JP Theron (Pr. Pln. A/2394/2016)
Drawn:	JP Theron (Pr. Pln. A/2394/2016)
Date:	November 2020
Scale:	1:1500 (A0)

Plan nr:
Concept Layout Plan 3
(DWG.IE) 201125 Blaauwskap/ Plangeni

Proposed Land Uses in terms of Town Planning Scheme System

Colour & Numbers	Land Use Description	Total Units	Schedule of Sizes: average size per erf	Schedule of Sizes: total area covered by land use	Schedule of Sizes: percentage of study area covered by use
	Open Space Zone I				
	Open Space Zone II	22			
	Open Space Zone III				
	Agricultural Zone I				
	Agricultural Zone II				
	Resort Zone I				
	Residential Zone I	500			
	Residential Zone II				
	Residential Zone III				
	Residential Zone IV				
	Residential Zone V				
	Residential Zone VI				
	Institutional Zone I	2			
	Institutional Zone II	1			
	Institutional Zone III				
	Authority Zone I	1			
	Authority Zone II				
	Special Zone				
	Undetermined Zone				
	Business Zone I	3			
	Business Zone II				
	Business Zone III				
	Business Zone IV				
	Business Zone V				
	Business Zone VI				
	Industrial Zone I				
	Industrial Zone II				
	Industrial Zone IV				
	Industrial Zone IV				
	Utility Zone I				
	Utility Zone II				
	Utility Zone III				
	Transport Zone I	1			
	Transport Zone II				
	Transport Zone III				
	Total:	530			

Addisional Information:

Contours	
Pipeline	
Sewerage Line	
Powerlines	
Buildings	
High Voltage Powerlines	
Powerline Servitude	

MACROPLAN
TOWN & REGIONAL PLANNERS
JP THERON
PR.PLN A/2394/2016
T: 054 332 3642 • C: 082 821 1124
E: jptheron@mweb.co.za
Head Office
4A Murray Avenue, Uitsigton 8801
Kimberley Office
4 Hemming Way, Kimberley 8301

MACROPLAN
TOWN & REGIONAL PLANNERS
LEN J FOURIE
PR.PLN A/1322/2006
T: 054 332 3642 • C: 082 821 1925
E: macroplan@mweb.co.za
Head Office
4A Murray Avenue, Uitsigton 8801
Kimberley Office
4 Hemming Way, Kimberley 8301

Municipality:

KAI !GARIB
Postal Address:
Private Bag X6
Kakamas
8870
Tel No: 054 461 6700
Fax No: 054 461 6401

Agency:

COGHSTA
Department: CO-OPERATIVE GOVERNANCE HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS NORTHERN CAPE

ANNEXURE A: COPY OF TITLE DEED

PROD DEEDS REGISTRATION SYSTEM - KIMBERLEY DATE : 20200302 TIME : 09:39:46.8 PAGE : 1
PREPARED BY : DRS05035 - L MADLALA

PICKING SLIP NR : 96007
FIRM FILE NR... : MACROPLAN

PROPERTY DETAILS PRINT FOR PORTION 30
OF PORTION 29
FARM NO 36
REG DIV KENHARDT RD

PROVINCE NORTHERN CAPE
PREV DESCRIPTION
DIAGRAM DEED NO T70957/2003
EXTENT 50.0020 H
CLEARANCE DAWID KRUIPER MUNISIPALITEIT
FARM NAME BLAAUWS KOP

NO INTERDICTS

DOCUMENTS	HOLDER	AMOUNT	O/P/A	SCAN/MICRO REF	MMDD
CONVERTED FROM CTN					

OWNER DETAILS

FULL NAME & SHARE	PURCH DATE	AMOUNT/REASON	O/P/A	IDENTITY	DATE OF BIRTH	TITLE DEED	MMDD	SCAN/MICRO REF
MUN KAI GARIB						T62545/2006CTN	0815	
	20060525	R19177.00						

* O/P/A - O - MULTIPLE OWNER P - MULTIPLE PROPERTY A - MULTIPLE OWNER AND PROPERTY

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FOR MORE DETAILED INFORMATION, PLEASE REFER TO THE REGISTERED SOURCE DOCUMENTS.

* * * END OF REPORT * * *

52
BISSET BOEHMKE MCBLAIN ING

Opgestel deur my

TRANSPORTBESORGER
R ELS

FEE
R 55,00 ✓

Gesertifiseer 'n ware afskrif in terme van die bepalings van
Certified a true copy in terms of the provisions of Regulation
Regulasie 66 kragtens die Registrasies van Aktes Wet, No 47
66 under the Deeds Registries Act, no 47 of 1937

FOR INFORMATION ONLY
SLEGS VIR INLIGTING

Registrasiekantoor
Deeds Registry

2020 -03- 02

Datum/Date.....

.....
REGISTRATEUR VAN AKTES
REGISTRAR OF DEEDS

UITGEREIK VIR INLIGTING
DOEL EINDES
ISSUED FOR INFORMATION PURPOSES

TRANSPORTAKTE

HIERBY WORD BEKEND GEMAAK DAT

RONEL ELS

T 000062545 / 2006

voor my verskyn het, REGISTRATEUR VAN AKTES, te KAAPSTAD, hy die genoemde komparant synde behoorlik daartoe gemagtig deur 'n Volmag aan hom verleen deur

JAN JOHANNES JORDAAN
IDENTITEITSNOMMER 510108 5073 08 9
ONGETROUD

geteken te UPINGTON op 27 JUNIE 2006

En genoemde Komparant het verklaar dat sy prinsipaal, op 25 MEI 2006, waarlik en wettiglik verkoop by Privaat ooreenkoms, en dat hy, in sy voorgenoemde hoedanigheid hierby sedeer en transporteer aan en ten gunste van

KAI! GARIB MUNISIPALITEIT

Hul opvolgers in titel of regverkrygendes,
titel of Regverkrygendes in volkome en vrye eiendom,

GEDEELTE 30 (GEDEELTE VAN GEDEELTE 29) VAN DIE PLAAS BLAUWS KOP NR 36),

GELEë IN DIE KAI! GARIB MUNISIPALITEIT,

AFDELING KENHARDT, PROVINSIE NOORD-KAAP;

GROOT: 50,0020 (VYFTIG KOMMA NUL NUL TWEE NUL) HEKTAAR;

AANVANKLIK OORGEDRA EN NOG STEEDS GEHOU KRAGTENS TRANSPORTAKTE NR T 70957/2003 MET KAART LG NR 1197/2002 WAT DAAROP BETREKKING HET.

I. **Wat betref die figuur x B C y op Kaart Nr 1197/2002 hierby aangeheg:**

A. Onderhewig aan die voorwaardes waarna verwys word in die gesegde Akte van Transport Nr T 4512/1915 en

B. Aan die volgende voorwaarde daarin bevat, naamlik :

"The Appearer's Constituent and his Successors in title or assigns shall have free and undisturbed access to the now-existing three drinking places on the Orange River and to use the water for domestic purposes and stock farming purposes whenever there is not sufficient water for the said purposes in the water furrow between the remainder of the said farm and the Orange River."

die genoemde Komparant se Prinsipaal synde John Harms van Niekerk as eienaar van die restant van die gesegde plaas "Blaauwskop" onder Grondbrief gedateer 17 November 1893 (Kenhardt Erfpagte Vol 1 Nr 14);

C. Verder onderhewig aan en geregtig op voordele onder die serwituut waarna verwys word in die endossement gedateer 8 Junie 1940, en 30 November 1942, op die gesegde Akte van Transport Nr T 4445/1940, watter endossemente soos volg lui :-

Gedateer 8 Junie 1940

"Restant – Registrasie van Serwituut

Kragtens Akte van Transport Nr T 5550/1940 gedateer 8.6.40 is die eienaar van die grond gehou daaronder geregtig op weireg op die restant van die grond hieronder gehou en is belet (1) om haar water- en weiregte te verkoop ens., (2) om grond te verkoop aan Naturelle ens., (3) om geen handels- of dranklisensies te verkry sonder die toestemming van die eienaars van die restant hieronder gehou onderworpe aan die voorwaardes en soos meer breedvoerig blyk uit die gesegde Akte van Transport."

Gedateer 30 November 1942

"Restant – Registrasie van Serwituut

Die volgende Transport Aktes No. 14350/42, No.T14351/42, No 22302/54, No 9806/58 en No14230/62 is ook onderhewig aan die terme en voorwaardes van die serwituut endossement gedateer 8 Junie 1940 hierop."

D. Verder onderhewig aan die nuut opgelegde voorwaarde, dat die Transportgewers die gesegde Gustav Peter Lutz en Stephanus Malan besigheid doende in vennootskap onder die firma naam LUTZ & MALAN, in aandele van twee derdes en eenderde respektiewelik alle Mineraleregte, in sover dit nie reeds deur die Staat gereserveer is nie, reserveer onderhewig aan die volgende :-

"Die Transportgewers hou die reg van toegang tot die verkoopte gronde uit vir hulle-self en vir hulle werknemers vir alle prospekteermyn of delfbedrywighede; en vir die oprigting van alle masjienerie in verband daarmee, asook die reg op die gebruik van water uit die Blaauwskop Besproeiingsvoor vir sodanige bedrywighede vry van betaling. Die Transportgewers sal egter verplig wees om redelike vergoeding te betaal soos onderling ooreengekom te word vir skade aan die transportnemers se eiendom aangerig deur die prospekteer- myn- of delfbedrywighede, en ingeval die partye nie tot 'n ooreenkoms kan geraak omtrent die bedrag van vergoeding wat betaal moet word nie, sal hulle verplig wees om die saak aan arbitrasie te onderwerp in terme van die arbitrasiewette van tyd tot tyd van toepassing in die Kaap-provinsie."

Die volgende mineraleregte is aan die Kroon gereserveer in die Grondbrief van die gesegde plaas "Blaauwskop" uitgereik ten behoewe van J.H.van Niekerk op 17 November, 1893 (Kenhardt Erfpagte Boek 1 Nr.14), voorwaarde V waarvan as volg lui :-

"V. That all rights to gold, silver and precious stones found or discovered at any time on or in the said land shall be reserved to the Crown, together with a right of ingress to and egress from any mines or works undertaken for mining or

prospecting purposes by any person or persons authorised by the Commissioner, but subject always to the provisions of the Act No.44 of 1887 or any other Act to be hereafter passed with regard to prospecting and mining for precious stones and minerals."

E. Onderhewig verder aan die endossement gedateer 20 Junie 1963 op Transportakte T 8791/1963, welke lees as volg :

"Sertifikaat van Minerale Regte Nr 12/1963 uitgereik ingevolge Art 71 van Wet 47 van 1937, ten opsigte van alle minerale regte uitgesonderd goud, silwer en edelgesteentes wat aan die Staat gereserveer is."

F. Onderhewig verder aan die endossement gedateer 16.11.73 op die A/K afskrif, welke lees as volg :

"Endossement kragtens Artikel 31 (6) van Wet Nr.47 van 1937 (soos gewysig).

'n Gedeelte van die eiendom hierin vermeld in para 1 groot ± 1,0050 ha is onteien deur die Afdelingsraad Kenhardt kragtens Art 130 van Ord 15/1952. Vide onteieningskennisgewing Nr.R/2/6 d.d 29.5.71 geliasseer as onteienings caveat EX 488/72 planne in tweevoud geliasseer hiermee."

G. Onderhewig verder aan die endossement gedateer 6 Desember 1988 op Transportakte Nr T 8791/1963, welke lees as volg :

(a) 'n ewigdurende serwituut van waterleiding (d.m.v. kanaal) oor 1,3800 ha.

(b) 'n ewigdurende serwituut van waterleiding (d.m.v. 'n duikpyp) oor 3500 meter.

(c) 'n ewigdurende serwituut van waterleiding (d.m.v. pyplyn) oor 1050 vierkante meter.

gesedeer aan REPUBLIEK VAN SUID – AFRIKA deur Akte van Sessie Nr. K1147/1989."

II. Wat betref die figuur x y D E F G A op Kaart Nr. 1197/2002 hierby aangeheg :

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDES

A. Onderhewig verder aan die voorwaardes waarna verwys word in Akte van Transport Nr T 4512/1915, en

B. Aan die volgende voorwaarde daarin bevat, naamlik :-

"The Appearer's Constituent and his Successors in title or assigns

shall have free and undisturbed access to the now-existing three drinking places on the Orange River and to use the water for domestic purposes and stock farming purposes whenever there is not sufficient water for the said purposes in the water furrow between the remainder of the said farm and the Orange River."

die genoemde Komparant se Prinsipaal synde John Harms van Niekerk as eienaar van die restant van die gesegde plaas "Blaauwskop" onder Grondbrief gedateer 17 November 1893 (Kenhardt Erfpagte Vol.1 Nr.14) ;

C. .....

D. .....

E. Verder onderhewig aan en geregtig op voordele onder die Serwituut waarna verwys word in die endossement gedateer 8 Junie 1940 op Sertifikaat van Nedersettings Titel Nr 4446/1940, wat soos volg lui :-

"REGISTRASIE VAN SERWITUUT

Kragtens Aktes van Transport Nos. 5550 ged. 8.6.40, 14350-14351/1942, 2491/1943, 3176/1943, 3521/1944, 12881/1944, 18466/1944, 2417/45; 6592/46; 11322/47, 9806/58, T14230/62 is voorsiening gemaak vir die oprigting van 'n besproeiingsraad vir die beheer van die Blaauwskop besproeiingsvoor tesame met bygaande regte, en regte van water uit die gesegde voor ten gunste van die gesamentlike eienaars. Soos meer breedvoerig sal blyk uit die gesegde Akte van Transport."

F. Verder onderhewig aan die nuut opgelegde voorwaarde, dat die Transportgewers die gesegde Gustav Peter Lutz en Stephanus Malan besigheid doende in vennootskap onder die firma naam LUTZ & MALAN, in aandele van twee derdes en eenderde respektiewelik alle Mineraleregte, in sover dit nie reeds deur die Staat gereserveer is nie, reserveer onderhewig aan die volgende :-

"Die Transportgewers hou die reg van toegang tot die verkoopte gronde uit vir hulle-self en vir hulle werknemers vir alle prospekteermyn of delfbedrywighede; en vir die oprigting van alle masjienerie in verband daarmee, asook die reg op die gebruik van water uit die Blaauwskop Besproeiingsvoor vir sodanige bedrywighede vry van betaling. Die Transportgewers sal egter verplig wees om redelike vergoeding te betaal soos onderling ooreengekom te word vir skade aan die transportnemers se eiendom aangerig deur die prospekteer – myn – of delfbedrywighede, en ingeval die partye nie tot 'n ooreenkoms kan geraak omtrent die bedrag van vergoeding wat betaal moet word nie, sal hulle verplig wees om die saak aan arbitrasie te onderwerp in terme van die arbitrasiewette van tyd tot tyd van toepassing in die Kaap – provinsie."

Die volgende mineraleregte is aan die Kroon gereserveer in die Grondbrief van die gesegde plaas "Blaauwskop" uitgereik ten behoewe van J.H. van Niekerk op 17 November, 1893 (Kenhardt

Erfpagte Boek 1 Nr.14), voorwaarde V waarvan as volg lui :-

"V. That all rights to gold, silver and precious stones found or discovered at any time on or in the said land shall be reserved to the Crown, together with a right of ingress to and egress from any mines or works undertaken for mining or prospecting purposes by any person or persons authorised by the Commissioner, but subject always to the provisions of the Act No. 44 of 1887 or any other Act to be hereafter passed with regard to prospecting and mining for precious stones and minerals."

G. Onderhewig aan die endossement gedateer 20 Junie 1963 op Transportakte T 8791/1963, welke lees as volg :

"Sertifikaat van Minerale Regte Nr. 12/1963 uitgereik ingevolge Art 71 van Wet 47 van 1937, ten opsigte van alle minerale regte uitgesonderd goud, silwer en edelgesteentes wat aan die Staat gereserveer is."

H. Onderhewig verder aan die endossement gedateer 16.11.73 op die A/K afskrif, welke lees as volg :

"Endossement kragtens Artikel 31 (6) van Wet Nr. 47 van 1937 (soos gewysig).

'n Gedeelte van die eiendom hierin vermeld in para 2 groot ± .,2352 ha is onteien deur die Afdelingsraad Kenhardt kragtens Art 130 van Ord. 15/1952. Vide onteieningskennisgewing Nr.R/2/6 d.d. 29.5.71 geliasseer as onteienings caveat EX 489/72 planne in tweevoud geliasseer hiermee."

I. Onderhewig verder aan die endossement gedateer 16.11.73 op die A/K afskrif, welke lees as volg:

"Endossement kragtens Artikel 31(6) van Wet Nr 47 van 1937 (soos gewysig)

'n Ged van die eiendom hierin vermeld in para 2 groot 1,0746 ha is onteien deur die Afdelingsraad Kenhardt kragtens Art 130 van Ord 15/1952. Vide onteieningskennisgewing Nr R/2/6 d.d. 29.5.71 geliasseer as onteienings caveat EX 498/72 planne in tweevoud geliasseer hiermee.

J. Onderhewig aan die endossement gedateer 27.9.1984 op Transportakte T8791/1963, welke lees as volg :

"ENDOSSEMENT

Kragtens Akte van Transport T 48698/1984 hede gedateer is die Restant van die hierinvermelde eiendom geregtig op 'n serwituut pad 7 meter wyd oor Perseel 122 en Perseel 146 daar deur getransporteer die hele Noord Oostelike grens waarvan aangedui is op Kaart No.5382/1982 en 5349/1982 daaraan geheg deur die lyn A.B. onderskeidelik."

K. Verder onderhewig aan die endossement gedateer 24.9.1987 op Transportakte T8791/1963, welke lees as volg :

"RESTANT PARA 2.

Kragtens Transportakte T45713/1987 is die Restant van Ged. 3 van die Plaas Blaauwskop Nr. 36 geregtig op die volgende voorwaarde oor Perseel 95 Blaauwskop Nedersetting :

"Geen Handels – en Dranklisensies sal verkry, toegelaat of uitgeneem word sonder die skriftelike toestemming van die transportgewer of sy regsopvolgers nie."

soos meer volledig sal blyk uit gesegde Transportakte.

L. Verder onderhewig aan die endossement gedateer 24.9.1987 op Transportakte T8791/1963, welke lees as volg :

"RESTANT PARA 2.

Kragtens Transportakte T45715/1987 is die Restant van Ged.3 van die Plaas Blaauwskop Nr. 36 geregtig op die volgende voorwaarde oor Perseel 95 Blaauwskop Nedersetting :

"Geen handels- en dranklisensies sal verkry, toegelaat of uitgeneem word sonder die skriftelike toestemming van die transportgewer of sy regsopvolgers nie."

soos meer volledig sal blyk uit gesegde Transportakte.

M. Onderhewig verder aan die endossement gedateer 6 Desember 1988 op Transportakte T 8791/1963, welke lees as volg :

"(a) 'n ewigdurende serwituut van waterleiding (d.m.v. kanaal) oor 11,6800 ha.

(b) 'n ewigdurende serwituut van waterleiding (d.m.v. duikpyp) oor 1,2200 ha.

c) 'n ewigdurende serwituut van waterleiding (d.m.v. duikpyp) oor 2300 meter.

(d) 'n ewigdurende serwituut van waterleiding (d.m.v. 8 pypleidings) oor 9450 vierkante meter.

gesedeer aan REPUBLIEK VAN SUID-AFRIKA deur Akte van Sessie Nr K1147/1989."

N. Verder onderhewig aan die endossement gedateer 25 Mei 1990 op Transportakte T8791/1963, welke lees as volg :

"Kragtens T29320/90 is Para 2 hierin beskryf, geregtig op 'n padserwituutgebied soos aangetoon op onderverdelingskaart Nr.5424/89, oor perseel 150 Blaauws Kop Nedersetting, groot 16,9640 ha soos meer volledig sal blyk uit bovermelde transportakte."

O. ONDERHEWIG aan die voorwaarde dat bogemelde eiendom getransporteer word geregtig op 'n padserwituut 6 meter wyd oor die Restant van Gedeelte 3 van die Plaas Blaauws Kop Nr.36, geleë in die Kai ! Garib Munisipaliteit, Afdeling Kenhardt, Provinsie Noord-Kaap, Groot 392,8639 hektaar oor roetes soos deur die transportgewer aan die transportnemer uitgewys te word.

WESHALWE die komparant afstand doen van al die regte en titel wat

TRANSPORTGEWER

voorheen op genoemde eiendom gehad het, en gevolglik ook erken het dat hy geheel en al van die besit daarvan onthef en nie meer daartoe geregtig is nie en dat, kragtens hierdie akte, bogenoemde

TRANSPORTNEMERS

Hul opvolgers in titel of regverkrygendes, tans en voortaan daartoe geregtig is, ooreenkomstig plaaslike gebruik, behoudens die regte van die Staat en ten slotte erken dat die munisipale waardasie van die eiendom die bedrag van R19 177,00 (NEGENTIEN DUISEND EEN HONDERD SEWE EN SEWENTIG RAND) beloop.

TEN BEWYSE WAARVAN ek, genoemde Registrateur, tesame met die Komparant hierdie Akte onderteken en dit met die ampseël bekragtig het.

Onderteken, verly en met die ampseël bekragtig op die kantoor van die Registrateur van Aktes te Kaapstad op 15/8/2006

a/a.

In my teenwoordigheid

REGISTRATEUR VAN AKTES

ANNEXURE B: AUTHORISING DOCUMENTATION

BARZANI GROUP

info@barzanigroup.co.za
www.barzanigroup.co.za

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APPOINTMENT LETTER

MACROPLAN TOWN & REGIONAL PLANNERS

Date : 07 July 2020

To : **Macroplan Town & Regional Planners (Consultant)**
Represented by *Len Fourie*

From : **Barzani Development (Pty) Ltd (Employer)**
Represented by *Roelof van den Berg & Ian van der Westhuizen*

Reference: NC/21/2018/PP (Plangeni 500) / BD0027

RE: APPOINTMENT FOR TOWN PLANNING FOR THE PLANGENI (BLAAUWSKOP) 500 PROJECT

The Employer takes this opportunity to confirm that your company has been appointed for Town Planning for the Plangeni (Blaauwskop) 500 project as outlined hereunder. Should any of the provisions of this appointment letter contradict any provision of the Consultant's relevant quotation, the provision of this Appointment shall prevail. The provisions of the Appointment are as follows:

1. **Price and Scope**

   The Consultant is appointed for the scope as outlined hereunder at the following rates:

info@barzanigroup.co.za
www.barzanigroup.co.za

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3. Payment:

3.1 Claims will be submitted by the Consultant upon completion of the specific milestones.

3.2 Payments will be made 30 working days after the original signed invoices have been submitted in the prescribed format of the Employer.

3.3 Invoices should be submitted with the relevant proof of the completed action.

3.4 Claims will be e-mailed to nadine@barzanigroup.co.za.

3.5 Should any payment be made before the 30 working days as set out in Clause 3.3 above, same will not create any expectation of future payments being made on any date before the 30 working days have lapsed.

4. Conditions:

4.1 The work will commence one day after the last signature of this Appointment Letter.

4.2 The Contract amount is fixed.

4.3 No additional cost or extension of time claims will be awarded other than agreed upon by both parties.

4.4 No interest will be applied.

4.5 Price escalations will not be allowed.

4.6 All milestones (amounts), as set out in clause 1, is based on the amount of units. Should the amount of units decrease for whatsoever reason, the price per milestone will decrease proportionate to the amount of units.

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4.7 The Consultant agrees to the provisions as set out in the Non-Disclosure Agreement attached hereto.

4.8 The Consultant shall exercise reasonable professional skill, care and diligence in the performance of the professional Services.

4.9 The Consultant is an independent Consultant appointed as service provider by the Employer, for the Scope as mentioned in Clause 1 above.

4.10 The Consultant agrees to adhere to the following communication channels throughout the Appointment:

4.10.1 All communication regarding operational related activities and inspections will be sent to the Project Administrator.

4.10.2 All meetings conducted by the Consultant in the execution of the scope as detailed above will be recorded and the relevant minutes will be sent to the Project Administrator.

4.10.3 All correspondence sent by the Consultant to any other party, in the execution of the scope as detailed above, will be sent to the Project Administrator.

4.10.4 All correspondence regarding claims submitted by the Consultant, or the payment thereof, will be sent to the Employer's Debtors Division Manager.

4.10.5 The Consultant agrees to at all times comply with the relevant workflow of the Employer. The Employer will provide the relevant training to the Consultant as and when required.

4.10.6 The Consultant will at no time contact the client of the Employer directly without written consent from the Employer. Further the

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Consultant will not be entitled to conduct any 3rd party meetings without the Employer's Operations Manager's consent and knowledge.

4.11 The Parties agree that should the Consultant become aware, or should reasonably have become aware, that any portion of the scope required to be completed by the Consultant have been completed by another party, or not required to be completed for whatsoever reason, then the Consultant will not be entitled to remuneration applicable to the Consultant's scope for the specific portion. Should the Consultant become aware of the latter, the Consultant will immediately inform the Employer in writing.

4.12 The Consultant enters into this agreement on the strength that it has completed the relevant verification process and warrants that the abovementioned project is feasible to proceed with.

4.13 The Employer strictly reserves the right, and at its sole discretion, to terminate this Agreement with immediate effect if the Consultant fails meet the required standards as can reasonably expected from a professional Consulting establishment.

4.14 No latitude, extension of time or other indulgence which may be given or allowed by any party to the other parties in respect of the performance of any obligation hereunder, and no delay or forbearance in the enforcement of any right of any party arising from this agreement, and no single or partial exercise of any right by any party under this agreement, shall in any circumstances be construed to be an implied consent or election by such party or operate as a waiver or a novation of or otherwise affect any of the

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party's rights in terms of or arising from this agreement or estop or preclude any such party from enforcing at any time and without notice, strict and punctual compliance with each and every provision or term hereof.

4.15 No amendment, alteration, addition, variation or consensual cancellation of the Appointment or any provision contemplated herein shall be of any force or effect unless reduced to writing and signed by both parties.

4.16 This Appointment will be open for acceptance for a period of 7 working days, from the date of receipt of this Appointment Letter by the Consultant. Failing which the Employer reserves the right to withdraw this Appointment Letter without any prejudice to its rights.

Roelof van den Berg: _____ **Date:** 07/07/2020
CEO

Ian van der Westhuizen: _____ **Date:** 01/07/2020
MD

Herewith do we accept this appointment letter, together with all the terms and conditions

Date: _____

Consultant's Representative: _____

Signature: _____

ANNEXURE C: SG DIAGRAMS

SYE Meter		RIGTINGS-HOEKE		KOÖRDINATE Y Stelsel: WG 21° X		
		Konstante:		0.00		+3100 000.00
AB	734.70	303 52 42	A	- 9 892.14		+ 72 092.42
BC	669.50	33 52 57	B	-10 502.11		+ 72 501.97
CD	717.92	123 56 24	C	-10 128.87		+ 73 057.78
DE	275.68	204 06 30	D	- 9 533.26		+ 72 656.94
EF	13.72	209 01 40	E	- 9 645.87		+ 72 405.31
FG	19.22	214 58 00	F	- 9 652.53		+ 72 393.32
GA	365.47	218 43 10	G	- 9 663.54		+ 72 377.57
	Zoovoorby (10)		△	- 230.28		+ 70 921.70
	Curries Camp (63)		△	- 3 159.66		+ 74 376.52

L.G. No.
1197/2002
Goedgekeur
nms.
LANDMETER-GENERAAL
2002-11-20.

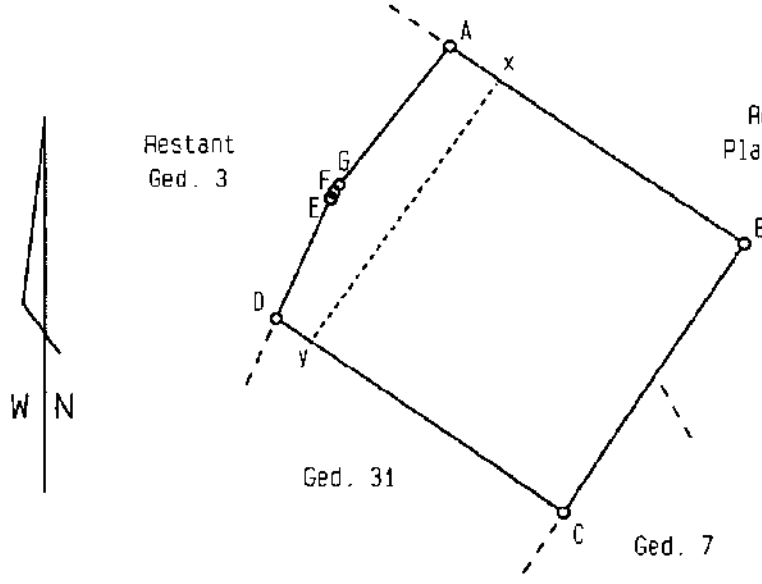
Wet 70/1970
Toestemming No: 36287
Datum : 30/8/2002

Wet 21/1940
Verwysing: L2.1.2.9.4
Datum 11/6/2002

Goedgekeur kragtens Artikel 49 van Wet No 7 van 1998 Noord-Kaap Beplanning en Ontwikkelings Wet
Verwysing: Restant Ged. 2 en 3 Plaas Blauws Kop ~~No~~ 36
Datum : 5/6/2002

Beskrywing van bakens

A, C, D : Ysterpaal
B : Ysterhoekdraadpaal
E, F, G : Houthoekdraadpaal



Skaal 1: 15000

Die figuur
A B C D E F G
stel voor 50.0020 hektaar grond, synde

Gedeelte 30 (gedeelte van Gedeelte 29) van die Plaas Blauws Kop No 36
geleë in die Administratiewe Distrik Kenhardt
Provinsie Noord-Kaap

Opgemeet in Julie tot Augustus 2002 deur my

PLS0680 J L N van Zyl
Professionele Landmeter

Hierdie kaart is geheg aan No. ged. t.g.v. Registrateur van Aktes	Die oorspronklike kaart is L.G. No. 1196/2002 Transport Grondbrief	Lêer KNHD36 M.S. 466/2002 A.P. Komp. GK-5 (5601) GK-5CAU (5613)

ANNEXURE D: SERVICES REPORTS

PLANGENI TOWNSHIP

KEIMOES

ELECTRICAL SERVICES REPORT

HEYNS VAN ROOYEN
CONSULTING ELECTRICAL ENGINEERS

P.O. BOX 1128
KIMBERLEY
8301
TEL: 053 831 1609
FAX: 086 503 5564

K0659
REVISION C
FEBRUARY 2021

Document Control

Version	Date	Comments
A	21/09/2020	Issued for Comment
B	24/11/2020	Issued for Comment
C	26/02/2021	Incorporate comment after meeting in Keimoes

	Prepared By:	Approved By:
Name	AJ Jooste	AJ Jooste
Date	26/02/2021	26/02/2021
Signature		

Abbreviations

A	Ampere
ABC	Air Bundle Conductor
ADMD	After Diversity Maximum Demand
DMRE	Department of Mineral Resources and Energy
IDP	Integrated Development Plan
INEP	Integrated National Electrification Programme
kV	Kilovolt
kVA	Kilovolt Ampere
LV	Low Voltage
MV	Medium Voltage
MVA	Megavolt Ampere
SP	Single Phase
TP	Three Phase
V	Volt

Table of Contents

Introduction

This Electrical Services Report focusses on the electrical requirements and capacity for the establishment of a new township approximately 15km from Keimoes called Plangeni. The township will consist out of 500 stands and is meant for low income housing. The site is also known as the Blaauwskop property.

The 50ha area is located in the Kai !Garib Municipality that forms part of the ZF Mgcawu District Municipality within the Northern Cape.

Coordinates:
28°40'7.99" S
21°6'8.95" E

Information provided by the town planner and Eskom were used in the compilation of this report.

Current Situation

The area where the township is to be established is currently not serviced. An Eskom MV line runs to the site and supplies a municipal high mast light.

The Kai !Garib Municiality is the electrical distribution authority in Keimoes.

Eskom is the distribution authority in the area where the township is planned.

Demand Calculation

The electrical demand calculation for the proposed development is based on a value per stand known as After Diversity Maximum Demand (ADMD). This value is determined by the economic class of households that are planned to occupy the area.

The low income households planned for this area within an Eskom reticulated area is calculated at 1.3 kVA ADMD. This value is determined based on actual demand registered in historic developments by Eskom. Keeping this value per stand realistic ensures that infrastructure and capacity is used prudently and economically and services the maximum amount of people based on their actual needs.

A further 0.9 diversity is applied on the primary side of the transformer to calculate the load connected on the MV side of the Eskom network.

Given the above, the proposed Plangeni Township is estimated to require 585 kVA on the Eskom network once fully occupied.

Availability of Capacity

As stated previously, Eskom is the distribution authority in this area.

Eskom has a MV line (on the Oasis-Keimoes Feeder) that stops just outside of the currently built stands. This MV line supplies a small pole mounted transformer that supplies LV power to a high mast light.

Current investigation by Eskom has indicated that this line does not have capacity to sustain the proposed development. There is a MV line 6 km away from the site that would have to be used to supply the township.

Preliminary investigation indicated that voltage on this line would fall below the 95% voltage level limit if the township is added. To correct this problem, a voltage regulator would be needed on the line to increase the voltage and facilitate the addition of the township. The exact placement of the voltage regulator on the MV line will be determined during detail design by Eskom.

Existing Overhead Line

An existing Eskom overhead line runs along the boundary of the settlement and only provides power to the single high mast light. A servitude is registered along this line's route which directly impacts the registration of houses within the servitude – A few houses are impacted.

	
Photo 1: Overhead line running on the boundary of the settlement. Houses along this route are impacted by restrictions due to servitude.	Photo 2: Pole mounted transformer with the high mast light in the background.

Eskom was engaged on this matter. Once the settlement has been reticulated with the new planned electrical infrastructure, the high mast light will be fed from the new infrastructure. The existing line will then be removed at no cost to the municipality. The limitations due to the line and servitude can then be removed.

The line T-off from the Eskom line running along the R359, but the problematic section is from pole OE190-6 to pole OE190-9.

Funding

Eskom has indicated that this project will follow the normal funding route as with most of their reticulation projects.

Eskom applies to Department of Mineral Resources and Energy (DMRE) for Integrated National Electrification programme (INEP) funding. Eskom, together with all municipalities, request funding from DMRE for their projects that fall within either bulk infrastructure or reticulation category. The department divides their funding between municipalities and Eskom based on the different entities' historic spending on budgets and targets reached. The end goal is to facilitate the connection of more households.

This is however a long process. From preparing the submission, DMRE consideration of the projects, allocation of funding and the actual pay out for work to be done can take a few years. This excludes the actual construction work. Another factor that can influence the timeframe is how this development fits in within the current Eskom project pipeline. At this point, Plangeni is not in the three year planning cycle since the township does not formally exist yet.

Eskom is responsible for including this development within their funding application to DMRE.

As with all these applications and the eventual funding allocation, only a certain percentage of the required funding is normally received. This means that the Plangeni project might likely be funded over a number of years unless prioritised by Eskom.

The estimated costs are as follows:

Item	Cost (excl. VAT)
Voltage Regulator	R2 750 000.00
Bulk MV Line	R1 500 000.00
Internal Reticulation	R9 250 000.00
Total	**R13 500 000.00**

Integrated Development Plan

This township's electrical reticulation needs to appear on the Integrated Development Plan (IDP) of the municipality. INEP only funds projects that have been through the IDP process and have been deemed important enough.

The municipality will therefore need to have this township incorporated into their IDP as soon as possible after the township has been established.

Design & Construction

Eskom's Cape Town engineering department will handle the design of the reticulation network including the bulk services.

After funding has been secured from INEP, the construction will take place. This process is normally done by Eskom's own construction teams or a contractor appointed by Eskom.

The current layout of the proposed township is shown below.

The reticulation will be done overhead on tar poles placed in the streets – Street front and not mid-block methodology. Open MV conductor lines connected to pole mounted transformers placed as per the detail design. Air Bundle Conductor (ABC) will be used to distribute low voltage from the transformer and connect to pole top boxes that services a few houses. From here airdac will be installed to the individual houses before being connected to the readyboard on the inside of the house. The requirement of kicker poles at the individual houses will be determined by the designer to ensure

the airdac does not hang too low and whether the housing structure can support the tension in the conductor.

Metering will be prepaid and the backend system will be managed by Eskom. This also means that tariffs paid by the residents will be that of Eskom.

Maintenance of the electrical network in the township, included the bulk infrastructure, will be done by Eskom.

Administrative

The following are the steps to be taken:

- Application to Electrify
  The Kai !Garib Municipality will write a letter to Eskom requesting that the utility supply the new township with electricity. After this, Eskom begins the process of incorporating the township in their long term planning, funding, etc.

- Update the IDP
  The municipality will have to go through the process to have the IDP updated and incorporate the proposed township.

- NERSA License
  Eskom will apply to NERSA to have their supply area expanded to include the new township. *The municipality will have to indicate that they do not intend of supplying this area on their own and forms part of the letter sent by the municipality to Eskom.*

Conclusion

It is the conclusion of this services report that:

- Eskom will be the supply authority for the proposed township.
- The township can be supplied with electricity by Eskom given available capacity.
- The bulk services can be installed from the Eskom MV line to the township about 6 km away. A voltage regulator will have to be installed to ensure the voltage does not fall below the voltage limit of the MV line.
- No problems are foreseen that can hamper the supply of electricity to the proposed township.
- A few key administrative processes will have to be concluded by the municipality before Eskom can take the process further.
- All costs needed to supply electricity to the proposed township can be funded through INEP.
- The existing overhead line will be decommissioned and removed once new electrical infrastructure has been built.

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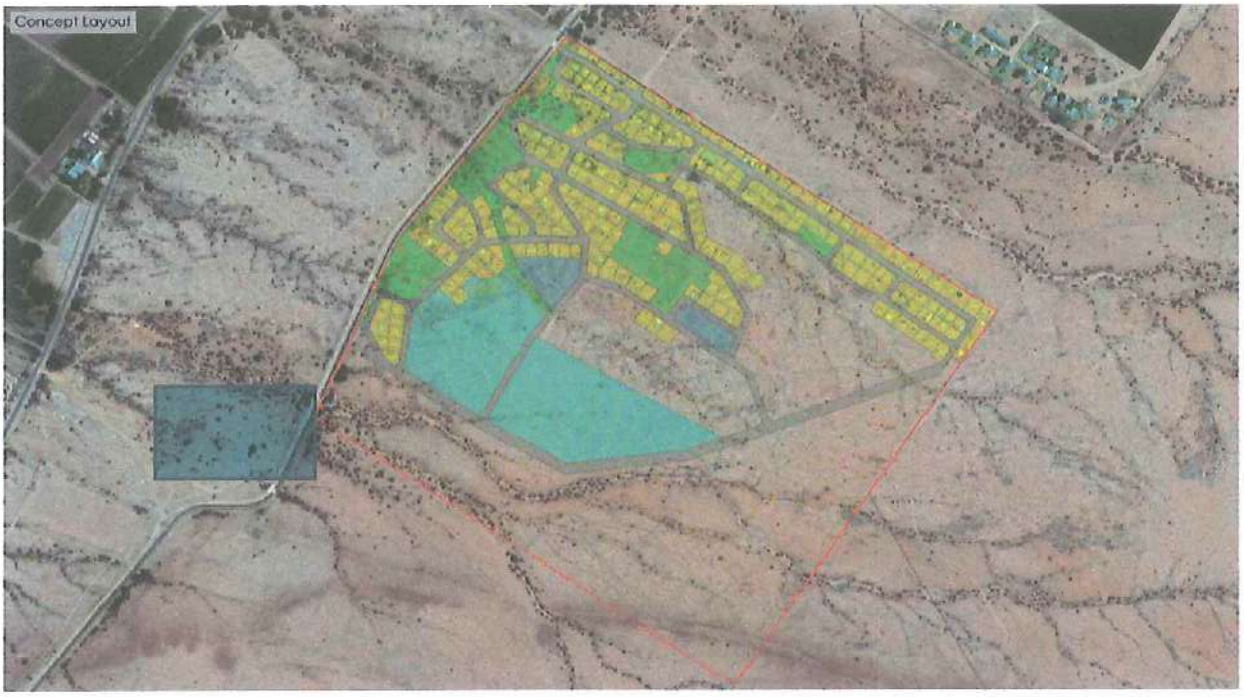
082 578 0860

KAI! GARIB MUNICIPALITY



PLANGENI

CIVIL ENGINEERING SERVICES REPORT

SK3393

Prepared for:

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FEBRUARY 2021

INDEX

Table of Contents

1. INTRODUCTION

The Barzani Group, on behalf of COCHSTA, appointed Mr Len Fourie of Macroplan in Upington to produce the plans and lay-out of several townships along the Lower Orange River, from Groblershoop to Keimoes and surrounds. The Plangeni settlement on the southern bank of the Orange River to the east of Keimoes and surrounds. The Plangeni settlemenmt on the southern bank of the Orange River to the east of Keimoes is one such development.

Macroplan appointed Stabilis Development (Pty) Ltd for the required Civil Engineering Services information.

2. BACKGROUND

Consideration is being given to the development of a new township, consisting of low-income housing, at Portion 30 of Farm Blaauwskop No. 36, Blaauwskop Settlement, Kenhardt Road, Kai !Garib Municipality, ZF Mgcawu District Municipality, Northern Cape.

The applicant is Kai !Garib Local Municipality who will undertake development responsible should it be approved.

The Coordinates for the proposed development are as follow:

Point	Coordinates
A	28°39'52.13S 21°05'50.89"E
B	28°40'10.69S 21°05'50.89"E
C	28°40'23.81S 21°06'12.90"E
D	28°40'05.51S 21°06'26.80"E

The locality drawings is attached as annexure A.

3. PURPOSE OF REPORT

The purpose of this report is to assist the application to register a township on the land for the planning of 500 residential sites. The absence of civil engineering services and possible development solutions for services are provided. The estimated development cost will be provided. The development of the land as a township will be done under the authority of Kai !Garib Local Authority.

4. GEOLOGY OF AREA

Very hard granite outcrops are visible on a large portion of the area. The granite is known as "Kanon Eiland Granite". The area is stable for house foundations, but the construction of underground services are expensive. The high percentage of hard rock excavation inflates the cost of services.

5. VEGETATION

The proposed site for the residential development is partly developed and has some natural vegetation present. According to the Vegetation map of South-Africa, Lesotho and Swaziland vegetation type is expected to be Bushmanland Ari. Bushmanland Arid Grassland is not considered threatened vegetation.

6. CLIMATE

Keimoes, the closest locality to Blaauwskop with on-line climate data, receives only 154mm of rain annually, which leaves the area semi-arid. The rainfall is entirely inadequate for growing crops. The large scale agriculture in the district is for all its needs dependant on irrigation out of the Orange River. Most of the rain is during summer. Rainfall often occurs in late afternoon sudden and violent electric thunder storms. Rainfall is highly variable, with occasional high rainfall events, perhaps once in a couple of years. Droughts are common, with dry periods lasting for years. The summers are hot and dry, with midday temperatures often more the 40° centigrade.

7. CIVIL ENGINEERING SERVICES

7.1 BULK SERVICES SUPPLY

The proposed development will require authorization under the National Water Act (Act no. 36 of 1998) to abstract water from the Orange River. The Department of Water and Sanitation, who administer the Act, will require an application. Include in the application an EIA for the construction work on the banks of the river will be required.

7.1.1 Water supply

No substantial bulk infrastructure exist for the proposed development.

The area is located next to an irrigation canal and 2,5km from the Orange River. The capacity of the irrigation canal is insufficient for the supply of sufficient raw water to the proposed development and the irrigation farmers. The canal is also each alternative 14 days "downtime".

The only sustainable abstraction will be from the Orange River. Servitudes over private owned land will be required.

7.1.2 External water demand

The external raw water demand will be calculated according to the standards supplied in" Guidelines for Human Settlements Planning and Design". The base of the information for the calculations are as follow:

- Proposed sites planned: 500
- Average household size: 4,8
- Population growth rate: 1%

- Planning period: 20 years
- Current population: 2400
- Future population: 2928
- Demand per person: 80ℓ/day

The demand calculation are as follow:

- Domestic demand 238,56 m³/day
- Municipal use and losses 15% 35,78 m³/day
- 20% over supply for external infrastructure 54,87 m³/day
- Purification losses 5% 16,46 m³/day
- **Total** **345,67 m³/day (350 m³/day)**

7.1.3 Purification and water storage

A purification plant with capacity of 350 m³/day is required for the proposed township. Water storage capacity will be based on the following:

- Ground water storage 72 hours
- Elevated storage 8 hours

The calculated storage to be provided is as follow:

- Ground storage 1050m³
- Elevated storage for peak demand 117m³

7.1.4 Domestic water distribution

For the design of the water distribution network the following principles will be applicable:

- PVC class 10 pipes
- Ring feeders must be maintained
- Minimum pressure under peak demand – 10m
- Peak factor – 4
- Underground network with a minimum cover on pipes of 600mm
- Maximum water velocity under peak demand conditions – 1m/s

7.1.5 Water demand management

The current water management policy of Kai !Garib Municipality will be implemented for the development. Each site will be supplied with a water management device. Free basic water will be supplied to the site until a consumption of 6m³ per month is reached. Slow supply of water will be available after 6m³ consumption until the end of the month or if additional water supply is purchase.

7.2 SANITATION

No sanitation infrastructure exists. Currently no policy is applied to the area because the formal planning is not completed.

The proposal for handling of waste water are:

- Grey water to be disposed on site
- Black water to be disposed on site utilizing VIP's or double put toilets.
- Septic tanks may be constructed, but the service cost of the tanks will be very expensive. The nearest waste water plant from Plangeni is Keimoes, 40km. Serious pressure will be put on the vacuum trucks of the municipality to accommodate the additional work. An additional vacuum tank will be required by the municipality.

7.3 ACCESS TO LAND

Access to the area is from a provincial road, R359 between Upington and Kakamas. The access road to the proposed residential area is provided with an interlocking paved road.

7.4 INTERNAL ROADS

The internal streets of the area will be graded gravel streets. The storm water run-off will be accommodated in the streets. Collector streets will be improved to supply a permanent surface (black or paved)

7.5 STORM WATER

The three drainage lines on the proposed area are mostly dry, with water only during rains and perhaps shortly thereafter. During the odd thunder storm, drainage lines can come down in flood. Because rainfall events are far apart, the flooding drainage lines is not an obstacle for the proposed development. Only two of the sub-catchments areas (no. 2 and 3) have an influence on the development of the residential area.

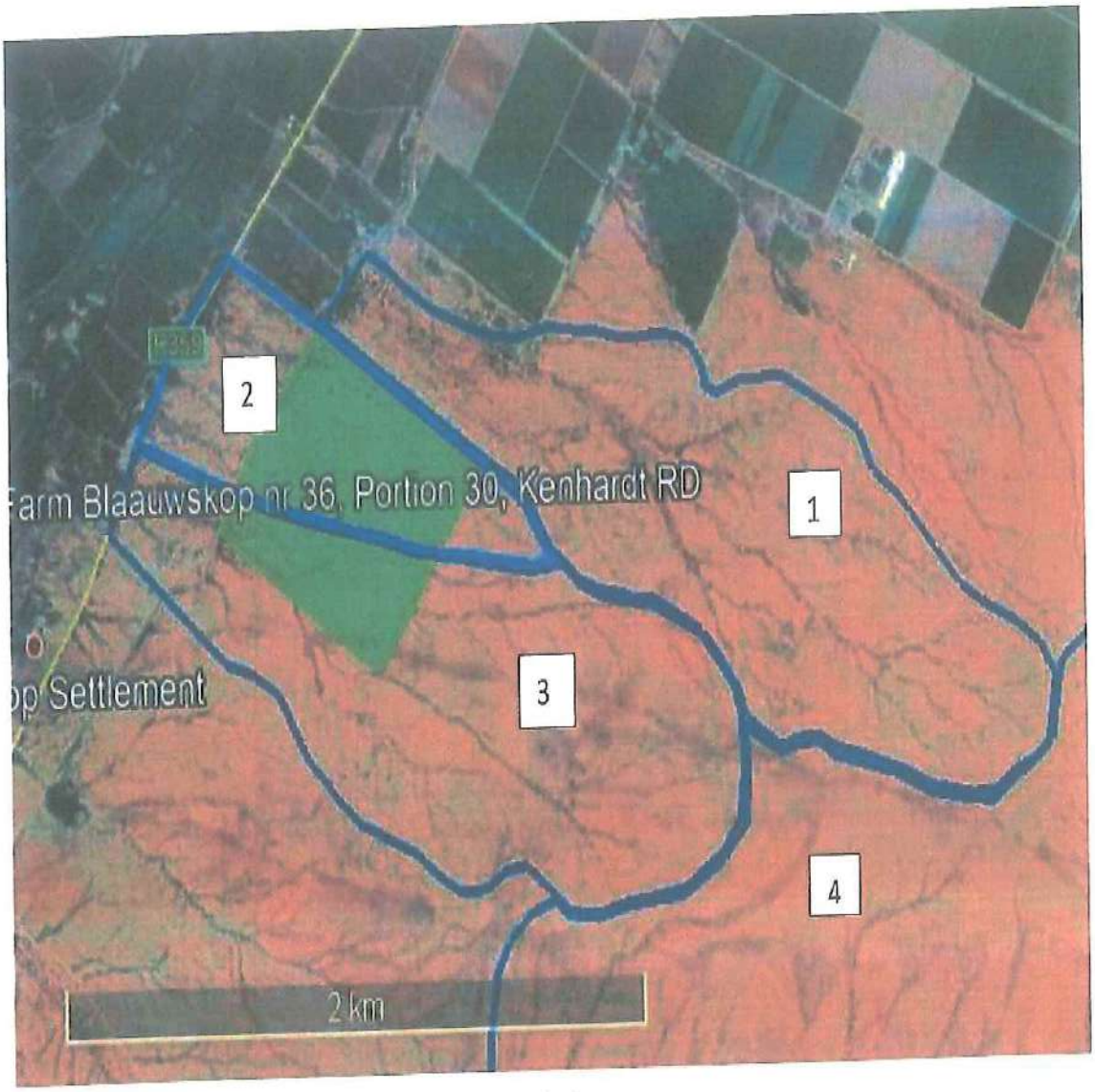


Figure 8 Catchment areas

+

No.	Area Ha	Circumference km	Highest Point masl	Lowest Point masl	Distance km	Slope
1	156	6.6	818	776	2.9	1.45
2	145	5.7	776	769	1.6	0.43
3	62	3.8	809	770	2.45	0.02
4	89380	153	1021	758	55	>0.01

The slope of sub-catchment 2 and 3 are only 0,02 to 0,43m drop over 100m. This slope ensure a run-off with a low velocity

The drainage lines pass over the irrigation canal with concrete slabs at each crossing. The run-off do not enter the canal. The town planning layout must accommodate the run-off lines. The storm water will be accommodated in the streets. This proposal will

ensure that no damage to private property will occur after heavy down poor. Additional storm water crossings over the canal are not foreseen.

7.6 SOLID WASTE REMOVAL

Kai !Garib Municipality did complete a feasibility study for the upgrading, development and application for permits from the Department of Water and Sanitation for solid waste removal sites. This process of upgrading is incorporated in the IDP of the municipality. Funding for the projects is from the MIG programme.

At Plangeni a small transfer facility will be required. Until this facility is established, all solid waste must be transported to the site in Kakamas. This site is the nearest facility with a permit.

7. GRAVEYARD

The town planning process will indicate a location for a graveyard. The development of the graveyard will be funded from the MIG programme after a permit for the site is received.

8. DEVELOPMENT STRATEGY AND COST

The provision of services for the Plangeni development is the responsibility of Kai !Garib Municipality. The proposed civil engineering services of the area will be incorporated in the IDP of the municipality. The IDP is updated each year, after negotiations with all communities in the jurisdiction area of Kai !Garib Municipality, the poverty for provision will contribute towards the timeless development of Plangeni.

The provision of services to address the backlog is done according to a three year development plan, compiled according to the yearly allocation to the municipality through the MIG programme. Funding from a different source will contribute towards the funders development of Plangeni.

A cost indication for the backlog in civil engineering services at Plangeni are as follow:

- External water supply	R 3 858 230.00
- Water purification and storage	R 6 950 000.00
- Water network	R 3 162 500.00
- Site connections with management device	R 2 012 500.00
- Streets and storm water	R 2 415 000.00
- Solid waste transfer site	R 850 000.00

- Graveyard development	R 2 500 000.00
	R 21 748 250.00
- VAT 15%	R 3 262 327.52
- **TOTAL**	**R 25 000 000.00**

9. EMERGENCY SERVICES

Households are already occupied sites on the area. Permanent and temporary structures are erected. The municipality was transporting potable water to the people over a distance of 10km. The potable water was stored in 5 000ℓ plastic tanks.

An emergency water supply and distribution project is currently under construction. The information of the project is as follow:

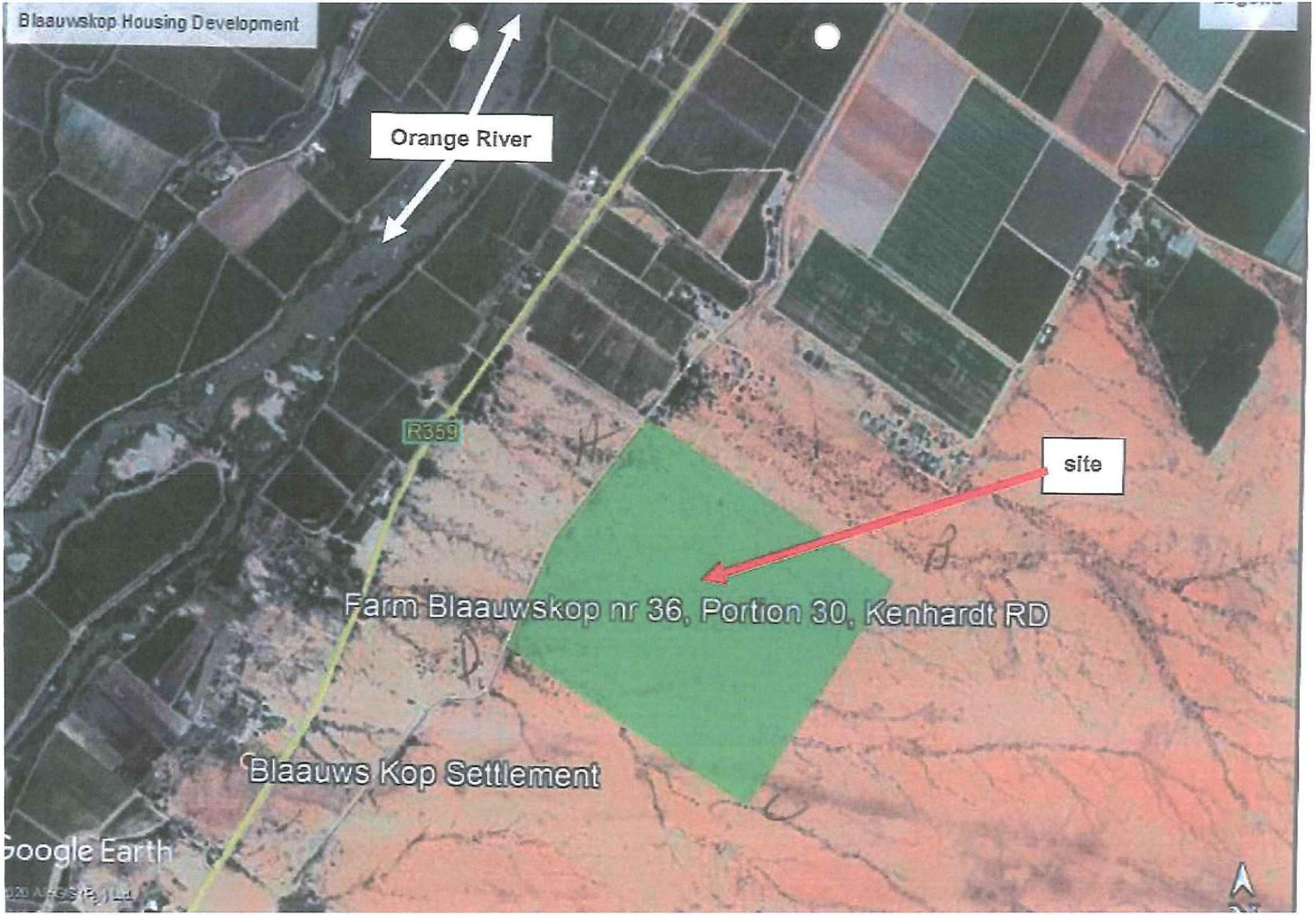
- Project no.:	MIG –SMIF/NC0691/W/2020
- Project amount:	R 2 848 369.25
- Water distribution network:	2646m of uPVC piping
- 5000ℓ tanks with standpipes:	15
- Water purification plant (Existing plant relocate from Bloemsmond:	1
- Raw water pump from irrigation canal:	2

J.H.C. THERON Pr. Eng.
STABILIS DEVLOPMENT (PTY) LTD

1. 3. 2021
DATE

ANNEXURE A

LOCALITY


Blaauwskop Housing Development
Orange River
R359
site
Farm Blaauwskop nr 36, Portion 30, Kenhardt RD
Blaauws Kop Settlement
Google Earth

ANNEXURE B

SLOPE OF AREA

SN 3393

KAI IGARIB MUNICIPALITY
CONCEPT TOWNSHIP ESTABLISHMENT

Design:	JP Theron (Pr. Pln. A/2394/2016)
Drawn:	JP Theron (Pr. Pln. A/2394/2016)
Date:	August 2020
Scale:	1:2000 (A1)

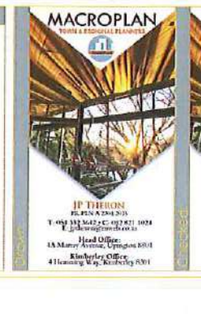
Plan:
Concept Layout Plan
(DWG.TE) 200825 Braauwskop/ Plangeni

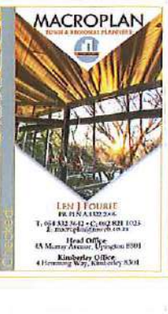
Proposed Land Uses in terms of Land Use Management System

Colour & Numbers	Land Use Description	Total Units	Schedule of Sizes	Colour & Numbers	Land Use Description	Total Units	Schedule of Sizes
	Open Space Zone I				Undetermined Zone		
	Open Space Zone II	26			Business Zone I		
	Open Space Zone III				Business Zone II		
	Agricultural Zone I				Business Zone III		
	Agricultural Zone II				Business Zone IV		
	Resort Zone II				Business Zone V		
	Residential Zone I	501			Business Zone VI		
	Residential Zone II				Industrial Zone I		
	Residential Zone III				Industrial Zone II		
	Residential Zone IV				Industrial Zone III		
	Residential Zone V				Industrial Zone IV		
	Residential Zone VI				Utility Zone I		
	Institutional Zone I	1			Utility Zone II		
	Institutional Zone II	3			Utility Zone III		
	Institutional Zone III				Transport Zone I		
	Authority Zone I				Transport Zone II		
	Authority Zone II				Transport Zone III		
	Special Zone			Total:		530	

Additional Information:

Contours	
Pipeline	
Sewerage Line	
Powerlines	
Buildings	
High Voltage Powerlines	





Municipality:

KAI IGARIB
Postal Address:
Private Bag X6
Kakamas
8870
Tel No: 054 461 6700
Fax No: 054 461 6401

Client:

COGHSTA

ANNEXURE E: DETAIL LAYOUT

KAI !GARIB MUNICIPALITY
TOWNSHIP ESTABLISHMENT
LAYOUT

Design:	JP Theron (Pr. Pln. A/2394/2016)
Drawn:	JP Theron (Pr. Pln. A/2394/2016)
Date:	November 2020
Scale:	1:1500 (A0)

Plan nr:

Concept Layout Plan 3
(DWG:TE) 201125 Blaauwskop/ Plangeni

Proposed Land Uses in terms of Land Use Management System:

Colour & Numbers	Land Use Description	Total Units	Schedule of Sizes: average size per erf	total area covered by land use	percentage of study area covered by use
	Open Space Zone I				
	Open Space Zone II	22			
	Open Space Zone III				
	Agricultural Zone I				
	Agricultural Zone II				
	Resort Zone II				
	Residential Zone I	500			
	Residential Zone II				
	Residential Zone III				
	Residential Zone IV				
	Residential Zone V				
	Residential Zone VI				
	Institutional Zone I	2			
	Institutional Zone II	1			
	Institutional Zone III				
	Authority Zone I	1			
	Authority Zone II				
	Special Zone				

Colour & Numbers	Land Use Description	Total Units	Schedule of Sizes: average size per erf	total area covered by land use	percentage of study area covered by use
	Undetermined Zone				
	Business Zone I	3			
	Business Zone II				
	Business Zone III				
	Business Zone IV				
	Business Zone V				
	Business Zone VI				
	Industrial Zone I				
	Industrial Zone II				
	Industrial Zone IV				
	Industrial Zone IV				
	Utility Zone I				
	Utility Zone II				
	Utility Zone III				
	Transport Zone I	1			
	Transport Zone II				
	Transport Zone III				
	Total:	530			

Addisional Information:

Contours	
Pipeline	
Sewerage Line	
Powerlines	
Buildings	
High Voltage Powerlines	
Powerline Servitude	

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COGHSTA
Department:
CO - OPERATIVE GOVERNANCE
HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS
NORTHERN CAPE

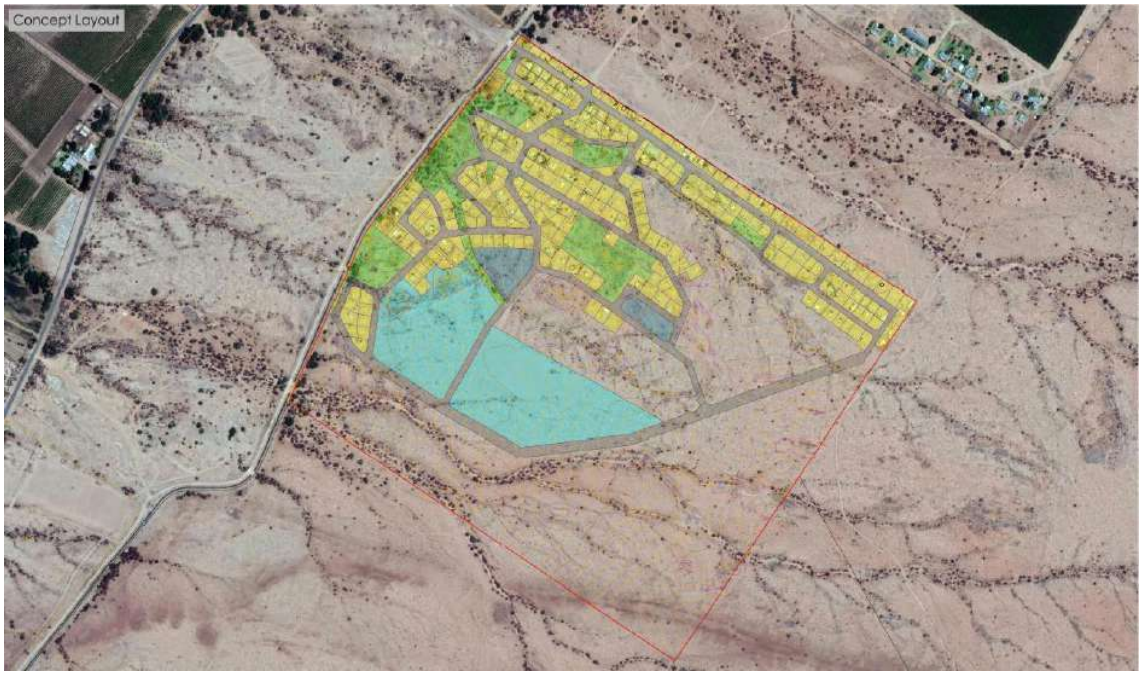
ANNEXURE F: BOTANICAL ASSESSMENT

PB CONSULT
ENVIRONMENTAL MANAGEMENT SERVICES

BOTANICAL ASSESSMENT

BLAAUWSKOP SETTLEMENT LCH

PROPOSED FORMALIZATION AND DEVELOPMENT OF 500 ERVEN ON PORTION 30 OF THE FARM BLAUWS KOP NO. 36, UPINGTON KAI !BLAAUWSKOP LOCAL MUNICIPALITY,NORTHERN CAPE PROVINCE



24 August 2020

P.J.J. Botes (Pr.Sci.Nat: 400184/05)

Registered Professional Botanical, Environmental and Ecological Scientist

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7280

Cell: 082 921 5949
Fax: 086 611 0726
Email: peet@pbconsult.co.za

EXECUTIVE SUMMARY

VEGETATION TYPE

Bushmanland Arid Grassland

Classified as "Least Threatened" (GN 1002, December 2011) although statutory conservation targets have not yet been met.

VEGETATION ENCOUNTERED

The site supported a very dry version of Bushmanland Arid Grassland vegetation, with a slightly denser and higher shrubland / small tree layer next to few drainage lines. Species diversity was very low and most of the veld had been impacted by the recent drought, reducing many of the plant species to dried-out shrubs. The proposed activity is expected to result in a permanent transformation of approximately 35 ha of land, of which approximately about 23 are already settled / disturbed.

CONSERVATION PRIORITY AREAS

According to the Northern Cape CBA maps the proposed site falls within a CBA area. However, there is no alternative on the property that will not impact on the CBA. It must also be taken into account that about 23 ha of the site has already been impacted by informal settlement.

The site will not impact on any recognised centre of endemism.

CONNECTIVITY

The transformation will not add significantly to the existing impact on connectivity and will not add to the impact on the surrounding area, where connectivity will remain the same.

LAND-USE

The footprint is on municipal land which had already been impacted by informal settlement. Just less than 50% of the footprint is disturbed or already settled. The remainder of the property is natural veld, grazed by livestock of the local inhabitants.

PROTECTED PLANT SPECIES

The most significant botanical aspect of this site is the presence of the nationally protected *Vachellia erioloba* and Sheppard trees (*Boscia albitrunca*) (refer to Table 2). In addition a number of Northern Cape Nature Conservation Act, protected species (Refer to Table 3) were also observed.

MAIN CONCLUSION

The proposed application is for the formalization of a settlement that has already been impacted by informal settlement. The activity is expected to result in a permanent transformation of approximately 35 ha of land, of which approximately about 23 are already settled. The site overlaps an identified critical biodiversity area (according to the 2016, Northern Cape Critical Biodiversity Areas maps). In addition, protected Camel Thorn (*Vachellia erioloba*) and Sheppard trees (*Boscia albitrunca*), and a number of Northern Cape Nature Conservation Act, protected species were observed within the footprint.

According to the impact assessment given in Table 6 the development is likely to result in a **Medium-Low** impact, which can be reduced to a **Low** impact with good environmental control during construction.

With the correct mitigation it is unlikely that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity.

WITH THE AVAILABLE INFORMATION IT IS RECOMMENDED THAT PROJECT BE APPROVED, WITH THE PROPOSED MITIGATION ACTIONS.

NO-GO OPTION

The No-Go option is not likely to result in a "no-impact" scenario, as constant slow degradation is expected to continue as a result of urban activities and poor management of the site.

There is also an urgent need for the establishment of additional residential erven in the Municipality, which is likely to outweigh the No-Go option.

INDEPENDENCE & CONDITIONS

PB Consult is an independent entity with no interest in the activity other than fair remuneration for services rendered. Remunerations for services are not linked to approval by decision making authorities and PB Consult have no interest in secondary or downstream development as a result of the authorization of this proposed project. There are no circumstances that compromise the objectivity of this report. The findings, results, observations and recommendations given in this report are based on the author's best scientific and professional knowledge and available information. PB Consult reserve the right to modify aspects of this report, including the recommendations if new information become available which may have a significant impact on the findings of this report.

RELEVANT QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Mr Peet Botes holds a BSc. (Hons.) degree in Plant Ecology from the University of Stellenbosch (Nature Conservation III & IV as extra subjects). Since qualifying with his degree, he had worked for more than 20 years in the environmental management field, first at the Overberg Test Range (a Division of Denel) managing the environmental department of OTR and being responsible for developing and implementing an ISO14001 environmental management system, ensuring environmental compliance, performing environmental risk assessments with regards to missile tests and planning the management of the 26 000 ha of natural veld, working closely with CapeNature (De Hoop Nature Reserve).

In 2005 he joined Enviroscientific, an independent environmental consultancy specializing in wastewater management, botanical and biodiversity assessments, developing environmental management plans and strategies, environmental control work as well as doing environmental compliance audits and was also responsible for helping develop the biodiversity part of the Farming for the Future audit system implemented by Woolworths. During his time with Enviroscientific he performed more than 400 biodiversity en environmental legal compliance audits.

During 2010 he joined EnviroAfrica in order to move back to the biodiversity aspects of environmental management. Experience with EnviroAfrica includes NEMA EIA applications, environmental management plans for various industries, environmental compliance audits, environmental control work as well as more than 70 biodiversity & botanical specialist studies.

Towards the end of 2017, Mr Botes started his own small environmental consulting business focusing on biodiversity & botanical assessments, biodiversity management plans and environmental compliance audits.

Mr Botes is a registered Professional Botanical, Environmental and Ecological Scientists at SACNASP (South African Council for Natural Scientific Professions) as required in terms of Section 18(1)(a) of the Natural Scientific Professions Act, 2003, since 2005.

DECLARATION OF INDEPENDENCE

THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I Petrus, Jacobus, Johannes Botes, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- 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 NEMA, the Environmental Impact Assessment Regulations, 2014, as amended, and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have 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 NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2014 (specifically in terms of regulation 13 of GN No. R. 326) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 13 of GN No. R. 326.

Note: The terms of reference must be attached.

Signature of the specialist:

PB Consult (Sole Proprietor)

Name of company:

24 August 2020

Date:

CONTENTS

LIST OF TABLES:

LIST OF PHOTOS:

1. INTRODUCTION

Blaauwskop Settlement is a small settlement on Portion 30 (a portion of portion 29) on the Farm Blauws Kop Nr. 36 (50.002 ha in size). The property is located just off the R359 (Blaauwskop road). The Kai !Garib Local Municipality wishes to formalize the existing settlement through the rezoning and subdivision of 500 Erven for low cost housing, which will include associated infrastructure such as water, electricity, sewage and solid waste removal.
Macroplan has been appointed by the Barzani Group as Town and Regional Planners to manage the town planning process in terms of SPLUMA (Act 16 of 2013).

The proposed project will trigger listed activities under the National Environmental Management Act, (Act 107 of 1998) (NEMA) and the EIA regulations (as amended). As result EnviroAfrica was appointed to perform the NEMA EIA application and PB Consult was appointed to conduct a botanical assessment of the proposed sites, which, although disturbed in some areas, still supports natural vegetation.

The proposed footprint is expected to all within the vegetation type known as Bushmanland Arid Grassland. Bushmanland Arid Grassland is considered "Least Threatened" in terms of the National list of ecosystems that are threatened and in need of protection). Desktop studies shows that the site overlaps a terrestrial critical biodiversity area (CBA1) as identified in the 2017 Northern Cape Biodiversity Spatial Plan.

The vegetation encountered within the proposed footprint was a dry and degraded (e.g. grazed & urban related impacts) version of Bushmanland Arid Grassland. A number of drainage lines drain the landscape towards the Orange River. Some of these drainage lines were in good condition (away from the existing settlement) and some in very poor condition (used for dumping of household waste). As is typical the drainage lines supported a larger shrub / small tree vegetation type.

1.1. TERMS OF REFERENCE

The terms of reference for this appointment were to:

- Evaluate the proposed site(s) in order to determine whether any significant botanical features will be impacted as a result of the proposed development.
- Determine and record the position of any plant species of special significance (e.g. protected tree species, or rare or endangered plant species) that should be avoided or that may require "search & rescue" intervention.
- Locate and record sensitive areas from a botanical perspective within the proposed development footprint that may be interpreted as obstacles to the proposed development.
- Make recommendations on impact minimization should it be required
- Consider short- to long-term implications of impacts on biodiversity and highlight irreversible impacts or irreplaceable loss of species.

