



ERF 16, SAALSKOP (TOPLINE), KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE;

ERF 87, SAALSKOP (TOPLINE), KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE;

PLOT 2777, BOEGOEBERG SETTLEMENT, KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORHTERN CAPE PROVINCE;







Table of Contents

SECTION A: COMPREHENSIVE APPLICATION FORM	1
SECTION B: MOTIVATIONAL REPORT	14
1. INTRODUCTION	14
1.1. BACKGROUND	
1.2. CURRENT REALITY	
1.3. ASSIGNMENT	16
1.4. OBJECTIVE	
1.5. JURISDICTION	20
1.6. COMPLIANCE WITH PRINCIPLES	25
2. PLANNING CONSIDERATIONS	29
2.1. LOCATION OF STUDY AREA	29
2.2. PHYSIOGRAPHY	30
2.2.1. TOPOGRAPHY	30
2.2.2. SOIL/GEOLOGICAL CONDITIONS	30
2.2.3. FAUNA AND FLORA	30
2.3. INTEGRATED PLANNING	30
2.4. CHARACTER OF THE AREA	
2.5. INFRASTRUCTURE	31
2.5.1. WATER	31
2.5.2. SEWERAGE	32
2.5.3. ELECTRICITY	
2.5.4. STORM WATER	
2.5.5. ROAD NETWORK	
2.6. SIZE, ZONINGS AND REGULATIONS	
2.7. SUMMARY	
2.8. LAYOUT PRINCIPLES	
3. PROPOSED LAND USE CHANGE	
3.1. PLANNING APPROACH	
3.2. PUBLIC PARTICIPATION	
3.3. PROPOSED LAND USES	37
4. RECOMMENDATION	
4.1. APPROVAL OF THE APPLICATION	39
LIST OF FIGURES	
FIGURE 1: LOCALITY MAP OF THE REGION	18
FIGURE 2: LOCALITY MAP WITH AERIAL PHOTOGRAPH	19
FIGURE 3: GENERAL LAND USE MAP	21
FIGURE 4: PROPOSED SUBDIVISION & CONSOLIDATION	40
FIGURE 5: PROPOSED SUBDIVISION FOR HOUSING PROJECT	41
FIGURE 6: PROPOSED REZONING	42
LIST OF PHOTOS	
PHOTO 1: EXISTING SPORT FIELD	
PHOTO 2: INFORMAL HOUSES TO THE NORTH OF TOPLINE	
PHOTO 3: INFORMAL HOUSES ALONG WESTERN BORDER OF TOPLINE	
PHOTO 4: STORM WATER FURROWS THAT TRAVERSE THE STUDY	
	23

PHOTO 5: INFORMAL HOUSES TO THE SOUTH-WEST OF TOPLINEPHOTO 6: SOUTH-EASTERN SECTION TO BE DEVELOPED	24
LIST OF TABLES TABLE 1: BREAKDOWN OF PROPERTY INFORMATION.	16

LIST OF ANNEXURES

ANNEXURE A: COPY OF TITLE DEED

ANNEXURE B: AUTHORISING DOCUMENTATION

ANNEXURE C: SG DIAGRAM
ANNEXURE D: SERVICES REPORT
ANNEXURE E: DETAIL LAYOUT

ANNEXURE F: BOTANICAL ASSESSMENT ANNEXURE G: GEOTECHNICAL REPORT ANNEXURE H: HERITAGE ASSESSMENT ANNEXURE I: FRESH WATER REPORT ANNEXURE J: FINAL SCOPING REPORT ANNEXURE K: SANRAL NO-OBJECTION

ANNEXURE L: SDF MAP
ANNEXURE M: ZONING MAP

ANNEXURE N: SACPLAN REGISTRATION CERTIFICATES

SECTION A: COMPREHENSIVE APPLICATION FORM



97 Oranje Street Tel 054 833 9500 Fax 054 833 0690 E-Mail: fvaneck3@gmail.com

> Private Bag X2 Groblershoop 8850

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	Physical address:	4A Murray Avenue
	Upington		Upington
Code:	8800		8801
Tel no:	054 332 3642	Cell no:	082 821 1025
Terrio.	034 332 3042	Cell 110.	082 821 1024
Fax no:	054 332 4283		
SACPLAN	Len J. Fourie: Pr.Pln. A/1322/2006	E-mail address:	macroplan@mweb.co.za
	J.P. Theron: Pr. Pln. A/2394/2016	E-IIIdii duuless.	jptheron@mweb.co.za
Reg No:	(Annexure M)		

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)

1, 16 & 87, Saalskop ot 2777, Boegoeberg nent are owned by	Contact person:	Fanus van Eck	Marike Joubert
nent are owned by	Contact person:		
<u>.</u>	Contact person:		
II/le a i a			
!Kheis Local			
pality.			
Bag X2			
rshoop	Physical address:	97 Oranje Street	9 Cambridge Office Park
3 9500	Cell no:	082 662 2771	066 457 5755
	E-mail address:	fvaneck3@gmail.com	Marike@Barzanigroup.co.za
_	3 9500 3 0690		

If the applicant is not the registered owner(s), attach a power of attorney from the registered owner(s) to the application.



SECTION 3

Details of Property (In accordance with Title deed)

ERF 1, SAALSKOP, Kenhardt RD, Northern Cape Province (hence refer to as Erf 1, Saalskop);

ERF 16, SAALSKOP, Kenhardt RD, Northern Cape Province (hence refer to as Erf 16, Saalskop);

Erf / Farm No and portion description:

ERF 87, SAALSKOP, Kenhardt RD, Northern Cape Province (hence refer to as Erf 87, Saalskop);

Plot 2777, Boegoeberg Settlement, !Kheis Municipality, Kenhardt RD, Northern Cape Province (hence refer to as Plot 2777, Boegoeberg Settlement);

The involved properties forms the town commonage of Topline, as such no physical address are allocated thereto. The locality of the involved properties can be described as follows:

Erf 1, Saalskop: Borders to the west of the town of Topline;

Physical address of erf/farm:

Erf 16, Saalskop: Border to the southwest of Topline;

Erf 87, Saalskop: Borders to the north of Topline and runs along the N10;

Plot 2777, Boegoeberg Settlement: Surrounds the town of Topline to the north, west and south.

Location from nearest town:

The portions of the properties involved in this submission are located within the demarcated urban edge of

Erf 1, Saalskop: 51.7143ha;

Erf 16, Saalskop: 3.3515ha;

Area

(m² or ha): Erf 87, Saalskop: 10.3301ha;

> Plot 2777, Boegoeberg Settlement: 3112.8062ha,

Erf 1, Saalskop: Residential Zone IV;

Erf 16, Saalskop: Undetermined Zone;

Erf 87, Saalskop: The portion of this property that is applicable to this submission is zoned as Residential Zone IV;

Existing Zoning:

Plot 2777, Boegoeberg Settlement: The portion of this property that is applicable to this submission is zoned as Agricultural Zone I

Existing land use:

Erf 1, Saalskop: The portion of this property that is applicable to this submission is partially utilised by informal



	Topline.		housing, whilst the remaining section is
			vacant;
			Erf 16, Saalskop: Undeveloped for the
			most part, except for a few in formal
			houses;
			Erf 87, Saalskop: The portion of this
			property that is applicable to this
			submission is completely occupied by
			informal housing;
			Plot 2777, Undeveloped for the most part,
			except for a few informal houses.
			Erf 1, Saalskop: 23.5ha of this property will
			be affected by the proposed processes of
			residential formalisation and expansion;
			residential formalisation and expansion,
			Erf 16, Saalskop: 1.5ha of this property will
			be affected by the proposed processes of
			residential formalisation and expansion;;
Town/ suburb:	Within Topline.	Area applicable to	
Towny suburb.	within ropinie.	application:	Erf 87, Saalskop: 2ha of this property will
			be affected by the proposed processes of
			residential formalisation and expansion;
			Plot 2777, Boegoeberg Settlement: 2ha of
			this property will be affected by the
			proposed processes of residential
			formalisation and expansion.
			Erf 1, Saalskop: T11369/1994;
			Erf 16, Saalskop: T15487/2001;
			, 544.5.55 15 10//2001,
Registration Division:	Kenhardt RD	Title deed no:	Erf 87, Saalskop: T22879/1999;
			Plot 2777, Boegoeberg Settlement:
			T81655/2002.
			(Annexure A)
			<u> </u>

SECTION 4

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

Application for:

(Please mark applicable block with a cross)

The establishment of a township or the extension of the boundaries of a township.	
The rezoning from one zone to another	х
The removal, amendment or suspension of a restrictive or obsolete condition, servitude or reservation registered against the title of the land.	
The amendment or cancellation a general plan or SG Diagram	
The closure of any public place or road and street reserves	
The secondary use as provided for in the regulations (not supported by SDF)	
The departure from the development parameters of the zoning scheme	
The departure to use land for a purpose not provided for in the zoning scheme granted on a temporary basis	
The secondary use as provided for in the regulations (supported by SDF)	
The subdivision of land	х
The registration of a servitude	
The consolidation of land	х
The extension of the validity period of an approval	
The application for the exemption of subdivision and consolidations as provided for in the regulations	
Any other application not provided for in the table above	

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 formalisation and expansion project for Topline.

Topline has experienced normal population growth over the past few years, however, the provision for additional registered residential properties were never established to accommodate the population growth in Topline. Residents have subsequently resorted to informal housing by means of occupying municipal or state owned land without undergoing the necessary town planning processes. COGHSTA is currently in the process of addressing the **housing backlog** within the Northern Cape, with numerous township establishment projects already identified of which the communities of the !Kheis Local Municipality forms part of.



The proposed Topline formalisation and expansion project entails the provision of 247 residential properties, as well as land uses normally associated township expansion, such as institutional uses, municipal uses and business premises. The goal of this application is to obtain approval for the necessary town planning processes that are needed for formalisation of existing informal residential stands, make provision for residential expansion, incorporate land uses such as business, institutional (churches), municipal and recreational uses, whilst providing a coherent internal road network that promotes easy and accessible movement throughout.

In order for the planned Topline formalisation and expansion project to take place, the following land use changes are required:

1. SUBDIVISION: (See Figure 4):

- 1.1. Subdivision of a 1.5ha portion of Erf 16, Saalskop:
- 1.2. Subdivision of a 2ha portion of Erf 87, Saalskop;
- 1.3. Subdivision of a 7ha portion of Plot 2777, Boegoeberg Settlement.

2. CONSOLIDATION (See Figure 5):

2.1. Consolidation of the newly subdivided portions of land, as mentioned under §1.1 - 1.3, with Erf 1, Saalskop into an individual land unit.

3. SUBDIVISION (See Figure 6):

3.1. Subdivision of the newly consolidated land unit, into 266 individual cadastral land units. Please note that the proposed subdivision will not adversely affect the previous surveyed properties created from the involved properties that still need to be registered at the Deeds Office.

4. REZONING (See Figure 7):

4.1. 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 Topline formalisation and expansion project. The proposed zonings, in terms of the newly adopted !Kheis 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	370		
Business Zone I	Business Premises	1		
Institutional Zone II	Place of Worship	1		
Open Space Zone II	Public Open Spaces	12		
Transport Zone I	Public Street	1		
Authority Zone I	Municipal Uses	1		
Undetermined Zone	Undetermined 1			
Total		266		

Please refer to Figures 4, 5 & 6, Annexure E, $\S 2.8 \& \S 3.3$ 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 portions of the involved properties applicable to this submission have been occupied by informal stands to some extent.
Is the current zoning of the land utilised?		NO	If answered NO, what is the application / use of the land?	This application will rectify the discrepancy between land uses and zoning, causes by the establishment of informal houses.
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?	YES		If answered YES, when and provide particulars, including all authority reference numbers and decisions:	Erven 1 & 87, Saalskop were subject to processes of land use change in the past. The land use changes proposed by this application will not impede on the previous land use changes.
Does the proposal apply to the entire land unit?		NO	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:	Erf 1, Saalskop: 23.5ha of this property will be affected by the proposed processes of residential formalisation and expansion; Erf 16, Saalskop: 1.5ha of this property will be affected by the proposed processes of residential formalisation and expansion;; Erf 87, Saalskop: 2ha of this property will be affected by the proposed processes of residential formalisation and expansion; Plot 2777, Boegoeberg Settlement: 2ha of this property will be affected by the proposed processes of residential formalisation and expansion.

			A total of 29ha is therefore applicable to this submission.
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	YES	If answered YES, please provide detail description:	N/A
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 have been conducted on account of the Topline formalisation and expansion project. 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 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) concluded that the development site is intermediately suitable for residential development; 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

				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 had to be obtained in relation to the proposed residential development and they are as follow: Environmental Authorisation: The final scoping report (Annexure J) has been submitted to DENC. The processing of the application has been limited, due to the Covid-19 protocols that have been enforced by the Department of Environment and Nature Conservation. This application for land use change is therefore submitted without the EA; Sanral: KInfly see Annexure K for Sanral no-objection. The !Kheis Municipality has granted permission to submit this application and commence with the public participation process without the Environmental Authorisation. It should however be noted that this application will not proceed beyond the public participation process until the environmental authorisation has been obtained. Kindly note that the involved property is registered in the ownership of the !Kheis Municipality and therefore the input from the Department of Agriculture is not required.

Water supply:		ply:	BVI Consulting Engineering has been appointed to conduct a detailed sometime report (Annexure D) for Topline formalisation and expansion project services report investigated the current bulk services capacity, determined to accommodate the proposed expansion project and solutions to obtain the required funding to implement the necessary up to the bulk services infrastructure. The findings of the services report provision of this service are as follow:	ect. The ned the I sought pgrades
			"In conclusion, the engineering services are not in place (water and sewer) the standard requirements. The infrastructure will have to be upgraded reg of the implementation of the Topline 248 houses development in order to current and expected future needs. The upgrading should be done in such as to take into consideration the Topline 248 Houses development."	gardless to meet h a way
			Kindly refer to the services report for more detail on the proposed upgramunicipal infrastructure.	iding of
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.			Funding can be applied for through the Municipal Infrastructure Gran and Regional Bulk Infrastructure Grant (RBIG). For repair work at the treatment works, the Water and Sanitation Infrastructure Grant (WSIG) to be applied for.	e water
	supply:	BVI Consulting Engineering has been appointed to conduct a detailed sometime report (Annexure D) for Topline formalisation and expansion project services report investigated the current bulk services capacity, determined to accommodate the proposed expansion project and solutions to obtain the required funding to implement the necessary up to the bulk services infrastructure. The findings of the services report provision of this service are as follow:	ect. The ned the I sought pgrades	
		"In conclusion, the engineering services are not in place (water and sewer) the standard requirements. The infrastructure will have to be upgraded reg of the implementation of the Topline 248 houses development in order to current and expected future needs. The upgrading should be done in such as to take into consideration the Topline 248 Houses development."	gardless to meet	
			Kindly refer to the services report for more detail on the proposed upgramunicipal infrastructure.	ading of
			Funding can be applied for through the Municipal Infrastructure Gran and Regional Bulk Infrastructure Grant (RBIG). For repair work at the	



		treatment works, the Water and Sanitation Infrastructure Grant (WSIG) can also be applied for.
	Sewerage and waste-water:	BVI Consulting Engineering has been appointed to conduct a detailed services report (Annexure D) for Topline formalisation and expansion project. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the proposed expansion project 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 this service are as follow:
		"In conclusion, the engineering services are not in place (water and sewer) to meet the standard requirements. The infrastructure will have to be upgraded regardless of the implementation of the Topline 248 houses development in order to meet current and expected future needs. The upgrading should be done in such a way as to take into consideration the Topline 248 Houses development."
What arrangements will be		Kindly refer to the services report for more detail on the proposed upgrading of municipal infrastructure.
made regarding the following services for the development? (Full Engineering Reports must be supplied, where		Funding can be applied for through the Municipal Infrastructure Grant (MIG) and Regional Bulk Infrastructure Grant (RBIG). For repair work at the water treatment works, the Water and Sanitation Infrastructure Grant (WSIG) can also be applied for.
applicable). If services will be provided by the Municipality, proof of input from departments must be included as Annexure to the application.	Storm-Water:	Storm water drainage will take place above ground, in natural furrows and along the streets of the proposed layout. The layout plan has been designed to accommodate all storm water furrows identified in the Freshwater Report, as well as align with the general topography of the development site. No Problems are expected in this regard.
	Road Network:	The Topline formalisation and expansion layout exhibits an extended internal road network that functionally link with the existing road network of Topline. The proposed residential development will effectively link with the existing road network of Topline via numerous connections. The existing collector and arterial roads of Topline will extent into the applicable portions of land, which forms the development site of this application. A hierarchy of road types have been designed throughout the planned town planning layout, in order to promote accessibility and mobility.
		This housing projects does not propose any new direct accesses to a provincial or national road. The study area extends well beyond the development alignment along the N10 National Road. Sanral has been notified of the planned formalisation and expansion project and their no-objection is attached as

Annexure K to this submission.

SECTION 6

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

				Checklis		
			Checklist (for the completion by the Applicant only)	Respon	nsible A	<u>uthorit</u>
					only)	
/ES	NO	ANNEXURE	DOCUMENT ATTACHED	YES	NO	N/A
X		Section A	Completed Comprehensive Application form			
X		Section B	Complete Motivation Report			
Х		§2.3	Alignment to the Provincial, District and Municipal SDFs			
	х		Public participation report (minutes of meetings, copies of advertisement, etc.)			
Х		Annexure B	Power of Attorney (Board of Directors' / Trustees' resolution / consent)			
x		Annexure A	Copy of Title Deed(s)			
	х		Mortgage holder's consent			
х		Annexure C	Cadastral information – diagram/General Plan including servitudes, lease areas,			
*		Aillexure C	etc.			
	х		Status report from Surveyor General – street closure or state owned land			
х		Figure 4	Topographic map/ aerial map			
х		Figure 1 & 2	Locality Map			
х		Annexure E	Site Plan			
х		Annexure M	Zoning Map			
	х		Zoning Certificate			
х		Figure 4	Land Use Map			
	х		Conveyancer's certificate			
	х		Special endorsement/proxy			
	х		Home Owners' Association consent			
х		Annexure E	Proposed design/layout plan			
х		Figure 5	Proposed subdivision plan			
	х		Proposed consolidation plan			
	х		Proposed development plan			
		Mineral rights certificate (together with mineral holder's consent) and				
	Х		prospecting contract			
	х		Mineral impact assessment (MIA)			
			Environmental Impact Assessment (EIA – EA) including Heritage Impact			
x		Annexure J (Final	Assessment (approval from Dept Sport, Arts and Culture) and Archaeological			
		Scoping Report)	Impact Assessment (AIA) (approval from relevant Department - SAHRA)			
х		Annexure D	Detail Engineering Services report (Bulk and internal)			
Х		Annexure K	Traffic impact study (SANRAL & DRPW no-objections)			



х		Annexure G	Geo-technical report (including geology) report (NHRB Standards)		
	х		Social impact assessment		
	х		Flood line assessment (1:50 and 1:100 years)		
	х		Coastal setback report (consent from Dept of Environmental Affairs)		
	х		Subdivision of agricultural land (consent of the Dept of Agriculture)		
	х		List of sections in Title Deed conditions to be removed /amended		
х		Annexure N	Adherence to planning legislation including the Planning Profession Act 36 of 2002		
х			At least three (3) sets of full colour documentation copies		

SECTION 7

Declaration

Note: If application is made by a person of	ther than the owner, a Power of $ ho$	Attorney is comp	oulsory	. If th	e prop	erty	is (owned	l by m	ore
than one person, the signature of each owner	is compulsory. Where the prope	rty is ov	vned b	y a c	отра	ny, tro	ust, o	r othe	er juris	stic
person, a certified copy of the Board of Directo	ors/Trustees' resolution is comp	oulsory.								
I hereby certify the information supplied in t	his application form to be comp	lete and correc	t and	that I	am pr	operly	autho	orised	to ma	ake
this application.										
Applicant's / Owner's Signature:	Pheron	Date:	2	0	2	0	1	0	2	5
Full name (print):	Justus Petrus Theron			II	II	1			1	Į.
Professional capacity:	Professional Town and Re	gional Planner								
Applicant's ref:	Pr. Pln. A/2394/2016									
Applicant's / Owner's Signature:	J. June	Date:	2	0	2	0	1	0	2	5
Full name (print):	Len Jacobus Fourie	<u> </u>								
Professional canacity:	Professional Town and Re	gional Planner	– Seni	or Tov	vn Plai	nner				

SECTION 8

Pr.Pln. A/1322/2006

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	DOCUMENTATION TO BE PROVIDED AS F			
		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.		



Applicant's ref:

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. Public Meeting	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. Proof of Public Meeting
Note: The holding of a public meeting in order to inform the general public of the application. Any Additional components:	The applicant must provide proof of the agenda, the attendance register and minutes of the meeting to the Responsible Authority. Proof of additional components:

SECTION B: MOTIVATIONAL REPORT

1. INTRODUCTION

1.1. BACKGROUND

GENERAL BACKGROUND



The Northern Cape Province is currently experiencing growth and development in a number of the urban centres throughout the province. The downscaling and slowing of the general economic market of South Africa, is however countered by development in the Renewable Energy field in some areas of the Northern Cape Province. This is due to the fact that a lot of the focus areas of the Renewable Energy Zones, are based in the mentioned province and brought new

development opportunities through diversification. The diversification brought about by this economic sector has benefitted existing and new businesses/ industries and moved the primary focus of some Municipal areas away from the normal agriculture, mining and tourism basis.

The !Kheis Local Municipality which is situated alongside the mighty Orange River, was able to benefit from intensive agricultural activities and growth in this sector. In the context of the aforementioned, urban centres in the municipality clustered around the Orange River with Groblershoop having become the seat of local governance and primary town. The growth in the agricultural sector of !Kheis has not only had an economic impact, but has also led to an increase in the population of the municipality where it could be expected that such increase took place both in the form of immigration and natural growth. This, in turn, has caused for an escalated need for housing opportunity, especially in the Groblershoop area. Less significant population growth has been experience within the town of Topline, with this town forming the focus of this application for land use change.

The provision for additional registered residential properties were never established to accommodate the population growth in Topline, subsequently residents have resorted to informal housing by means of occupying municipal or state owned land without undergoing the necessary town planning processes. COGHSTA is currently in the process of addressing the housing backlog within the Northern Cape, with numerous township establishment projects already identified of which the communities of the !Kheis Local Municipality forms part of.



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 provision of sub-economic housing for the ever-growing population of Topline are proposed. The application seeks to obtain the necessary land use change approval for the creation of 247 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 Topline 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 as to allow the District Municipal Planning Tribunal to make informed decisions.

1.2. CURRENT REALITY

The undertaking of the township establishment project, consisting of 247 residential erven, for the Topline Community by Macroplan derives from an indirect appointment by COGHSTA and is therefore a project of national and provincial importance. The development site comprise of sections of Erven 1, 16 & 87, Saalskop and Plot 2777, Boegoeberg Settlement that can be best described as outlining the existing town of Topline. The involved properties are held under the ownership of the !Kheis Municipality, and a total of 29ha will be subject to land use changes. 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 150 informal stands currently exists in the town of Topline that will be formalised as part of this township establishment project, whilst an additional 97 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.

It should be noted the involved properties have been subject to processes of land use change in the past, with the registration of these erven completed at office of the Chief Surveyor General, but the registration at the Deeds Office were never finalised. This application for land use change will not have any effect on the previous land use changes conducted on the involved properties.

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), !Kheis SPLUMA By-laws & the !Kheis Land Management Scheme are as follow:

- 1. Formalise the existing informal stands currently established on the study area;
- 2. Provide additional residential properties for future population increases;
- 3. Incorporate land uses normally associated with residential expansion, such as institutional, recreational and business uses;
- 4. Create a coherent internal road network that adequately links to the existing road network of Topline.



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

Property Description	Property Size	Land Use	Zoning Status Quo (Applicable to the
			involved land portions)
Erf 1, Saalskop	51.7143ha	The portion of this property	Residential Zone IV
		that is applicable to this	
		submission is partially utilised	
		by informal housing, whilst the	
		remaining section is vacant.	
Erf 16, Saalskop	3.3515ha	Undeveloped for the most part,	Undetermined Zone
		except for a few in formal	
		houses.	
Erf 87, Saalskop	10.3301ha	The portion of this property	Residential Zone IV
		that is applicable to this	
		submission is completely	
		occupied by informal housing.	
Plot 2777, Boegoeberg	3112.8062ha	Undeveloped for the most part,	Agricultural Zone I
Settlement		except for a few informal	
		houses.	

Table 1: Breakdown of property information.

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

In order to achieve the objective of providing sub-economic housing for the town of Topline, this formal land use change application, pertaining to consolidation, subdivision & rezoning, is submitted to the !Kheis Local Municipality as municipality of first instance. This application for land use change (consolidation, subdivision & rezoning) is therefore submitted to the !Kheis 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 formalisation and expansion of Topline. The appointment letter from Barzani Development, as well as the preceding appointment letter from the !Kheis 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 4):
 - 1.1. Subdivision of a 1.5ha portion of Erf 16, Saalskop:
 - 1.2. Subdivision of a 2ha portion of Erf 87, Saalskop;
 - 1.3. Subdivision of a 7ha portion of Plot 2777, Boegoeberg Settlement.
- 2. CONSOLIDATION (See Figure 5):
 - 2.1. Consolidation of the newly subdivided portions of land, as mentioned under §1.1 1.3, with Erf 1, Saalskop into an individual land unit.

3. SUBDIVISION (See Figure 6):

3.1. Subdivision of the newly consolidated land unit, into 266 individual cadastral land units. Please note that the proposed subdivision will not adversely affect the previous surveyed properties created from the involved properties that still need to be registered at the Deeds Office.

4. REZONING (See Figure 7):

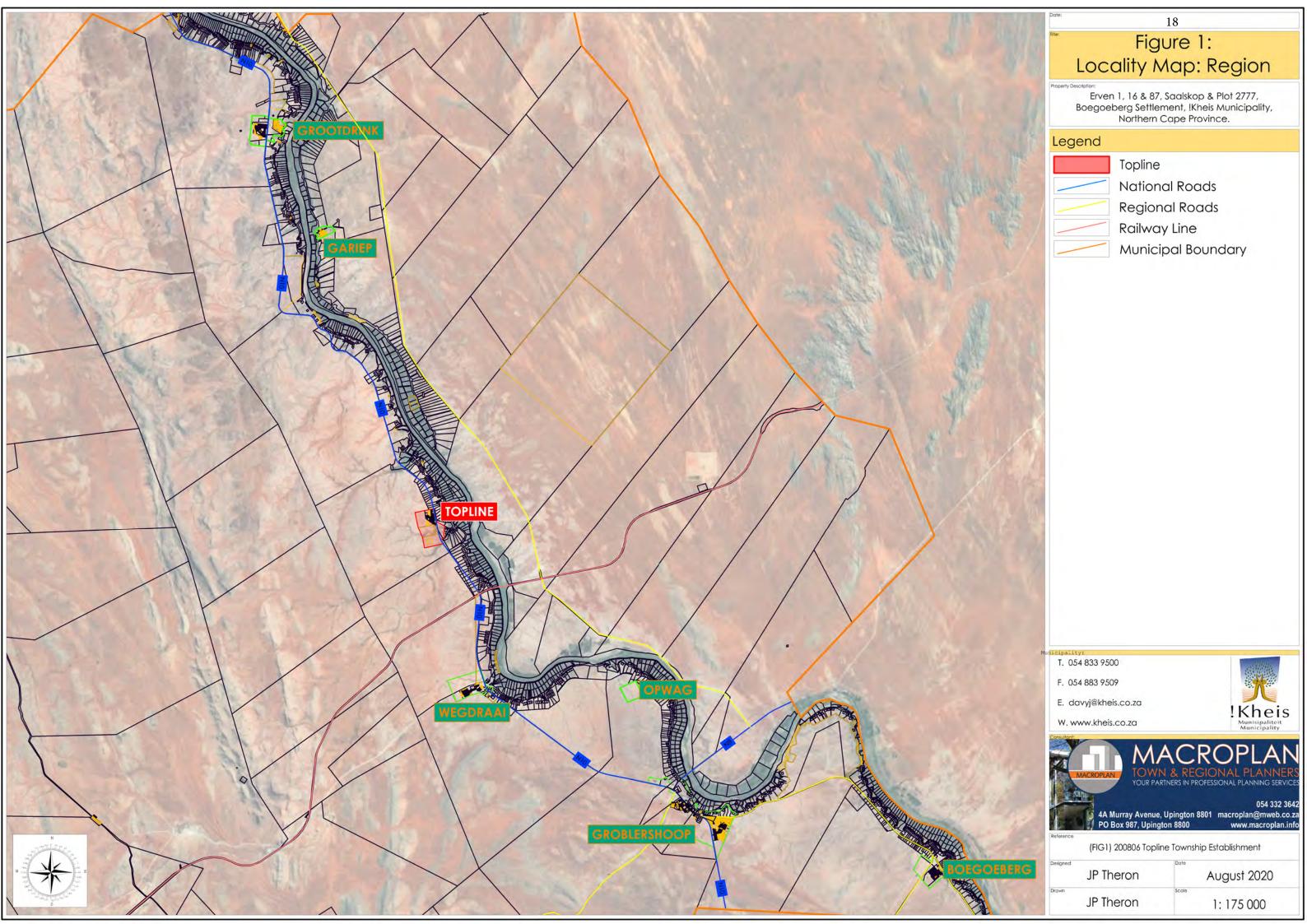
4.1. Rezoning of the newly created properties, thereby allocating appropriate land use rights to each of the newly created individual erven suitable to their future purpose within the Topline formalisation and expansion project. The proposed zonings, in terms of the newly adopted !Kheis Scheme Regulations, are as follow and should be read together with the final layout plan attached as Annexure E to this submission:

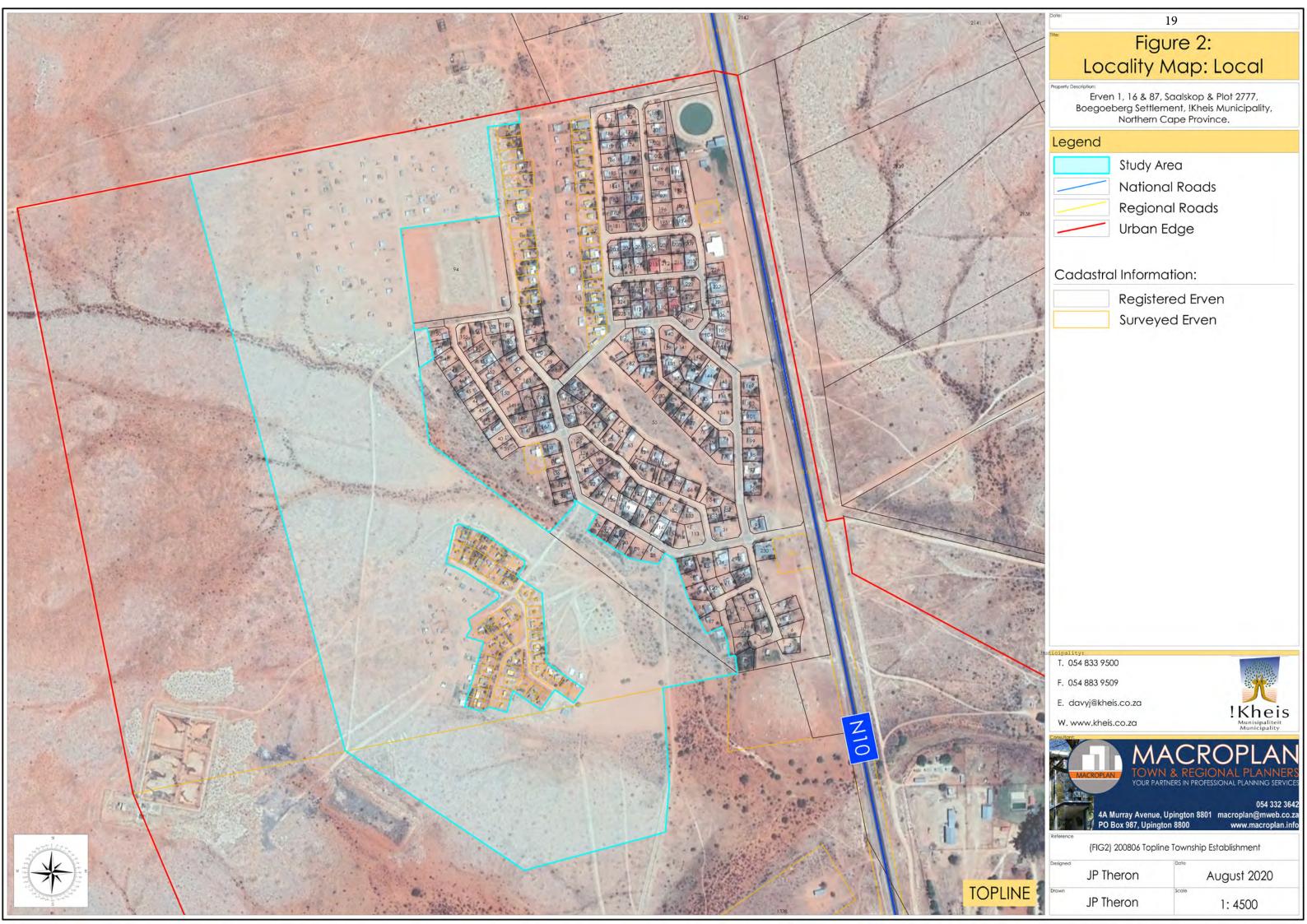
Zoning	Primary Use/s	Erven Amount
Residential Zone I	Residential House	370
Business Zone I	Business Premises	1
Institutional Zone II	Place of Worship	1
Open Space Zone II	Public Open Spaces	12
Transport Zone I	Public Street	1
Authority Zone I	Municipal Uses	1
Undetermined Zone	Undetermined	1
Total		266

Please refer to Figures 4, 5 & 6, Annexure E, §2.8 & §3.3 of this report for more information in this regard.

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







1.5. JURISDICTION

The !Kheis Municipality recently approved the all-inclusive Land Use Management System (LUMS) for the entire !Kheis Local Municipal area, as such the entire municipal area will make use of the same planning policy and municipal SPLUMA by-laws. The !Kheis LUMS has been informed, guided and developed in terms of SPLUMA and will also be enacted in these terms. §26 of SPLUMA 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 follows:

§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.

The !Kheis Municipality has established its own decision-making authority in terms of the parameters of SPLUMA. In the light of the above, this land use application is submitted to the !Kheis Municipality as the authority of first instance, for processing, administration and subsequent referral to the relevant decision-making authority.



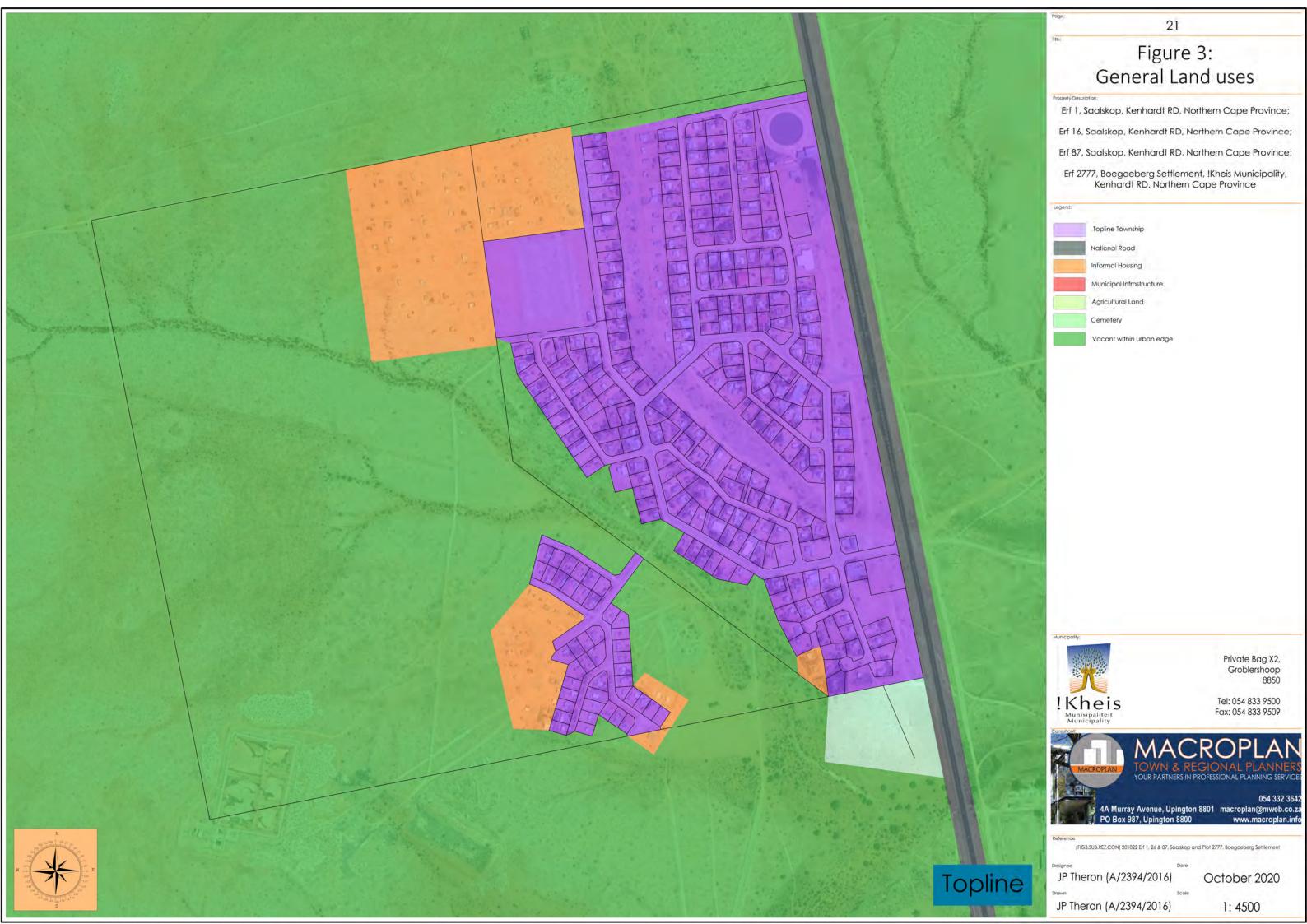


Photo 1: Existing Sport field



The existing sport field that is being used by the Topline community can be seen in the photo above, as seen north-westerly direction. This sport field will be formalised as part of this application, thereby securing the recreational purpose this land use provides the community.



Photo 2: Informal houses to the north of Topline

The informal houses to the north of Topline can be seen in the image above, as seen from a southerly direction. these informal houses are position in a grid pattern and can therefore be formalised on their existing location.



Photo 3: Informal houses along western border of Topline



The informal houses along the western border of Topline can be seen in the image above, as seen from a northerly direction. The favourable formation in which these houses have been positioned will allow for minimum relocation of movement.



Photo 4: Storm water furrows that traverse the study

One of the storm water furrows that traverse the study area can be seen in the image above, as seen from a south-westerly direction. These storm water furrows have been incorporated within the layout plan through large open spaces.



Photo 5: Informal houses to the south-west of Topline



One of the informal houses situated to the south-west of Topline can be seen in the image above, as seen from a north-easterly direction. It is evident from the photo above that the topography is suitable for normal township establishment.



Photo 6: South-eastern section to be developed

In the image above the close proximity of the informal houses to the existing town of Topline can be seen. This is a result of normal population growth over the years, without registered properties being provided to accommodate this growth.



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
- 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 formalisation of existing informal properties and provision of additional residential erven will address past spatial and other development imbalance, since integration will be achieved 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 department; 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 !Kheis Municipality is the registered landowner of the land units involved in this submission for land use change, as such the involved properties are 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 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;



(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 !Kheis 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 township expansion falls under the jurisdiction of the !Kheis Municipality, as such the provision of services will be the responsibility of the !Kheis Municipality. A services report was compiled on the basis of the proposed residential expansion, with the general findings being that the existing bulk service infrastructure is not sufficient to accommodate the additional erven. The !Kheis 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 study area is confined by the urban edge of Topline, as such this application does not contribute to urban sprawl. In terms of sustainability the study area is also included in the !Kheis Spatial Development Framework.

(vii) Result in communities that are viable.