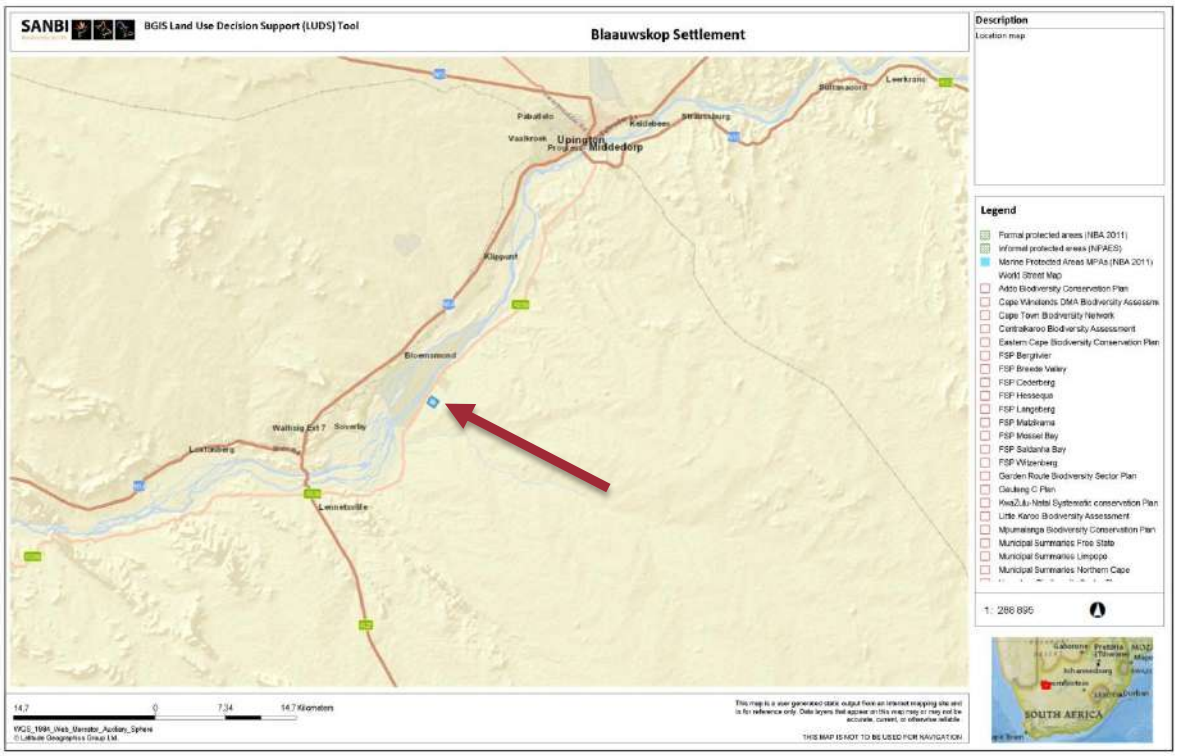
2. STUDY AREA

2.1. LOCATION & LAYOUT

Blaauwskop is located near Kanoneiland, just south of the R359, between Raaswater and Lennetsville, about 30 km south west of Upington (to the south of the Orange River) in the Kai !Garib Local Municipality of the

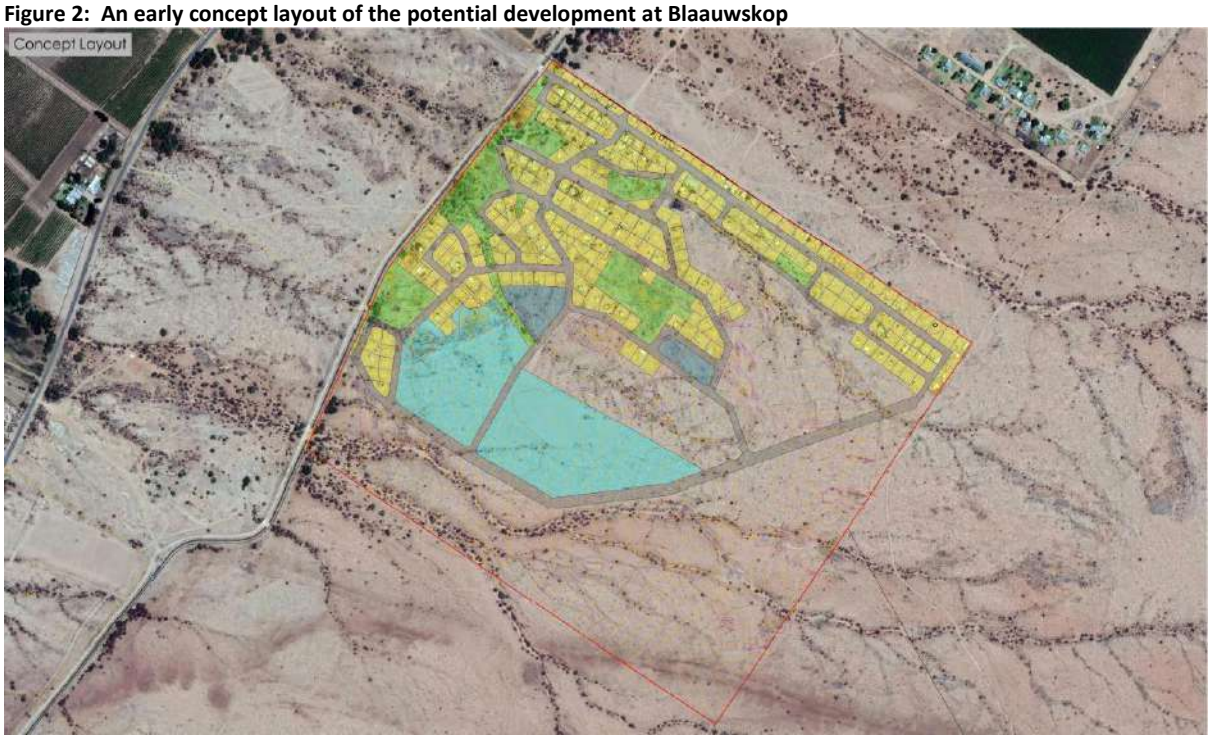
Northern Cape Province (Figure 1). Blaauwskop is located on portion 30 (a portion of portion 29) of the Farm Blauws Kop Nr. 360, Upington (GPS Coordinates 28° 40' 09.64"S; 21° 06' 07.49"E).

Figure 1: Map showing the location of Blaauwskop in relation to Upington in the Northern Cape



The proposed development will very likely aim at formalising the existing development and to add new erven to this existing developed areas, but will also aim to establish corridors along ecological important features (e.g. significant water courses etc.). Figure 2, gives an early example of a proposed footprint.

Figure 2: An early concept layout of the potential development at Blaauwskop



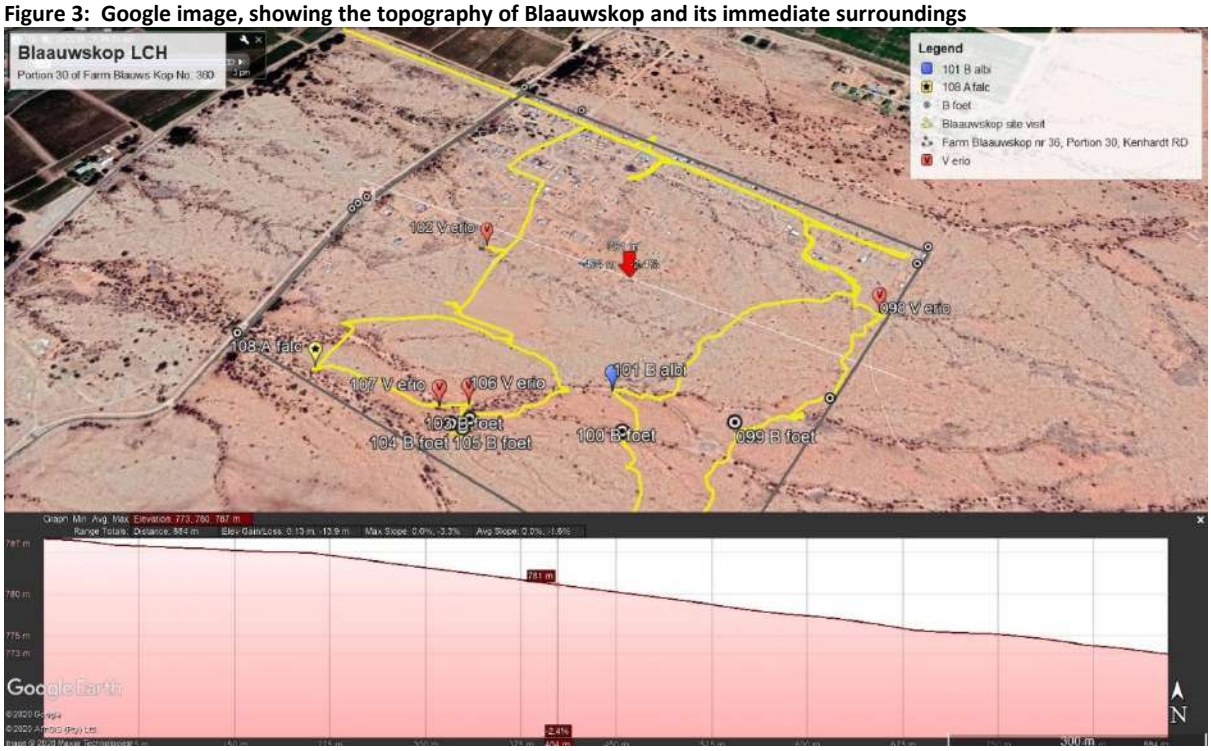
2.2. CLIMATE

All regions with a rainfall of less than 400 mm per year are regarded as arid. This area normally receives about 106 mm of rain per year (the climate is therefore regarded as arid to very arid). Keimoes normally receives about 84 mm of rain per year, with most rainfall occurring during autumn. It receives the lowest rainfall (0 mm) in June and the highest (27 mm) in March. The monthly average daily maximum temperatures range from 19.8°C in June to 33°C in January. The region is the coldest during July when temperatures drop to 3°C on average during the night (www.saexplorer.co.za).

2.3. TOPOGRAPHY & SOILS

The Blaauwskop settlement is located on an almost flat landscape only slightly undulating and with a barely perceivable slope towards the Orange River (the north). The landscape is drained by smaller drainage lines towards the Orange River (Figure 3). The average slope is about 1.6%, with a maximum slope of about 3.3%.

Figure 3: Google image, showing the topography of Blaauwskop and its immediate surroundings



According to Mucina & Rutherford (2006), the geology for Bushmanland Arid Grassland vegetation is dominated by mudstones and shales of the Ecca Group (Prince Albert and Volksrust Formations) and Dwyka tillites, both of the early Karoo age. About 20% of rock outcrops are formed by Jurassic intrusive dolerite sheets and dykes.

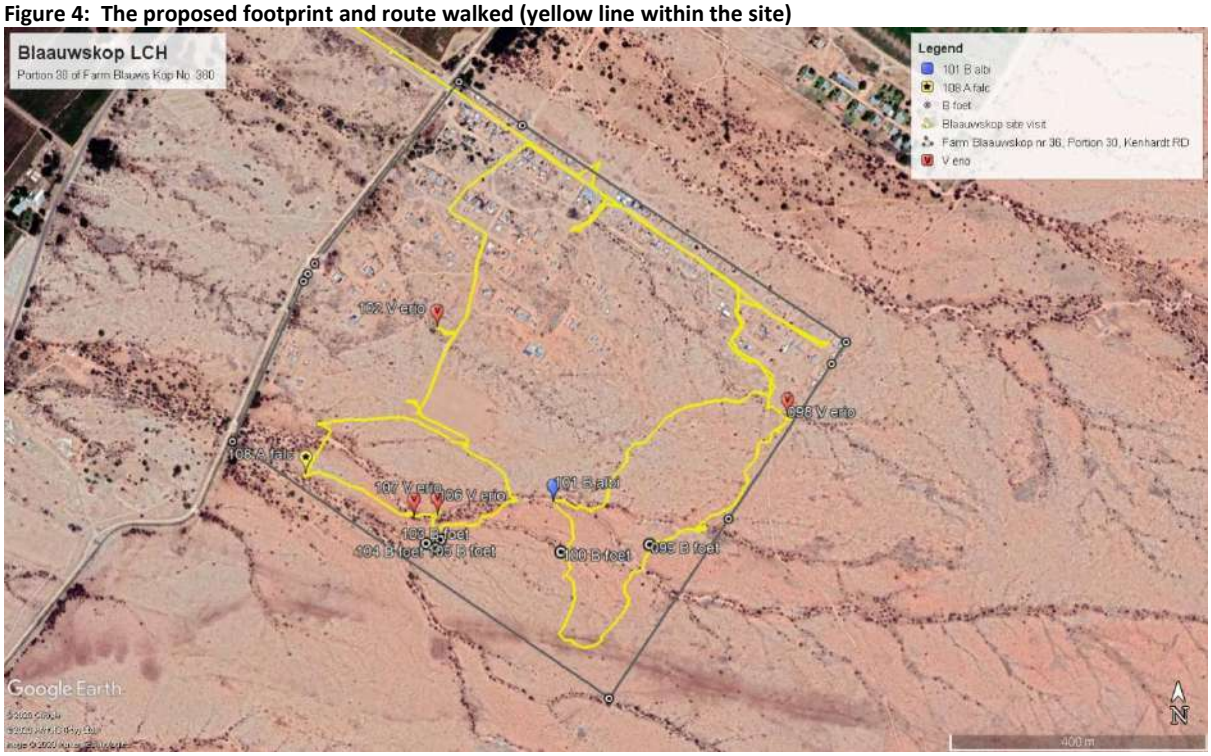
The soils are described as soils with minimal development, usually shallow on hard or weathering rock, Glenrosa and Mispah forms, with lime generally present in the entire landscape (Fc land type) and, to a lesser extent, red-yellow apedal, freely drained soils with a high base status and usually <15% clay (Ah and Ai land types) are also found. The salt content in these soils is very high. The soils on site were generally shallow on weathering rock with high quarts content and the occasional low rocky granite outcrop.

3. EVALUATION METHOD

Desktop studies coupled with a site visit were performed. The site visit was conducted on the 3rd of February 2019. The timing of the site visit was reasonable in that, even though the veld was very dry, almost all perennial plants were identifiable.

It is important to note that at the time of the site visit the Northern Cape was still in the midst of one of its worst drought periods in a long time, and very few grasses, herbs, other annual plants or bulbs were observed.

Figure 4: The proposed footprint and route walked (yellow line within the site)



However, the author is confident that a fairly good understanding of the status of the site was obtained. The survey was conducted by walking the site and examining, marking and photographing any area of interest. Confidence in the findings is high. During the site visit the author endeavoured to identify and locate all significant biodiversity features, special plant species and or specific soil conditions which might indicate special botanical features (e.g. rocky outcrops or silcrete patches).

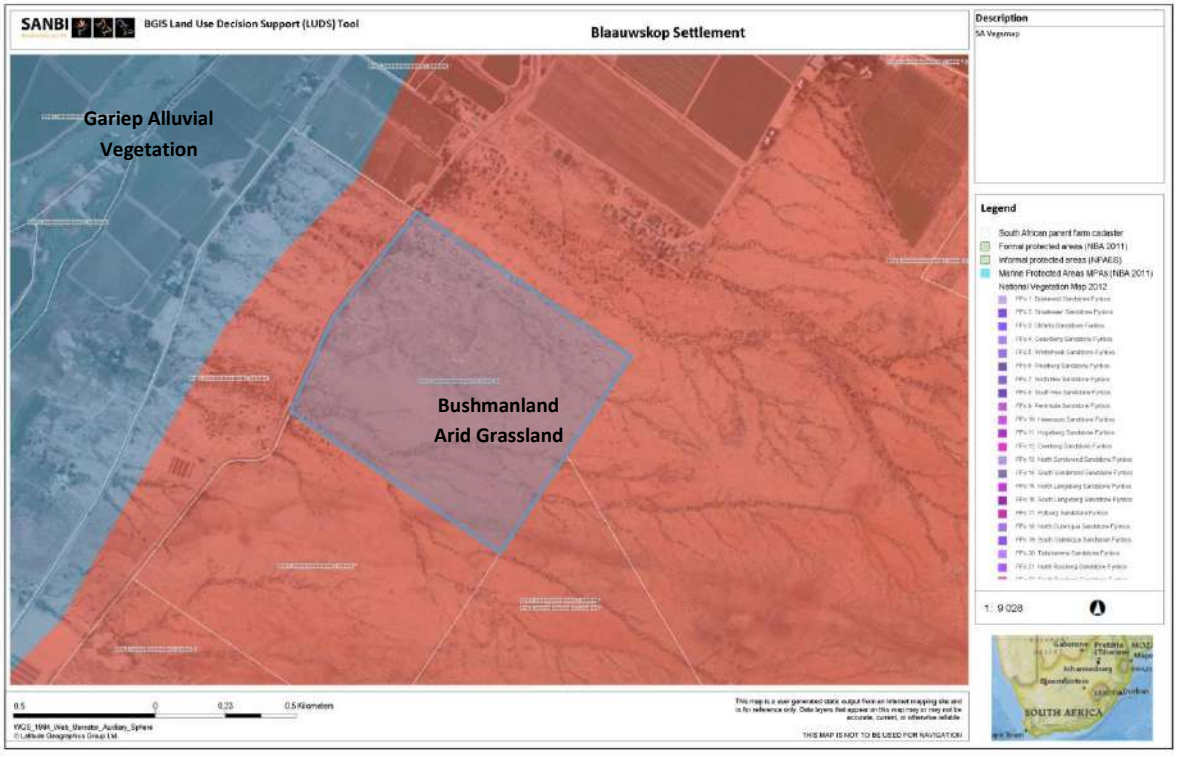
The most noteworthy features observed were a number of protected plant species (of which the most significant are marked in Figure 4) and the smallish drainage lines with its denser vegetation.

4. THE VEGETATION

The Northern Cape contains about 3500 plant species in 135 families and 724 genera, with about 25% of this flora endemic to the region. It is also home to an exceptionally high level of insect and reptile endemism, with new species still being discovered. However, it must be noted that this remarkable diversity is not distributed evenly throughout the region, but is concentrated in many local centres of endemism. The Karoo used to support millions of antelope, mainly springbuck, but also numerous other larger antelope (and other grazing animal). These animals roamed the vast plains of the Karoo, utilizing different selections of plants and allowing for long "rest" periods as they move around, and as a result preventing overgrazing (Shearing, 1994).

The Blaauwskop area would be classified as a desert region. In accordance with the Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006, as updated in the 2012 beta version) only one broad vegetation type is to be expected within the proposed footprint, namely **Bushmanland Arid Grassland** (Figure 5). The Grassland vegetation type is classified as "Least Threatened" (GN 1002, December 2011).

Figure 5: Vegetation map of South Africa (2012 beta 2 version), showing the expected vegetation types



4.1. THE VEGETATION IN CONTEXT

4.1.1. Nama-Karoo Biome

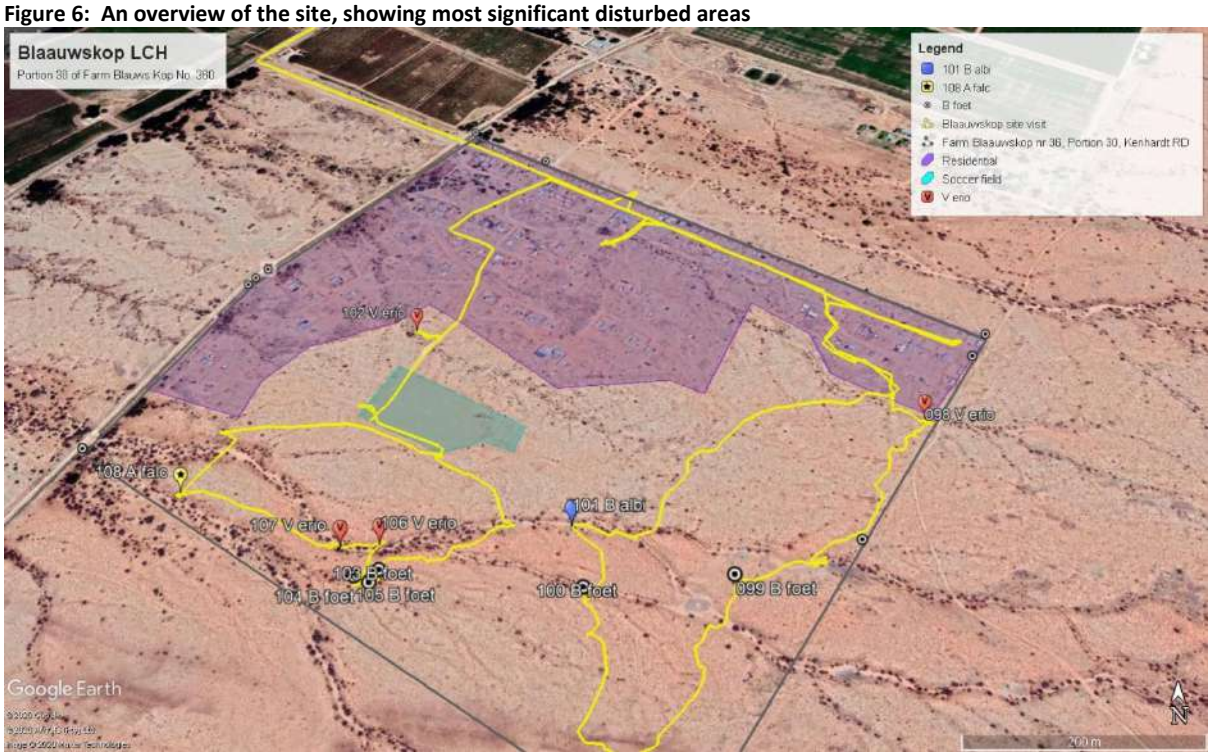
Bushmanland Arid Grassland is part of the Nama-Karoo Biome, which is a large arid landlocked region on the central plateau of the western half of South Africa, extending into Namibia. It is flanked by the Succulent Karoo to the west and south, desert to the northwest, arid Kalahari Savanna to the north, Grassland to the northeast, Albany Thicket to the southeast and small parts of Fynbos to the south. In South Africa, only the Desert Biome has a higher variability in annual rainfall and only the Kalahari Savanna greater extremes in temperature. The Nama-Karoo receives most of its rainfall in summer, especially in late summer (Mucina *et. al*., 2006).

Climate is essentially continental and with almost no effect of the ameliorating influences of the oceans. Rainfall is low and unreliable, peaking in March. Droughts are unpredictable and often prolonged. Summers are hot and winters cold with temperature extremes ranging from -5°C in winter to 43°C in summer. However, rainfall intensity can be high (e.g. episodic thunderstorm and hail storm events). This coupled with the generally low vegetation cover associated with aridity and grazing pressure by domestic stock over the last two centuries, raises the potential for soil erosion. In semi-arid environments such as the Nama-Karoo, nutrients are generally located near the soil surface, making it vulnerable to sheet erosion (Mucina *et. al*., 2006). In contrast with the Succulent Karoo, the Nama-Karoo is not particularly rich in plant species and does not contain any centre of endemism. Local endemism is very low, which might indicate a relative youthful biome linked to the remarkable geological and environmental homogeneity of the Nama-Karoo. Rainfall seasonality and frequency are too unpredictable and winter temperatures too low to enable leaf succulent dominance (as in the Succulent Karoo). It is also too dry in summer for dominance by perennial grasses alone and the soils generally to shallow and rainfall too low for dominance by trees. But soil type, soil depth and local differences in moisture availability can cause abrupt changes in vegetation structure and composition (e.g. small drainage lines support more plant species than surrounding plains) (Mucina *et. al*., 2006).

4.2. VEGETATION ENCOUNTERED

The property is about 50 ha in size (Figure 6), of which just less than half (approximately 23 ha) is either disturbed or already settled. This include about 22 ha disturbed as a result of existing housing and associated impact, and about 1.13 ha covered by an open sport field. The remainder of the site supported a very dry version of Bushmanland Arid Grassland vegetation, with a slightly denser and higher shrubland / small tree layer next to few drainage lines.

Figure 6: An overview of the site, showing most significant disturbed areas



4.2.1. Existing disturbance footprint

Figure 6 gives an overview of the disturbed areas, which includes;

- Purple areas: Are as already settled or being settled, about 22 ha in size (Photo 1 – Photo 4).
- Light blue areas: Sporting fields, about 1.13 ha in size (Photo 5**Error! Reference source not found.**);

Photo 1: The existing settlement, to the east of the property (Figure 6), looking south to north.

Photo 2: The north eastern corner of the existing settlement (purple area to the east in Figure 6). Note the existing disturbance footprint.

Photo 3: The existing settlement to the north west of the property (purple area in Figure 6). Looking from south to north

The areas (and its immediate surroundings) had been cleared of vegetation in the areas already settled. In these areas only a few hardy indigenous species (e.g. *Tetraena decumbens* and *Senegalia mellifera*) and the alien invader *Prosopis* remains.

Photo 4: Poor waste management within the existing settlement (purple area in Figure 6).

Photo 5: The sporting fields, looking from east to west (light blue in Figure 6).

4.2.2. Remaining natural veld

The condition of the veld on the property, suggests that settlement had started in the eastern part and north eastern part of the property, slowly moving west as more houses are erected. To veld in the south-western portion of the site, on the other hand, was still in remarkable good condition (although drought and grazing had certainly reduced the vegetation cover). The remaining natural veld was generally very uniform in appearance and can be described as a low shrubland scattered individuals of the small tree *Senegalia mellifera* (Swarthaak) throughout. However, the species diversity was very low, probably because of the drought. The bottom shrub layer was dominated by *Tetraena decumbens* (the plants were often reduced to dried-out bushes with a few remaining leaves) and circles or patches of the common *Aloe claviflora* (Kraalaalwyn) (Photo 6 - Photo 9).

Photo 6: Typical remaining natural veld encountered in the south-western portion of the property. Note the *Senegalia mellifera* shrubs scattered through the site, with *Tetraena decumbens* and *Aloe claviflora* dominating the bottom stratum of the vegetation.

Photo 7: Natural veld encountered in the south-western corner of the site. Note the rocky outcrop to the right of picture.

Other plants observed in the bottom shrub layer included: the small *Acanthopsis hoffmannseggiana*, the spiny *Aptosimum spinescens* (occasionally observed), *Blepharis furcata* (occasionally), the grass *Eragrostis rigidor* and a number of other white grasses (e.g. *Stipagrostis ciliata, S. uniplumis*), *Justicia australis*, *Kleinia longiflora*, *Monsonia* cf. *parvifolia* (Boesmankers), the larger shrub *Phaeoptilum spinosum*, *Rhigozum trichotomum*, *Rogeria longiflora*, the parasitic *Tapinanthus oleifolius* (usually within the *Senegalia* or *Parkinsonia* trees), *Tetraena retrofracta* (only a few individuals observed), *Tetraena rigida* (occasionally).

Photo 8: The beautiful flowers of *Aptosimum spinosum*, one of the few plants in flower.

Photo 9: Natural vegetation encountered towards the middle of the southern portion of the property. Typical denser stands of *Senegalia mellifera* can be observed along one of the smaller drainage lines.

The drainage lines (Photo 9 & Photo 10) was usually almost demarcated by a line or twin lines of denser vegetation mostly dominated by *Senegalia mellifera*, but with species like *Boscia foetida*, occasionally *Boscia albitrunca*, *Parkinsonia africana Phaeoptilum spinosum, Ziziphus mucronata* and 4 individuals of *Vachellia*

erioloba (Camel thorn tree). Underneath these trees or shrubs two wild asparagus species were also observed, namely *Asparagus* cf. *laricinus* and *A.* cf. *nelsii*. Some of these drainage lines had resulted in slightly deeper sand distributed in small alluvial fans which were also where most of the protected Sheppard- and Camel thorn trees were encountered. In fact almost all of the larger protected trees were associated with these drainage lines.

Photo 10: One of the larger drainage lines encountered.

One of the interesting finds was a patch of 4 – 5 Aloe plants, most of which were Aloe gariepensis. However, one of the individuals appears to be a cross between A. gariepensis and A. hereroensis (Photo 11).

Photo 11: One of the interesting finds was this *Aloe*, which appears to be a cross between *Aloe gariepensis* and *Aloe hereroensis*. Aloe gariepensis normally have a single stem inflorescence, while the inflorescence on Aloe hereroensis is normally a panicle (divided, like in this photo). However, the flowers clusters of *Aloe hereroensis* is normally on the same height and borne at the tips of the panicle.

The false Sheppard's tree (*Boscia foetida*) was relatively common, but only two individuals of *Boscia albitrunca* were encountered, of which one is located underneath the *Vachellia erioloba* marked by waypoint 098 in Table 2.

Photo 12: The largest *Boscia albitrunca* individual encountered (Refer to waypoint 101 in Table 2).

Four Camel thorn trees (*Vachellia erioloba*) had been observed, of which three were magnificent trees (Refer to waypoints (102, 106 and 107 in Table 2) (Photo 13).

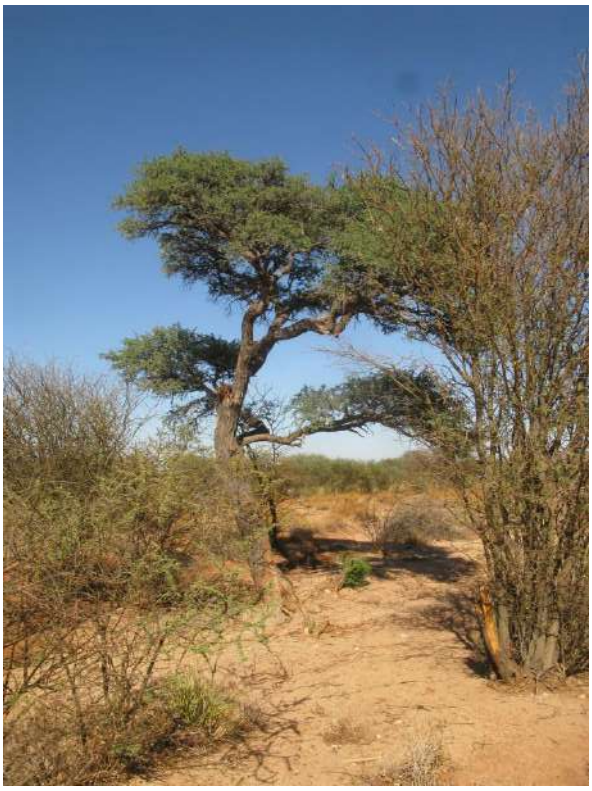


Photo 13: The largest of the Camel thorn trees observed (refer to waypoint 107 in Table 2).

4.3. CRITICAL BIODIVERSITY AREAS MAPS

The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole (Holness & Oosthuysen, 2016). The 2016 Northern Cape Critical Biodiversity Area (CBA) Map updates, revises and replaces all older systematic biodiversity plans and associated products for the province (including the Namakwa District Biodiversity Sector Plan, 2008). Priorities from existing plans such as the Namakwa District Biodiversity Plan, the Succulent Karoo Ecosystem Plan, National Estuary Priorities, and the National Freshwater Ecosystem Priority Areas were incorporated. Targets for terrestrial ecosystems were based on established national targets, while targets used for other features were aligned with those used in other provincial planning processes.

Critical biodiversity areas (CBA's) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI 2007). The primary purpose of CBA's is to inform land-use planning in order to promote sustainable development and protection of important natural habitat and landscapes. CBA's can also be used to inform protected area expansion and development plans.

- **Critical biodiversity areas (CBA's)** are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity-compatible land uses and resource uses.

- **Ecological support areas (ESA's)** are areas that are not essential for meeting biodiversity representation targets/thresholds but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree of restriction on land use and resource use in these areas may be lower than that recommended for critical biodiversity areas.

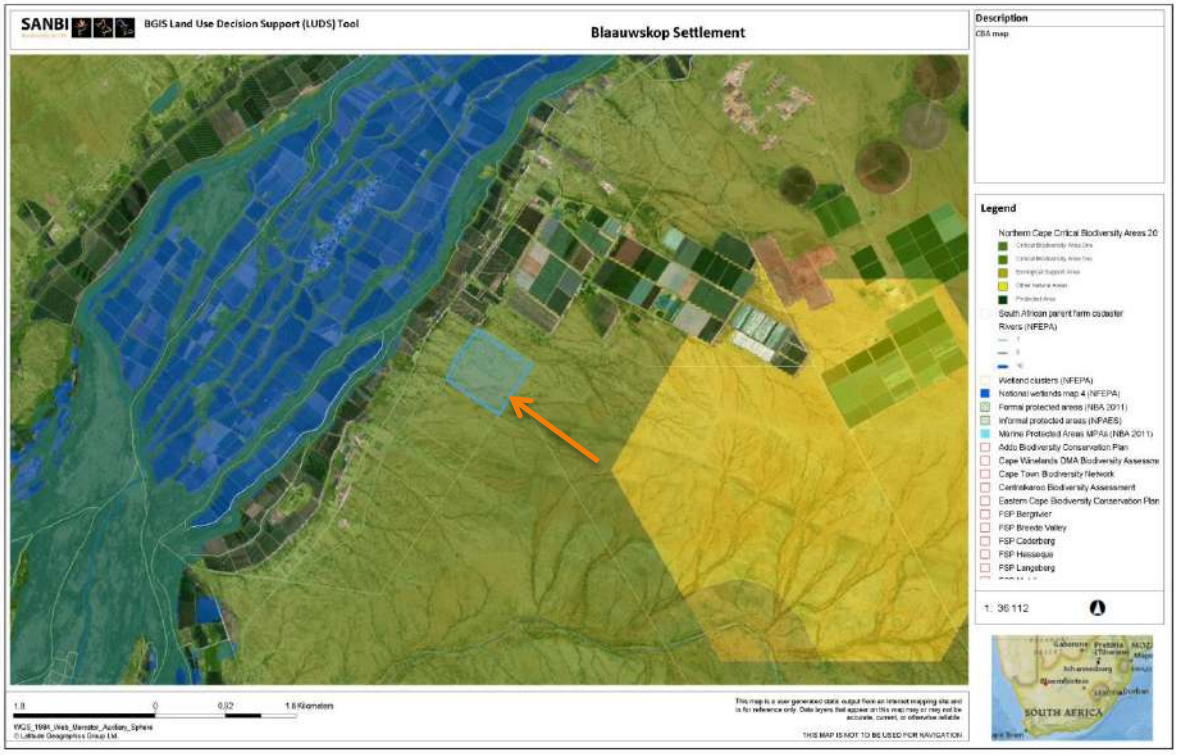
From a land-use planning perspective it is useful to think of the difference between CBA's and ESA's in terms of where in the landscape the biodiversity impact of any land-use activity action is most significant:

- For CBA's the impact on biodiversity of a change in land-use that results in a change from the desired ecological state is most significant locally at the point of impact through the direct loss of a biodiversity feature (e.g. loss of a populations or habitat).

- For ESA's a change from the desired ecological state is most significant elsewhere in the landscape through the indirect loss of biodiversity due to a breakdown, interruption or loss of an ecological process pathway (e.g. removing a corridor results in a population going extinct elsewhere or a new plantation locally results in a reduction in stream flow at the exit to the catchment which affects downstream biodiversity).

According to the Northern Cape CBA map (Figure 7), the proposed development falls within a terrestrial CBA. However, there is no alternative site on the property or its immediate vicinity that is not located within the CBA.

Figure 7: The Northern Cape Critical Biodiversity Areas Map (2016) showing the proposed development



4.4. POTENTIAL IMPACT ON CENTRES OF ENDEMISM

The proposed development will not impact on any recognised centre of endemism (Van Wyk & Smith, 2001).

4.5. FLORA ENCOUNTERED

Table 1 gives a list of the plant species encountered during this study. Because of the limitations (timing and a single site visit as well as the drought) it is likely that a number of annuals might have been missed.

Table 1: List of plant species observed within or near the proposed footprint

No.	Species name	FAMILY	Status	Alien & invader plant (AIP)
1.	*Aloe claviflora*	ASPODELACEAE	LC NCNCA, Schedule 2 Protected (all species in this Family)	**Apply for a NCNCA Flora permit (DENC)**
2.	*Aptosimum spinescens*	SCROPHULARIACEAE	LC	
3.	*Blepharis furcata*	ACANTHACEAE	LC	
4.	*Boscia albitrunca*	BRASSICACEAE (CAPPARACEAE)	LC NFA protected species NCNCA, Schedule 2 Protected (all species of Boscia)	**Apply for a NFA Tree permit (DAFF)** **Apply for a NCNCA Flora permit (DENC)**
5.	*Boscia foetida*	BRASSICACEAE (CAPPARACEAE)	LC Protected in terms of schedule 2 of the NCNCA	**Apply for a NFA Tree permit (DAFF)**
6.	*Justicia australis (=Monechma genistifolium)*	ACANTHACEAE	LC	
7.	*Kleinia longiflora*	ASTERACEAE	LC	

No.	Species name	FAMILY	Status	Alien & invader plant (AIP)
8.	*Monsonia* cf. *parviflora*	GERANIACEAE	LC	
9.	*Phaeoptilum spinosum*	NYCTAGINACEAE	LC	
10.	*Rhigozum trichotomum*	BIGONACEAE	LC	
11.	*Rogeria longiflora*	PEDALIACEAE	LC	
12.	*Tapinanthus oleifolius*	LORANTHACEAE	LC	
13.	*Senegalia mellifera (=Acacia mellifera)*	FABACEAE	LC	
14.	*Tetraena decumbens (=Zygophyllum decumbens)*	ZYGOPHYLLACEAE	LC	
15.	*Tetraena retrofracta (=Zygophyllum retrofractum))*	ZYGOPHYLLACEAE	LC	
16.	*Tetraena rigida (=Zygophyllum rigidum)*	ZYGOPHYLLACEAE	LC	
17.	*Vachellia erioloba*	FABACEAE	LC NFA protected species	**Apply for a NFA Tree permit (DAFF)**

4.6. THREATENED AND PROTECTED PLANT SPECIES

South Africa has become the first country to fully assess the status of its entire flora. Major threats to the South African flora are identified in terms of the number of plant taxa Red-Listed as threatened with extinction as a result of threats like, habitat loss (e.g. infrastructure development, urban expansion, crop cultivation and mines), invasive alien plant infestation (e.g. outcompeting indigenous plant species), habitat degradation (e.g. overgrazing, inappropriate fire management etc.), unsustainable harvesting, demographic factors, pollution, loss of pollinators or dispersers, climate change and natural disasters (e.g. such as droughts and floods). South Africa uses the internationally endorsed IUCN Red List Categories and Criteria in the Red List of South African plants. However, due to its strong focus on determining risk of extinction, the IUCN system does not highlight species that are at low risk of extinction, but may nonetheless be of high conservation importance. As a result a SANBI uses an amended system of categories in order to highlight species that may be of low risk of extinction but are still of conservation concern (SANBI, 2015).

In the Northern Cape, species of conservation concern are also protected in terms of national and provincial legislation, namely:

- The National Environmental Management: Biodiversity Act, Act 10 of 2004, provides for the protection of species through the "*Lists of critically endangered, endangered, vulnerable and protected species*" (GN. R. 152 of 23 February 2007).
- National Forest Act, Act 84 of 1998, provides for the protection of forests as well as specific tree species through the "*List of protected tree species*" (GN 908 of 21 November 2014).
- Northern Cape Nature Conservation Act, Act of 2009, provides for the protection of "*specially protected species*" (Schedule 1), "*protected species*" (Schedule 2) and "*common indigenous species"* (Schedule 3).

4.6.1. Red list of South African plant species

The Red List of South African Plants online provides up to date information on the national conservation status of South Africa's indigenous plants (SANBI, 2015).

- **No red-listed species** was observed.

4.6.2. NEM: BA protected plant species

The National Environmental Management: Biodiversity Act, Act 10 of 2004, provides for the protection of species through the "Lists of critically endangered, endangered, vulnerable and protected species" (GN. R. 152 of 23 February 2007).

- **No NEM: BA protected species was observed.**

4.6.3. NFA Protected plant species

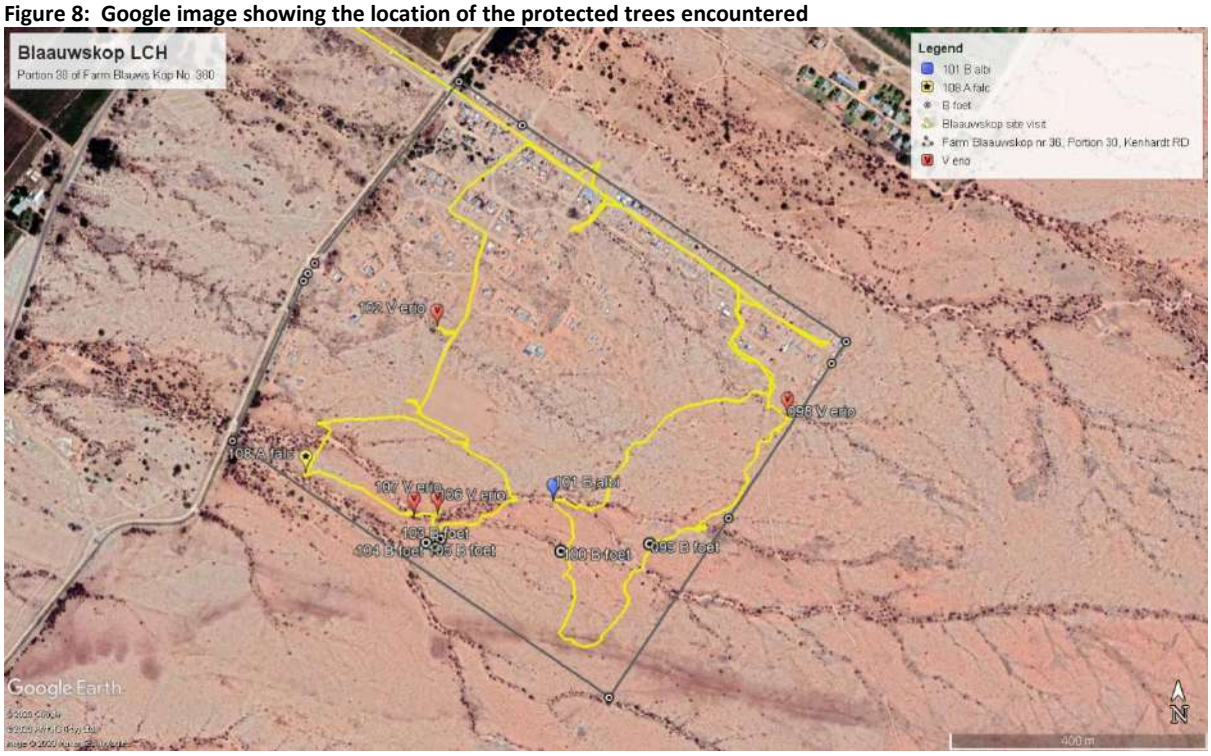
The National Forests Act (NFA) of 1998 (Act 84 of 1998) provides for the protection of forests as well as specific tree species (as updated).

- **Two species protected in terms of the NFA** was observed, namely ***Vachellia erioloba*** and ***Boscia albitrunca***. Table 2 and Figure 8 give locations for each tree as well as recommendations for impact minimisation. A NFA permit as well as a NCNCA permit will be required for the removal of these plants.

Table 2: Location of NFA protected trees observed within or near the footprint

NO.	SPECIES NAME	COMMENTS	RECOMMENDATIONS
098 V erio	*Vachellia erioloba* S28° 40' 09.4" E21° 06' 23.3"	Medium sized tree (1.5 m tall) in good condit ion	**To be protected** A NFA permit required for removal.
098	*Boscia albitrunca* S28° 40' 09.4" E21° 06' 23.3"	Small shrub 0.4 m in height (poor condition).	**To be protected** A NFA & NCNCA permit required for removal.
101 B albi	*Boscia albitrunca* S28° 40' 13.7" E21° 06' 09.8"	Tree (2 m tall) in relative good condition.	**To be protected** A NFA & NCNCA permit required for removal.
102 V erio	*Vachellia erioloba* S28° 40' 04.9" E21° 06' 03.0"	Beautiful tree (5-6 m tall) in good condition.	**To be protected** A NFA permit required for removal.
106 V erio	*Vachellia erioloba* S28° 40' 14.4" E21° 06' 03.1"	Beautiful tree (6 m tall) in good condition.	**To be protected** A NFA permit required for removal.
107 V erio	*Vachellia erioloba* S28° 40' 14.5" E21° 06' 01.7"	Beautiful tree (7-8 m tall) in good condition.	**To be protected** A NFA permit required for removal.

Figure 8: Google image showing the location of the protected trees encountered



4.6.4. NCNCA protected plant species

The Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect on the 12th of December 2011, and also provides for the sustainable utilization of wild animals, aquatic biota and plants. Schedule 1 and 2 of the act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. NB. Please note that all indigenous plant species are protected in terms of Schedule 3 of this act (e.g. any work within a road reserve).

- The following species protected in terms of the NCNCA were encountered. Recommendations on impact minimisation also included.

Table 3: Plant species protected in terms of the NCNCA encountered within the study area

NO.	SPECIES NAME	COMMENTS	RECOMMENDATIONS
1.	*Aloe claviflora* **Schedule 2 protected**		Very common plant in this area. Protection through topsoil conservation.
2.	*Aloe gariepensis* **Schedule 2 protected**		A small number of plants observed, forming a patch to the west of the westernmost drainage line on the property. Unlikely to be impacted by the current draft layout proposals.
3.	*Boscia albitrunca* **Schedule 2 protected**		Refer to Table 2.
4.	*Boscia foetida* **Schedule 2 protected**	About 5 individuals observed, mostly small shrubs next to the drainage lines	By protecting the drainage lines (water courses) with a small corridor next to drainage lines almost all of the individuals will be protected as well.

5. IMPACT ASSESSMENT METHOD

The objective of this study was to evaluate the botanical diversity of the property area in order to identify significant environmental features which might have been impacted as a result of the development. The Ecosystem Guidelines for Environmental Assessment (De Villiers *et. al*., 2005), were used to evaluate the botanical significance of the property with emphasis on:

- Significant ecosystems
  - Threatened or protected ecosystems
  - Special habitats
  - Corridors and or conservancy networks
- Significant species
  - Threatened or endangered species
  - Protected species

5.1. DETERMINING SIGNIFICANCE

Determining impact significance from predictions of the nature of the impact has been a source of debate and will remain a source of debate. The author used a combination of scaling and weighting methods to determine significance based on a simple formula. The formula used is based on the method proposed by Edwards (2011). However, the criteria used were adjusted to suite its use for botanical assessment. In this document significance rating was evaluated using the following criteria (Refer to Table 4).

Significance = Conservation Value x (Likelihood + Duration + Extent + Severity) (Edwards 2011)

Table 4: Categories and criteria used for the evaluation of the significance of a potential impact

ASPECT / CRITERIA	LOW (1)	MEDIUM/LOW (2)	MEDIUM (3)	MEDIUM/HIGH (4)	HIGH (5)
CONSERVATION VALUE Refers to the intrinsic value of an attribute or its relative importance towards the conservation of an ecosystem or species or even natural aesthetics. Conservation status is based on habitat function, its vulnerability to loss and	The attribute is transformed, degraded not sensitive (e.g. Least threatened), with unlikely possibility of species loss.	The attribute is in good condition but not sensitive (e.g. Least threatened), with unlikely possibility of species loss.	The attribute is in good condition, considered vulnerable (threatened), or falls within an ecological support area or a critical biodiversity area, but with	The attribute is considered endangered or, falls within an ecological support area or a critical biodiversity area, or provides core habitat for endemic or rare &	The attribute is considered critically endangered or is part of a proclaimed provincial or national protected area.

ASPECT / CRITERIA	LOW (1)	MEDIUM/LOW (2)	MEDIUM (3)	MEDIUM/HIGH (4)	HIGH (5)
fragmentation or its value in terms of the protection of habitat or species			unlikely possibility of species loss.	endangered species.	
LIKELIHOOD Refers to the probability of the specific impact occurring as a result of the proposed activity	Under normal circumstances it is almost certain that the impact will not occur.	The possibility of the impact occurring is very low, but there is a small likelihood under normal circumstances.	The likelihood of the impact occurring, under normal circumstances is 50/50, it may or it may not occur.	It is very likely that the impact will occur under normal circumstances.	The proposed activity is of such a nature that it is certain that the impact will occur under normal circumstances.
DURATION Refers to the length in time during which the activity is expected to impact on the environment.	Impact is temporary and easily reversible through natural process or with mitigation. Rehabilitation time is expected to be short (1-2 years).	Impact is temporary and reversible through natural process or with mitigation. Rehabilitation time is expected to be relative short (2-5 years).	Impact is medium-term and reversible with mitigation, but will last for some time after construction and may require on-going mitigation. Rehabilitation time is expected to be longer (5-15 years).	Impact is long-term and reversible but only with long term mitigation. It will last for a long time after construction and is likely to require on-going mitigation. Rehabilitation time is expected to be longer (15-50 years).	The impact is expected to be permanent.
EXTENT Refers to the spatial area that is likely to be impacted or over which the impact will have influence, should it occur.	Under normal circumstances the impact will be contained within the construction footprint.	Under normal circumstances the impact might extent outside of the construction site (e.g. within a 2 km radius), but will not affect surrounding properties.	Under normal circumstances the impact might extent outside of the property boundaries and will affect surrounding land owners or –users, but still within the local area (e.g. within a 50 km radius).	Under normal circumstances the impact might extent to the surrounding region (e.g. within a 200 km radius), and will regional land owners or –users.	Under normal circumstances the effects of the impact might extent to a large geographical area (>200 km radius).
SEVERITY Refers to the direct physical or biophysical impact of the activity on the surrounding environment should it occur.	It is expected that the impact will have little or no affect (barely perceptible) on the integrity of the surrounding environment. Rehabilitation not needed or easily achieved.	It is expected that the impact will have a perceptible impact on the surrounding environment, but it will maintain its function, even if slightly modified (overall integrity not compromised). Rehabilitation easily achieved.	It is expected that the impact will have an impact on the surrounding environment, but it will maintain its function, even if moderately modified (overall integrity not compromised). Rehabilitation easily achieved.	It is expected that the impact will have a severe impact on the surrounding environment. Functioning may be severely impaired and may temporarily cease. Rehabilitation will be needed to restore system integrity.	It is expected that the impact will have a very severe to permanent impact on the surrounding environment. Functioning irreversibly impaired. Rehabilitation often impossible or unfeasible due to cost.

5.2. SIGNIFICANCE CATEGORIES

The formal NEMA EIA application process was developed to assess the significance of impacts on the surrounding environment (including socio-economic factors), associated with any specific development proposal in order to allow the competent authority to make informed decisions. Specialist studies must advise the environmental assessment practitioner (EAP) on the significance of impacts in his field of specialty. In order to do this, the specialist must identify all potentially significant

environmental impacts, predict the nature of the impact and evaluate the significance of that impact should it occur. Potential significant impacts are evaluated, using the method described above, in order to determine its potential significance. The potential significance is then described in terms of the categories given in Table 5.

Table 5: Categories used to describe significance rating (adjusted from DEAT, 2002)

SIGNIFICANCE	DESCRIPTION
Insignificant or Positive (4-22)	There is no impact or the impact is insignificant in scale or magnitude as a result of low sensitivity to change or low intrinsic value of the site, or the impact may be positive.
Low (23-36)	An impact barely noticeable in scale or magnitude as a result of low sensitivity to change or low intrinsic value of the site, or will be of very short-term or is unlikely to occur. Impact is unlikely to have any real effect and no or little mitigation is required.
Medium Low (37-45)	Impact is of a low order and therefore likely to have little real effect. Mitigation is either easily achieved. Social, cultural and economic activities can continue unchanged, or impacts may have medium to short term effects on the social and/or natural environment within site boundaries.
Medium (46-55)	Impact is real, but not substantial. Mitigation is both feasible and fairly easily possible, but may require modification of the project design or layout. Social, cultural and economic activities of communities may be impacted, but can continue (albeit in a different form). These impacts will usually result in medium to long term effect on the social and/or natural environment, within site boundary.
Medium high (56-63)	Impact is real, substantial and undesirable, but mitigation is feasible. Modification of the project design or layout may be required. Social, cultural and economic activities may be impacted, but can continue (albeit in a different form). These impacts will usually result in medium to long-term effect on the social and/or natural environment, beyond site boundary within local area.
High (64-79)	An impact of high order. Mitigation is difficult, expensive, time-consuming or some combination of these. Social, cultural and economic activities of communities are disrupted and may come to a halt. These impacts will usually result in long-term change to the social and/or natural environment, beyond site boundaries, regional or widespread.
Unacceptable (80-100)	An impact of the highest order possible. There is no possible mitigation that could offset the impact. Social, cultural and economic activities of communities are disrupted to such an extent that these come to a halt. The impact will result in permanent change. Very often these impacts cannot be mitigated and usually result in very severe effects, beyond site boundaries, national or international.

6. DISCUSSING BOTANICAL SENSITIVITY

The aim of impact assessment is to determine the vulnerability of a habitat to a specific impact. In order to do so, the sensitivity of the habitat should be determined by identifying and assessing the most significant environmental aspects of the site against the potential impact(s). For this development the following biodiversity aspects was considered:

- **Location**: The proposed development footprint is located on Municipal property, already impacted by informal settlement. As a result almost 50% of the property has already been degraded in terms of natural vegetation.
- **Activity**: The proposed activity is expected to result in a permanent transformation of approximately 70% (approximately 35 ha) of the property, of which approximately 23 ha has already been degraded/settled.
- **Geology & Soils**: No special features such as true quarts patches or heuweltjies were observed in or near to the larger footprint area that may result in specialised plant habitat.
- **Land use and cover**: The footprint is on municipal land which had already been impacted by informal settlement. Just less than 50% of the footprint is disturbed or already settled. The remainder of the property is natural veld, grazed by livestock of the local inhabitants.
- **Vegetation status**: The site supported a very dry version of Bushmanland Arid Grassland vegetation, with a slightly denser and higher shrubland / small tree layer next to few drainage lines. Species diversity was very low and most of the veld had been impacted by the recent drought, reducing many of the plant species to dried-out shrubs. The vegetation is not considered a threatened vegetation type, but conservation targets have not yet been met.
- **Conservation priority areas:** According to the Northern Cape CBA maps the proposed site falls within a CBA area. However, there is no alternative on the property that will not impact on the CBA. The site will not impact on any recognised centre of endemism.
- **Connectivity**: The transformation will not add significantly to the existing impact on connectivity and will not add to the impact on the surrounding area, where connectivity will remain the same.
- **Watercourses and wetlands**: Not evaluated in this study as a separate freshwater impact assessment has been commissioned as part of the NEMA EIA process.
- **Protected or endangered plant species**: The most significant botanical aspect of this site is the presence of the nationally protected *Vachellia erioloba* and Sheppard trees (*Boscia albitrunca*) (refer to Table 2). In addition a number of Northern Cape Nature Conservation Act, protected species (Refer to Table 3) were also observed.
- **Alien and Invasive Plant species**: The alien invasive *Prosopis* tree was observed in some areas. These plants should be removed responsibly before development commence.

6.1. IMPACT ASSESSMENT

Table 6 rates the significance of environmental impacts associated with the proposed development. It also evaluates the expected accumulative effect of the proposed development as well as the No-Go option.

Table 6: Impact assessment associated with the proposed development

Impact assessment								
Aspect	**Mitigation**	**CV**	**Lik**	**Dur**	**Ext**	**Sev**	**Significance**	Short discussion
Geology & soils: Potential impact on special habitats (e.g. true quartz or "heuweltjies")	Without mitigation	2	1	5	2	1	18	No special habitats observed.
	With mitigation	2	1	3	1	1	12	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
Landuse and cover: Potential impact on socio-economic activities.	Without mitigation	2	3	5	1	1	20	Permanent transformation of approximately 35ha of indigenous vegetation used for grazing.
	With mitigation	2	2	3	1	1	14	Potential beneficial socio-economic impact (much needed housing project).
Vegetation status: Loss of vulnerable or endangered vegetation and associated habitat.	Without mitigation	2	3	5	1	1	20	Permanent transformation of 35 ha of Bushmanland Arid Grassland (Least Threatened).
	With mitigation	2	2	3	1	1	14	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
Conservation priority: Potential impact on protected areas, CBA's, ESA's or Centre's of Endemism.	Without mitigation	3	3	5	2	1	33	The development will impact on a proposed CBA. However, there is no alternative location on the property that will not impact on the same CBA.
	With mitigation	2	2	3	1	1	14	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
Connectivity: Potential loss of ecological migration corridors.	Without mitigation	2	3	5	1	1	20	The transformation will not add significantly to the existing impact on connectivity and will not add to the impact on the surrounding area, where connectivity will remain the same.
	With mitigation	2	2	3	1	1	14	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
Watercourses and wetlands: Potential impact on natural water courses and its ecological support areas.	Without mitigation						0	N/a (Refer to the Freshwater specialist report).
	With mitigation						0	
Protected & endangered plant species: Potential impact on threatened or protected plant species.	Without mitigation	3	3	5	2	2	36	A number of protected species were observed, most notably a number of nationally protected tree species.
	With mitigation	2	2	3	1	1	14	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
Invasive alien plant species: Potential invasive plant infestation as a result of the activities.	Without mitigation	3	3	4	2	2	33	For most of the property, only the occasional Prosopis trees were observed (mostly in the north eastern section of the property).
	With mitigation	2	1	2	1	1	10	Special care must be taken during their removal (in order to avoid re-sprouting).

Impact assessment								
Aspect	**Mitigation**	**CV**	**Lik**	**Dur**	**Ext**	**Sev**	**Significance**	Short discussion
Veld fire risk: Potential risk of veld fires as a result of the activities.	Without mitigation	1	2	3	2	2	9	Veld fire risk low.
	With mitigation	1	1	1	1	1	4	Address fire danger throughout construction.
Cumulative impacts: Cumulative impact associated with proposed activity.	Without mitigation	3	3	5	2	2	36	Permanent transformation of approximately 35 ha of natural veld for urban development.
	With mitigation	2	2	3	2	2	18	Refer to all the mitigation recommendations above.
The "No-Go" option: Potential impact associated with the No-Go alternative.	Without mitigation	3	3	4	2	2	33	The site had already been settled for the most part.
	With mitigation						0	

According Table 6, the main impacts associated with the proposed development will be:

- The transformation of 35 ha of indigenous vegetation within a proposed CBA; and
- The potential impact on a number of nationally protected trees as well as provincially protected plant species.

However, there is no logical alternative site, and the property is already degraded as a result of informal settlement.

The No-Go option is not likely to result in a “no-impact” scenario, as constant slow degradation is expected to continue as a result of urban activities and poor management of the site.

The cumulative impact (even without mitigation) is expected to be **Medium-Low**, which can be reduced to **Low** through mitigation.

7. IMPACT MINIMISATION RECOMMENDATIONS

The proposed application is for the formalization of a settlement that has already been impacted by informal settlement. The activity is expected to result in a permanent transformation of approximately 35 ha of land, of which approximately about 23 are already settled. The site overlaps an identified critical biodiversity area (according to the 2016, Northern Cape Critical Biodiversity Areas maps). In addition, protected Camel Thorn (*Vachellia erioloba*) and Sheppard trees (*Boscia albitrunca*), and a number of Northern Cape Nature Conservation Act, protected species were observed within the footprint.

According to the impact assessment given in Table 6 the development is likely to result in a **Medium-Low** impact, which can be reduced to a **Low** impact with good environmental control during construction.

With the correct mitigation it is unlikely that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity.

7.1. MITIGATION ACTIONS

The following mitigation actions should be implemented to ensure that the proposed development does not pose a significant threat to the environment:

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must include the recommendations made in this report.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EMP and any other conditions pertaining to specialist studies.
- **Before any work is done** protected tree species must be marked and demarcated (Refer to Table 2). If any of these species are to be removed, the appropriate permits approvals must first be obtained.
- Lay-down areas or construction sites must be located within the construction footprint.
- No clearing of any area outside of the construction footprint may be allowed.
- All waste that had been illegally dumped within the footprint must be removed to a Municipal approved waste disposal site.
- An integrated waste management approach must be implemented during construction.
    - Construction related general and hazardous waste may only be disposed of at Municipal approved waste disposal sites.
- Alien invasive *Prosopis* plants within the footprint (and immediate surroundings) must be removed in a responsible way (to ensure against regrowth).
- The Municipality must ensure that adequate waste and sewerage facilities and or services are established to service this community.

8. REFERENCES

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APPENDIX 1: COMPLIANCE WITH APPENDIX 6 OF GN. NO. 982 (4 DECEMBER 2014)

Specialist reports

1. A specialist report prepared in terms of these regulations must contain -	
a) Details of –	**Refer to:**
(i) The specialist who prepared the report; and	Refer to Page ii & Appendix 2
(ii) The expertise of the specialist to compile a specialist report including a curriculum vitae;	Refer to Appendix 2
b) A declaration that the specialist is independent in a form as may be specified by the competent authority;	Refer to Page ii
c) An indication of the scope of, and the purpose for which the report was prepared;	Refer to Heading 1.1
d) The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Refer to Heading 3
e) A description of the methodology adopted in preparing the report or carrying out the specialist process inclusive of equipment and modelling used;	Refer to Heading 3
f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructures, inclusive of a site plan identifying site alternatives;	Refer to Headings 4.1, 4.2, 4.3, 4.4, 4.6.
g) An identification of any areas to be avoided, including buffers;	Refer to Figure 8
h) A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Refer to Figure 8
i) A description of any assumptions made and any uncertainties or gaps of knowledge;	Refer to Heading 3
j) A description of the findings and potential implications of such findings on the impact of the proposed activity, [including identified alternatives on the environment] or activities;	Refer to Heading 6
k) Any mitigation measures for inclusion in the EMPr;	Refer to Heading 7.1
l) Any conditions for inclusion in the environmental authorization;	None
m) Any monitoring requirements for inclusion in the EMPr or environmental authorization;	Refer to Heading 7.1
n) A reasoned opinion -	
(i) [as to] whether the proposed activity, activities or portions thereof should be authorized;	Refer to the "*Main conclusion*" within the executive summary (Page i)
(iA) regarding the acceptability of the proposed activity or activities; and	
(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorized, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable the closure plan;	Refer to Heading 7.1
o) A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/a
p) A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/a
q) Any information requested by the competent authority.	N/a
2. Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	

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Nationality:	South African
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Profession:	Environmental Consultant & Auditing
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Qualifications:	**BSc** (Botany & Zoology), with Nature Conservation III & IV as extra subjects; Dept. of Natural Sciences, Stellenbosch University 1989.
	Hons. BSc (Plant Ecology), Stellenbosch University, 1989
	More than 20 years of experience in the Environmental Management Field (Since 1997 to present).
Professional affiliation:	Registered Professional Botanical, Environmental and Ecological Scientist at SACNASP (South African Council for Natural Scientific Professions) since 2005.
SACNAP Reg. No.:	400184/05

BRIEF RESUME OF RELEVANT EXPERIENCE

1997-2005: Employed by the Overberg Test Range (a Division of Denel), responsible for managing the environmental department of OTB, developing and implementing an ISO14001 environmental management system, ensuring environmental compliance, performing environmental risk assessments with regards to missile tests and planning the management of the 26 000 ha of natural veld, working closely with CapeNature (De Hoop Nature Reserve).

2005-2010: Joined Enviroscientific, as an independent environmental consultant specializing in wastewater management, botanical and biodiversity assessments, developing environmental management plans and

strategies, environmental control work as well as doing environmental compliance audits and was also responsible for helping develop the biodiversity part of the Farming for the Future audit system implemented by Woolworths. During his time with Enviroscientific he performed more than 400 biodiversity and environmental legal compliance audits.

2010-2017: Joined EnviroAfrica, as an independent Environmental Assessment Practitioner and Biodiversity Specialist, responsible for Environmental Impact Assessments, Biodiversity & Botanical specialist reports and Environmental Compliance Audits. During this time Mr Botes compiled more than 70 specialist Biodiversity & Botanical impact assessment reports ranging from agricultural-, pipelines- and solar developments.

2017-Present: Establish a small independent consultancy (PB Consult) specialising in Environmental Audits, Biodiversity and Botanical specialist studies as well as Environmental Impact Assessment.

LIST OF MOST RELEVANT BOTANICAL & BIODIVERSITY STUDIES

Botes. P. 2007: Botanical assessment. Schaapkraal, Erf 644, Mitchell's Plain. A preliminary assessment of the vegetation in terms of the Fynbos Forum: Ecosystem guidelines. 13 November 2007.

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ANNEXURE G: GEOTECHNICAL REPORT

REPORT ON THE GEOTECHNICAL CONDITIONS ON PORTION 30 OF PORTION 29 OF THE FARM BLAAUWS KOP 36, DISTRICT KENHARDT

2020/J011/MCP

ON BEHALF OF : MACROPLAN

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EXECTUVE SUMMARY

1 INTRODUCTION

It is envisaged to develop some 50 hectare of land on Portion 30 of Portion 29 of the farm Blaauws Kop 36 as a residential area known as Plangeni. For this purpose Cedar Land Geotechnical Consult (Pty) Ltd was appointed as subconsultant to Macroplan to conduct a geotechnical investigation on the property.

2 SITE DESCRIPTION

2.1 Site Location

Portion 30 of Portion 29 of the farm Blaauws Kop 36 is situated on the eastern bank of the Orange River, some 31 kilometers southwest of the town of Upington in the Northern Cape. The eastern and southern boundaries of the property are formed by vacant land ; the western boundary by an irrigation canal and the northern boundary by cultivated agricultural lands. The size of the property is 50 hectare.

2.2 Topography and Drainage

The land investigated is located between 783,0mamsl and 771,0mamsl, sloping east to west at approximately 2,0%. However, the slope is not even and fairly level land and rocky outcrops are present randomly distributed over the area of investigation.

Drainage takes place by means of sheetwash. The sheetwash is disposed of towards the northwest according to the slope of the land. However, several minor non-perennial water courses bisect the land from southeast to northwest. The water courses are contained in narrow and shallow gullies.

2.3 Vegetation and Landscape

The area of investigation is referred to as Bushmanland Arid Grassland. On site it was found that in the areas where natural vegetation is present it consists of a sparse stands of Acacia melliflora. Stands of aloe claviflora are present, although these plants are removed for herbal medication and extension of urbanization.

2.4 Existing Facilities

The area can be divided into two zones as follows :

2.4.1 Informal Housing

Formal structures of masonry construction and informal housing consisting of galvanized iron structures and some masonry structures are present in the northern part of the site, close to the entrance and from provincial road R359 and local distributor road. Over the larger part of the site reed and galvanized iron structures are being erected on a randomly scattered basis. Sewerage disposal is by means of pit latrines. A few public flush toilets are provided. Some residents have created small vegetable and flower gardens on the stands.

2.4.2 Vacant Land

Vacant, undeveloped land is present in the southern and eastern parts of the site.

3 NATURE OF INVESTIGATION

3.1 Test Pitting

On 6 October 2020 35 test pits were excavated with a Bell 315 SK 4X4 TLB on hire from ALS Plant Rentals. All test pits were excavated to refusal. The test pits were profiled by a professionally registered geotechnical engineer.

3.2 Materials Testing

Soil testing was undertaken by Roadlab in Upington.

Soil testing consisted of the following :

- Conductivity and pH determinations on five samples of the in-situ materials to determine the corrosivity thereof.
- Foundation indicator testing on 11 samples of the in-situ materials to determine possible conditions of heave or settlement.
- CBR and road indicator testing on three samples to determine the suitability of the in-situ materials to be utilized as road layerworks.

Due to general limited vertical extent of the soil profile and coarse nature thereof, it was not feasible to retrieved undisturbed samples to determine properties of settlement or collapse fairly accurately. In the

few cases where it was possible to excavate to an appreciable depth undisturbed sampling failed due to the loose consistency and arenaceous nature of the soil.

4 STRATIGRAPHY

The available information shows that the area of investigation is located on a subduction zone dating approximately 1000 million years old. The zone is located between the lithology of the Kaapvaal Craton and the Namaqua-Natal mobile belt. The remains of the original geology in the area are referred to as the Kakamas Terrane and the site is located on Kanoneiland granite of the Keimoes Suite that is intrusive into the terrane, as described by Moen. The granite is described as dark grey, speckled white rock with a high biotite content. The texture is coarse grained.

5 SOIL PROFILE

5.1 Colluvium

Colluvial deposits are present as surface deposits in a surface horizon between 100mm to 600mm thick. It consists of pale light brown fine sands to coarse sand with contents of gravels and cobbles of granite or calcrete in variable proportions, but mostly matrix supported. The soil matrix is normally intact.

5.2 Alluvium

Alluvium is present as a surface horizon between 300mm and 1300mm thick. The distribution thereof is limited to the debris deposited by the non-perennial water courses bordering the canal. It consists of light brown, medium dense to very loose fine sands to coarse sand with matrix supported fine gravels of quartz and very weak calcareous cementing in variable proportions.

5.3 Residual Granite

Residual granite underlies the colluvium and alluvium, occurring from depths between 100mm and 1300mm minimum, extending to 300mm to 1900mm maximum. The residual granite can be described as dirty white speckled dark grey varying to dark grey speckled white, micaceous or calcareous cemented, coarse sand containing fine gravels of quartz and cobbles of granite. The consistency of the residual granite varied between dense and very dense in the test pits.

5.4 Pedogenic Deposits

5.4.1 Nodular Calcrete

Nodular calcrete generally underlies the transported surface deposits. It was present between zero and

500mm deep minimum, extending to 300mm to 1300mm maximum. The nodular calcrete can be described as dirty white to grey white, rounded, fine to medium coarse, concretions contained in a matrix of fine sand, or as a cemented pedocrete. The consistency varies from medium dense to very dense.

5.4.2 Unconsolidated Calcrete

Unconsolidated calcrete underlies the transported surface deposits. It was present between 300mm and 900mm deep minimum, extending to 1100mm to 1300mm maximum. The unconsolidated powder calcrete can be described as dirty white, fine, calcareous sand. The consistency is medium dense.

6 GROUNDWATER

6.1 Perched Water

Perched groundwater was not encountered on site. Conditions are such that perched will generally not occur in the area.

6.2 Permanent Groundwater

Groundwater is expected to occur at depths between 20 meters and 30 meters in fractures restricted to a zone directly below the water table. The presence of permanent water has no influence on the geotechnical conditions on site.

7 SITE CLASS DESIGNATION

7.1 Geotechnical Zone I

This zone comprises 82,5% of the area investigated. The soil profile consists of a horizon of colluvium less than 600mm thick overlying medium dense to very dense residual sand or nodular calcrete and at depth bedrock granite. As per the materials profile encountered in the test pits the combined thickness of the strata of nodular calcrete and residual soil is sufficient to dissipate the stresses induced by the foundations effectively. The area is thus zoned as "S" and the materials strata can be regarded as compressible to a maximum of 10mm.

7.2 Geotechnical Zone II

This zone comprises 5,4% of the area investigated and is present in three separate areas on site. The soil profile consists of a superficial horizon of colluvium and residual soil less than 400mm thick overlying bedrock of granite. Foundation stresses induced by conventional strip foundations for single and double storey structures will result in almost negligible settlement if founded directly on the slightly

weathered and unweathered hard rock to very hard rock. The area is thus zoned as "R" and regarded as stable.

7.3 Geotechnical Zone III

This zone comprises 2,4% of the area investigated. The zone is present in four separate areas along the western boundary of the property. The profile consists of a horizon of transported sand less than 600mm thick overlying medium dense to very dense residual sand or nodular calcrete and at depth bedrock granite. As per the materials profile encountered in the test pits the combined thickness of the strata of nodular calcrete and residual soil is sufficient to dissipate the stresses induced by the foundations effectively. However, the area is influenced by the periodic presence of water originating from blocking the natural water courses and seepage from the canal. Damage to structures by occur due to soil moisture triggering the corrosivity of the soil. Potentially the area can be zoned as "S" and the materials strata can be regarded as compressible to a maximum of 10mm if the inundation of the area can be resolved. In the unresolved condition the area is zoned as "P(Water)" and conditions are regarded as unfavourable for residential development.

7.4 Geotechnical Zone IV

This zone comprises 9,7% of the area investigated. This zone is characterized by the numerous localized granite outcrops. Such outcrops consist of areas of exposed corestones and areas of hard rock present as fairly level batholitic surfaces. Potentially the areas can be zoned as R which can in principle be regarded as stable, but the highly undulating land surface due to the presence of boulders and outcrops detracts from the suitability thereof for residential development. The area is thus zoned as "P(Outcrops)".

8 CONDITIONS OF EXCAVATION

On average over the entire site it is most likely that a 30 ton track mounted excavator will prove to be more suitable equipment for excavation than the 55kW TLB, achieving deeper levels of penetration prior to refusal.

Irrespective of which method of excavation is considered, the most important issue is that across the entire site the depth to bedrock that can be regarded as hard rock excavation that is highly variable as follows :

- Unweathered, very hard rock, granite resulting in virtually immediate refusal of excavation.
- Slightly weathered, hard rock, granite resulting in very slow penetration indicating conditions of uneconomical excavation by the mechanical equipment used for the investigation.

- Very dense, residual granite tending to medium hard rock resulting in very slow penetration indicating conditions of uneconomical excavation by mechanical equipment used for the investigation.

Conditions of Boulder Class A excavation could be identified in one test pit only, but should the presence of outcrops be taken into account, the volume of such excavation may be significant.

As for individual areas, the following is applicable :

8.1 Geotechnical Zone I

Refusal of excavation was encountered in all the test pits between depths of 500mm and 1500mm, averaging 1050mm. The implication of this is that should trenches require excavated depths to 1000mm, zero of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 30% of the excavation may be classified as hard.

8.2 Geotechnical Zone II

Refusal of excavation was encountered in all the test pits between depths of 50mm and 400mm, averaging 225mm. The implication of this is that should trenches require excavated depths to 1000mm, 77,5% of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 85% of the excavation may be classified as hard.

8.3 Geotechnical Zone III

Refusal of excavation was encountered in all the test pits between depths of 1300mm and 2200mm, averaging 1750mm. The implication of this is that conditions of hard rock excavation will not be encountered to trench depths of 1500mm. However, cognizance must be taken of the fact that in the present state conditions of wet excavation may be present.

8.4 Geotechnical Zone IV

Minimal test pitting could be conducted in these areas. The test pitting conducted may not represent actual conditions due to the highly undulating rock profile. It is thus proposed on a preliminary basis to allow for 50% hard rock excavation and 50% boulder class A excavation in this zone.

9 LAND SLOPE

The average slope across the larger part of the land between 1,5% and 2,5%, but highly variable in Geotechnical Zone IV. The land lope does not detract from the development potential of the area.

No steep slopes are present on the property.

10 AREAS SUBJECT TO FLOODING

Blockages of the natural water courses occur on the western perimeter of the property close to the canal. The combination of such blocking and seepage from leakages of the canal results in periodical inundation of four areas close to the canal.

11 MATERIALS UTILISATION

- *Trench Backfilling* : None of the materials are suitable for selected fill or pipe bedding. All materials can be used for normal backfill.
- *Layerworks for Paved or Segmental Block Paving* : The residual soils are suitable for the construction of in-situ selected and subbase for lightly trafficked streets.
- *Wearing Course for Gravel Roads in Urban Areas* : None of the soil materials are 100% suitable for this purpose. The use of these materials will generally result in a road surface subject to raveling and corrugations.

12 AREAS SUBJECT TO FLOODING

12.1 Presence of Non-perennial Gullies

Five shallow non-perennial gully areas have been identified. Although these areas are not subject to continuous flooding, such events may result in damage to infrastructure if not designed for. It is recommended that the flood characteristics of these water courses be determined and a safe area between the future houses and the gullies maintained.

12.2 Areas of Ponding

These area are zoned separately as Geotechnical Zone III. Should it be necessary to locate erven in this zone, the land shall be rehabilitated to allow safe development thereof. Such rehabilitation shall consist of repairs of the leaks in the canal and providing sufficient channeling for the non-perennial streams to eliminate ponding in the canal area.

13 FOUNDATION AND STRUCTURAL DESIGN

13.1 Geotechnical Zone I

13.1.1 Strip Foundations

Foundations of 400mm wide placed directly on the medium dense to very dense residual granite or nodular calcrete may be used. Should the areas of the proposed dwellings not exceed 200m^2 foundations for internal non-loadbearing walls may consist of thickened floorslabs. Should this option be adopted the floorslabs shall be reinforced steel mesh.

13.1.2 Slab-on-the-ground Foundations

The solution of slab-on-the-ground foundations may only be used for dwellings less than 200m^2 in area. Edge beams shall be placed directly on the medium dense to dense nodular calcrete or residual soil. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs.

13.2 Geotechnical Zone II

13.2.1 Strip Foundations

Foundations of 400mm wide placed directly on bedrock of granite may be used. Should the areas of the proposed dwellings not exceed 200m^2 foundations for internal non-loadbearing walls may consist of thickened floorslabs. Should this option be adopted the floorslabs shall be reinforced steel mesh.

13.2.2 Slab-on-the-ground Foundations

The solution of slab-on-the-ground foundations may only be used for dwellings less than 200m^2 in area. Edge beams shall be placed directly on bedrock of granite. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs.