Relevance: This application does not include any land use changes that will cause the developments on the properties to be at odds with the SDF, it is therefore perceivable that it will not have an adverse effect on the Topline 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 and Land Use Management Scheme of the !Kheis 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 had to be obtained in relation to the proposed residential development and they are as follow:

• Environmental Authorisation: The final scoping report (Annexure J) has been submitted to DENC. The processing of the application has been limited, due to the Covid-19 protocols that have been enforced by the Department of Environment and Nature Conservation. This application for land use change is therefore submitted without the EA;



• Sanral: See Annexure K for the no-objection from Sanral.

The !Kheis Municipality has granted permission to submit this application and commence with the public participation process without the Environmental Authorisation, Sanral no-objection. It should however be noted that this application will not proceed beyond the public participation process until the environmental authorisation and Sanral no-objection have been obtained. Kindly note that the involved property is registered in the ownership of the !Kheis Municipality and therefore the input from the Department of Agriculture is not required.

(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 Land Use Management Scheme of the !Kheis 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 !Kheis 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 northernmost municipalities in the province. The urban heart of the municipality may be described as being Groblershoop, which is located in the north-eastern sections of the municipality on the banks of the Orange River.

This application for land use change pertains to the small rural town of Topline, with this settlement nestled between the other !Kheis communities. Topline is furthermore located next to the N10 national road and approximately 25km north-north-west of Groblershoop. The study area of this application consist of portions of four registered land units, with the collective surrounding Topline to the north, south and west. The coordinates for the center of the study area is as follows:

Lat: 28°45'16.22"S

Long: 21°50'18.44"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 Topline formalisation and expansion project necessitated the completion of numerous specialist studies that inform the Environmental Impact Assessment. The assessment has scrutinised the area earmarked for expansion, thereby addressing the physiography in more detail. The draft 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 Topline formalisation and expansion project. The Geological Report (Annexure G) concluded that the study area is intermediately suitable for normal township expansion, with the study area being classified under geotechnical zones I, II & III. These geotechnical zones have intermediate development potential and the construction type thereof is normal. No problems are expected in this regard.

2.2.3. FAUNA AND FLORA

The proposed Topline formalisation and expansion project 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. No problems are anticipated in this regard.

2.3. INTEGRATED PLANNING

The Spatial Planning and Land Use Management Act (Act 16 of 2013) stipulates that each Municipality must prepare a spatial development framework (SDF) that interprets and represents 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 District 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).



!KHEIS SPATIAL DEVELOPMENT FRAMEWORK:

The !Kheis SDF was revised in 2016 to align with the principles of the Spatial Planning and Land Use Management Act (Act 16 of 2013) and has since been a valid and weight bearing document for spatial guidance. The SDF of the !Kheis Municipality adheres to the basic SDF requirements as stipulated in the Spatial Planning and Land Use Management Act (Act 16 of 2013), therefore providing a potential investor with adequate information to plan a development according to the spatial vision of the municipality.

Within the !Kheis SDF, the portions of land identified for the Topline formalisation and expansion project falls within the urban edge of Topline and has furthermore been earmarked (See Annexure L) for low-cost housing, as such the development proposal is in line with the spatial vision of Topline.

2.4. CHARACTER OF THE AREA

As mentioned throughout this report, the study area comprise of land portions, which serve as the town commonage of Topline and is located on the periphery of this town. This locale contributes to a strong contrast between vacant areas and built-up areas. An estimate of 150 informal stands can also be located on the involved portions of land, as such a strong residential character has already been established on the study area. All of the land portions that translate to the study area of this application borders to the existing developments of Topline. The development proposal will therefore fit well in with the existing residential character brought forth by the existing town of Topline.

2.5. INFRASTRUCTURE

2.5.1. WATER

BVI Consulting Engineering has been appointed to conduct a detailed services report (Annexure D) for Topline formalisation and expansion project. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the proposed expansion project 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 this service are as follow:

"In conclusion, the engineering services are not in place (water and sewer) to meet the standard requirements. The infrastructure will have to be upgraded regardless of the implementation of the Topline 248 houses development in order to meet current and expected future needs. The upgrading should be done in such a way as to take into consideration the Topline 248 Houses development."

Kindly refer to the services report for more detail on the proposed upgrading of municipal infrastructure.



Funding can be applied for through the Municipal Infrastructure Grant (MIG) and Regional Bulk Infrastructure Grant (RBIG). For repair work at the water treatment works, the Water and Sanitation Infrastructure Grant (WSIG) can also be applied for

2.5.2. SEWERAGE

BVI Consulting Engineering has been appointed to conduct a detailed services report (Annexure D) for Topline formalisation and expansion project. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the proposed expansion project 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 this service are as follow:

"In conclusion, the engineering services are not in place (water and sewer) to meet the standard requirements. The infrastructure will have to be upgraded regardless of the implementation of the Topline 248 houses development in order to meet current and expected future needs. The upgrading should be done in such a way as to take into consideration the Topline 248 Houses development."

Kindly refer to the services report for more detail on the proposed upgrading of municipal infrastructure.

Funding can be applied for through the Municipal Infrastructure Grant (MIG) and Regional Bulk Infrastructure Grant (RBIG). For repair work at the water treatment works, the Water and Sanitation Infrastructure Grant (WSIG) can also be applied for.

2.5.3. ELECTRICITY

BVI Consulting Engineering has been appointed to conduct a detailed services report (Annexure D) for Topline formalisation and expansion project. The services report investigated the current bulk services capacity, determined the needed upgrades to accommodate the proposed expansion project 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 this service are as follow:

"In conclusion, the engineering services are not in place (water and sewer) to meet the standard requirements. The infrastructure will have to be upgraded regardless of the implementation of the Topline 248 houses development in order to meet current and expected future needs. The upgrading should be done in such a way as to take into consideration the Topline 248 Houses development."

Kindly refer to the services report for more detail on the proposed upgrading of municipal infrastructure.



Funding can be applied for through the Municipal Infrastructure Grant (MIG) and Regional Bulk Infrastructure Grant (RBIG). For repair work at the water treatment works, the Water and Sanitation Infrastructure Grant (WSIG) can also be applied for

2.5.4. STORM WATER

Storm water drainage will take place above ground, in natural furrows and along the streets of the proposed layout. The layout plan has been designed to accommodate all storm water furrows identified in the Freshwater Report, as well as align with the general topography of the development site. No Problems are expected in this regard.

2.5.5. ROAD NETWORK

The Topline formalisation and expansion layout exhibits an extended internal road network that functionally link with the existing road network of Topline. The proposed residential development will effectively link with the existing road network of Topline via numerous connections. The existing collector and arterial roads of Topline will extent into the applicable portions of land, which forms the development site of this application. A hierarchy of road types have been designed throughout the planned town planning layout, in order to promote accessibility and mobility.

This housing projects does not propose any new direct accesses to a provincial or national road. The study area extends well beyond the development alignment along the N10 National Road. Sanral has been notified of the planned formalisation and expansion project and their no-objection is attached as Annexure K to this submission.

2.6. SIZE, ZONINGS AND REGULATIONS

The development site pertains to portions of Erf 1, 16 & 87, Saalskop and Plot 2777, Boegoeberg Settlement, Kenhardt RD, !Kheis Municipality, Northern Cape Province, and cover a total area of 29ha. The !Kheis Local Municipality is the registered owner of the properties involved in this submission. According to the !Kheis Land Use Management Scheme the zoning of the involved portions of land are as follow:

- Erf 1, Saalskop: Residential Zone IV;
- Erf 16, Saalskop: Undetermined Zone;
- Erf 87, Saalskop: Residential Zone IV;
- Plot 2777, Boegoeberg Settlement: Agricultural Zone I

The current utilisation of the involved portions of land are as follows:

- Erf 1, Saalskop: Partially utilised by informal housing, whilst the remaining section is vacant;
- Erf 16, Saalskop: Undeveloped for the most part, except for a few in formal houses;
- Erf 87, Saalskop: Completely occupied by informal housing;
- Plot 2777, Boegoeberg Settlement: Undeveloped for the most part, except for a few informal houses.



It should be noted the involved properties have been subject to processes of land use change in the past, with the registration of these erven completed at office of the Chief Surveyor General, but the registration at the Deeds Office were never finalised. This application for land use change will not have any effect on the previous land use changes conducted on the involved properties.

The purpose of this application is to obtain the approval of the necessary land use changes needed for the formalisation of existing informal residential properties, provide additional erven for future population growth and provide supportive uses, such as institutional, business and municipal uses.

The following land use changes have to be followed:

- 1. SUBDIVISION: (See Figure 4):
 - 1.1. Subdivision of a 1.5ha portion of Erf 16, Saalskop:
 - 1.2. Subdivision of a 2ha portion of Erf 87, Saalskop;
 - 1.3. Subdivision of a 7ha portion of Plot 2777, Boegoeberg Settlement.

2. CONSOLIDATION (See Figure \$):

2.1. Consolidation of the newly subdivided portions of land, as mentioned under §1.1 - 1.3, with Erf 1, Saalskop into an individual land unit.

3. <u>SUBDIVISION (See Figure 5)</u>:

3.1. Subdivision of the newly consolidated land unit, into 266 individual cadastral land units. Please note that the proposed subdivision will not adversely affect the previous surveyed properties created from the involved properties that still need to be registered at the Deeds Office.

4. REZONING (See Figure 6):

4.1. 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 Topline formalisation and expansion project. The proposed zonings, in terms of the newly adopted !Kheis 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	370
Business Zone I	Business Premises	1
Institutional Zone II	Place of Worship	1
Open Space Zone II	Public Open Spaces	12
Transport Zone I	Public Street	1
Authority Zone I	Municipal Uses	1
Undetermined Zone	Undetermined	1
Total		266



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

In order to achieve the objective of providing sub-economic housing for the town of Topline, this formal land use change application, pertaining to consolidation, subdivision & rezoning, is submitted to the !Kheis Local Municipality as municipality of first instance. This application for land use change (consolidation, subdivision & rezoning) is therefore submitted to the !Kheis Municipality in order to ensure legal compliance with the clear context of the Spatial Planning and Land use Management Act (Act 16 of 2013).

2.7. SUMMARY

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

- 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 !Kheis Land Use Management Scheme;
- c) Addresses 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 and Land Use Management Act (Act 16 of 2013);
- e) The proposed Topline formalisation and expansion project aligns with the provisions of the !Kheis SDF;

2.8. LAYOUT PRINCIPLES

LOW-COST HOUSING

The Topline formalisation and expansion project will make provision for 247 sub economic properties, ranging between 300m² 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.

RELOCATION OF EXISITNG INFORMAL STANDS

Most of the existing informal stands will be accommodated within the proposed layout plan, however a few of the informal properties will have to the relocated. This is brought about by the position of informal stands within registered streets, as well as the formation of erven that doesn't allow for a coherent town planning layout.

SUPPORTING LAND USES

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



STORM WATER FURROWS

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.

ROAD NETWORK

The Topline formalisation and expansion layout exhibits an extended internal road network that functionally link with the existing road network of Topline. The proposed residential development will effectively link with the existing road network of Topline via numerous connections. The existing collector and arterial roads of Topline will extent into the applicable portions of land, which forms the development site of this application. A hierarchy of road types have been designed throughout the planned town planning layout, in order to promote accessibility and mobility.

This housing projects does not propose any new direct accesses to a provincial or national road. The study area extends well beyond the development alignment along the N10 National Road. Sanral has been notified of the planned formalisation and expansion project and their no-objection is attached as Annexure K to this submission.

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 Topline;
- 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;
- Formalising existing informal stands situated within the town of Topline;
- Providing supporting land uses that will contribute to a sustainable community;
- Incorporating land uses derived by community engagement with the !Kheis 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, 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 !Kheis Municipality at this stage, we will be guided by the requirements of the municipality, and we anticipate this to include:

1. Notice placed in local print media, which will be followed by a limited period (30 days) within which any member of public may provide inputs and/or objections to this development at the offices of 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.

Should any inputs be received at the offices of the !Kheis 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 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 the 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 !Kheis Land Use Management Scheme – Please refer to Figure 7 for the layout plan with appropriate zoning notations:

	Indication on map: colour	Yellow	
Residential Zone I	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.

247 land units created will be given this zoning with the objective of addressing housing backlog, as well as make provision for future population growth.

	Indication on map:	Red	
	colour		
			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
Business Zone I	Primary use/s	Pusinoss Puilding /	product exchanges, put-put course, flats above ground floor
busiliess Zolle i	Primary use/s	Business Building / Premises	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.

2 land units created will be given this zoning within the layout, providing economic prosperity to the residents of the proposed community.



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

1 land unit created will be given this zoning within the layout, providing religious properties for the residents of the proposed community.

	Indication on map: colour	Green	
Open Space Zone II	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.

12 land units created will be given this zoning within the layout, accommodating storm-water furrows & site topography.

	Indication on map:	Light Green	
	colour		
			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
Open Space Zone III	Primary use/s	Private open	an ornamental garden or pleasure-garden, provided that the land
		space	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, accommodating the existing sport field situated on the study area.

	Indication on map: colour	Light Grey	
Transport Zone I	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 colour	map:	Light Red	
				Means land/erven and buildings utilised by Local and
				District Municipality to carry out its mandatory
Authority Zone I				functions, of which the extent thereof is of such nature
	Primary use/s		that is cannot be classified or defined under any other	
			Municipal Use	usage in these regulations and include uses such as
	Filliary use/s		Widilicipal Ose	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.

	Indication on map: colour	Red squares	
Undetermined Zone	Primary use/s	Undetermined	Referred to properties previously zoned 'undetermined' or other abolished zones in previous schemes which cannot be appropriately converted to a new use zone;

¹ land units 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 (Consolidation, Subdivision and Rezoning) for formalisation and expansion for Topline is desirable for development within the !Kheis Local Municipality and should be positively considered for approval by the JMPT.

4.1. APPROVAL OF THE APPLICATION

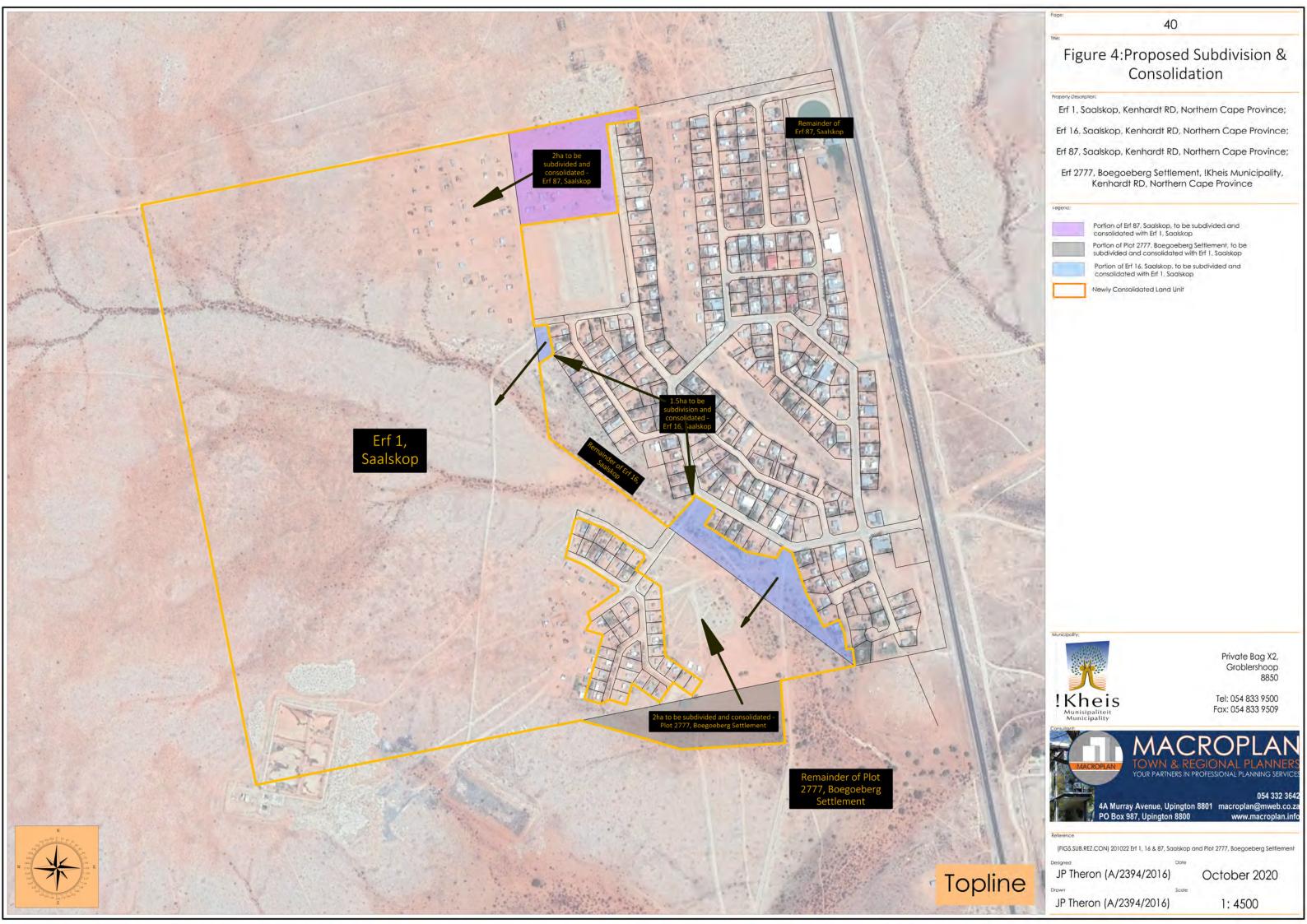
The !Kheis Municipality is therefore requested to:

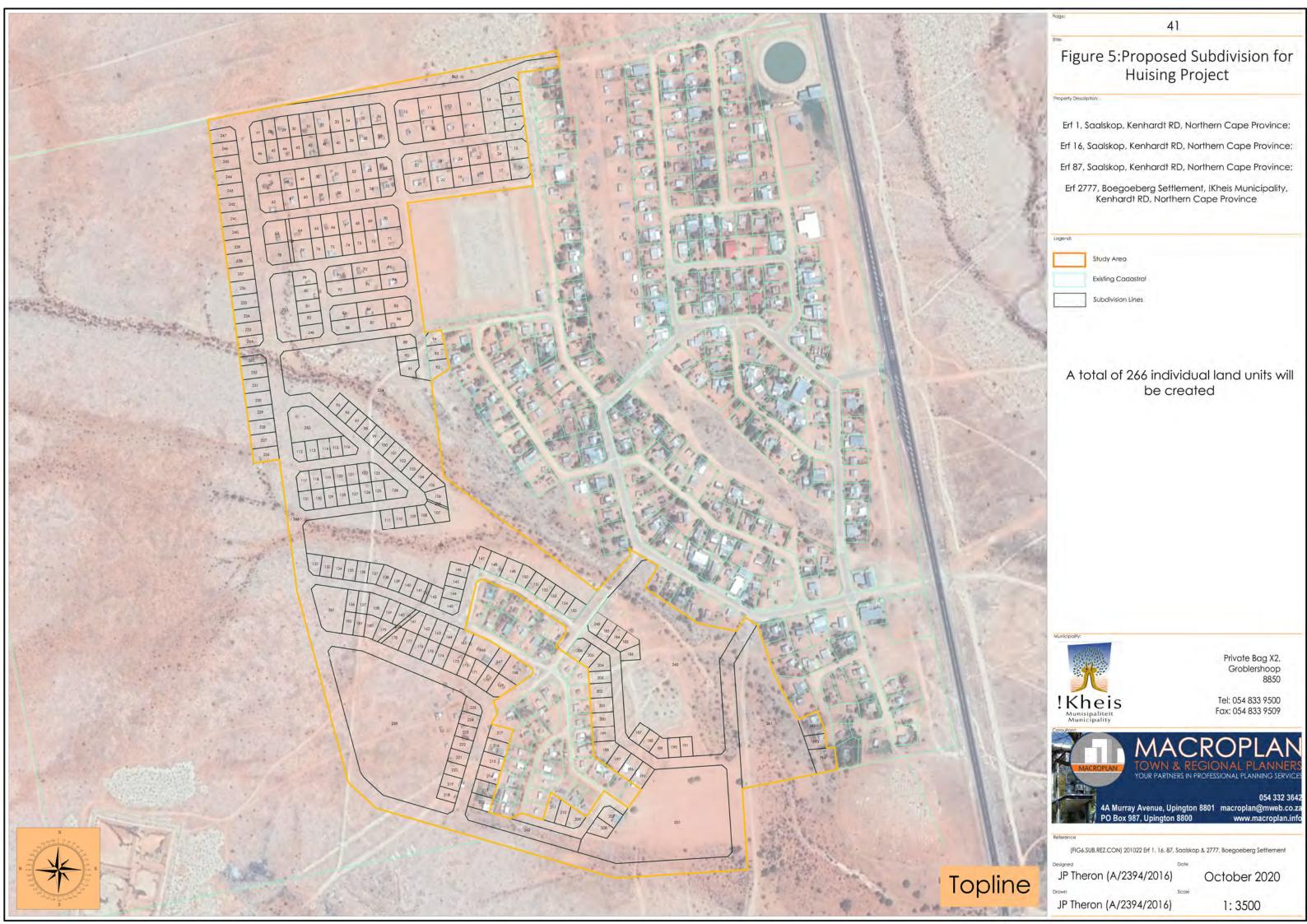
- 1. Give the go-ahead for advertising the application according to and in terms of the procedures adopted by themselves as part of their commitment to the provisions of the Spatial Planning and Land Use Management Act, Act 16 of 2013. The public participation process will be handled by this office and 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 !Kheis Municipality.









Design: JP Theron (Pr. Pln. A/2394/2016) JP Theron (Pr. Pln. A/2394/2016) Drawn: October 2020 Date: Scale: 1:3000

Colour &	Land Use	Total	Schedule			Colour &	Land Use	Total		Schedule of	Sizes
Numbers	Description	Units	overage stre per erf	total area covered by land use	percentage of study orea covered by use	Numbers	Description	Units	overage stre per erf	total area covered by land use	percentage of stud area covered by us
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	Open Space Zone III	1				TTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTTT	Business Zone II				
	Agricultural Zone I						Business Zone III				
	Agricultural Zone II					11111,	Business Zone IV				
	Resort Zone II					/////	Business Zone V				
	Residential Zone I	247					Business Zone VI				
7777	Residential Zone II						Industrial Zone I				
	Residential Zone III						Industrial Zone II				
1111	Residential Zone IV						Industrial Zone IV				
1////	Residential Zone V						Industrial Zone IV				
1111111	Residential Zone VI						Utility Zone I				
	Institutional Zone I					/////	Utility Zone II				
	Institutional Zone II	1				/////	Utility Zone III				
	Institutional Zone III						Transport Zone I	1			
	Authority Zone I	1					Transport Zone II				
	Authority Zone II						Transport Zone III				
	Special Zone					Total:		266			





Head Office: 4A Murray Avenue, Upington 8801 Kimberley Office 4 Hemming Way, Kimberley 8301

! Kheis

Tel: 054 833 9500 Fax: 054 833 9509





SPORTBESORGER C A THERON

Vir verdera endossemente sien For turther endorsements see

ANSPORTAKTE

(In terme van Artikel 31 van die Registrasie van Aktes Wet Nr. 47 van 1937)

HIERMEE WORD BEKEND GEMAAK

NADEMAAL die ondergemelde grond vestig in die Administrateur van die Provinsie van die Kaap die Goeie Hoop kragtens Artikel 3 (5) van die Wet op die Afskaffing van Ontwikkelingsliggame 1986, welke grond tans geregistreer is in die naam van:

BENEDE-ORANJE STREEKSDIENSTERAAD

kragtens Artikel 3 (4) (d) van Wet 75/1986, welke grond gehou word kragtens Grondbrief Nr. T16785/1977;

EN NADEMAAL 'n Sertifikaat aan my uitgereik is deur die Direkteur in die Departement van Plaaslike Regering en Nasionale Behuising kragtens Artikel 3 (5) van die Wet op die Afskaffing van Ontwikkelingsliggame 1986 (Wet 75 van 1986) welke Sertifikaat in ooreenstemming is met Artikel 31 (4) van Wet 47 van 1937 waarkragtens daar voldoen is aan die bepalings van alle wette in verband met die verandering van die eiendomsreg op die grond ten gevolge van sodanige vestiging;

SO IS DIT dat hy die Komparent in sy hoedanigheid voormeld hiermee in volle en vrye rienuom sedeer on transporteer aan en ten gunste van:-

ADMINISTRATEUR VAN DIE PROVINSIE VAN DIE KAAP DIE GOEIE HOOP

of Gemagtigdes:-

 √ GEDEELTE 10 van die plaas KAROSNEDERSETTING Nr. 43, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 67,0292 (SEWE EN TAGTIG KOMMA NUL TWEE NEGE TWEE) haktaar:

EERSTE OORGEDRA EN STEEDS GEHOU kragtens Grondbrief Nr. T16785/1977 met Kaart LG Nr. 9912/1974 wat daarop betrekking het.

2. V GEDEELTE 11 van die Plaas KAROSNEDERSETTING Nr. 43, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 64,0071 (VIER EN SESTIG KOMMA NUL NUL SEWE EEN) hektaar;

EERSTE OORGEDRA en STEEDS GEHOU kragtens Grondbrief Nr. T16785/1977 met Kaart LG Nr. 9910/1974 wat daarop Jetrekking how.

3. √ERF 45 LEERKRANS, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 52,1126 (TWEE EN VYFTIG KOMMA EEN EEN TWEE SES) hektaar;

EERSTE OORGEDRA en STEEDS GEHOU kragtens Grondbrief Nr. T16785/1977 met Kaart LG Nr. 9913/1974 wat daarop betrekking het;

✓ PERSEEL 769 (Gedeelte van Perseel 446) KAROSNEDERSETT;
 geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 25,4243 (VYF EN TWINTIG KOMMA VIER TWEE VIER DRIE) hektaar;

EERSTE OORGEDRA en STEEDS GEHOU kragtens Grondbrief Nr. T16785/1977 met Kaart LG Nr. 9911/1974 wat daarop betrekking het;

5. $\sqrt{}$ ERF 44 LEERKRANS, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 47,4623 (SEWE EN VEERTIG KOMMA VIER SES TWEE DRIE) hektaar;

EERSTE OORGEDRA en STEEDS GEHOU kragtens Grondbrief Nr. *16785/1977 met Kaart LG Nr. 9914/1974 wat daarop betrekking het;

6. V GEDEELTE 14 van die Plaas BOEGOEBERGNEDERSETTING Nr. 48, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 82,9405 (TWEE EN TAGTIG KOMMA NEGE VIER NUL VYF) hektaar;

EERSTE OORGEDRA en STEEDS GEHOU kragtens Grondbrief Nr. T16785/1977 met Kaart LG Nr. 6668/1975 wat daarop betrekking het;

7. ERF 1 SAALSKOP, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 86,3824 (SES EN TAGTIG KOMMA DRIE AGT TWEE VIER) hektear;

EERSTE GEREGISTREER kragtens Sertifikaat van Verenigde Titel Nr. T16776/1977 met Kaart LG Nr. 7070/1974 wat daarop betrekking het;

EN GEHOU kragtens Grondbrief Nr. T16785/1977;

8. Die RESTANT van ERF 45 WEGDRAAI, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 65,8523 (VYF EN SESTIG KOMMA AGT VYF TWEE DRIE) hektaar;

EERSTE GERÉGISTRUER kragtens Sertifikaat van Verenigde Titel Nr. T16779/1977 met Kaart LG Nr. 7063/1974 wat daarop betrekking het;

EN GEHOU kragtens Grondbrief Nr. T16785/1977.

9. V Die FieSTANT van ERF 757 LOUISVALEWEG, in die Administratiewe Distrik van Kenhardt;

GROOT: 91,0216 (EEN EN NEGENTIG KOMMA NUL TWEE EEN SES) hektaar;

EERSTE OORGEDRA en STEEDS GEHOU kragtens Grondbrief Nr. T16785/1977 met Kaart LG Nr. 10446/1973 wat daarop betrekking het;

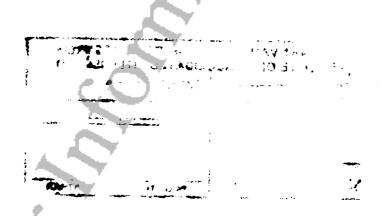
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10. ERF 131 GROOTDRINK, geleë in die Administratiewe Distrik van Kenhardt;

GROOT: 90,3047 (NEGENTIG KOMMA DRIE NUL VIER SEWE) hektaar;

EERSTE GEREGISTREER kragtens Sertifikaat van Verenigde Titel Nr. T16784/1977 met Kaart LG Nr. 119/1975 wat daarop betrekking het;

EN GEHOU kragtens Grondbrief Nr. T16785/1977.



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TRANSPORTGEWER

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in die Jaar van Onse Heer Eenduisend Negehonderd Vier en Negentig (1994).

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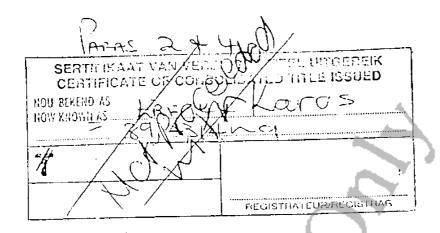
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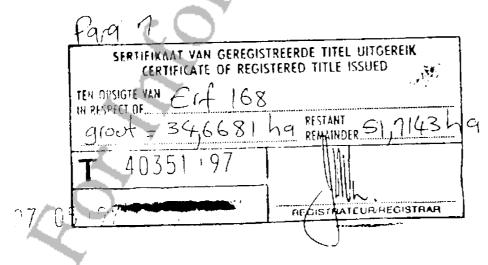
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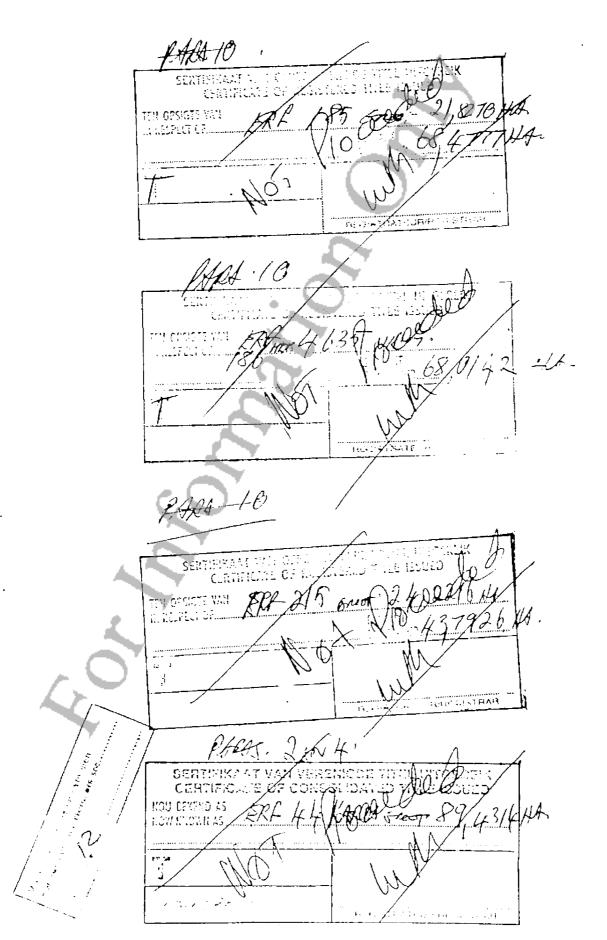
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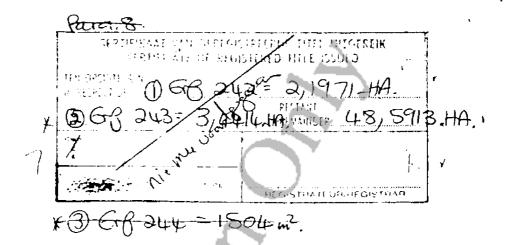
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56 Hofmeyr
Telophona (021) 464-1400

Opgestel deur my

White Jalille

TRANSPORTBESORGER

DE VILLIERS, P J DE B

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CRF 2	169 = 736 m² rem. 14,7686 ha 26 = 501m² rem. 14,7185 ha 27 = 808 m² rem. 14,6377 ha 228 = 465 m² rem. 14,159112 ha
	229 = 258 m rem 1,0520 ha

AT WAN OFFICIOTOFFEDDE TITE!

SERTIFIKAAT VAN GEREGISTREERDE TITEL

(Uitgereik kragtens die bepalings van Artikel 43 van die Registrasie van

Aktes Wet 1937 (Wet Nr-47-ven 1937)

NADEMAAL

PROVINSIE VAN NOORD-KAAP

CFL.CLLS C:

aansoek gedoen het om die uitreiking aan hom van 'n Sertifikaat van Geregistreerde Titel kragtens die bepalings van Artikel 43 van die Registrasie van Aktes Wet, 1937, ten opsigte van die hierondergenoemde grond, synde gedeelte van die grond geregistreer op sy naam kragtens Akte van Transport Nr T40351/1997

ALVERT THE RESERVED TELESCOPE OF THE PROPERTY OF THE PROPERTY

SO IS DIT dat ingevolge die bepalings van genoemde Wet, ek, die Registrateur van Aktes, te KAAPSTAD hierby sertifiseer dat voornoemde

PROVINSIE VAN NOORD-KAAP

Die se Opvolgers in Titel of Regverkrygendes, die geregistreerde eienaar is van :

1. ERF 3 SAALSKOP

GELEE in die Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 1,0778 (Een komma Nul Sewe Sewe Agt) hektaar

SOOS AANGEDUI op die aangehegte Kaart Nr 1487/1998 EN GEHOU kragtens Transportakte Nr T40351/1997;

2. ERH 87 SAALSKOP

GELEE in die Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 14,8422 (Veertien komma Agt Vier Twee Twee) hektaar

SOOS AANGEDUI op die aangehegte Kaart Nr 1513/1998 EN GEHOU kragtens Transportakte Nr T40351/1997;



EN DAT kragtens hierdie Sertifikaat genoemde

PROVINSIE VAN NOORD-KAAP

Die se Opvolgers in Titel of Regverkrygendes, nou en voortaan daartoe geregtig is ooreenkomstig plaaslike gebruik, maar behoudens die regte van die Staat;

TEN BEWYSE waarvan ek, voornoemde Registrateur, hierdie ^kte onderteken en met die Ampseël bekragtig het.

ALDUS GEDOEN en GETEKEN op die kantoor van die Registrateur van Aktes, te KAAPSTAD OP 23 WAART 1999

REGISTRATEU/A/

N AKTES

Deeds Registry
Cape Town

Deeds Registry
Cape Town

Registrar of Deeds



SERTIFICATE VAN GERECISTREERDE TITLL UITCEREIK
CERTIFICATE OF REGISTERED TITLE ISSUED

TEN OPSIGTE VAN ERF 170 = LL 2611 ha
RESTAND 10 13301 ha

RESTAND 10 13301 ha

T 22381 139

REGISTRATE PUREGISTRAR

EDERTHSPORTER AND	SECTION 16 OF ACT 47 OF 1937 TRANSFERRED TO
Municipaliteir	! Kheis (Prok 27/2000
036062/2002	an/
2002-05-119	HE DISTRATEURINEGISTBAR



SEËLREG Talaphone (021) 464 1400 Opgestel deur my

DE VILLIERS, P J DE B

See page 24 for endorsements Sien bladsy 24 vir endossemente

881655/2002

AKTE VAN TRANSPORT

MALAN & VENNOTE SCHRODERSTRAAT 25 UPINGTON POSBUS 27 UP:NGTON B800 (054) 3321127/8/9



HIERMEE WORD BEKEND GEMAAK

CHARL ANDRÉ THERON DAT

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

SIYANDA DISTRIK MUNISIPALITEIT

gedateer die 25ste Maart 2002 en geteken te UPINGTON

	Para 15	
	GETRANSPORTEER AAN	TRANSFERRED TO
	J. OLYN	
	RESTANT/REMAINDER	
(र्षे	T 55738/07.) =
	2007-07-13	REGISTIVATEUR/REGISTRAR
	Para 16	
	GETRANSPORTEER AAN	TRANSFERRED TO
	H VIS	
	RESTANT/REMAINDER	
(20)	T 55739/07	. 0
	13/7/07.	Jan V
	2007 07.13	REGISTRATEURAREGISTRAR
	_	
_	Para 18	TDANCEEDBED TO
ſ	GETRANSPORTEER AAN	TRANSFERRED TO
	Para 18 GETRANSPORTEER AAN M. AMOS	TRANSFERRED TO
	GETRANSPORTEER AAN	TRANSFERRED TO
21)	GETRANSPORTEER AAN M. AMOS	TRANSFERRED TO
(2)	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER	TRANSFERRED TO
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740 07.	Apa V
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07.	Apa V
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07.	Apa V
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07.	REGISTRATEUR/REGISTRAR
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07. 20007:07-13 Pag 22 GETRANSPORTEER AAN	Apa V
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07. 12007-07-13	REGISTRATEUR/REGISTRAR
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07. 20007:07-13 Pag 22 GETRANSPORTEER AAN	REGISTRATEUR/REGISTRAR
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740 07. 2007-07-13 Pag 22 GETRANSPORTEER AAN A. J. AMOIEL RESTANT/REMAINDER	REGISTRATEUR/REGISTRAR
	GETRANSPORTEER AAN M. AMOS RESTANT/REMAINDER T 55740/07. 20007-07-13 Paga 22 GETRANSPORTEER AAN A. J. SPANDIEL	REGISTRATEUR/REGISTRAR

EN die genoemde Komparant het verklaar dat SIYANDA DISTRIK MUNISIPALITEIT die ondergemelde eiendom op 25 Maart 2002 waarlik en wettiglik per PRIVATE OOREENKOMS verkoop het en dat hy/sy in sy/haar voormelde hoedanigheid hierby sedeer en transporteer aan en ten gunste van:

IKHEIS MUNISIPALITEIT

die se opvolgers in titel of regverkrygendes, in volkome en vrye eiendom,

1. ERF 221 GROBLERSHOOP

Geleë in die Munisipaliteit !KHEIS, Afueling Kenhardt, Provinsie Noord-Kaap

waarop uitgelê is Algemene Plan Nr 13081

GROOT 2894 (Tweeduisend Agthonderd Vier en Neentig) vierkante meter;

welke insluit strate

AANVANKLIK GEREGISTREER kragtens Sertifikaat van Geregistreerde Titel T1.179/99 met Kaart Nr 5478-90 wat daarop betrekking het

EN GEHOU kragtens Akte van Transport T1189/1999

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDES:

- (A) Die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr. T 7083/1938.
- (B) Die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1968, Nr. 264/71:

Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou;

- (C) Die volgende voorwaardes opgelê deur die Administrateur kragtens Artikel 18 van die Dorpe Ordonnansie Nr 33/1934, soos geskep in Groblershoop Dorp Uitbreiding Nr 1 soos vervat in Sertifkaat van Geregistreerde Titel Nr T1176/1999 naamlik:-
 - Alle woorde en uitdrukkings wat in die volgende voorwaardes gebesig word, het dieselfde betekenisse as wat daaraan geheg word by die regulasies afgekondig by Provinsiale Kennisgewing no. 383 van 13 Junie 1958.
 - 2. Ingeval 'n dorpsaanlegskema of enige gedeelte daarvan op hierdie erf van toepassing is of daarop van toepassing gemaak word, sal enige bepalings daarvan wat meer beperkend is as enige voorwaardes van eiendomsreg wat op hierdie erf van toepassing is voorkeur geniet. Ernge bepaling van hierdie voorwaardes moet nie opgevat word as sou dit die bepalings van artikel 146 van Ordonnansie no. 15 van 1952, soos gewysig, vervang nie.
 - 3. Die eienaar van hierdie erf is vorplig om sonder betaling van vergoeding toe te laat dat elektrisiteitskabels of drade en hoof- en/of ander waterpype en die rioolvuil en dreinering, insluitende stormwater van enige ander erf of erwe, binne of buite hierdie dorp, oor hierdie erf gevoer word indien dit deur die plaaslike owerheid nodig geag word, en wel op die wyse en plek wat van tyd tot tyd redelikerwys vereis word. Dit sluit die reg op toegang te alle redelike tye tot die eiendom in met die doel om enige werke met betrekking tot bogenoemde aan te lê, te wysig, to verwyder of te inspekteer.
 - 4. Die eienaar van hierdie erf is verplig om sonder vergoeding op die erf die materiaal te ontvang of uitgrawings op die erf toe te laat al na vereis word, sodat die volle breedte van die straat gebruik kan word en die wal veilig en behoorlik skuins gemaak kan word omrede van die verskil tussen die hoogte van die straat soos finaal aangelê en die erf tensy hy verkies om steunmure te bou tot genoeë van en binne 'n tydperk wat die plaaslike owerheid bepaal.
 - Geen gebou op hierdie erf mag gebruik word of van gebruik verander word vir 'n ander doel as wat volgens hierdie voorwaardes toegelaat word nie.
 - D. Verder onderhewig aan die voorwaardes soos vervat in Artikel 47 (c) van die Akteswet Wet 47/1937 dat die binnegemelde eiendom as 'n dorp ingedeel is en dat dit onderworpe bly aan die Wetsbepalings op dorpe.