13.3 Geotechnical Zone III

Should remedial measures be implemented successfully to the four areas may be made available for residential development. Such remedial measures shall include features to prevent inundation of the areas and disposal of flood water from the water courses, as well as repairs to the canal.

The two options can be discussed as follows :

13.3.1 Strip Foundations

Foundations of 400mm wide placed directly on the medium dense to very dense residual granite or nodular calcrete may be used. Should the areas of the proposed dwellings not exceed 200m^2 foundations for internal non-loadbearing walls may consist of thickened floorslabs. Should this option be adopted the floorslabs shall be reinforced steel mesh.

13.3.2 Slab-on-the-ground Foundations

The solution of slab-on-the-ground foundations may only be used for dwellings less than 200m^2 in area. Edge beams shall be placed directly on the medium dense to dense nodular calcrete or residual soil. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs.

13.4 Geotechnical Zone IV

In principle it is possible to build successfully in these rocky conditions, but it will come at a cost. It is recommended that these areas only be developed if the demand for houses exceed the availability of stands in Zones I and II. The conditions in each stand will have to be designed for on an individual basis.

14 CORROSIVE SOIL

The results of materials testing undertaken for this investigation indicate that all soil materials are highly to very highly corrosive. Potentially, this has an influence on pavement design, installation of wet services and house construction. However, the corrosive character of soil is only triggered by the presence of soil moisture, but the condition that soil moisture will never be present cannot be guaranteed.

The presence of different types of soluble salts result in different types of damage to infrastructure. It is therefore recommended that additional testing be conducted to identify the types of corrosive material present, be it sulfides, sulfates or chloride, and provide the correct protection against corrosion that may result due to the presence of these materials.

15 OTHER CONSIDERATIONS

- *Undermining* : The area is not subject to undermining.

- *Seismic Activity* : The Peak Ground Acceleration expected in 50 years is 0,07g. A low risk for the development of earth tremors therefore exist.
- *Dolomite* : The area of investigation is not subject to any restrictions due to the presence of dolomite. Bedrock of dolomite does not occur in the area of investigation.

16 CONCLUSIONS

The property is regarded as being of favourable to poor suitability for residential development. The factors that reduce the suitability of the land for development are :

- The presence of batholitic rock outcrops and large corestones close to the surface. The presence thereof will result in conditions of hard excavation and boulder excavation. While it is physically possible to establish housing units under these conditions, the decision to develop these areas shall be based on economical constraints.
- The presence of ponding in the area close to the canal. The ponding occurs due to the canal blocking the natural flow of the non-perennial water courses and is aggravated by seepage from leakages from the canal. The areas of ponding can only be utilized for erven and provision of housing if the drainage problems are solved.
- The residual soils and calcrete are highly corrosive. This is problematic in especially Geotechnical Zone III as the corrosive properties of soil are usually activated by the presence of interstitial water.

REPORT ON THE GEOTECHNICAL CONDITIONS ON PORTION 30 OF PORTION 29 OF THE FARM BLAAUWS KOP 36, DISTRICT KENHARDT

2020/J032/MCP_01

INDEX

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REPORT ON THE GEOTECHNICAL CONDITIONS ON PORTION 30 OF PORTION 29 OF THE FARM BLAAUWS KOP 36, DISTRICT KENHARDT

1 INTRODUCTION

It is envisaged to develop some 50 hectare of land on Portion 30 of Portion 29 of the farm Blaauws Kop 36 as a residential area known as Plangeni. For this purpose Cedar Land Geotechnical Consult (Pty) Ltd was appointed as subconsultant to Macroplan to conduct a geotechnical investigation on the property based on a quotation dated 27 September 2019.

2 TERMS OF REFERENCE

The requirements of the following documents were adhered to in the conduct of the investigation and reporting of the project :

- The document *Geotechnical Site Investigations for Housing Developments (Generic Specification GFSH-2)*, issued by the National Department of Housing in September 2002.
- The document *SANS 634-1 : Geotechnical Investigations for Township Development*, issued by SABS in February 2012.

3 AVAILABLE INFORMATION

The following sources of available information recording available data obtained in the larger Keimoes area have been consulted for background information :

- *Breytenbach FJ* : Geotechnical Conditions in a Part of Keimoes Extension 7 : A Report for the Establishment of 121 Housing Units, issued by Soilkraft cc on behalf of Roadlab/Prehab JV on 12 April 2009.

- *Breytenbach FJ* : Geotechnical Conditions on Erf 1070 Upington : A Phase 3 Report for the Development of Upington Truck Stop, issued by Soilkraft cc on behalf of Mr Kobus Duvenhage on 16 November 2011.
- *Breytenbach FJ* : Geotechnical Report for the Town of Keimoes : Rezoning and Subdivision of Erf 666, Keimoes, issued by Soilkraft cc on behalf of the Kai !Garib Municipality on 31 July 2012.
- *Breytenbach FJ* Geotechnical Conditions on the Remainder of Erf 2867 Keimoes : A Phase 3 Report for the Proposed Construction of a New Magistrate's Office, issued by Soilkraft cc on behalf of WorleyParsons (Pty) Ltd on 14 May 2013.
- *Breytenbach FJ* : Report on the Geotechnical Conditions on Portion 128 and a Portion of the Restant of the Farm Kousas 459, Keimoes, issued by Cedar Land Geotechnical Consult (Pty) Ltd on behalf of Macroplan on 28 May 2020.

4 SITE DESCRIPTION

4.1 Site Location

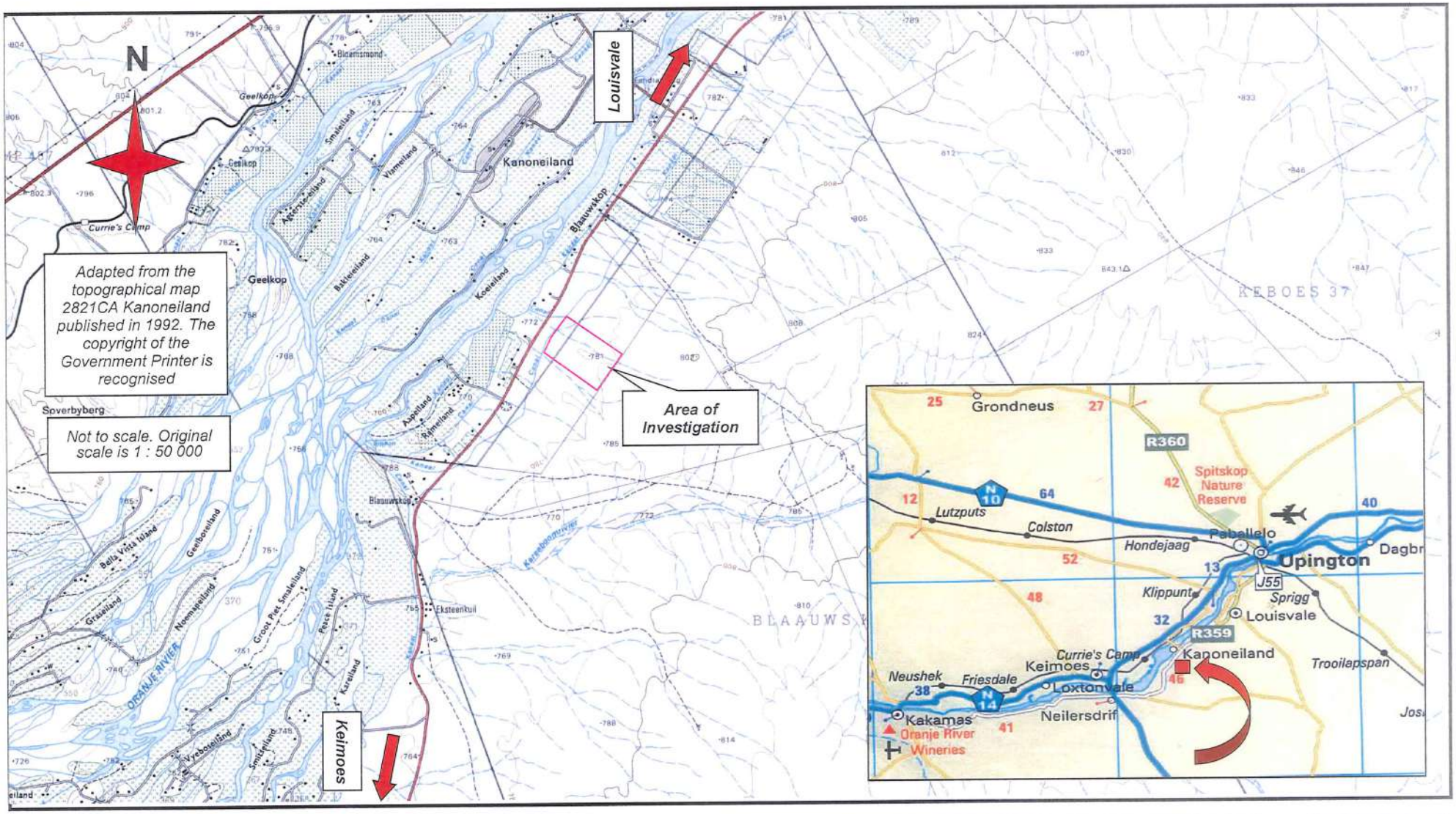
Portion 30 of Portion 29 of the farm Blaauws Kop 36 is situated on the eastern bank of the Orange River, some 31 kilometers southwest of the town of Upington in the Northern Cape. The eastern and southern boundaries of the property are formed by vacant land ; the western boundary by an irrigation canal and the northern boundary by cultivated agricultural lands. Access to the property is via a concrete block paved road originating from provincial road R359. The size of the property is 50 hectare.

Refer to the attached Figure 1 : Locality Plan.

4.2 Topography and Drainage

The land investigated is located between 783,0mamsl and 771,0mamsl, sloping east to west at approximately 2,0%. However, the slope is not even and fairly level land and rocky outcrops are present randomly distributed over the area of investigation.

Drainage takes place by means of sheetwash. The sheetwash is disposed of towards the northwest according to the slope of the land. However, several minor non-perennial water courses bisect the land from southeast to northwest. The water courses are contained in narrow and shallow gullies. These drainage features are filled with thick deposits of loose and very loose sand and it appears as if some conditions of high soil moisture may develop in the area of the canal.



C.L.G.C.

LOCALITY PLAN

FIGURE 1

4.3 Vegetation and Landscape

Based on the work done by Mucina[Reference 14] the area of investigation is referred to as Bushmanland Arid Grassland. The landscape features are described as consisting of extensive to irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses giving this vegetation type the character of semi-desert steppe. In places low shrubs change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected. On site it was found that in the areas where natural vegetation is present it consists of a sparse stands of Acacia melliflora. Stands of aloe claviflora are present, although these plants are removed for herbal medication and extension of urbanization.

4.4 Existing Facilities

Site conditions are illustrated on Photo 1 . Site Conditions. The area can be divided into two zones as follows :

4.4.1 Informal Housing

Formal structures of masonry construction and informal housing consisting of galvanized iron structures and some masonry structures are present in the northern part of the site, close to the entrance and from provincial road R359 and local distributor road. Over the larger part of the site reed and galvanized iron structures are being erected on a randomly scattered basis. Water is provided from emergency tanks via an underground pipe network present in the older part of the village. These tanks were provided as measures during the Covid-19 pandemic and electricity are provided to the structures, though it may not always be legal connections. Sewerage disposal is by means of pit latrines. A few public flush toilets are provided. Some residents have created small vegetable and flower gardens on the stands.

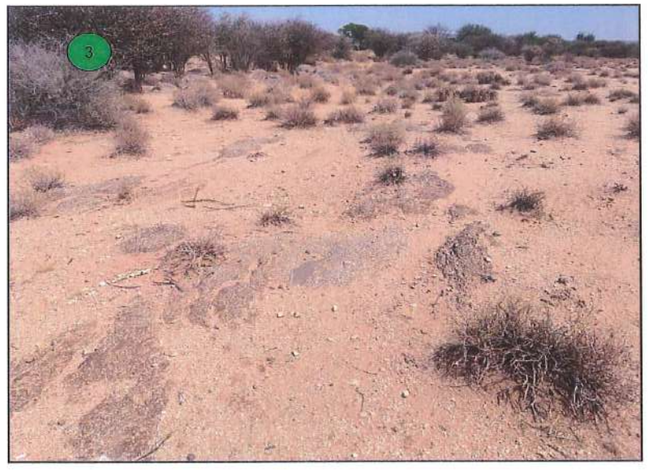
4.4.2 Vacant Land

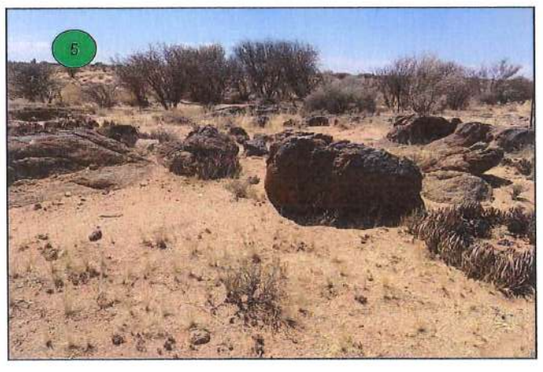
Vacant, undeveloped land is present in the southern and eastern parts of the site.

5 NATURE OF INVESTIGATION

5.1 Test Pitting

In compliance with the requirements of SANS 634 and GFSH-2 test pitting was conducted to provide applicable geotechnical information. On 6 October 2020 35 test pits were excavated with a Bell 315 SK 4X4 TLB on hire from ALS Plant Rentals. The TLB was equipped with a





1 Site conditions as seen from southeastern corner. Test pit 1 in excavation. Slight dip and darker rock line may represent a fault zone.

2 Informal waste site.

3 Granite exposed in non-perennial water course.

4 Blocks of excavated (blasted) solid granite.

5 Granite corestones.

C.L.G.C.

SITE CONDITIONS IN PLANGENI

PHOTO 1

600mm wide bucket. All test pits were excavated to refusal.

The test pits were profiled by a professionally registered geotechnical engineer. For the benefit of the non-geotechnical reader of this document, these guidelines are summarized in the attached Table 1 : Soil Profiling Parameters. The profiles of the test pits may be found in Addendum A to this report. The positions of the test pits are indicated on the attached Figure 2 : Site Plan. Provisional co-ordinates for property beacons A to H are indicated on this figure.

TABLE 1 : SOIL PROFILING PARAMETERS

CONSISTENCY : GRANULAR SOILS

SPT N	GRAVELS & SANDS Generally free draining soils		DRY DENSITY (kg/m^3)
<4	Very loose	Crumbles very easily when scraped with geological pick. Requires power tools for	<1450
4-10	Loose	Small resistance to penetration by sharp pick point. requires many blows by pick point	1450-1600
10-30	Medium dense	Considerable resistance to penetration by sharp pick point	1600-1750
30-50	Dense	Very high resistance to penetration by sharp pick point. Requires many blows by pick point for excavation.	1750-1925
>50	Very dense	High resistance to repeated blows of geological pick. Requires power tools for excavation.	>1925

CONSISTENCY : COHESIVE SOILS

SPT N	SILTS & CLAYS and combinations with SANDS Generally slow draining soils		UCS (kPa)
<2	Very soft	Pick point easily pushed in 100mm. Easily moulded by fingers	<50
2-4	Soft	Pick point easily pushed in 30mm-to 40mm Moulded by fingers with some pressure.	50-125
4-8	Firm	Pick point penetrates to 10mm Very difficult to mould with fingers.	125-250
8-15	Stiff	Slight indentation by pick point Cannot be moulded by fingers. Penetrated by thumb nail	250-500
15-30	Very stiff	Slight indentation by blow of pick point. Requires power tools for excavation	500-1000

SOIL TYPE

SOIL TYPE	PARTICLE SIZE (mm)
Clay	<0.002
Silt	0,002-0,06
Sand	0,06-2,0
Gravel	2,0-60,0
Cobbles	60,0-200,0
Boulders	>200,0

MOISTURE CONDITION

Dry	No water detectable
Slightly moist	Water just discernable
Moist	Water easily discernable
Very moist	Water can be squeezed out
Wet	Generally below water table

COLOUR

Speckled	Very small patches of colour <2mm
Mottled	Irregular patches of colour 2-6mm
Blotched	Large irregular patches 6-20mm
Banded	Approximately parallel bands of varying colours
Streaked	Randomly orientated streaks of colour
Stained	Local colour variations : Associated with discontinuity surfaces

SOIL STRUCTURE

Intact	No structure present.
Fissured	Presence of discontinuities, possibly cemented.
Slickensided	Very smooth, glossy, often striated discontinuity planes.
Shattered	Presence of open fissures, Soil break into gravel size blocks.
Micro shattered	Small scale shattering, very closely spaced open fissures. Soil breaks into sand size crumbs
Residual structures	Residual bedding, laminations, foliations etc.

ORIGIN

Transported	Alluvium, hillwash, talus etc.
Residual	Weathered from parent rock, eg residual granite
Pedocretes	Ferricrete, silcrete, calcrete etc.

DEGREE OF CEMENTATION OF PEDOCRETES

TERM	DESCRIPTION	UCS (MPa)
Very weakly cemented	Some material can be crumbled between finger and thumb. Disintegrates under knife blade to a friable state.	0,1-0,5
Weakly cemented	Cannot be crumbled between strong fingers. Some material can be crumbled by strong pressure between thumb and hard surface. Under light hammer blows disintegrate to a friable state.	0,5-2,0
Cemented	Material crumbles under firm blows of sharp pick point. Grains can be dislodged with some difficulty by a knife blade.	2,0-5,0
Strongly cemented	Firm blows of sharp pick point on hand-held specimen show 1-3mm indentations. Grains cannot be dislodged by knife blade.	5,0-10,0
Very strongly cemented	Hand-held specimen can be broken by single firm blow of hammer head. Similar appearance to concrete.	10,0-25

5.2 Materials Testing

Soil testing was undertaken by Roadlab in Upington. As a matter of quality control duplicate samples were sent to the Roadlab branch in Germiston for independent testing to verify the results.

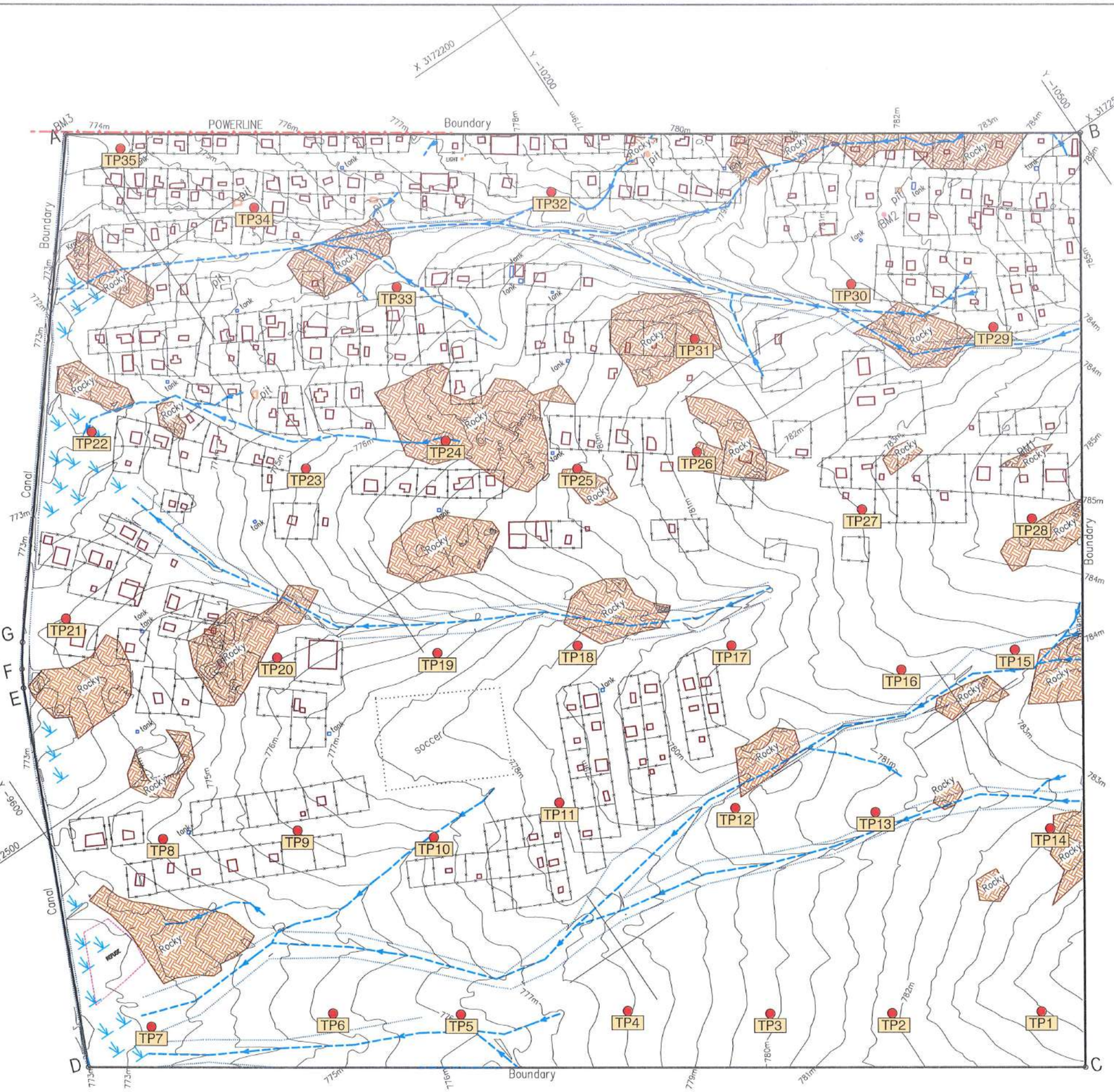
COORDINATES – PLANGENI		
System: WGS84 WG21		
Point	Y	X
A	-09892.143	3172092.425
B	-10502.108	3172501.970
C	-10128.869	3173057.778
D	-09533.263	3172656.944
E	-09645.873	3172405.313
F	-09652.530	3172393.318
G	-09663.543	3172377.571

FIGURE 2 :
SITE PLAN

LEGEND

TP1 TEST PIT POSITION

ROCKY AREA



60m 180m 300m
0m 120m 240m

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cedarland.mariette@breede.co.za (Mariette)

TAAK: JOB NAME:	Plangeni Development
LIGGING: SITE:	Portion 30 of the Farm Blaauwskop 36
KLIËNT: CLIENT:	Kai !Garib Municipality
TEKENING NO: DRAWING NO:	Figure 2 : Site Plan
DATUM: DATE:	9 October 2020

Soil testing consisted of the following :

- Conductivity and pH determinations on five samples of the in-situ materials to determine the corrosivity thereof.
- Foundation indicator testing on 11 samples of the in-situ materials to determine possible conditions of heave or settlement.
- CBR and road indicator testing on three samples to determine the suitability of the in-situ materials to be utilized as road layerworks.

The results of the soil testing may be found in Addendum B. However, for easy reference, these results are summarized in the attached Table 2 : Summary of Soil Testing. The data sheets contained in Addendum B are copies of the originals, which are available from Roadlab.

Due to general limited vertical extent of the soil profile and coarse nature thereof, it was not feasible to retrieved undisturbed samples to determine properties of settlement or collapse fairly accurately. In the few cases where it was possible to excavate to an appreciable depth undisturbed sampling failed due to the loose consistency and arenaceous nature of the soil.

6 SITE GEOLOGY AND GEOHYDROLOGY

Although the geology of the larger area around Keimoes appears to consist ubiquitously of granitoid rock, it is in fact highly complex and from a stratigraphical viewpoint provides complicated formation. As a background to the site geology an effort is made in this subparagraph to provide a simplified explanation of the regional geology of the area. For this purpose publications by Visser[Reference 14.2], McCarthy[Reference 14.3], Cornell[Reference 14.4] and Moen[Reference 14.5] were consulted. Of these four references, the latter two can be regarded as site specific.

Two concepts must be identified :

- *Craton* : A craton is a block of ancient crust, formed 3000 million years ago and its rocks have essentially remained unchanged. Cratons form the larger parts of the land-building mass.
- *Terrane* : A terrane is a term for a tectonostratigraphic unit, which is a fragment of crustal material formed on, or broken off from, one tectonic plate and accreted or "sutured" to crust lying on another plate. The crustal block or fragment preserves its own distinctive geologic history, which is different from that of the surrounding areas.

TABLE 2 : SUMMARY OF SOIL TESTING

TEST PIT	SAMPLE NO	DEPTH (mm)	SOIL ORIGIN	SOIL TYPE	GM	PI	LL	ACTIVITY	pH	CONDUCTIVITY (Sm^{-1})	% < 0,002mm	OMC (%)	MDD (kgm^{-3})	SOIL CLASS		
														COLTO	PRA	UNIFIED
3	U9427	300-1100	Residual granite	Well-graded sand	1,60	6	26	Low			0,0				A-1-b(0)	SM-SC
6	U9428	200-800	Residual granite	Sandy gravel	2,30	3	26	Low	8,33	0,09	0,1	6,7	2091	G6	A-1-a(0)	SW-SM-SC
9	U9429	300-900	Residual granite	Gravelly sand	2,10	5	21	Low			0,0				A-1-b(0)	SW-SM-SC
12	U9430	100-1100	Residual granite	Gravelly sand	2,00	3	26	Low	7,73	0,15	0,2				A-1-b(0)	SW-SM
15	U9431	0-600	Alluvium	Fine sand	1,30	5	21	Low			0,0				A-2-4(0)	SM-SC
18	U9432	0-400	Pedogenic deposits	Nodular calcrete	2,00	3	25	Low	8,10	0,15	0,0	9,0	2079	G6	A-1-b(0)	SM
21	U9433	0-500	Colluvium	Well-graded sand	1,70	0	25	Low			0,0				A-1-b(0)	SM
24	U9434	300-1300	Pedogenic deposits	Nodular calcrete	1,80	4	24	Low			0,6				A-1-b(0)	SM-SC
27	U9435	200-700	Residual granite	Coarse sand	2,00	8	31	Low	8,29	0,08	0,1				A-2-4(0)	SM
30	U9436	0-300	Residual granite	Sandy gravel	2,10	2	21	Low			0,3	6,4	2098	G6	A-1-a(0)	SW-SC
33	U9437	200-1300	Residual granite	Coarse sand	1,90	3	27	Low	8,38	0,02	0,2				A-1-b(0)	SW-SM

6.1 Regional Geology

The regional geology of the area is indicated in Figure 3 : Regional Geology.

The geological processes by which the area under consideration was shaped, initiated some 1000 million years ago with the formation of the supercontinent Rodinia. A mountain chain of global extent formed along the boundaries, underlain by metamorphic rocks that have since then been exposed due to erosion. Metamorphic rocks of this age formed across South Africa to the south and west of the Kaapvaal Craton, known as the Namaqua-Natal Province. The Namaqua-Natal Province can be divided into five tectonostratigraphic subprovinces and terranes, based on marked changes in the lithostratigraphy across structural discontinuities. The five domains so recognized are the Richtersveld Subprovince, the Bushmanland Terrane, Kakamas Terrane, Areachap Terrane and Kaaien Terrane. The tectonic subdivision as proposed on Figure 2 (Cornell) is reproduced in this document as Figure 4.

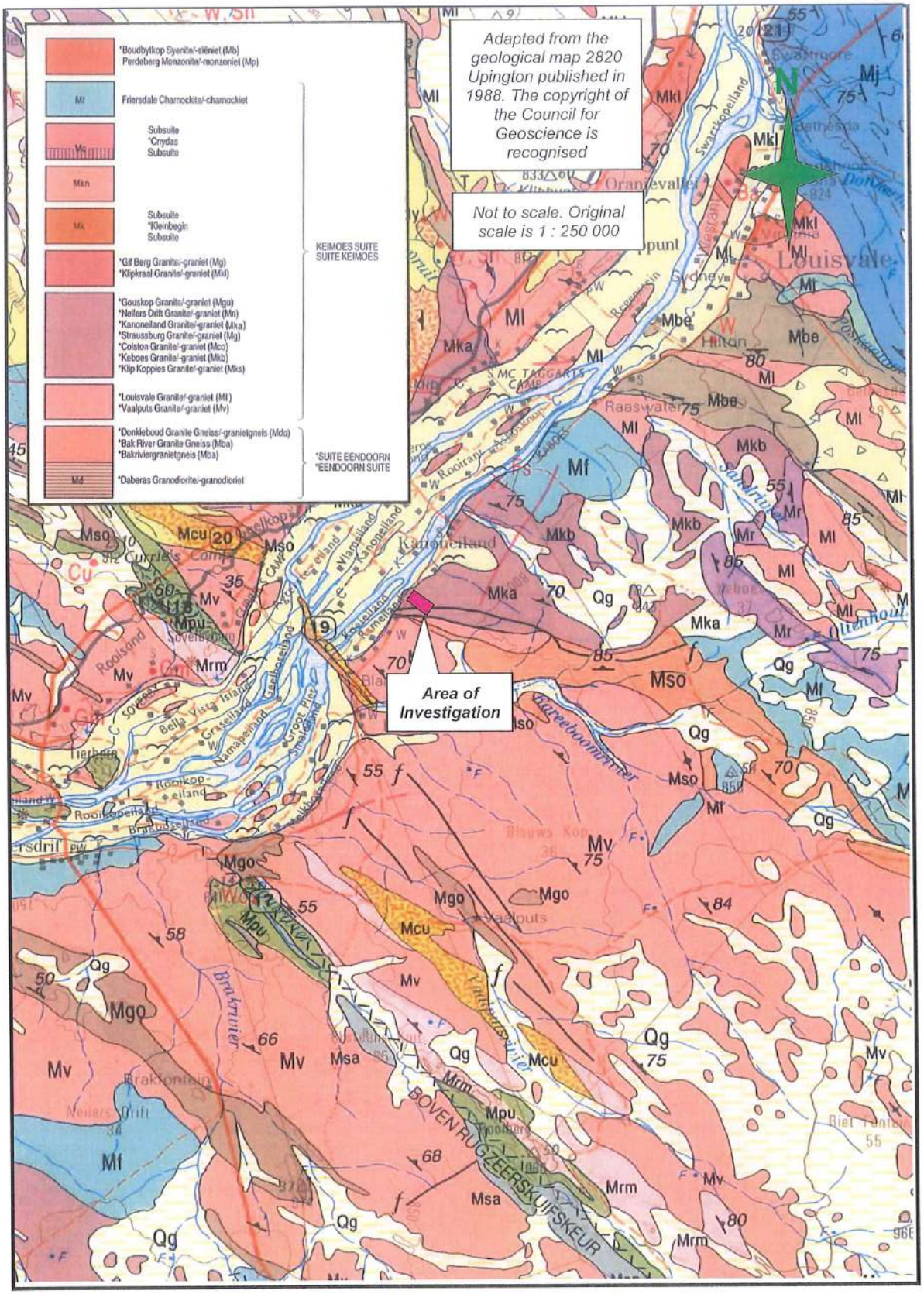
The process of landforming can be described as compatible to the modern concept of plate tectonics. In this case the Namaqua plate became buried beneath the Kaapvaal Craton in a subduction zone. Considering the forces involved it can be regarded as a violent process, resulting in the breaking up of the landmass into the five domains as described above, associated with the intrusion of recycled rock material from the subduction zone. In the case of the Kakamas terrane, numerous intrusions occurred during the process of subduction, of which the Keimoes Suite is one. The Keimoes Suite in turn, consists of several granitic batholites. Moen as well as the official geology map 2280 describe the presence of Kanoneiland granite batholith of the Keimoes Suite in the area of investigation. On Figure 3 the Kanoneiland granite is indicated in purple and referenced as Mka.

A schematic plate tectonic model showing the process as proposed on Figure 2.40 (Moen) is reproduced in this document as Figure 5. It is on the intrusive rock material of the Keimoes Suite of the Kakamas terrane that the proposed Plangeni development is located.

6.2 Site Geology

The site geology is illustrated on Figure 6 : Site Geology. Although bedrock occurs exclusively as granite of the Kanoneiland batholite, the figure illustrates the possible presence of post intrusive tectonic occurrences.

The Kanoneiland granite is described as a mesocratic biotite granite characterized by a poorly developed tectonic fabric and numerous mafic and leucocratic inclusions. The mafic inclusions consist chiefly of biotite and/or hornblende, lying in the foliation planes. The granite is medium to coarse grained and non-porphyritic. Although the granite generally appeared to



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REGIONAL GEOLOGY

FIGURE 3

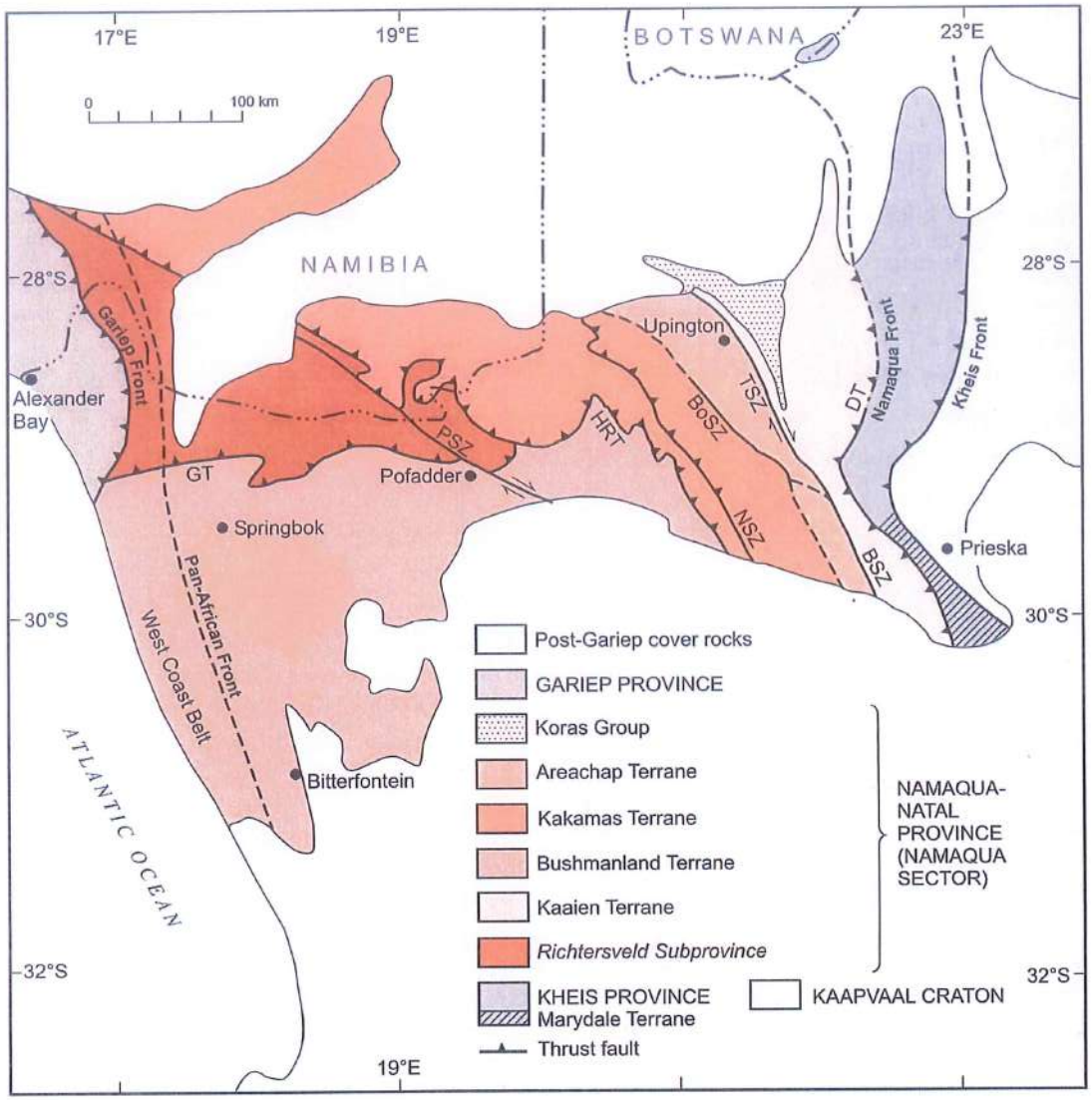


FIGURE 4 : TECTONIC SUBDIVISION OF THE NAMAQUA SECTOR

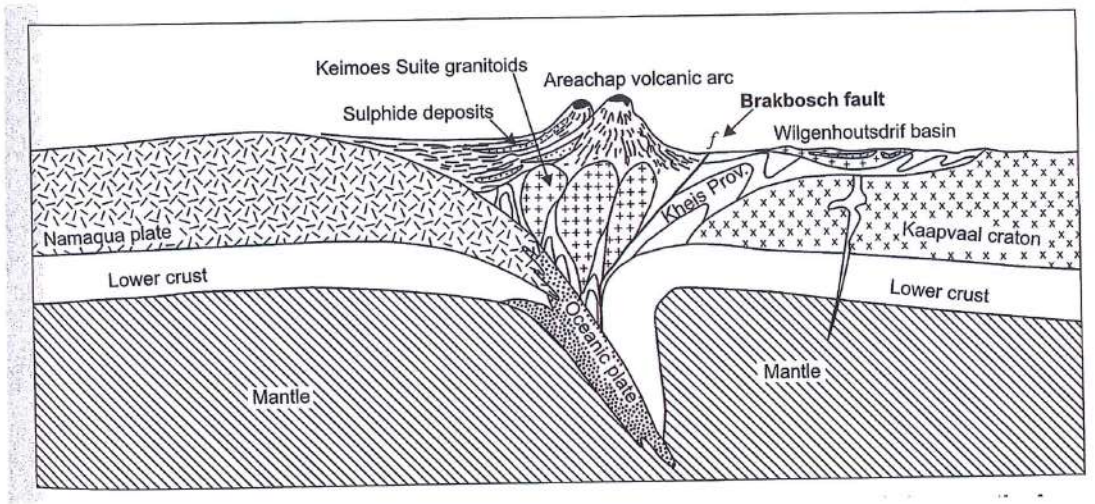


FIGURE 5 : SCHEMATIC PLATE TECTONIC MODEL SHOWING THE GRANITOIDS OF THE KEIMOES SUITE

Lithology		Suite	Terrane
Mka	Kanoneiland Granite	Keimoes	Kakamas

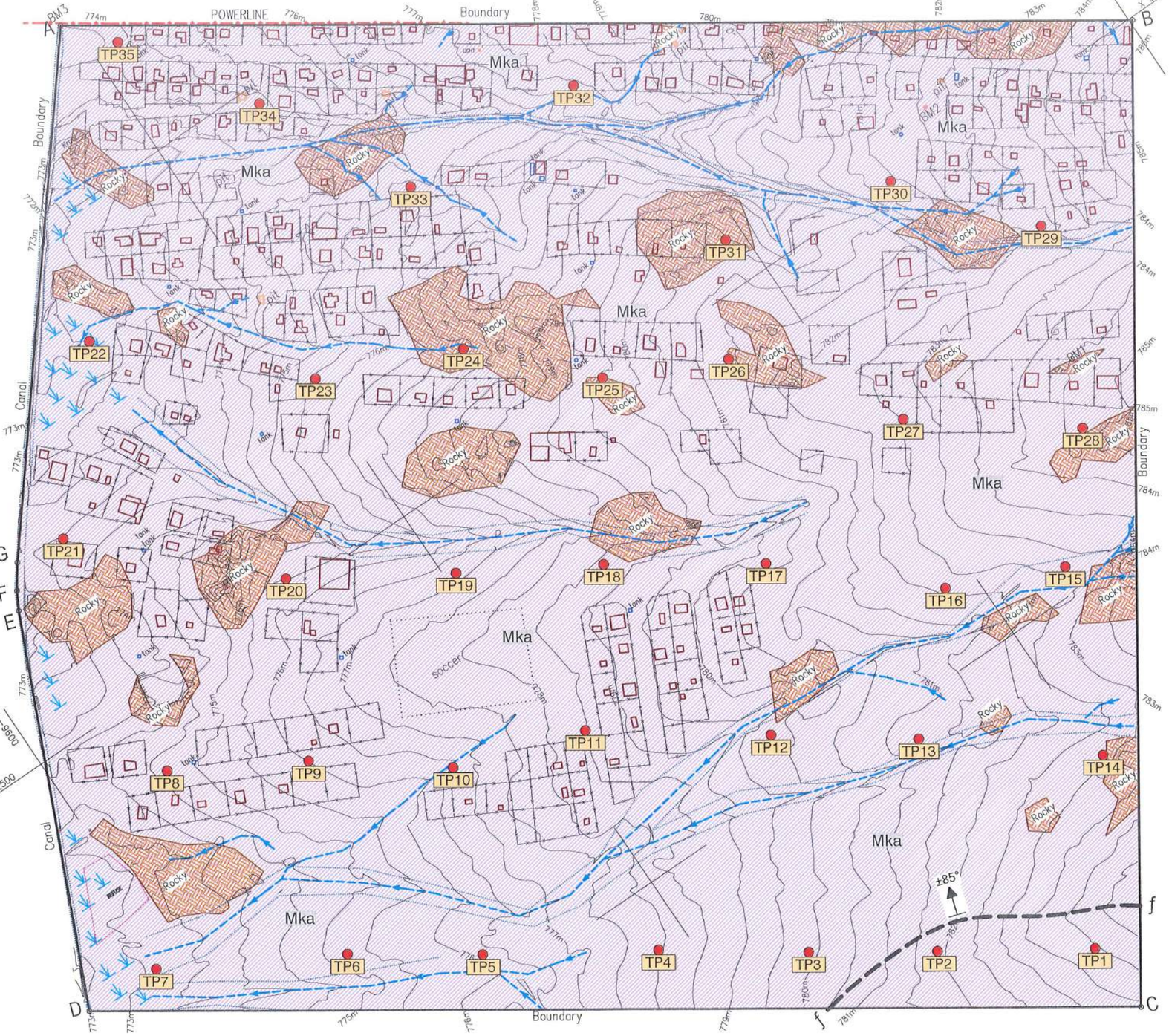
FIGURE 6 :
SITE GEOLOGY

LEGEND

TP1 TEST PIT POSITION

ROCKY AREA

±85° POSSIBLE FAULT ZONE



60m 180m 300m
0m 120m 240m

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LIGGING: SITE:	Portion 30 of the Farm Blaauwskop 36
KLIËNT: CLIENT:	Kai !Garib Municipality
TEKENING NO: DRAWING NO:	Figure 6 : Site Geology
DATUM: DATE:	19 October 2020

be massive in the test pit excavations, a regional dip of 70° to 75° towards the north east is indicated on Figure 3. The area of investigation is characterized by the randomly distributed, numerous outcrops and sub outcrops of granite.

The presence of a fault zone close to or in the area of investigation. The fault line strikes virtually due east-west. Possible evidence of such a line was encountered between TP's 1 and 14, extending to the area between TP's 2 and 3. The line can be clearly identified by a linear, narrow outcrop of granite and is also discernable on Photo 1.

6.3 Soil Profile

6.3.1 Colluvium

Colluvial deposits were encountered in TP's 1 to 6, 8 to 12, 16, 19 to 23, 27 to 31 and 32 to 35 as a surface horizon between 100mm to 600mm thick. It consists of pale light brown, fine sand to coarse sand with contents of gravels and cobbles of granite in variable proportions, but mostly matrix supported. The soil matrix is normally intact, but some examples of very weak calcareous cementing occur as well as the presence of small, rounded calcrete concretions. At the time of investigation the colluvium was dry and the consistency varied between loose and medium dense.

6.3.2 Alluvium

Alluvium was encountered in TP's 7, 13 to 15 and 24 as a surface horizon between 300mm and 1300mm thick. The distribution thereof is limited to the debris deposited by the non-perennial water courses bordering the canal. It consists of light brown fine sand to coarse sand with matrix supported fine gravels of quartz in variable proportions. The soil matrix is normally intact, but some examples of very weak calcareous cementing occur as well as the presence of small, rounded calcrete concretions. At the time of investigation the alluvium was dry and the consistency varied between very loose and medium dense. The alluvium in all the test pits contained a fair number of tree roots.

6.3.3 Residual Granite

Residual granite was encountered in TP's 1 to 12, 15, 19, 20, 22, 23, 26, 27, 30 to 35. It underlies the colluvium and alluvium, occurring from depths between 100mm and 1300mm minimum, extending to 300mm to 1900mm maximum. The thickness of the horizon varied between 150mm and 1100mm in the test pits. The residual granite can be described as dirty white speckled dark grey varying to dark grey speckled white coarse sand containing fine gravels of quartz and cobbles of granite. The soil matrix is normally micaceous, but some

examples of very weak calcareous cementing occur as well as the presence of small, rounded calcrete concretions. The consistency of the residual granite varied between dense and very dense in the test pits.

6.3.4 Pedogenic Deposits

Pedogenic deposits are present on site, both as unconsolidated granular material and nodular calcrete. It appears as if these deposits post-date the Mokalanen Formation. The pedogenic deposits are not as widely distributed on site as in the areas of Upington, Keimoes and Groblershoop.

6.3.4(i) Nodular Calcrete

Nodular calcrete was encountered in TP's 13, 14 and 28 underlying the transported surface deposits, but in TP 18 exposed as surface horizon. It was present between zero and 500mm deep minimum, extending to 300mm to 1300mm maximum. The thickness of the horizon varied between 200mm and 800mm in the test pits. The nodular calcrete can be described as dirty white to grey white, rounded, fine to medium coarse, concretions contained in a matrix of fine sand, or as a cemented pedocrete. The consistency varies from medium dense to very dense.

6.3.4(ii) Unconsolidated Calcrete

Unconsolidated calcrete was encountered in TP's 19 and 24 underlying the transported surface deposits. It was present between 300mm and 900mm deep minimum, extending to 1100mm to 1300mm maximum. Elsewhere on site the presence of powder calcrete as a lesser component of the soil is widely distributed across the site in all soil strata. The unconsolidated powder calcrete can be described as dirty white, fine, calcareous sand. The consistency is medium dense.

6.4 Groundwater

6.4.1 Perched Water

Perched groundwater was not encountered in any of the test pits during the investigation. Considering the climate of the area and the nature of in situ materials, it is anticipated that perched water will generally not prove problematic on the site. It may be present in the lesser drainage courses after events of inundation. Even if it did occur, the grading of in-situ materials is such that dispersal will take place fairly rapidly. Furthermore, it is expected that

perched water and/or surface seepage may occur shortly after precipitation events and in years of excessive rain only.

6.4.2 Permanent Groundwater

Vegter[Reference 14 6] indicates the probability for drilling successfully for water in the area to be between 40% and 60%, and the probability that such a borehole will yield more than 2l/s is less than 10%. Groundwater is expected to occur at depths between 20 meters and 30 meters in fractures restricted to a zone directly below the water table.

7 GEOTECHNICAL EVALUATION

The engineering properties of the in-situ materials are summarized in Table 3 : Summary of Engineering Properties. The characterizations have been derived based on the Unified materials classifications as reported by literature studies.

7.1 Engineering and Material Characteristics

7.1.1 Properties of Heave

The results of the materials testing as reported in Table 2 indicate the in-situ materials are not expansive. Any future structures will thus not be subject to heave. The content of active clay, that is the material smaller than 0,002mm in diameter, was less than 0,5% for all the samples tested.

7.1.2 Properties of Settlement

7.1.2(i) Colluvium

Colluvial deposits were encountered in TP's 1 to 6, 8 to 12, 16, 19 to 23, 27 to 31 and 32 to 35 as a surface horizon between 100mm to 600mm thick. It consists of pale light brown fine sands to coarse sand with contents of gravels and cobbles of granite or calcrete in variable proportions, but mostly matrix supported. The soil matrix is normally intact. At the time of investigation the colluvium was dry and the consistency varied between loose and medium dense. The properties of the colluvium are thus such that it does not tend to excessive settlement.

TABLE 3 : SUMMARY OF ENGINEERING PROPERTIES

TEST PIT NO	SAMPLE NO	DEPTH (mm)	SOIL ORIGIN	SOIL TYPE	SOIL CLASS PRA	SOIL CLASS UNIFIED	COHESION[1] (kNm^{-2})	FRICTION ANGLE (°)[1]	COMPRESSIBILITY[2]	EROSION RESISTANCE[2,5]	PERMEABILITY[2] k (cms^{-1})	SPECIFICATIONS FOR UNPAVED ROADS[3] MAXIMUM SIZE	OVERSIZE INDEX (I_o)	GRADING COEFFICIENT(G_c)	SHRINKAGE PRODUCT(S_p)	CBR @ 95% MOD	SUITABILITY FOR ROAD CONSTRUCTION[4] PAVED	UNPAVED
3	U9427	300-1100	Residual granite	Well-graded sand	A-1-b(0)	SM-SC	5 to 22	30° to 35°	Low	5 to 8	$2,7X10^{-6}$ to $5,0X10^{-7}$	28,0	0,0	27,1	144,0			Good
6	U9428	200-800	Residual granite	Sandy gravel	A-1-a(0)	SW-SM-SC	1 to 22	30° to 38°	Negligible to low	5 to 8	$2,7X10^{-6}$ to $5,0X10^{-7}$	63,0	4,0	30,2	55,0	36	Subbase and selected	Ravels and corrugates
9	U9429	300-900	Residual granite	Gravelly sand	A-1-b(0)	SW-SM-SC	1 to 22	30° to 38°	Negligible to low	5 to 8	$2,7X10^{-6}$ to $5,0X10^{-7}$	20,0	0,0	35,9	60,0			Ravels and corrugates
12	U9430	100-1100	Residual granite	Gravelly sand	A-1-b(0)	SW-SM	1 to 22	32° to 38°	Negligible to low	6 to 8	$(7,5\pm4,8)X10^{-6}$	28,0	0,0	34,8	46,5			Ravels and corrugates
15	U9431	0-600	Alluvium	Fine sand	A-2-4(0)	SM-SC	5 to 22	30° to 35°	Low	5 to 8	$2,7X10^{-6}$ to $5,0X10^{-7}$	5,0	0,0	11,8	162,5			Erodible
18	U9432	0-400	Pedogenic deposits	Nodular calcrete	A-1-b(0)	SM	20 to 22	32° to 35°	Low	8	$(7,5\pm4,8)X10^{-6}$	63,0	3,0	31,2	108,0	34	Subbase and selected	Good
21	U9433	0-600	Colluvium	Well-graded sand	A-1-b(0)	SM	20 to 22	32° to 35°	Low	8	$(7,5\pm4,8)X10^{-6}$	20,0	0,0	32,4	0,0			Ravels and corrugates
24	U9434	300-1300	Pedogenic deposits	Nodular calcrete	A-1-b(0)	SM-SC	5 to 22	30° to 35°	Low	5 to 8	$2,7X10^{-6}$ to $5,0X10^{-7}$	20,0	0,0	32,8	95,0			Ravels and corrugates
27	U9435	200-700	Residual granite	Coarse sand	A-2-4(0)	SM	20 to 22	32° to 35°	Low	8	$(7,5\pm4,8)X10^{-6}$	20,0	0,0	36,5	128,0			Ravels
30	U9436	0-300	Residual granite	Sandy gravel	A-1-a(0)	SW-SC	1 to 10	30° to 38°	Negligible to low	5 to 6	$(3,0\pm2,0)X10^{-7}$	37,5	3,0	31,5	42,0	44	Subbase and selected	Ravels and corrugates
33	U9437	200-1300	Residual granite	Coarse sand	A-1-b(0)	SW-SM	1 to 22	32° to 38°	Negligible to low	6 to 8	$(7,5\pm4,8)X10^{-6}$	20,0	0,0	32,5	64,0			Ravels and corrugates

1 Obrzud RF and Truty A : The Hardening Soil Model - A Practical Guidebook, 2018 edition, revised 21 October 2018.

2 Brink ABA et al : Soil Survey for Engineering, published in 1982.

3 The Structural Design, Construction and Maintenance of Unpaved Roads (Draft TRH 20), Committee of State Road Authorities 1990.

4 Structural Design of Urban Roads (Draft UTG), Committee of State Road Authorities 1993.

5 Erosion resistance : 1 is best 10 is poor.

7.1.2(ii) Alluvium

Alluvium was encountered in TP's 7, 13 to 15 and 24 as a surface horizon between 300mm and 1300mm thick. The distribution thereof is limited to the debris deposited by the non-perennial water courses bordering the canal. It consists of light brown fine sands to coarse sand with matrix supported fine gravels of quartz and very weak calcareous cementing in variable proportions. At the time of investigation the colluvium was dry and the consistency varied between very loose and medium dense. Although the soil composition of the alluvium is such that it is not specially subject to settlement, it can be regarded as recent, unconsolidated deposits. Considering the vertical extent of the alluvial deposits, it is regarded as the soil material on site most subject to settlement.

7.1.2(iii) Residual Granite

Residual granite was encountered in TP's 1 to 12, 15, 19, 20, 22, 23, 26, 27, 30 to 35. It underlies the colluvium and alluvium, occurring from depths between 100mm and 1300mm minimum, extending to 300mm to 1900mm maximum. The thickness of the horizon varied between 150mm and 1100mm in the test pits. The residual granite can be described as dirty white speckled dark grey varying to dark grey speckled white, micaceous or calcareous cemented, coarse sand containing fine gravels of quartz and cobbles of granite. The consistency of the residual granite varied between dense and very dense in the test pits. It can thus accommodate stresses imposed by conventional housing structures without undue settlement. Only limited – if any –settlement can thus be expected for structures such as single storey units of masonry construction.

7.1.2(iv) Pedocretes

- *Nodular Calcrete :* Nodular calcrete was encountered in TP's 13, 14 and 28 underlying the transported surface deposits, but in TP 18 exposed as surface horizon. It was present between zero and 500mm deep minimum, extending to 300mm to 1300mm maximum. The nodular calcrete can be described as dirty white to grey white, rounded, fine to medium coarse, concretions contained in a matrix of fine sand, or as a cemented pedocrete. The consistency varies from medium dense to very dense. . It can thus accommodate stresses imposed by conventional housing structures without undue settlement. Only limited – if any – settlement can thus be expected for structures such as single storey units of masonry construction.
- *Unconsolidated Calcrete :* Unconsolidated calcrete was encountered in TP's 19 and 24 underlying the transported surface deposits. It was present between 300mm and 900mm deep minimum, extending to 1100mm to 1300mm maximum. The unconsolidated powder calcrete can be described as dirty white, fine, calcareous sand. The consistency is medium

dense. The properties of the powder calcrete are thus such that it does not tend to excessive settlement.

7.1.3 Corrosivity

When discussing soil corrosivity, it is applicable to consider the guidelines as proposed by Evans[Reference 14.7]. The corrosivity of a soil towards buried, exposed, metallic surfaces is dependent on the following properties of the soil :

- Electrical conductivity.
- Chemical properties of the soil.
- Ability of the soil to support sulphate reducing bacteria.
- Heterogeneity of the soil.

The tests carried out for the compilation of this report must be considered as indicative of the corrosivity of the soils only. The pH of a soil gives an indication of potential acid related problems. Should the soil pH be less than 6,0, corrosion may take place ; and should the pH be less than 4,50, the problem of corrosion may be serious. If the conductivity of the soil is less than $0,01Sm^{-1}$, corrosiveness is generally not a problem. However, the potential for corrosivity of the soil increases with an increase in conductivity. Should the conductivity of the soil exceed $0,05Sm^{-1}$, the soil can be regarded as very corrosive. Should exposed metal pipes pass from argillaceous soils to arenaceous soils or vice versa, electrochemical cells are set up due to the different rates of oxygen diffusion of the soils. Sulphate reducing bacteria is usually present under anaerobic conditions, that is, typically saturated or waterlogged clays.

The results of the chemical testing carried out for this report indicate the following :

- *Acidity* : The pH of the samples of material tested varied between 7,73 and 8,38. The soils are thus regarded as not corrosive due to the acidity there of.
- *Water Soluble Salts Content* : The conductivity of the samples of material tested varied between $0,02Sm^{-1}$ for the residual granite to $0,15Sm^{-1}$ for the residual granite and calcrete. The soluble salt content does therefore contribute significantly to the corrosivity of the soils.

Other considerations are :

- *Heterogeneity of the Soil* : Conditions of corrosive soils due to a heterogeneous soil profile do not occur on the property.
- *Water Logged Soils* : Conditions of water logged soils are generally not present on site, but may occur in the vicinity of the canal on the western boundary of the property.

7.1.4 Materials Utilisation

7.1.4(i) Backfilling of Service Trenches

All materials, that is the alluvium, colluvium, pedogenic materials and residual soils can be used for normal backfilling of services trenches. However, due to the coarse granular composition thereof these materials are not suitable for pipe bedding or selected backfill around pipes.

7.1.4(ii) Construction of Paved or Segmental Block Streets

Only provisional indicators for future guidance of development are provided as far as material quality for road construction is concerned, complying with the requirements applicable to the level of investigation.

The results of the compaction testing on soil samples show the in-situ materials to be generally of G6 quality. It can therefore be considered as suitable to be utilised for purposes of paved road or segmental block road construction. This type of construction is applicable to access roads to townships. For purpose of lightly trafficked roads such as local access roads, loops and culs-de sac it may be used for natural subbase construction.

7.1.4(iii) Wearing Course for Urban Gravel Roads

The properties to provide guidance for the use of soil materials for the structural design of a wearing course for urban gravel roads are contained in the various sub-columns of the column "Specifications for Unpaved Roads" in Table 3. The various parameters are colour-coded : Green = suitable ; red = unsuitable. The two sub-columns with a light yellow-brown background contain the parameters on which the physical behaviour of the wearing is course is determined.

From the table it is clear that none of the in-situ materials comply in all aspects to the requirements for a gravel wearing course. In most cases the use of these materials will result in a wearing course subject to raveling and corrugations. This can be attributed the non-cohesive character of most of the materials.

7.1.5 Other Considerations

The properties discussed in this subsection of the report were obtained from literature reported values based on studies done by the US Army Corps of Engineers as reported by Brink[Reference 14.8] for compacted material. This approach is followed as the arenaceous

character of the in-situ materials that did not allow the retrieval of undisturbed sampling. The typical soil properties associated with the Unified classifications of the materials are thus reported.

7.1.5(i) Compressibility

The compressibility of the material can be regarded as a necessary input to pavement design as well as lesser important supporting information for geotechnical classification for site class designation.

- *Colluvium* : The colluvium is regarded as low compressible with cohesion (c_0) of 20,0kNm^{-2} to 22kNm^{-2} and the effective stress envelope approximately 32° to 35°.
- *Alluvium* : The alluvium is regarded as low compressible with cohesion (c_0) of 5,0kNm^{-2} to 22kNm^{-2} and the effective stress envelope approximately 30° to 35°.
- *Pedogenic Deposits* : The nodular calcrete is regarded as low compressible with cohesion (c_0) of 5,0kNm^{-2} to 22kNm^{-2} and the effective stress envelope approximately 30° to 35°.
- *Residual Granite* : The residual granite is regarded as negligibly to low compressible with cohesion (c_0) of 1kNm^{-2} to 22kNm^{-2} and the effective stress envelope approximately 30° to 38°.

7.1.5(ii) Permeability

Permeability is an important parameter in the design of surface drainage and seepage drains. As such indicators in this regard are provided.

- *Colluvium* : The colluvium is regarded as semi-pervious to impervious. The soil permeability coefficient is approximately (7,5±4,8)X10^{-6}cms^{-1}.
- *Alluvium* : The permeability of the alluvium is regarded as semi-pervious to impervious. The soil permeability coefficient varies between 2,7X10^{-6}cms^{-1} to 5,0X10^{-7}cms^{-1}.
- *Pedogenic Deposits* : The permeability of the pedogenic deposits is highly variable depending on the mode of deposition and regarded as semi-pervious to impervious. The soil permeability coefficient varies between 2,7X10^{-6}cms^{-1} to 5,0X10^{-7}cms^{-1}.
- *Residual Granite* : The residual granite is regarded as pervious to impervious. The soil permeability coefficient varies between 2,7X10^{-6}cms^{-1} to 5,0X10^{-7}cms^{-1}.

7.1.5(iii) Erosion Potential

All soil materials encountered during the investigation can be regarded as moderately to poorly resistant against erosion. The aspect of erosion potential is important in the area. It may be partially attributed to the low clay content of the soil materials. The net result of these

properties is poor founding conditions on the unconsolidated alluvial deposits and favourable founding conditions on thin horizons of colluvium soil.

7.2 Properties of Bedrock Granite

The TLB used to excavate the test pits did not penetrate bedrock to any significant extent and refusal of excavation occurred either within millimeters after encountering bedrock, or as very slow refusal of excavation in very dense residual granite sand tending to soft rock. It is not customary to penetrate bedrock in the case of a geotechnical investigation for purposes of a residential development. Refusal of excavation on hard rock is accepted as suitable. One can thus accept bedrock to be hard tending to very hard once refusal of excavation was encountered.

Parametric calculations with Roclab software results for unweathered, moderately to widely jointed, hard rock to very hard rock as present in abundant outcrops on site, result in the following properties :

- Cohesion : 20,1MPa
- Friction Angle : 44°
- Tensile Strength : 0,38MPa
- Uni-axle Compressive Strength : 26,8MPa
- Young's Modulus : 55250,0 MPa

All which show a very sound rock.

7.3 Excavation Classification with Respect to Services

7.3.1 Hand Excavation

7.3.1(i) Colluvium and Alluvium

The colluvium and alluvium can be considered as suitable to be excavated by swing tools. However, especially in the alluvium and water courses the sidewalls of excavations can be prone to collapse.

7.3.1(ii) Pedocretic Deposits

Unconsolidated calcrete and calcretisation of the transported and residual soils usually contribute positively to the consistency of the in-situ materials, but cannot be regarded as pure pedocretic deposits per se. However, the nodular calcrete can be regarded as proper

pedocretes. The consistency of the nodular calcrete varies from medium dense to very dense. It will thus be possible to excavate the nodular calcrete initially with swing tools, but with an increase in consistency the provision of mechanical equipment will be required to remove it on an economical basis. For this purpose the minimum requirement will be the use of a 55kW TLB.

7.3.1(iii) Residual Soils

Residual granite is of medium dense to very dense consistency. In a condition of medium dense consistency it will be possible to excavate these materials manually ; in a state of dense consistency it will be possible to excavate it manually with considerable effort ; and if very dense, not at all and may as minimum require the use of a 55kW TLB. Even with such equipment, refusal of excavation (for all practical purposes) can be expected on the very dense residual granite tending to soft rock.

7.3.1(iv) Bedrock

Bedrock of granite cannot be excavated manually successfully.

7.3.2 Classification of Material for Machine Excavation

In terms of Table 5 of SANS 634 : 2012 the following is applicable :

7.3.2(i) Restricted Excavation

- *Soft Excavation* : Alluvium, colluvium and pedogenic deposits can be regarded as soft excavation. Residual granite can initially be regarded as soft excavation, with consistency thereof improving to very dense and gradually to weathered rock with depth. In the latter two conditions the presence of granitoid materials cannot be regarded as soft excavation anymore. Conditions of soft excavation were encountered in TP's 1 to 16, 18 to 24 and 26 to 35. The combined thickness of these strata varied between 150mm and 1900mm in the test pits, averaging 890mm prior to encountering conditions of intermediate or hard rock excavation.
- *Intermediate Excavation* : The presence of very dense residual soil and slightly weathered, medium hard rock, granite often resulted in conditions where very little progress in excavation was made with the TLB, resulting in extremely slow penetration through the granitoid materials. These conditions are regarded as intermediate excavation. Based on physical appearance and tactile conditions it was difficult to discern between the very dense residual soil and weathered granite and it remains an area of uncertainty. Conditions considered as intermediate excavation were encountered in TP's 1 to 16, 18 to 20, 22, 23,

26 to 28 and 31 to 34 from depths varying between 150mm and 1900mm minimum to 200mm and 2200mm maximum, averaging 150mm thick, prior to encountering hard rock excavation.

- *Hard Rock Excavation* : Refusal of excavation occurred in all the test pits. Three conditions are regarded as hard excavation :

  - Unweathered, very hard rock, granite resulting in virtually immediate refusal of excavation.
  - Slightly weathered, hard rock, granite resulting in very slow penetration indicating conditions of uneconomical excavation by the mechanical equipment used for the investigation.
  - Very dense, residual granite tending to medium hard rock resulting in very slow penetration indicating conditions of uneconomical excavation by mechanical equipment used for the investigation.

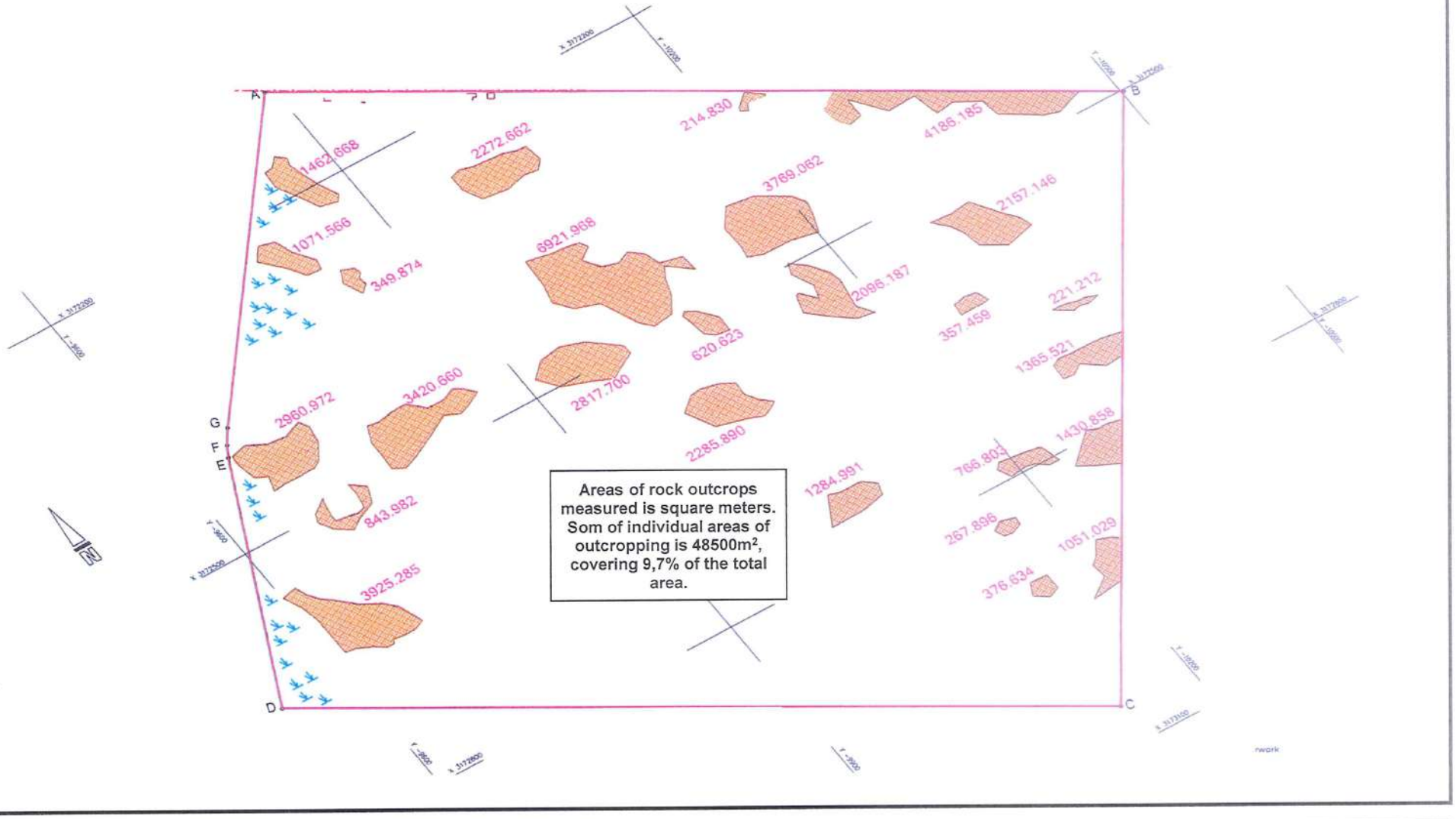
It is most likely that a 30 ton track mounted excavator will prove to be more suitable equipment for excavation than the 55kW TLB, achieving deeper levels of penetration prior to refusal. Be it as it may, refusal of excavation was encountered in all the test pits between depths of 50mm and 2200mm, averaging 970mm.

7.3.2(ii) Non-restricted Excavation

The classification as per subparagraph 7.3.2(i) : Restricted Excavation as above is also applicable for non-restricted excavation.

7.3.3 Other Considerations

The site is characterized by the widely distributed of localized granite outcrops. Calculations show that some 48500m^2 comprising 9,7% of the land is covered by such outcrops. These conditions are illustrated on Figure 7 : Distribution of Rock Outcrops. It is important to realise that due to the mode of weathering of granite to corestones all of these areas cannot be regarded as hard rock excavation. This situation is illustrated by the profile of TP 24 located between closely spaced rock outcrops, but consists of 1500mm sand prior to encountering rock ; as well as TP 31 where variable conditions of excavation and rock levels were encountered in one test pit. Although a reliable indicator of the presence of boulders cannot be provided based on the available information, indications are that over and above the occurrence of hard rock excavation, Boulder Class A excavation must be expected.



C.L.G.C.

DISTRIBUTION OF ROCK OUTCROPS

FIGURE 7

7.4 Seismicity

7.4.1 Historical Seismic Data

An increase in the occurrence of tremors in the Kai !Garib was encountered up to late 2011. The Council of Geoscience was therefore appointed to compile a desktop study of the available information and to provide indications of the probability and intensity of tremors that may occur in the area. Such a report[Reference 14.9] was made available on 25 July 2012.

The seismicity in the area is dominated by a cluster of seismic events. The events are of low to moderate magnitude with the highest having a magnitude of M_L 5,8 (M_L = Local Magnitude) which occurred on 21 February 1976. The largest events within the cluster near Augrabies were two M_L 4,9 earthquakes which occurred on 12 and 25 January 2011. Although Keimoes falls outside the cluster, it is within the sphere of influence.

The earliest recorded event in the area occurred in 1914 with a magnitude of M_L 3,0. Since then more than 1100 earthquakes have been recorded. Most of the events were recorded since 1979. The highest number of earthquakes was recorded in 2011 when 760 earthquakes were recorded within a swarm located in the in the Augrabies area. The earthquakes vary in magnitude from events of magnitude less than one to moderately sized events of which the largest had a magnitude M_L of 5,8. Most of the earthquakes had small magnitude values around 1,8.

Figure 2.2 from the report of the Council for Geoscience is reproduced here as Figure 8 : Historic Occurrences of Earthquakes in the Kai !Garib Area.

7.4.2 Site Specific Information

The closest source of seismic measurements to Plangeni under control of the Council for Geoscience is Tontelbos at 31° 10' 12"S and 20' 30' 00"E. Kijko[Reference 14.10] indicates the following :

- The annual probability for an earthquake with intensity of 4,5 on the Modified Mercalli Scale to occur in the area is less than $10^{-0,7}$; and with an intensity of 8,5 to occur the probability is $10^{-3,8}$.
- The annual probability for an earthquake with an acceleration of $10^{-1,9}$g to occur in the area is less than $10^{-0,7}$; and with an acceleration of $10^{-0,75}$g to occur in the area is less than $10^{-3,8}$.
- A 10% probability exists that an earthquake with Peak Ground Acceleration exceeding of 0,07g may take place once in 50 years.

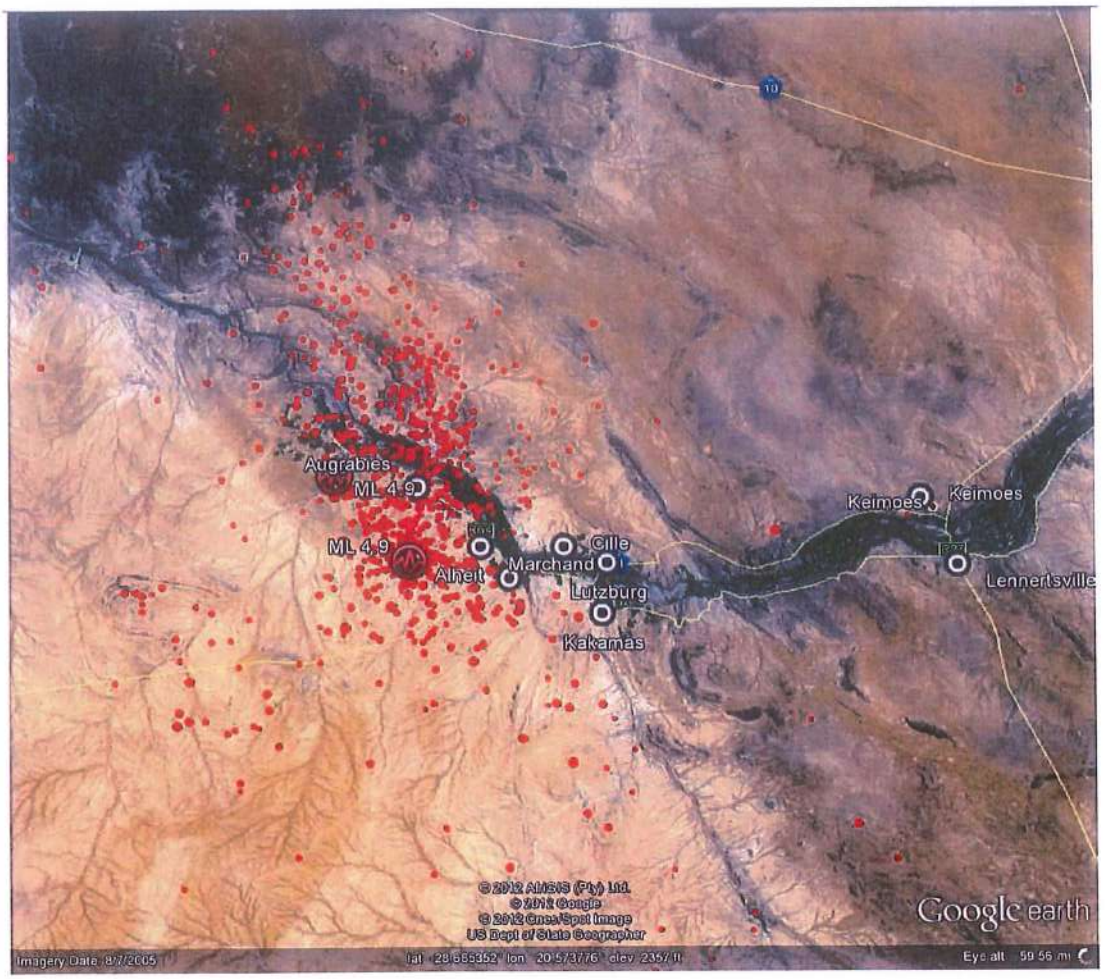


FIGURE 8 : HISTORIC OCCURRENCES OF EARTHQUAKES IN THE KAI !GARIB AREA

A 10% probability of an event with magnitude less than 100cms^{-2} to take place once in 50 years is regarded as most favourable ; natural seismic activity with magnitude exceeding 100cms^{-2} is regarded as unfavourable.