2. ERF 222 GROBLERSHOOP

Geleë in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

waarop uitgelê is Algemene Plan Nr 13081

GROOT 3693 (Drieduisend Seshonderd Drie en Negentig) vierkante meter

welke insluit strate

AANVANKLIK GEREGISTREER kragtens Sertifikaat van Geregistreerde Titel T1179/1999 met Kaart Nr 5479-90 wat daarop betrekking het

EN GEHOU kragtens Akte van Transport T1189/1999

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDES:

- (A) Die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr T 7083/1938.
- (B) Die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1968 Nr 264/71:

"Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou."

- C) Die volgende voorwaardes opgelê deur die Administrateur kragtens Artikel 18 van die Dorpe Ordonnansie Nr 33 van 1934 soos geskep in Groblershoop Dorpuitbreiding Nr 1 soos vervat in Sertifikaat van Geregistreerde Titel Nr T1176/99 soos uiteengesit in paragraaf 1 C hierbo.
- (D) Verder onderhewig aan die voorwaardes soos vervat in Artikel 47 (c) van die Akteswet Wet 47/1937 dat die binnegemelde eiendom as 'n dorp ingedeel is en dat dit onderworpe bly aan die Wetsbepalings op dorpe.

3. RESTANT ERF 223 Groblershoop

Geleë in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

waarop uitgelê is Algemene Plan Nr 13081

GROOT 3286 (Drieduisend Tweehonderd Ses en Tagtig) vierkante meter;

welke insluit strate

AANVANKLIK GEREGISTREER kragtens Sertifikaat van Geregistreerde Titel T1184/1-39 met Kaart Nr 5480-90 wat daarop betrekking het

EN GEHOU kragtens Akte ven Transport T1189/1999

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDES:

- (A) Die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr T 7083/1938.
- (B) Die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1968 Nr 264/71:

"Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou."

- Die volgende voorwaardes opgelê deur die Administrateur kragtens Artikel 18 van die Dorpe Ordonnansie Nr 33 van 1934 soos geskep in Groblershoop Dorpuitbreiding Nr 1 soos vervat in Sertifikaat van Geregistreerde Titel Nr T1177/99 welke lees soos uiteengesit in paragraaf 1 C hierbo.
- (D) Verder onderhewig aan die voorwaardes soos vervat in Artikel 47 (c) van die Akteswet Wet 47/1937 dat die binnegemelde eiendom as 'n dorp ingedeel is en dat dit onderworpe bly aan die Wetsbepalings op dorpe.

4. RESTANT ERF 224, Groblershoop

Geleë in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

waarop uitgelê is Algemene Plan Nr 13081

GROOT 557 (Vyfhonderd Sewe en Vyftig) vierkante meter;

welke insluit strate

AANVANKLIK GEREGISTREER kragtens Sertifikaat van Verenigde Titel T1184/1999met Kaart Nr 5481-90 wat daarop betrekking het

EN GEHOU kragtens Akte van Transport T1189/1999

1. Wat betref die tiguur BVDEg op Kaart Nr 5481/90

ONDERHEWIG AAN DIE VOIGENDE VOORWAARDES:

- (A) Die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr T7083/1938;
- (B) Die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1968, Nr. 264/71:

Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou;

Wat betref die figuur ABgF op Kaart LG Nr 5481/90

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDES:

(A) Die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr. T 7033/1938.

(B) Die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1968, Nr. 264/71:

Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou;

- (C) Die volgende voorwaardes opgelê deur die Administrateur kragtens Artikel 18 van die Dorpe Ordonnansie Nr 33/1934, soos geskep in Groblershoop Dorp Uitbreiding Nr 1 soos vervat in Sertifkaat van Geregistreerde Titel Nr T1177/1999 naamlik :-
 - 1. Alle woorde en uitdrukkings wat in die volgunde voorwaardes gebesig word, het dieselfde betekenisse as wat daaraan geheg word by die rc ;ulasies afgekondig by Provinsiale Kennisgewing no. 383 van 13 Junie 1958.
 - Ingeval 'n dorpsaanlegskema of enige gedaelte daarvan op hierdie erf van toepassing is of daarop van toepassing gemaak word, sal enige bepalings daarvan wat meer beperkend is as enige voorwaardes van eiendomsreg wat op hierdie erf van toepassing is voorkeur geniet. Enige bepaling van hierdie voorwaardes moet nie opgevat word as sou dit die bepalings van artikel 146 van Ordonnansie no. 15 van 1952, soos gewysig, vervang nie.
 - 3. Die eienaar van hierdie erf is verplig om sonder betaling van vergoeding toe te laat dat elektrisiteitskabels of drade en hoof- en/of ander waterpype en die rioofvuil en dreinering, insluitende stormwater van enige ander erf of erwe, binne of buite hierdie dorp, oor hierdie erf gevoer word indien dit deur die plaaslike owerheid nodig geag word, en wel op die wyse en plek wat van tyd tot tyd redelikerwys vereis word. Dit sluit die reg op toegang te alle redelike tye tot die eiendom in met die doel om enige werke met betrekking tot bogenoemde aan the lê, te wysig, te verwyder of te inspekteer.
 - 4. Die eienaar van hierdie erf is verplig om sonder vergoeding op die erf die materiaal te ontvang of uitgrawings op die erf toe te laat al na vereis word, sodat die volle breedte van die straat gebruik kan word en die wal veilig en behoorlik skuins gemaak kan word omrede van die verskil tussen die hoogte van die straat soos finaal aangelê en die erf tensy hy verkies om steunmure te oou tot genoeë van en binne 'n tydperk wat die plaaslike owerheid bepaal.

- Geen gebou op hierdie erf mag gebruik word of van gebruik verander word vir 'n ander doel as wat volgens hierdie voorwaardes toegelaat word nie.
- III. WAT BETREF DIE HELE EIENDOM VERDER ONDERHEWIG aan die voorwaardes soos vervat in Artikel 47 (c) van die Akteswet Wet 47/1937 dat die binnegemelde eiendom as 'n dorp ingedeel is en dat dit onderworpe bly aan die Wetsbepalings op dorpe.
- 5. RESTANT ERF 225 Groblershoop

Geleë in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

waarop uitgelê is Algemene Plan 13081

GROOT 8,2540 (Agt komma Twee Vyf Vier Nul) hektaar

welke insluit strate

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Verenigde Titel T1188/1999 met Kaart Nr 5482-90 wat daarop betrekking,

- I. Wat betref die figuur ABCDEFGHJKMNPQbaA1B1C1D1E1F1 op kaart LG Nr 5482/90
 - A. ONDERHEWIG aan die voorwaardes waarna verwys word in Sertifikaat van Geregistreerde Titel Nr. T 8210/1941.
 - B. ONDERHEWIG VERDER aan die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1971, Nr. 264/71:

[&]quot;Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou."

- II. WAT betref die figuur WbRSTUV op kaart LG Nr 5482/90
 - A. ONDERHEWIG aan die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr. T7083/1938;
 - B. ONDERHEWIG VERDER aan die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1971 Nr 264/71:

'.!le regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staa" voorbehou;

- III. Wat bettef die figure ZabXY op kaart L.G. Nr 5482-90:
 - A. ONDERHEWIG aan die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr T 7083/1938;
 - B. ONDERHEWIG VERDER aan die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1971 Nr 264/71:

Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou;

- C. ONDERHEWIG VERDER aan die volgende voorwaardes opgelê deur die Administrateur kragtens Artikel 18 van die Dorpe Ordonnansie Nr 33/1904, soos vervat in Sertifikaat van Geregistreerde Titel Nr T1177/99, naamlik:-
- Alle woorde en uitdrukkings wat in die volgende voorwaardes gebesig word, het dieselfde betekenisse as wat daaraan geheg word by die regulasies afgekondig by Provinsiale Kennisgewing No 383 van13 Junie 1958.

- 2. Ingeval 'n dorpsaanlegskema of enige gedeelte daarvan op hierdie erf van toepassing is of daarop van toepassing gemaak word, sal enige bepalings daarvan wat meer beperkend is as enige voorwaardes van eiendomsreg wat op hierdie erf van toepassing is voorkeur geniet. Enige bepaling van hierdie voorwaardes moet nie opgevat word as sou dit die bepalings van artikel 146 van Ordonnansie no. 15 van 1952, soos gewysig, vervang nie.
- 3. Die eienaar van hierdie erf is verplig om sonder betaling van vergoeding toe te laat dat elektrisiteitskabels of drade en hoof- en/of ander waterpype en die rioolvuil en dreinering, insluitende stormwater van enige ander erf of erwe, binne of buite hierdie dorp, oor hierdie erf gevoer word indien dit deur die plaaslike owerheid nodig geag word, en wel op die wyse en plek wat van tyd tot tyd redelikerwys vereis word. Dit sluit die reg op toegang te alle redelike tye tot die eiendom in met die doel om enige werke met betrekking tot bogenoemde aan te lê, te wysig, te verwyder of te inspekteer.
- 4. Die eienaar van hierdie erf is verplig om sonder vergoeding op die erf die materiaal te ontvang of uitgrawings op die erf toe te laat al na vereis word, sodat die volle breedte van die straat gebruik kan word en die wal veilig en behoorlik skuins gemaak kan word omrede van die verskil tussen die hoogte van die straat soos finaal aangelê en die erf tensy hy verkies om steunmure te bou tot genoeë van en binne 'n tydperk wat die plaaslike owerheid bepaal.
- Geen gebou op hierdie erf mag gebruik word of van gebruik verander word vir 'n ander doel as wat volgens hierdie voorwaardes toegelaat word nie.
- IV. WAT BETREF DIE HELE EIENDOM VERDER ONDERHEWIG aan die voorwaardes soos vervat in Artikel 47 (c) van die Akteswet Wet 47/1937 dat die binnegemelde eiendom as 'n dorp ingedeel is en dat dit onderworpe bly aan die Wetsbepalings op dorpe.
- 6. PERSEEL 2291, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT488 (Vierhonderd Agt en Tagtig) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6392/79 wat daarop betrekking het

ONDERHEWIG AAN DIE VOLGENDE VOORWAARDES:

- (A) Die voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr. T 7083/1938;
- (B) Die volgende voorwaardes vervat in Grondbrief uitgereik op 17 November 1971 en geregistreer op 24 Desember 1968, Nr. T264/71:

Alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die mineraalwette omskryf, op of onder die grond word uitdruklik vir die Staat voorbehou;

7. PERSEEL 2292, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GRUOT 500 (Vyfhonderd) vierkante mater

AANVANKLIK GEREGISTREER EN GEHCU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6393/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbovermeld;

8. PERSEEL 2293, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6394/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbovermeld;

9. PERSEEL 2294, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6395/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titei Nr T 34688/1971, soos meer volledig iteengesit in paragraaf 6. A. en B. hierbo vermeld;

10. PERSEEL 2295, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6396/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbovermeld;

11. PERSEEL 2296, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !Y.HEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 441 (Vierhonderd Een en Veertig) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6397/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

PERSEEL 2303, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 477 (Vierhonderd Sewe en Sewentig) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6404/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

13. PERSEEL 2304, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6405/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

(14.)

PERSEEL 2305, gedeelte van Perseel 1679, Boegoebergnedersettir.g

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6406/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971 soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbovermeld;

15.

PERSEEL 2306, gedeelte van Perseel 1679, Boegoebargnedersetting

GELEE in die Minisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665 2001 met Kaart Nr 6407/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde. Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en. B. hierbovermeld;

16)

PERSEEL 2307, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6408/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

17. PERSEEL 2308, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 598 (Vyfhonderd Agt en Negentig) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6409/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

(18) PERSEEL 2309, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 563 (Vyfhonderd Drie en Sestig) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6410/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B hierbo vermeld;

19. PERSEEL 2310, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6411/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

20. PERSEEL 2311, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhon/terd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6412/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

21. PERSEEL 2312, gedealte van Perseel 1679, Boegoebergnedersetting

GÉLEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6413/79 wat daarop bet. Jakking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbovermeld;

(22)

PERSEEL 2313, gedeelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS, Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 500 (Vyfhonderd) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6414/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

23. PERSEEL 2314, georelte van Perseel 1679, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 488 (Vierhonderd Agt en Tagtig) vierkante meter

AANVANKLIK GEREGISTREER EN GEHOU kragtens Sertifikaat van Geregistreerde Titel T38665/2001 met Kaart Nr 6415/79 wat daarop betrekking het

ONDERHEWIG AAN

Die voorwaardes vervat in bogemelde Sertifikaat van Verenigde Titel Nr T 34688/1971, soos meer volledig uiteengesit in paragraaf 6. A. en B. hierbo vermeld;

24. Restant van Perseel 2643, Boegoebergnedersetting

GELEE in die Munisipaliteit !KHEIS Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 3 504,6345 (Drieduisend Vyfhonderd en Vier komma Ses Drie Vier Vyf) hektaar

AANVANKLIK GEREGISTREER kragtens Sertifikaat van Verenigde Titel Nr T20099/92 met Kaart Nr 6870 wat daarop betrekking het

EN GEHOU kragtens Transportakte T28499/1999;

- I. Wat betref die restant van die figuur A.B.C.6a.E.F.G.5b.5c.5f.1G.1H.1K.1L.5g.5h.5j.5.5m.5n.2G.2H.2J. 2K.2L.2M.2N.2P.2Q. op bovermelde Kaart Nr. 6870/90;
 - A. ONDERHEWIG aan die endossement gedateer 7 Mei 1980 op Sertifikaat van Verenigde Titel Nr. T7083/1938, welke endossement as volg lees :

"Endorsement i.t.o. Section 2A.(2) of the Railway and Harbour Purchase Act of 1977 (Act 47 of 1977) as amended by Act 80/1979.

The Pepublic of South Africa (in it's Railway and Harbours Administration) having purchased the land approximately 28,56 hectares from the South African Iron and Steel Industrial Corporation Ltd., which land was expropriated by the said corporation by virtue of Expropriation Notice No. S116(a)(Ex.1680/74) the said land vests in terms of the provisions of Section 2A(1) of the abovementioned Act, in the Republic of South Africa (in it's Railways and Harbours Administration) as from 1/4/1977).

(Expropriation Endorsement dd. 6/9/74)

Application Filed as T. 12353/1980."

B. ONDERHEWIG VERDER aan die volgende serwitute, vervat in Notariële Akte van Serwituut No. K326/92 en waarna verwys word in die endossement gedateer 3 April 1992 op Serwituut van Geregistreerde Titel Nr. T20098/92 wat as volg lui :

"die eiendom vermeld in para 1 hierin onderhewig aan die volgende serwitute ten gunste van die publiek:

- (a) 'n Padserwituut 15 meter wyd waarvan die middellyn aangetoon word deur die lyn a. middel van Pad C.;
- (b) 'n Padserwituut soos aangetoon deur die figuur 2n.2p.2q.2r.2s.L.M.N.F.2t.2u.;
- (d) 'n Padserwituut soos aange+oon deur die figuur

2y.2z.3a.3b.3c.3d.3e.1B.1C.3f.3g.3h.3j.3k.

- (e) 'n Padserwituut 15 meter wyd waarvan die lyne 3m.3.;3n.p.; 3p.3q.; 3q.3m. respektiewelik die suidelike, westelike, noordelike en oostelike grens aangetoon;
- (f) 'n Padserwituut 15 meter wyd waarvan die middellyn aangetoon word deur die lyn 3a.3r. op lyn 3a.3q.;
- (g) 'n Begrafplaasserwituut soos aangetoon deur die figuur 4c.4d.4e.4f.;

welke bovermelde serwitute verskyn op kaart Nr. 6872/90 hierby aangeheg."

en welke serwituut ook onderskeidelik verwys word in serwituutnotas Nrs. 1, 6, 10, 11, 12 en 19 op voormelde kaart nr. 6879/90.

- II. Wat betref die figuur 6a.D.6b. op bovermelde kaart Nr. 6870/90:
 - A. ONDERHEWIG aan sulke voorwaardes soos waarna verwys word in Sertifikaat van Verenigde Titel Nr. T7083/1983.
 - B. GEREGTIG op die voordeel van die endossement gedateer 28 Mei 1984 op Scrtifikaat van Geregistreerde Titel Nr. T8210/1941, welke endossement soos volg lees :

"Kragtens Grondbrief Nr. T27492/1984hede gedateer is die Restant van die hierinvermelde eiendom geregtig op 'n serwituut van reg van weg, oor

- Perseel 2241 Groot 1,1401 hektaar
- 2. Perseel 2240 Groot 5237 vierkante meter

die westelike grens waarvan, aangedui op Kaart Nr. 5937/1978 en 5936/1978 daaraan geheg deur die lyn A.D. ten opsigte van albei eiendomme.

II. Wat betref die figuur

5b.H.J.K.L.M.N.P.Q.R.S.T.U.V.W.X.Y.Z.1A.1B.1C.1D.1E.1F.5f.5cp bovermelde Kaart Nr. 6870/90

- A. ONDERHEWIG aan sulke voorwaardes soos waarna verwys word in Sertifikaat van Verenigde Titel Nr. T7083/1938.
- B. GEREGTIG op die voordeel van die endossement gedateer 28 Mei 1984 op Sertifikaat van Geregistreerde Titel Nr. T8210/1941, welke endossement meer volledig uiteengesit is in Paragraaf 11.B. hierbo.

C. ONDERHEWIG VERDER aan die volgende serwitute, vervat in Notariële Akte van Serwituut No. K326/92S en waarna verwys word in die endossement gedateer 3 April 1992 op Sertifikaat van Geregistreerde Titel Nr. 20098/92 wat as volg lees :

Die eienaar vermeld in Para 3 hierin onderhewig aan die volgende serwituut ten gunste van die publiek;

- (a) 'n Padserwituut 15 meter wyd waarvan die lyn K.L. die oostelike grens aantoon;
- (b) 'n Padserwituut soos aangetoon deur die figuur e.Y.Z.1A.;
- (c) 'n Begrafplaas soos aangetoon deur die figuur h.H.J.K.j.;

welke bovermelde serwitute verskyn op Kaart Nr. 6874/90 hierby aangeheg."

en welke serwitute ook onderskeidelik ook na verwys word in serwituutnotas Nr. 18, 7 en 20 op voormelde kaart Nr. 6870/90.

Wat betref die restant van die figuur

5g.1M.1N.1P.1Q.1R.,1S.1T.1U.1W.1X.1X.2A.2B.2C.2D.2E.2F.5n. 5m.5k.5j.5h. op bovermelde Kaart Nr 6870/90.

- A. ONDERHEWIG aan sulke voorwaardes waarna verwys word in Sertifikaat van Verenigde Titel Nr. T7083/1938.
- B. GEREGTIG op die voordeel van die endossement gedateer 28 Mei 1984 op Sertifikaat van Geregistreerde Titel Nr. T8210/1941, welke endossement meer volledig uiteengesit is in Paragraaf II.B. hierbo.
- C. ONDERHEWIG VERDER aan die volgende serwitute, vervat in Notariële Akte van Serwituut No. K326/92S en waarna verwys word in die endossement gedateer 3 April 1992 op Sertifikaat van Geregistreerde Titel Nr. T20098/92 wat as volg lui:

Die eiendom vermeld in Para 4 hierin onderhewig aan die volgende serwituut ten gunste van die publiek:

- (a) 'n Padserwituut soos aangetoon deur die figuur a.F.G.H.b.c.d.;
- (b) 'n Padserwituut 15 meter wyd, waarvan die noordelike en westelike grens respektiewelik aangetoon word deur die lyne j.K. en K.L.;
- (c) 'n Begrafplaas soos aangetoon deur die figuur j.k.m.n.;

welke bovermelua serwitute verskyn op Kaart Nr. 3869/90 hierby aangeheg."

welke serwitute ook onderskeidelik ook na verwys word in serwituutnotas Nr. 9, 17 en 21 op voormelde Kaart Nr. 6870/90.

- V. INSOVERRE die eiendom as 'n geheel betref:
 - A. ONDERHEWIG aan die voorbehoud ten gunste van die Staat van alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie soos in die Wet op Mynregte 1967 (Wet 20 van 1967) omskryf.
 - B. ONDERHEWIG VERDER aan die serwituutrey ten gunste van die Staat of sy gevolmagtigde om sonder betaling van vergoeding enige materiaal soos sand, klip en gruis vanaf die hieronder omskrewe gebiede te verwyder of te laat verwyder en mag vir hierdie doeleinde 'n pad oor die eiendom maak, naamlik :
 - (a) die gebied voorgestel deur die figuur 2h.2j.2k.2m.;
 - (b) die gebied voorgestel deur die figuur 2j.5d.T.U.V.5e.2k.;

- (c) die gebied voorgestel deur die figuur 1W.1X.1Y.1Z.2A.2B.2C.2D.1V.;
- (d) die gebied voorgestel deur die figuur 2E.2F.5q.5r.5s.5p.;
- (e) die gebied voorgestel deur die figuur 5r.5q.5t.;

en alle figure soos aangetoon op voormelde Kaart Nr. 6870/90.

25. Perseel 2777 Boegoebergnedersetting

GFLEE in die Musisipaliteit !KHEIS Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT 3112,8062 (Drieduisend Eenhonderd en Twaalf komma Agt Nul Ses Twee) hektaar

AANVANKLIK GEREGISTREER kragtens Sertifikaat van Geregistreerde Titel Nr T15834/2000 met Kaart Nr 483/1999 wat daarop betrekking het

EN GEHOU kragtens Transportakte T18197/2C01;

- A. ONDERHEWIG AAN die voorbehoud van alle regte op edelgesteentes, edelmetale, onedele minerale en aardolie, op of onder die grond soos omskryf in die Wet op Mynregte 1967 (Wet 20 van 1967) vir die Staat.
- B. ONDERHEWIG VERDER aan 'n serwituut dat die eiendom as 'n meent gebruik moet word en aanverwante regte en voorwaardes soos vervat in Notariële Akte van Meentserwituut Nr. K203/2001S." en ook meer spesifiek aan die beperking daarin vervat dat die eiendom nie beswaar, vervreem of oorgedra mag word sonder die ?remier se skriftelike toestemming nie.

WESHALWE die Komparant afstand doen van al die reg en titel war die gesegde SIYANDA DISTRIK MUNISIPALITEIT voorheen in die genoemde eiendom gehad het en gevolglik ook erken dat dit geheel en al uit die besit daarvan onthef is en nie meer daartoe geregtig is en dat kragtens hierdie akte, die genoemde

!KHEIS MUNISIPALITEIT

die se opvolgers in titel of regverkrygendes tans en voortaan daartoe geregtig is, ooreenkomstig p! aslike gebruik, behoudens die Regte van die Staat en erken dit ten slotte dat die koopprys van die eiendom wat hiermee getransporteer word die bedrag van R1,00 (EEN RAND) is.

IN GETUIENIS WAARVAN EK, die genoemde REGISTRATEUR VAN AKTES tesame met die Komparant, q.q. hierdie Akte onderteken het en met my Ampseël bekragtig het.

ALDUS GEDOEN EN GETEKEN op die kantoor van die REGISTRATEUR VAN AKTES te KAAPSTAD op 26 September 2002.

In my teenwoordigheid

REGISTRATEUR VAN AKTES

VA00005483/2007

Certified a true copy of the duplicate original Gesertifiseer in ware afskrif van die duplikaatfiled of record in this Registry, issued to cerve in oursprouklike in bewering gogea op hierdie Regiulaca of the original thereof under the provisions stractivation, unigerelik om te diens die plok van
of Eesda Registrasies Regulation (Io 68 CI)
üle vorsprouklike daarvan under die bepalings van
cre August as exadore Registrasie (Io 88 CI)
Deeda Registry / Registrasie (Io 88 CI)
Cape Town / Kaapsted

Asst. Registrasie van Astes

	Para 12	
(GETRANSPORTEER AAN	TRANSFERRED TO
į	M. WATERBOE	-R
	·	
	RESTANT/REMAINDER	
(m)	T00055736/2007	0 3 -
	2007-07-13	REGISTRATEUR/REGISTHAR
	2007 07 13	HEGIST VALEDATHEGISTHAH

Para 14	
GETRANSPORTEER AAN	TRANSFERRED TO
S. WILSON	
RESTANT/REMAINDER	
T000055737 / 2007	1
2007-07-13	REGISTALTEUR/REGISTRAR

See page 25 for endorsements
Sien bladsy 25 vir endossemente

PROD

DEEDS REGISTRATION SYSTEM - KIMBERLEY

PREPARED BY: DRS05047 - BOSTRNDER JOSSLINE EDMIL

PROPERTY DETAILS PRINT FOR PORTION

erf no

TOWNSHIP SAALSKOP REG DIV KENHARDT RD

PROVINCE

NORTHERN CAPE

PREV DESCRIPTION

PTN OF 168-GP12958

DIAGRAM DEED NO EXTENT

T15487/2001 3.3515 H

CLEARANCE -

DAWID KRUIPER MUNISIPALITEIT

999 FIRM NR

FIRM NAME : AKTEKANTOOR KIMBERLEY

DATE: 20200721 TIME: 10:48:55.2 PAGE:

FILE NR : PREP

FEE AMOUNT: R .00

NO INTERDICIS

DOCUMENTS

AMOUNT

OWNER DETAILS

FULL NAME & SHARE

MUN KHEIS

CONVERTED FROM CTN

AMOUNT/REASON O/P/A IDENTITY

SECT 16

DATE OF BURTH

TITLE DEED

T36062/2002CTN

MMDD SCAN/MICRO REF

T15487/2001CTN 0309

0509

0 - MULTIPLE OWNER P - MULTIPLE PROPERTY A - MULTIPLE OWNER AND PROPERTY

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END OF REPORT *



NADEMAAL

015487 * 2001

48 1 16 VAN WET 47 VAN 1937 SECTION 16 OF ACT 47 OF 1937 "TRANSPORTEER AAN TRANSFERRED TO SLIEK VAN SUID-AFRIKA THE REPUBLIC OF SOUTH AFRICA 2000 036062/20 and the strength of the streng REGISTRATEUR/REGISTRAN 2002 -05- 0 9 UITGEREIK VIR INLIGTING
DOELEINDES
ISSUED FOR INFORMATION
PURP SERTIFIKNADIN
kragtens die b OPENAN UNICACHATO CH C'ENCEMIENTERED a MAENEHIED GEREGISTREERDE (Uitgereik kragtens die bepalings van Artikel 43 van die Registrasie van Aktes Wet 1937 (Wet Nr 47 van 1937)

PROVINSIE VAN NOORD-KAAP

aansoek gedoen het om die uitreiking aan hom van 'n Sertifikaat van Geregistreerde Titel kragtens die bepalings van Artikel 43 van die Registrasie van Aktes Wet, 1937, ten opsigte van die hierondergenoemde grond, synde gedeelte van die grond geregistreer op sy naam kragtens Sertifikaat van Geregistreerde Titel T40351/1997

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 -07-22 REGISTRATEUR VAN AKTES REGISTRAR OF DEEDS

Datum/Date

SO IS DIT dat ingevolge die bepalings van genoemde Wet, ek, die Registrateur van Aktes, te KAAPSTAD hierby sertifiseer dat voornoemde

PROVINSIE VAN NOORD-KAAP

Die se Opvolgers in Titel of Regverkrygendes, die geregistreerde eienaar is van :

ERF

16 SAALSKOP

GELEE

in die Afdeling Kenhardt, Provinsie Noord-Kaap

GROOT

3,3515 (Drie komma Drie Vyf Een Vyf) hektaar

SOOS AANGEDUI op die aangehegte Kaart Nr 1376/2000

EN GEHOU kragtens Sertifikaat van Geregistreerde Titel Nr T40351/1997;

EN DAT kragtens hierdie Sertifikaat genoemde

PROVINSIE VAN NOORD-KAAP

Die se Opvolgers in Titel of Regverkrygendes, nou en voortaan daartoe geregtig is ooreenkomstig plaaslike gebruik, maar behoudens die regte van die Staat;

TEN BEWYSE waarvan ek, voornoemde Registrateur, hierdie Akte onderteken en met die Ampseël bekragtig het.

ALDUS GEDOEN en GETEKEN op die kantoor van die Registrateur van Aktes, te KAAPSTAD op 9 MARET 2001

REGISTRATEUR VAN AKTES

UTGEREIK VIR INLIGTING
PURPOPORING





Company Registration: 2009/001909/07 VAT Number: 4470254741

Barzani Development
Barzani Holdings

Barzani Infra

Barzani Properties

P Barzani Aviation

Barzani Technologies

Barzani Town Planning

Barzani IT Solutions

Barzani Project Management

Barzani Construction Supplies

Barzani Logistics & Plant

Barzani Mining

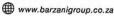
Barzani Finance

Barzani Security

Barzani Legal

Barzani Materials





Gauteng (Head Office)

Tel: +27 12 881 0210 Fax: +27 86 476 7573

Building 9 Cambridge Office Park 5 Bauhinia Street, Highveld Techno Park, Centurion, 0169

North West

Tel: +27 18 468 4876 Fax: +27 86 476 7573

52 Ian Street, Wilkoppies Klerksdorp, 2571 (PO Box 6468 Flamwood, 2572)

Northen Cape

Tel: +27 53 831 3249 Fax: +27 86 476 7573

Sub Office: Agri Office Park Building 2, Unit 1 South Kimberly, 8301

Eastern Cape

Tel: +27 43 050 0828 Fax: +27 86 476 7573

Leadwood House, Cedar Square Bonza Bay Road Beacon Bay, 5241

Kwazulu-Natal

Tel: +27 31 944 1635 Fax: +27 86 476 7573

Office 15, Ground Floor A Block BCX Durban 1, 1 Frosterley Cresent La Lucia Ridge, Umhlanga, 4091

Mpumalanga

Tel: +27 13 590 0952 Fax: +27 86 476 7573

2nd Floor, North Tower Suites 202, 1 Aqua Street, Riverside 1226

Amendment 1 to Appointment

Date

: 28 May 2020

To

: Macroplan Town & Regional Planners (Pty) Ltd (Consultant)

Represented by

: Len Fourie

From

: Barzani Holdings (Employer)

Represented by

: Roelof Van Den Berg & Ian Van Der Westhuizen

Reference: NC/21/2018/PP (Topline 248)

WHEREAS the Employer appointed the Consultant for town planning services at the Topline 248 project.

AND WHEREAS the parties are desirous to change the Employer's name from Barzani Holdings (Pty) Ltd to Barzani Development (Pty) Ltd.

The Parties agree that the provisions of the Appointment will be amended as follows:

1. Amendment

The Parties agree that the Employer be changed to Barzani Development (Pty) Ltd with registration number 2009/001909/07. The signatories for the amended Employer remain the same and the Employer accordingly agrees





Company Registration: 2009/001909/07 VAT Number: 4470254741



Barzani Holdings

Barzani Infra

Barzani Properties

Barzani Aviation

Barzani Technologies

Barzani Town Planning
Barzani IT Solutions



Barzani Logistics & Plant

Barzani Mining

Barzani Finance

Barzani Legal

A Barzani Materials

☑ Inlo@barzanigroup.co.za

www.barzanigroup.co.za

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Tel: +27 12 881 0210 Fax: +27 86 476 7573

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Mpumalanga

Tel: +27 13 590 0952 Fax: +27 86 476 7573

2nd Floor, North Tower Suites 202, 1 Aqua Street, Riverside 1226 that the Consultant will by no means be prejudiced by the amendment in any possible way. The signatories wave all rights that Barzani Holdings (Pty) Ltd enjoyed with the original Appointment Letter.

2. General

Save for the amendments and additional provisions stipulated under this amendment, the balance of the provisions and interpretations of the Appointment Letter and all relevant contracts remain to be in full force and effect.

Roelof van den Berg:

Date: 23/05/2022

Director

Lan van der Westhuizen: Date: 28/05/2020

Director

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

01-06-2020

Service Provider Representative:

Len J Fourie

Signature:



Erf 87 Saalskop L.G. No. geleë in die Administratiewe Distrik Kenhardt 1513/1998 Provinsie Noord-Kaap Opgemeet in Junie 1989, November 1989 en Goedgekeur Maart - April 1990 deur my, PLS 0807 HG van Zyl LANDMETER-Professionele Landmeter GENERAAL 1999.01.06 VEL 2 VAN 2 VELLE Boegoebergnedersetting Perseel 2142 В Perseel 2579 Erf Boegoebergnedersetting perseel 1018 170. J1 Κ1 94 (Openbare Plek) H1 Abukwa-straat 10m 86 Oriedoring-straat 13m 193⁶¹ 1 92 Besembos₩eg Lemoendoringstraat 10m 91 90 (Openbare Plek) Besellosted 13th 72 101 100 99 98 griedoringstraat 13m 97 96 С Ε'n Besembosweg 13m W Ν Skaal 1: 4000

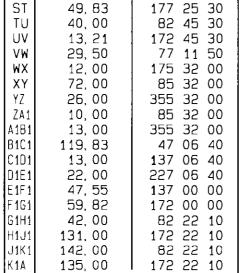


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;	23, 00	168 45 00	LANDMETER-
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	7, 07	33 45 00	/ / ·
)	20, 87	348 45 00	147./·
,	634, 47	348 45 00	74.

VEL 1 VAN 2 VELLE





8eskrywing van bakens

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Ysterpaal en klipstapel

D, E, Y, A1

12mm Ysterpen in beton

Alle ander

: 12mm Ysterpen

Die figuur

A B C D E F G H J K L M N P Q R S T U V W X Y A1 B1

C1 D1 E1 F1 G1 H1 J1 K1

stel voor

14,8422 hektaar

grond, synde

Erf 87 Saalskop geleë in die Administratiewe Distrik Kenhardt Provinsie Noord-Kaap

Opgemeet in Junie 1989, November 1989 en Maart – April 1990 deur my,

> PLS 0807 HG van Zyl Professionele Landmeter





LG. WATTOOT TAGFAY

Erf 16 Saalskop

geleë in die Administratiewe Distrik Kenhardt Provinsie Noord-Kaap

Opgemeet in Junie 1989, November 1989 en Maart en April 1990 deur my

PLS0807 H G van Zyl Professionele Landmeter L.G. No.

1376/2000

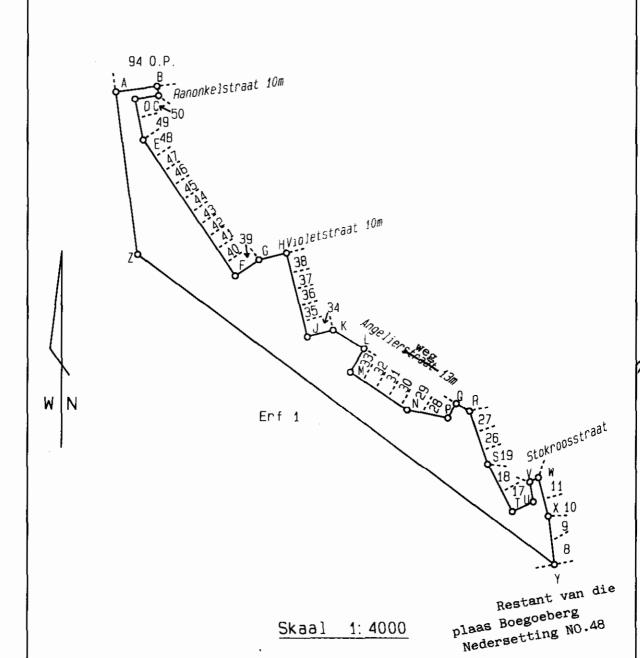
Goedgekeur

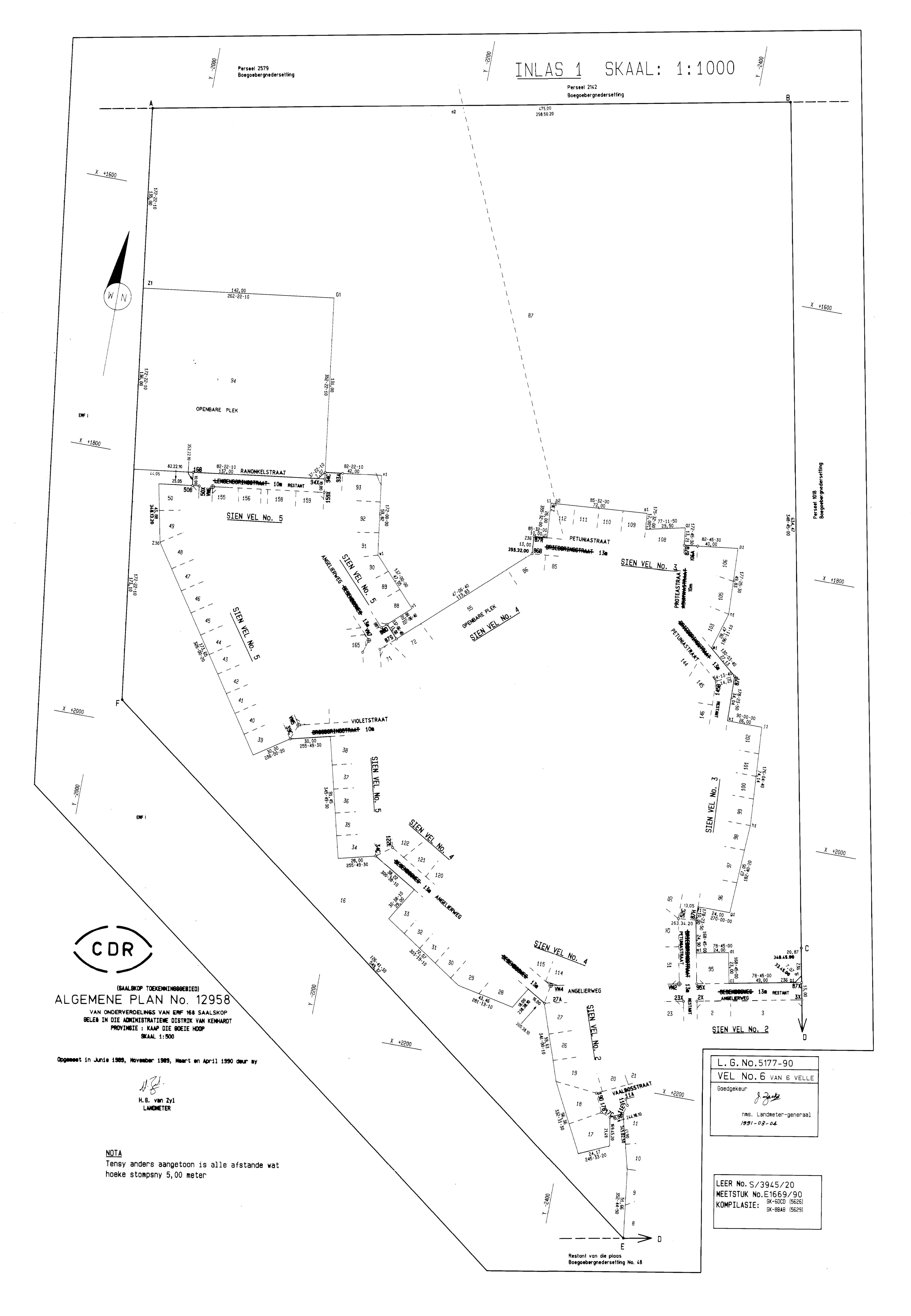
AN.

nms. Landmeter-Generaal

2000 - 10-27.