To put the above information into perspective, Table 4 : Earthquake and Magnitude and Intensity, is attached to this report.

7.5 Undermining

The area of investigation is not undermined.

7.6 Dolomite Stability

The area of investigation is not subject to dolomite related instabilities.

TABLE 4 : EARTHQUAKE MAGNITUDE AND INTENSITY

MODIFIED MERCALLI INTENSITY SCALE	INTENSITY	DESCRIPTION	RICHTER SCALE MAGNITUDE	RADIUS OF PERCEPTIBILITY (km)
I	Instrumental	Detected only by seismography		
II	Feeble	Noted only by sensitive people	3.5 to 4.2	3 to 24
III	Slight	Like the vibrations due to a passing lorry. Felt by people at rest, especially on upper floors		
IV	Moderate	Felt by people while walking. Rocking of loose objects, including vehicles	4.3 to 4.8	24 to 45
V	Rather strong	Felt generally ; most sleepers are awakened and bells ring		
VI	Strong	Trees sway and suspended objects swing ; damage by overturning and filing of loose objects	4.9 to 5.4	48 to 112
VII	Very strong	General public alarm ; walls crack ; plaster falls	5.5 to 6.1	110 to 200
VIII	Destructive	Car drivers seriously disturbed; masonry fissured ; buildings damaged	6.2 to 6.9	200 to 400
IX	Ruinous	Houses collapse ; pipes break		
X	Disasterous	Ground cracks badly ; buildings destroyed ; railway lines bent ; landslides on steep slopes	7.0 to 7.3	400 to 700
XI	Very disasterous	Few buildings remain standing; bridges destroyed ; all services out of action ; great landslides and floods	7.4 to 8.1	400 to 700
XII	Catastrophic	Total destruction ; objects thrown into the air; ground rises and falls in waves	>8.1	400 to 700

8 DRAINAGE

On Figure 2 the presence of a network of drainage features are indicated. All these features consist of shallow (less than 500mm deep) sand filled features hosting non-perennial water courses. All the features drain westwards and the canal on the western limit of the site forms

a man-made obstacle, blocking flows from the drainage courses, resulting in areas of high soil moisture. These areas are indicated with blue arrows on the figure. The conditions are further detrimentally influenced by leakages from the canal.

The net result of the conditions is that although favourable natural founding conditions prevail as per the profiles of TP's 7, 21 and 22, conditions are detrimentally influenced by the presence of a man-made, artificial, high, temporary and cyclic perched water levels. During the time of investigation these gullies were dry, but enquiries with local specialists confirm that it is clear that these areas are subjected to the presence of temporary water seepage.

9 SITE CLASS DESIGNATIONS

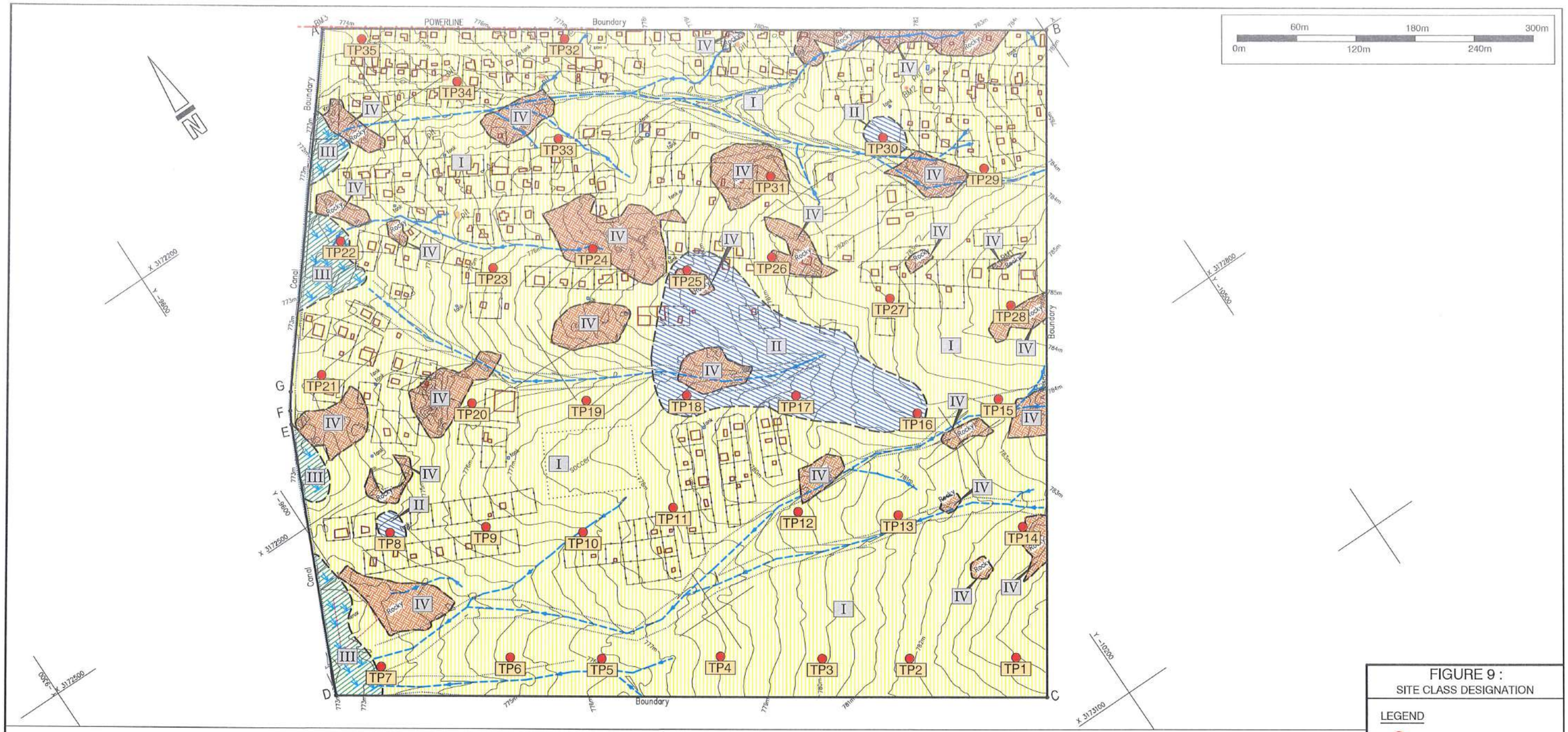
Based on the above discussions the property can be divided into seven zones characterized as follows as per the guidelines posted by SANS 10400 : Section H[Reference 14.11]. The zonation is indicated on Figure 9 : Site Class Designation.

9.1 Geotechnical Zone I

This zone comprises 82,5% of the area investigated and covers the larger part of the site. It is characterized by the materials profiles of TP's 1 to 6, 9 to 15, 19 to 21, 23, 26 to 29 and 32 to 35. It consists of a horizon of colluvium less than 600mm thick overlying medium dense to very dense residual sand or nodular calcrete and at depth bedrock granite. Slope across the land is between 1,7% and 2,2%. Foundation stresses induced by conventional strip foundations for single and double storey structures will result in limited compression settlement less than 10mm if founded directly on the residual soil. As per the materials profile encountered in the test pits the combined thickness of the strata of nodular calcrete and residual soil is sufficient to dissipate the stresses induced by the foundations effectively. The area is thus zoned as "S" and the materials strata can be regarded as compressible to a maximum of 10mm.

9.2 Geotechnical Zone II

This zone comprises 5,4% of the area investigated and is present in three separate areas on site. It is characterized by the materials profiles of TP's 8, 16 to 18, 25 and 30. It consists of a superficial horizon of colluvium and residual soil less than 400mm thick overlying bedrock of granite. Slope across the land is less than 2,5%. Foundation stresses induced by conventional strip foundations for single and double storey structures will result in almost negligible settlement if founded directly on the slightly weathered and unweathered hard rock to very hard rock. The area is thus zoned as "R" and regarded as stable.



FOUNDATION DESIGN, BUILDING PROCEDURES AND PRECAUTIONARY MEASURES

AREA	AREA OF PROPERTY (%)	GEOTECHNICAL CLASS	ESTIMATED SOIL MOVEMENT (mm)	SOIL PROFILE	CONSTRUCTION TYPE	FOUNDATION DESIGN	ASSOCIATED PROBLEMS	DEVELOPMENT POTENTIAL
I	82,45	S	0mm to 10mm compression settlement	More than 400mm of colluvium or alluvium overlying medium dense to very dense nodular calcrete or residual granite	Normal	Normal strip foundations placed on medium dense residual granite or nodular calcrete Slab-on-the-ground foundations placed on medium dense to very dense residual granite or nodular calcrete	None	Favourable
II	5,48	R	Negligible	Less than 400mm of colluvium or alluvium overlying bedrock of granite	Normal	Normal strip foundations placed on bedrock of granite. Slab-on-the-ground foundations placed on bedrock of granite	Conditions of hard rock excavation	Intermediate
III	2,37	P(Water) alternatively S	Undetermined	More than 400mm of colluvium or alluvium overlying medium dense to very dense nodular calcrete of residual granite	Not applicable	Reserve as public open space	Periodic flooding from non-perennial streams and artificial high ground water levels due to leakages from the canal	Poor
			0mm to 10mm compression settlement	More than 400mm of colluvium or alluvium overlying medium dense to very dense nodular calcrete of residual granite	Normal	Normal strip foundations placed on medium dense residual granite or nodular calcrete Slab-on-the-ground foundations placed on medium dense to very dense residual granite or nodular calcrete	The area can only be developed if measures can be implemented to eliminate the occurrence of seasonal flooding and seepage from leaking canal	Favourable
IV	9,70	P(Outcrops)	Highly variable	Corestones of granite contained in residual soil	Specifically designed for each individual house	The feasibility of developing each individual stand shall be determined on an economical and technical basis. All aspects of the structures shall be professionaly designed. Alternative : Reserve as public open space	Conditions of boulder class A excavation. Conditions of hard rock excavation.Tension concentrations of strip foundations	Poor
			Negligable	Batholytic outcops of very hard rock, granite	Specifically designed for each individual house	The feasibility of developing each individual stand shall be determined on an economical and technical basis. All aspects af the structures shall be professionaly designed. Foundation design of slab-on-the-ground considered as preliminary proposal. Alternative : Reserve as public open space	Conditions of hard rock excavation	Poor

FIGURE 9 :
SITE CLASS DESIGNATION

LEGEND

TP1 TEST PIT POSITION

ROCKY AREA

MATERIAL BOUNDARY

Cedar Land Geotechnical Consult (Pty) Ltd

POSBUS 607
CERES
6835
SEL : 082 570-2767 (Frans)
082 373-2146 (Mariette)

P O BOX 607
CERES
6835
CELL : 082 570-2767 (Frans)
082 373-2146 (Mariette)

EPOS/E-MAIL: cedarland.frans@breede.co.za (Frans)
cedarland.mariette@breede.co.za (Mariette)

TAAK: / JOB NAME: Plangeni Development

LIGGING: / SITE: Portion 30 of the Farm Blaauwskop 36

KLIENT: / CLIENT: Kai !Garib Municipality

TEKENING NO: / DRAWING NO: Figure 9 : Site Class Designation

DATUM: / DATE: 2 November 2020

9.3 Geotechnical Zone III

This zone comprises 2,4% of the area investigated. The zone is present in four separate areas along the western boundary of the property. It is characterized by the materials profiles of TP's 7 and 22. It consists of a horizon of transported sand less than 600mm thick overlying medium dense to very dense residual sand or nodular calcrete and at depth bedrock granite Slope across the land is between 1,5% and 2,0%. Foundation stresses induced by conventional strip foundations for single and double storey structures will result in limited compression settlement less than 10mm if founded directly on the residual soil. As per the materials profile encountered in the test pits the combined thickness of the strata of nodular calcrete and residual soil is sufficient to dissipate the stresses induced by the foundations effectively.

However, the area is influenced by the periodic presence of water as discussed in Section 8 of this report. Potentially the area can be zoned as "S" and the materials strata can be regarded as compressible to a maximum of 10mm if the inundation of the area can be resolved. In the unresolved condition the area is zoned as "P(Water)" and conditions are regarded as unfavourable for residential development.

9.4 Geotechnical Zone IV

This zone comprises 9,7% of the area investigated. This zone is characterized by the numerous localized granite outcrops. It is important to realise that due to the mode of weathering of granite to corestones all of these areas cannot be regarded as a continuous presence of hard rock present as fairly level batholitic surfaces. This situation is illustrated by the profile of TP 24 located between closely spaced rock outcrops, but consists of 1500mm sand prior to encountering rock. In TP 31 variable conditions of excavation and rock levels were encountered in one test pit. On Photo 1 the two conditions can also be discerned. Picture 4 shows rock that was blasted from fairly level batholite occurrences, and Picture 5 shows the occurrence of corestones.

Potentially the areas can be zoned as R which can in principle be regarded as stable, but the highly undulating land surface due to the presence of boulders and outcrops detracts from the suitability thereof for residential development. The area is thus zoned as "P(Outcrops)".

10 FOUNDATION RECOMMENDATIONS AND SOLUTIONS

The foundation design alternatives and ancillary issues as discussed below are summarized in Table 5 : Foundation Design, Building Procedures and Precautionary Measures. In some cases more than one foundation solution is offered in the discussion below. Whichever option

TABLE 5 : FOUNDATION DESIGN, BUILDING PROCEDURES AND PRECAUTIONARY MEASURES

AREA	AREA OF PROPERTY (%)	GEOTECH NICAL CLASS	ESTIMATED SOIL MOVEMENT (mm)	SOIL PROFILE	CONSTRUCTION TYPE	FOUNDATION DESIGN AND BUILDING PROCEDURES	ASSOCIATED PROBLEMS	DEVELOPMENT POTENTIAL
I	82,5	S	0mm to 10mm compression settlement	More than 400mm of colluvium or alluvium overlying medium dense to very dense nodular calcrete or residual granite	Normal	Normal strip foundations placed on medium dense to very dense residual granite or nodular calcrete Slab-on-the-ground foundations placed on medium dense to very dense residual granite or nodular calcrete	None	Favourable
II	5,4	R	Negligible	Less than 400mm of colluvium or alluvium overlying bedrock of granite	Normal	Normal strip foundations placed on bedrock of granite Slab-on-the-ground foundations placed on bedrock of granite	Conditions of hard rock excavation	Intermediate
III	2,4	P(Water) alternatively S	Undetermined 0mm to 10mm compression settlement	More than 400mm of colluvium or alluvium overlying medium dense to very dense nodular calcrete or residual granite More than 400mm of colluvium or alluvium overlying medium dense to very dense nodular calcrete or residual granite	Not applicable Normal	Reserve as public open space Normal strip foundations placed on medium dense to very dense residual granite or nodular calcrete Slab-on-the-ground foundations placed on medium dense to very dense residual granite or nodular calcrete	Periodic flooding from non-perennial streams and artificial high ground water levels due to leakages from the canal The area can only be developed if measures can be implemented to eliminate the occurrence of seasonal flooding and seepage from the leaking canal.	Poor Favourable
IV	9,7	P(Outcrops)	Highly variable Negligable	Corestones of granite contained in residual soil Batholytic outcrops of very hard rock, granite	Specifically designed for each individual house Specifically designed for each individual house	The feasibility of developing each individual stand shall be determined on an economical and technical basis. All aspects of the structures shall be professionaly designed. Alternative : Reserve as public open space. The feasibility of developing each individual stand shall be determined on an economical and technical basis. All aspects of the structures shall be professionaly designed. Foundation design of slab-on-the-ground considered as preliminary proposal. Alternative : Reserve as public open space.	Conditions of boulder class A excavation Conditions of hard rock excavation Tension concentrations in strip foundations Conditions of hard rock excavation	Poor Poor

is used, the design must adhere strictly on the proposals of SANS 10400H. As geotechnical conditions favour the use of both alternatives, the decision of which option to use must be based on financial and practical considerations. In all cases service trenches shall not be excavated parallel to buildings within 1500mm of the building perimeter.

10.1 Geotechnical Zone I

The zone is classed as S, meaning that less than 10mm of compression settlement may occur. Considering the limited slope across the land of approximately 2% only and the favourable geotechnical site classification as per Section 9 above, two foundation design alternatives are applicable to the zone.

The two options can be discussed as follows :

10.1.1 Strip Foundations

Foundations of 400mm wide placed directly on the medium dense to very dense residual granite or nodular calcrete may be used. Should the areas of the proposed dwellings not exceed 200m^2 foundations for internal non-loadbearing walls may consist of thickened floorslabs. Should this option be adopted the floorslabs shall be reinforced steel mesh.

10.1.2 Slab-on-the-ground Foundations

The solution of slab-on-the-ground foundations may only be used for dwellings less than 200m^2 in area. Edge beams shall be placed directly on the medium dense to dense nodular calcrete or residual soil. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs.

10.2 Geotechnical Zone II

The zone is classed as R, meaning that the proposed horizon for founding is stable and negligible soil movement is expected. Considering the limited slope across the land of approximately 2% only and the favourable geotechnical site classification as per Section 9 above, two foundation design alternatives are applicable to the zone.

The two options can be discussed as follows :

10.2.1 Strip Foundations

Foundations of 400mm wide placed directly on bedrock of granite may be used. Should the areas of the proposed dwellings not exceed 200m² foundations for internal non-loadbearing walls may consist of thickened floorslabs. Should this option be adopted the floorslabs shall be reinforced steel mesh.

10.2.2 Slab-on-the-ground Foundations

The solution of slab-on-the-ground foundations may only be used for dwellings less than 200m² in area. Edge beams shall be placed directly on bedrock of granite. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs.

10.3 Geotechnical Zone III

Two scenarios must be considered for Geotechnical Zone III :

10.3.1 Prevailing Conditions

The prevailing conditions are defined by periodic inundation of the area by water of the non-perennial water courses ponding in the canal area limiting the disposal thereof. The condition is further exacerbated by seepage originating from leaks in the canal. These conditions may result in flooding of houses and damage to the structures caused by the combined influence of the high soluble salt content of the soil and the periodic flooding.

The conditions described above are not due to the natural environment, but of artificial origin. Should these conditions not be catered for, that is the leakages in the canal repaired and provision made for disposal of the ponding water, development shall not take place in the area. The provisional site class designation of P(Water) shall be maintained and the areas set aside as public open space.

10.3.2 Provision of Remedial Measures

Should remedial measures be implemented the four areas may be made available for residential development. Such remedial measures shall include features to prevent inundation of the areas and disposal of flood water from the water courses, as well as repairs to the canal. The issue at stake is which authority is responsible for such undertaking and who is responsible for maintenance of the canal.

In case the measures as mentioned above can be implemented successfully, a site class designation of "S" can be accepted, meaning that less than 10mm of compression settlement may occur. Slope across the land is between 1,5% and 2,0%. Considering the limited slope across the land and the favourable geotechnical site classification as per Section 9 above, two foundation design alternatives are applicable to the zone.

The two options can be discussed as follows :

10.3.2(i) Strip Foundations

Foundations of 400mm wide placed directly on the medium dense to very dense residual granite or nodular calcrete may be used. Should the areas of the proposed dwellings not exceed 200m^2 foundations for internal non-loadbearing walls may consist of thickened floorslabs. Should this option be adopted the floorslabs shall be reinforced steel mesh.

10.3.2(ii) Slab-on-the-ground Foundations

The solution of slab-on-the-ground foundations may only be used for dwellings less than 200m^2 in area. Edge beams shall be placed directly on the medium dense to dense nodular calcrete or residual soil. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs.

10.4 Geotechnical Zone IV

This zone poses a special set of problems. In principle founding of structures can take place in the area, but a careful technical appraisal should be made of individual erven to determine the feasibility of founding.

Problems that can be expected are the following :

10.4.1 Areas of Corestones

Expect conditions of Boulder Excavation Class A and difficult access due to the presence of surface boulders. Foundations will be subject to stress concentrations resulting in cracking of the superstructure if the foundations cannot accommodate the stress concentrations.

It is therefore recommended that each stand be considered individually and a decision made on the feasibility of utilisation. Foundations for structures shall be designed by a professional

engineer on an individual basis for each stand. The site classification of P(Rock Outcrops) is maintained and the development potential thereof is regarded as poor. Should it be considered as uneconomical to build on the stands, the areas should be set aside as public open space.

10.4.2 Batholitic Surfaces

These surfaces are present as fairly level areas of unweathered or lightly weathered granite spanning footprint areas of typical low cost houses. It may be possible to found under such conditions, but will require excavation of very hard rock.

To minimize excavations the solution of slab-on-the-ground foundations may be used for dwellings in area. Edge beams shall be placed directly on the rock. Foundations for internal non-loadbearing walls shall consist of thickened floorslabs. The foundations shall not contain any changes in surface levels with steps exceeding 400mm and do not support any chimneys or walls which support concrete roofs. However, professional advice shall be obtained regarding founding of the structures.

It is therefore recommended that each stand be considered individually and a decision made on the feasibility of utilisation. Foundations for structures shall be designed by a professional engineer on an individual basis for each stand. The site classification of P(Rock Outcrops) is maintained and the development potential thereof is regarded as poor. Should it be considered as uneconomical to build on the stands, the areas should be set aside as public open space.

11 SPECIAL PRECAUTIONARY MEASURES

Three issues that may impact the development of the site negatively need to be considered. These issues have been addressed in the applicable subsections of the report, but are highlighted here :

11.1 Soil Conductivity

The conductivity measurement of 0,15Sm-1 reported for samples of both the residual granite and the nodular calcrete is on the threshold[Reference 14.12] of soluble salt contents that may result in problems as far as road construction is concerned. The occurrence of high soluble salt contents in soils is common in the Northern Cape and would not have raised any concern except that extensive damage to infrastructure occurs in an upmarket residential development close to Plangeni. Such damage consists of discoloring, lifting, and blistering of bituminous surfacing and disintegration of plastering on structures. One may speculate about the origin of

the high salt content, whether it can be related to paleo geological conditions, contaminated surface run-off from agricultural activities, or whether it originates from the chemical breakdown of bedrock granite or calcium carbonate in the form of amorphous nodules of calcrete, but it remains of academical interest.

On a preliminary basis the following is thus proposed :

11.1.1 Road Construction

- *Gravels Roads* : No precautionary measures need to be taken. In fact, the presence of a high soluble salt content may act as a dust palliative.
- *Paved Roads* : Should the material be used as stabilized base or subbase, it shall be treated with lime. The applicable lime content can be regarded as the minimum quantity required to maintain a minimum pH of 10 in laboratory testing. A better solution would be to design the access roads as concrete block pavement structures, which will have the additional benefit of providing employment opportunities for the local people.

11.1.2 Structures

Completely dry soils are considered to be non-aggressive towards concrete. Wet or damp soils may or may not be aggressive depending on the nature and concentration of water-soluble ions that are held in water in the pore spaces. The aggressiveness of soils depends therefore on the percentage and aggressiveness of the water present in the voids in the soil, and these may be subject to periodic fluctuations.

Because of the nearly static conditions that prevail at the soil-concrete interface of house foundations, Fulton[Reference 14.13] proposes the chemical treatment of soils in this zone and it is feasible in some cases to reduce the corrosive potential of aggressive soils. This may be done by the addition of lime to backfilled soil around a concrete foundation. However, no guidelines are provided by the source neither are applicable fractions of treating agents mentioned.

11.1.3 Wet Services Installations

Although not common nowadays, the use of metallic pipes for water reticulation was practiced in the past. It is recommended that UPVC, PVC and Polycop pipes be used in this applicable applications. Even the use of metallic couplings must be avoided.

11.1.4 Additional Geotechnical Investigations

This geotechnical investigation determined that the possibility exist that damage may occur to pavements and structures caused by the soluble salt content of the soil, but can only be regarded providing a first indicator in this regard. The most authoritative publication[Reference 14.14] in this regard proposes the following :

11.1.4(i) First Order Investigation

The investigation completed can be regarded as a first order investigation. The investigation identified the type of site and determined that ground conditions that may be aggressive to concrete prevail.

11.1.4(ii) Detailed Investigation

A detailed investigation shall be carried out to determine :

- Groundwater mobility (static, mobile, flowing).
- Concentrations of aggressive chemicals in soil and groundwater, including sulfates, sulfides, water-soluble magnesium and acids (indicators are pH, chloride and nitrate ions).

11.1.4(iii) Determine the Design Sulfate Class

Sulfate class determination is a five-level classification of sulfate concentration that is applied to individual series of tests on soil or groundwater. Separate sulfate classes may be derived from the characteristic values of sulfate determined from both water-extract sulfate tests and total potential sulfate tests on soil, and from sulfate tests on groundwater. The highest of the derived Sulphate classes is taken as the Design Sulphate Class for a location.

11/1/4(iv) Determine Aggressive Chemical Environment

The aggressive chemical environment for concrete class for the site is determined taking the Design Sulfate Class, type of site, water mobility and pH into account and produce a concrete specification and mix design suitable for the conditions.

11.2 Drainage

The issue of area-specific poor drainage has been discussed in Section 8 and Subsections 9.3 and 10.3 of this document. It must be stated without any ambiguity that these areas shall be kept as public open spaces if the drainage problems cannot be resolved in an engineered

and scientific way. Structures in Geotechnical Zone III especially may be subject to damage caused by soluble salt related properties if conditions of surface drainage are not attended to.

The natural non-perennial drainage channels on site are shallow and holds no obvious danger to the development of the area. However, a suitable distance, based on flood calculations shall be maintained between these channels and the stands.

11.3 Rock Outcrops

The potential effects of the rock outcrops on the development has been discussed in Subsections 9.4 and 10.4 of this report. The issue is that at the time of investigation several dwellings have already been erected on the granite outcrops. Cognizance must be taken of the difference between the solid rock outcrops and the presence of large corestones. Both occurrences result in specific problems for residential development. A decision must be made regarding the feasibility of development of such areas, considering the additional costs that will be incurred for hard rock excavation, boulder excavation and establishing services. The decision shall also include the human factor of relocating occupants from their existing houses.

12 CONCLUSIONS

The property is regarded as being of favourable to poor suitability for residential development. The factors that reduce the suitability of the land for development are :

- The presence of batholitic rock outcrops and large corestones close to the surface. The presence thereof will result in conditions of hard excavation and boulder excavation. While it is physically possible to establish housing units under these conditions, the decision to develop these areas shall be based on economical constraints.
- The presence of ponding in the area close to the canal. The ponding occurs due to the canal blocking the natural flow of the non-perennial water courses and is aggravated by seepage from leakages from the canal. The areas of ponding can only be utilized for erven and provision of housing if the drainage problems are solved.
- The residual soils and calcrete are highly corrosive. This is problematic in especially Geotechnical Zone III as the corrosive properties of soil are usually activated by the presence of interstitial water.

The conclusions as based on the site conditions are summarized in Table 6 : Influence of Constraints per Geotechnical Zoning. This classification is based on the proposals of the document *Geotechnical Site Investigations for Housing Developments (Generic Specification GFSH-2)*, issued by the National Department of Housing in September 2002.

TABLE 6 : INFLUENCE OF CONSTRAINTS PER GEOTECHNICAL ZONING

CONSTRAINT	KEY TO CLASSIFICATION			CLASSIFICATION PER GEOTECHNICAL ZONE					
	MOST FAVOURABLE (1)	INTERMEDIATE (2)	LEAST FAVOURABLE (3)	I	II	III (At present)	III (Rehabilitated)	IV (Boulders)	IV (Batholyte)
Site Class Designation				S	R	P(Water)	S	P(Outcrops)	P(Outcrops)
Collapsible soil	Any collapsible horizon or consecutive horizons totalling a depth of less than 750mm in thickness	Any collapsible horizon or consecutive horizons with a depth of more than 750mm in thickness	A least favourable situation for this constraint does not occur						
Seepage	Permanent or perched water table more than 1,5m below ground surface	Permanent or perched water table less than 1,5m below ground surface	Swamps and marshes						
Active soil	Low soil heave potential anticipated	Moderate soil heave potential anticipated	High soil heave potential anticipated						
Corrosive Soil[1]	Soil conductivity <0,01Sm^{-1} Soil pH >6	Soil conductivity <0,01Sm^{-1} to 0,05Sm^{-1} Soil pH 4,5 to 6	Soil conductivity > 0,05Sm^{-1} Soil pH <4,5						
Highly compressible soil	Low soil compressibility anticipated	Moderate soil compressibility anticipated	High soil compressibility anticipated						
Erodibility of Soil	Low	Intermediate	High						
Difficulty of excavation to 1,5m depth	Scattered or occasional boulders less than 10% of the total volume	Rock or hardpan pedocretes between 10% and 40% of the total volume	Rock or hardpan pedocretes more than 40% of the total volume						
Undermined ground	Undermining at a depth greater than 240m below surface, except where total extraction mining has not occurred	Old undermined areas to a depth of 90m to 240m below surface where stope closure has ceased	Mining within less than 90m to 240m of surface or where total extraction mining has taken place						
Dolomite and limestone stability	Possibly stable. Areas of dolomite overlain by Karroo rocks or intruded by sills. Areas of Black Reef rocks. Anticipated Inherent Risk Class 1	Potentially characterised by instability. Anticipated Inherent Risk Classes 2 to 5	Known sinkholes and dolines. Anticipated Inherent Risk Classes 6 to 8						
Steep slopes	Between 2° and 6° in all regions	Slopes between 6° and 18° and less than 2° (Natal and Western Cape) Slopes between 6° and12° and less than 2° (all other regions)	More than 18° (Natal and Western Cape). More than 12° (all other regions)						
Areas of unstable natural slopes	Low risk	Intermediate risk	High risk (Especially in areas subject to seismic activity)						
Areas subject to seismic activity	10% probability of an event less than 100cms^{-2} within 50 years	Mining induced seismic activity more than 100cms^{-2}	Natural seismic activity more than 100cms^{-2}						
Areas subject to flooding	A "most favourable" situation for this constraint does not occur	Areas adjacent to a known drainage channel or floodplain with slope less than 1%	Areas with a known drainage channel or floodplain						

Notes

1 This item is not included in GFSH-2. It is regarded as potential important to the development of Plangeni and recorded as a constraint.

12.1 Stratigraphy

The available information shows that the area of investigation is located on a subduction zone dating approximately 1000 million years old. The zone is located between the lithology of the Kaapvaal Craton and the Namaqua-Natal mobile belt. The remains of the original geology in the area are referred to as the Kakamas Terrane and the site is located on Kanoneiland granite of the Keimoes Suite that is intrusive into the terrane, as described by Moen. The granite is described as dark grey, speckled white rock with a high biotite content. The texture is coarse grained.

12.2 Soil Profile

12.2.1 Colluvium

Colluvial deposits are present as surface deposits in a surface horizon between 100mm to 600mm thick. It consists of pale light brown fine sands to coarse sand with contents of gravels and cobbles of granite or calcrete in variable proportions, but mostly matrix supported. The soil matrix is normally intact. The properties of the colluvium are thus such that it does not tend to excessive settlement, collapse or heave.

12.2.2 Alluvium

Alluvium is present as a surface horizon between 300mm and 1300mm thick. The distribution thereof is limited to the debris deposited by the non-perennial water courses bordering the canal. It consists of light brown, medium dense to very loose fine sands to coarse sand with matrix supported fine gravels of quartz and very weak calcareous cementing in variable proportions. Although the soil composition of the alluvium is such that it is not specially subject to settlement, it can be regarded as recent, unconsolidated deposits. Considering the vertical extent of the alluvial deposits, it is regarded as the soil material on site most subject to settlement.

12.2.3 Residual Granite

Residual granite underlies the colluvium and alluvium, occurring from depths between 100mm and 1300mm minimum, extending to 300mm to 1900mm maximum. The residual granite can be described as dirty white speckled dark grey varying to dark grey speckled white, micaceous or calcareous cemented, coarse sand containing fine gravels of quartz and cobbles of granite. The consistency of the residual granite varied between dense and very dense in the test pits. It can thus accommodate stresses imposed by conventional housing structures without undue settlement.

12.2.4 Pedogenic Deposits

- *Nodular Calcrete* : Nodular calcrete generally underlies the transported surface deposits. It was present between zero and 500mm deep minimum, extending to 300mm to 1300mm maximum. The nodular calcrete can be described as dirty white to grey white, rounded, fine to medium coarse, concretions contained in a matrix of fine sand, or as a cemented pedocrete. The consistency varies from medium dense to very dense It can thus accommodate stresses imposed by conventional housing structures without undue settlement.
- *Unconsolidated Calcrete* : Unconsolidated calcrete underlies the transported surface deposits. It was present between 300mm and 900mm deep minimum, extending to 1100mm to 1300mm maximum. The unconsolidated powder calcrete can be described as dirty white, fine, calcareous sand. The consistency is medium dense. The properties of the powder calcrete are thus such that it does not tend to excessive settlement.

12.3 Groundwater

12.3.1 Perched Water

Perched groundwater was not encountered on site. Conditions are such that perched will generally not occur in the area.

12.3.2 Permanent Groundwater

Groundwater is expected to occur at depths between 20 meters and 30 meters in fractures restricted to a zone directly below the water table. The presence of permanent water has no influence on the geotechnical conditions on site.

12.4 Conditions of Excavation

On average over the entire site it is most likely that a 30 ton track mounted excavator will prove to be more suitable equipment for excavation than the 55kW TLB, achieving deeper levels of penetration prior to refusal. Refusal of excavation was encountered in all the test pits between depths of 50mm and 2200mm, averaging 970mm. The implication of this is that should trenches require excavated depths to 1000mm, 3% of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 35% of the excavation may be classified as hard.

Irrespective of which method of excavation is considered, the most important issue is that across the entire site the depth to bedrock that can be regarded as hard rock excavation that is highly variable as follows :

- Unweathered, very hard rock, granite resulting in virtually immediate refusal of excavation.
- Slightly weathered, hard rock, granite resulting in very slow penetration indicating conditions of uneconomical excavation by the mechanical equipment used for the investigation.
- Very dense, residual granite tending to medium hard rock resulting in very slow penetration indicating conditions of uneconomical excavation by mechanical equipment used for the investigation.

Conditions of Boulder Class A excavation could be identified in one test pit only, but should the presence of outcrops be taken into account, the volume of such excavation may be significant.

As for individual areas, the following is applicable :

12.4.1 Geotechnical Zone I

This zone is classified as S. Refusal of excavation was encountered in all the test pits between depths of 500mm and 1500mm, averaging 1050mm. The implication of this is that should trenches require excavated depths to 1000mm, zero of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 30% of the excavation may be classified as hard.

12.4.2 Geotechnical Zone II

This zone is classified as R. Refusal of excavation was encountered in all the test pits between depths of 50mm and 400mm, averaging 225mm. The implication of this is that should trenches require excavated depths to 1000mm, 77,5% of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 85% of the excavation may be classified as hard.

12.4.3 Geotechnical Zone III

In its present condition this zone is classified as P(Water). If remedial measures can be successfully applied to resolve the artificially created drainage problems a zonation of S is applicable. Refusal of excavation was encountered in all the test pits between depths of 1300mm and 2200mm, averaging 1750mm. The implication of this is that conditions of hard

rock excavation will not be encountered to trench depths of 1500mm. However, cognizance must be taken of the fact that in the present state conditions of wet excavation may be present.

12.4.4 Geotechnical Zone IV

This zone is classified as P(Outcrops) Minimal test pitting could be conducted in these areas. The test pitting conducted may not represent actual conditions due to the highly undulating rock profile as illustrated by the profile of TP 31. It is thus proposed on a preliminary basis to allow for 50% hard rock excavation and 50% boulder class A excavation in this zone.

12.5 Site Class Designation

12.5.1 Geotechnical Zone I

This zone comprises 82,5% of the area investigated and covers the larger part of the site. The soil profile consists of a horizon of colluvium less than 600mm thick overlying medium dense to very dense residual sand or nodular calcrete and at depth bedrock granite. Slope across the land is between 1,7% and 2,2%. As per the materials profile encountered in the test pits the combined thickness of the strata of nodular calcrete and residual soil is sufficient to dissipate the stresses induced by the foundations effectively. The area is thus zoned as "S" and the materials strata can be regarded as compressible to a maximum of 10mm.

12.5.2 Geotechnical Zone II

This zone comprises 5,4% of the area investigated and is present in three separate areas on site. The soil profile consists of a superficial horizon of colluvium and residual soil less than 400mm thick overlying bedrock of granite. Slope across the land is less than 2,5%. Foundation stresses induced by conventional strip foundations for single and double storey structures will result in almost negligible settlement if founded directly on the slightly weathered and unweathered hard rock to very hard rock. The area is thus zoned as "R" and regarded as stable.

12.5.3 Geotechnical Zone III

This zone comprises 2,4% of the area investigated. The zone is present in four separate areas along the western boundary of the property. The profile consists of a horizon of transported sand less than 600mm thick overlying medium dense to very dense residual sand or nodular calcrete and at depth bedrock granite. Slope across the land is between 1,5% and 2,0%. As per the materials profile encountered in the test pits the combined thickness of the

strata of nodular calcrete and residual soil is sufficient to dissipate the stresses induced by the foundations effectively. However, the area is influenced by the periodic presence of water originating from blocking the natural water courses and seepage from the canal. Damage to structures by occur due to soil moisture triggering the corrosivity of the soil. Potentially the area can be zoned as "S" and the materials strata can be regarded as compressible to a maximum of 10mm if the inundation of the area can be resolved. In the unresolved condition the area is zoned as "P(Water)" and conditions are regarded as unfavourable for residential development.

12.5.4 Geotechnical Zone IV

This zone comprises 9,7% of the area investigated. This zone is characterized by the numerous localized granite outcrops. Such outcrops consist of areas of exposed corestones and areas of hard rock present as fairly level batholitic surfaces. Potentially the areas can be zoned as R which can in principle be regarded as stable, but the highly undulating land surface due to the presence of boulders and outcrops detracts from the suitability thereof for residential development. The area is thus zoned as "P(Outcrops)".

12.6 Land Slope

The average slope across the larger part of the land between 1,5% and 2,5%, but highly variable in Geotechnical Zone IV. The land lope does not detract from the development potential of the area.

No steep slopes are present on the property.

12.7 Areas Subject to Flooding

Blockages of the natural water courses occur on the western perimeter of the property close to the canal. The combination of such blocking and seepage from leakages of the canal results in periodical inundation of four areas close to the canal.

It is thus concluded that attention be given to the presence of these conditions as they may influence the future development of the area.

12.8 Materials Utilization

- *Trench Backfilling* : None of the materials are suitable for selected fill or pipe bedding. All materials can be used for normal backfill.

- *Layerworks for Paved or Segmental Block Paving* : The residual soils are suitable for the construction of in-situ selected and subbase for lightly trafficked streets.
- *Wearing Course for Gravel Roads in Urban Areas* : None of the soil materials are 100% suitable for this purpose. The use of these materials will generally result in a road surface subject to raveling and corrugations.

12.9 Other Considerations

- *Undermining* : The area is not subject to undermining.
- *Seismic Activity* : The Peak Ground Acceleration expected in 50 years is 0,07g. A low risk for the development of earth tremors therefore exist.
- *Soil Corrosivity* : The in-situ soils and pedocretes are highly corrosive due a high soluble salts content.
- *Dolomite* : The area of investigation is not subject to any restrictions due to the presence of dolomite. Bedrock of dolomite does not occur in the area of investigation.

13 RECOMMENDATIONS

13.1 Foundation and Structural Design

Section 10 of this document provides guidelines for foundation and structural design. These guidelines are based strictly on the contents of SANS 10400H and the NHBRC Home Owners Manual published in 2015. It is recommended that development take place strictly according to these guidelines.

The following is recommended :

- *Geotechnical Zones I and II* : In these zones where more than one alternative for foundation design is provided, the property developer can base his choice on financial constraints.
- *Geotechnical Zone III* : Unless remedial measures are put in place to ensure that flooding of the area does not occur, no development shall take place. If remedial measures can be applied successfully foundation and structural design suitable to accommodate 10mm time related settlement shall be provided for.
- *Geotechnical Zone IV* : In principle it is possible to build successfully in these rocky conditions, but it will come at a cost. It is recommended that these areas only be developed if the demand for houses exceed the availability of stands in Zones I and II. The conditions in each stand will have to be designed for on an individual basis.

13.2 Areas Subject to Flooding

13.2.1 Presence of Non-perennial Gullies

Five shallow non-perennial gully areas have been identified. Although these areas are not subject to continuous flooding, such events may result in damage to infrastructure if not designed for. It is recommended that the flood characteristics of these water courses be determined and a safe area between the future houses and the gullies maintained. Having stated this, it is recognized that a geotechnical document is not a guideline for hydraulic design for urban development.

13.2.2 Areas of Ponding

These area are zoned separately as Geotechnical Zone III. The rehabilitation of these areas is not necessarily the responsibility of the local municipal authority or the property developer. Should it be necessary to locate erven in this zone, the land shall be rehabilitated to allow safe development thereof. Such rehabilitation shall consist of repairs of the leaks in the canal and providing sufficient channeling for the non-perennial streams to eliminate ponding in the canal area.

13.3 Materials Utilization

- *Trench Backfill* : The in-situ materials may be used for normal backfill of trenches. Material for pipe bedding and selected backfill shall be obtained from commercial sources.
- *Layerworks for Paved or Segmental Block Paving* : Material for base construction must be obtained from commercial sources. Depending on the pavement design, selected layerworks and subbase material may consist of in-situ derived soils. It is recommended that a centerline investigation consisting of test pitting and soil sampling be conducted to allow the consulting engineer to produce suitable pavement designs for the project. Special attention must be paid to the chemical properties of the soils to avoid future damage caused by chemically aggressive materials.
- *Wearing Course for Gravel Roads in Urban Areas* : Material for the construction of a gravel wearing course may be sourced from the in-situ soils. However it is not the perfect material, but the "perfect" material or this purpose is very hard to obtain in the area.

13.4 Conditions of Excavation

Although manual excavation is possible through the colluvium and alluvium, and to some extent through the residual soil, it is considered as not an economic proposition, mostly due to the consistency and composition of the soil. Excavation through these soils shall require the

use of a TLB rated at 55kW minimum, or preferably a 30 ton excavator for the very dense pedocretes and residual granite need to be removed. It is recommended that adequate provision be made for hard rock and boulder class A excavation. In Geotechnical Zone III provision must be made for excavation in wet conditions. Workers in the trenches shall be protected against collapse by either reducing slopes of the excavations to 1(V) : 2(H) or the provision of shoring.

13.5 Corrosive Soil

The results of materials testing undertaken for this investigation indicate that all soil materials are highly to very highly corrosive. Potentially, this has an influence on pavement design, installation of wet services and house construction. However, the corrosive character of soil is only triggered by the presence of soil moisture, but the condition that soil moisture will never be present cannot be guaranteed.

The presence of different types of soluble salts result in different types of damage to infrastructure. It is therefore recommended that additional testing be conducted to identify the types of corrosive material present, be it sulfides, sulfates or chloride, and provide the correct protection against corrosion that may result due to the presence of these materials.

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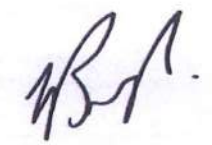

FJ Breytenbach, Pr Eng (920166)
For Cedar Land Geotechnical Consult (Pty) Ltd

2 November 2020

REPORT ON THE GEOTECHNICAL CONDITIONS ON PORTION 30 OF PORTION 29 OF THE FARM BLAAUWS KOP 36, DISTRICT KENHARDT

2020/J011/MCP

ADDENDUM A: TEST PIT PROFILES

TRIAL HOLE: 1

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI GARIP MUNICIPALITY*

LOCATION: *28°40'22,0" S 21°06'12,9" E*

Cedar Land Geotechnical Consult (Pty) Ltd
P O Box 607
Ceres
6835
Cell: 082 570 2767
Email:
cedarland.frans@breede.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES.
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1000 mm due to very slow penetration on medium hard rock, granite.
		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
0.40						
0.60						
0.80						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 1

FIGURE: A1

TRIAL HOLE: 2

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *I-JB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'20,1" S 21°06'09,6" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite and dirty white, medium coarse, subangular and subrounded gravel sized calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1200 mm due to very slow penetration on very dense, coarse sand.
		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
0.40						
0.60						
0.80						
1.00		Dry, dirty white, very dense, strongly calcareous cemented, coarse *SAND*. Residual granite.				
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 2

FIGURE: A2

TRIAL HOLE: 3

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'18,5" S 21°06'06,9" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, loose, intact, fine *SAND* and matrix supported, coarse, rounded gravel sized calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1300 mm due to very slow penetration on medium hard rock, granite.
0.40		Dry, light brown mottled dirty white, dense, calcareous cemented, fine *SAND* with subvertical lenses (50 mm to 100 mm wide) of dirty white, speckled dark grey, overall well-graded, micaceous sand. Residual granite.				
0.60			U9427	0,3-1,1	●	
0.80						
1.00		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.20						
1.40						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 3

FIGURE: A3

TRIAL HOLE: 4

PROJECT: *PROPOSED PLANGLNI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'16,6" S 21°06'03,8" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, loose, intact, fine *SAND* and matrix supported, coarse, rounded, gravel sized, calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1400 mm due to very slow penetration on very dense, coarse sand.
		Dry, light brown mottled dirty white, dense, calcareous cemented, fine *SAND*. Residual granite.				
0.40						
0.60						
0.80						
1.00		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
1.20		Dry, dirty white, very dense, strongly calcareous cemented, coarse *SAND*. Residual granite.				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 4

FIGURE: A4

TRIAL HOLE: 5

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI IGARIP MUNICIPALITY*

LOCATION: *28°40'14,5" S 21°06'00,1" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 600 mm due to very slow penetration on medium hard rock, granite.
		Dry, light grey brown, medium dense, micaceous *SAND* and matrix supported, coarse, angular gravels of granite. Residual granite.				
0.40						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
0.60						
0.80						
1.00						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 5

FIGURE: A5

TRIAL HOLE: 6

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'12,8" S 21°05'57,3" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, pale light grey brown, medium dense,calcareous cemented *SAND* and matrix supported, coarse, angular gravels of granite. Residual granite.				2 Refusal of excavation at 800 mm due to very slow penetration on medium hard rock, granite.
0.40			U9428	0.2-0,8	●	
0.60		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
0.80						
1.00						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 6

FIGURE: A6

TRIAL HOLE: 7

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'10,7" S 21°05'53,1" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				
		Dry, light brown, very loose, intact, fine *SAND*. Alluvium. Tree roots are present in the horizon.				NOTES: 1 No seepage water encountered. 2 Refusal of excavation at 2200 mm due to very slow penetration on medium hard rock, granite.
0.20						
0.40						
0.60						
0.80		Dry, pale light grey brown mottled white, medium dense, intact, fine *SAND* and matrix supported, fine, gravel sized, rounded calcrete concretions. Alluvium. Tree roots are present in the horizon.				
1.00						
1.20						
1.40		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
1.60						
1.80						
2.00		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				Water encountered; Water level; Bottom of hole; Approximate material change; Disturbed sample; Undisturbed sample
2.20						
2.40						

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 7

FIGURE: A7

TRIAL HOLE: 8

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'07,2" S 21°05'56,1" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				2 Refusal of excavation at 350 mm due to very slow penetration on hard rock, granite.
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, hard rock, *GRANITE*.				
0.40						
0.60						
0.80						
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 8

FIGURE: A8

TRIAL HOLE: 9

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI IGARIP MUNICIPALITY*

LOCATION: *28°40'08,8" S 21°05'59,2" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1000 mm due to very slow penetration on medium hard rock, granite.
		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
0.40						
0.60			U9429	0,3-0,9	●	
0.80						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 9

FIGURE: A9

TRIAL HOLE: 10

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *//10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'10,7" S 21°06'02,1" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, loose, intact, fine *SAND* with matrix supported, fine, rounded quartz gravels and medium coarse, subangular gravels of banded ironstone and coarse, angular gravels of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, dense, relic jointed and calcareous cemented, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				2 Refusal of excavation at 500 mm due to very slow penetration on medium hard rock, granite.
0.40		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
0.60						
0.80						
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 10

FIGURE: A10

TRIAL HOLE: 11

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'11,7" S 21°06'05,4" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, light brown, loose, intact, fine *SAND* with matrix supported, fine to medium coarse, rounded, gravel sized, calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 900 mm on hard rock, granite.
0.40		Dry, dark grey mottled dirty white, very dense, coarse, micaceous *SAND* tending to clast supported, fine, subangular gravels of quartz. Residual granite.				
0.60						
0.80		Dark grey brown speckled white, massive, very coarse grained, slightly weathered, micaceous, hard rock, *GRANITE*.				
1.00						▽ Water encountered ▼ Water level ⊓ Bottom of hole --- Approximate material change ▪ Disturbed sample ▪ Undisturbed sample
1.20						

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 11

FIGURE: A11

TRIAL HOLE: 12

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *TJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *//10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'14,1" S 21°06'09,2" E*

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Cell: 082 570 2767
Email:
cedarland.frans@breede.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, light grey and light brown mottled white, very dense, calcrete cemented, micaceous gravelly *SAND*. Residual granite.				2 Refusal of excavation at 1300 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60			U9430	0,1-1,1	●	
0.80						
1.00						
1.20		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.40						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 12

FIGURE: A12

TRIAL HOLE: 13

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'16,0" S 21°06'12,2" E*

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Email:
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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, light brown, very loose, intact, fine *SAND* and matrix supported, fine, rounded gravels of quartz. Alluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1500 mm due to very slow penetration on medium hard rock, granite.
0.40						
		Light grey white, fine to medium coarse, rounded and subrounded, gravel sized, very dense, nodules of *CALCRETE*. Pedogenic deposits.				
0.60						
0.80						
1.00						
1.20						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 13

FIGURE: A13

TRIAL HOLE: 14

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'18.6" S 21°06'15,8" E*

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Email:
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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, light brown, very loose, intact, fine *SAND* and matrix supported, fine, rounded gravels of quartz. Alluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1200 mm due to very slow penetration on medium hard rock, granite.
		Light grey white, fine to medium coarse, rounded and subrounded, gravel sized, medium dense, nodules of *CALCRETE*. Pedogenic deposits.				
0.40						
0.60						
0.80						
1.00						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.20						
1.40						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 14

FIGURE: A14

TRIAL HOLE: 15

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'14,7" S 21°06'17,7" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, light brown, very loose, fine *SAND*. Alluvium. Tree roots are present in the horizon.				1 No seepage water encountered.
0.20			U9431	0-0,6	●	2 Refusal of excavation at 1400 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60		Dry, light brown, very loose, intact, fine *SAND* and matrix supported, fine, rounded gravels of quartz. Alluvium.				
		Dry, dark grey brown speckled white, very dense, coarse, micaceous *SAND*. Residual granite.				
0.80						
1.00						
1.20						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 15

FIGURE: A15

TRIAL HOLE: 16

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI GARIB MUNICIPALITY*

LOCATION: *28°40'13,6" S 21°06'14,9" E*

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Email:
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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dark grey brown speckled white, massive, very coarse grained, slightly weathered, micaceous, hard rock, *GRANITE*.				2 Refusal of excavation at 200 mm on hard rock, granite.
0.40						
0.60						Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
0.80						

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 16

FIGURE: A16

TRIAL HOLE: 17

PROJECT: *PROPOSLD PI ANGENI DEVELOPMLNT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'10,9" S 21°06'11,5" E*

Cedar Land Geotechnical Consult (Pty) Ltd
P O Box 607
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6835
Cell: 082 570 2767
Email:
cedarland.frans@breede.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dark grey brown speckled white, massive, very coarse grained, slightly weathered, micaceous, very hard rock, *GRANITE.* Rock outcrop.				1 No seepage water encountered.
						2 Refusal of excavation at 50 mm on very hard rock, granite.
0.20						
0.40						
0.60						
0.80						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 17

FIGURE: A17

TRIAL HOLE: 18

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'08,9" S 21°06'08,1" E*

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Email:
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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Abundant, clast supported, fine, gravel sized, nodules of *CALCRETE* in a matrix of dry, fine, light brown sand. Overall consistency is medium dense. Pedogenic deposits.				1 No seepage water encountered.
						2 Refusal of excavation at 400 mm due to very slow penetration on medium hard rock, granite.
0.20			U9432	0-0.4	●	
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE.*				
0.40						
0.60						
0.80						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 18

FIGURE: A18

TRIAL HOLE: 19

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI GARIB MUNICIPALITY*

LOCATION: *28°40'07,2" S 21°06'04,9" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite Residual granite.				2 Refusal of excavation at 1400 mm due to very slow penetration on medium hard rock, granite.
0.40						
		Dry, dull light red, medium dense, fine, calcareous *SAND*. Unconsolidated pedogenic deposits.				
0.60						
		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
0.80						
		Dry, dull light red, medium dense, fine, calcareous *SAND*. Unconsolidated pedogenic deposits.				
1.00						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.20						
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 19

FIGURE: A19

TRIAL HOLE: 20

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'06,2" S 21°06'01,3" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				2 Refusal of excavation at 1300 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60						
0.80						
1.00						
1.20		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE.*				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 20

FIGURE: A20

TRIAL HOLE: 21

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI GARIB MUNICIPALITY*

LOCATION: *28°40'01,7" S 21°05'57,2" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES: 1 No seepage water encountered. 2 Refusal of excavation at 650 mm on very hard rock, granite.
		Dry, dull light brown, medium dense, intact, fine *SAND* and matrix supported, fine, subrounded, gravel sized, calcrete concretions. Overall well-graded, gravelly sand. Colluvium.				
0.20			U9433	0-0,6	●	
0.40						
0.60		Dark grey brown speckled white, massive, very coarse grained, unweathered, micaceous, very hard rock, *GRANITE*.				
0.80						
1.00						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 21

FIGURE: A21

TRIAL HOLE: 22

PROJECT: *PROPOSED PLANGI-NI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°39'58,4" S 21°06'00,5" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite and lenses of light brown, fine sand (<100mm wide) and calcareous, fine sand (<50mm wide). Residual granite.				2 Refusal of excavation at 1300 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60						
0.80						
1.00						
1.20		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 22

FIGURE: A22

TRIAL HOLE: 23

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI IGARIP MUNICIPALITY*

LOCATION: *28°40'01,9" S 21°06'04,7" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, medium dense, intact, coarse *SAND* and matrix supported, angular cobbles of granite. Colluvium.				1 No seepage water encountered.
0.20		Abundant, clast supported, angular *COBBLES* of granite in a matrix of dry, dirty white, fine, gravel sized, calcareous concretions. Overall consistency is very dense. Residual granite.				2 Refusal of excavation at 700 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
0.80						
1.00						
1.20						
1.40						
1.60						

Water encounterec
Water level
Bottom of hole
Approximate material change
Disturbac sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 23

FIGURE: A23

TRIAL HOLE: 24

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *HJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KANGARIP MUNICIPALITY*

LOCATION: *28°40'03,2" S 21°06'08,2" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, very loose, intact, fine *SAND*. Alluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1500 mm due to very slow penetration on very dense, calcareous sand with calcareous concretions.
		Dry, dirty white, medium dense, calcareous cemented, fine *SAND*. Overall well-graded sand. Unconsolidated pedogenic deposits.				
0.40						
0.60						
0.80			U9434	0,3-1,3	●	
1.00						
1.20						
		Dry, dirty white, very dense, calcareous, fine *SAND* and matrix supported, fine, subrounded calcareous concretions. Pedogenic deposits.				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 24

FIGURE: A24

TRIAL HOLE: 25

PROJECT: *PROPOSED PI ANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BI AAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'05,5" S 21°06'10,7" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dark grey brown speckled white, massive, very coarse grained, slightly weathered, micaceous very hard rock, *GRANITE*. Rock outcrop.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 50 mm on very hard rock, granite.
0.40						
0.60						
0.80						Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00						

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 25

FIGURE: A25

TRIAL HOLE: 26

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *HJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI GARIP MUNICIPALITY*

LOCATION: *28°40'06,7" S 21°06'13,6" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, light red brown, medium dense, intact, coarse *SAND*. Residual granite.				1 No seepage water encountered.
		Abundant, clast supported, angular *BOULDERS* of dark grey speckled white, unweathered, very hard rock, granite, in a matrix of dry, light red brown, fine sand. Overall consistency is very dense. Residual granite.				2 Refusal of excavation at 700 mm due to very slow penetration on medium hard rock, granite.
0.20						
0.40						
0.60		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
0.80						Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00						

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 26

FIGURE: A26

TRIAL HOLE: 27

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIB MUNICIPALITY*

LOCATION: *28°40'10,0" S 21°06'16,4" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, dirty white, loose, intact, fine *SAND* and matrix supported, fine, gravel sized calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white mottled black, very dense, calcareous cemented, very coarse, micaceous *SAND*. Residual granite.				2 Refusal of excavation at 900 mm due to very slow penetration on medium hard rock, granite.
0.40			U9435	0.2-0,7	●	
0.60						
0.80		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.00						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 27

FIGURE: A27

TRIAL HOLE: 28

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'12,4" S 21°06'20,0" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, intact, loose, fine *SAND*. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white, very dense, coarse, gravel sized nodules of *CALCRETE*. Pedogenic deposits.				2 Refusal of excavation at 1000 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60						
0.80						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 28

FIGURE: A28

TRIAL HOLE: 29

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 30*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI IGARIP MUNICIPALITY*

LOCATION: *28°40'08,2" S 21°06'22,0" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, dirty white, loose, intact, fine *SAND* and matrix supported, fine, gravel sized calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1100 mm due to very slow penetration on very dense, micaceous sand with cobbles of granite.
		Dry, dirty white speckled dark grey, very dense, micaceous, coarse *SAND* and matrix supported, angular, cobbles of granite. Residual granite.				
0.40						
0.60						
0.80						
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 29

FIGURE: A29

TRIAL HOLE: 30

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°40'05.5" S 21°06'19.5" E*

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cedarland.frans@breede.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, dirty white, loose, intact, fine *SAND* and matrix supported, fine, gravel sized calcrete concretions. Colluvium.	U9436	0-0,3	●	1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, dense, micaceous, coarse *SAND* and matrix supported, angular, cobbles of granite. Residual granite.				2 Immediate refusal at 300 mm on dirty white, speckled dark grey, massive, coarse grained, unweathered, micaceous, very hard rock, granite.
0.40						
0.60						
0.80						
1.00						
1.20						

▽ Water encountered
▼ Water level
⊢ Bottom of hole
--- Approximate material change
• Disturbed sample
▪ Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 30

FIGURE: A30

TRIAL HOLE: 31

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI GARIP MUNICIPALITY*

LOCATION: *28°40'04,5" S 21°06'15,2" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Northern face of test pit: Dry, dirty white, loose, intact, fine *SAND* and matrix supported, fine, gravel sized, calcrete concretions. Colluvium.				1 No seepage water encountered.
0.20		Dry, light grey brown speckled white, dense, micaceous, coarse *SAND* and matrix supported, subangular, cobbles of granite. Residual granite.				2 Northern face of test pit: refusal of excavation at 1400 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60						3 Southern face of test pit: refusal of excavation at 50 mm on very hard rock, granite.
0.80						
1.00						
1.20						
1.40		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE.*				
		Southern face of test pit: 0 - 50 mm: Dark grey brown speckled white, massive, very coarse grained, slightly weathered, micceous, very hard *rock, GRANITE.* Rock outcrop.				
1.60						
1.80						

▽ Water encountered
▼ Water level
⊓ Bottom of hole
--- Approximate material change
▪ Disturbed sample
▪ Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 31

FIGURE: A31

TRIAL HOLE: 32

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI IGARIP MUNICIPALITY*

LOCATION: *28°39'59,8" S 21°06'14,2" E*

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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, intact, loose, fine *SAND*. Colluvium.				1 No seepage water encountered.
		Dry, dirty white speckled dark grey, very dense, micaceous, coarse *SAND* and matrix supported, angular, cobbles of granite. Residual granite.				2 Refusal of excavation at 500 mm due to very slow penetration on medium hard rock, granite.
0.20						
0.40		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
0.60						
0.80						
1.00						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 32

FIGURE: A32

TRIAL HOLE: 33

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°39'59,6" S 21°06'09,4" E*

Cedar Land Geotechnical Consult (Pty) Ltd
P O Box 607
Ceres
6835
Cell: 082 570 2767
Email:
cedarland.frans@breede.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, intact, loose, fine *SAND*. Colluvium.				1 No seepage water encountered.
0.20		Dry, dirty white speckled dark grey, very dense, micaceous, coarse *SAND* and matrix supported, angular, cobbles of granite and a lens of dirty white, calcareous sand between 700 mm and 850 mm deep Residual granite.				2 Refusal of excavation at 1400 mm due to very slow penetration on medium hard rock, granite.
0.40						
0.60			U9437	0,2-1,3	●	
0.80						
1.00						
1.20						
		Dirty white, speckled dark grey, massive, coarse grained, slightly weathered, micaceous, medium hard rock to hard rock, *GRANITE*.				
1.40						
1.60						

Water encountered
Water level
Bottom of hole
--- Approximate material change
• Disturbed sample
▪ Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 33

FIGURE: A33

TRIAL HOLE: 34

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KANGARIP MUNICIPALITY*

LOCATION: *28°39'56,2" S 21°06'07,4" E*

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Email:
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Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				
		Dry, pale light brown, intact, loose, fine *SAND*. Colluvium.				
0.20		Dry, dirty white speckled dark grey, very dense, micaceous, coarse *SAND* and matrix supported, angular, cobbles of granite and random veins of light red brown, fine sand. Residual granite.				
0.40						
0.60						
0.80						
1.00						
1.20						
1.40		Dry, dirty white speckled dark grey, very dense, micaceous, coarse *SAND* and matrix supported, angular cobbles of granite. Residual granite.				
1.60						

NOTES:

1 No seepage water encountered.

2 Refusal of excavation at 1500 mm due to very slow penetration on very dense, micaceous sand with cobbles of granite.

- Water encountered
- Water level
- Bottom of hole
- Approximate material change
- Disturbed sample
- Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 34

FIGURE: A34

TRIAL HOLE: 35

PROJECT: *PROPOSED PLANGENI DEVELOPMENT*

LOGGED BY: *FJB*

SITE: *PORTION 30 OF THE FARM BLAAUWSKOP NO 36*

DATE LOGGED: *7/10/2020*

CLIENT: *KAI !GARIP MUNICIPALITY*

LOCATION: *28°39'53,3" S 21°06'05,3" E*

Cedar Land Geotechnical Consult (Pty) Ltd
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6835
Cell: 082 570 2767
Email:
cedarland.frans@breede.co.za

Depth (m)	Legend	PROFILE	SAMPLE Number	SAMPLE Type	SAMPLE Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, pale light brown, intact, loose, fine *SAND*. Colluvium.				1 No seepage water encountered.
0.20						2 Refusal of excavation at 1100 mm due to very slow penetration on very dense, micaceous sand with cobbles of granite.
		Dry, dirty white speckled dark grey, very dense, micaceous, coarse *SAND* and matrix supported, angular, cobbles of granite. Residual granite.				
0.40						
0.60						
0.80						
1.00						
1.20						

Water encountered
Water level
Bottom of hole
Approximate material change
Disturbed sample
Undisturbed sample

Contractor: ALS Plant Hire
Date Drilled: 7/10/2020
Machine: Bell 315SK

Hole Diameter: 600 mm
Water Depth:
Sheet: 1 of 1

SOIL PROFILE: TEST PIT 35

FIGURE: A35

REPORT ON THE GEOTECHNICAL CONDITIONS ON PORTION 30 OF PORTION 29 OF THE FARM BLAAUWS KOP 36, DISTRICT KENHARDT

2020/J032/MCP_01

ADDENDUM B: RESULTS OF MATERIALS TESTING

ROADLAB

Roadlab Germiston
207 Rietfontein Road Germiston
1401
Tel: 011 828 0279 Fax: 011 828 0279
Email: info@roadlab.co.za
Web: www.roadlab.co.za

Date Reported : 2020-10-20

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835

Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

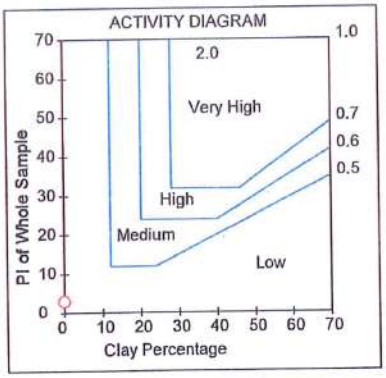
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

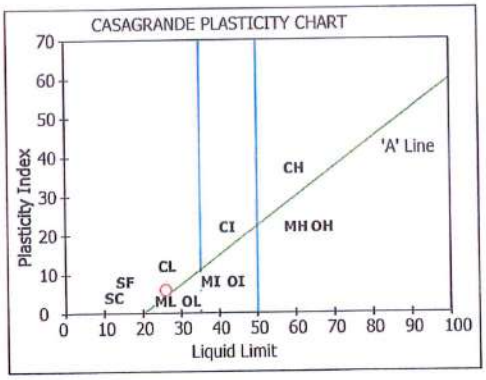
Sample No.	: U9427
Position	: TP3
Layer Type	: 300-1100mm
Sample Colour	: Light Brown Gravel
Sample Type	: Mix Weathered Calcre

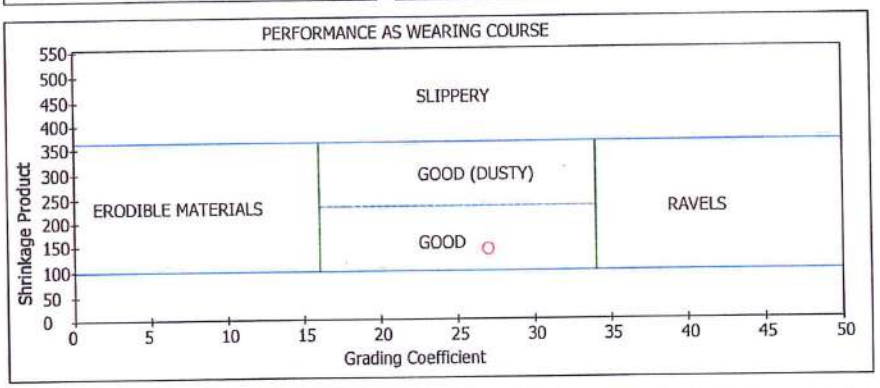
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	98
20.00	97
14.00	95
5.000	82
2.000	65
0.425	48
0.250	42
0.150	34
0.075	23
0.060	13
0.050	10
0.020	2,4
0.005	0,4
0.002	0,0

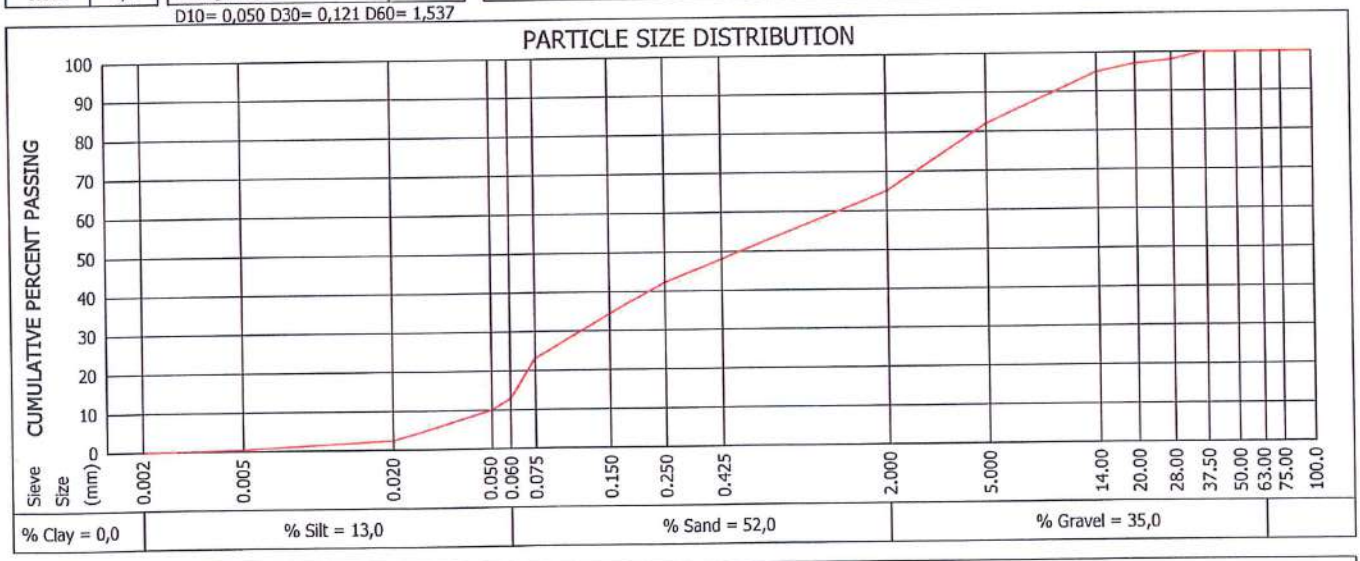
Soil Mortar	2.000 - 0.425	26
	0.425 - 0.250	8
	0.250 - 0.150	12
	0.150 - 0.075	18
	< 0.075	36
Effective Size		0,050
Uniformity Coefficient		30,7
Curvature Coefficient		0,2
Oversize Index		0,0
Shrinkage Product		144,0
Grading Coefficient		27,1
Grading Modulus		1,60
Atterberg Limits	Liquid Limit	26
	Plasticity Index	6
	Linear Shrinkage	3.0
	PI < 0.075	
Unified Soil Classification		SM-SC
US Highway Classification		A-1-b(0)

D10= 0,050 D30= 0,121 D60= 1,537









% Clay = 0,0	% Silt = 13,0	% Sand = 52,0	% Gravel = 35,0

Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
The test results reported relate to the samples tested.
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Report compiled by : Juraine Okkies

sanas Testing Laboratory
Accreditation No. T0296
Prog.ver 10.7 (2019/11/07)

D Juckers
Technical Signatory

ROADLAB

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Web: www.roadlab.co.za

Date Reported : 2020-10-15

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
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6835

Project : Blaauwskop (Plangeni)

Attention : Frans Breytenbach

Determination of the California Bearing Ratio Test Report SANS 3001 - GR1 / GR2 / GR10 / GR20 / GR30 / GR40 / PR5

SAMPLE INFORMATION AND PROPERTIES

SAMPLE NO.		U9428			
HOLE NO./ Km / CHAINAGE		TP6			
ROAD NO./ NAME Line 1 ROAD NO./ NAME Line 2		S28° 40' 12,8" E21° 05' 57,3"			
LAYER TESTED/SAMPLED		200-800mm			
SAMPLE DEPTH		200-800mm			
DATE SAMPLED		2020-10-06			
COLOUR OF SAMPLE		Light Greyish Brown			
TYPE OF SAMPLE		Mix Granite Calcrete			

SIEVE ANALYSIS - % PASSING SIEVES *(SANS 3001-GR1:2010, SANS 3001-GR2:2010)

SIEVE ANALYSIS (GR 1) % PASSING	100.0 mm				
	75.0 mm	100			
	63.0 mm	95			
	50.0 mm	95			
	37.5 mm	91			
	28.0 mm	89			
	20.0 mm	87			
	14.0 mm	84			
	5.0 mm	63			
	2.0 mm	41			
	0.425 mm	22			
	0.075 mm	8			
GM %		2,3			

SOIL MORTAR ANALYSIS (SANS 3001-PR5:2011)

COARSE SAND	2.000 - 0.425	47			
COARSE FINE SAND	0.425 - 0.250	11			
MEDIUM FINE SAND	0.250 - 0.150	11			
FINE FINE SAND	0.150 - 0.075	12			
SILT CLAY	0.075	20			

ATTERBERG LIMITS ANALYSIS - *(SANS 3001-GR10:2010)

ATTERBERG LIMITS (%) SANS GR10,GR11	LIQUID LIMIT	26			
	PLASTICITY INDEX	2,8			
	LINEAR SHRINKAGE	1,5			
CLASSIFICATION	H.R.B.	A-1-a(0)			
	COLTO	G6			
	TRH 14	G6			

CALIFORNIA BEARING RATIO - *(SANS 3001-GR30:2010, SANS 3001-GR40:2010)

SANS GR30 MAX. DRY DENSITY	OMC %	6,7			
	MDD (kg/m³)	2091			
	COMP MC %	6,7			
SWELL % @	MOD | NRB | PRO	0,00 | 0,02 | 0,03			
C.B.R. SANS GR40	100 %	65			
	98 %	51			
	97 %	46			
	95 %	36			
	93 %	29			
	90 %	20			

STABILISER IN LAB	Not Applicable			
TEST TYPE	CBR			
SAMPLING METHOD	TMH 5			
WEATHER WHEN SAMPLED	Cold			

Deviation from Test Method :
Remarks and Notes :

Report compiled by : Juraine Okkies

sanas Testing Laboratory
Accreditation No. T0296
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Date Reported : 2020-10-15

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835

Project : Blaauwskop

Attention : Frans Breytenbach

Determination Maximum Dry Density & Optimum Moisture Content Test Report

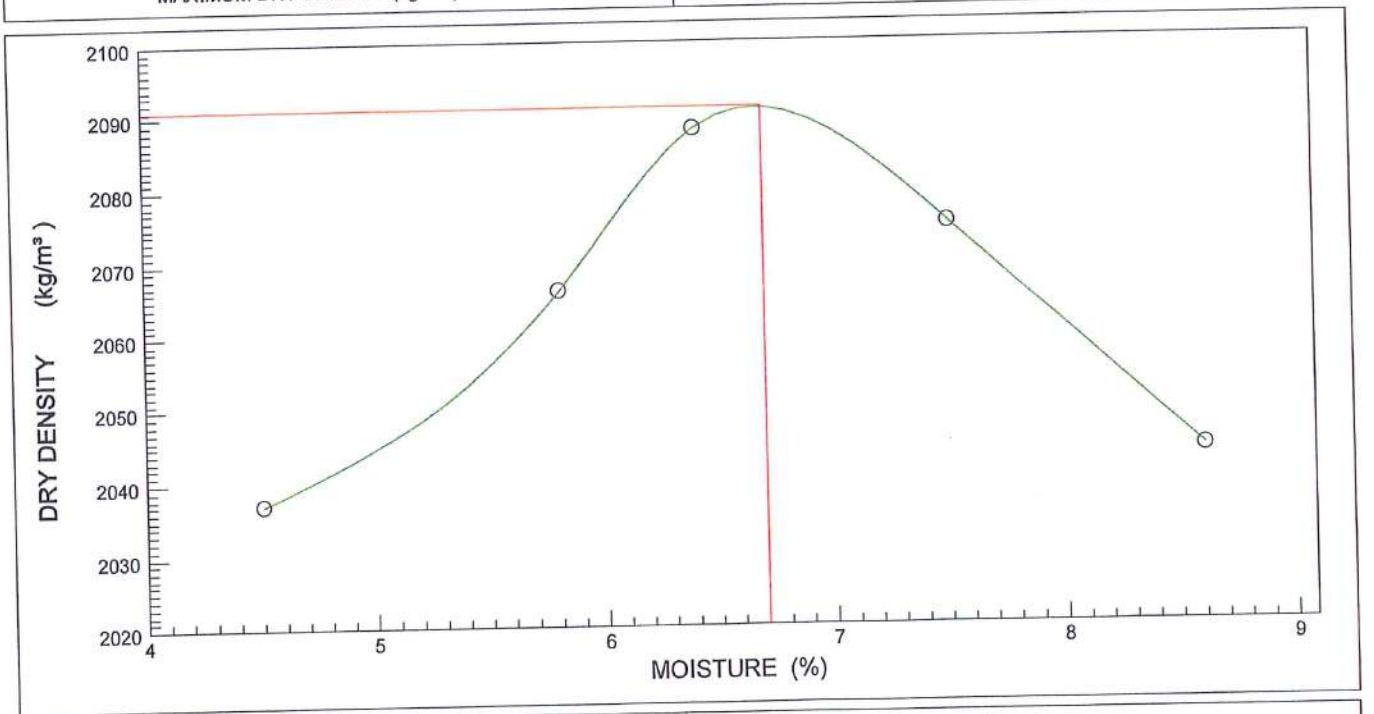
SANS 3001 - GR20/GR30

SAMPLE NO.	U9428
CONTAINER FOR SAMPLING	Black Nylon Bags
SIZE / APPROX. MASS OF SAMPLE	82kg
MOISTURE CONDITION OF SAMPLE	Moist
LAYER TESTED / SAMPLED FROM	400-800mm
MATERIAL DESCRIPTION	Mix W.Calcrete + W. Quartz
HOLE NO./ km / CHAINAGE	TP6
ROAD NO.	Not Specified
DATE RECEIVED	2020-10-06
DATE SAMPLED	2020-10-06
CLIENT MARKING	
COLOUR AND TYPE	Light Greyish Brown Gravel

POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m³)	2037	2066	2088	2075	2044			
MOISTURE (%)	4,5	5,8	6,4	7,5	8,6			

MAXIMUM DRY DENSITY (kg/m³) : 2091

OPTIMUM MOISTURE CONTENT (%) : 6,7



Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
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6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

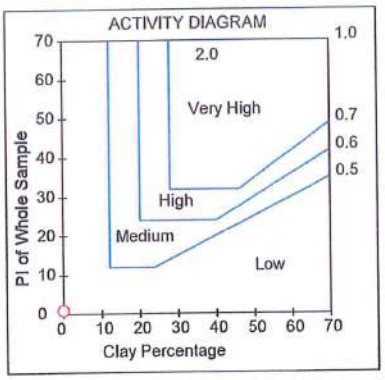
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

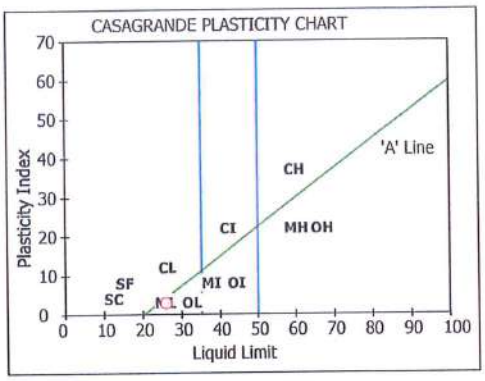
Sample No.	: U9428
Position	: TP6
Layer Type	: 400-800mm
Sample Colour	: Light Greyish Brown
Sample Type	: Mix W. Granite + Cal

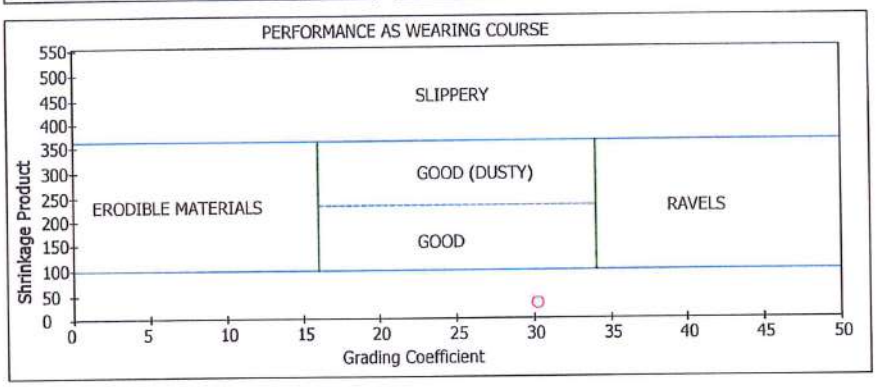
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	95
50.00	95
37.50	91
28.00	89
20.00	87
14.00	84
5.000	63
2.000	41
0.425	22
0.250	17
0.150	13
0.075	7,8
0.060	4,7
0.050	2,6
0.020	0,7
0.005	0,3
0.002	0,1

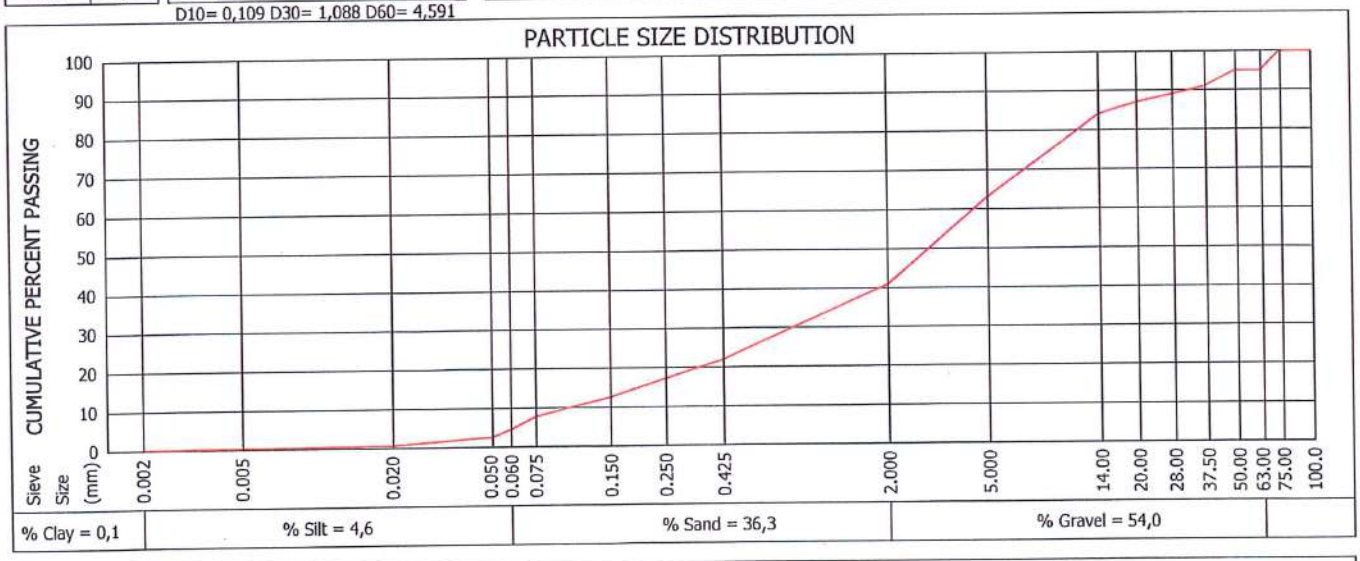
Soil Mortar	2.000 - 0.425	47
	0.425 - 0.250	11
	0.250 - 0.150	11
	0.150 - 0.075	12
	< 0.075	20
Effective Size		0,109
Uniformity Coefficient		42,1
Curvature Coefficient		2,4
Oversize Index		4,0
Shrinkage Product		33,0
Grading Coefficient		30,2
Grading Modulus		2,30
Atterberg Limits	Liquid Limit	26
	Plasticity Index	3,0
	Linear Shrinkage	1,5
	PI < 0.075	
Unified Soil Classification		SW-SM
US Highway Classification		A-1-a(0)

D10= 0,109 D30= 1,088 D60= 4,591









% Clay = 0,1	% Silt = 4,6	% Sand = 36,3	% Gravel = 54,0

Deviation from Test Method :
Remarks and Notes : Chemistry: pH = 8.33 [SANS 5854] & Conductivity = 0.09 S/m [SANS 6240]

Opinions and interpretations are not included in our scope of works. (T0296)
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Report compiled by : Juraine Okkies

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Web: www.roadlab.co.za

Date Reported : 2020-10-20

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
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6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

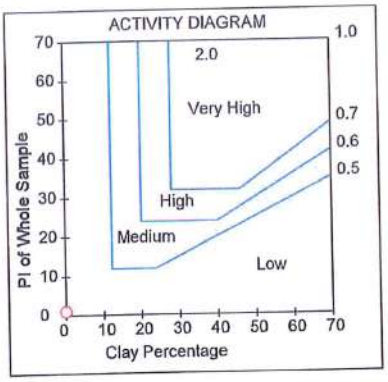
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

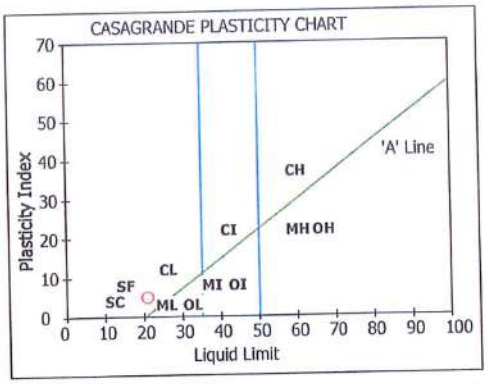
Sample No.	: U9429
Position	: TP9
Layer Type	: 300-900mm
Sample Colour	: Dark Greyish Brown G
Sample Type	: Mix W.Granite+OccCal

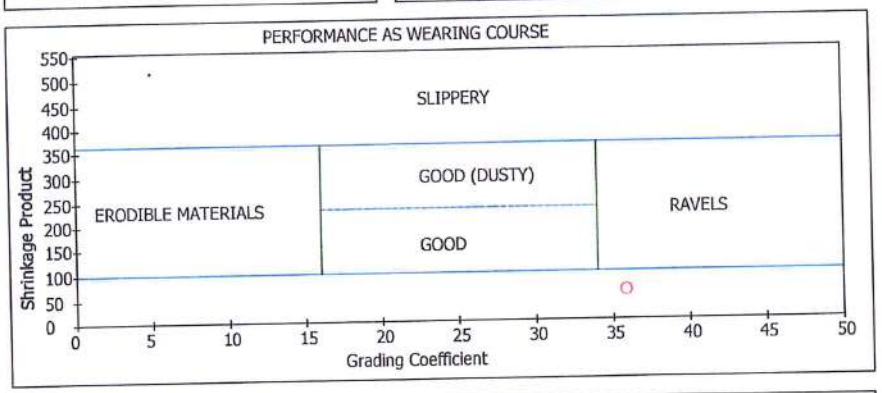
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	100
20.00	98
14.00	98
5.000	78
2.000	54
0.425	24
0.250	18
0.150	12
0.075	7,2
0.060	3,0
0.050	2,0
0.020	1,1
0.005	0,0
0.002	0,0

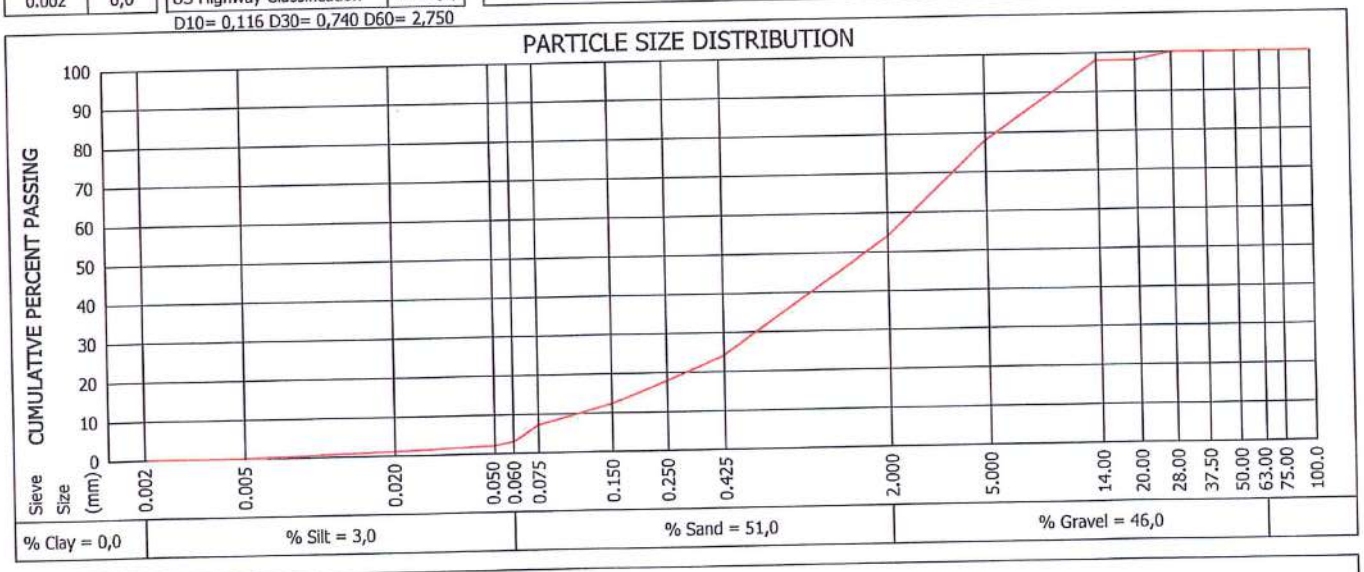
Soil Mortar	2.000 - 0.425	55
	0.425 - 0.250	12
	0.250 - 0.150	10
	0.150 - 0.075	10
	< 0.075	13
Effective Size		0,116
Uniformity Coefficient		23,7
Curvature Coefficient		1,7
Oversize Index		0,0
Shrinkage Product		60,0
Grading Coefficient		35,9
Grading Modulus		2,10
Atterberg Limits	Liquid Limit	21
	Plasticity Index	5
	Linear Shrinkage	2.5
	PI < 0.075	
Unified Soil Classification		SW-SM-SC
US Highway Classification		A-1-b(0)

D10= 0,116 D30= 0,740 D60= 2,750









% Clay = 0,0	% Silt = 3,0	% Sand = 51,0	% Gravel = 46,0

Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
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Date Reported : 2020-10-20

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Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
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6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

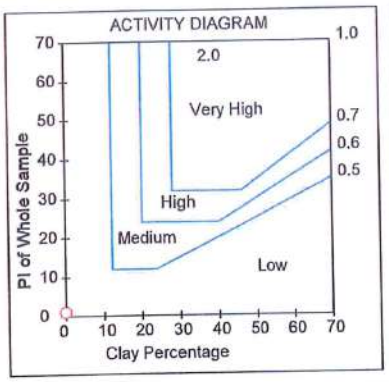
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

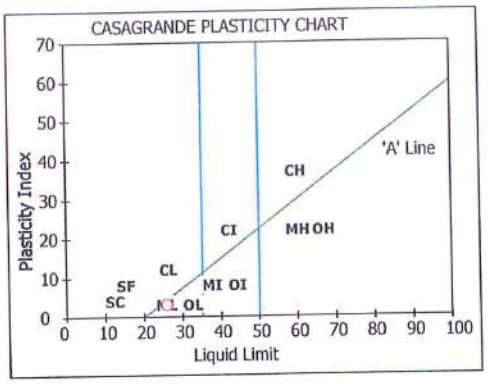
Sample No.	: U9430
Position	: TP12
Layer Type	: 100-1100mm
Sample Colour	: Light Greyish Brown
Sample Type	: Mix W. Granite + Cal

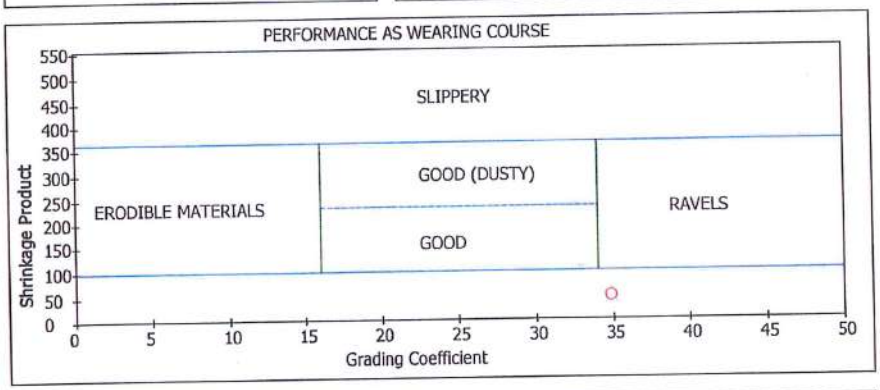
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	99
20.00	96
14.00	96
5.000	81
2.000	56
0.425	31
0.250	25
0.150	19
0.075	11
0.060	6,8
0.050	3,6
0.020	1,5
0.005	0,4
0.002	0,2

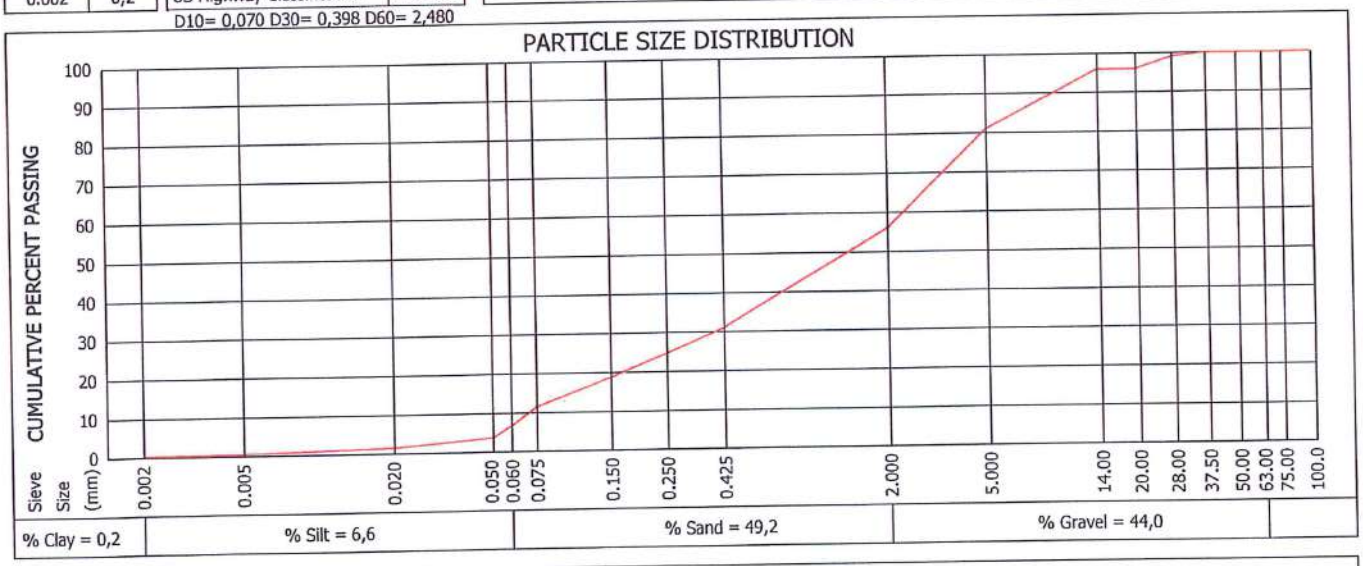
Soil Mortar	2.000 - 0.425	45
	0.425 - 0.250	11
	0.250 - 0.150	11
	0.150 - 0.075	14
	< 0.075	20
Effective Size		0,070
Uniformity Coefficient		35,4
Curvature Coefficient		0,9
Oversize Index		0,0
Shrinkage Product		46,5
Grading Coefficient		34,8
Grading Modulus		2,00
Atterberg Limits	Liquid Limit	26
	Plasticity Index	3.0
	Linear Shrinkage	1.5
	PI < 0.075	
Unified Soil Classification		SW-SM
US Highway Classification		A-1-b(0)

D10= 0,070 D30= 0,398 D60= 2,480









% Clay = 0,2	% Silt = 6,6	% Sand = 49,2	% Gravel = 44,0

Deviation from Test Method :
Remarks and Notes : Chemistry: pH = 7.73 [SANS 5854] & Conductivity = 0.15 S/m [SANS 6240]

Report compiled by : Juraine Okkies

sanas Testing Laboratory
Accreditation No. T0296
Prog.ver 10.7 (2019/11/07)

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Date Reported : 2020-10-20

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

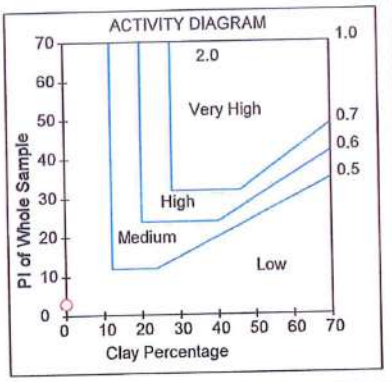
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

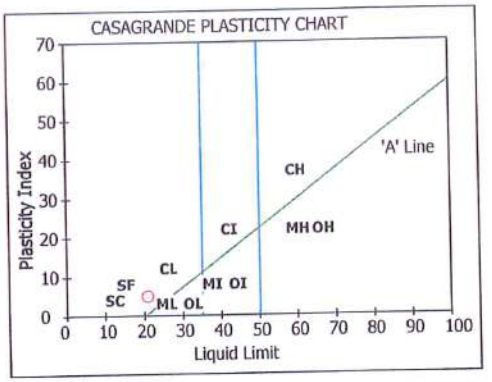
Sample No.	: U9431
Position	: TP15
Layer Type	: 0-600mm
Sample Colour	: Orange Brown Gravel
Sample Type	: Quartzitic Sand

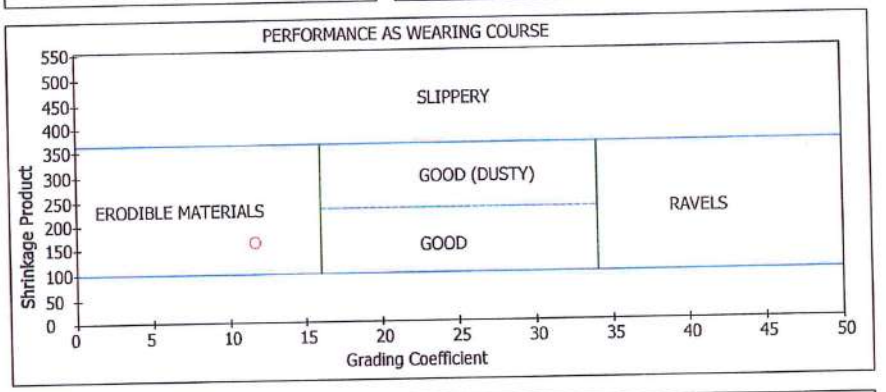
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	100
20.00	100
14.00	100
5.000	98
2.000	88
0.425	65
0.250	56
0.150	42
0.075	22
0.060	13
0.050	9,1
0.020	1,8
0.005	0,0
0.002	0,0

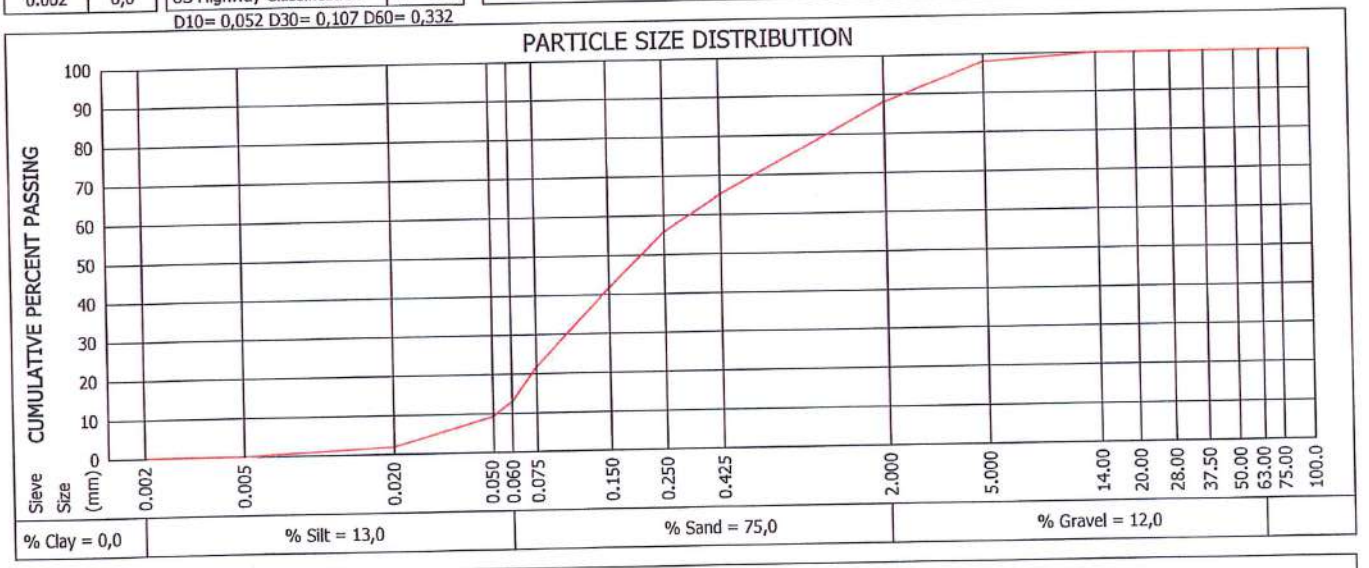
Soil Mortar	2.000 - 0.425	26
	0.425 - 0.250	11
	0.250 - 0.150	16
	0.150 - 0.075	22
	< 0.075	25
Effective Size		0,052
Uniformity Coefficient		6,4
Curvature Coefficient		0,7
Oversize Index		0,0
Shrinkage Product		162,5
Grading Coefficient		11,8
Grading Modulus		1,30
Atterberg Limits	Liquid Limit	21
	Plasticity Index	5
	Linear Shrinkage	2.5
	PI < 0.075	
Unified Soil Classification		SM-SC
US Highway Classification		A-2-4(0)

D10= 0,052 D30= 0,107 D60= 0,332









Deviation from Test Method :
Remarks and Notes :

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Date Reported : 2020-10-15

Job Request No.: RU3667

Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835

Project : Blaauwskop (Plangeni)

Attention : Frans Breytenbach

Determination of the California Bearing Ratio Test Report SANS 3001 - GR1 / GR2 / GR10 / GR20 / GR30 / GR40 / PR5

SAMPLE INFORMATION AND PROPERTIES

SAMPLE NO.	U9432
HOLE NO./ Km / CHAINAGE	T18
ROAD NO./ NAME Line 1 ROAD NO./ NAME Line 2	S28° 40' 08,9" E21° 06' 08,1"
LAYER TESTED/SAMPLED	0-400mm
SAMPLE DEPTH	0-400mm
DATE SAMPLED	2020-10-06
COLOUR OF SAMPLE	Light Brown
TYPE OF SAMPLE	Mix Granite Calcrete

SIEVE ANALYSIS - % PASSING SIEVES *(SANS 3001-GR1:2010, SANS 3001-GR2:2010)

SIEVE ANALYSIS (GR 1) % PASSING	100.0 mm	
	75.0 mm	100
	63.0 mm	97
	50.0 mm	97
	37,5 mm	94
	28.0 mm	93
	20.0 mm	91
	14.0 mm	90
	5.0 mm	71
	2.0 mm	49
	0.425 mm	36
	0.075 mm	18
GM %		2,0

SOIL MORTAR ANALYSIS (SANS 3001-PR5:2011)

COARSE SAND	2.000 - 0.425	27
COARSE FINE SAND	0.425 - 0.250	7
MEDIUM FINE SAND	0.250 - 0.150	12
FINE FINE SAND	0.150 - 0.075	18
SILT CLAY	0.075	36

ATTERBERG LIMITS ANALYSIS - *(SANS 3001-GR10:2010)

ATTERBERG LIMITS (%) SANS GR10,GR11	LIQUID LIMIT	25
	PLASTICITY INDEX	3,2
	LINEAR SHRINKAGE	2,0
CLASSIFICATION	H.R.B.	A-1-b(0)
	COLTO	G6
	TRH 14	G6

CALIFORNIA BEARING RATIO - *(SANS 3001-GR30:2010, SANS 3001-GR40:2010)

SANS GR30 MAX. DRY DENSITY	OMC %	9,0
	MDD (kg/m³)	2079
	COMP MC %	9,4
SWELL % @	MOD | NRB | PRO	0,01 | 0,03 | 0,06
C.B.R. SANS GR40	100 %	70
	98 %	52
	97 %	45
	95 %	34
	93 %	25
	90 %	16

STABILISER IN LAB	Not Applicable
TEST TYPE	CBR
SAMPLING METHOD	TMH 5
WEATHER WHEN SAMPLED	Cold

Deviation from Test Method :
Remarks and Notes :

Report compiled by : Juraine Okkies

sanas Testing Laboratory
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Date Reported : 2020-10-15

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
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6835

Project : Blaauwskop

Attention : Frans Breytenbach

Determination Maximum Dry Density & Optimum Moisture Content Test Report

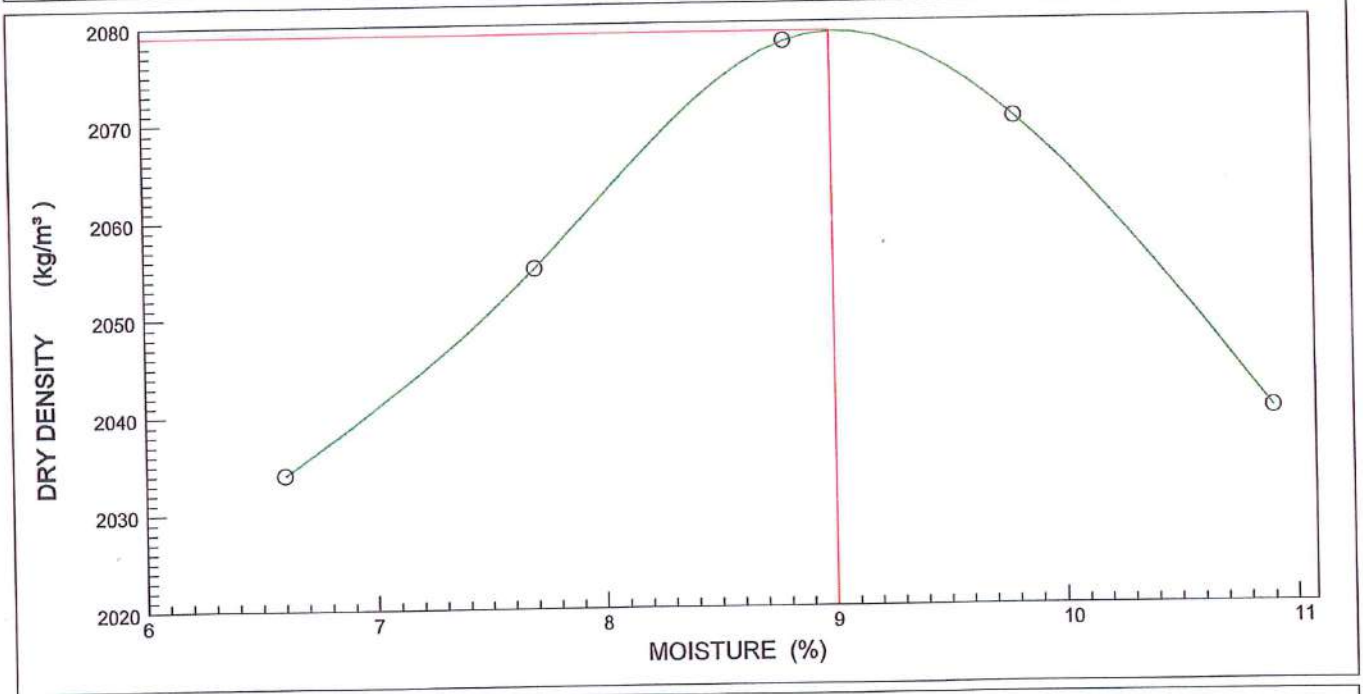
SANS 3001 - GR20/GR30

SAMPLE NO.	U9432
CONTAINER FOR SAMPLING	Black Nylon Bags
SIZE / APPROX. MASS OF SAMPLE	94kg
MOISTURE CONDITION OF SAMPLE	Moist
LAYER TESTED / SAMPLED FROM	0-400mm
MATERIAL DESCRIPTION	Mix W.Calcrete + W. Granitestone
HOLE NO./ km / CHAINAGE	TP18
ROAD NO.	Not Specified
DATE RECEIVED	2020-10-06
DATE SAMPLED	2020-10-06
CLIENT MARKING	
COLOUR AND TYPE	Light Greyish Brown Gravel

POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m³)	2034	2055	2078	2070	2040			
MOISTURE (%)	6,6	7,7	8,8	9,8	10,9			

MAXIMUM DRY DENSITY (kg/m³) : 2079

OPTIMUM MOISTURE CONTENT (%) : 9,0



Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
The test results reported relate to the samples tested.
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Date Reported : 2020-10-20

Job Request No.: RU3667
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Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

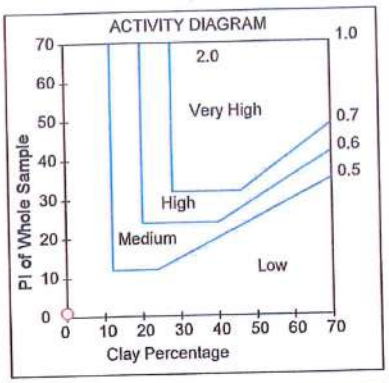
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

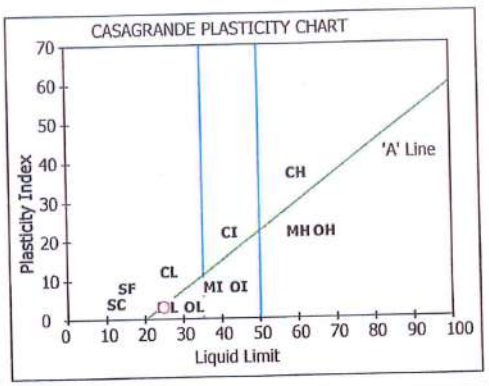
Sample No.	: U9432
Position	: TP18
Layer Type	: 0-400mm
Sample Colour	: Light Brown Gravel
Sample Type	: Mix W. Granite + Cal

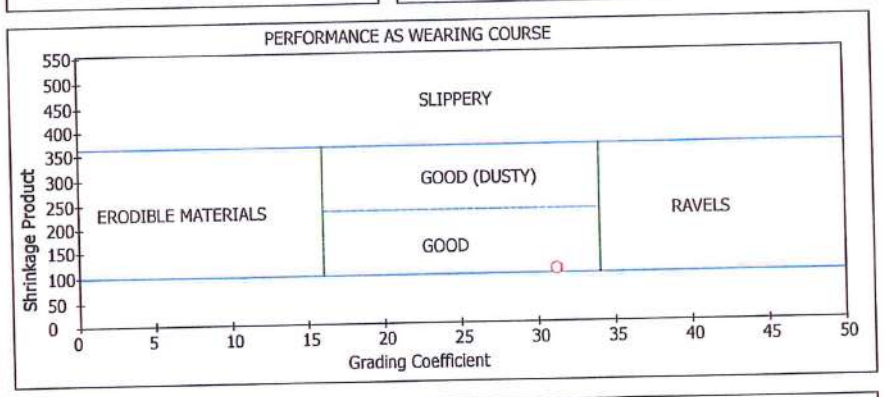
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	97
50.00	97
37.50	94
28.00	93
20.00	91
14.00	90
5.000	71
2.000	49
0.425	36
0.250	33
0.150	27
0.075	18
0.060	12
0.050	9,3
0.020	2,1
0.005	1,4
0.002	0,0

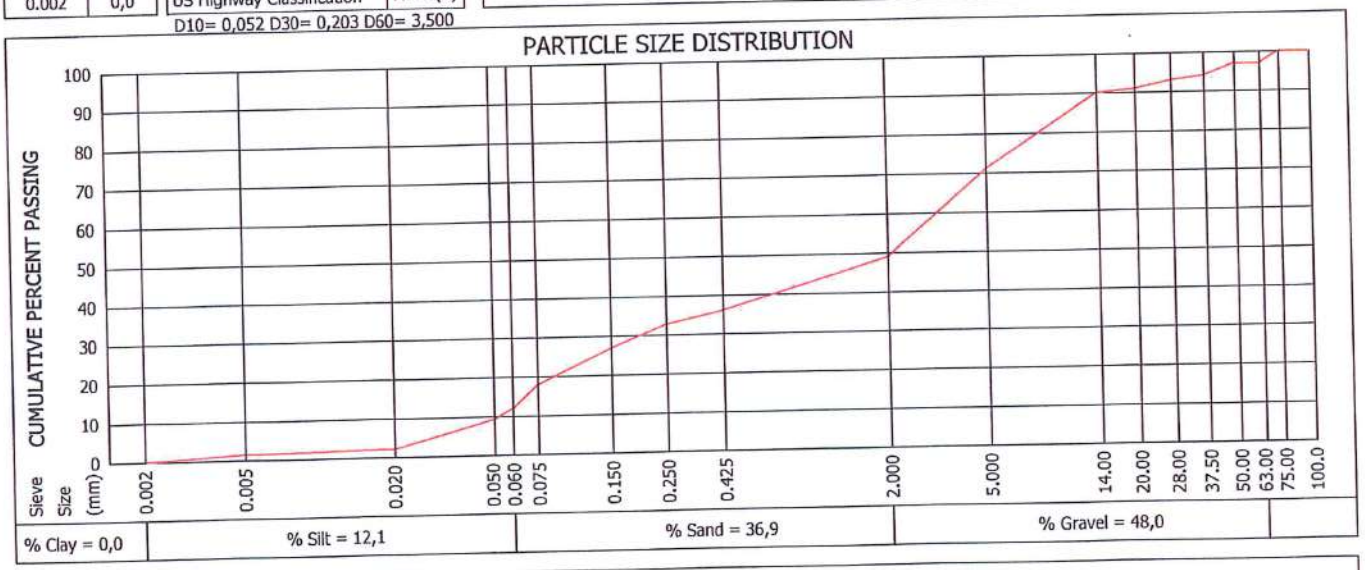
Soil Mortar	2.000 - 0.425	27
	0.425 - 0.250	7
	0.250 - 0.150	12
	0.150 - 0.075	18
	< 0.075	36
Effective Size		0,052
Uniformity Coefficient		67,3
Curvature Coefficient		0,2
Oversize Index		3,0
Shrinkage Product		108,0
Grading Coefficient		31,2
Grading Modulus		2,00
Atterberg Limits	Liquid Limit	25
	Plasticity Index	3.0
	Linear Shrinkage	3.0
	PI < 0.075	
Unified Soil Classification		SM
US Highway Classification		A-1-b(0)

D10= 0,052 D30= 0,203 D60= 3,500









% Clay = 0,0	% Silt = 12,1	% Sand = 36,9	% Gravel = 48,0

Deviation from Test Method :
Remarks and Notes : Chemistry: pH = 8.10 [SANS 5854] & Conductivity = 0.15 S/m [SANS 6240]

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
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Date Reported : 2020-10-20

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
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6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

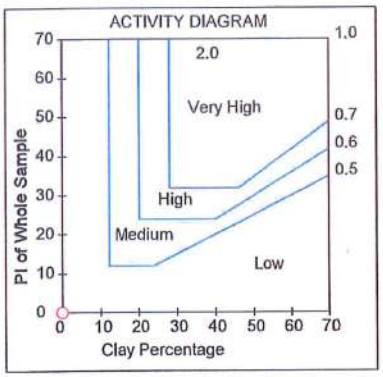
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

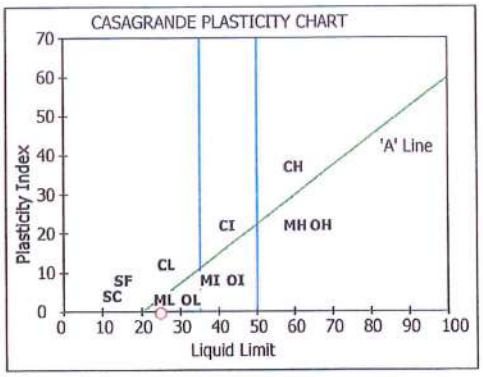
Sample No.	: U9433
Position	: TP21
Layer Type	: 0-600mm
Sample Colour	: Light Brown Gravel
Sample Type	: Mix Weathered Calcre

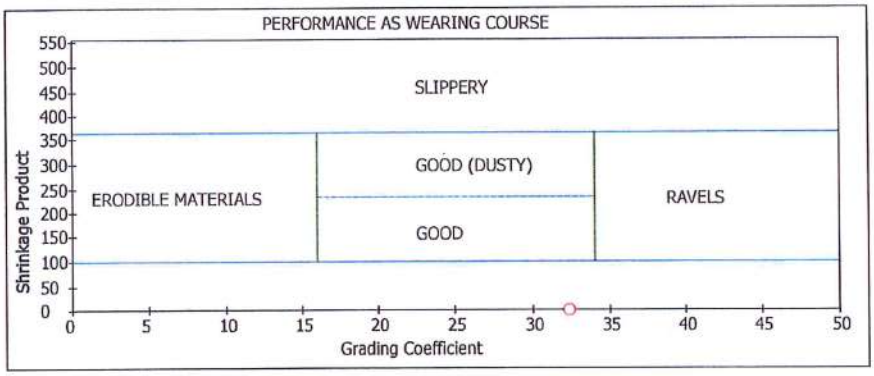
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	100
20.00	97
14.00	96
5.000	81
2.000	60
0.425	44
0.250	40
0.150	33
0.075	22
0.060	16
0.050	12
0.020	2,9
0.005	0,5
0.002	0,0

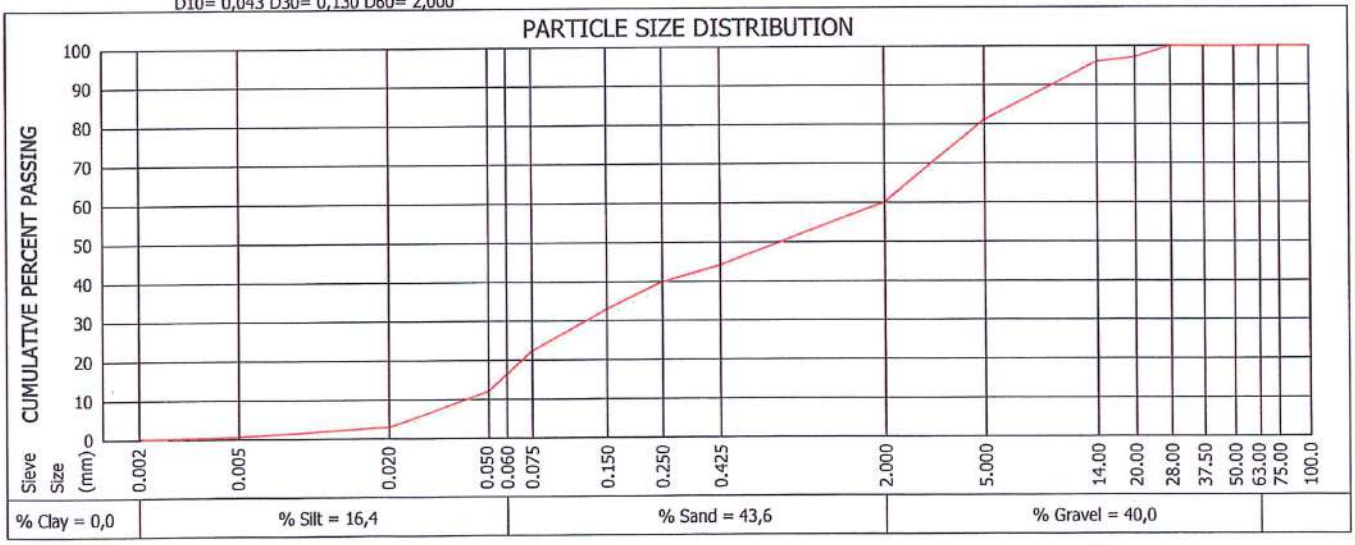
Soil Mortar	2.000 - 0.425	27
	0.425 - 0.250	7
	0.250 - 0.150	11
	0.150 - 0.075	18
	< 0.075	36
Effective Size		0,043
Uniformity Coefficient		46,5
Curvature Coefficient		0,2
Oversize Index		0,0
Shrinkage Product		0,0
Grading Coefficient		32,4
Grading Modulus		1,70
Atterberg Limits	Liquid Limit	25
	Plasticity Index	0,0
	Linear Shrinkage	0,0
	PI < 0.075	
Unified Soil Classification		SM
US Highway Classification		A-1-b(0)

D10= 0,043 D30= 0,130 D60= 2,000









% Clay = 0,0	% Silt = 16,4	% Sand = 43,6	% Gravel = 40,0

Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
The test results reported relate to the samples tested.
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PO Box 607
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Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

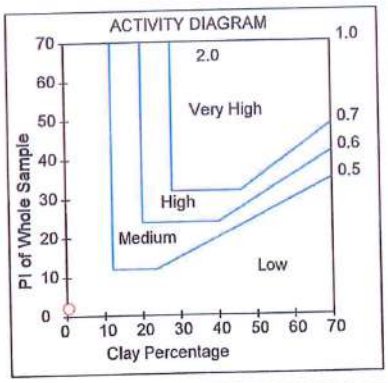
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

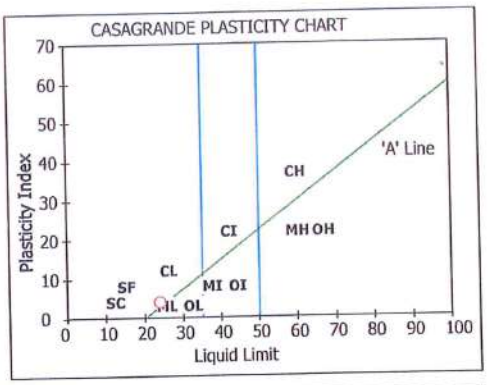
Sample No.	: U9434
Position	: TP24
Layer Type	: 300-1300mm
Sample Colour	: Light Brown Gravel
Sample Type	: Mix Weathered Granit

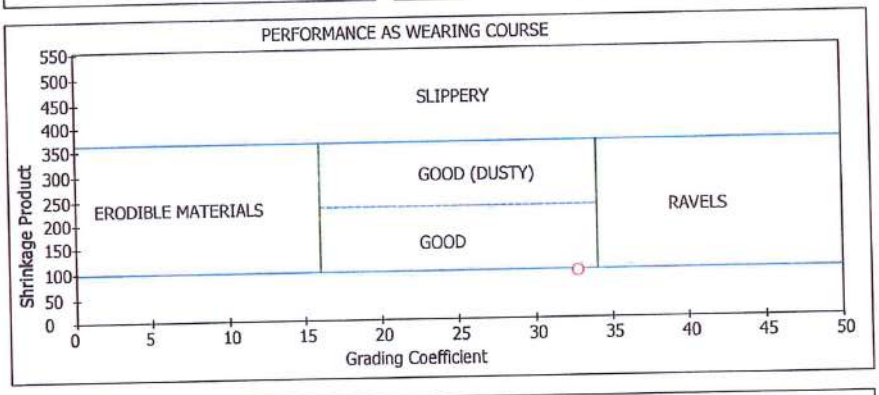
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	100
20.00	99
14.00	98
5.000	91
2.000	64
0.425	38
0.250	32
0.150	25
0.075	16
0.060	8,1
0.050	3,9
0.020	1,4
0.005	0,8
0.002	0,6

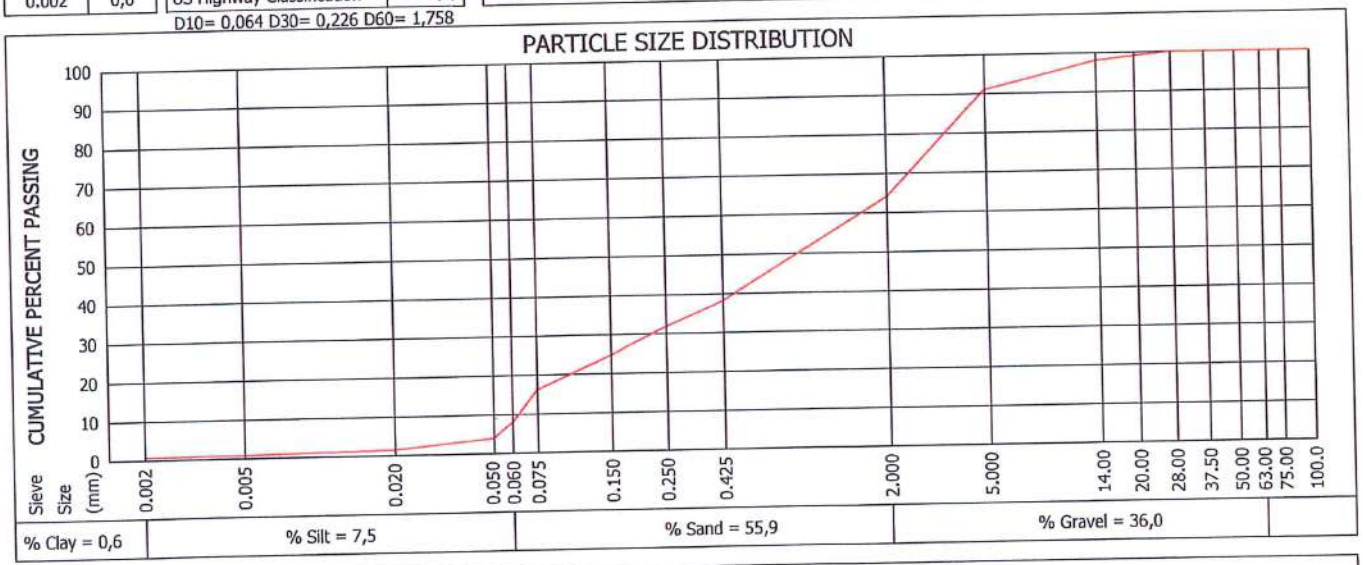
Soil Mortar	2.000 - 0.425	40
	0.425 - 0.250	11
	0.250 - 0.150	11
	0.150 - 0.075	13
	< 0.075	25
Effective Size		0,064
Uniformity Coefficient		27,5
Curvature Coefficient		0,5
Oversize Index		0,0
Shrinkage Product		95,0
Grading Coefficient		32,8
Grading Modulus		1,80
Atterberg Limits	Liquid Limit	24
	Plasticity Index	4
	Linear Shrinkage	2,5
	PI < 0.075	
Unified Soil Classification		SM-SC
US Highway Classification		A-1-b(0)

D10= 0,064 D30= 0,226 D60= 1,758









Deviation from Test Method :
Remarks and Notes :

Report compiled by : Juraine Okkies

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Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

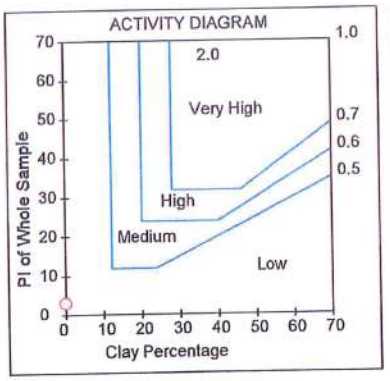
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

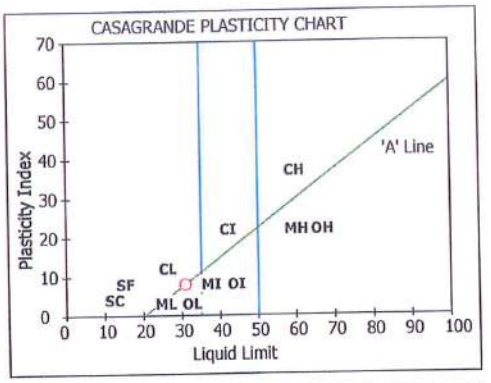
Sample No.	: U9435
Position	: TP27
Layer Type	: 200-700mm
Sample Colour	: Light Brown Gravel
Sample Type	: Mix W.Granite+OccCal

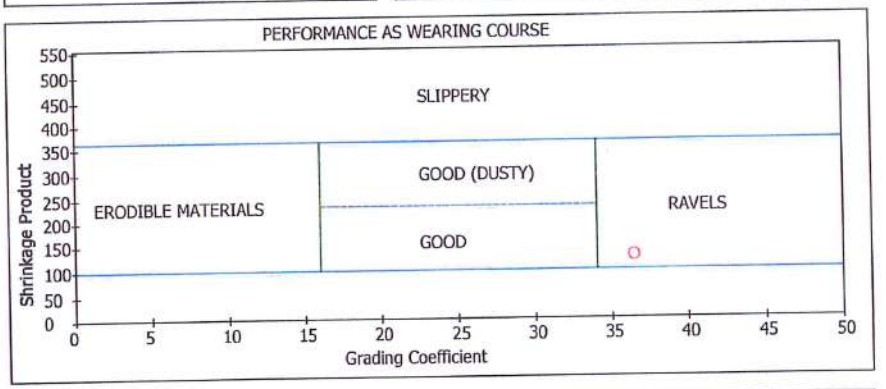
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	100
20.00	99
14.00	97
5.000	76
2.000	52
0.425	32
0.250	28
0.150	22
0.075	15
0.060	10
0.050	5,7
0.020	1,7
0.005	0,4
0.002	0,1

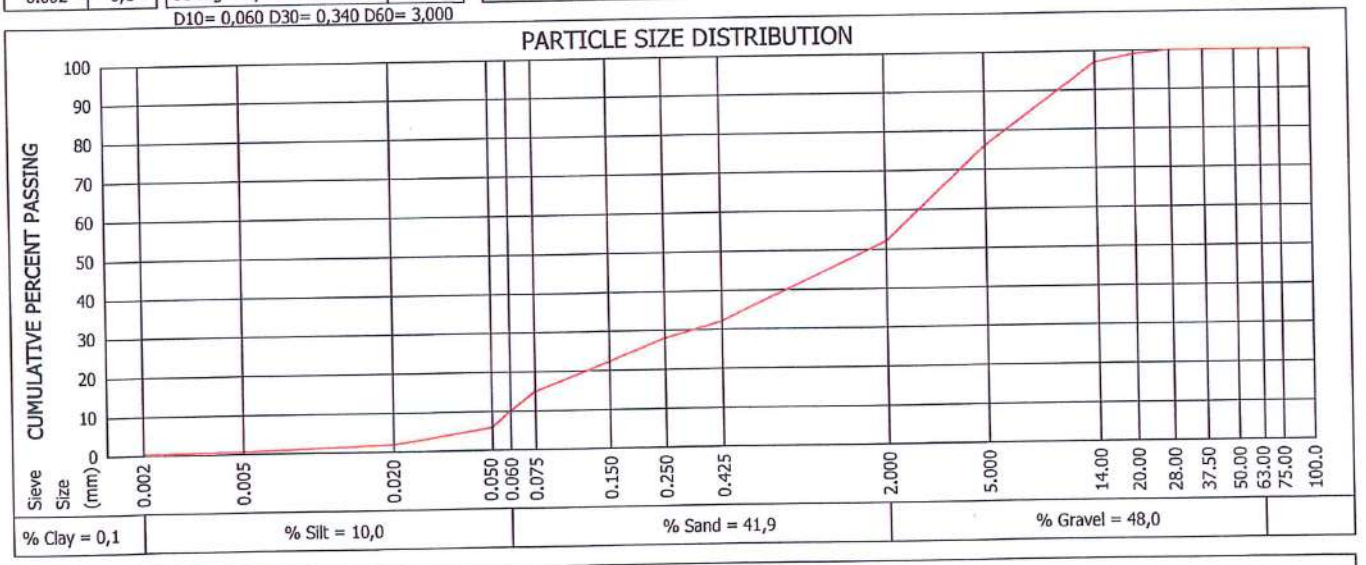
Soil Mortar	2.000 - 0.425	38
	0.425 - 0.250	9
	0.250 - 0.150	11
	0.150 - 0.075	14
	< 0.075	29
Effective Size		0,060
Uniformity Coefficient		50,0
Curvature Coefficient		0,6
Oversize Index		0,0
Shrinkage Product		128,0
Grading Coefficient		36,5
Grading Modulus		2,00
Atterberg Limits	Liquid Limit	31
	Plasticity Index	8
	Linear Shrinkage	4,0
	PI < 0.075	
Unified Soil Classification		SM
US Highway Classification		A-2-4(0)

D10= 0,060 D30= 0,340 D60= 3,000









Deviation from Test Method :
Remarks and Notes : Chemistry: pH = 8.29 [SANS 5854] & Conductivity = 0.08 S/m [SANS 6240]

Report compiled by : Juraine Okkies

sanas Testing Laboratory
Accreditation No. T0296
Prog.ver 10.7 (2019/11/07)

D Juckers
Technical Signatory

ROADLAB

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Email: info@roadlab.co.za
Web: www.roadlab.co.za

Date Reported : 2020-10-15

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835

Project : Blaauwskop (Plangeni)

Attention : Frans Breytenbach

Determination of the California Bearing Ratio Test Report SANS 3001 - GR1 / GR2 / GR10 / GR20 / GR30 / GR40 / PR5

SAMPLE INFORMATION AND PROPERTIES

SAMPLE NO.	U9436			
HOLE NO./ Km / CHAINAGE	T30			
ROAD NO./ NAME Line 1 ROAD NO./ NAME Line 2	S28° 40' 05,5" E21° 06' 19,5"			
LAYER TESTED/SAMPLED	0-300mm			
SAMPLE DEPTH	0-300mm			
DATE SAMPLED	2020-10-06			
COLOUR OF SAMPLE	Light Greyish Brown			
TYPE OF SAMPLE	Mix W. Granitestone			

SIEVE ANALYSIS - % PASSING SIEVES *(SANS 3001-GR1:2010, SANS 3001-GR2:2010)

SIEVE ANALYSIS (GR 1) % PASSING	100.0 mm				
	75.0 mm				
	63.0 mm				
	50.0 mm	100			
	37.5 mm	97			
	28.0 mm	93			
	20.0 mm	91			
	14.0 mm	86			
	5.0 mm	70			
	2.0 mm	48			
	0.425 mm	28			
	0.075 mm	11			
GM %		2,1			

SOIL MORTAR ANALYSIS (SANS 3001-PR5:2011)

COARSE SAND	2.000 - 0.425	41			
COARSE FINE SAND	0.425 - 0.250	10			
MEDIUM FINE SAND	0.250 - 0.150	11			
FINE FINE SAND	0.150 - 0.075	16			
SILT CLAY	0.075	23			

ATTERBERG LIMITS ANALYSIS - *(SANS 3001-GR10:2010)

ATTERBERG LIMITS (%) SANS GR10,GR11	LIQUID LIMIT	21			
	PLASTICITY INDEX	1,9			
	LINEAR SHRINKAGE	1,5			
CLASSIFICATION	H.R.B.	A-1-a(0)			
	COLTO	G6			
	TRH 14	G6			

CALIFORNIA BEARING RATIO - *(SANS 3001-GR30:2010, SANS 3001-GR40:2010)

SANS GR30 MAX. DRY DENSITY	OMC %	6,4			
	MDD (kg/m³)	2098			
	COMP MC %	6,3			
SWELL % @	MOD | NRB | PRO	0,00 | 0,02 | 0,04			
C.B.R. SANS GR40	100 %	86			
	98 %	66			
	97 %	58			
	95 %	44			
	93 %	34			
	90 %	23			

STABILISER IN LAB	Not Applicable			
TEST TYPE	CBR			
SAMPLING METHOD	TMH 5			
WEATHER WHEN SAMPLED	Cold			

Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
The test results reported relate to the samples tested.
Further use of the above information is not the responsibility or liability of Roadlab.
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Report compiled by : Juraine Okkies

sanas Testing Laboratory
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Date Reported : 2020-10-15

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835

Project : Blaauwskop

Attention : Frans Breytenbach

Determination Maximum Dry Density & Optimum Moisture Content Test Report

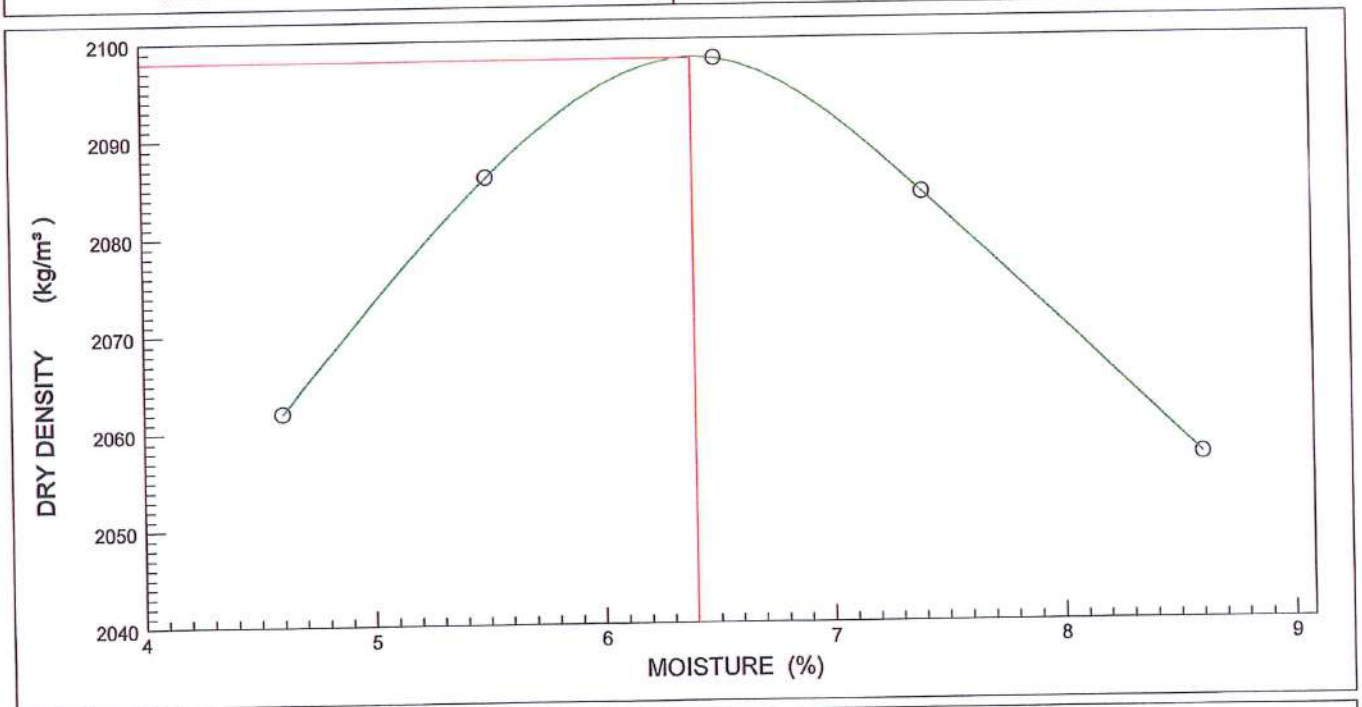
SANS 3001 - GR20/GR30

SAMPLE NO.	U9436
CONTAINER FOR SAMPLING	Black Nylon Bags
SIZE / APPROX. MASS OF SAMPLE	83kg
MOISTURE CONDITION OF SAMPLE	Moist
LAYER TESTED / SAMPLED FROM	0-400mm
MATERIAL DESCRIPTION	Mix W.Calcrete + W. Granitestone
HOLE NO./ km / CHAINAGE	TP30
ROAD NO.	Not Specified
DATE RECEIVED	2020-10-06
DATE SAMPLED	2020-10-06
CLIENT MARKING	
COLOUR AND TYPE	Light Greyish Brown Gravel

POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m³)	2062	2086	2098	2084	2057			
MOISTURE (%)	4,6	5,5	6,5	7,4	8,6			

MAXIMUM DRY DENSITY (kg/m³) : 2098

OPTIMUM MOISTURE CONTENT (%) : 6,4



Deviation from Test Method :
Remarks and Notes :

Opinions and interpretations are not included in our scope of works. (T0296)
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
The test results reported relate to the samples tested.
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Web: www.roadlab.co.za

Date Reported : 2020-10-20

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

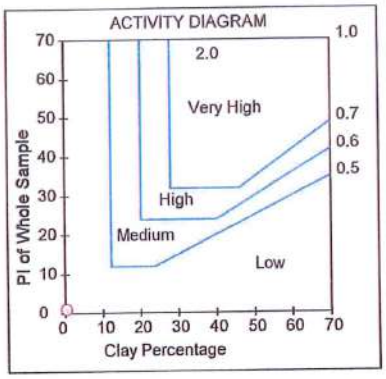
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

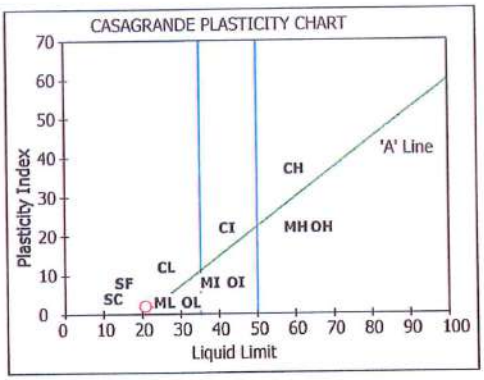
Sample No.	: U9436
Position	: TP30
Layer Type	: 0-300mm
Sample Colour	: Light Greyish Brown
Sample Type	: Mix W.Granitestone

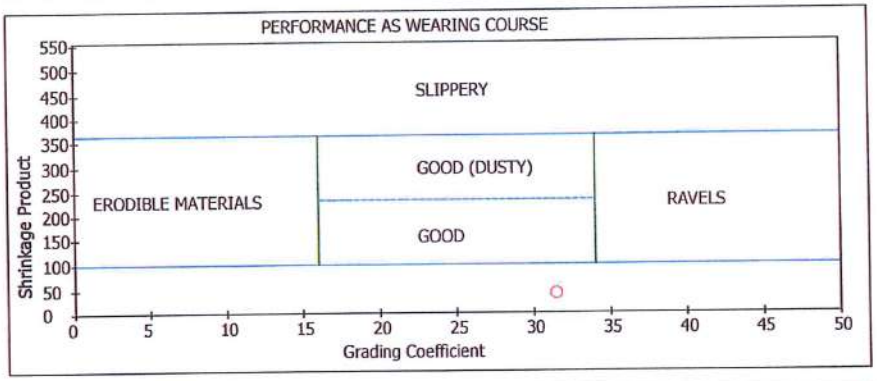
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	97
28.00	93
20.00	91
14.00	86
5.000	70
2.000	48
0.425	28
0.250	24
0.150	19
0.075	11
0.060	7,3
0.050	4,8
0.020	1,4
0.005	0,4
0.002	0,3

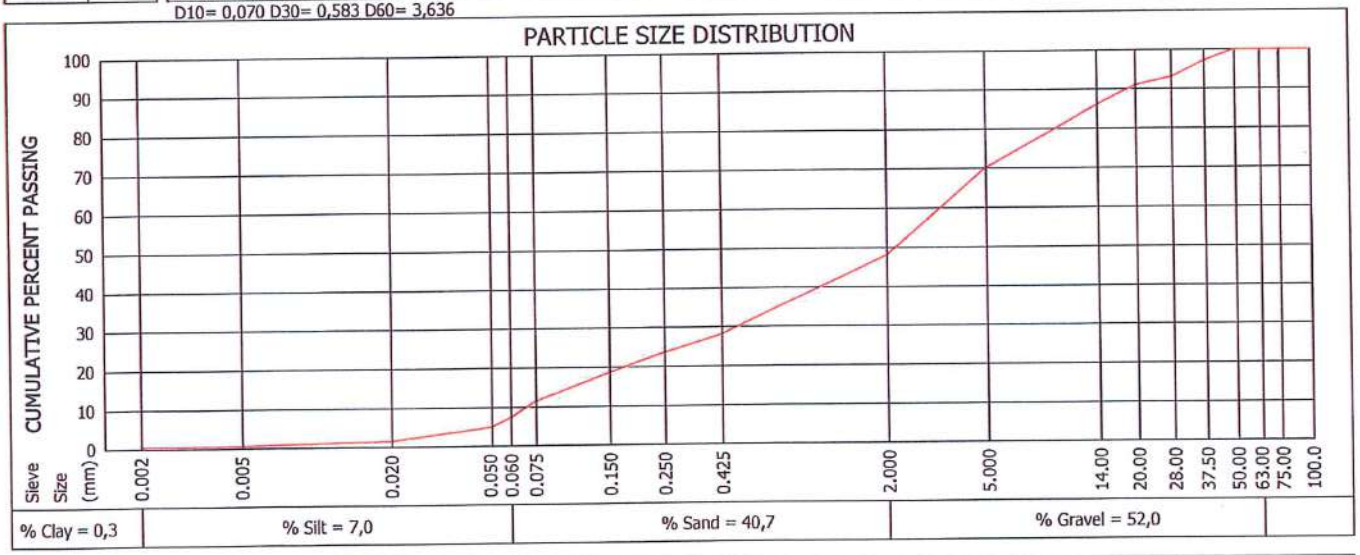
Soil Mortar	2.000 - 0.425	41
	0.425 - 0.250	10
	0.250 - 0.150	11
	0.150 - 0.075	16
	< 0.075	23
Effective Size		0,070
Uniformity Coefficient		51,9
Curvature Coefficient		1,3
Oversize Index		3,0
Shrinkage Product		42,0
Grading Coefficient		31,5
Grading Modulus		2,10
Atterberg Limits	Liquid Limit	21
	Plasticity Index	2.0
	Linear Shrinkage	1.5
	PI < 0.075	
Unified Soil Classification		SW-SC
US Highway Classification		A-1-a(0)

D10= 0,070 D30= 0,583 D60= 3,636









% Clay = 0,3	% Silt = 7,0	% Sand = 40,7	% Gravel = 52,0

Deviation from Test Method :
Remarks and Notes :

Report compiled by : Juraine Okkies

sanas Testing Laboratory
Accreditation No. T0296
Prog.ver 10.7 (2019/11/07)

D Jackers
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Web: www.roadlab.co.za

Date Reported : 2020-10-20

Job Request No.: RU3667
Cedar Land Geotechnical Consult (Pty) Ltd
PO Box 607
Ceres
6835
Attention : Frans Breytenbach

Project : Blaauwskop (Plangeni)

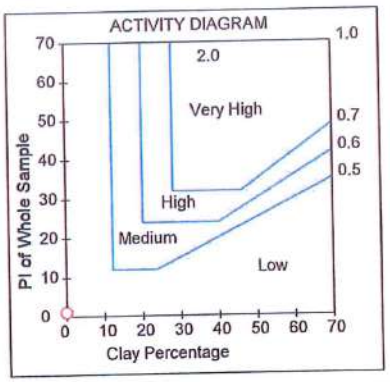
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

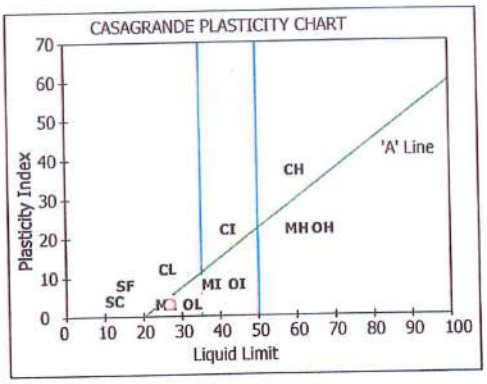
Sample No.	: U9437
Position	: TP33
Layer Type	: 200-1300mm
Sample Colour	: Greyish Brown Gravel
Sample Type	: Mix W.Granite+OccCal

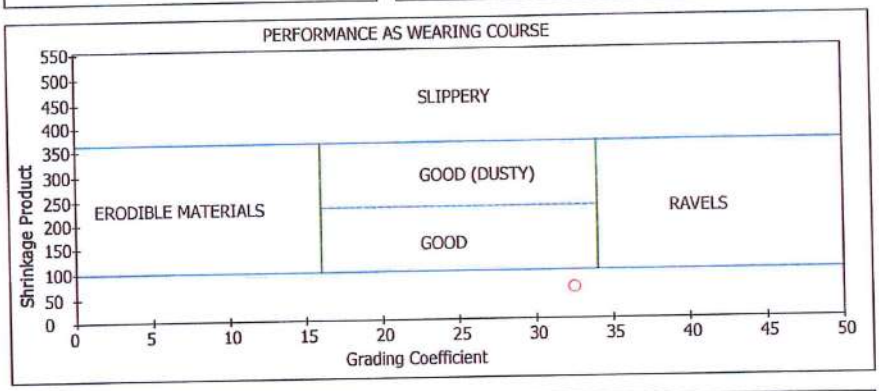
Sieve Size(mm)	% Passing
100.0	100
75.00	100
63.00	100
50.00	100
37.50	100
28.00	100
20.00	99
14.00	98
5.000	93
2.000	65
0.425	32
0.250	26
0.150	19
0.075	11
0.060	6,0
0.050	3,0
0.020	0,9
0.005	0,5
0.002	0,2

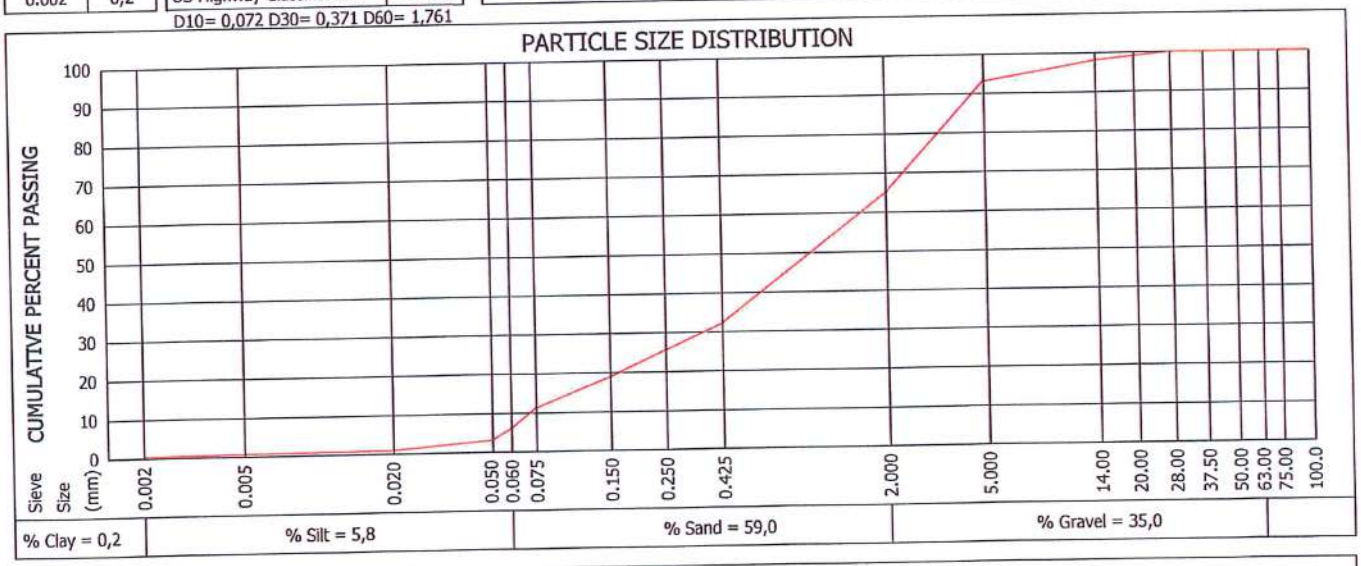
Soil Mortar	2.000 - 0.425	50
	0.425 - 0.250	10
	0.250 - 0.150	10
	0.150 - 0.075	12
	< 0.075	17
Effective Size		0,072
Uniformity Coefficient		24,5
Curvature Coefficient		1,1
Oversize Index		0,0
Shrinkage Product		64,0
Grading Coefficient		32,5
Grading Modulus		1,90
Atterberg Limits	Liquid Limit	27
	Plasticity Index	3.0
	Linear Shrinkage	2.0
	PI < 0.075	
Unified Soil Classification		SW-SM
US Highway Classification		A-1-b(0)

D10= 0,072 D30= 0,371 D60= 1,761









Deviation from Test Method :
Remarks and Notes : Chemistry: pH = 8.38 [SANS 5854] & Conductivity = 0.02 S/m [SANS 6240]

Report compiled by : Juraine Okkies

sanas Testing Laboratory
Accreditation No. T0296
Prog.ver 10.7 (2019/11/07)

D Juckers
Technical Signatory

ANNEXURE H: FRESHWATER REPORT

KAI !GARIB MUNICIPALITY

9 11th Avenue, Kakamas 8870

WATER USE LICENSE APPLICATION FOR THE PROPOSED URBAN DEVELOPMENT AT BLAAUWSKOP, NORTHERN CAPE

FRESH WATER REPORT

A REQUIREMENT IN TERMS OF SECTION 21 OF THE NATIONAL WATER ACT
MAY 2020

MACROPLAN

EnviroAfrica
Environmental Management and Impact Assessment
Omgewingsbestuur en Impakbeoordeling

watsan AFRICA

Index

Abbreviations

Northern Cape Department: Co-Operative Governance, Human Settlements and Traditional Affairs	COGHSTA
Critical Biodiversity Area	CBA
Department of Water and Sanitation	DWA
Ecological Importance	EI
Ecological Sensitivity	ES
Ecological Support Area	ESA
Environmental Impact Assessment	EIA
Electronic Water Use License Application (on-line)	eWULAA
Government Notice	GN
Hectares	ha
Legal water use	LWU
Metres Above Sea Level	masl
National Environmental Management Act (107 of 1998)	NEMA
National Freshwater Environment Priority Area	NFEPA
National Water Act (36 of 1998)	NWA
Non-government organization	NGO
Present Ecological State	PES
South Africa National Biodiversity Institute	SANBI
Section of an Act of Parliament	S
Water Use License Application	WULA

List of Figures

List of Tables

1 Introduction

The Barzani Group, on behalf of GOCHSTA, appointed Mr Len Fourie of Macroplan in Upington to produce the plans and lay-out of severlal townships along the Lower Orange River, from Groblershoop to Keimoes and surrounds. The Blaauwskop settlement on the southern bank of the Orange River to the east of Keimoes is one such development.