VEL 2 VAN 2 VELLE





SYE Meter	RIGTINGS- HOEKE	L.G. No. 1376/2000
1	I	
ZA 173, 10 Beskrywing va	1 172 22 10 n bakens	

Die figuur

: 12mm Ysterpen in beton

Alle ander : 12mm Ysterpen

A B C D E F G H J K L M N P Q R S T U V W X Y Z

stel voor

3, 3515 hektaar

grond, synde

Erf 16 Saalskop

geleë in die Administratiewe Distrik Kenhardt Provinsie Noord-Kaap

Opgemeet in Junie 1989, November 1989 en Maart en April 1990 deur my

PLS0807 H G van Zyl Professionele Landmeter

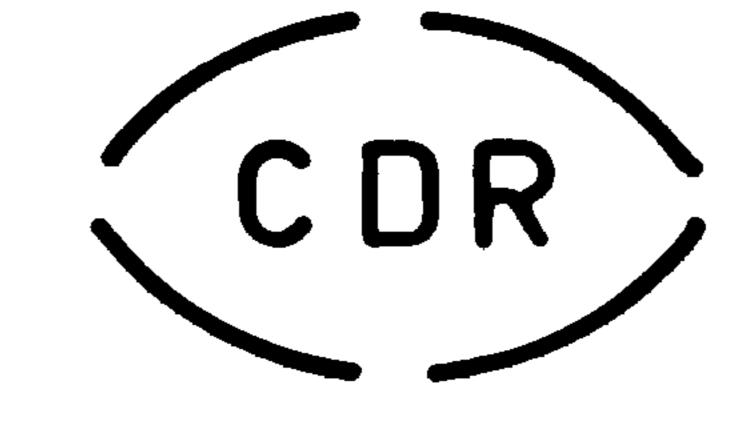
Hierdie kaart is geheg aan		Lêer S/3945/20
No .	,	M.S. E 1669/90
ged .		A.P. 12958
t.g.v.		Komp. GK-88AB (5629)
Registrateur van Aktes		אטווון. טא-ממאם (טטבש)

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* 3R	- 2 488, 70		85X	- 2 338,07	+ 1 815,87	16	3,3515 hektaar	104 105	505 595
7 8	- 2 523, 41		868	- 2 298,00	+ 1 819,00	17	676	106	611
88	- 2 475,84	1	87H	- 2 468,0 1	+ 2 066,77	18	623	107	530
8 C	- 2 482, 30	-	87P	- 2 462,8 3	+ 1 881,80	19 20	712 533	106 109	534 478
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9C	- 2 472.28	+ 2 265,23	87R	- 2 296, 99	+ 1 806,04	55	576	111	468
			87S	- 2 210,21	+ 1 900,56	23	867 772	112	468 812
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11E	- 2 441,19	1	88Y	- 2 197,69	+ 1 894, 43	56	691	115	548
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156	- 2 484,51	+ 2 255, 21	95X	- 2 477, 36	+ 2 113,75	33	482 470	121 122	606 732
168	- 2 0 38, 67	+ 1 805,58	106A	- 2 418,00	+ 1 791,00	34	476	123	622
17B	- 2 425,50	+ 2 221,52	106D	- 2 420, 16	+ 1 808,04	35	476	124	657
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23X	- 2 470,08	+ 2 128, 45	122E	- 2 236,00	+ 2 055,00	42	480	131	482
27 A	- 2 368,60	+ 2 148,64	124C	- 2 261,00	+ 1 993,00	43	480	132	731
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508	- 2 040,00	+ 1 815, 49	133X	- 2 403, 95	+ 2 077,88	49 50	545	139	388
50X	- 2 044,96	+ 1 814,83	134X	- 2 451,90	+ 1 955,97	51	1151	140	561
51Y	- 2 423, 41	+ 2 124, 48	134F	- 2 434, 41	+ 1 956, 46	5 2 5 3	581 420	141 142	598 488
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(SAALSKOP TOEKENNINGSGEBIED)

ALGEMENE PLAN NO.1295 VAN ONDERVERDELINGS VAN ERF 168 SAALSKOP SIEN KAART L.G.No. 5176/90 T/A GELEE IN DIE ADMINISTRATIEWE DISTRIK VAN KENHARDT PROVINSIE: KAAP DIE GOEIE HOOP



Opgemeet in Junie 1989, November 1989, Maart en April 1990 deur my

SKAAL 1:500



NOTA Tensy anders aangetoon is alle afstande wat hoeke stompsny 5,00 meter

<u>BAKENBESKRYWING</u>

KODES VIR INTERNE BAKENS

<u>VERSEKERINGSMERKE</u>

VELINDELING

INLAS 1
VEL MO. 6
ENT. Mo's
87. 16

OPTIMARE PLEK
94

VEL MO. 4
ENT. Mo's
134-146

VEL MO. 4
ENT. Mo's
29-33, 51-54,
56-72, 113-133
OPTIMARE PLEK
95

VEL MO. 4
ENT. MO's
29-33, 51-54,
56-72, 113-133
OPTIMARE PLEK
95

L.G.No.5177-90

VEL No.1 VAN 6 VELLE

Goedgekeur

nms. Landmeter-generaal 1991-03-04

Goedgekeur kragtens Art. 25 van Ord. 15/1985

Verw. Lêer: 17/6/2/5

Gedateer: 1990-05-02

HIERDIE PLAN IS ONDERWORPE AAN VOORWAARDES
SOOS VERWYS IN ARTIKEL 11(6) VAN WET 21/1940

ENDOSSEMENTE											
No.	WYSIGINGS	BYVOEGINGS	MAGTIGINGS	PARAAF	DATUM						

L.G. KANTOORNOTAS

Straatname verander Sien leer S/3945/20 bl. 29 – 35

LEER No. S/3945/20

MEETSTUK No. E1669/90

KOMPILASIE: GK-8BAB (5629)

ſ		SYE	RIGTIN			_	S	KOö tels	RDIN			• _Y		L.G. No.
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	ste	el voor	, , , ,	3112	2, 80	62	he	ktaa	r	٠ .			Ö	grand, synde

Perseel 2777 (gedeelte van Perseel 2579) Boegoebergnedersetting geleë in die Administratiewe Distrik Kenhardt

Provinsie Noord-Kaap

Opgemeet in Junie 1989, Januarie 1999 deur ons

PLS0807 H G van Zyl

PLS0680 J L N van Zyl

(5626) (5629) (5630)

(5628)

Professionele Landmeters

Hierdie kaart is LêerKNHD MF Die oorspronklike kaart geheg aan M.S. 166/1999 No. T15834 2000 L G. No. 6105/89 A.P. ged. Komp. GK-6 S V [No 44513/92 GK-6DCD GK-8BAB (Plan No 12643) GK-8BAD Registrateur van Aktes GK-8

COLOURTONE

		1010114								
	SYE Meter		GTINGS HOEKE		Υ			KOÖRDINATE Stelsel ∠°Z/°		
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Bakens.

A.B.C.D.E. - Ysterpaal 200 mm hoog in klipstapel.

G.J. - Nie gebaken

K.L. - Swaar ysterpaal.

Perseel 1875

(I) Figuur E.H.F.D. synde Ged 10 van die plaas Boegoebergnedersetting

(2) Figuur A.B.C.F.H. Synde Persee! 1869 ged. van Persee! 1018

Boegoebergnedersetting Volgens kaart 7072/1974

geheg aan T/A 1977 · 16775

ERF 1 Saalskop

Die figuur A.B.C.D.E.

stel voor

86,3824 Hektaar

grond, synde

* Perseel 1870 Boegoebergneder setting en bevat W-(2) hierbo

geleë in

Administratiewe Distrik

Kenhardt

Provinsie Kaap die Goeie Hoop.

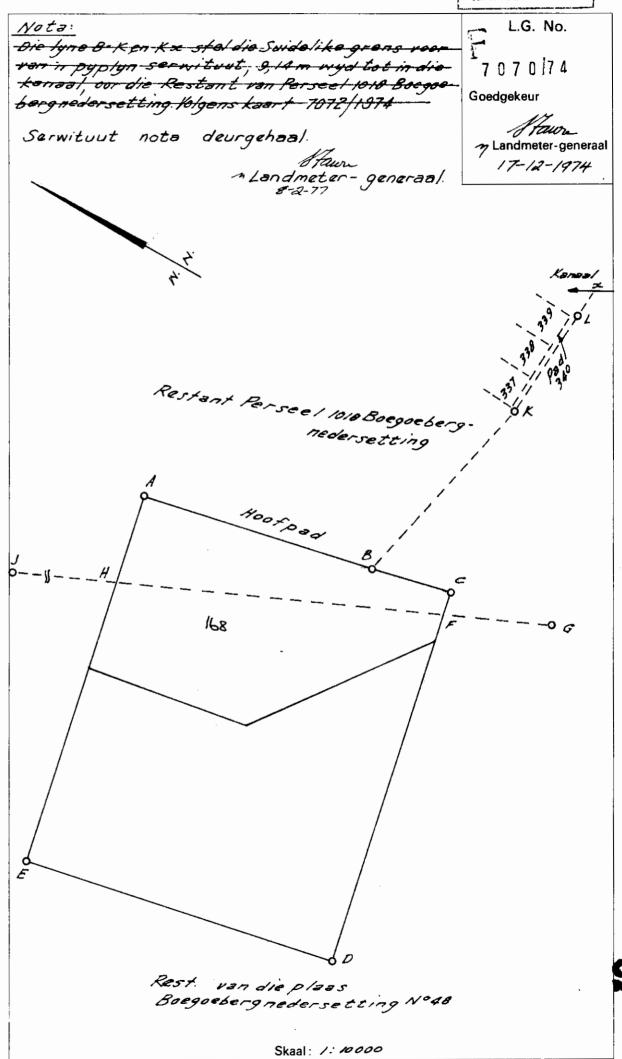
Saamgestel Sulie 1974

deur my,

Landmeter

	•		Landino
	Hierdie kaart is geheg aan S.V.T. /6776/77	Die oorspronklike kaarte is.	Lêer NoS/3945 M.S. No. Saamgestel
	No. gedateer	No geheg aan-	Komp. <i>GK-60CD (5626)</i>
,	t.g.v.	-Transport/Grondbrief	*88A8 (5629)
		-No	·
	Registrateur van Aktes		

VIR ENDOSSEMENTE SIEN KEERSY VAN KAART



DIE VOLGENDE AFTREST MAN HIERDIE KAART GEDOEN								
MEET- 8TUKKE	KAARTNO.	ONDE V.		KTENO.	CEPARA- FEER	RESTANT		
E1668/90	5176/90	Enf 168.	34,6681	4035197	M.	-		

:

1870



TOPLINE 248 HOUSING DEVELOPMENT

Engineering Services Investigation Report

Investigation of the available and required bulk civil and electrical services for the Topline village development in the !Kheis municipal area

AUGUST 2020

Prepared for: MACROPLAN

Attention: Mr Len Fourie

Prepared by:

Email:

BVi Northern Cape (Pty) Ltd 55 Bult Street, Upington, 8801

Contact persons: Mr Niël Maritz (Civil) &Mr Ricardo Humphries (Electrical)

Tel: 054 337 6600

Cell No: 078 824 5253 (R. Humphries) 082 783 5951 (N. Maritz)

charitym@bvinc.co.za nielm@bvinc.co.za



DOCUMENT CONTROL RECORD

Project Name:	Topline 248 Stands - Engineering Services Investigation Report
Project Number:	34167 – TOPLINE
Report for:	MACROPLAN

REVISIONS:

Rev # Date		Revision Details/Status	Prepared by / Author	Reviewed / Approved by		
03	2020/08/25	Draft report to be circulated to relevant parties.	F.D. MARITZ	F.D. Maritz (Pr.Eng)		

APPROVAL:

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EXECUTIVE SUMMARY

This report was compiled to investigate the bulk infrastructure serving the Topline village and to determine whether the bulk infrastructure is adequate for the development of an additional 248 stands, through a low-cost housing development.

The bulk engineering services report includes the following categories:

- Bulk Water Infrastructure
- Bulk Sewer Infrastructure
- Bulk Road and Storm Water Infrastructure
- Bulk Electrical Infrastructure

After investigating the infrastructure, it was found that the existing bulk infrastructure is not sufficient to accommodate the Topline 248 Houses project. The bulk services for each category that require attention before the project can commence is summarised below:

Bulk Water Infrastructure

Upgrading of the entire bulk water supply system is required as these 248 houses will almost double the demand related to the existing 288 houses.

Bulk Sewer Infrastructure

Construction of two new pump stations (6.6 l/s x 2).

Construction of two new 110mm rising mains (1.3km and 2.1km).

Construction of a new 0.5ML waste water treatment works:

Bulk Electrical Infrastructure

Upgrading and exstension of the exsiting bulk electrical supply system is required by Eskom, the exstension of the electrical system will not be a problem as the main sub-station in Groblershoop is currently being upgraded and will be commissioned in December 2020

This report can be used both for business plans and funding applications from the various funding schemes available.



TABLE OF CONTENTS

1.	INTRODUCTION	1
	1.1 Disclaimer	1
	1.2 Terms of Reference	1
	1.3 Site Location	1
2.	TOPOGRAPHY	4
3.	WATER SUPPLY	5
	3.1 Existing Water Infrastructure	5
	3.7 Current water demands and capacity of the existing bulk water supply system	. 11
	3.8 Bulk Water Infrastructure Requirements	13
4.	SEWERAGE	17
	4.1 Existing Sewage Infrastructure overview	17
	4.2 Bulk Sewer Infrastructure Requirements	18
5.	ROADS AND STORMWATER	21
	5.1 Roads and Access	21
	5.2 Stormwater Management	21
<mark>6.</mark>	SOLID WASTE	22
7.	ELECTRICAL SUPPLY	23
	7.1 Electrical Demands and Availability	23
	7.2 Existing Electrical Network	23
	7.3 Electrical Network Extension	24
8.	COST ESTIMATE	25
9.	PROJECT TIMELINE	27
10	CONCLUSION	28



1. INTRODUCTION

1.1 Disclaimer

This is a draft report and only outlines some of the findings of the investigation to date and should not be used as the final or complete report. No recommendations or conclusions have been made and some portions of the report may be incomplete as the investigation is still in process.

1.2 Terms of Reference

I. BVI Consulting Engineers was appointed by Macroplan to undertake this Bulk Engineering Services Study (Water, Sewer, Electricity and Roads & Storm Water) for the proposed Topline 248 housing project. Topline is one of six villages located close to the Orange river within the jurisdiction of !Kheis Local Municipality.

1.3 Site Location

- I. The site is situated approximately 17.7 km to the north-west of Groblershoop in the Northern Cape (Figure 1 Locality Plan).
- II. The development is located at the following coordinates: 28°45'13.83" S; 21°50'30.12" E



Figure 1: Topline 248 Housing Development Locality Plan



III. The planned development consists of 248 low-cost houses next to the existing village (Figure 2: 248 Stands Development Area)



Figure 2: Topline 248 Housing Development Locality Plan

IV. The purpose of the Bulk Engineering Services Assessment is to determine the availability and capacity of existing bulk services to service the proposed development. This report presents the



findings of a preliminary visual inspection and desktop investigation relating to bulk services and further sets out the criteria and standards for the internal services for the new development.

- V. The Bulk Engineering Services addressed in this report are the following:
 - Water Supply
 - Sewerage
 - Roads and Access
 - Storm Water Management
 - Electricity Supply



2. TOPOGRAPHY

The physical characteristics of the site can be summarized as follows:

- Ground cover comprises mostly of natural veld with short grass;
- Topographically, the site has a relatively gentle sloping terrain from the middle of the village
- Calcrete is close to the surface of the natural ground level, which makes excavations very hard.



3. WATER SUPPLY

3.1 Existing Water Infrastructure

Overview

The bulk water infrastructure supplying Topline village with water can be summarised as follows:

- A raw water canal pump station delivering 6l/s;
- A 1500m long, 75mm diameter PVC Class 6 raw water supply line between the canal and the water purification works on the side of the village
- The water treatment works consisting of:
 - o A 2500m³ open raw water storage dam
 - A 6.6l/s package type water treatment plant,
 - A 850m³ Sectional steel storage tank
 - o A 101/s high lift pump station
 - o A 150m³ Sectional steel elevated reservoir
- Distribution into the village

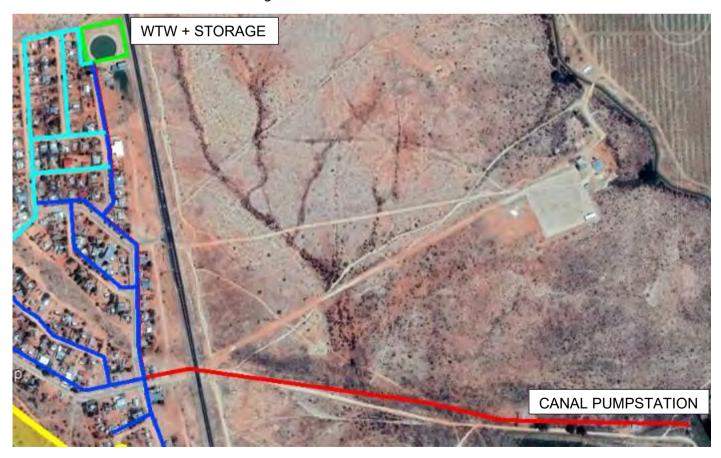


Figure 3: Existing Bulk Water Infrastructure



3.2 Raw Water Supply

Water supplied to Topline is extracted from the canal by means of a secured pump station with a fitted switchgear. The pump station consists of one pump that delivers 6l/s.

Raw water is pumped from the rivier pump station to the purification plant, delivering a maximum flow rate of 6l/s through a 1500m long, 75mm diameter Class 6 PVC pipeline to a 2500 m³ raw water storage dam next to the Package Plant Water Treatment Works in the village











3.3 Water treatment and storage site

The drawing below shows the site layout where the treatment works, raw and potable water storage reservoirs, as well as the pressure tower, is located.

The photo's below shows the reservoirs and treatment plant.



Figure 4: The reservoirs and treatment plant

Water is pumped from the 2500m³ raw water storage dam through the Water Treatment Plant to a 850 m³ sectional steel potable water storage reservoir. From there, it is pumped into the 150m³ elevated storage tank before is gravitates into the village network.

The diagram below shows a schematic layout of the treatment works, raw and potable water storage reservoirs, as well as elevated tower.

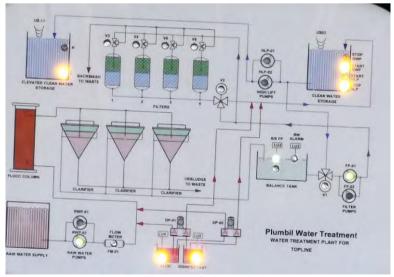


Figure 5: Schematic layout



3.4 Water Treatment Plant

The Package Plant Water Treatment Works (WTW) was constructed in 2008 to supply water at a rate of 2 l/s.





Photo's below shows the settlement tank, as well as the filters inside the container:











3.5 Reticulation System

The potable water is delivered from the elevated storage tank into the reticulation network via a 75mm diameter PVC Class 6 pipeline. The reticulation network is shown in the drawing below.



Figure 5 The reticulation network

3.6 Condition of the water supply system

Most of the elements of the water supply system are currently manually operated. These include the canal pump, the water treatment works, and the reservoir levels. The elevated tank is functional but leaking heavily. Most of the water meters and pressure gauges are out of service.



3.7 Current water demands and capacity of the existing bulk water supply system

The Red Book was used as basis for calculations of the theoretical capacity for the current bulk water supply system as well as required infrastructure.