Macroplan appointed Enviro Africa of Somerset West for the required impact assessment in terms of NEMA, together with the public participation process (Figure 1).

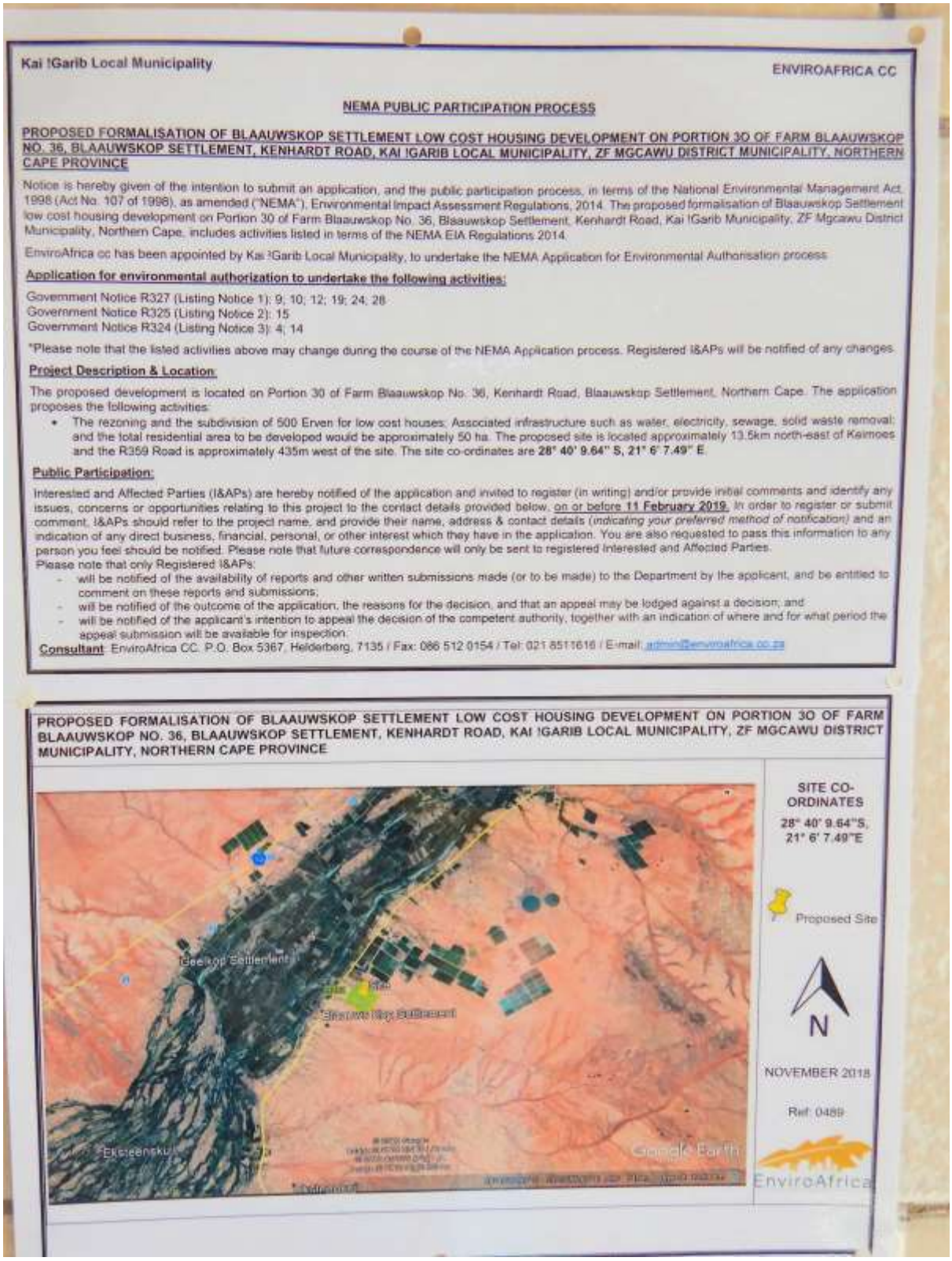
Likewise, Dr Dirk van Driel of WATSAN Africa of Cape Town was appointed to deal with the WULA in terms of the NWA for this envisaged urban development.

The required site visit was conducted on 8 February 2019.

These developments all span mostly dry drainage lines, which are nevertheless regarded as legitimate water resources, for which a WULA is mandatory. Moreover, these development can have an impact on the Orange River water quality. Some of them are adjacent to an irrigation canal, which poses challenges.

The Fresh Water Report must contain adequate information to allow for informed decision-making. The decision to approve the proposed urban development rests with DWS officials, in terms of S21 of the NWA. The Fresh Water Report must contain specified information according to a set profile, which has been developed over a number of years over many such reports and in accordance with GN509. A Risk Matrix is to be completed, as published on the DWA webpage.

In total nine of these reports will have to be produced. This is the last report in this series. For each of these reports, the issues are very much the same, with a similar terrain and social-economic circumstances. Consequently, the reports are the same, being mirror images of one another, but adapted to the specific localities and specific issues for each of the townships.



Kai !Garib Local Municipality

ENVIROAFRICA CC

NEMA PUBLIC PARTICIPATION PROCESS

PROPOSED FORMALISATION OF BLAAUWSKOP SETTLEMENT LOW COST HOUSING DEVELOPMENT ON PORTION 30 OF FARM BLAAUWSKOP NO. 36, BLAAUWSKOP SETTLEMENT, KENHARDT ROAD, KAI !GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

Notice is hereby given of the intention to submit an application, and the public participation process, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended ("NEMA"), Environmental Impact Assessment Regulations, 2014. The proposed formalisation of Blaauwskop Settlement low cost housing development on Portion 30 of Farm Blaauwskop No. 36, Blaauwskop Settlement, Kenhardt Road, Kai !Garib Municipality, ZF Mgcawu District Municipality, Northern Cape, includes activities listed in terms of the NEMA EIA Regulations 2014.

EnviroAfrica cc has been appointed by Kai !Garib Local Municipality, to undertake the NEMA Application for Environmental Authorisation process.

Application for environmental authorization to undertake the following activities:

Government Notice R327 (Listing Notice 1): 9; 10; 12; 19; 24; 28
Government Notice R325 (Listing Notice 2): 15
Government Notice R324 (Listing Notice 3): 4; 14

*Please note that the listed activities above may change during the course of the NEMA Application process. Registered I&APs will be notified of any changes.

Project Description & Location:

The proposed development is located on Portion 30 of Farm Blaauwskop No. 36, Kenhardt Road, Blaauwskop Settlement, Northern Cape. The application proposes the following activities:

- The rezoning and the subdivision of 500 Erven for low cost houses. Associated infrastructure such as water, electricity, sewage, solid waste removal; and the total residential area to be developed would be approximately 50 ha. The proposed site is located approximately 13.5km north-east of Keimoes and the R359 Road is approximately 435m west of the site. The site co-ordinates are **28° 40' 9.64" S, 21° 6' 7.49" E**.

Public Participation:

Interested and Affected Parties (I&APs) are hereby notified of the application and invited to register (in writing) and/or provide initial comments and identify any issues, concerns or opportunities relating to this project to the contact details provided below, on or before **11 February 2019**. In order to register or submit comment, I&APs should refer to the project name, and provide their name, address & contact details (*indicating your preferred method of notification*) and an indication of any direct business, financial, personal, or other interest which they have in the application. You are also requested to pass this information to any person you feel should be notified. Please note that future correspondence will only be sent to registered Interested and Affected Parties.

Please note that only Registered I&APs:

- will be notified of the availability of reports and other written submissions made (or to be made) to the Department by the applicant, and be entitled to comment on these reports and submissions;
- will be notified of the outcome of the application, the reasons for the decision, and that an appeal may be lodged against a decision; and
- will be notified of the applicant's intention to appeal the decision of the competent authority, together with an indication of where and for what period the appeal submission will be available for inspection.

Consultant: EnviroAfrica CC. P.O. Box 5367, Helderberg, 7135 / Fax: 086 512 0154 / Tel: 021 851 1616 / E-mail: admin@enviroafrica.co.za

PROPOSED FORMALISATION OF BLAAUWSKOP SETTLEMENT LOW COST HOUSING DEVELOPMENT ON PORTION 30 OF FARM BLAAUWSKOP NO. 36, BLAAUWSKOP SETTLEMENT, KENHARDT ROAD, KAI !GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

Figure 1 Public participation

2 Legal Framework

The proposed development "triggers" sections of the National Water Act. These are the following:

S21 (c) *Impeding or diverting the flow of a water course*

The proposed development is spanning the banks of a drainage line. A drainage line would be altered, should the development go ahead.

S21 (i) *Altering the bed, bank, course of characteristics of a water course.*

Some part of the proposed development will alter the characteristics of the banks of a drainage line.

Government Notice 267 of 24 March 2017

Government Notice 1180 of 2002. *Risk Matrix.*

The Risk Matrix as published on the DWS official webpage must be completed and submitted along with the Water Use Licence Application (WULA). The outcome of this risk assessment determines if a letter of consent, a General Authorization or a License is required.

Government Notice 509 of 26 August 2016

An extensive set of regulations that apply to any development in a water course is listed in this government notice in terms of Section 24 of the NWA. No development take place within the 1:100 year-flood line without the consent of the DWS. If the 1:100-year flood line flood line is not known, no development may take place within a 100m from a water course without the consent of the DWS. The development is adjacent to drainage lines, which are defined as legitimate water resources.

Likewise, the development triggers a part of the *National Environmental Management Act, NEMA, 107 of 1998).*

The EIA Regulations of 2014 No.1 Activity 12 states that no development may take place within 32m of a water course without the consent of the Department of Environmental Affairs and its provincial representatives. A part of the development is adjacent to drainage lines. Consequently, this regulation is relevant to this application.

This Fresh Water Report is exclusively focussed in S21 (c) and (i) of the NWA

Appendix 6 of GN R926 of 7 April 2017

This Government Notice outlines the minimum requirements of the contents of specialist reports for EIA's.

3 Climate Keimoes

https://www.google.com/search?q=climate+keimoes&rlz=1C1CHZL_enZA722ZA722&sxsrf=ALeKk038hMOZWDPa1PZiv1XlksnzR2Zrbg:1595417143824&tbm=isch&source=iu&ictx=1&fir=CmFbfTQBEpp2hM%252CMIzbhj9dgotX3M%252C_&vet=1&usg=AI4_-kQFYyVIH5MFKkQjI_J12SXuzUPO9Q&sa=X&ved=2ahUKEwil4YCB4ODqAhUSsHEKHQTCAxgQ9QEwEnoECAkQBQ#imgrc=CmFbfTQBEpp2hM

Figure 2 Climate Keimoes

Keimoes, the closest locality to Blaauwskop with on-line climate data, receives only 154mm of rain annually, which leaves the area semi-arid. The rainfall is entirely inadequate for growing crops. The large-scale agriculture in the district is for all its needs dependent on irrigation out of the Orange River. Most of the rain is during summer (Figure 2).

Rainfall often occurs in late afternoon sudden and violent electric thunder storms. Rainfall is highly variable, with occsional high rainfall events, perhaps once in a couple of years. Droughts are common, with dry periods lasting for years. The summers are hot and dry, with midday temperatures often more than 40° centicrade.

4 Location

Figure 3 Location

The location of the project is indicated in Figure 3. It is 30 km to the south west of Upington, as the crow flies, and 13 km east of Keimoes, on the south bank of the Orange River, in the Northern Cape.

5 Vegetation

The South African National Biodiversity Institute (SANBI) indicated the vegetation type on the property as Bushmanland Arid Grassland. The vegetation around the river is indicated as Lower Gariep Alluvial Vegetation. The Orange River is a National Freshwater Ecosystem Priority Area (NFEPA). The riparian area is indicated as Nama Karoo Bushmanland Flood Plain Wetland, despite that most of it today is manicured agriculture.

6 Quaternary Catchment

Blaauwskop is in the D73D quaternary catchment.

7 The Project

The plot of land is indicated in Figure 4 and its coordinates in Table 1.

The plot of land is bordering onto the irrigation canal (Figure 5). This is a prominent feature that will have an impact on the planning and the operation of the site. Houses have been built right to the edge of the canal. At the time of the site visit, children were playing in and around the canal (Figure 6), which is fast flowing, with very steep sides and is dangerous.

The plot is 100ha in size and 1500 erven with dwellings are envisaged, together with urban infrastructure. On the last count during the site visit, approximately 170 existing dwellings were recorded (Figure 7). The construction of new informal houses is ongoing.

Figure 4 Portion 36, Farm Blaauwskop

Table 1 Coordinates Portion 36 Farm Blaauwskop

Point	Coordinates
A	28°39’52.13S 21°06’04.24”E
B	28°40’10.69S 21°05’50.89”E
C	28°40’23.81S 21°06’12.90”E
D	28°40’05.51S 21°06’26.80”E

Figure 5 Irrigation canal

Figure 6 Children at irrigation canal

Figure 7 Dwellings

8 Drainage Lines

The landscape around much of the Lower Orange River as well as the Sak and Hartbees River is dominated by a dense succession of drainage lines. They spread along the river with many smaller tributaries to cover the entire area. The iron oxides in the sands renders a red hue that is visible from space on the Google Earth images. These reds are concentrated in the drainage lines, making them even more visible (Figure 8).

The drainage lines are mostly dry, with water only during rains and perhaps shortly thereafter. During the odd thunder storm, drainage lines can come down in flood. These floods maintain the drainage line's morphological integrity, as sediments are moved and these water ways are scoured out.

Because rainfall events are far apart, the drainage lines must have been form over millennia, even since geological times.

Around the Orange River and even the Sak and Hartbees River, large-scale agriculture has changed the drainage lines into drainage channels among the vineyards and orchards. The upper reaches away from the rivers are less impacted, even near-pristine, as intense agriculture is not possible, apart from those areas where water is piped over long distances from the Orange River.

Much of the discussion in this report is about these drainage lines.

9 Sub-Catchments

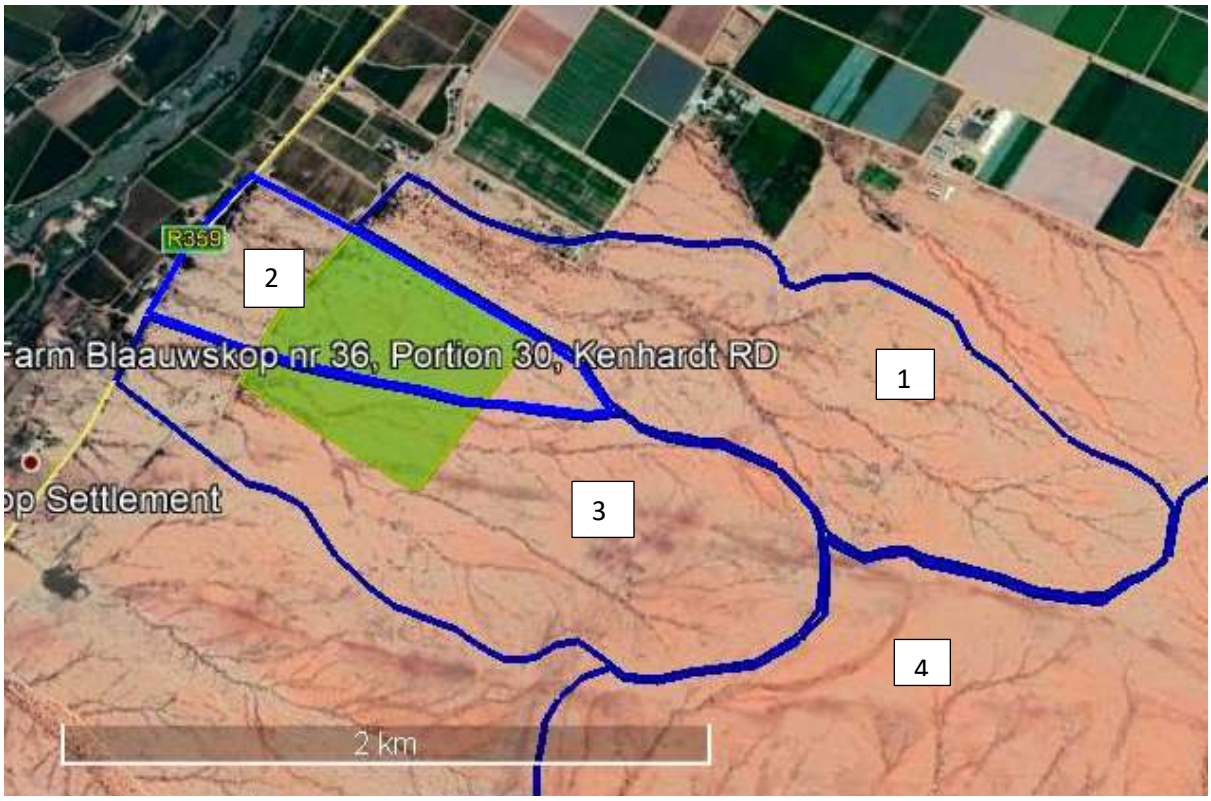


Figure 8 Catchment areas

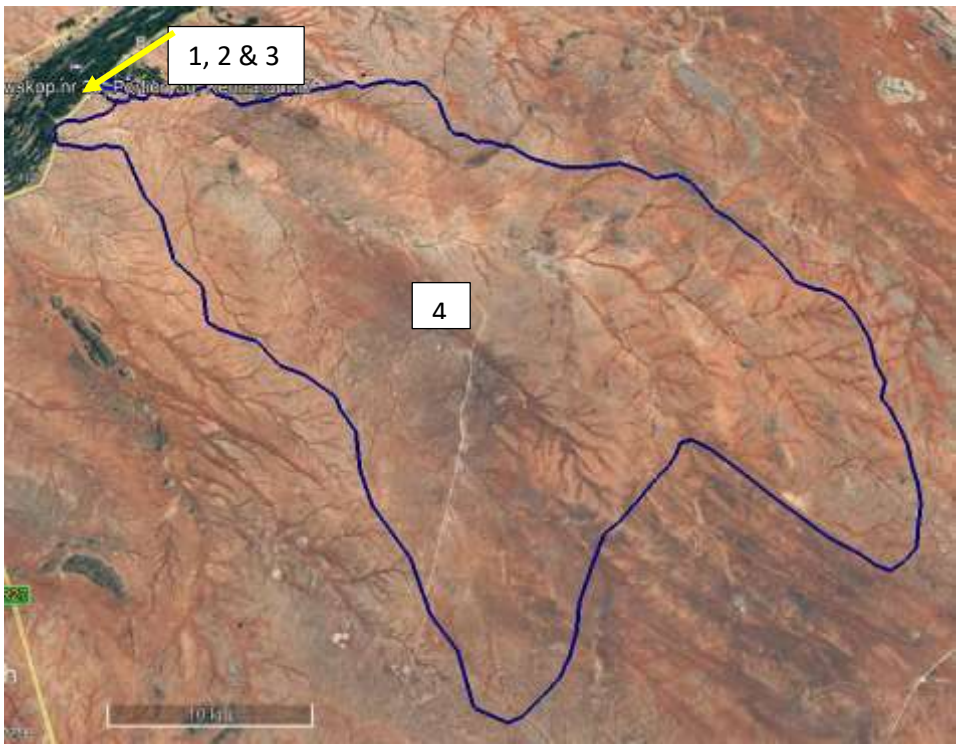


Figure 9 Larger sub-catchment

Table 2 Sub-catchments

No	Area Ha	Circumference km	Highest Point masl	Lowest Point masl	Distance km	Slope
1	156	6.6	818	776	2.9	1.45
2	145	5.7	776	769	1.6	0.43
3	62	3.8	809	770	2.45	0.02
4	89380	153	1021	758	55	>0.01

There are three very small sub-catchments span the block of land that has been earmarked for development (Figure 8, Table 2). These each have a small drainage line that end up against the vineyards.

The fourth sub-catchment is, at almost 90 000 hectares, by far the largest, but it does not span the development area and is adjacent to it, bordering onto it (Figure 9, Table 2).

The slope of sub-catchment 1 (Figure 8) is rather steep, with a drop of 1.45m over a distance of 100 horizontal metres. This slope, together with sandy soils, is normally enough reason to be careful of erosion during high rainfall events and calls for proper planning of a storm water system in this part of the development. In this case, this is a low rainfall area and the sub-catchments are very small, which negates the need for large storm water management infrastructure.

The slope of sub-catchment 2 is far less, with only 0.43m drop over 100m, with the slope in sub-catchment 3 being insignificant, with virtually level land with probably a very slow runoff rate.

The largest sub-catchment is entirely level (Table 1). The slope is the steepest at the high end of the sub-catchment and tapers off towards the middle and lower end. Like so many other similar sub-catchments in the region, sand is eroded from the higher parts and subsequently deposited lower down to create a wide flood plain that can readily be seen on Google Earth images (Figure 8). The tree lines on these wide flood plains are wider, probably because the ground water migrating down the drainage lines in the sands, albeit sparse, spread out over a wider area.

The larger sub-catchment connects to the Orange River downstream of Blaauwskop with a prominent canal through the vineyards (Figure 9).

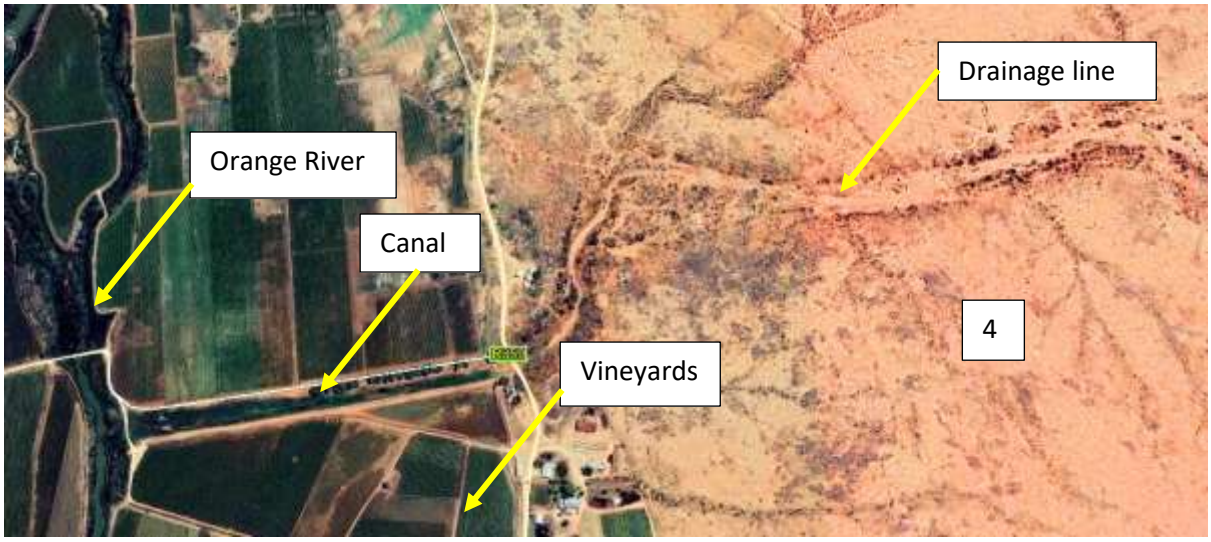


Figure 10 Larger drainage line canal

Figure 11 Drainage line in sub-catchment 1

10 Blaauwskop Drainage lines

The mostly dry drainage lines in sub-catchment 2 and 3 run right through the existing housing, with houses located on the banks, without any buffer zone (Figure 11).

The drainage lines were full of litter and household waste during the site visit.

The drainage lines pass over the irrigation canal. Concrete slabs have been constructed over the canal at each of the crossings, with concrete walls on either side of the crossing to keep storm water from entering the canal (Figure 12, 13 and 14).

Figure 12 Crossing No. 1

Figure 13 Crossing No.2

Figure 14 Crossing No. 3

It is expected that a number more of these crossings will have to be constructed, as the new development progresses, to keep runoff and litter out of the irrigation canal.

The drainage lines appear to be fairly natural on both sides of these crossings, with mostly swarthaak trees (*Senegalia mellifera*), as well as the invasive *Prosopis* trees being the riparian vegetation (Figure 15). The beds were mostly sandy, with little if any vegetation.

Figure 15 Drainage line vegetation

The drainage lines and surrounds were grazed by goats and other livestock.

11 Impacts on the Lower Orange River

The river is heavily utilized for agriculture, with the banks entirely modified into cultured vineyards. A multitude of large electric water pumps have been placed in the river for abstracting large volumes of water for irrigation. Abstraction significantly lowers the flow in the river.

Berms for the purpose of flood protection have been constructed on the banks of the river for most of its length. These berms have been constructed by the Department of Water Affairs and now have been a feature of the landscape for many decades. The berms keep flood water out of adjacent agricultural land and has denaturalised the riparian zone.

The single most impact on the Orange River are the two very large dams, The Gariep Dam and the Vanderkloof Dam. The river flow has been modified to a much more even regime, different from the varied flown with high peak flows and low drought flows.

The Lower Orange River is lined with a dense system of mostly dry drainage lines. These drainage lines only flow during and shortly after heavy rains. Their contribution to the flow of the Orange River is insignificant. Most of the flow comes from the Lesotho Highlands and some from the Vaal River. However, many of these drainage lines have been transformed into engineered agricultural return flow furrows that carries the excess of over irrigation back to the Orange River. Agricultural return flow adds much to the nutrient load of the Orange River because runoff contains fertilizer. Nitrogen is added in large quantities. Since phosphorus readily binds to the soil, not much phosphorus is added.

Return flow can contain a heavy silt load, thereby elevating turbidity in the river.

It is suspected that pesticides in agricultural return flow have a heavy impact on biomonitoring results, significantly reducing the SASS5 score.

The banks of the Orange River in the area is densely overgrown with Spaanse Riet (*Arundo donax*). This is classified as an aggressive and exotic invasive plant, which effectively prevents access to the river. The reeds result in a homogeneous aquatic habitat. This lack of variation supresses the SASS5 score, with only a limited number of aquatic macroinvertebrate species present in this habitat.

The impact of concern for this particular WULA is the return flow out of urban areas, of which Upington is the most significant, with its release of treated sewage effluent into the Orange River. In addition, a number of human settlements similar to Blaauwskop are being planned, where existing wastewater treatment works are inoperable and where these works are absent. This poses a threat to the water quality of the Orange River and of course a threat to the regional agricultural export industry. Hence it is necessary to monitor the Orange River, within the typical cost structure and timespan of a WULA. Biomonitoring seems to be the indicated option.

12 Biomonitoring the Lower Orange River

The biomonitoring was carried out according to the description of Dickens & Graham (2002).

Biomonitoring was carried out on the Lower Orange River during site visits for successive WULAs. So far 12 samples have been analyzed at 11 localities (Table 3). The site furthest east was at Hopetown and furthest west at Augrabies, with Upington in the middle. All of these are located upstream of the Augrabies Falls.

Another sample was analyzed at Styerkraal just east of the border post of Onseepkans downstream of the Augrabies Falls.

The river is mostly braided, with many smaller streams and with islands in the middle. The river sports many rapids and riffles, but also pool-like features where the river is broad and slower flowing.

The bottom is mainly muddy, with some large rocky outcrops in the middle of the river.

13 Lower Orange River Biomonitoring Results

The biomonitoring results have been captured in Table 1 and depicted in Figure 17.

The classes from A to F in Figure 18 has been assigned for mature rivers on flood plains such as the Lower Orange River.

Only 2 of the samples were classified a good and relatively unimpacted (Class A). Four were in Class B and C, which can be regarded as acceptable under the circumstances of an impacted river reach. These classes can possible be labelled as the ideal, a compromise between agriculture and aquatic ecological functioning.

Four samples were poor (Classes E and F), an undesirable state of affairs.

The one sample downstream of the Augrabies Falls was extremely poor.

Table 3 Biomonitoring in the Lower Orange River

Locality	Coordinates	Date	SASS 5	No Taxa	ASPT
Augrabies Lair trust	28°38'41.53S 20°26'08.49E	5/09/17	18	4	4.5
Augrabies Lair Trust	28°38'41.53S 20°26'08.49E	5/10/17	43	9	4.8
Groblershoop	28°52'31.80S 21°59'13.49E	14/8/18	41	7	5.9
Kakamas Triple D	28°45'08.37S 20°35'06.16E	15/8/18	50	9	5.6
Hopetown Sewer	29°36'05.07S 24°06'05.00E	7/10/18	29	7	4.1
Hopetown Sewer	29°36'08.06S 24°21'06.16E	7/10/18	29	8	3.6
Keimoes Housing	28°42'37.12S 20°55'07.81E	8/02/19	51	7	7.3
Upington Erf 323	28°27'11.91S 21°16'14.02E	12/2/19	56	9	6.2
Upington Affinity	28°27'11.91S 21°16'14.02E	20/5/19	54	9	6
Styerkraal	28°27'25.28S 21°15'01.87E	21/5/19	15	6	2.5
Grootdrink Bridge	28°17'15.30S 21°03'50.87E	17/5/20	34	7	5.3
Turksvy Dam	28°27'09.21S 21°17'20.72E	17/5/20	69	13	5.3

14 Biomonitoring sampling point

The sampling point should be chosen as close as possible and just downstream of a possible impact. In the case of Blaauwskop, this was not possible, because the Orange River was heavily overgrown with reeds, an impenetrable barrier (Figure 16). The closest point at the time was in Upington, Erf 323 as indicated in Table 1.

The river here was approximately 150m wide, pool-like with a slow current of some $0.1m^{-s}$ in the middle of the river but only $0.02m^{-s}$ next to the river bank at the sampling point. The *Phragmitis* reeds here were cleared to accommodate a floating jetty and a pump for the abstraction of water. At this point there was a sturdy concrete slipway for the launching of boats. There was a lot of froth and debris in the shallow water. The river was turbid at the time.

This site was right on the verge of the 4m high flood wall, of which there are many kilometres along both banks of the Lower Orange River. The bank was steep, with the submerged bank steep as well, with limited shallow water.

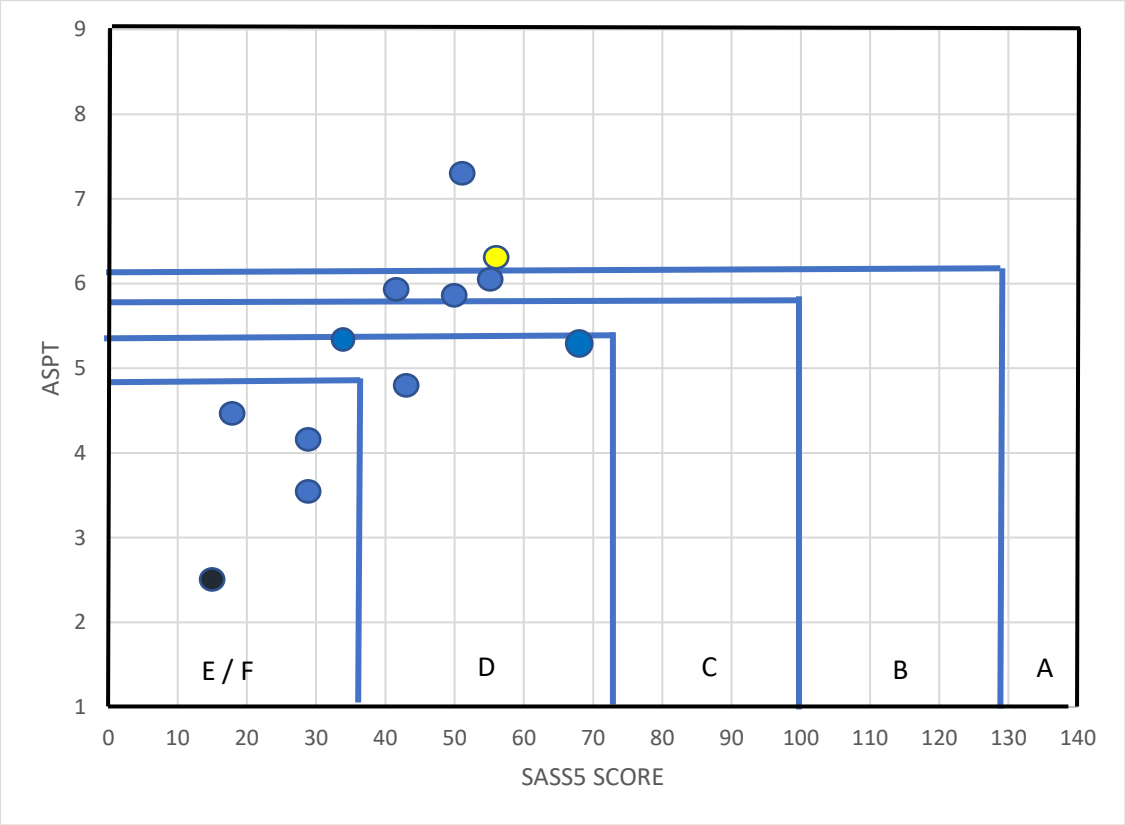
The available habitat was submerged vegetation, emerging vegetation muddy bottom and the jetty served as bedrock.

The biomonitoring results are given in the Appendix.

The results were surprisingly good (Figure 17), indicating a near-pristine, almost unimpacted state of the river. This is above the target ("C", impacted, but with most ecological functioning intact).

The impacts from all of the new housing developments, including Blaauwskop, should be managed to such an extent that the Orange River does not drop below a C class.

Figure 16 Reeds



Integrity Class	Description
A	Pristine; not impacted
B	Very Good; slightly impacted
C	Good; measurably impacted with most ecological functioning intact
D	Fair; impacted with some loss of ecological functioning
E	Poor; loss of most ecological function
F	Very Poor; loss of all ecological function

Figure 17 Lower Orange River biomonitoring results

The yellow dot represents the sampling point in Upington. All the other dots represent previous sampling.

15 **Present Ecological State** (PES)

Table 4 Habitat Integrity according to Kleynhans, 1999

A	Unmodified, natural	90 – 100
B	Largely natural with few modifications. A small change in natural habitats and biota, but the ecosystem function is unchanged	80 – 89
C	Moderately modified. A loss and change of the natural habitat and biota, but the ecosystem function is predominantly unchanged	60 – 79
D	Largely modified. A significant loss of natural habitat, biota and ecosystem function.	40 – 59
E	Extensive modified with loss of habitat, biota and ecosystem function	20 – 39
F	Critically modified with almost complete loss of habitat, biota and ecosystem function. In worse cases ecosystem function has been destroyed and changes are irreversible	0 - 19

The PES and EIS are protocols that have been produced by Dr Neels Kleynhans (Table 4 to 7) in 1999 of the then DWAF to assess river reaches. The PES is one of the evaluations that is prescribed for S21 (c) and (i) WULA's. The scores given are solely that of the practitioner and are based on expert opinion.

Sub-catchments 1, 2 and 3 have been lumped because they were very similar. They all score a D, very much altered, with much of the ecological functioning lost.

Sub-catchment 4 has been evaluated separately because it is much bigger, not in the township, with a proportionate smaller lower reach that has been canalised. This sub-catchment is less impacts, in a better state and scores a C for both the instream and riparian habitat, with most of the ecological functioning still intact.

Table 5 Present Ecological State of the Drainage Line 1, 2 and 3

Instream	Score	Weight	Product	Maximum score
Water abstraction	24	14	336	350
Flow modification	13	13	169	325
Bed modification	14	13	182	325
Channel modification	15	13	195	325
Water quality	16	14	224	350
Inundation	14	10	140	250
Exotic macrophytes	20	9	180	225
Exotic fauna	12	8	96	200
Solid waste disposal	10	6	60	150
Total		100	1402	2500
% of total			56.1	
Class			D	
Riparian				
Water abstraction	24	13	312	325
Inundation	14	11	154	275
Flow modification	13	12	156	300
Water quality	16	13	208	325
Indigenous vegetation removal	14	13	182	325
Exotic vegetation encroachment	20	12	240	300
Bank erosion	20	14	280	350
Channel modification	15	12	180	300
Total			1142	2500
% of total			45.7	
Class			D	

Table 6 Present Ecological State of Drainage Line 4

Instream	Score	Weight	Product	Maximum score
Water abstraction	24	14	336	350
Flow modification	23	13	299	325
Bed modification	22	13	286	325
Channel modification	21	13	273	325
Water quality	20	14	280	350
Inundation	21	10	210	250
Exotic macrophytes	20	9	180	225
Exotic fauna	18	8	144	200
Solid waste disposal	20	6	120	150
Total		100	1958	2500
% of total			78.3	
Class			C	
Riparian				
Water abstraction	24	13	312	325
Inundation	21	11	143	275
Flow modification	23	12	144	300
Water quality	20	13	195	325
Indigenous vegetation removal	19	13	156	325
Exotic vegetation encroachment	20	12	252	300
Bank erosion	22	14	266	350
Channel modification	21	12	168	300
Total			1636	2500
% of total			65.4	
Class			C	

Much has been published on the ecological state of South African rivers and the Orange River is no exception. In fact, it seems somewhat arrogant to assess the Lower Orange River, even at the sampling point, with a team of one and with the financial backing of a single WULA. This is a large undertaking that is to be contemplated by a team of experts. Nevertheless, this is what the WULA requires.

The river at the Upington sampling point, as elsewhere, has been impacted by major dams, large-scale water abstractions, an influx of agricultural chemicals, encroachment of reeds and exotic macrophytes, translocated and exotic fish, levees, bridges and many other infarctions.

Table 7 Present Ecological State Orange River

Instream	Score	Weight	Product	Maximum score
Water abstraction	15	14	210	350
Flow modification	15	13	195	325
Bed modification	20	13	260	325
Channel modification	22	13	286	325
Water quality	15	14	210	350
Inundation	12	10	120	250
Exotic macrophytes	18	9	162	225
Exotic fauna	15	8	120	200
Solid waste disposal	20	6	120	150
Total		100	1593	2500
% of total			63.7	
Class			C	
Riparian				
Water abstraction	15	13	195	325
Inundation	14	11	154	275
Flow modification	15	12	180	300
Water quality	15	13	195	325
Indigenous vegetation removal	15	13	195	325
Exotic vegetation encroachment	15	12	180	300
Bank erosion	20	14	280	350
Channel modification	18	12	216	300
Total			1595	2500
% of total			63.8	
Class			C	

However, the river at Upington was less impacted than further downstream, as at Kakamas. The river at Upington was stronger flowing, with much more water. The condition of the river gradually deteriorates as water abstraction and return flows increases downstream.

Hence the river was scored a C (Table 4), which signifies that it has been impacted, but despite these impacts still exhibits appreciable ecological functioning. The riparian zone scores a C as well.

There is a good chance that other practitioners would score the river very much the same.

Importantly, the proposed development at Blaauwskop is not about to change the PES of the Orange River at Upington.

16 Ecological Importance

The Ecological Importance (EI) is based on the presence of especially fish species that are endangered on a local, regional or national level (Table 8).

There are no fish in the drainage line, as there is no permanent water. According to this assessment, which is prescribed for WULA's, the drainage line is not important.

No other endangered species, either plant or animal, were detected in or near the drainage line.

Table 8 Ecological Importance according to endangered organisms (Kleynhans,1999).

Category	Description
1	One species or taxon are endangered on a local scale
2	More than one species or taxon are rare or endangered on a local scale
3	More than one species or taxon are rare or endangered on a provincial or regional scale
4	One or more species or taxa are rare or endangered on a national scale (Red Data)

As has been stated before, the higher vegetation in and around the drainage lines are of particular importance in these arid regions and add significantly to biodiversity. These should be considered as ecologically important.

The Orange River is most important, according to this assessment.

According to Skelton (1993) 12 species of indigenous fish occur in the Lower Orange River. Since 2011 another one was added, as well as 3 exotic species. These are the following:

Barbus trimaculatus
B paludinosus
B. hospus
Labeobarbus kimberleyensis (Near threatened)
L aenus
Labeo umbratus
L capensis
Austroglanis sclateri (Widespread elsewhere)
Clarias gariepinus
Pseudocrenilabrus philander (Threatened locally but abundant elsewhere)
Pseudobarbus quathlabae
Mesobola brevianalis (critically endangered)

Exotic and translocated fish:

Cyprinus carpio
Tilapia sparrmanii
Oreochromus mossambicus

Those in blue are endangered to a varying extent. Those indicated in red are exotic or translocated fish.

The only one that causes real concern in the largemouth yellow-fish *Labeobarbus kimberleyensis*. It is endemic to the Orange River system and hence is threatened not only on a local scale, but on a national scale as well. This puts the Lower Orange in category 4. This renders the Orange River as important.

According to the owners of the Kalahari River and Safari Co. along the northern bank of the Orange River on the Riemvasmaak Road, mature blue kurper *Oreochromus mossambicus* are regularly captured in increasing numbers. It now takes at least 4 man-days to capture a single yellow fish.

Yellow fish are generally infected with cestode bladder worms, while darters (*Anhinga rufa*) that predate on these fish are heavily infected with tape worms. It seems as if the translocated Tilapia are not affected by these parasites.

According to Mr Chris van der Post, a renown angling guide and the owner of the Gkhui Gkhui River Lodge near Hopetown, there are still many smallmouth-yellow fish around, but largemouth yellow-fish are scarce.

17 Ecological Sensitivity

Ecological Sensitivity (ES) is often described as the ability of aquatic habitat to assimilate impacts. It is not sensitive if it remains the same despite of the onslaught of impacts. Put differently, sensitive habitat changes substantially, even under the pressure of slight impacts.

The Ecological Sensitivity also refers to the potential of aquatic habitat to bounce back to an ecological condition closer to the situation prior to human impact. If it recovers, it is not regarded as sensitive.

17.1 Ecological Sensitivity Drainage Lines

The question arises**,** according to the ES definition, if the drainage lines would recover to its original ecological state prior to any human impact. If the roads and vineyards, along with the rubble and trash be removed, would the drainage line recover? The answer is probably yes, even though the drainage lines would find new routes and even though it would take many decades, perhaps more than a century, in this semi-arid region where re-growth of vegetation can take a long time. However, this is not a realistic scenario. Development is here to stay, together with its impacts. From this point of view the drainage line can be considered as ecologically sensitive.

17.2 Ecological Sensitivity Orange River

The Lower Orange River has absorbed numerous and deep-cutting human impacts. Yet is still functions as an aquatic ecosystem. In the highly improbable event of ceased human impact, the river here would probably bounce back to its previous glory. In this respect the river cannot be categorised as sensitive. It is dreaded among conservation minded people that the Lower Orange River might have some more capacity to absorb further impact.

18 Possible Impacts

The impacts on sub-catchments 2 and 3 are going to be the greatest, as the township will be built right over these drainage lines.

Drainage lines of sub-catchments 1 and 4 are adjacent to the new development and would be spared of houses right on its banks.

The impacts include trampling and over-grazing of the sub-catchment, destruction of the drainage lines, littering and the danger of untreated sewage ending up in the drainage canal and the Orange River.

19 Mitigation Measures

A buffer zone of 20m should be allowed on either side of these drainage lines, a green zone through the envisaged township.

The township should be arranged in such a way that the drainage lines still connect to the stormwater infrastructure over the irrigation canal. Stormwater should not be allowed to enter the irrigation canal. Where necessary, additional infrastructure should be built over the irrigation canal.

Litter and household waste have been noted in the drainage lines of the existing township. This problem, if not properly managed, will escalate when the township expands. Litter and waste should not be allowed to enter the canal. It should not be allowed to wash down the drainage lines and into the Orange River. Infrastructure to catch the waste should be installed and these structures should be regularly cleaned.

Another 1500 households would put strain on the current sewage and wastewater handling system. It would be disastrous if sewage ends up in the Orange River. Proper planning and infrastructure are necessary.

The three smaller sub-catchments can probably not produce enough runoff, even during a large rainfall event, to pose a threat to the new development. The larger sub-catchment of almost 90 000 ha is large enough to produce a sudden and dangerous pulse of runoff during a high rainfall event, perhaps of 30 to 40mm in a day. Residents should be aware of the potential hazard.

The authorities will have to give the dangers of children in and around the irrigation canal some thought, because the danger of drownings increases as the township grows.

20 Impact Assessment

Some of the decision-making authorities prescribe an impact assessment according to a premeditated methodology (Table 23.1, Appendix).

The main benefit of this exercise is that it allows for the evaluation of mitigation measures. Later follows the Risk Matrix. This is different from the Impact Assessment as it does not attempt to weigh the success of mitigation measures.

The assessment indicates that the impacts are acceptable, provided that the mitigation measures are adequate to contain these impacts (Table 6).

Table 9 Impact Assessment

Description of impact Construction phase. Destruction of drainage lines **Mitigation measures** Construction only during the dry season, limit the foot print, vegetate disturbed areas. Maintain buffer zone Keep building rubble and sediments out of drainage lines. Connect drainage lines to storm water infrastructure over irrigation canal								
Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability
Without mitigation								
Cumulative	Regional	Medium	Long term	Medium	Probable	Certain	Reversible	Replaceable
With mitigation measures								
Cumulative	Local	Low	Long term	Low	Unlikely	Sure	Reversible	Replaceable

Description of impact Operational phase. Litter and sewage into the drainage lines and Orange River **Mitigation measures** Assure a proper municipal litter and urban waste collection and removal system Install adequate wastewater treatment facility and infrastructure								
Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability
Without mitigation								
Cumulative	Regional	Medium	Long term	Medium	Probable	Certain	Reversible	Replaceable
With mitigation measures								
Cumulative	Local	Low	Long term	Low	Unlikely	Sure	Reversible	Replaceable

These mitigation measures can be effective, but only if municipal services are maintained.

21 Risk Matrix

The purpose of the Risk Matrix is to determine if a General Authorisation of a License is applicable.

The assessment was carried out according to the interactive Excel table that is available on the DWS webpage. Table 10 is a replica of the Excel spreadsheet that has been adapted to fit the format of this report. The numbers in Table 10 (continued) represent the same activities as in Table 9, with sub-activities added.

The methodology is tabled in the Appendix.

Table 10 Risk Matrix

No.	Activity	Aspect	Impact	Significance	Risk Rating
1	Construction	Sediments / debris washing down the drainage lines	Silting up of drainage line	26	Low
2	Wastewater / sewage	Sewage ending up in the drainage line and the Orange River	Pollution of the river	54	Low
3	Urban solid waste	Waste ending up in the drainage line and in the river	Pollution of drainage line and Orange river	48	Low

Table 10 Continued Risk Rating

No	Flow	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Conse-quence
1 2 3	1 1 1	1 2 1	2 1 1	1 2 1	1.25 1.5 1	1 1 1	1 2 2	3.25 4.5 4

No	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significance	Risk Rating
1 2 3	1 3 3	1 3 3	5 5 5	1 1 1	8 12 12	26 54 48	Low Low Low

Values have been given under the Assumption that mitigation measures will be in place.

The risk of material importance is the possibility of urban waste and untreated sewage down the drainage line and into the Orange River. The risk increases because of the cumulative risks posed by the various developments along the reach of the Orange River. It is supposed that if the contamination in the river rises and the farming community becomes aware of it, that there would be a strong reaction, leading to curbing or ending the problem. This assumption influenced the score for “duration”, as the problem was perceived not to continue.

In most cases loosened soil and silt that can be washed down the drainage lines during construction are considered to be a risk to the aquatic environment. In the event of the Blaauwskop development, the risk is so small that it is not worth considering in a Risk Matrix.

The Risk Matrix indicates that the risks to the aquatic environment are low. A General Authorisation should be in order for this application and a License is deemed not to be the indicated level of authorisation.

22 Resource Economics

Table 11. Goods and Services three smaller drainage lines

Goods & Services	Score Smaller drainage lines	Score larger drainage line
Flood attenuation	2	5
Stream flow regulation	2	5
Sediment trapping	2	5
Phosphate trapping	1	3
Nitrate removal	1	3
Toxicant removal	1	2
Erosion control	1	5
Carbon storage	1	3
Biodiversity maintenance	2	5
Water supply for human use	0	0
Natural resources	0	2
Cultivated food	1	2
Cultural significance	0	2
Tourism and recreation	0	1
Education and research	0	1

0 Low
5 High

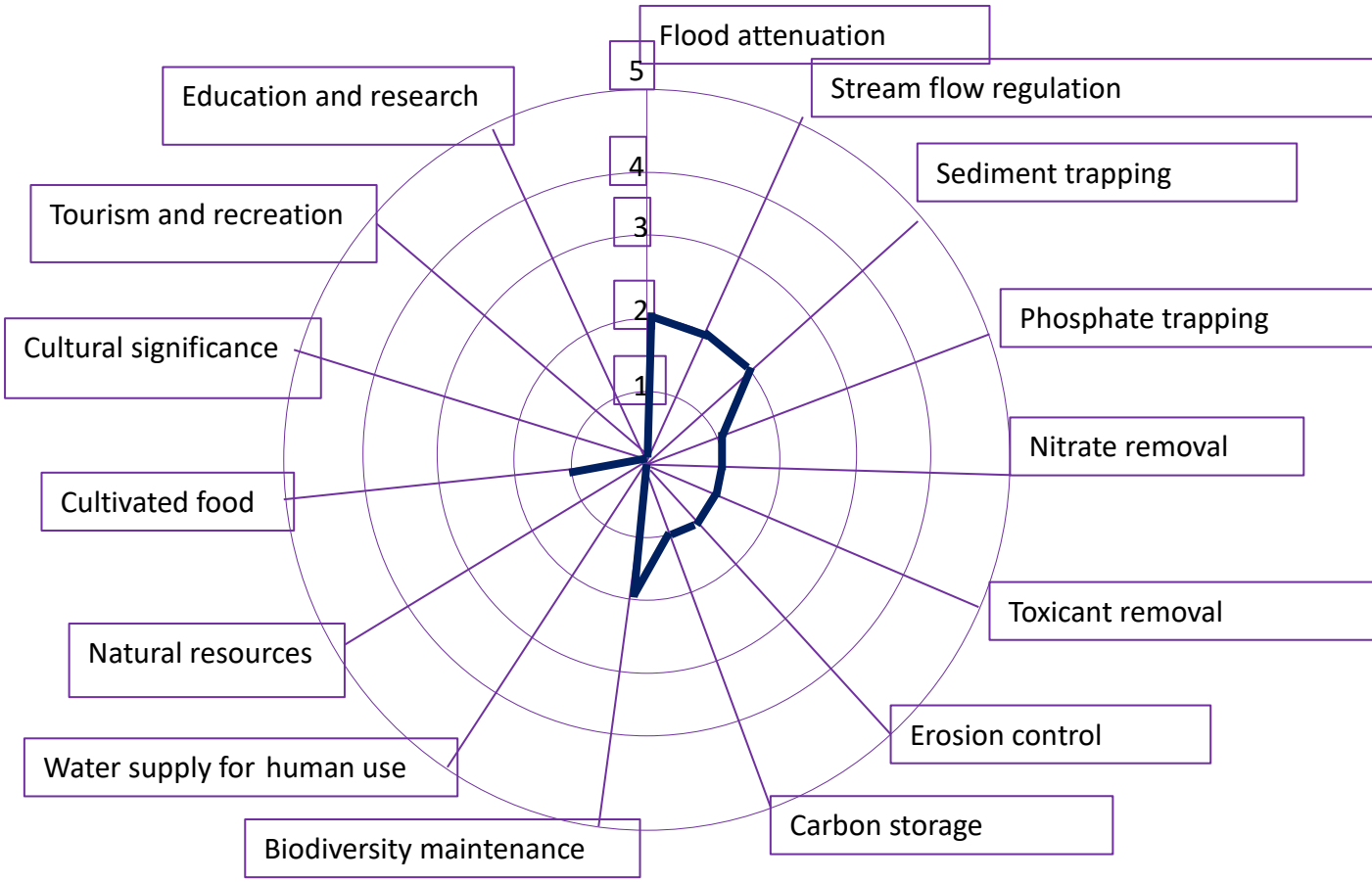


Figure 18 Resource Economic Footprints of the smaller drainage lines

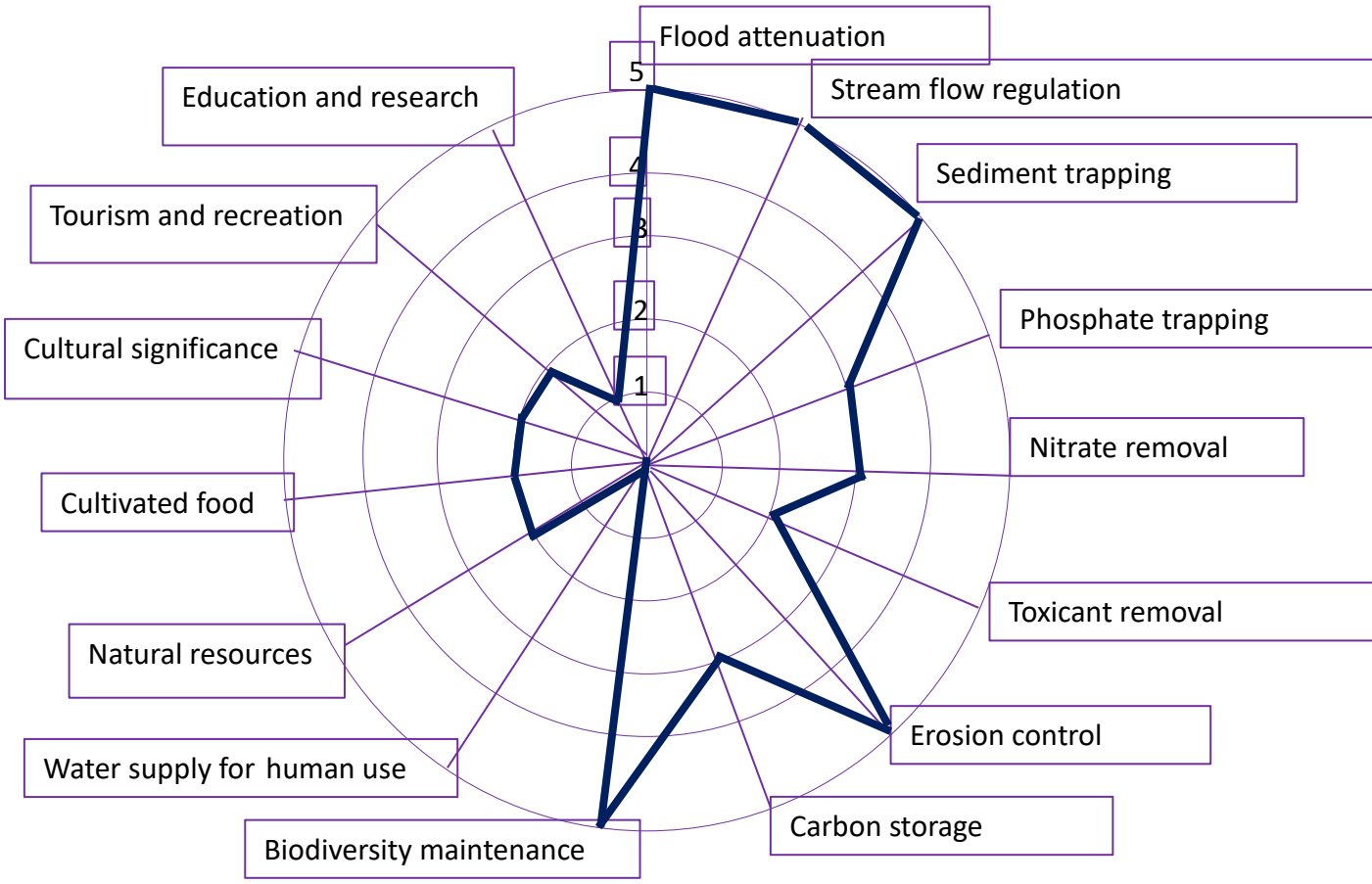


Figure 19 Resource Economic Footprints of the larger drainage lines

The goods and services delivered by the environment, in this case the drainage line at the new Blaauwskop housing development, is a Resource Economics concept as adapted by Kotze *et al* (2009). The methodology was designed for the assessments of wetlands, but in the case of the drainage line the goods and services delivered are particularly applicable and important, hence it was decided to include it in the report.

The diagram (Figure 18 and 19) is an accepted manner to visually illustrate the resource economic footprint the drainage line, from the data in Table 8.

The size of the star shape attracts the attention of the decision-makers. This shape (spider diagram, Figure 18) of the lumped three smaller drainage lines is very small, indicating that the water course has a small economic foot print. If these drainage lines are lost because of development, it won't represent a mentionable loss in environmental goods and services.

However, the larger drainage line renders considerably more economic goods and services and has a significant conservation value, with a much larger star shape (Figure 1).

A large river such as the Orange River renders a full house of goods and services, with a score of 5 for all of them. The spider diagram becomes a perfect circle.

The development at Blaauwskop is not about to change any of this. However, cumulative impacts of many such developments along the Lower Orange River on water quality and long-term water provision for human use and irrigation is the first to come to mind when the considering the future.

23 Site Visits: General Observations

Pertaining to Fresh Water Reports in general, urban wastewater is of importance because untreated waste ends up in water ways, which rebels against the NWA and other contemporary South African environmental legislation. Photographic evidence is presented in several of the nine townships along the Lower Orange River that are now under consideration for expansion where anaerobic pond systems for the treatment of sewage lie idle and are not being utilized for the treatment of urban sewage. Instead raw sewage is dumped in drainage lines. Likewise, several sewage pump stations are dysfunctional, overflowing, with large quantities of raw sewage flowing down drainage lines.

Household solid waste is not collected and removed according to standard municipal operating procedures. Very large quantities of waste accumulate in the townships and the streets. Large quantities of waste end up in the drainage lines as well.

These two aspects are crucial to the WULA and environmental authorisation of any further urban development. If these malpractices are allowed to continue and if the normal municipal services continue to be absent, this untenable situation would become worse when these townships expand.

This is not only a tangible threat to human health and human well-being in the Northern Cape, but in many South African municipalities, as well as in cities elsewhere in the world where WATSAN Africa concluded contracts.

In a number of the townships, graveyards are illegally located right in drainage lines or within the 32m buffer zone from drainage lines.

From a Fresh Water Report perspective, a Licence or General authorisation should probably not be granted until the sewage and waste issues are satisfactory and sustainably resolved. But then this is entirely the prerogative of the DWS and its officials.

24 Conclusions

Figure 20 has been adapted from one of the most recent DWS policy documents.

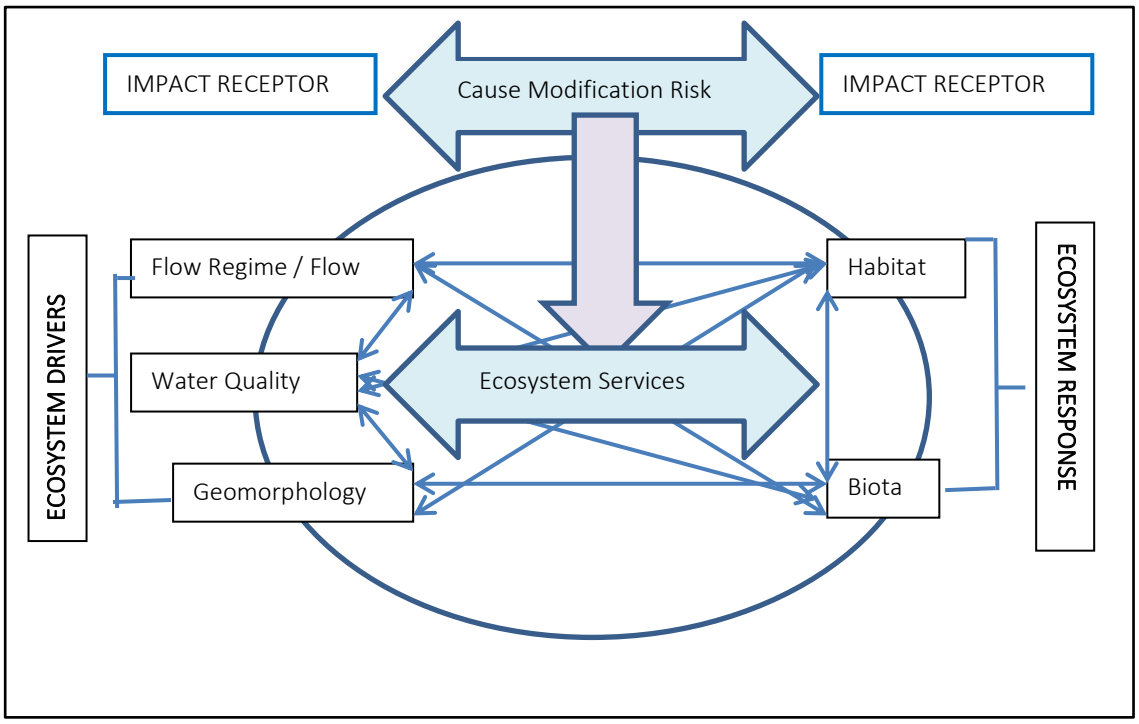


Figure 20 Minimum Requirements for a S21(c) and (i) Application

An anthropogenic activity can impact on any of the ecosystem drivers or responses and this can have a knock-on effect on all of the other drivers and responses. This, in turn, will predictably impact on the ecosystem services (Figure 20). The WULA and the EAI must provide mitigation measured for these impacts.

The driver of the drainage lines is the occasional flood that follows sudden and intense rainfall events. This is followed by prolonged droughts and intense summer heat that prevents the development of any viable aquatic habitat. This is apart from shallow ground water that explains the growth of a somewhat more prolific vegetation along the drainage lines.

The current sewage and solid waste situation are threats to the WULA. The authorities may insist that these issues be resolved before a General Authorization is approved.

Apart from this, the findings of this Fresh Water Report indicate that a general Authorization would be in order for the development of an urban housing scheme at Blaauwskop.

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26 Declaration of Independence

I, Dirk van Driel, as the appointed independent specialist hereby declare that I:

- Act/ed as the independent specialist in this application
- Regard the information contained in this report as it relates to my specialist input/study to be true and correct and;
- 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 NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management act;
- Have and will not have vested interest in the proposed activity;
- Have disclosed to the applicant, EAP and competent authority any material information have or may have to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the environmental Impact Assessment Regulations, 2010 and any specific environmental management act.
- Am fully aware and meet the responsibilities in terms of the NEMA, the Environmental Impacts Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R543) and any specific environmental management act and that failure to comply with these requirements may constitute and result in disqualification;
- Have ensured that information containing all relevant facts on respect of the specialist input / study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties facilitated in such a manner that all interested and affected parties were provided with reasonable opportunity to participate and to provide comments on the specialist input / study;
- Have ensured that all the comments of all the interested and affected parties on the specialist input were considered, recorded and submitted to the competent authority in respect of the application;
- Have ensured that the names of all the interested and affected parties that participated in terms of the specialist input / study were recorded in the register of interested and affected parties who participated in the public participation process;
- Have provided the competent authority with access to all information at my disposal regarding the application, weather such information is favourable or not and;
- Am aware that a false declaration is an offence in terms of regulation 71 of GN No. R543.

Signature of the specialist:  26 June 2020

27 Résumé

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Water Scientist

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Experience

WATSAN Africa, Cape Town. Scientist **2011 - present**

USAID/RTI, ICMA & Chemonics. Iraq & Afghanistan **2007 -2011**
Program manager.

City of Cape Town **1999-2007**
Acting Head: Scientific Services, Manager: Hydrobiology.

Department of Water & Sanitation, South Africa **1989 – 1999**
Senior Scientist

Tshwane University of Technology, Pretoria **1979 – 1998**
Head of Department

University of Western Cape and Stellenbosch University 1994- 1998 part-time

- Lectured post-graduate courses in Water Management and Environmental Management to under-graduate civil engineering students
- Served as external dissertation and thesis examiner

Service Positions

- Project Leader, initiator, member and participator: Water Research Commission (WRC), Pretoria.
- Director: UNESCO West Coast Biosphere, South Africa
- Director (Deputy Chairperson): Grotto Bay Home Owner's Association
- Member Dassen Island Protected Area Association (PAAC)

Membership of Professional Societies

- South African Council for Scientific Professions. Registered Scientist No. 400041/96
- Water Institute of South Africa. Member

Reports

- Process Review Kathu Wastewater Treatment Works
- Effluent Irrigation Report Tydstroom Abattoir Durbanville
- River Rehabilitation Report Slangkop Farm, Yzerfontein
- Fresh Water and Estuary Report Erf 77 Elands Bay
- Ground Water Revision, Moorreesburg Cemetery
- Fresh Water Report Delaire Graff Estate, Stellenbosch
- Fresh Water Report Quantum Foods (Pty) Ltd. Moredou Poultry Farm, Tulbagh
- Fresh Water Report Revision, De Hoop Development, Malmesbury
- Fresh Water Report, Idas Valley Development Erf 10866, Stellenbosch
- Wetland Delineation Idas Valley Development Erf 10866, Stellenbosch
- Fresh Water Report, Idas Valley Development Erf 11330, Stellenbosch
- Fresh Water Report, La Motte Development, Franschhoek
- Ground Water Peer Review, Elandsfontein Exploration & Mining
- Fresh Water Report Woodlands Sand Mine Malmesbury
- Fresh Water Report Brakke Kuyl Sand Mine, Cape Town
- Wetland Delineation, Ingwe Housing Development, Somerset West
- Fresh Water Report, Suurbraak Wastewater Treatment Works, Swellendam
- Wetland Delineation, Zandbergfontein Sand Mine, Robertson
- Storm Water Management Plan, Smalblaar Quarry, Rawsonville
- Storm Water Management Plan, Riverside Quarry
- Water Quality Irrigation Dams Report, Langebaan Country Estate
- Wetland Delineation Farm Eenzaamheid, Langebaan
- Wetland Delineation Erf 599, Betty's Bay
- Technical Report Bloodhound Land Speed Record, Hakskeenpan
- Technical Report Harkerville Sand Mine, Plettenberg Bay
- Technical Report Doring Rivier Sand Mine, Vanrhynsdorp
- Rehabilitation Plan Roodefontein Dam, Plettenberg Bay
- Technical Report Groenvlei Crusher, Worcester
- Technical Report Wiedouw Sand Mine, Vanrhynsdorp
- Technical Report Lair Trust Farm, Augrabies
- Technical Report Schouwtoneel Sand Mine, Vredenburg
- Technical Report Waboomsrivier Weir Wolseley
- Technical Report Doornkraal Sand Mine Malmesbury
- Technical Report Berg-en-Dal Sand Mine Malmesbury
- Wetland Demarcation, Osdrif Farm, Worcester
- Technical Report Driefontein Dam, Farm Agterfontein, Ceres
- Technical Report Oewerzicht Farm Dam, Greyton
- Technical Report Glen Lossie Sand Mine, Malmesbury
- Preliminary Report Stellenbosch Cemeteries
- Technical Report Toeka & Harmony Dams, Houdenbek Farm, Koue Bokkeveld
- Technical Report Kluitjieskraal Sand & Gravel Mine, Swellendam
- Fresh Water Report Urban Development Witteklip Vredenburg
- Fresh Water Report Groblershoop Resort, Northern Cape
- Fresh Water Report CA Bruwer Quarry Kakamas, Northern Cape
- Fresh Water Report, CA Bruwer Sand Mine, Kakamas, Northern Cape
- Fresh Water Report, Triple D Farms, Agri Development, Kakamas
- Fresh Water Report, Keren Energy Photovoltaic Plant Kakamas
- Fresh Water Report, Keren Energy Photovoltaic Plant Hopetown
- Fresh Water Report Hopetown Sewer
- Fresh Water Report Hoogland Farm Agricultural Development, Touws River

- Fresh Water Report Klaarstroom Waste Water Treatment Works
- Fresh Water Report Calvinia Sports Grounds Irrigation
- Fresh Water Report CA Bruwer Agricultural Development Kakamas
- Fresh Water Report Zwartfontein Farm Dam, Hermon
- Statement Delsma Farm Wetland, Hermon
- Fresh Water Report Lemoenshoek Farms Pipelines Bonnyvale
- Fresh Water Report Water Provision Pipeline Brandvlei
- Fresh Water Report Erf 19992 Upington
- Botanical Report Zwartejongensfontein Sand Mine, Stilbaai
- Fresh Water Report CA Bruwer Feldspath Mine, Kakamas
- Sediment Yield Calculation, Kenhardt Sand Mine
- Wetland Demarcation, Grabouw Traffic Center
- Fresh Water Report, Osdrift Sand Mine, Worcester
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- Strategic Planning Report, Sanitation, Afghanistan Government, New Delhi, India
- Fresh Water Report, Potable Water Pipeline, Komaggas
- Fresh Water Report, Wastewater Treatment Works, Kamieskroon
- Fresh Water Report, Turksvy Farm Dam, Upington
- Fresh Water Report Urban Development Erf 4440, Kuruman
- Fresh Water Report, Groblershoop Urban Development, IKheis Municipality
- Fresh Water Report, Boegoeberg Urban Development, IKheis Municipality
- Fresh Water Report, Opwag Urban Development, IKheis Municipality
- Fresh Water Report, Wegdraai Urban Development, IKheis Municipality
- Fresh Water Report, Topline Urban Development, IKheis Municipality
- Fresh Water Report, Grootdrink Urban Development, IKheis Municipality
- Fresh Water Report, Gariep Urban Development, IKheis Municipality
- Fresh Water Report, Bonathaba Farm Dam, Hermon
- Botanical Report, Sand Mine Greystone Trading, Vredendal
- Botanical Report, Namakwa Klei Stene, Klawer

28 Appendix

28.1 Biomonitoring results

SASS5 Score Sheet										
Date	12 Feb 19	**Taxon**	**Weight**	**Score**	**Taxon**	**Weight**	**Score**	**Taxon**	**Weight**	**Score**
Locality	Erf 232	Porifera	5		**Hemiptera**			**Diptera**		
	Upington	Coelenterata	1		Belostomatidae	3		Athericidae	10	
		Turbellaria	3		Corixidae	3	3	Blepharoceridae	15	
		Oligochaeta	1		Gerridae	5		Ceratopogonidae	5	
Coordinates	28°27' 11.91"	Huridinea	3		Hydrometridae	6		Chironomidae	2	
	21°16'14.02"	**Crustacea**			Naucoridae	7	7	Culicidae	1	
		Amphipodae	13		Nepidae	3		Dixidae	10	
DO mg/l	6.3	Potamonautidae	3		Notonectidae	3	3	Empididae	6	
Temperature °C	26,7	Atyidae	8	8	Pleidae	4	4	Ephydridae	3	
pH	8.5	Palaemonidae	10		Veliidae	5	5	Muscidae	1	
EC mS/m	25.8	Hydracarina	8		**Megaloptera**			Psychodidae	1	
		Plecoptera			Corydalidae	10		Simuliidae	5	
SASS5 Score	56	Notonemouridae	14		Sialidae	8		Syrphidae	1	
Number of Taxa	9	Perlidae	12		**Trichoptera**			Tabanidae	5	
ASPT	6,2	**Ephemeroptera**			Dipseudopsidae	10		Tipulidae	5	
		Baetidae 1 sp	4	4	Ecnomidae	8		**Gastropoda**		
Other Biota		Baetidae 2 sp	6		Hydropsychidae 1 sp	4		Ancylidae	6	
		Baetidae >3 sp	12		Hydropsychidae 2 sp	6		Bulinidae	3	
	Cyprinus carpio	Caenidae	6		Hydropsychidae <2 sp	12		Hydrobiidae	3	
		Ephemeridae	15		Phylopotamidae	10		Lymnaeidae	3	
		Heptageniidae	13		Polycentropodidae	12		Physidae	3	
		Leptophlebiidae	9		Psychomyidae	8		Planorbidae	3	
		Oligoneuridae	15		**Cased Caddis**			Thiaridae	3	
Comments		Polymitarcyidae	10		Barbarochthonidae	13		Viviparidae	5	
		Prosopistomatida	15		Calamoceratidae	11		**Pelecipoda**		
		Teloganodidae	12	12	Glossostomatidae	11		Corbiculidae	5	
		Trichorythidae	9		Hydroptilidae	6		Sphariidae	3	
		Odonata			Hydrosalpingidae	15		Unionidae	6	
		Calopterygidae	10		Leptostomatidae	10	10			
		Clorocyphidae	10		Leptoceridae	6				
		Chorolestidae	8		Petrothrincidae	11				
		Coenagrionidae	4		Pisulidae	10				
		Lestidae	8		Sericostomatidae	13				
		Platycnemidae	10		**Coleoptera**					
		Protoneuridae	8		Dyticidae	5				
		Aesthnidae	8		Elmidae Dryopidae	8				
		Corduliidae	8		Gyrinidae	5				
		Gomphidae	6		Haliplidae	5				
		Libellulidae	4		Helodidae	12				
		Lepidoptera			Hydraenidae	8				
		Pyralidae	12		Hydrophilidae	5				
					Limnichidae	10				
					Psephenidae	10				
Score				24			32			0

28.2 Methodology used in determining significance of impacts

The methodology to be used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives is provided in the following tables:

Table 26.2.1 Nature and type of impact

Nature and type of impact	Description
Positive	An impact that is considered to represent an improvement to the baseline conditions or represents a positive change
Negative	An impact that is considered to represent an adverse change from the baseline or introduces a new negative factor
Direct	Impacts that result from the direct interaction between a planned project activity and the receiving environment / receptors
Indirect	Impacts that result from other activities that could take place as a consequence of the project (e.g. an influx of work seekers)
Cumulative	Impacts that act together with other impacts (including those from concurrent or planned future activities) to affect the same resources and / or receptors as the project

Table 28.2.2 Criteria for the assessment of impacts

Criteria	Rating	Description
Spatial extent of impact	National	Impacts that affect nationally important environmental resources or affect an area that is nationally important or have macro-economic consequences
	Regional	Impacts that affect regionally important environmental resources or are experienced on a regional scale as determined by administrative boundaries or habitat type / ecosystems
	Local	Within 2 km of the site
	Site specific	On site or within 100m of the site boundary
Consequence of impact/ Magnitude/ Severity	High	Natural and / or social functions and / or processes are severely altered
	Medium	Natural and / or social functions and / or processes are notably altered
	Low	Natural and / or social functions and / or processes are slightly altered
	Very Low	Natural and / or social functions and / or processes are negligibly altered
	Zero	Natural and / or social functions and / or processes remain unaltered
Duration of impact	Temporary	Impacts of short duration and /or occasional
	Short term	During the construction period
	Medium term	During part or all of the operational phase
	Long term	Beyond the operational phase, but not permanently
	Permanent	Mitigation will not occur in such a way or in such a time span that the impact can be considered transient (irreversible)

Table 28.2.3 Significance Rating

Significance Rating	Description
High	High consequence with a regional extent and long-term duration High consequence with either a regional extent and medium-term duration or a local extent and long-term duration Medium consequence with a regional extent and a long-term duration
Medium	High with a local extent and medium-term duration High consequence with a regional extent and short-term duration or a site-specific extent and long-term duration High consequence with either local extent and short-term duration or a site-specific extent with a medium-term duration Medium consequence with any combination of extent and duration except site-specific and short-term or regional and long term Low consequence with a regional extent and long-term duration
Low	High consequence with a site-specific extent and short-term duration Medium consequence with a site-specific extent and short-term duration Low consequence with any combination of extent and duration except site-specific and short-term Very low consequence with a regional extent and long-term duration
Very low	Low consequence with a site-specific extent and short-term duration Very low consequence with any combination of extent and duration except regional and long term
Neutral	Zero consequence with any combination of extent and duration

Table 28.2.4 Probability, confidence, reversibility and irreplaceability

Criteria	Rating	Description
Probability	Definite	>90% likelihood of the impact occurring
	Probable	70 – 90% likelihood of the impact occurring
	Possible	40 – 70% likelihood of the impact occurring
	Unlikely	<40% likelihood of the impact occurring
Confidence	Certain	Wealth of information on and sound understanding of the environmental factors potentially affecting the impact
	Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact
	Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact
Reversibility	Reversible	The impact is reversible within 2 years after the cause or stress is removed
	Irreversible	The activity will lead to an impact that is in all practical terms permanent
Irreplaceability	Replaceable	The resources lost can be replaced to a certain degree
	Irreplaceable	The activity will lead to a permanent loss of resources.

28.3 Risk Matrix Methodology

RISK ASSESSMENT KEY (Referenced from DWA RISK-BASED WATER USE AUTHORISATION APPROACH AND DELEGATION GUIDELINES)

Negative Rating

TABLE 1- SEVERITY

How severe does the aspects impact on the environment and resource quality characterisitics (flow regime, water quality, geomorfology, biota, habitat)

Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful and/or wetland(s) involved	5

Where "or wetland(s) are involved" it means

TABLE 2 – SPATIAL SCALE

How big is the area that the aspect is impacting on?

Area specific (at impact site)	1
Whole site (entire surface right)	2
Regional / neighbouring areas (downstream within quaternary catch	3
National (impacting beyond seconday catchment or provinces)	4
Global (impacting beyond SA boundary)	5

TABLE 3 – DURATION

How long does the aspect impact on the environment and resource quality?

One day to one month, PES, EIS and/or REC not impacted
One month to one year, PES, EIS and/or REC impacted but no change in status
One year to 10 years, PES, EIS and/or REC impacted to a lower status but can be improved over this period through mitigation
Life of the activity, PES, EIS and/or REC permanently lowered
More than life of the organisation/facility, PES and EIS scores, a E or F

TABLE 4 – FREQUENCY OF THE ACTIVITY

How often do you do the specific activity?

Annually or less	1
6 monthly	2
Monthly	3
Weekly	4
Daily	5

TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT

How often does the activity impact on the environment?

Almost never / almost impossible / >20%	1
Very seldom / highly unlikely / >40%	2
Infrequent / unlikely / seldom / >60%	3
Often / regularly / likely / possible / >80%	4
Daily / highly likely / definitely / >100%	5

TABLE 6 – LEGAL ISSUES

How is the activity governed by legislation?

No legislation	1
Fully covered by legislation (wetlands are legally governed)	5

Located within the regulated areas

TABLE 7 – DETECTION	
How quickly can the impacts/risks of the activity be observed on the environment (water resourc	
Immediately	
Without much effort	
Need some effort	
Remote and difficult to observe	
Covered	

TABLE 8: RATING CLASSES		
RATING	**CLASS**	**MANAGEMENT DESCRIPTION**
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale
A low risk class must be obtained for all activities to be considered for a GA		

TABLE 9: CALCULATIONS

Consequence = Severity + Spatial Scale + Duration
Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection
Significance \Risk= Consequence X Likelihood

ANNEXURE I: FINAL SCOPING REPORT

PROPOSED FORMALISATION OF BLAAUWSKOP SETTLEMENT LOW COST HOUSING DEVELOPMENT ON PORTION 30 OF FARM BLAAUWSKOP NO. 36, BLAAUWSKOP SETTLEMENT, KENHARDT ROAD, KAI !GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

FINAL ENVIRONMENTAL SCOPING REPORT
AND PLAN OF STUDY

OCTOBER 2020

KAI !GARIB LOCAL MUNICIPALITY

PROPOSED FORMALISATION OF BLAAUWSKOP SETTLEMENT LOW COST HOUSING DEVELOPMENT ON PORTION 30 OF FARM BLAAUWSKOP NO. 36, BLAAUWSKOP SETTLEMENT, KENHARDT ROAD, KAI !GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

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APPENDIX 1D:	SITE NOTICES AND LETTER DROPS (AND PROOF)
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ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
DENC	Department of Environment and Nature Conservation
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMP	Environmental Management Programme
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NID	Notice of Intent to Develop
NWA	National Water Act
OESA	Other Ecological Support Area
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute

WULA	Water Use Licence Application

1. INTRODUCTION

1.1 BACKGROUND

Consideration is being given to the development of a new township, consisting of low-income housing, at Portion 30 of Farm Blaauwskop No. 36, Blaauwskop Settlement, Kenhardt Road, Kai !Garib Municipality, ZF Mgcawu District Municipality, Northern Cape.

The applicant is Kai !Garib Local Municipality who will undertake the activity should it be approved. EnviroAfrica CC has been appointed as the independent Environmental Assessment Practitioner ("EAP") responsible for undertaking the relevant Environmental Impact Assessment ("EIA") and the Public Participation Process ("PPP") required in terms of the National Environmental Management Act (Act 107 of 1998) ("NEMA").

This Final Scoping Report, which will be submitted to the Department of Environment and Nature Conservation ("DE&NC") for consideration (as per section 22 of the EIA Regulations, the competent authority must; *(a) accept the scoping report, with or without conditions, and advise the applicant to proceed or continue with the tasks contemplated in the plan of study for environmental impact* assessment), forms part of the EIA process.

The purpose of this Final Environmental Scoping Report is to describe the proposed project, the process followed to date, to present alternatives and to list issues identified for further study and comment by specialists.

Should the EIA process be authorized by DE&NC, the Specialist Studies (noted in Section 8) will be undertaken and the significant issues (noted in Section 6) will be investigated and assessed during the next phase of this application, namely the Draft Environmental Impact Report (EIR) stage.

1.2 DESCRIPTION OF THE PROPOSED ACTIVITY

Kai !Garib Municipality is proposing to formalise and develop low cost housing in the Blaauwskop Settlement community located within Kai !Garib Local Municipality. The development proposal will have a development footprint of approximately 50ha and will be rezoned and subdivided into approximately 500 Erven, mainly for residential purposes.

The study area are as follows:

- Portion 30 of Farm Blaauwskop No. 36 (Please see Appendix 1J for the Title Deed).

The project entails the formalisation of approximately 500 Erven for the community Blaauwskop Settlement. The current zoning of the site is Agricultural Zone I. A Spatial Planning Land Use Application ("SPLUMA") application will be submitted for the rezoning and subdivision of land, and the rezoning to various land uses including public streets and any other land uses needed for the community of Blaauwskop Settlement. The project includes the associated infrastructure such as water, electricity, sewage, and solid waste removal. The total area to be developed measures approximately 50 (fifty) hectares in extent.

The site is located in Blaauwskop Settlement, in the Kai !Garib Municipality, Northern Cape. Please refer to **Appendix 1I** for the site co-ordinates.

2. NEED AND DESIRABILITY

In terms of the National Environmental Management Act, as amended, EIA 2014 regulations (as amended) the Scoping/EIA report must provide a description of the need and desirability of the proposed activity. The consideration of "need and desirability" in EIA decision-making requires the consideration of the strategic context of the development proposal along with the broader societal needs and the public interest.

While the concept of need and desirability relates to the *type* of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which *need* refers to *time* and *desirability* to *place* – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to *wise use of land* – i.e. the question of what is the most sustainable use of land.

2.1 NEED

Housing is a national need, including in the Kai Garib Local Municipality.

According to the Kai Garib Municipality, the proposed development represents a significant step towards service delivery and housing objectives within the municipality and the broader Keimoes area. As such, this initiative is a positive step towards better governance and service delivery and will benefit the broader Keimoes community. Furthermore, this development will not only meet the pressing needs of adequate housing within the municipality but will also be in line to support the municipal IDP objectives of (i) providing housing for the poor, (ii) decreasing the city's housing backlog, and (iii) fulfil the Constitutional mandate to provide adequate housing and basic services to citizens.

According to the Kai !Garib Municipality's Integrated Development Plan (IDP 2020-21), … *there is a pressing need for houses, especially low-cost houses, as well as serviced plots within all of the communities within the Kai !Garib area. However, it is quite satisfying to see that a great deal of progress was made in the delivering brick houses to communities since 1994. Unfortunately, the communities need for houses exceed the speed at which houses are built on individual erven.*

According to the Census 2011 (Stats SA), 88.4 % of the population live in formal dwellings where 43.1% of households are comprised of houses which they own and have fully paid off. However, according to service delivery data from the Municipality, the number of informal settlements is growing overnight and the demand for service provision in these areas pose great challenges.

The demand for housing in the Kai !Garib Municipality includes the total number of households in the municipal area. The Municipality had a total of 6 500 very formal dwellings and 9 720 formal dwellings whereas the number of informal dwellings increased from 6 500 (in 2012) to approximately 9 698 units (currently). This highlights the growing backlog of housing required within the Kai !Garib Municipality and the need for housing within the Municipality.

The proposed location is considered a viable option as the proposed site allows for accessibility and linkage to the existing services infrastructure. The main environmental issues, as detailed in the Kai !Garib Municipality Integrated Development Plan (IDP), 2020-21[1], include sanitation and sewerage (associated with the informal settlements), littering, river pollution, and lack of sufficient cemeteries. Sanitation has been

[1] Kai !Garib Municipality Integrated Development Plan (IDP), 2020-21. Accessed at: http://www.kaigarib.gov.za/idp-2020-2021/

identified as a key challenge by the Kai !Garib Municipality, where the current state of sewerage infrastructure in many settlements have reached capacity and pose health risks to the affected communities. Therefore, the socio-economic, as well as the environmental issues, must be incorporated in determining the desirability of the location of the site. Moreover, as per the IDP (2020/21), the sewerage systems within the formal areas of Keimoes, Kakamas and Kenhardt are currently under strain and need to be upgraded.

Table 14.6: Housing Demand

WARDS	1	2	3	4	5	6	7	8	9	TOTAL
NEEDS BASED ON LAND USE SURVEY AND OUTSTANDING PROJECTS										
Informal Structures on Stands	138	39	50	0	93	0	17	0	0	337
Informal Structures in backyards & landless	83	8	185	0	62	0	54	0	2	394
LAND NEEDED										
Land needed in ha for landless and backyard dwellings (Stand size 400m²)	4.742	0.457	10.571	0	3.542	0	3.085	0	0.114	22.838ha
ADDITIONAL HOUSEHOLDS, PLANNED PROJECTS AND LAND NEEDS										
Expected additional households 2014-2019	153	95	102	84	78	86	65	89	83	835
Expected land needs (ha) based on 5 year growth (Stand size 400m²)	8.742	5.428	5.828	4.80	4.457	4.914	3.714	5.085	4.742	47.71ha
PREFFERED HOUSING PROGRAMMES in %										
Fully subsidised (low cost/rental/ Informal Settlements Upgrading Programme	10 112	7572	7984	5611	4423	6988	4447	5163	5669	57 969
Institutional/GAP/FLISP Housing/People's Housing	167	166	316	179	302	242	111	132	256	1 871
Bonded housing	1129	453	1217	585	774	455	298	256	754	5 921

Source: Kai !Garib Local Municipality, 2015

Figure 1: Kai !Garib Municipality IDP 2017 – 2018 - Housing Demand

2.2 DESIRABILITY

The following factors determine the desirability of the area for the proposed development.

2.2.1 Location and Accessibility

The proposed location is considered to be a viable option. The proposed site is located to the east of the R365 Road in Blaauwskop Settlement and allows for access and provides a link to the existing services infrastructure. Any upgrades or additional services infrastructure that will be required will be included and addressed in the Draft Environmental Impact Report (EIR).

The desirability and location of the proposed development will be further investigated in the EIR.

2.2.2 Compatibility with the Surrounding Area

The proposed site is located within the agricultural area of Blaauwskop Settlement and is surrounded by agricultural land uses. The area on which the site is located is in a degraded state, was previously used for livestock grazing and some informal dwellings are present on site which needs to be formalised as part of this EIA application. The Orange River is located approximately 750m north west of the site and the R359 Road is located approximately 400m west of the site. As stated above, the site would provide accessibility and allow the proposed development to link to the existing services infrastructure.

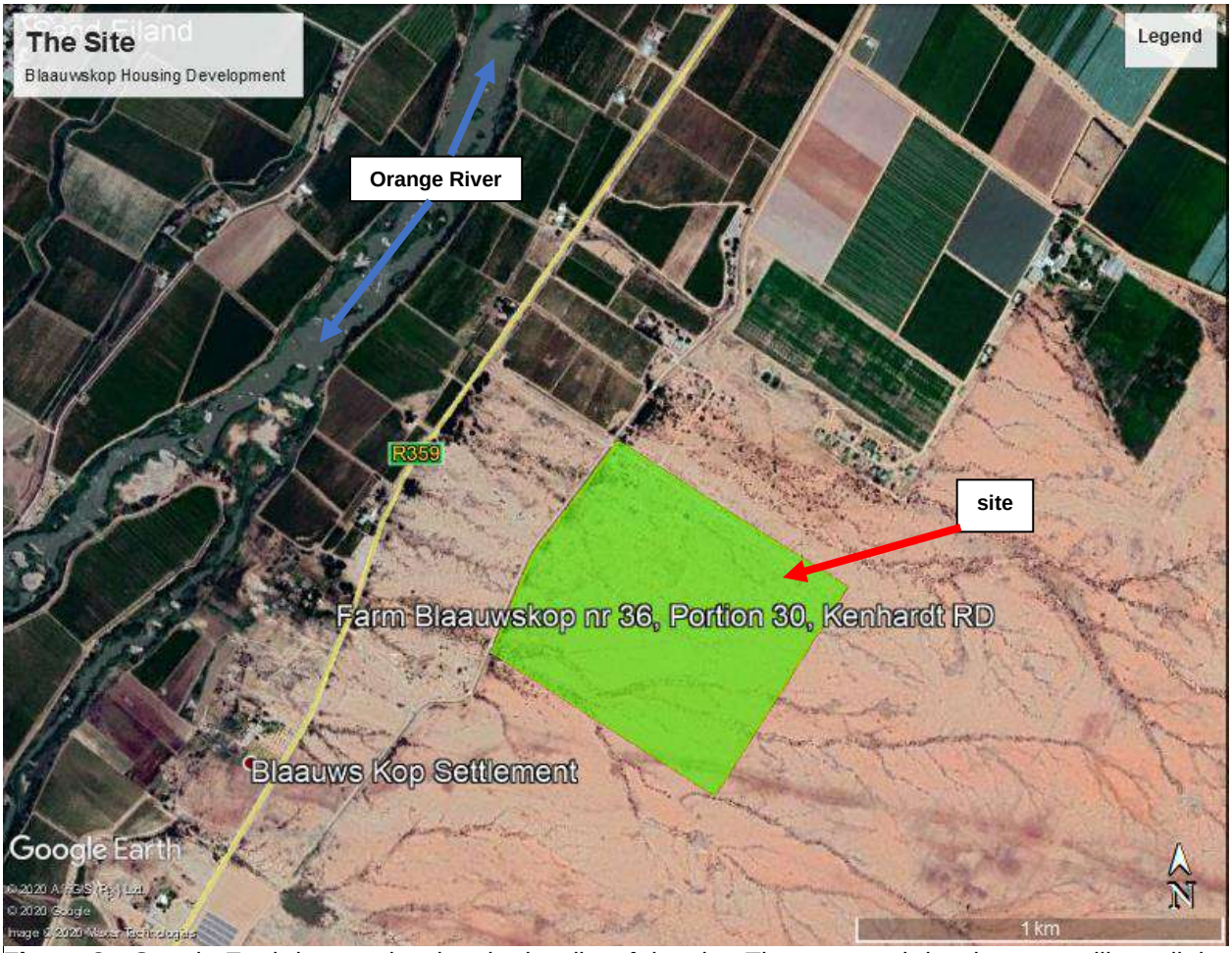


Figure 2: Google Earth image showing the locality of the site. The proposed development will entail the formalisation of informal dwellings located on site. The Orange River is located approximately 750m west of the site and the R359 Road is located approximately 400m west of the site.

3. LEGAL REQUIREMENTS

The current assessment is being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, NEMA) ("NEMA"), to be read with section 24 (5): NEMA Environmental Impact Assessment ("EIA") Regulations 2014, as amended. However, the provisions of various other Acts must also be considered within this EIA.

The legislation that is relevant to this study is briefly outlined below.

3.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measure are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998)

The National Environmental Management Act (Act 107 of 1998) ("NEMA"), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorisation from the relevant authorities based on the findings of an environmental assessment. NEMA is a national act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Northern Cape to the Department of Environment and Nature Conservation (DE&NC).

On the 04 December 2014 the Minister of Water and Environmental Affairs promulgated regulations in terms of Chapter 5 of the NEMA, namely the EIA Regulations 2014. These were amended on 07 April 2017 (GN No. 326, No. 327 (Listing Notice 1), No. 325 (Listing Notice 2), No. 324 (Listing Notice 3) in Government Gazette No. 40772 of 07 April 2017). Listing Notice 1 and 3 are for a Basic Assessment and Listing Notice 2 for a full Environmental Impact Assessment (EIA).

According to the regulations of Section 24(5) of NEMA, authorisation is required for the following listed activities for the proposed housing development:

<u>Government Notice R327 (Listing Notice 1) listed activities:</u>

9 The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water;

(i) with an internal diameter of 0,36 metres or more; or

(ii) with a peak throughput of 120 litres per second or more;

excluding where;
a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or
b) where such development will occur within an urban area.

10 The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes

(i) with an internal diameter of 0,36 metres or more; or
(ii) with a peak throughput of 120 litres per second or more;

excluding where;
a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or
b) where such development will occur within an urban area.

12 The development of;
(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres;
(ii) infrastructure or structures with a physical footprint of 100 square metres or more;

where such development occurs;
(a) within a watercourse;
(b) in front of a development setback; or
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;

19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
(a) will occur behind a development setback;
(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or
(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.

24 The development of a road -
(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or
(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;

but excluding a road—
(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;
(b) where the entire road falls within an urban area; or
(c) which is 1 kilometre or shorter**.**

28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:
(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or
(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.

Government Notice **R325** (Listing notice 2) listed activities:

15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for;
(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

Government Notice **R324** (Listing notice 3) listed activities:

4 The development of a road wider than 4 metres with a reserve less than 13.5 metres

12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

g. Northern Cape
i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;
ii. Within critical biodiversity areas identified in bioregional plans;
iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas; or
iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

14 The development of;
(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 10 square metres;
(ii) infrastructure or structures with a physical footprint of 10 square metres or more;

where such development occurs;
(a) within a watercourse;
(b) in front of a development setback; or
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;
Excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;

An Application Form was submitted to DE&NC. On acknowledgment from DE&NC this Scoping Process is being undertaken to identify potential issues.

The principles of environmental management as set out in section 2 of NEMA have been taken into account. The principles pertinent to this activity include:

- People and their needs will be placed at the forefront while serving their physical, psychological, developmental, cultural and social interests. The activity seeks to provide additional employment and economic development opportunities, which are a local and national need – *the proposed activity is expected to have a beneficial impact on people, especially developmental and social benefits, as well providing additional employment and economic development opportunities.*

- Development will be socially, environmentally, and economically sustainable. Where disturbance of ecosystems, loss of biodiversity, pollution and degradation, and landscapes and sites that constitute the nation's cultural heritage cannot be avoided, are minimised and remedied. The impact that the activity will potentially have on these will be considered, and mitigation measures will be put in place - *potential impacts have been identified and considered, and any further potential impacts will be identified during the public participation process. Mitigation measures will be included in the Environmental Management Programme ("EMPr")*.
- Where waste cannot be avoided, it will be minimised and remedied through the implementation and adherence of the EMPr – *this will be included in the EIR*.
- The use of non-renewable natural resources will be responsible and equitable.
- The negative impacts on the environment and on people's environmental rights will be anticipated, investigated and prevented, and where they cannot be prevented, will be minimised and remedied.
- The interests, needs and values of all interested and affected parties will be taken into account in any decisions through the Public Participation Process (PPP).
- The social, economic and environmental impacts of the activity will be considered, assessed and evaluated, including the disadvantages and benefits.
- The effects of decisions on all aspects of the environment and all people in the environment will be taken into account, by pursuing what is considered the best practicable environmental option.

3.3 NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). South African National Heritage Resources Agency ("SAHRA") is the enforcing authority.

In terms of Section 38 of the National Heritage Resources Act, SAHRA will require a Heritage Impact Assessment (HIA) where certain categories of development are proposed. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is found to be adequate, a separate HIA is not required.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activities are relevant:

- *any development or other activity which will change the character of a site exceeding 5 000 m² in extent;*
- *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length*

Furthermore, in terms of Section 34(1), 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 SAHRA, or the responsible resources authority. Nor may anyone destroy, damage, alter, exhume or remove from its original position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3). In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority.

3.4 EIA GUIDELINE AND INFORMATION DOCUMENT SERIES

The following are the latest guidelines and information Documents that have been consulted:

- Department of Environmental Affairs and Development Planning's (DEA&DP) *Environmental Impact Assessment Guideline and Information Document Series (Dated: March 2013)*:
  - ✓ *Guideline on Transitional Arrangements*
  - ✓ *Generic Terms of Reference for EAPs and Project Schedules*
  - ✓ *Guideline on Alternatives*
  - ✓ *Guideline on Public Participation*
  - ✓ *Guideline on Exemption Applications*
  - ✓ *Guideline on Appeals*
  - ✓ *Guideline on Need and Desirability*

- Department of Environmental Affairs and Tourism (DEAT*) Integrated Environmental Management Information Series*

3.5 NATIONAL WATER ACT

Besides the provisions of NEMA for this EIA process, the proposed development will also require a water use authorization under the National Water Act (Act N0. 36 of 1998). The Department of Water and Sanitation (DWS), who administer that Act, will be a leading role-player in the EIA.

If, and as required by the DWS, a General Authorization (GA) or Water Use Licence Application (WULA) may be compiled and submitted.

3.6 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) is part of a suite of legislation falling under NEMA, which includes the Protected Areas Act, the Air Quality Act, the Integrated Coastal Management Act and the Waste Act. Chapter 4 of NEMBA deals with threatened and protected ecosystems and species and related threatened processes and restricted activities. The need to protect listed ecosystems is addressed (*Section 54*).

3.7 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (ACT 16 OF 2013)

The subject area falls under the jurisdiction of Kai !Garib local municipality and the appropriate zoning and subdivision would need to be allocated in order to permit the development of the land for the intended purpose. The Spatial Planning Land Use Management Application (SPLUMA) application will be submitted once this EIA process has been completed.

4. ALTERNATIVES

Alternatives to the proposed development are limited and have therefore not been considered for the following reasons described below.

4.1 SITE ALTERNATIVES

The proposed site is the only viable site available at this stage and the only one that will be investigated in this application. Housing is a constant need in the municipality, with other sites possibly earmarked for residential development that will not form part of this application. These will be addressed in the Environmental Impact Report phase.

4.2 ACTIVITY ALTERNATIVES

Activity alternatives are also very limited with no feasible alternatives besides residential development to assess. Due to the need for housing in the Kai !Garib Local Municipality, the housing development and associated infrastructure on the property is therefore the only activity considered.

The development may include a number of different land-uses however, besides just residential opportunities. These will be investigated during the Environmental Impact Report phase.

4.3 LAYOUT ALTERNATIVES

Various layout alternatives will be investigated during the Environmental Impact Report phase. These will be compiled with input from the municipality and its requirements, Engineers, as well as input and/or recommendations of the various specialists, as well as input from Interested and Affected Parties, including the community members. Please refer to **Appendix 1A** for the Concept Layout Plan.

4.4 NO-GO ALTERNATIVE

This is the option of not developing the proposed residential development.

Although the no-go development might result in no potential negative environmental impacts, the direct and indirect socio-economic benefits of not constructing the residential development will not be realised. The need for additional housing opportunities in the Kai !Garib Local Municipality will not be realised. These potential negative and/or positive environmental impacts will be assessed in the Environmental Impact Report.

5. SITE DESCRIPTION

5.1 LOCATION

The proposed site is located on a dirt road off the R359 and is located within the Blaauwskop Settlement. The proposed site is located approximately 13km east of Keimoes and approximately 30 km to the south-west of Upington, as the crow flies. The proposed site for development is located adjacent to the Orange-Fish River Tunnel (irrigation canal). Please refer to **Appendix 1L** for the site photographs, **Appendix 1l** for the site co-ordinates and see **figures 3** to **8** below.

The study area is as follows:

- Portion 30 of Farm Blaauwskop No. 36 (Please see **Appendix 1J** for the Title Deed).

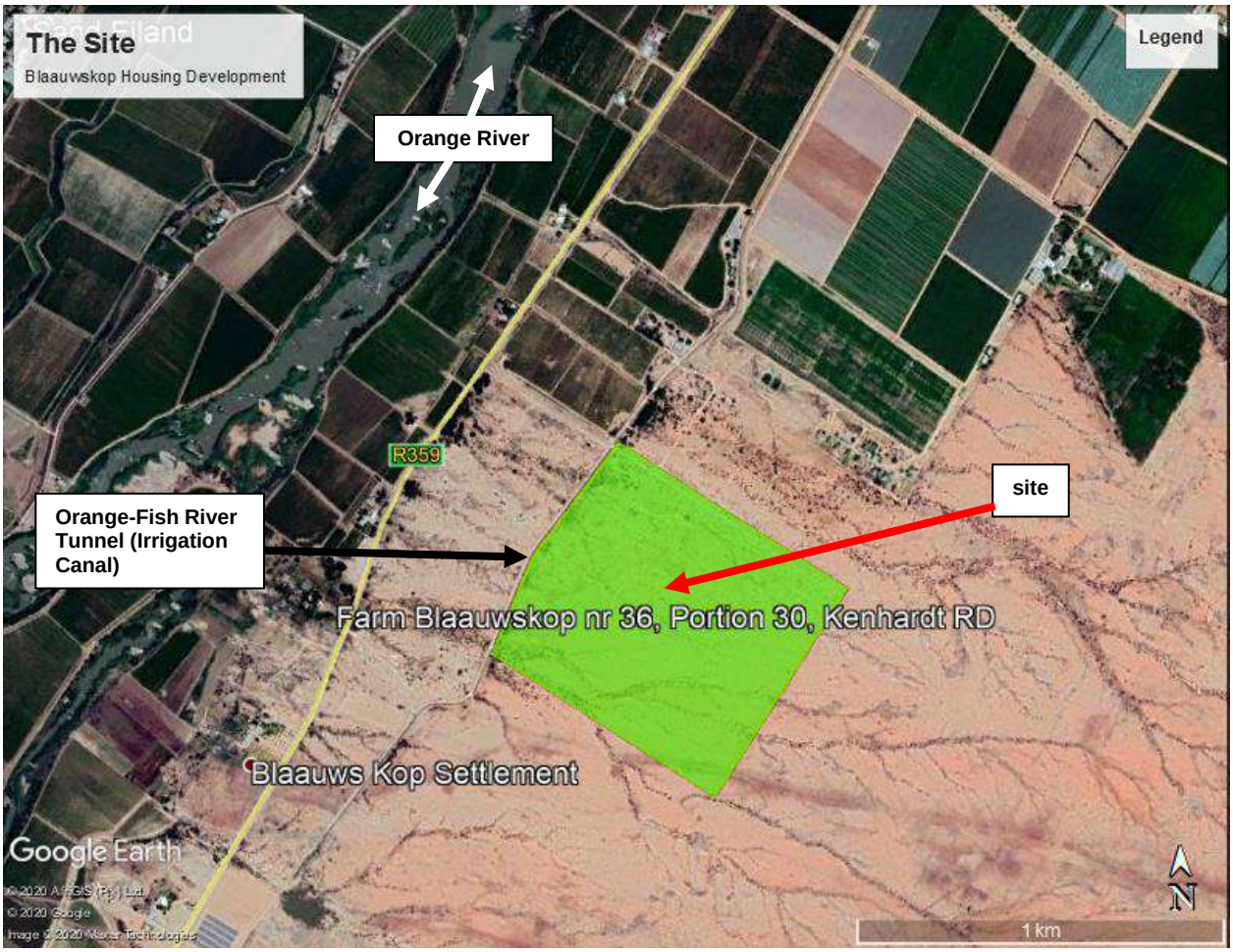


Figure 3: Google Earth Aerial image of the proposed site (green polygon) and surrounding area.

Figure 4: General view of the informal dwellings on site, looking in a south-eastern direction. The site is transformed.

Figure 5: General view of the informal dwellings on site. The site comprises of informal dwellings with access roads.

Figure 6: General view of the informal dwellings on site; looking in a south-eastern direction. The site is transformed. A number of alien trees are present on site.

Figure 7: General view of the informal dwellings on site, looking in a north-eastern direction. The site is transformed and degraded.

Figure 8: General view of the informal dwellings on site, looking in a southern direction. A number of alien trees are found on site.

5.2 VEGETATION

The proposed site for the residential development is partly developed and has some natural vegetation present. According to the Vegetation map of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006, as updated in the 2012 beta version) the vegetation type is expected to be Bushmanland Arid Grassland (see figure 9 below). Bushmanland Arid Grassland is not considered a threatened vegetation type, with more than 99% remaining. However only 4% is formally conserved (Augrabies Falls National Park). According to the 2016 Northern Cape CBA map, the proposed development footprint is located within a Critical Biodiversity Area (CBA). Unfortunately, there are no logical alternative sites available to the Kai !Garib Municipality, which will not impact on the CBA (see figure 10). Please note that a Botanical Impact Assessment was undertaken and will be detailed and addressed further as part of the Draft Environmental Impact Report (Draft EIR) phase.

As per the Botanical Assessment (Appendix 1H), plant species diversity was very low and most of the veld had been impacted by the recent drought, reducing many of the plant species to dried-out shrubs. The proposed activity is expected to result in a permanent transformation of approximately 35ha of land, of which approximately 23ha have already been disturbed / transformed. The site will not impact on any recognised centre of endemism. Protected Camel Thorn (*Vachellia erioloba*) and Sheppard trees (*Boscia albitrunca*), protected by the National Forest Act (NFA), and a number of Northern Cape Nature Conservation Act (NCNCA) protected species were observed within the footprint. According to the Botanical Assessment, a Medium-Low impact, which can be reduced to a Low impact with good environmental control during construction.

With the correct mitigation it is **unlikely** that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity.

In conclusion, the Botanical Specialist concluded that "with the available information it is recommended that project be approved, with the proposed mitigation actions".

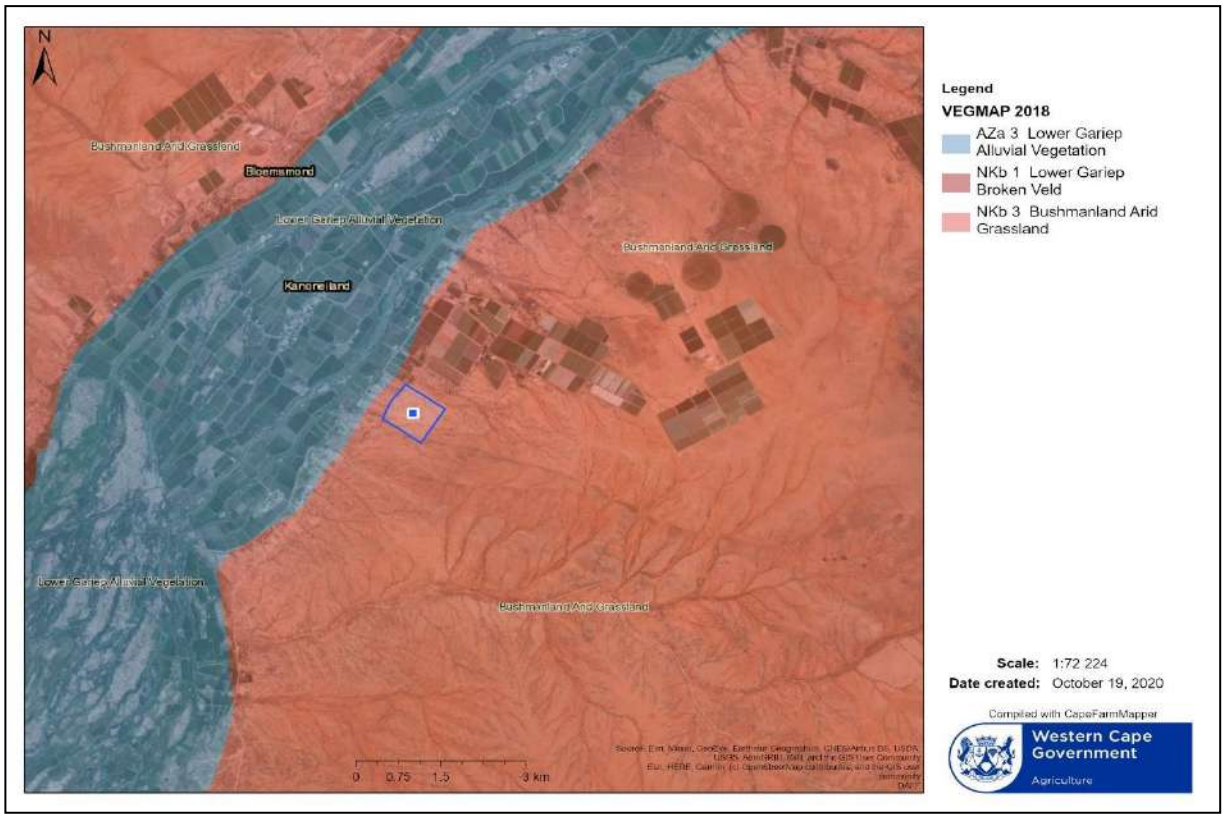


Figure 9: SANBI BGIS Vegetation map of the area.

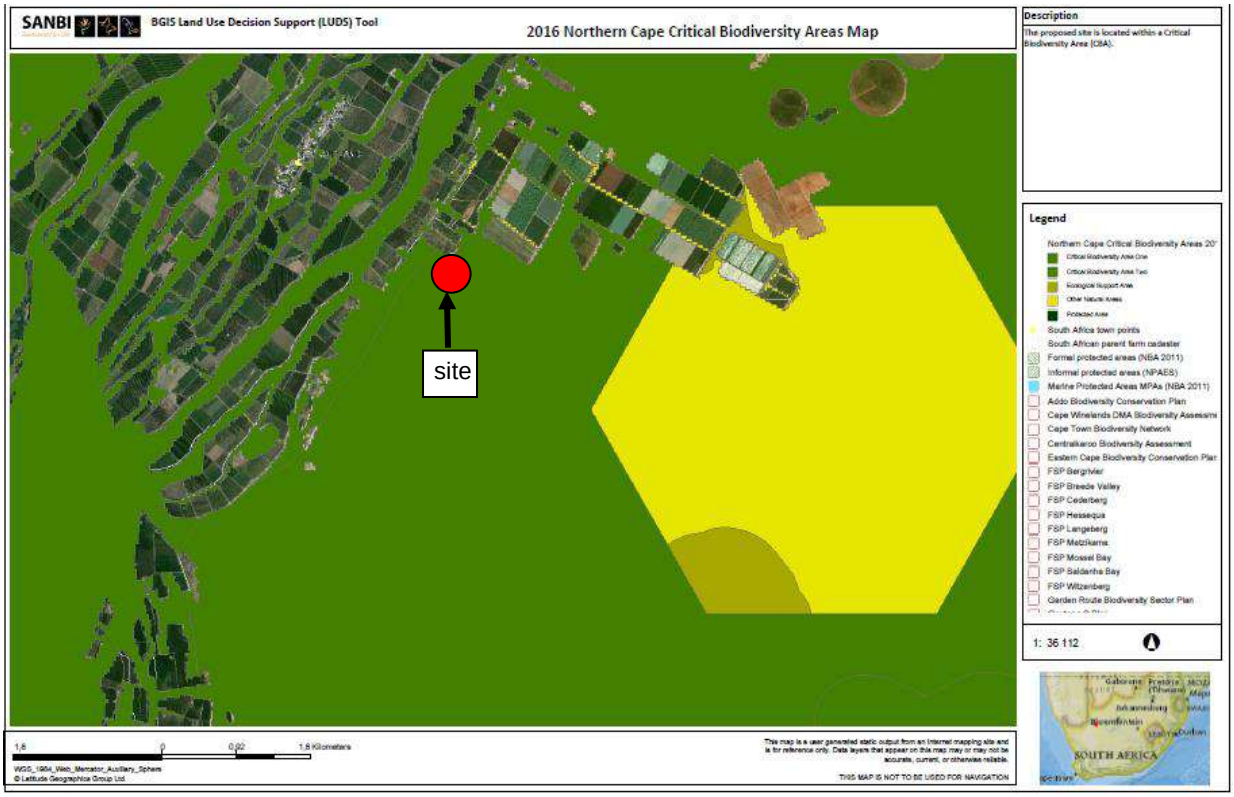


Figure 10: SANBI BGIS - 2016 Northern Cape Critical Biodiversity Areas Map.

5.3 FRESHWATER

From the SANBI National Freshwater Ecosystem Priority Areas ("NFEPA") map (see Figure 11 below), there are no natural watercourses on the proposed site. The Orange River is located approximately 690m west of the proposed site. There is an irrigation channel to the west of the proposed site. However, from the site visit and Google earth images, and the Freshwater Report (**Appendix 1H**), the proposed housing development transverses a number of drainage lines. According to the Freshwater Report (attached as **Appendix 1G**), the proposed housing development will entirely alter the drainage lines. Please refer to **Appendix 1G** and Figures **11** to **12** below.

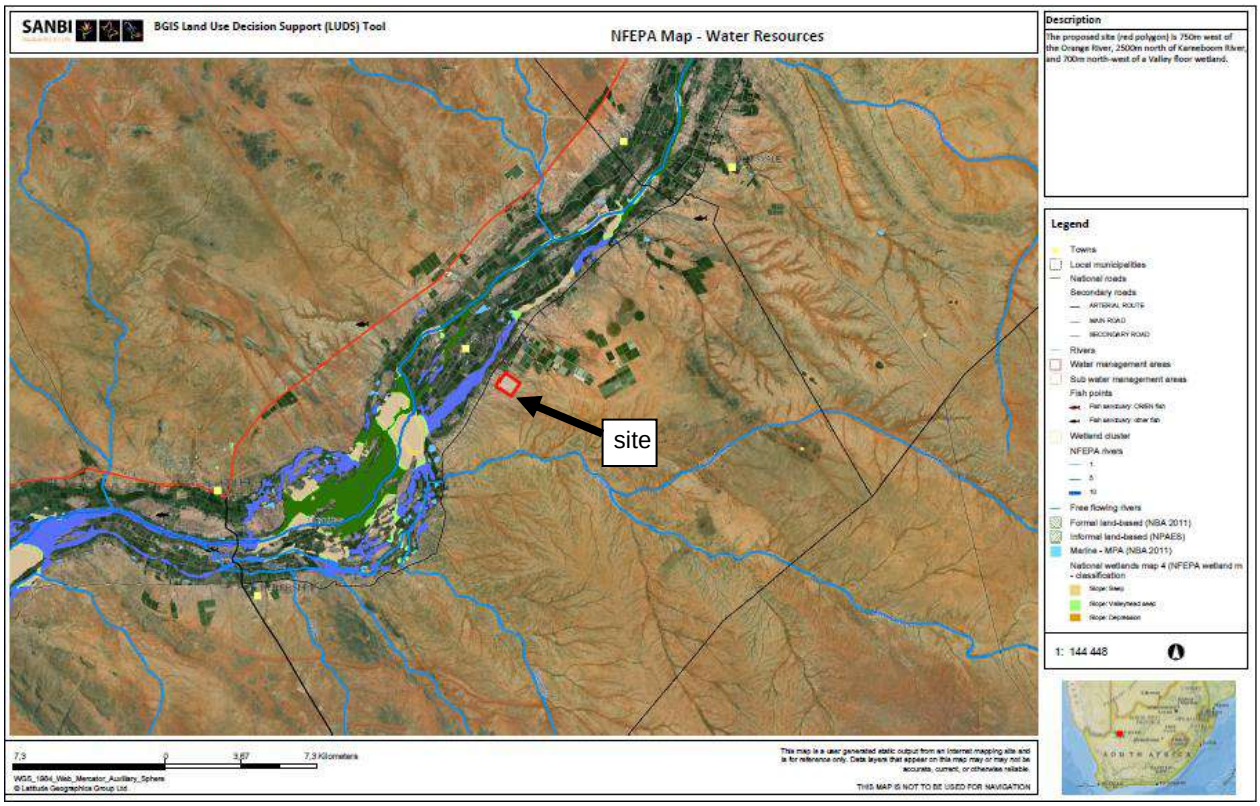


Figure 11: SANBI BGIS NFEPA map of the area.

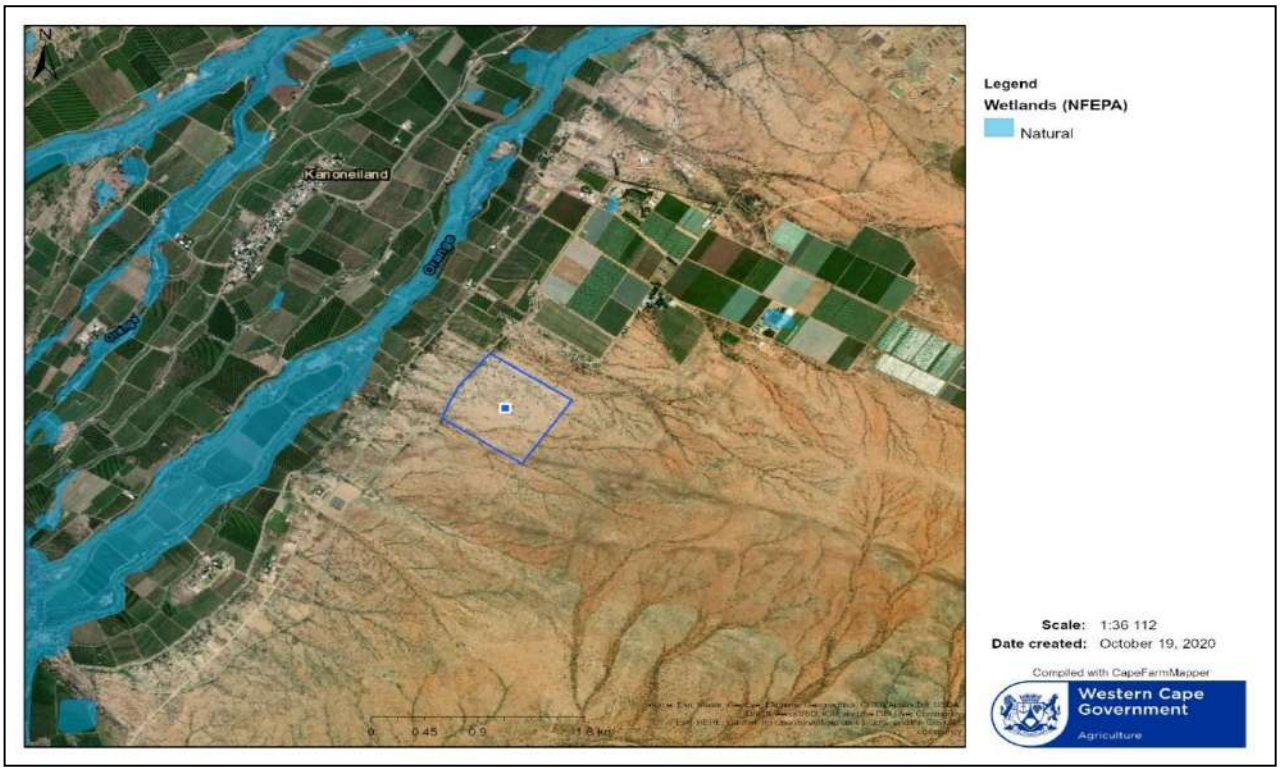


Figure 12:Natural Freshwater Priority Area (NFEPA) associated with the proposed site for development.

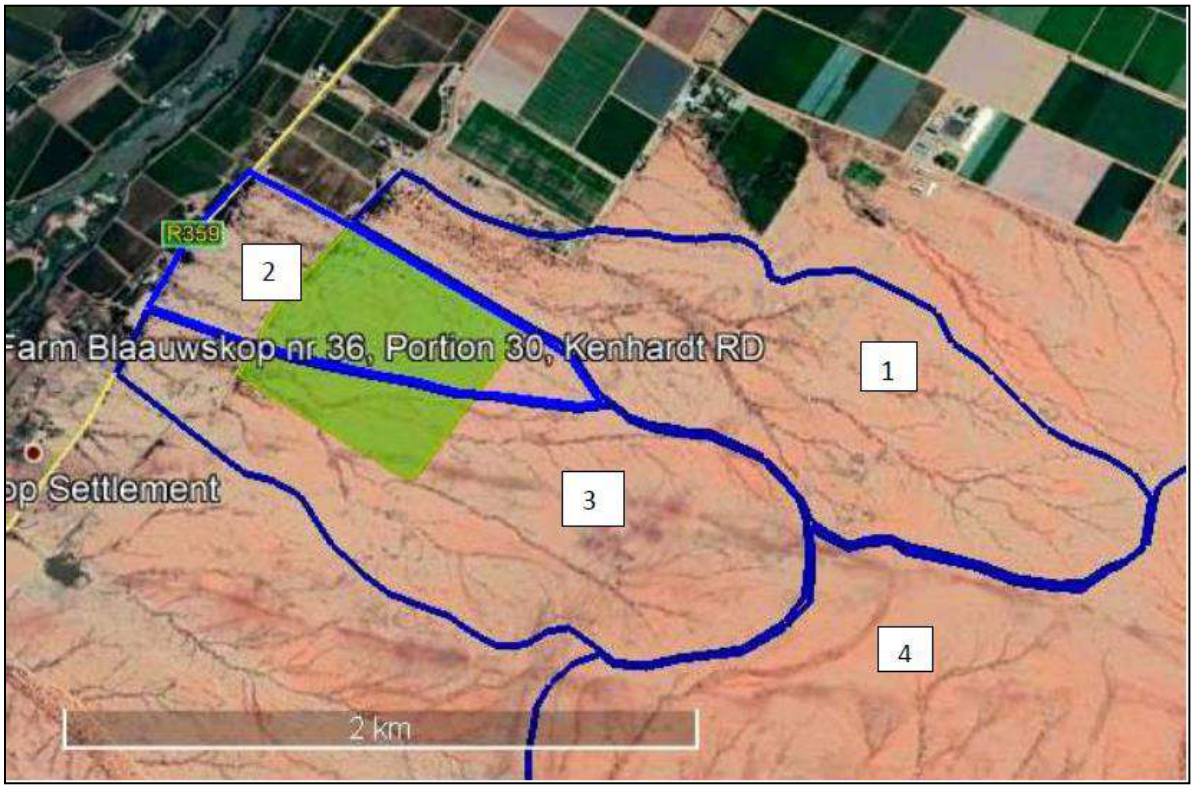


Figure 13: Catchment areas (see Appendix 1H).

The drainage lines are mostly dry, with water only during rains and perhaps shortly thereafter. Although heavy rainfall events in the area are uncommon, such events can result in the drainage lines flooding. These floods maintain the morphological integrity of the drainage lines, as sediments are transported and these water ways are scoured out. Because rainfall events are infrequent, the drainage lines must have been formed over millennia, even since geological times (see **Appendix 1H**). Around the Orange River and even the Sak and Hartbees River, large-scale agriculture has changed the drainage lines into drainage channels among the vineyards and orchards. The upper reaches away from the rivers are less impacted, even near-pristine, as intense agriculture is not possible, apart from those areas where water is piped over long distances from the Orange River (see **Appendix 1H**).

The mostly dry drainage lines in sub-catchment 2 and 3 run right through the existing housing, with houses located on the banks, without any buffer zone (see **Appendix 1H**). The drainage lines pass over the irrigation canal (located adjacent to the north western boundary of the proposed development footprint. Concrete slabs have been constructed over the canal at each of the crossings, with concrete walls on either side of the crossing to keep storm water from entering the canal (see Appendix 1H). The impacts on sub-catchments 2 and 3 are going to be the greatest, as the township will be built right over these drainage lines (see **Appendix 1H**). Drainage lines of sub-catchments 1 and 4 are adjacent to the new development and would be spared of houses right on its banks (see **Appendix 1H**).

The impacts include trampling and over-grazing of the sub-catchment, destruction of the drainage lines, littering and the risk of untreated sewage ending up in the drainage canal and the Orange River (see **Appendix 1H**).

Mitigation Measures

- A buffer zone of 20m should be allowed on either side of these drainage lines, a green zone through the envisaged township. The township should be arranged in such a way that the drainage lines still connect to the stormwater infrastructure over the irrigation canal. Stormwater should not be allowed to enter the irrigation canal. Where necessary, additional infrastructure should be built over the irrigation canal.
- Litter and household waste have been noted in the drainage lines of the existing township. This problem, if not effectively managed, will escalate when the township expands. Litter and waste should not be allowed to enter the canal. It should not be allowed to wash down the drainage lines and into the Orange River. Infrastructure to catch the waste should be installed and these structures should be regularly cleaned.
- Another 1500 households would put strain on the current sewage and wastewater handling system. It would be disastrous if sewage ends up in the Orange River. Proper planning and infrastructure are necessary.
- The three smaller sub-catchments can probably not produce enough runoff, even during a large rainfall event, to pose a threat to the new development. The larger sub-catchment of almost 90 000 ha is large enough to produce a sudden and dangerous pulse of runoff during a high rainfall event, perhaps of 30 to 40mm in a day. Residents should be aware of the potential hazard.
- Consideration must be made with regards to health and safety aspects, especially children's safety in and around the irrigation canal some thought, because the danger of drownings increases as the township grows.

A General Authorisation is required from Department of Water and Sanitation ("**DWS**"). The impact of the proposed development on these watercourses are to be further investigated in the Environmental Impact Report phase.

5.4 CLIMATE

Keimoes, the closest locality to Blaauwskop Settlement with on-line climate data, receives only 154mm of rain annually, which categorized this area as semi-arid. The rainfall is entirely inadequate for growing crops. The large-scale agriculture in the district is for all its needs dependent on irrigation out of the Orange River. Most of the rain is during summer. Rainfall is highly variable, with occasional (i.e. once every couple of years) high rainfall events. Droughts are common, with dry periods lasting for years. The summers are hot and dry, with midday temperatures often exceeding 40°C.

5.5 SOCIO-ECONOMIC CONTEXT

According to the Kai !Garib Municipality Integrated Development Plan (IDP) (Final IDP 2019 – 2020), the municipal area falls within the ZF Mgcawu District Municipality's Area and consists of 3 large towns: Kakamas, Keimoes, and Kenhardt. According to the Municipality's Spatial Development Framework (SDF), adopted in October 2012, the Municipal area occupies 26 358km², the equivalent of 25.71% of the mentioned District Municipality and 2.16% of the whole of South Africa.

The population projection of Kai !Garib Local Municipality shows an estimated average annual growth rate of 0.9% between 2018 and 2023. The average annual growth rate in the population over the projection period for ZF Mgcawu District Municipality, Northern Cape Province and South Africa is 1.2%, 1.3% and 1.3% respectively. The Northern Cape Province is estimated to have an average growth rate of 1.3% which is very similar than that of the Kai !Garib Local Municipality. The South Africa as a whole is estimated to have an average annual growth rate of 1.3% which is very similar than that of Kai !Garib's projected growth rate (Kai !Garib Municipality IDP 2019 – 2020).

The following has been extracted from the Kai !Garib Municipality's IDP:

In 2018, the Kai !Garib Local Municipality's population consisted of 28.46% African (20 100), 7.00% White (4 930), 63.32% Coloured (44 600) and 1.23% Asian (865) people. The largest share of population is within the young working age (25-44 years) age category with a total number of 24 200 or 34.4% of the total population. The age category with the second largest number of people is the babies and kids (0-14 years) age category with a total share of 21.3%, followed by the teenagers and youth (15-24 years) age category with 14 900 people. The age category with the least number of people is the retired / old age (65 years and older) age category with only 4 500 people is indicated by the statistics (Kai !Garib Municipality IDP 2019 – 2020).

With the Coloured population group representing 63.3% of the Kai !Garib Local Municipality's total population, the overall population pyramid for the region will mostly reflect that of the African population group. The chart below compares Kai !Garib's population structure of 2018 to that of South Africa.

- *There is a significantly larger share of young working age people - aged 20 to 34 (32.8%) - in Kai !Garib, compared to the national picture (27.5%).*
- *The area appears to be a migrant receiving area, with many of people migrating into Kai !Garib, either from abroad, or from the more rural areas in the country looking for better opportunities.*
- *Fertility in Kai !Garib is significant lower compared to South Africa as a whole.*
- *Spatial policies changed since 1994.*
- *The share of children between the ages of 0 to 14 years is significant smaller (21.3%) in Kai !Garib compared to South Africa (29.0%). Demand for expenditure on schooling as percentage of total budget within Kai !Garib Local Municipality will therefore be lower than that of South Africa (Kai !Garib Municipality IDP 2019 – 2020).*

If the number of households is growing at a faster rate than that of the population it means that the average household size is decreasing, and vice versa. In 2018, the Kai !Garib Local Municipality comprised of 18 400 households. This equates to an average annual growth rate of 0.24% in the number of households from 2008 to 2018. With an average annual growth rate of 0.87% in the total population, the average household size in the Kai !Garib Local Municipality is by implication increasing. This is confirmed by the data where the average household size in 2008 increased from approximately 3.6 individuals per household to 3.8 persons per household in 2018 (Kai !Garib Municipality IDP 2019 – 2020).

In 2018, there were 37 100 people living in poverty, using the upper poverty line definition, across Kai !Garib Local Municipality - this is 5.92% lower than the 39 400 in 2008. The percentage of people living in poverty has decreased from 59.57% in 2008 to 51.92% in 2018, which indicates a decrease of 7.65 percentage points (Kai !Garib Municipality IDP 2019 – 2020).

Within Kai !Garib Local Municipality, the number of people without any schooling decreased from 2008 to 2018 with an average annual rate of -3.17%, while the number of people within the 'matric only' category, increased from 6,420 to 8,920. The number of people with 'matric and a certificate/diploma' increased with an average annual rate of 1.35%, with the number of people with a 'matric and a Bachelor's' degree increasing with an average annual rate of 0.07%. Overall improvement in the level of education is visible with an increase in the number of people with 'matric' or higher education (Kai !Garib Municipality IDP 2019 – 2020).

The number of people without any schooling in Kai !Garib Local Municipality accounts for 29.53% of the number of people without schooling in the district municipality, 5.26% of the province and 0.15% of the national. In 2018, the number of people in Kai !Garib Local Municipality with a matric only was 8,920 which is a share of 20.33% of the district municipality's total number of people that has obtained a matric. The number of people with a matric and a Postgrad degree constitutes 15.53% of the district municipality, 2.59% of the province and 0.03% of the national (Kai !Garib Municipality IDP 2019 – 2020). A total of 42 800 individuals in Kai !Garib Local Municipality were considered functionally literate in 2018, while 13 400 people were considered to be illiterate. Expressed as a rate, this amounts to 76.11% of the population, which is an

increase of 0.1 percentage points since 2008 (66.12%). The number of illiterate individuals decreased on average by -2.27% annually from 2008 to 2018, with the number of functional literate people increasing at 2.63% annually (Kai !Garib Municipality IDP 2019 – 2020).

Kai !Garib Local Municipality's functional literacy rate of 76.11% in 2018 is lower than that of ZF Mgcawu at 79.67%, and is lower than the province rate of 78.61%. When comparing to National Total as whole, which has a functional literacy rate of 84.42%, it can be seen that the functional literacy rate is higher than that of the Kai !Garib Local Municipality (Kai !Garib Municipality IDP 2019 – 2020).

The agricultural sector is still the main economic sector who made the biggest contribution to the economy of Kai !Garib. The Agriculture sector is also a major employer in the Municipality in terms of all formal employment. It is also the sector with the largest potential for economic growth. The commercial farmers farm especially with grapes for export, raisins and wine, while citrus types of fruit are also becoming more prevalent in the area (Kai !Garib Municipality IDP 2019 – 2020).

The municipality has indicated that there is a pressing need for houses, especially low-cost houses, as well as serviced plots within all of the communities within the Kai !Garib area. Although progress has been reported with regards to delivering brick houses to communities since 1994, unfortunately, the communities need for houses exceeds the speed at which houses are built on individual erven (Kai !Garib Municipality IDP 2019 – 2020). According to the Census 2011 (Stats SA) 88.4 % of the population live in formal dwellings and 43.1 % households live in houses which they own and have fully paid off. However, according to service delivery data from the Municipality, the number of informal settlements is rapidly growing and the demand for service provision in these areas pose great challenges. When looking at the formal dwelling unit backlog (number of households not living in a formal dwelling) over time, it can be seen that in 2007 the number of households not living in a formal dwelling were 1 840 within Kai !Garib Local Municipality. From 2007 this number increased annually at 4.51% to 2 860 in 2017 (Kai !Garib Municipality IDP 2019 – 2020).

5.6 HERITAGE FEATURES

Due to the nature and size of the proposed development, potential heritage resources may be affected by the proposed development. Heritage resources include any of the following, as defined by the National Heritage Resources Act (Act 25 of 1999):

- living heritage as defined in the National Heritage Council Act No 11 of 1999 (cultural tradition; oral history; performance; ritual; popular memory; skills and techniques; indigenous knowledge systems; and the holistic approach to nature, society and social relationships);
- Ecofacts (non-artefactual organic or environmental remains that may reveal aspects of past human activity; definition used in KwaZulu-Natal Heritage Act 2008);
- places, buildings, structures and equipment; places to which oral traditions are attached or which are associated with living heritage; historical settlements and townscapes;
- landscapes and natural features; geological sites of scientific or cultural importance;
- archaeological and palaeontological sites; graves and burial grounds;
- public monuments and memorials; sites of significance relating to the history of slavery in South Africa; movable objects, but excluding any object made by a living person; and battlefields.

A **Heritage Impact Assessment** ("**HIA**") was conducted and is attached to this report as **Appendix 1I**. The HIA identified the following heritage resources on site:

- Five occurrences of lithic material were recorded within the development footprint on Portion 30 of Farm Blaauwskop No. 36. The lithic assemblages consist of surface scatters of very few formal tools, predominantly untrimmed flakes, cores, stone working debris, and few scrapers made from the highly utilised banded ironstone formation (BIF).
- Three incidences of lithic material were recorded outside the development footprint, towards the south.

- No formal or informal graves were identified.
- The proposed site has zero palaeontological significance

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

- The lithic traces on the landscape of the study area are of low significance and the impact of the development on these resources are inconsequential. No other heritage was identified. Therefore, no further mitigation is required, and from a heritage point of view we recommend that the proposed development can continue.
- Due to the zero palaeontological significance of the area, no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area as the igneous rocks underlying the site are not fossiliferous. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2019).
- Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find.

The HIA (**Appendix 1I**) has identified no significant heritage resources on Farm Blaauwskop No. 36, Portion 30, Blaauwskop Settlement, Kai !Garib Municipality, ZF Mgcawu District Municipality, Northern Cape as set out in the report. In the development footprint there are **no archaeological, historical, cultural sites, or paleontological resources that will be impacted on negatively by the proposed development.**

Due to the scale of the development and the level of development that is occurring within Keimoes, the availability of bulk services for the development will need to be investigated. The Kai !Garib Municipality will more than likely be the service provider for the bulk services. BVI Consulting Engineers will prepare the Bulk Engineering Services Reports on the external services for the proposed housing development.

6. SERVICES

Due to the scale of the development and the level of development that is occurring within Blaauwskop Settlement, the availability of bulk services for the development will need to be investigated. The Kai !Garib Municipality will more than likely be the service provider for the bulk services. BVI Consulting Engineers will prepare the Bulk Engineering Services Reports on the external services for the proposed housing development.

6.1 WATER

The water source, upgrades to existing water reticulation infrastructure and connection with the proposed internal water network will need to be determined. Back-up storage will also need to be investigated. The availability and confirmation that sufficient capacity exists to service the proposed development will need to be addressed, and confirmation received from the engineers and/or municipality.

6.2 SEWER

The availability of sewer services in the Blaauwskop and Keimoes area is of concern. Potential upgrades to existing infrastructure or the potential development of new infrastructure to adequately service the proposed development will need to be investigated. The availability and confirmation that sufficient capacity exists to service the proposed development will need to be addressed and confirmed by the engineers and/or the municipality.

6.3 ROADS

The internal road network and design standards, including any access roads, will need to be determined in line with the proposed layout design.

6.4 STORMWATER

The internal stormwater network and links and upgrades to the existing external stormwater network, will need to be determined and addressed in the Bulk Engineering Services Reports. This will be determined once a conceptual site layout plan has been developed.

6.5 SOLID WASTE (REFUSE) REMOVAL

Refuse removal will be via the Municipal waste stream and disposed of at the nearest municipal bulk solid waste disposal site. Sufficient capacity to adequately service the proposed development will need to be confirmed by the engineers and municipality.

6.6 ELECTRICITY

The proposed internal electrical network, electrical infrastructure requirements, upgrades to the existing external electrical network, including the provider and confirmation of sufficient capacity will need to be determined and addressed in the Bulk Engineering Services Reports.

7. ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

Environmental issues were raised through informal discussions with the project team, specialists and authorities. All issues raised will be assessed in the specialist reports and will form part of the Environmental Impact Report. Additional issues raised during the public participation will be listed in the Final Scoping Report.

The following potential issues have been identified and will be addressed in the Draft Environmental Impact Report (EIR):

7.1. BOTANICAL

A Botanical Impact Assessment (BIA) was conducted to determine if there is any sensitive or endangered vegetation on the proposed site. According to the SANBI BGIS website the proposed site would be covered with Bushmanland Arid Grassland (Least Threatened, Figure 9) and is located within a Critical Biodiversity Area (CBA) (Figure 10). Due to the size of the development (approximately 50ha), there will be a loss of vegetation during the construction phase of the project.

As per the Botanical Assessment (Appendix 1H), plant species diversity was very low and most of the veld had been impacted by the recent drought, reducing many of the plant species to dried-out shrubs. The proposed activity is expected to result in a permanent transformation of approximately 35ha of land, of which approximately 23ha have already been disturbed / transformed. The site will not impact on any recognised centre of endemism. Protected Camel Thorn (*Vachellia erioloba*) and Sheppard trees (*Boscia albitrunca*), protected by the National Forest Act (NFA), and a number of Northern Cape Nature Conservation Act (NCNCA) protected species were observed within the footprint. According to the Botanical Assessment, a Medium-Low impact, which can be reduced to a Low impact with good environmental control during construction.

With the correct mitigation it is **unlikely** that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat.
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities.
- Loss of local biodiversity and threatened plant species.
- Loss of ecosystem connectivity.

In conclusion, the Botanical Specialist concluded that “with the available information it is recommended that project be approved, with the proposed mitigation actions”.

7.2. FRESHWATER

A **Freshwater Report** was compiled and is attached to this report as **Appendix 1H**. According to the Freshwater Report, the proposed housing development transverses a number of drainage lines.

AS per the Freshwater Report (Appendix 1H), the proposed housing development transverses a number of drainage lines. According to the Freshwater Report (attached as Appendix 1H), the proposed housing development will entirely alter the drainage lines.

The drainage lines are mostly dry, with water only during rains and perhaps shortly thereafter. Although heavy rainfall events in the area are uncommon, such events can result in the drainage lines flooding. These floods maintain the morphological integrity of the drainage lines, as sediments are transported and these water ways are scoured out. Because rainfall events are infrequent, the drainage lines must have been formed over millennia, even since geological times (see **Appendix 1H**). Around the Orange River and even the Sak and Hartbees River, large-scale agriculture has changed the drainage lines into drainage channels among the vineyards and orchards. The upper reaches away from the rivers are less impacted, even near-pristine, as intense agriculture is not possible, apart from those areas where water is piped over long distances from the Orange River (see **Appendix 1H**).

The mostly dry drainage lines in sub-catchment 2 and 3 run right through the existing housing, with houses located on the banks, without any buffer zone (see **Appendix 1H**). The drainage lines pass over the irrigation canal (located adjacent to the north western boundary of the proposed development footprint. Concrete slabs have been constructed over the canal at each of the crossings, with concrete walls on either side of the crossing to keep storm water from entering the canal (see Appendix 1G). The impacts on sub-catchments 2 and 3 are going to be the greatest, as the township will be built right over these drainage lines (see **Appendix 1H**). Drainage lines of sub-catchments 1 and 4 are adjacent to the new development and would be spared of houses right on its banks (see **Appendix 1H**). The impacts include trampling and over-grazing of the sub-catchment, destruction of the drainage lines, littering and the danger of untreated sewage ending up in the drainage lines, Orange-Fish River Tunnel (irrigation canal) as well as the Orange River (see **Appendix 1H**).

Mitigation Measures

- A buffer zone of 20m should be allowed on either side of these drainage lines, a green zone through the envisaged township. The township should be arranged in such a way that the drainage lines still connect to the stormwater infrastructure over the irrigation canal. Stormwater should not be allowed to enter the irrigation canal. Where necessary, additional infrastructure should be built over the irrigation canal.

- Litter and household waste have been noted in the drainage lines of the existing township. This problem, if not properly managed, will escalate when the township expands. Litter and waste should not be allowed to enter the canal. It should not be allowed to wash down the drainage lines and into the Orange River. Infrastructure to catch the waste should be installed and these structures should be regularly cleaned.

- Another 1500 households would put strain on the current sewage and wastewater handling system. It would be disastrous if sewage ends up in the Orange River. Proper planning and infrastructure are necessary.

- The three smaller sub-catchments can probably not produce enough runoff, even during a large rainfall event, to pose a threat to the new development. The larger sub-catchment of almost 90 000 ha is large enough to produce a sudden and dangerous pulse of runoff during a high rainfall event, perhaps of 30 to 40mm in a day. Residents should be aware of the potential hazard (see **Appendix 1H**)

- The authorities will have to give the dangers of children in and around the irrigation canal some thought, because the danger of drownings increases as the township grows. A General Authorisation is required from Department of Water and Sanitation ("**DWS**"). The impact of the proposed development on these watercourses are to be further investigated in the Environmental Impact Report phase.

7.3. HERITAGE

A **Heritage Impact Assessment** ("**HIA**") was conducted and is attached to this report as **Appendix 1I**. The HIA identified the following heritage resources on site:

- Five occurrences of lithic material were recorded within the development footprint on Portion 30 of Farm Blaauwskop No. 36. The lithic assemblages consist of surface scatters of very few formal tools, predominantly untrimmed flakes, cores, stone working debris, and few scrapers made from the highly utilised banded ironstone formation (BIF).
- Three incidences of lithic material were recorded outside the development footprint, towards the south.
- No formal or informal graves were identified.
- The proposed site has zero palaeontological significance

Based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

- The lithic traces on the landscape of the study area are of low significance and the impact of the development on these resources are inconsequential. No other heritage was identified. Therefore, no further mitigation is required, and from a heritage point of view we recommend that the proposed development can continue.
- Due to the zero palaeontological significance of the area, no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area as the igneous rocks underlying the site are not fossiliferous. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2019).
- Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find.

7.4. VISUAL IMPACT

The potential impact on the sense of place of the proposed development will also be considered. However, due to the nature of the activity, the surrounding land-uses as well as the sense of place is not expected to be significantly altered by the proposed development, and therefore, no further studies are suggested.

7.5. OTHER ISSUES IDENTIFIED

Any further issues raised during the public participation process or by the Competent Authority not mentioned in this section, will be dealt with during the EIA phase.

8. DETAILS OF THE PUBLIC PARTICIPATION PROCESS

Interested and Affected Parties ("I&APs") have been and will be identified throughout the process. Landowners adjacent to the proposed site, relevant organs of state, organizations, ward councillors and the Local and District Municipality were added to this database. A complete list of organisations and individual groups identified to date is shown in **Appendix 1L.**

Public Participation will be conducted for the proposed development in accordance with the requirements outlined in Regulation 41 of the NEMA EIA Regulations, 2014 (as amended). The issues and concerns raised during the scoping phase will be dealt with in the EIA phase of this application.

As such, each subsection of Regulation 41 contained in Chapter 6 of the NEMA EIA Regulations, 2014 (as amended) will be addressed separately to thereby demonstrate that all potential Interested and Affected Parties ("I&AP's") were notified of the proposed development.

R54 (2) (a):

R41 (2) (a) (i): The site notices (A2 and A3 sizes) were placed at different locations around the project site as well as at the municipality office in town (please refer to **Appendix 1D**)

The posters contained all details as prescribed by R41(3) (a) & (b) and the size of the on-site poster was at least 60cm by 42cm as prescribed by section R41 (4) (a).

R41 (2) (a) (ii): N/A. There is no alternative site.

R41 (2) b):

R41 (2) (b) (i): N/A. The Applicant is the landowner

R41 (2) (b) (ii): The Initial notification letter (**Appendix 1C**) was circulated to residents within a 200m radius of the project site. Also see **Appendix 1D** for the letter drops.

R41 (2) (b) (iii): An initial notification letter was sent to the municipal Ward councillor at the Kai !Garib Municipality, for the ward in which the site is situated (please refer to **Appendix 1C** for proof of notification letters sent).

R41 (2) (b) (iv): An initial notification letter was sent to the Kai !Garib Municipality as the municipality is the Applicant.

R54 (2) (b) (v): Initial notification letter (please refer to **Appendix 1C** for proof of notification letters sent) will be sent to the following organs of state having jurisdiction in respect of any aspect of the activity:

- Department of Water and Sanitation;
- Department of Agriculture and Land Reform;
- Department of Roads and Public Works;
- Department of Agriculture, Forestry and Fisheries;
- Department of Co-operative Governance, Human Settlements and Traditional Affairs;
- Department of Environment and Nature Conservation (D:E&NC);
- South African Heritage Resources Agency;

- Kai !Garib Municipality; and
- ZF Mgcawu District Municipality.

R41 (2) (c) (i): An advertisement was placed in the local newspaper, **Kalahari Bulletin**, on 1**7 January 2019** (please refer to **Appendix 1B** for proof of advertisement).

R41 (2) (d): N/A

R41 (6):
R41 (6) (a): All relevant facts in respect of the application were made available to potential I&AP's.

R41 (6) (b): I&AP's were given more than a 30-day registration and comment period on the proposed application during the first round of public participation.

R42 (a), (b), (c) and R43(2): A register of interested and affected parties was opened, maintained and is available to any person requesting access to the register in writing (please refer to **Appendix 1L** for the list of I&APs).

Please find attached in **Appendix 1**:

- Appendix 1A – Concept Layout
- Appendix 1B - Proof of Notice boards, advertisements and notices that were sent out;
- Appendix 1C – Notification Letter of Availability of Draft Scoping Report
- Appendix 1D – Initial Notification Letters
- Appendix 1E – Poster Placement and Maildrops
- Appendix 1F – Initial Comments and Responses Report;
- Appendix 1G – Botanical Impact Assessment
- Appendix 1H – Freshwater Impact Assessment;
- Appendix 1I – Heritage Impact Assessment;
- Appendix 1J – Locality and Biodiversity Overlay Maps;
- Appendix 1K – Site Co-Ordinates;
- Appendix 1L – Title Deed
- Appendix 1M – List of potential interested and affected parties;
- Appendix 1N – Site Overview Photos;

9. PLAN OF STUDY FOR THE EIA

9.1.1. TASKS TO BE UNDERTAKEN

Due to the nature of the proposed development there are a number of activities that will still need to be undertaken during the next phase of the project. The proposed process is as described as follows (This follows from a Scoping process to be accepted by the D:E&NC):

The NEMA Application Form was submitted to D:E&NC on the 14th August 2020 along with the Draft Scoping Report. The Application Form and Draft Scoping Report were made available for a 30-day comment period starting from **14th August 2020 to 16th October 2020**. Comments received during the Public Participation Process ("PPP") will be incorporated into the Final Scoping Report, to be submitted to D:E&NC for a decision, and will be addressed in the Draft Environmental Impact Report (EIR).

The following is a list of tasks to be performed as part of the EIA Process. Should the process be modified significantly, changes will be copied to D:E&NC.

EIA PROCESS	
TASK	TIMEFRAMES
Submit NEMA Application and Draft Scoping Report (DSR) and Plan of Study for EIA to D:E&NC and distribute to registered I&APs for comment	August 2020
Submit Final Scoping Report (FSR) and Plan of Study to D:E&NC for a decision	October 2020
Receive approval for the FSR and the Plan of Study for EIA.	November 2020
Undertake specialist studies. • Heritage Impact Assessment received; and • Freshwater Report received. • Awaiting the submission of the Biodiversity Impact Assessment and Geotechnical Report.	August 2020 – November 2020
Compile the Draft Environmental Impact Report (EIR) for public comment based on specialist information.	November 2020
Submit Draft EIR for public comment.	December 2020
Receive responses to the Draft EIR.	December 2020
Preparation of a FINAL EIR and submission to D:E&NC.	January 2021 – February 2021

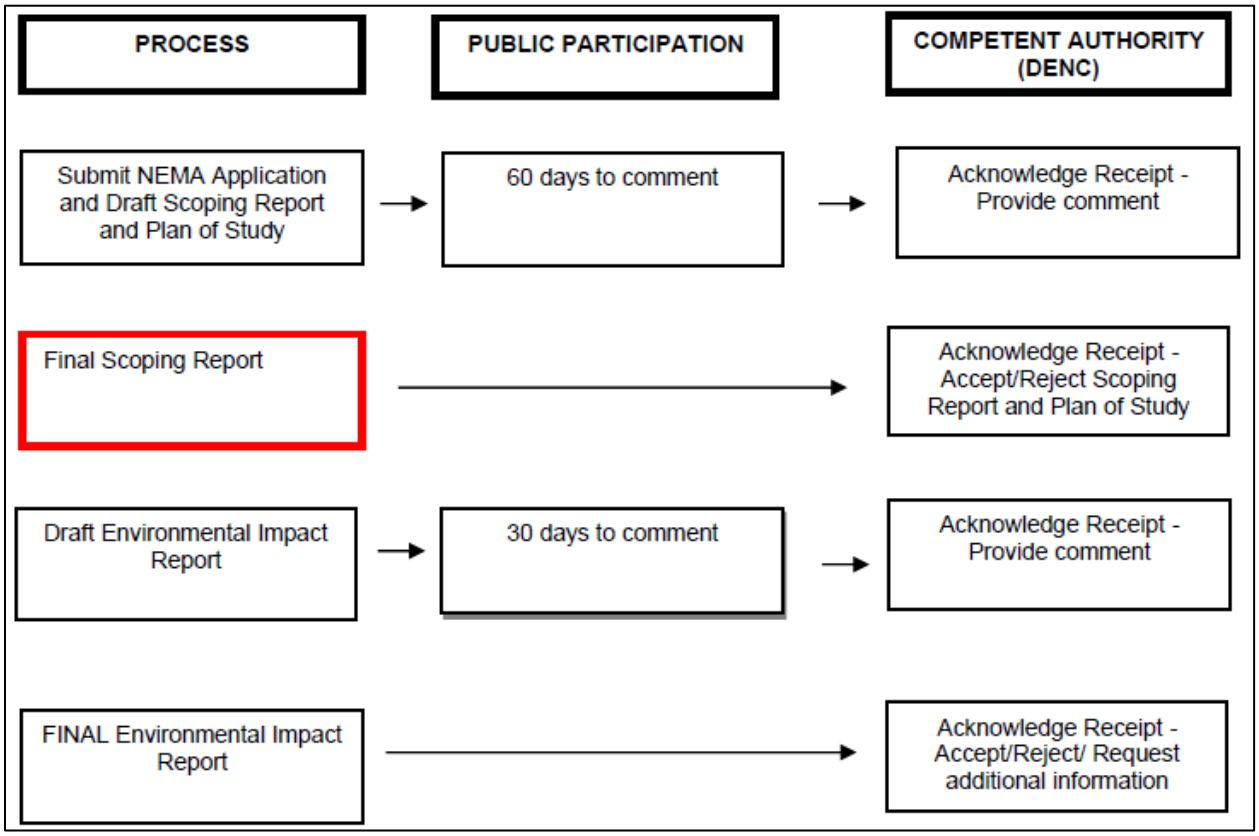


Figure 14. Summary of the EIA process and public participation process. The red indicates the stages where the competent authority will be consulted during the process.

8.1 PUBLIC PARTICIPATION AND INTERESTED AND AFFECTED PARTIES

Please refer to Figure 15 to see where the public participation process is present in the environmental impact assessment. The Interested and Affected Parties will have a chance to view and comment on all the reports that are submitted in the Draft Environmental Impact Report (EIR) phase. The figures also indicated what timeframes are applicable to what stage in the process. If required, meetings with key stakeholders will be held.

At the end of the comment period, the EIR will be revised in response to feedback received from I&APs. All comments received and responses to the comments will be incorporated into the Final EIR. The Final EIR will then be submitted to D:E&NC for consideration and decision-making.

Correspondence with I&APs will be via e-mail, post, fax, telephone, and newspaper advertisements.

Should it be required, this process may be adapted depending on input received during the on-going process and as a result of public input. D:E&NC will be informed of any changes in the process.

8.2 CRITERIA FOR SPECIALIST ASSESSMENT OF IMPACTS

As a result of the environmental issues and potential impacts identified in *Section 6*, the need for the following specialist studies has been identified:

- Biodiversity Assessment
- Freshwater Assessment
- Heritage Impact Assessment
- Geotechnical Report

The impacts of the proposed activity on the various components of the receiving environment will be evaluated in terms of duration (time scale), extent (spatial scale), magnitude and significance as outlined in Table 1. These impacts could either be positive or negative.

The magnitude of an impact is a judgment value that rests with the individual assessor while the determination of significance rests on a combination of the criteria for duration, extent and magnitude. Significance thus is also a judgment value made by the individual assessor.

Table 1: Criteria used for evaluating impacts

Criteria	Category
Nature of impact	This is an evaluation of the effect that the construction, operation and maintenance of a proposed dam would have on the affected environment. This description should include what is to be affected and how.
Duration (Predict whether the lifetime of the Impact will be temporary (less than 1 year) short term (0 to 5 years); medium term (5 to 15 years); long term (more than 15 years, with the Impact ceasing after full implementation of all development components with mitigations); or permanent.	**Temporary:** < 1 year (not including construction) **Short-term:** 1 – 5 years **Medium term:** 5 – 15 years **Long-term:** >15 years (Impact will stop after the operational or running life of the activity, either due to natural course or by human interference) **Permanent:** Impact will be where mitigation or moderation by natural course or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary
Extent (Describe whether the impact occurs on a scale limited to the site area; limited to broader area; or on a wider scale)	**Site Specific:** Expanding only as far as the activity itself *(onsite)* **Small:** restricted to the site's immediate environment within 1 km of the site *(limited)* **Medium:** Within 5 km of the site *(local)* **Large:** Beyond 5 km of the site *(regional)*
Intensity (Describe whether the magnitude (scale/size) of the Impact is high; medium; low; or negligible. The specialist study must attempt to quantify the magnitude of impacts, with the rationale used explained)	**Very low:** Affects the environment in such a way that natural and/or social functions/processes are not affected **Low:** Natural and/or social functions/processes are slightly altered **Medium:** Natural and/or social functions/processes are notably altered in a modified way **High:** Natural and/or social functions/processes are severely altered and may temporarily or permanently cease
Probability of occurrence Describe the probability of the Impact actually occurring as definite (Impact will occur regardless of mitigations	**Improbable:** Not at all likely **Probable:** Distinctive possibility **Highly probable:** Most likely to happen **Definite:** Impact will occur regardless of any prevention measures

Status of the Impact Describe whether the Impact is positive, negative (or neutral).	**Positive:** The activity will have a social/ economical/ environmental benefit **Neutral:** The activity will have no affect **Negative:** The activity will be socially/ economically/ environmentally harmful
Degree of Confidence in predictions State the degree of confidence in predictions based on availability of information and specialist knowledge	**Unsure/Low:** Little confidence regarding information available (<40%) **Probable/Med:** Moderate confidence regarding information available (40-80%) **Definite/High:** Great confidence regarding information available (>80%)
Significance (The impact on each component is determined by a combination of the above criteria and defined as follows) The significance of impacts shall be assessed with and without mitigations. The significance of identified impacts on components of the affected biophysical or socio-economic environment (and, where relevant, with respect to potential legal requirement/s) shall be described as follows:	**No change:** A potential concern which was found to have no impact when evaluated **Very low:** Impacts will be site specific and temporary with no mitigation necessary. **Low:** The impacts will have a minor influence on the proposed development and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures **Moderate:** Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures. **High:** Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.

In addition to determining the individual impacts against the various criteria, the element of mitigation, where relevant, will also be brought into and addressed in the assessment. In such instances the impact will be assessed with a statement on the mitigation measure that could/should be applied. An indication of the certainty of a mitigation measure considered, achieving the end result to the extent indicated, is given on a scale of 1-5 (1 being totally uncertain and 5 being absolutely certain), taking into consideration uncertainties, assumptions and gaps in knowledge.

Table 2: The stated assessment and information will be determined for each individual issue or related groups of issues and presented in descriptive format in the following table example or a close replica thereof.

Impact Statement:		
Mitigation:		
Ratings	Duration	
	Extent	
	Intensity	
	Probability of impact	
	Status of Impact (Positive/negative)	
	Degree of confidence	
Significances	Significance **without** Mitigation	
	Significance ***WITH*** Mitigation	
Indication of the certainty of a mitigation measure considered, achieving the end result to the extent indicated, is given on a scale of 1-5 (1 being totally uncertain and 5 being absolutely certain), taking into consideration uncertainties, assumptions and gaps in knowledge		
Legal Requirements (Identify and list the specific legislation and permit requirements which are relevant to this development):		

10. CONCLUSION AND RECOMMENDATIONS

A scoping exercise is being undertaken to present the proposed activities to the Interested and Affected Parties ("I&APs") and to identify environmental issues discussed in this report and concerns raised as a result of the proposed development alternatives to date. The issues and concerns were raised by I&APs, authorities, the project team as well as specialist input, based on baseline studies undertaken.

This Final Scoping Report, being undertaken in terms of NEMA, summarises the process undertaken, the alternatives presented, and the issues and concerns raised.

As a result of the above, the need for the following specialist studies, have been identified:

- Botanical Assessment (Appendix 1G)
- Freshwater Assessment (Appendix 1H)
- Heritage Impact Assessment (Appendix 1I)
- Geotechnical Report

Any further issues raised as a result of the Public Participation Process ("PPP") will be dealt with and addressed during the Environmental Impact Assessment ("EIA") phase.

The significance of the impacts associated with the alternatives proposed will be assessed in these specialist studies, as part of the EIA. Once the specialist studies have been completed, they will be summarised in an Environmental Impact Report ("EIR"), which integrates the findings of the assessment phase of the EIA.

Based on the significance of the issues raised during the ongoing PPP Process and Scoping Phase, it is evident that an EIA is required. Moreover, as per section 22 of the EIA Regulations, the competent authority must; *(a) accept the scoping report, with or without conditions, and advise the applicant to proceed or continue with the tasks contemplated in the plan of study for environmental impact assessment*. ***It is therefore recommended that authorisation for the commencement of an EIA for the proposed development is granted.*** Should the EIA process be authorised, the significant issues raised in the process to date will be addressed and the specialist studies noted in this report, will be undertaken.

11. DETAILS AND EXPERTISE OF THE EAP

This Final Scoping Report was prepared by Anthony Mader who has a BSc (Honours) Degree in Ecology, Environment and Conservation and is currently completing his PhD, at the University of the Witwatersrand. Anthony has over three years' experience as an Environmental Consultant and an Environmental Control Officer, having worked on projects, in Western Cape, Northern Cape, KwaZulu-Natal, and Eastern Cape, where he facilitated Environmental (EA) and Water Use (WUA) applications and audited a variety of projects including, but not limited to, Civil engineering infrastructure projects such as water supply schemes, roads, culverts, bridges, warehouses, and a substation; and Auditing of water supply schemes, housing developments, warehouses, roads, bridges, and reservoirs. The entire process and report was supervised by Bernard de Witt who has more than 30 years' experience in environmental management and environmental impact assessments.

(----------END----------)

ANNEXURE J: DRPW NO-OBJECTION LETTER

MACROPLAN TOWN & REGIONAL PLANNERS

• 4A MURRAY AVENUE • P.O.BOX 987 • UPINGTON • 8800 • [T] 054 332 3642 • [F] 054 332 4283 • WWW.MACROPLAN.INFO • GOBETLA BEPLANNINGSDIENSTE CC •
• CC REG. NO. 2006/017796/23 • VAT NO. 4070226610 • CENTRAL SUPPLIER DATABASE SUPPLIER NUMBER: MAAA0235531 •

Reference: Date:

(ENQ.PC.DRPW) 210215 Plangeni Township Establishment Project 15 February 2020

Head of the Department of Roads and Public Works
PO Box 3132
Squarehill Park
Kimberley
8300

Attention: Menelisi Sithole

PROJECT: PLANGENI TOWNSHIP ESTABLISHMENT PROJECT

INVOLVED PROPERTY SUMMARY:

- PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KENHARDT RD, KAI !GARIB LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE

The above-mentioned matter, as well as the attached documentation, refer.

Our office, Macroplan Town and Regional Planners, has been appointed by Barzani Development on behalf of the Department of Cooperative Governance, Human Settlements and Traditional Affairs (hence forth referred to as COGHSTA), to facilitate the needed town planning procedures involved with the township establishment of Plangeni. Plangeni is not a proclaimed township at present, since none of the estimated 350 properties, which form this informal town, are registered at the office of the Chief Surveyor General or the Deeds Office. The informal town of Plangeni has been created by the farmworkers that work on the surrounding farmlands. The informal town of Plangeni has now grown to a point where formalisation is necessary as well as the provision of supporting land uses, such as schools, businesses, municipal infrastructure, recreational areas etc. The Kai !Garib Local Municipality has secured the property on which the community of Plangeni is established with the goal of registering this town as a formal proclaimed township. The recent commitment by COGHSTA to address the housing backlog within the Northern Cape, presented the Kai !Garib Local Municipality with the ideal opportunity to undergo the necessary town planning processes to register Plangeni as a proclaimed township, with registered properties that can be allocated to individual ownership.

In terms of the Spatial Planning and Land Use Management Act, No. 16 of 2013, approval / input from any state or semi-state department is required for any development that can directly or indirectly impact on the general functioning of said departments (in this instance the Department of Roads and Public Works, from here on referred to as DRPW). The development site, Portion 16 of the Farm Blauws Kop, No. 36, does not border to a provincial road, however access is being received from the R359, as such approval in terms of the Advertising on Roads and Ribbon Development Act, 21 of 1940, is required for this proposed township establishment project. In the case of the land portion involved, the objective is to have the property subdivided and rezoned, in terms of the Spatial Planning and Land Use Management Act, No. 16 of 2013, as part of the township proclamation of Plangeni. As mentioned, the community of Plangeni currently receives access from the R359 provincial road via an approved access road, as visible on photo 1 of the next page.

Photo 1: Existing access from R359 to the community of Plangeni.

PLANGENI TOWNSHIP ESTABLISHMENT PROJECT DESCRIPTION:

The undertaking of the township establishment project, consisting of 500 residential erven & supporting land uses, for the Plangeni community by Macroplan derives from an indirect appointment by COGHSTA and is therefore a project of national and provincial importance. The development site comprises the entire extent of Portion 16 of the Farm Blauws Kop, No. 36, with this property being held under the ownership of the Kai !Garib Municipality. The proposed township establishment project will provide sub-economic housing with the end goal of securing ownership of land for the current residents. An estimate of 350 informal stands currently exists in the informal town of Plangeni, with a further 150 erven planned for future population growth of the involved settlement. Since the objective is to create a new sustainable town other land uses normally associated with urban centres such as business premises, schools, recreational areas, municipal infrastructure, municipal uses and similar uses are also being planned. The Plangeni township establishment project entails the design of a formal coherent town planning layout through a SPLUMA process, which is informed by numerous specialist studies. At this stage the project has progressed to a point where a concept layout (Annexure D) has been prepared that may be subject to minor alterations to comply with the findings of the specialist studies, but the general layout and functioning thereof should be maintained. One of the main instructions from COGHSTA and the local municipality, was to accommodate the existing informal houses as best possible, but fortunately the area identified for the proclamation of Plangeni is situated more than 350m from the involved provincial road. It should, however, be noted that the involved community receives access from the provincial road via an existing access road which is already approved.

The latest concept layout has been designed to formalise the informal town of Plangeni, make provision for residential expansion, and incorporate land uses such as business, institutional (churches) and recreational uses, whilst providing a coherent internal road network that promotes easy and accessible movement throughout.

INFORMATION CONCERNING DRPW:

The township establishment project for Plangeni pertains to one provincial road (R359), since access to the community of Plangeni is received from this road, The R359 road is clearly indicated in red on the planning diagram that is attached as Annexure E to this submission. The R359 provincial road runs parallel to the study area, however the nearest distance between the development site and the provincial road is ±350m. The input and approval from DRPW is a requirement before the approval for the process can be sought from the ZF Mgcawu Planning Tribunal on the proposed SPLUMA land use change application. The following aspects may be highlighted and feedback from DRPW in this regard is of utmost importance:

- SPLUMA Process: The township establishment project for Plangeni is a legal process guided by the Spatial Planning and Land Use Management Act (Act 16 of 2013) and this legislation clearly states that all state and semi-state departments need to be informed of any developments that may directly or indirectly impact on the general functioning of said departments. The property that comprises the study area will impact on one provincial road, as such, DRPW needs to be informed of the planned township establishment project and an approval/ no-objection, in terms of the Advertising on Roads and Ribbon Development Act, 21 of 1940, is needed before the land use change application can be submitted to the local authority.

- Distance from Provincial Roads: As per SPLUMA requirements, input from DRPW should be obtained if a provincial road is being impacted on or bordering to a proposed development. In the case of the Plangeni Township establishment project, access to the development site is being received from the R359 provincial road. The R359 provincial road runs parallel to the study area, however the nearest distance between the development site and the provincial road is ±350m. Therefore, the development site is not within a distance of 95 meters from the centreline of any building restrictions or within 5 meters from the statutory boundary of any public road. No problems are expected in this regard.

  The requested approval must provide a no-objection towards the processes of subdivision and rezoning, as well as any other land use changes that the planned township establishment may require. This inclusion of a no-objection towards the processes of subdivision and rezoning is needed in order to proceed with the submission of the formal land use change application at the local municipality.

The objectives of this letter are as follow:

1. To notify DRPW of the proposed township establishment project;
2. To obtain a no-objection for the land use changes (subdivision and rezoning), in terms of the Spatial Planning Land Use Management Act (Act 16 of 2013), that need to be followed for the planned township establishment;
3. To obtain approval in terms of the Advertising on Roads and Ribbon Development Act, 21 of 1940;

In order to supplement this letter, please find the following documents attached:

A. Wayleave application
B. Copy of Title Deed
C. Locality Map
D. Preferred Township Establishment Layout
E. Planning Diagram indicating proposed development in relation to provincial road

Kindly take note that this submission is lodged in accordance to the provision of the Kai !Garib Final SPLUMA By-Laws and according to §32.(1) of this policy, if an organ of state fails to comment or provide information within 60 days from the date of which this notification letter has been furnished, that organ of state is deemed to have no comment or information to furnish.

Please let us know if this letter for an approval meets your requirements and if any additional information needs to be provided. We trust that you will find these matters to be in order and if there are any additional components we can assist you with, please do not hesitate to request such information

We look forward to your inputs in this regard. Please feel free to contact our office in the case of any further enquiries.

Yours Sincerely,

Justus Petrus Theron Pr.Pln. A/2394/2016

M +27 82 821 1024
T +27 54 332 3642
E jptheron@mweb.co.za

The DR&PW

DEPARTMENT : ROADS & PUBLIC WORKS

NORTHERN CAPE PROVINCE

REPUBLIC OF SOUTH AFRICA

APPLICATION DATE		
DAY	MONTH	YEAR
15	2	2021

WAYLEAVE / ENCROACHMENT APPLICATION

Any work undertaken within the statutory width or within a distance of 95 meters from the centreline of any building restriction road (Advertising on Roads and Ribbon Development Act, No. 21 of 1940) or within the statutory width or within 95 meters from the statutory boundary of any public road (Road Ordinance, 19 of 1976).

SERVICE OWNER / APPLICANT DETAILS

Service Owner:	**Barzani Development**	Applicant:	**Macroplan**
Physical Address:	**9 Cambridge Office Park**	Address:	**P.O. Box 987**
5 Bauhinia Street, Highveld, Techno Park Centurion		**Upington**	
	Postal Code **169**		Postal Code **8800**
Contact Person:	**Marike Joubert**	Contact Person:	**JP Theron**
Telephone:	**012 881 0210**	Telephone:	**543 323 642**
Cellphone:	**N/A**	Cellphone:	**828 211 024**
Email:	Marike@Barzanigroup.co.za	Email:	jptheron@mweb.co.za

PURPOSE OF APPLICATION/SUBJECT

The objectives of this wayleave application are as follow:

1. To notify DRPW of the proposed township establishment project;

2. To obtain a no-objection for the land use changes (subdivision and rezoning), in terms of the Spatial Planning Land Use Management Act (Act 16 of 2013), that need to be followed for the planned township establishment;

3. To obtain approval in terms of the Advertising on Roads and Ribbon Development Act, 21 of 1940;

SERVICE DETAILS

Fully describe, type of service, and work to be undertaken in the road reserve or building restriction area indicating clearly the location and position related to the km marker boards and road reserve boundary

DESCRIPTION

TYPE OF SERVICE

			Mark With X
Access		Power Line	
Pipeline (Water, sewer, etc)		Communication Line	
Undertaking of works outside of the abovementioned within the stautory road reserve or within 95m of the centreline of a Provincial road			

Other:	X	If Other, Specify: Land Use Changes

Land use change application, in terms of the Spatial Planning and Land Use Management Act (Act 16 of 2013), which includes Subdivision & rezoning.

GPS CO-ORDINATES:

LATITUDE	28 ° 40 ' 7,08 " S	LONGITUDE:	21 ° 6 ' 9,02 " E

*If Encroachment is parrallel to a Provincial Road, Provide Start and End Co-ordinates

Start Co-ordinates		**End Co-ordinates**	
LATITUDE	' " S	LATITUDE:	° ' " E
LONGITUDE:	' " S	LONGITUDE:	° ' " E

***Note:** your application will not be proccessed if the GPS Co-ordinates have not been provided

REQUIRED DRAWINGS

Drawings to be produced by an ECSA Register Engineer			**Mark with X**
Detailed Designs		Cross Section	
Locality Plan	X	Other	

If Other, Specify: Location, planning diagrams & Preferred Layout

***Note:** Referencing of drawings must be in relation to the Centreline of the road

****Note:** Your application will not be proccessed if required drawings have not been provided

DECLARATION FOR AND ON BEHALF OF SERVICE OWNER:

I ACCEPT ALL CONDITIONS IMPOSED IN TERMS OF ANY AGREEMENT BETWEEN THE DEPARTMENT OF ROADS AND PUBLIC WORKS AND OUR FIRM AS THE SERVICE OWNER AND ALL CONDITIONS IMPOSED ON THIS APPLICATION. I AM AUTHORISED TO SIGN ON BEHALF OF THE SERVICE OWNER

JP Theron

NAME (PRINT)

SIGNATURE

15/02/2021

DATE

COMPLETED FORM TO BE RETURNED TO

DIRECTOR ROADS: Mr. J. Roelofse

Enquires: C. Ndubula / V. Ngcobo

Postal Address

P.O. BOX 3132
KIMBERLEY
8300

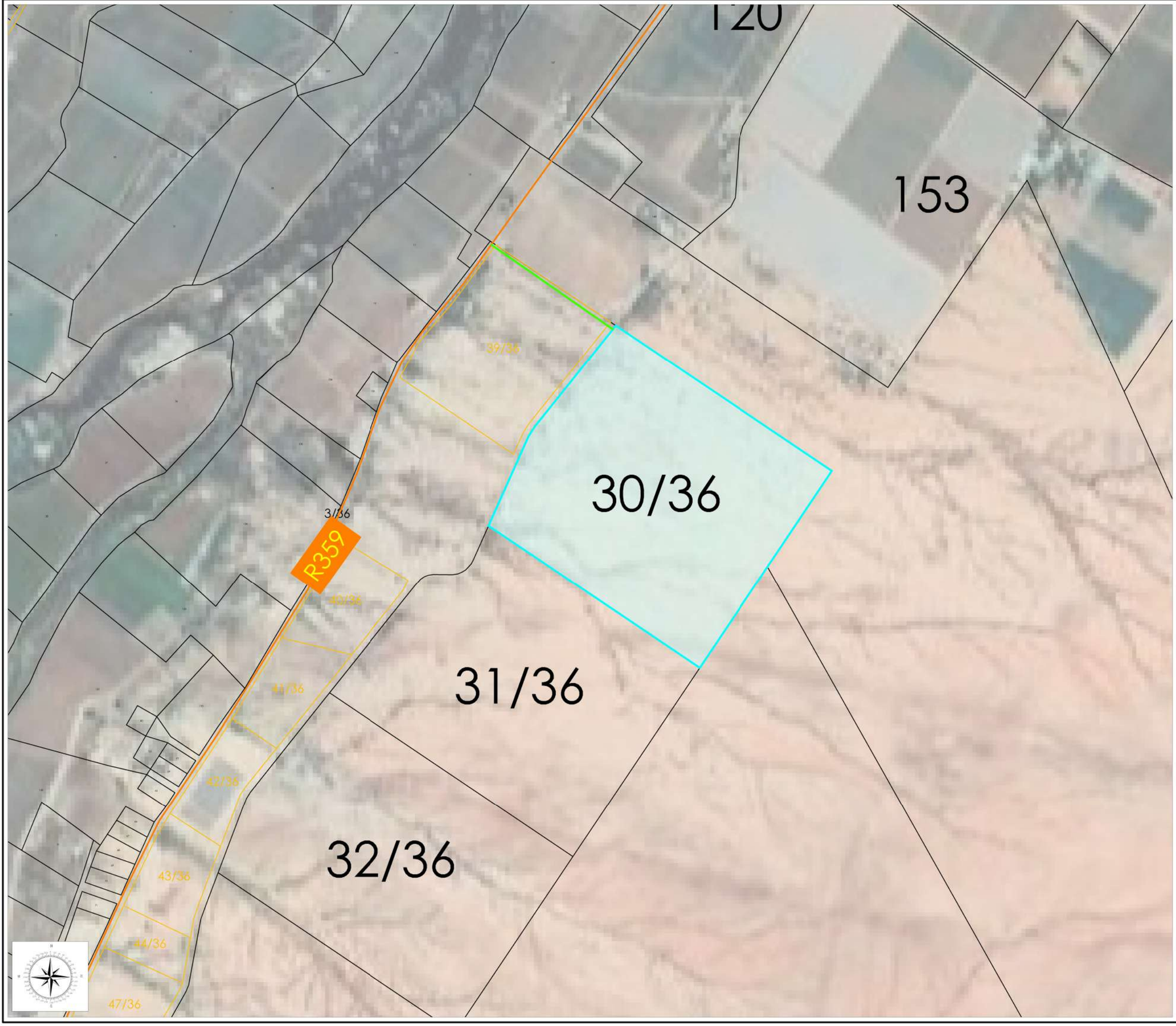
Street Address

9-11 Stokroos Street
Squarehill Park
KIMBERLEY
8301

TEL: 053 861 9600/62

FAX: 053 861 9626

EMAIL: ncrwayleaves@gmail.com



Project Name:
PLANGENI TOWNSHIP ESTABLISHMENT

Title:
FIGURE 3: ROAD NETWORK

Description:
PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Development Site
- Provincial Road (R359)
- Access From R359

Municipality:

KAI !GARIB

Postal Address:
Private Bag X6
Kakamas
8870

Tel No: 054 461 6700
Fax No: 054 461 6401

Consultant:

MACROPLAN
TOWN & REGIONAL PLANNERS
YOUR PARTNERS IN PROFESSIONAL PLANNING SERVICES

4A Murray Avenue, Upington 8801
PO Box 987, Upington 8800

054 332 3642
macroplan@mweb.co.za
www.macroplan.info

Reference
(FIG3) 210215 Ptn 30 of the Farm Blauws Kop, No. 36

Designed	Date
JP Theron	February 2021
Drawn	Scale
JP Theron	1: 10000

ANNEXURE K: CANAL AUTHORITY NO-OBJECTION LETTER

MACROPLAN TOWN & REGIONAL PLANNERS

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• CC REG. NO. 2006/017796/23 • VAT NO. 4070226610 • CENTRAL SUPPLIER DATABASE SUPPLIER NUMBER: MAAA0235531 •

Reference: Date:

(ENQ.PC.DRPW) 210215 Plangeni Township Establishment Project 15 February 2020

Blauwskop Settlement Water Association
P.O. Box 48
Kanoneiland
8806

Attention: Anton De Villiers.

PROJECT: PLANGENI TOWNSHIP ESTABLISHMENT PROJECT

INVOLVED PROPERTY SUMMARY:

- PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KENHARDT RD, KAI !GARIB LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE

The above-mentioned matter, as well as the attached documentation, refer.

Our office, Macroplan Town and Regional Planners, has been appointed by Barzani Development on behalf of the Department of Cooperative Governance, Human Settlements and Traditional Affairs (hence forth referred to as COGHSTA), to facilitate the needed town planning procedures involved with the **township establishment of Plangeni**. Plangeni is not a proclaimed township at present, since none of the estimated 350 properties, which form this informal town, are registered at the office of the Chief Surveyor General or the Deeds Office. The informal town of Plangeni has been created by the farmworkers that work on the surrounding farmlands and has now grown to a point where formalisation is necessary as well as the provision of supporting land uses, such as schools, businesses, municipal infrastructure, recreational areas etc. The Kai !Garib Local Municipality has secured the property on which the community of Plangeni is established with the goal of registering this town as a formal proclaimed township. The recent commitment by COGHSTA to address the **housing backlog** within the Northern Cape, presented the Kai !Garib Local Municipality with the ideal opportunity to undergo the necessary town planning processes to register Plangeni as a proclaimed township, with registered properties that can be allocated to individual ownership.

In terms of the Spatial Planning and Land Use Management Act, No. 16 of 2013, approval / input from all interested and affected parties is required for any development that can directly or indirectly impact on the general functioning of an I&P. The development site, Portion 16 of the Farm Blauws Kop, No. 36, borders to the canal that falls under the jurisdiction of Blauwskop Settlement Water Association, as such feedback/no-objection from the Blauwskop Settlement Water Association, is required for this proposed township establishment project. In the case of the land portion involved, the objective is to have the properties subdivided and rezoned, in terms of the Spatial Planning and Land Use Management Act, No. 16 of 2013, as part of the formalisation of the existing informal properties of Plangeni, as well as make provision for future population growth of the said settlement.

PLANGENI TOWNSHIP ESTABLISHMENT PROJECT DESCRIPTION:

The undertaking of the township establishment project, consisting of 500 residential erven & supporting land uses, for the Plangeni community by Macroplan derives from an indirect appointment by COGHSTA and is therefore a project of national and provincial importance. The development site comprises the entire extent of Portion 16 of the Farm Blauws Kop, No. 36, with this property being held under the ownership of the Kai !Garib Municipality. The proposed township establishment project will provide sub-economic housing with the end goal of securing ownership of land for the current residents. An estimate of 350 informal stands currently exists in the informal town of Plangeni, with a further 150 erven planned for future population growth of the involved settlement. Since the objective is to create a new sustainable town other land uses normally associated with urban centres such as business premises, schools, recreational areas, municipal infrastructure, municipal uses and similar uses are also being planned. The Plangeni township establishment project entails the design of a formal coherent town planning layout through a SPLUMA process, which is informed by numerous specialist studies. At this stage the project has progressed to a point where a concept layout (Annexure D) has been prepared that may be subject to minor alterations to comply with the findings of the specialist studies, but the general layout and functioning thereof should be maintained.

One of the main instructions from COGHSTA and the local municipality, was to accommodate the existing informal houses as best possible. In the case of the community of Plangeni existing informal stands/ structures can be located as close as 10m to the canal.

The latest concept layout has been designed to formalise the existing informal residential stands, make provision for residential expansion, incorporate land uses such as business, institutional (churches) and recreational uses, whilst providing a coherent internal road network that promotes easy and accessible movement throughout.

INFORMATION CONCERNING BLAUWSKOP SETTLEMENT WATER ASSOCIATION:

The township establishment project for Plangeni borders the canal to the east, as such the Blauwskop Settlement Water Association needs to be informed of the planned township establishment project and feedback in regards to the development proposal needs to be obtained. The following aspects may be highlighted and feedback from Blauwskop Settlement Water Association in this regard is of utmost importance:

- SPLUMA Process: The township establishment project for Plangeni is a legal process guided by the Spatial Planning and Land Use Management Act (Act 16 of 2013) and this legislation clearly states that all interested and affected parties need to be informed of any developments that may directly or indirectly impact on the general functioning of an I&P. The land portion that comprises the study area border to the canal, as such, the Blauwskop Settlement Water Association needs to be informed of the planned township establishment project and an approval/ no-objection is needed before the land use change application can be submitted to the local authority.

- Distance from Canal: As per SPLUMA requirements, input from the Blauwskop Settlement Water Association should be obtained due to the development site locale adjacent to the canal (indicated in light blue on planning diagram – Annexure D). In the case of the Plangeni township establishment project the western property boundary of Portion 30 of the Farm Blauws Kop, No. 36 is located approximately 10m from the canal. It should be noted that these are existing informal residential stands that have been established throughout the years.

  The requested approval must provide a no-objection towards the processes of subdivision and rezoning, as well as any other land use changes that the planned township establishment may require. This inclusion of a no-objection towards the processes of subdivision and rezoning is needed in order to proceed with the submission of the formal land use change application at the local municipality.

- **Provision of Water:** Stabilis has been appointed to investigate the need for water, as well as determine the best source of water for the Plangeni Community. The Orange River will be sole source of water, since a sustainable water source is required for a community such as Plangeni. Water from the canal is not a sustainable option and cannot therefore be used for Plangeni. At this stage the final services report compiled by Stabilis is not available, with the investigation and calculations still underway. It should however be noted that a meeting was held with the Kai !Garib Municipality and all stakeholders agreed that the Orange River has to provide water to the Plangeni Community and not the canal.

The objectives of this letter are as follow:

1. To notify Blauwskop Settlement Water Association of the proposed township establishment project;
2. To obtain input from Blauwskop Settlement Water Association in regards to the proposed township establishment project;
3. To obtain a no-objection for the land use changes (subdivision and rezoning), in terms of the Spatial Planning Land Use Management Act (Act 16 of 2013), that need to be followed for the planned township establishment;

In order to supplement this letter, please find the following documents attached:

A. Copy of Title Deed
B. Locality Maps
C. Preferred Township Establishment Layout
D. Planning Diagram indicating proposed development in relation to canal

Kindly take note that this submission is lodged in accordance to the provision of the Kai !Garib Final SPLUMA By-Laws and according to §32.(1) of this policy, if an organ of state fails to comment or provide information within 60 days from the date of which this notification letter has been furnished, that organ of state is deemed to have no comment or information to furnish.

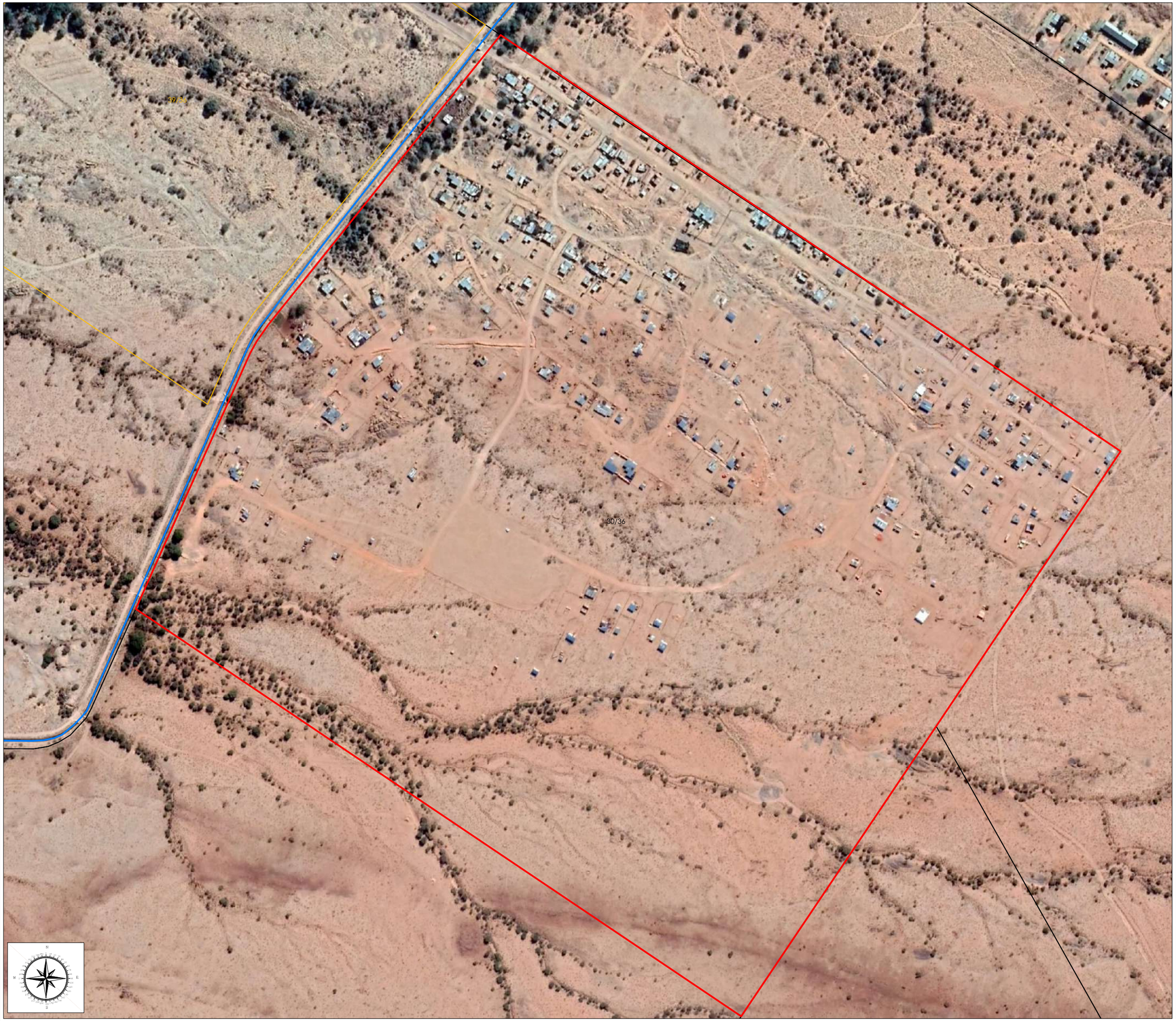
Please let us know if this letter for an approval meets your requirements and if any additional information needs to be provided. We trust that you will find these matters to be in order and if there are any additional components we can assist you with, please do not hesitate to request such information

We look forward to your inputs in this regard. Please feel free to contact our office in the case of any further enquiries.

Yours Sincerely,

Justus Petrus Theron Pr.Pln. A/2394/2016

M +27 82 821 1024
T +27 54 332 3642
E jptheron@mweb.co.za



Project Name:
PLANGENI TOWNSHIP ESTABLISHMENT

Title:
FIGURE 3: IMPACT ON CANAL

Description:
PORTION 30 OF THE FARM BLAUWS KOP, NO. 36, KAI !GARIB MUNICIPALITY, NORTHERN CAPE PROVINCE

Legend

- Development Site
- Canal

Municipality:

KAI !GARIB MUNICIPALITY

Postal Address:
Private Bag X6
Kakamas
8870

Tel No: 054 461 6700
Fax No: 054 461 6401

Consultant:

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054 332 3642
4A Murray Avenue, Upington 8801 macroplan@mweb.co.za
PO Box 987, Upington 8800 www.macroplan.info

Reference
(FIG3) 210215 Ptn 30 of the Farm Blauws Kop, No. 36

Designed	Date
JP Theron	February 2021
Drawn	Scale
JP Theron	1: 10000

ANNEXURE L: BREAKDOWN OF HOUSES

ANNEXURE M: SDF

PLAN 110 a - SPATIAL DEVELOPMENT FRAMEWORK / LAND DEVELOPMENT PLAN - KAI !GARIB 2012 - 2017

POLICY FRAMEWORK

Vision of the Kai !Garib SDF is as follow:

- Development of a sustainable and viable municipal area through the allocation of resources available and integrated spatial planning.

Goals of the Kai !Garib SDF is as follow:

- To ensure integration of development, planning and environmental processes, resulting in sustainable development.
- Proper spatial planning, resulting in the provision of an economic base for business and industrial development.
- Spatial planning to represent the realistic needs of the community.
- A set of planning principles focussing attention to a bottom-up developmental approach.
- Proper management of the SDF document and implementation of planning objectives and principles resulting in sustainable projects.

Objectives for Kai !Garib Municipality:

- Development of a sustainable Municipal area – this indicates the fact that all projects must be measured according to its sustainability as part of future development.
- Development of a viable Municipal area – this indicates that all projects must be measured against whether it is viable for future development or not.
- The allocation of available resources – this indicates that the availability of resources must be kept in mind.
- Integrated spatial planning – for all future planning projects, the integration of communities must be addressed by spatial planning.

Environmental Principals adopted for the Kai !Garib Municipal area:

- Educational programmes pertaining to the delicate relationship between environment and inhabitants have to be implemented and sustained, focussing on the responsibilities of the inhabitants in regard of the protection of the ability to sustain life.
- Environmental courses should be developed and conducted for all government officials, especially municipal officials who are involved in land-use management and development.
- Provide for the transfer of information, communication and give guidance with regard to the planning of resource management, as a community service.
- Information dissemination and extension services must be provided to the general public in order to develop institutional and social transformation and to ensure the sustainable use of land and resources at regional levels.
- A system of values, increase in recognition and understanding of the values have to be developed. These values should be recognised in decision-making connected with the use of the land and its management.

Spatial Planning Objectives, Planning Tools and restructuring elements for Kai !garib Municipality in accordance with the 6 SPC's identified as part of the NCPSDF

The following components must be kept in mind:

- The SPC's indicates the existing land use patterns based on the same SPC categories, but aligned with the Draft Scheme Regulations of Kai !Garib.
- The SPC's indicates the ultimate land-use prescribed for specific areas within the Municipality.
- Any land use application must therefore keep the SPC's in mind when formulating the detail regarding the motivation for a specific application.
- Development of SPC A and B will only be considered under certain conditions as stipulated in the Spatial Planning Objectives, Planning Tools and Restructuring elements segment.
- Development of land outside of the Urban Edge that falls in SPC C outside of the components identified in the Spatial Planning Objectives, Planning Tools and Restructuring elements segment, must be motivated and discussed with various role-players.
- SPC C-F represents the segment that forms part of the development zone of the Municipality and must be read with reference to Spatial Planning Objectives, Planning Tools and Restructuring elements segment.

The following Spatial Planning Categories were identified in the NCPSDF and will be used for the SDF Plans that forms part of this document.

SPC A – Core Areas

SPC A Planning Strategy Adopted:

- These areas must be protected and development under normal circumstances not allowed.

SPC A General Planning Policies:

- Development of biodiversity areas must be facilitated with the help of innovative public-private partnerships.
- Non-consummative activities such as passive outdoor recreation activities and tourism to be allowed.
- The development of any new protected area must be researched and the integration of such areas with their surrounding and uses must form part of such a research program.

SPC B – Buffer Areas

SPC B Planning Strategy Adopted:

- To create a continuous network of natural resources areas throughout the Municipal area that maintain ecological processes and provide ecosystem services and these include the provision of water, arable soil, disaster amelioration, recreational opportunities, etc.

SPC B General Planning Policies:

- The management of such systems must honour long-standing benign uses by local people, e.g. the Ekaterenskuil, Blouoso Trust and Riemvasmaak communities.
- No structures and permanent human habitation will be permitted below the 1:50 year flood line of the Orange River and or any other local river or storm water component in Kai !Garib.
- In the case of existing building, resorts and developments below the flood line and or where the flood line has been altered, the development and or redevelopment may be allowed on the condition that a comprehensive flood management plan is drawn up and approved by the various authorities. Such a plan must focus on flood proofing buildings, construction of buildings on fill above the flood level, buildings on piers and columns and taking into consideration the flood height, duration of floods and velocity of water flow.
- Any modification of an SPC B area is subject to an appropriate environmental off-set or quid pro quo. Such off-set could be in the form of other SPC B land being formally designated as SPC A, mitigation banking (i.e. putting an appropriate amount of monetary capital into a trust to fund conservation initiatives where required) and implementation of the SDI approach as prescribed in the NCPSDF Toolkit D10.

SPC C – Agricultural Areas

SPC C Planning Strategy Adopted:

- To assist in the development of the agricultural sector of Kai !Garib into a Provincial and National Asset.
- To protect high potential agricultural land from non-agricultural development outside of the Urban Edge of the various towns.

SPC C General Planning Policies:

- The general guidelines for the 'Development of land outside of the Urban Edge' as discussed in SPC D are adopted for this category as policy.
- Any modification of an SPC C area is subject to an appropriate environmental off - set or quid pro quo. Such off - set could be in the form of other SPC B land being formally designated as SPC A, mitigation banking (i.e. putting an appropriate amount of monetary capital into a trust to fund conservation initiatives where required) and implementation of the SDI approach as prescribed in the NCPSDF Toolkit D10.
- Any enhanced development rights on SPC C areas must be subject to the establishment of a Special Management Area where the ethos of sustainable agriculture is served in practice.

SPC D – Urban Areas

SPC D Planning Strategy Adopted:

- Develop sustainable primary and secondary towns that will enhance the living conditions of the residents.

SPC D General Planning Policies:

- Identification of Urban Areas and an Urban Edge to form a directive for settlement planning.
- Identification of Mixed use areas to allow for the diversification of land uses.
- Identification of Precincts (CBD, Industrial and Tourism) for the various communities and settlements and promoting development within these areas.
- Identification of Neighbourhood nodes where applicable and promoting development within these areas.
- Identification of Activity Corridors, Spines and Streets and focussing on the urban renewal of these areas and promoting development of communities.
- Identification and maintenance of the MOSS within the Urban Edges of the various towns.
- The alignment of the identified Growth Areas of the NCPSDF with the Kai !Garib SDF.
- The restructuring of the towns by incorporating new development initiatives in the planning process.
- Guiding Rural Development in order to promote sustainable communities.

SPC E – Industrial Areas

SPC E Planning Strategy Adopted:

- To establish industrial Precincts in the various towns and the provision of infrastructure to harvest and process the resources available on a sustainable basis.

SPC E General Planning Policies:

- To identify an Industrial Precinct for each of the towns where the opportunity for manufacturing exist.
- Ensure the sustainable use and protection of the environment.
- Ensure that the development and design of Industrial areas is in a manner that supports the existing economy.

SPC F – Surface Infrastructure and Buildings

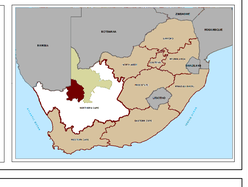
SPC F Planning Strategy Adopted:

- To ensure that future planning of areas provide detail for the provision of infrastructure development.

DRAFTED FOR :

KAI !GARIB MUNICIPALITY

KAI !GARIB MUNICIPALITY/LETSETI-MUNICIPALITY



DRAFTED BY :

TGIS

MACROPLAN
Studio- & Streetdesigners
Town & Regional Planners

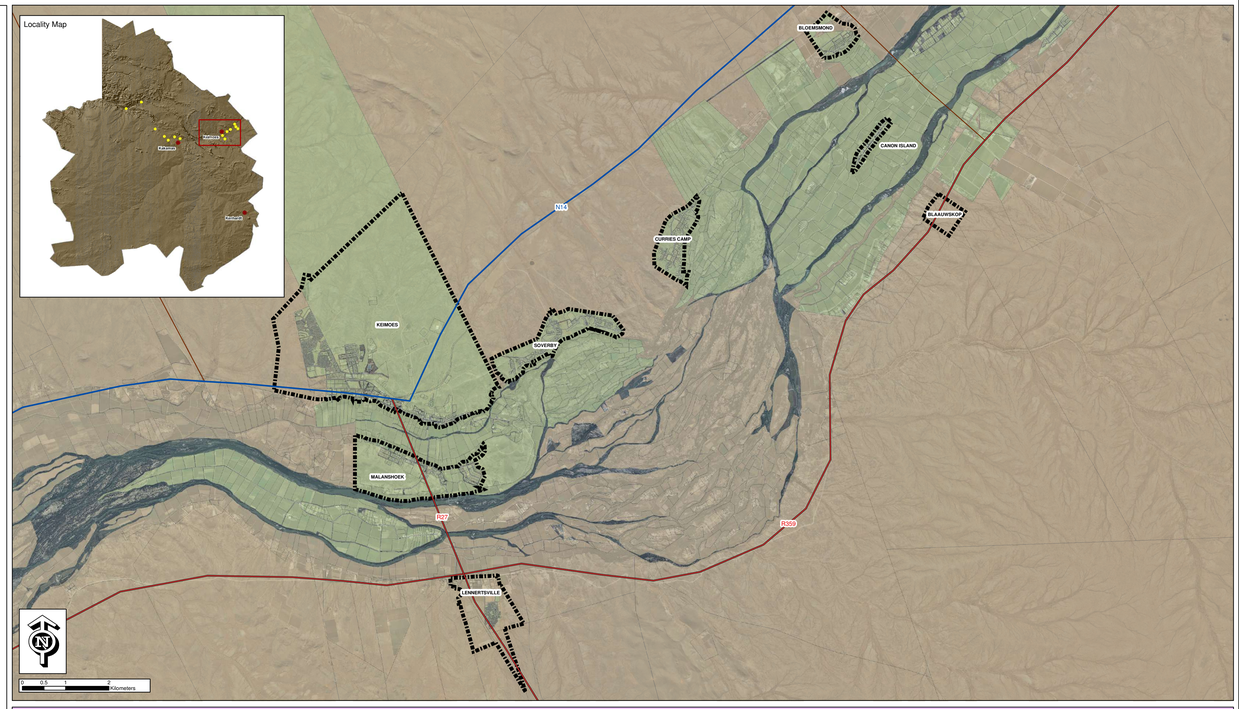
In associate mat:
In association with:

SOBETLA
Spatial Designs
Land Use Specialists

Date: 22 August 2012

Projection: Transverse Mercator WGS84, LO21

COMPOSITE SPATIAL DEVELOPMENT



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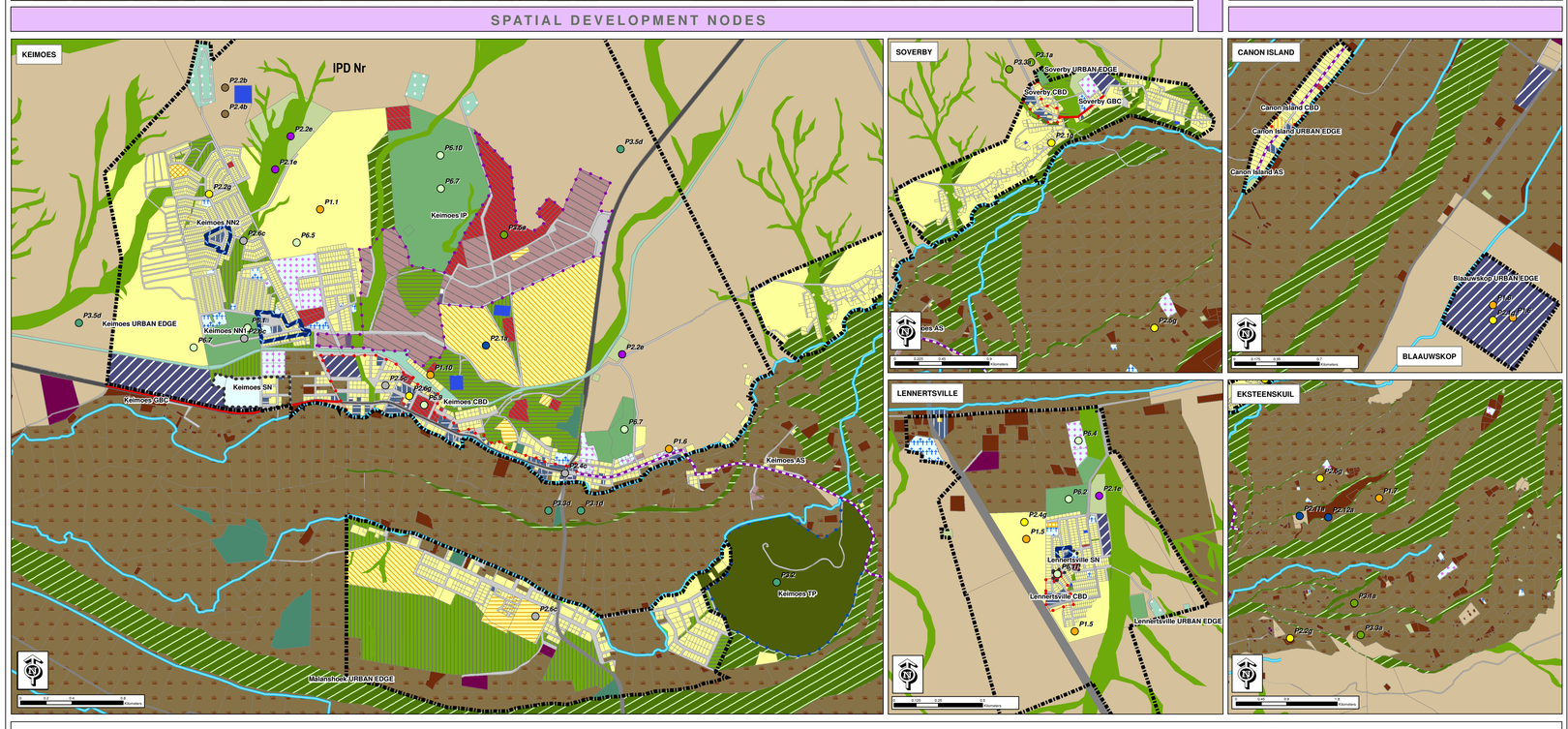
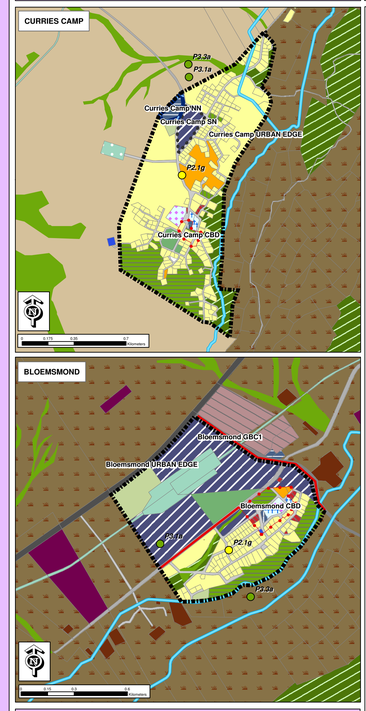


SPATIAL DEVELOPMENT NODES



PROJECT IMPLEMENTATION

IDP Nr	Project Name	Location	Status Quo	Delineation on SDF Plans	Summary of Score	Priority
						11-12=Priority 1 Project/essential for development
						9-10=Priority 2 Project/ veel hoë chance of development
						7-8=Priority 3 Project/ matig/medium chance of development
						<7=Priority 4 Project/ teen lae chance of development
Lack of proper housing / existing informal settlements - KPA 2						
	500 erven (Planning)	Keimoes	Business Plans submitted	P1.1	11	1
	150 erven (Planning)	Kakamas	Business Plans submitted	P1.2	11	1
	200 erven (Planning)	Kenhardt		P1.3	10	2
	400 erven (Planning)	Augrabies	Business Plans submitted	P1.4	10	2
	50 erven (Planning)	Lennertsville	Business Plans submitted	P1.5	10	2
	Development of Dal Island	Riverside/kp	Planning	P1.6	9	3
	Development of Dal Island	Riverside/kp	Planning	P1.9	9	3
	RA Church Project	40 Tweegevonkrig, Noodsberate, Keimoes, Blouswaksig, Uitkyk	Negotiations	P1.8	7	3
	Rural Land Reform Projects	Bulderaskuil Plaas	Negotiations	P1.7	6	4
	Transnet – Housing Transfer	Blaimanskrik Keimoes	Negotiations	P1.10	6	4
Lack of Basic Services - KPA 2 a) Water					0	0
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Keimoes	Planning	P2.1a	10	1
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Kenhardt	Feasibility Study	P2.2a	10	1
	Distribution network	Kakamas East	Business Plan Submitted	NA	10	1
	Greenfields Water Reticulation	Augrabies Lennertsville, Kenhardt		NA	10	1
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Augrabies	Construction	P2.4a	11	1
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Lutzburg	Construction	P2.5a	11	1
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Cilmo	Construction	P2.6a	11	1
b la-b 103	Extension of the water distribution networks	Smaller towns	Business Plan completed	NA	11	1
b la-b 104	Water Demand Management System	Kai !Garib	Planning	NA	11	1
	Water reticulation network	Kenhardt (500 houses)	Planning	NA	11	1
	Water Reticulation Network	Kakamas (750 houses)	Planning	NA	11	1
b la-b 901	Water Bulk Services (RBIG)	Kakamas	Planning	NA	11	1
b la-b 902	Provision of high and low level storage (RBIG)	Kakamas	Planning	NA	11	1
b la-b 902	Upgrade of WTW	Lennertsville	Planning	NA	11	1
b la-b 902	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Keimoes	Planning	NA	11	1
	Upgrading Bulk Water Services	Reinvasmaak Vredesvallei	In Process	NA	11	1
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Alheit	Planning	P2.3a	10	2
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Marchand	Feasibility Study & MIG Registration	P2.7a	10	2
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Lutzburg	Feasibility Study & MIG Registration	P2.8a	9	2
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Lennertsville	Feasibility Study & MIG Registration	P2.9a	9	2
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Tierkloof	Feasibility Study & MIG Registration	P2.10a	9	2
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Marchand/ Bendom	Feasibility Study & MIG Registration	P2.6a	9	2
	Upgrading of WTW Storage Capacity/ Pumping station/ Network	Bulderaskuil/ Blande	Feasibility Study & MIG Registration	P2.11a	9	2
b la-b 903	Installation of water meters and water management system	Kai !Garib	Planning	NA	9	2
	New WTW Storage Capacity/ Pumping station/ Network	Bulderaskuil Plaas	Planning	P2.12a	7	3
Lack of Basic Services - KPA 2 b) Sanitation					0	0
	Development of oxidation dams	Augrabies, Vredesvallei, Marchand, Blouputs	Planning, Grid not available	P3.1a	11	1
	Upgrade of WWTW(RBIG)	Kakamas	Planning	P2.3b	11	1
	Upgrade of WWTW(RBIG)	Keimoes	Planning	P2.4b	11	1
	Greenfields Sewerage reticulation	Keimoes, Kakamas, Augrabies, Lennertsville, Kenhardt	Planning	NA	10	2
	Upgrade of Hospital, Alkaia Park, Keimoes CBD, Erf 6	Keimoes	Planning	NA	10	2
	New WWTW Storage Capacity/ Pumping station/ Network	Kai !Garib	Planning	NA	10	2
	Fencing of Oxidation dams	Keimoes, Kenhardt	Planning	P2.2b	10	2
	New WWTW Storage Capacity/ Pumping station/ Network	Kai !Garib	Feasibility Study	NA	9	2
	Upgrading of internal sewerage network	Kai !Garib	Planning	NA	9	2
	Sewer network and treatment plant	Reinvasmaak Vredesvallei	Business Plan Submitted	NA	9	2
Lack of Basic Services - KPA 2 c) Roads					0	0
	Upgrade access bridges (N27)	Keimoes Nelerakraft	Construction	P2.4c	10	1
	Resealing and puching of internal roads	Keimoes, Kakamas	Construction	RA	10	1
	Development of a taxi terminus for Kakmas	Kakmas	Application	P2.5c	10	2
	Tarring of streets Erf 7	Vastrivierhoek, Aksalpark, Mataniehoek	Construction	P2.6c	10	2
	Upgrade access roads & bridges	Alheit	Construction	P3.1c	9	2
	Upgrade access roads & bridges	Augrabies	Tender Phase	P2.2c	9	2
	Upgrade access roads & bridges	Marchand	Tender Phase	P2.3c	9	2
	Tarring of streets	Uitkoms Vredesvallei Mission	Business Plan submitted	P2.7c	9	2
	Upgrading of access routes/ Busand Taxi Routes	Kai !Garib	Business Plan/ Planning	NA	8	3
Lack of Basic Services - KPA 2 d) Storm water					0	0
	Upgrade storm water management	Alheit, Keimoes/Kakmas/CBD/Noodkamp	Pre-planning	NA	7	3
	Building of earth drains	Kai !Garib	Business Plan	NA	6	4
	Informal Drainage	Augrabies/ Cilmo/ Marchand/ Lutzburg/ Alheit/ Lennertsville	Planning	NA	6	4
Lack of Basic Services - KPA 2 e) Cemeteries					0	0
	Development of cemetery	Kakamas	Planning	P2.4e	11	1
	Development of cemetery/ soil prior tested/ etc	ALL WARDS	Feasibility Studies	P2.1c	10	2
	Development of cemetery	Riemvasmaak	Registration	P2.3e	9	2
	Upgrade safety & facilities	Keimoes	Planning	P2.2e	8	3
Lack of Basic Services - KPA 2 f) Refuse Removal					0	0
	Development of new dumping area for the communities	Kai !Garib	Feasibility Study	NA	11	1
	Develop a new site at Augrabies & Marchand/Wake Transfer Station	Augrabies	Feasibility Study	NA	9	2
	Develop a new site at Augrabies & Marchand/Wake	Marchand	Feasibility Study	NA	9	2
	New Dumping sites	Cilmo, Marchand, Lutzburg, Alheit, Lennertsville, Bulderaskuil Plaas, Bloemsmond, Mc Taggert camp, Sandvlei, Oor Hekkies	Feasibility Study	NA	9	2
	Feasibility Study: New Dumping Sites	Kai !Garib	In Process	NA	8	3
	Waste reduction public awareness	Kai !Garib	Planning	NA	8	3
	Dumping site closure	Marchand	Planning	NA	8	3
Lack of Basic Services - KPA 2 g) Electricity					0	0
	Street lighting	Blouoso Blaauwskop	Construction	P2.1g	11	1
	Area & street lighting for all communities according to priority areas	Augrabies/ Lutzburg/ Alheit	Construction	P2.2g	10	2
	Area & street lighting for all communities according to priority areas	Lennertsville	Construction	P2.4g	10	2
	Street lighting for Marchand	Marchand	Construction	P2.7g	10	2
	Area & street lighting	Bulderaskuil Plaas/ Mc Taggert camp/ Kakamas, Keimoes, Kenhardt	Business Plan	P2.2g	7	3
	Upgrade of electricity networks	Kai !Garib	Business Plan	P2.5g	7	3
	Electrification of Bulderaskuil	Bulderaskuil	Business Plan	P2.5g	6	4
Poverty & Unemployment (LED) : KPA 3 a) Agriculture Development :					0	0
	Blouoso Trust: Further development of irrigation land	BLOUSOO	Planning	NA	11	1
	Development of irrigation land for grape production in Bulderaskuil	Bulderaskuil Islands	Planning	NA	11	1
	The Riemvasmaak Comprehensive Rural Development Programme (CRDP)	Riemvasmaak	Implementation	NA	11	1
	Pgs - Project	Bloosoer Bulderaskuil	Feasibility Study?	P3.1a	10	2
	Upgrade land and soil conditions	Bulderaskuil/ Bloosoer	Planning	P3.3a	10	2
	Development of irrigation land for Lucerne production	Reinvasmaak, Vastrivi'rri	Planning	NA	10	2
	Ski-boh: Lucerne Project	Kai !Garib	Feasibility Study	P3.2a	9	2
	Gamsbok Project	Kai !Garib	Feasibility Study	P3.4a	9	2
	Green Abattoir	Keimoes	Feasibility Study	P3.5a	9	2
	Development of irrigation land/ Bulk water supply	Reinvasmaak, Vredesvallei	Planning	P3.6a	9	2
	Establishing and Implementing Commonage Plan	Kai !Garib	Implementation: Ongoing	NA	8	3
	Tsjuni Development Project	Kai !Garib	Planning	NA	8	3
	Upgrading of infrastructure for emerging farmers	Kai !Garib		NA	7	3
	Food Security Program for homestead gardens	Kai !Garib Area	Planning	NA	7	3
	Farmer Training	Kai !Garib	Planning	NA	7	3
	Livestock Improvement Programme	Kai !Garib	Planning	NA	7	3
	Land for Kleinspring farmer program	Kai !Garib		NA	6	4
	Upgrading of equipment for emerging farmers	Kai !Garib		NA	6	4
Poverty & Unemployment (LED) : KPA 3 b) Business Development : (SMME & SAME)					0	0
	Mvula Kompos Project	Marchand	Implementation	NA	12	1
	Salmon Waste Recycling Project	Keimoes	Implementation	NA	12	1
	Meat Recycling Industries	Keimoes, Kakamas/ Augrabies/ Kenhardt	Planning	NA	10	2
	Car Wash Business Initiative	Keimoes, Kakamas & Kenhardt	Planning	NA	9	3
Poverty & Unemployment (LED) : KPA 3 c) Youth Development :					0	0
	Learner ships (Technical Skills)	Kai !Garib	Planning	NA	12	1
	FET College	Kai !Garib	Pre-Planning	NA	10	2
Poverty & Unemployment (LED) : KPA 3 d) : Tourism Development :					0	0
	Upgrading & Restoration of Cannon Parks	Kakamas/ Keimoes/ Kenhardt	Implementation	P3.1d	12	1
	Upgrading of Botanical Garden/ Natural Reserve	Tierberg	Business Plan submitted	P3.2d	11	1
	Tourism Awareness Campaign	All wards	Planning	NA	11	1
	Development of day camping/ facilitiesnext to river	Keimoes	Pre-Planning	P3.3d	10	2
	Upgrading of Rooiberg/ Holiday Resort	Kenhardt	Business Plan Submitted	P3.4d	9	3
	Beautification of town entrances	Main Towns	Ongoing	P3.5d	8	3
	Development and Marketing of Tourism	N/A	Brochures available/ Website up and running	NA	8	3
	Xam tuga Celebrations	All Wards	Planning	NA	7	3
	Bird Watching Weekend	Kai !Garib	Planning	NA	6	4
	Christmas Celebrations	Main towns	Planning	NA	6	4
Municipal Capacity to implement the IDP and provide basic services - KPA 4 & 5					0	0
	Establishment of SDF	Kai !Garib	Planning	NA	11	1
	Establishment of Reaction plan to Earthquakes	Kai !Garib	Proposal submitted	NA	11	1
	Completion of zoning scheme	Kai !Garib	Not approved by Dom's LG	NA	10	2
Sport and recreational facilities and services - KPA 2					0	0
b la-b 501	Upgrading of Community Halls	All wards	Implementation	P6.1c	11	1
	Upgrading of sport grounds/ Phase 2	Keimoes/ Kakamas/ Kenhardt	Re-apply for funding	P6.1	10	2
	Sport & recreational facilities (in-house)	Keimoes	Pre-planning	P6.5	10	2
	Sport & recreational facilities (in-house)	Kakamas	Pre-planning	P6.6	10	2
	Upgrading of sport grounds/ Kr Lennertsville	Lennertsville	Planning	P6.2	9	3
	Upgrade of existing sport facilities	All Wards	Business plan submitted	P6.7	8	3
	Alheit Community Hall	Alheit	Pre-planning	P6.3	7	3
	Play grounds	Lennertsville	Pre-planning	P6.4	7	3
	Community Hall Kakamas	Kakamas	Pre-planning	P6.8	6	4
	Community Hall Keimoes	Keimoes	Pre-planning	P6.9	6	4
	Upgrading of existing Golf facilities	Keimoes	Re-apply for funding	P6.10	6	4
	Building of Cricket	Augrabies	Planning	P6.12	6	4
	Upgrading of Sport / wildpat Mission & Vredesvallei	Reinvasmaak	Pre-Planning	P6.13	6	4

B.a.3 National Parks	D.a Main Towns	D.h.3 Guest House	D.n Cemeteries	F.a National Roads
B.a.2 Private Conservation Areas	D.b Local Towns	D.h.4 Flats Residential Building	D.o Sport Fields and Infrastructure	F.b Main Roads
B.b.1 Fresh water Ecosystem Priority Areas	D.f.1 Place of Instruction	D.h.5 Mixed Density Residential Area	D.p Airport and Infrastructure	F.c Minor Roads
B.b.2 Rivers and Riverbeds (incl 32m buffer)	D.f.2 Place of Worship	D.h.7 Low Cost Housing	D.q Resort and Tourism Related Areas	F.d Public Streets
B.b.3 Other Natural Areas	D.f.3 Institution	D.h.8 Informal Housing	D.r Farmsteads and Outbuildings	F.f Railway Lines
B.c.1 Public Park	D.g.1 Government Uses	D.i.1 Business Premise	E.a Agricultural Industry	F.g Power Lines
B.c.2 Landscaped Areas	D.g.2 Municipal Uses	D.i.2 Shop	E.b Industrial Development Zone	F.i Renewable Energy Structure
C.a.2 Extensive Stock Farms	D.h.1 Single Residential House	D.j.1 Service Trade Industry	E.c.1 Light Industry I (Industrial Zone I)	F.j Dams and Reservoirs
C.b Intensive Agricultural Areas	D.h.10 Residential Estate	D.j.2 Service Station	E.c.2 Light Industry II (Industrial Zone II)	F.k Canals
C.b.1 Cultivated Areas	D.h.2 Group Housing	D.m Mixed Use Development Areas	E.d Heavy Industry	F.l Sewerage Plants and Refuse Areas

IDP Projects

- Agriculture development
- Cemeteries
- Electricity
- Housing
- Roads
- Sanitation
- Sport and recreational
- Tourism development
- Water

- URBAN EDGE
- ACTIVITY CORRIDOR: General Business
- ACTIVITY STREET: Tourism
- Canal
- NODE: Neighbourhood
- NODE: Speciality
- PRECINCT: CBD
- PRECINCT: Industrial
- PRECINCT: Tourism

ANNEXURE N: SACPLAN REGISTRATION CERTIFICATES

The South African Council for Planners
SACPLAN

REGISTRATION CERTIFICATE

Issued in terms of Section 13(4) of the Planning Profession Act, 2002
(Act 36 of 2002)

This is to Certify that

Len Jacobus Fourie

ID number: 7411095141083

is registered as a

Professional Planner

in terms of the Planning Profession Act, 2002 and is authorised to act as such in accordance with the said Act and the Rules prescribed thereunder.

Issued under the Seal of the Council

SACPLAN PROFESSIONAL PLANNER

CHAIRPERSON

REGISTRAR

REGISTRATION NUMBER:
A/1322/2006

Date of Issue: 22-10-2020

The registered person remains in good standing with SACPLAN for the period ending as stipulated herein.

This certificate is valid until: **30-06-2021**

Verification Number: fc65d50d229c61f2d0af96e3196a8d74

The South African Council for Planners
SACPLAN

REGISTRATION CERTIFICATE

Issued in terms of Section 13(4) of the Planning Profession Act, 2002
(Act 36 of 2002)

This is to Certify that

Justus Petrus Theron

ID number: 9106135096085

is registered as a

Professional Planner

in terms of the Planning Profession Act, 2002 and is authorised to act as such in accordance with the said Act and the Rules prescribed thereunder.

Issued under the Seal of the Council

SACPLAN PROFESSIONAL PLANNER

CHAIRPERSON

REGISTRAR

REGISTRATION NUMBER:
A/2394/2016

Date of Issue: 23-10-2020

The registered person remains in good standing with SACPLAN for the period ending as stipulated herein.

This certificate is valid until: **30-06-2021**

Verification Number: f794dceabbb603d5d727899ffbba78f8