The table blow shows factors capacities and operating hours used in the calculations:

	1	Design Loss Factor Water treatment works (LFw)		10.0%		
ORS	2	Design Loss Factor Total conveyance losses (LFr)		15.0%		
FACTORS	3	Summer peak factor (SPF)		1.5		
	4	Peak factor reticulation (PFR) From Red Book (Instantenous Peak)				
S S	1	Source Pump Station (SPSH) (Ma	ximum operating hours per day that required volume of water need	16	hours	
OPERATING	2	Water purification plant (WTPH) (Ma	ximum operating hours per day that required volume of water need	16	Hours	
OPE	3	Lifting Pump Station (LPS%) (%	of Instantanious peak flow)	150%		
JE JE	1	Storage in elevated tanks (Hou	rs of Instantanous Peak Demand)	4	hours	
STORAGE	2	Potable Water Storage Reservoirs (Hou	rs of Annual Average Daily Demand*SPF)	48	hours	
ST	3	Raw Water Storage Reservoirs (Hou	rs of Summer Average Daily Demand)	7	days	

The table on the next page shows the current theoretical demands and capacity of the existing bulk water infrastructure:



		BULK AND COM	NECTOR SERVICES C	APACITY	CALCUL	ATION :	CURRENT			
	NO.	DESCRIPTION		UN	TS	DEMAND PER UNIT			Criteri	ia
	1	Sub-Economical Houses (Existing)		288	Houses >	600	/ househo	ld per day	172.8 m ³ /d	
	2	Sub-Economical Houses (135 houses development)			Houses >	600	/ househo	ld per day	0 m ³ /d	
	4	Economical Houses (Existing)		0	Houses >	1200	/ househo	ld per day	0 m³/d	
	5	Economical Houses (135 houses development)		0	Houses >	1200	/ househo	ld per day	0 m³/d	
GENERAL	7	Primary School Hostel		0	Learners	150	/ Learner	per day	0 m³/d	
GEN	8	Schools (1)		200	Learners	25	/ Learner	per day	5 m³/d	
	9	High School Hostel		0	Learners	150	// Learner	per day	0 m ³ /d	
	10	High School		0	Learners	25	/ Learner	per day	0 m ³ /d	
	11	Clinics (1)		250	m² x	500	1/100m ² pe	er day	1.25 m ³ /d	
	12	Businesses, Government and Municipal (1)		6300	m² x	400 I/100m ² per day			25.2 m ³ /d	
	13	Developed Parks, Sportsgrounds and Day Cares(1)		1.50	ha	5	mm water	per day	75 m³/d	
		ANNUAL AVERAGE DAILY DEMAND (AADD)							279.25 m ³ /d	i
	1	Annual Average Daily Demand (AADD)	AADD	279.3	m³/day	11.6	m ³ /hour	3.2 Vs	ΥII	
	2	Gross Annual Average Daily demand (GAADD)	(1+Lfr)*AADD	321.1	m³/day	13.4	m³/hour	3.7 Vs	CURRENT CAPACITY	
	3	Summer Gross Daily Demand (SGDD)	SPF*GAADD	481.7	m ³ /day	20.1	m³/hour	5.6 Vs	JRRENT	
MANDS	4	Instantanious Peak Demand (IPD) (Main supply pipeline to reticulation)	AADD*PFR			81.4	m³/hour	22.6 Vs	ರ	1
AL DEN	5	Storage Capacity Elevated Storage	hours*IPD					325.8 m³	150.0 m ³	46%
THEORETICAL DEMANDS	6	Lifting Pump Station Capacity and Pipeline Flow between Main Storage and Elevated tank	IPD*LPS%	208	mm dia	122.2	m³/hour	33.9 Vs	10.0 l/s	29%
HE	7	Potable Water Storage Capacity (Main Storage)	hours*AADD					558.5 m ³	850.0 m3	152%
	8	Water Treatment Plant Capacity (WTPC)	SGDD*24/WTPH	722.6	m3/day	30.1	m3/hour	8.4 Vs	6.6 l/s	79%
	9	Source Pump Station Capacity and Pipeline Flow	WTPC*(1+LFW)*24/SF	136	mm dia	51.9	m3/hour	14.4 Vs	6.0 l/s	42%
	10	Raw Water Storage Capacity	Days*SGDD					3372.0 m ³	2528.0 m3	75%

It is clear from the table that the existing infrastructure is already under pressure to handle the demand. Water from the raw water storage dam is also used to irrigate the sportsfield. The biggest problems are with bulk and elevated storages.



3.8 Bulk Water Infrastructure Requirements

The table below shows factors capacities and operating hours used in the calculations for future demand:

	1	Design Loss Factor Water treatment works (LFw)		10.0%		
FACTORS	2	Design Loss Factor Total conveyance losses (LFr)		15.0%		
FAC	3	Summer peak factor (SPF)		1.5		
	4	Peak factor reticulation (PFR) From Red Book (Instantenous Peak)				
S S	1	Source Pump Station (SPSH)	(Maximum operating hours per day that required volume of water need	16	hours	
OPERATING HOURS	2	Water purification plant (WTPH)	(Maximum operating hours per day that required volume of water need	16	Hours	
OPE H	3	Lifting Pump Station (LPS%)	(% of Instantanious peak flow)	150%		
끯	1	Storage in elevated tanks	(Hours of Instantanous Peak Demand)	4	hours	
STORAGE	2	Potable Water Storage Reservoirs	(Hours of Annual Average Daily Demand*SPF)	48	hours	
ST	3	Raw Water Storage Reservoirs	(Hours of Summer Average Daily Demand)	7	days	

The table below compares the current infrastructure capacities with the capacity that is required for the 248 stands development. Cells highlighted in red would require upgrading in order to accommodate the expected demands.



		BULK AND CO	NNECTOR SERVICES (CAPACITY	CALCUL	ATION : FUTURE	<u> </u>		
	NO.	DESCRIPTION		UNITS		DEMAND	PER UNIT	Criter	ia
	1	Sub-Economical Houses (Existing)		288	Houses x	600 I/ housel	nold per day	172.8 m ³ /d	
	2	Sub-Economical Houses (135 houses development)		248	Houses x	600 l/ housel	nold per day	148.8 m³/d	
	4	Economical Houses (Existing)		0	Houses x	1200 l/ housel	nold per day	0 m ³ /d	
	5	Economical Houses (135 houses development)		0	Houses x	1200 I/ housel	nold per day	0 m³/d	
GENERAL	7	Primary School Hostel		0	Learners	150 l/ Learne	r per day	0 m ³ /d	
GEN	8	Schools (1)		200	Learners	25 I/ Learne	r per day	5 m ³ /d	
	9	High School Hostel		0	Learners	150 l/ Learne	r per day	0 m ³ /d	
	10	High School		0	Learners	25 I/ Learne	r per day	0 m ³ /d	
	11	Clinics (1)		250	m² x	500 l/100m ²	oer day	1.25 m ³ /d	I
	12	Businesses, Government and Municipal (1)		6300	m² x	400 l/100m ²	oer day	25.2 m ³ /d	I
	13	Developed Parks, Sportsgrounds and Day Cares(1)		1.50	ha	5 mm wate	er per day	75 m ³ /d	I
		ANNUAL AVERAGE DAILY DEMAND (AADD)						428.05 m ³ /d	I
	1	Annual Average Daily Demand (AADD)	AADD	428.1	m ³ /day	17.8 m³/hour	5.0 l/s	Į.	
	2	Gross Annual Average Daily demand (GAADD)	(1+Lfr)*AADD	492.3	m³/day	20.5 m³/hour	5.7 l/s	CURRENT CAPACITY	
	3	Summer Gross Daily Demand (SGDD)	SPF*GAADD	738.4	m³/day	30.8 m³/hour	8.5 √s	IRRENT	
IANDS	4	Instantanious Peak Demand (IPD) (Main supply pipeline to reticulation)	AADD*PFR			107.0 m³/hour	29.7 l/s	3	
AL DEN	5	Storage Capacity Elevated Storage	hours*IPD				428.1 m ³	150.0 m ³	35%
THEORETICAL DEMANDS	6	Lifting Pump Station Capacity and Pipeline Flow between Main Storage and Elevated tank	IPD*LPS%	238	mm dia	160.5 m³/hour	44.6 l/s	10.0 l/s	22%
THEC	7	Potable Water Storage Capacity (Main Storage)	hours*AADD				856.1 m ³	850.0 m3	99%
	8	Water Treatment Plant Capacity (WTPC)	SGDD*24/WTPH	1107.6	m3/day	46.1 m3/hou	12.8 l/s	6.6 l/s	51%
	9	Source Pump Station Capacity and Pipeline Flow	WTPC*(1+LFW)*24/SF	168	mm dia	79.6 m3/hou	22.1 l/s	6.0 l/s	27%
	10	Raw Water Storage Capacity	Days*SGDD				5169.0 m ³	2528.0 m3	49%



Recommended upgrades to the Topline bulk water infrastructure are as follows (shown on the drawing below):

- Upgrading of the canal pump station with a duty and standby pump to supply 22l/s.
- New 160 mm diameter Class 6 PVC pipeline between the canal pump station and the existing raw water storage reservoir.
- Upgrading of the raw water srtorage dam to 5000 m³
- Upgraded Water Treatment Works capable of delivering 46m³/h on the existing treatment works site
- A new 430m3 sectional steel pressure tower on the highest point to the north.
- A new 45l/s uplifting pump station at the treatment works.
- A new 250mm diameter pipeline between the lifting pump station and the pressure tower.



Figure 6: Proposed Water Bulk Infrastructure



9 Fire Fighting Requirements

Areas to be protected by a fire service should be classified according to a fire-risk category. The new development can be classified as a "Low risk – Group 4" according to the "Guidelines for Human Settlement Planning and Design".

No specific provision for fire fighting water is required in water storage, or reticulation mains in these areas. Hydrants should, however, be located at convenient points in the area on all mains of 75 mm nominal internal diameter and larger, and in the vicinity of all schools, commercial areas and public buildings.

Fire fighting in areas zoned "Low-risk – Group 4" should generally be carried out using trailer-mounted water tanks or fire appliances that carry water, which can be replenished from the hydrants provided in the reticulation, if necessary.



4. SEWERAGE

4.1 Existing Sewage Infrastructure overview

Thirty percent of the houses in the Topline village is currently serviced by VIP toilets. Sixty percent of the houses are using toiltes with conservancy tanks which get regualry cleaned buy municipal waste truck.





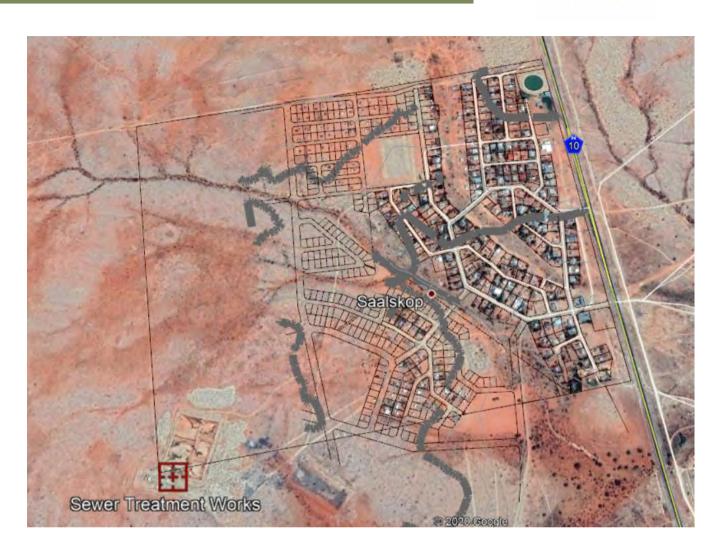














4.2 Bulk Sewer Infrastructure Requirements

If a full borne sewer sewerage system is required for the new 248 houses development, the associated bulk infrastructure will consist of a pumpstation, rising main pipeline and oxidation ponds as shown on the Google image below. The existing Sewer Treatment Works is too close to the edge of the village and needs to be moved to a new location as shown on the Google image below.



The total sewer flow is calculated as follows:

TOPLINE	TOTAL	SEWER FLOW				
Sewer flow per day - Sub economical houses	536	sub economical houses @	500	l/day	268 000	l/day
Sewer flow per day - Economical houses	0	economical houses @	750	l/day	-	I/day
Sewer flow per day - Hostels	0	persons @	140	l/day	-	I/day
Sewer flow per day - Schools	200	persons @	20	l/day	4 000	l/day
Businesses and State Institutions	0	buildings	100	l/day	-	l/day
SEWER FLOW PER DAY - TOTAL					272 000	l/day



The sizes and capacities of the proposed pump stations and rising mains were calculated as follows:

PUMP STATION No	1 AND RI	SING MAIN				
Sewer flow per day - Sub economical houses	536	sub economical houses @	500	l/day	268000	l/day
Sewer flow per day - Economical houses		economical houses @	750	l/day	0	l/day
Sewer flow per day - Hostels	0	persons @	140	l/day	0	l/day
Sewer flow per day - Schools	200	persons @	20	l/day	4000	l/day
Businesses and State Institutions	3	buildings	100	l/day	300	l/day
SEWER FLOW PER DAY - TOTAL					272300	I/day
Average sewer flow					3.2	l/s
Factor for inflow from other sources	30%				0.9	l/s
Sewer flow with inflow from other sources					4.1	l/s
PEAK NETWORK SEWER FLOW	2.1		3.5		14.3	l/s
FLOWRATE FROM OTHER PUMP STATIONS					0	l/s
TOTAL PEAK FLOW					14.34	l/s
ACTUAL PUMP ABILITY	1.63	times peak flow			23.4	l/s
Theoretical pump station capacity for normal pump operation	1	hours of peak flow			52	m³
Theoretical pump station capacity for emergency storage	4	hours of normal flow			59	m³
TOTAL REQUIRED THEORETICAL PUMP STATION CAPACITY					111	m³
Pump details						kW
Rising main diameter					206	mm
Rising main material					PVC	
Rising main length					1650	m
Static pump height					13	m
Friction losses					12	m
Total pump height					25	m

Recommended Topline bulk sewer infrastructure construction (excluding internal sewer lines) are as follows (shown on the drawing above):

- Construction of a new sewer pump station capable of delivering 23.4 l/s direct to the Waste Water Treatment plant.
- New 200mm diameter Class 6 PVC pipelines (2100m & 1300m) between the pump stations and a new Waste Water Treatment Plant (oxidation ponds).
- Construction of a new Waste Water Treatment Plant (oxidation ponds) with a capacity of 0.3Ml per day.



5. ROADS AND STORMWATER

5.1 Roads and Access

Access to the development will be from the existing Residential Collector Streets (Class 4b), as shown on the drawing below:

No problems are foreseen regarding roads and access.

5.2 Stormwater Management

The guiding principle underlying the storm water management strategy is that, where possible, the peak run-off from the post-developed site should not exceed that of the pre-developed site for the full range of storm return periods (1:2 to 1:50). Where possible, measures should be incorporated into the site development plan to attenuate the post-development flows to pre-development rates.

The storm water network must be designed to accommodate (flood frequencies as prescribed by "The Red Book") the minor storm event (1:5 year) in open channels or side drains of streets. The major storm (1:50 year) should be managed through controlled overland flows, above-ground attenuation storage (if required) and berms at the higher end of the site (if required). As no formal storm water system exists in the area, concentration of storm water must be avoided as far as possible. Earthworks on plots should therefore encourage free drainage of the area.

Topline is a small village that generally drains from the centre. Existing roads will be adequate for this purpose.



6. SOLID WASTE



7. ELECTRICAL SUPPLY

7.1 Electrical Demands and Availability

This section of the report covers the availability of the Bulk Electrical connection to the future 248 Community stands, an expected additional load of the proposed development will initially be 298 KVA as per INEP guidelines and the accommodation of this load will form the basis of this report. The community of Topline falls directly under "Eskom Distribution" and the existing electrified homes in the community purchase electricity directly from Eskom and not through the Kheis local Municipality.

The bulk connection to the community / town is via a 22kV overhead line fed from the 10MVA Grobelershoop sub-station



7.2 Existing Electrical Network

The bulk connection to the community / town is via a 22kV overhead line fed from the Eskom 10MVA Grobelershoop sub-station, this sub-station is currently in the process of being upgraded to 20MVA and will be commissioned in December 2020.

The existing MV electrical network in the Topline runs through the town via 22 KV overhead line feeder connecting to various pole mounted transformers (see figure 1 below).

The existing feeder can easily handle the future additional 298kVA load only after the upgraded Eskom Groblershoop sub-station is brought online as indicated by Eskom's network planning department.







7.3 Electrical Network Extension

The internal electrical network extension in the Topline community will only be done by Eskom after the formulation processes are completed as this area falls under the Eskom Distribution



8. COST ESTIMATE

The cost estimate for the proposed activities are as provided below. The level of accuracy is commensurate with a concept level design.

Description		Amount
Water Bulk Services		
New mobile 12l/s river pump station	R	850 000,00
0,85km 125mm Ø supply line	R	722 500,00
Upgrading of Water Treatment Works	R	700 000,00
New 360m ³ storage reservoir	R	900 000,00
New 240m ³ storage reservoir	R	840 000,00
New 24I/s lifting pump station	R	240 000,00
0,3km 200mm Ø line from lifting PS to elevated storage	R	285 000,00
Sub-Total (Water)	R	4 537 500,00
Bulk Sewer Services	R	-
New 0,25 ML oxidation pond system	R	2 675 662,36
New sewer pump station No 1	R	1 676 508,10
New sewer pump station No 2	R	1 676 508,10
2,1km 110mm Ø uPVC rising main (PS No.1)	R	2 233 596,40
1,3km 110mm Ø uPVC rising main (PS No.2)	R	1 451 837,66
Sub-Total (Sewer)	R	8 262 274,95
Roads and Access	R	-
None	R	-
Stormwater	R	-
None	R	-
Electrical	R	-
O/H ACSR line ring	R	2 300 000,00
Circuit breaker (11kV, LC1&2)	R	1 550 000,00
O/H ACSR line to POC	R	1 850 000,00
Sub-Total (Electrical)	R	5 700 000,00
Sub-Total	R	18 499 774,95
15% P&G's	R	2 774 966,24
Sub-Total	R	21 274 741,19
10% Contingencies	R	2 127 474,12
Sub-Total	R	23 402 215,31
10% Professional fees	R	2 340 221,53
Sub-Total	R	25 742 436,84
15% VAT	R	3 861 365,53
Grand Total	R	29 603 802,37

Notes:

- 1) Base date of the calculations is April 2020;
- 2) No provision was made for EIA, registration and/or land acquisition;
- 3) No allowance was made for institutional and/or social development.



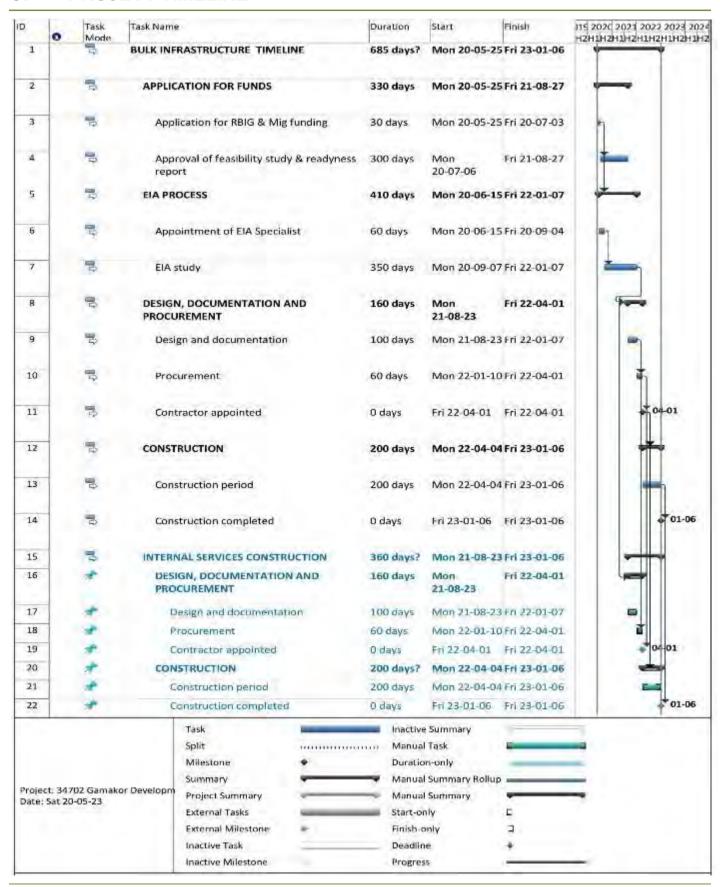
8.1 Funding

Funding can be applied for through the Municipal Infrastructure Grant (MIG) and Regional Bulk Infrastructure Grant (RBIG). For repair work at the water treatment works, the Water and Sanitation Infrastructure Grant (WSIG) can also be applied for.

This report can be used for funding application from the various schemes available.



9. PROJECT TIMELINE





10. CONCLUSION

Engineering services were assessed to determine spare capacity on the existing bulk infrastructure and compared to the estimated demand of the newly proposed Topline 248 houses development.

The findings and conclusions in this report are based on a preliminary desktop study, as well as site visits.

- Bulk Water Infrastructure The current capacity of the bulk water infrastructure is not enough to accommodate the proposed 248 houses development as is. It is proposed that the infrastructure should be upgraded, not only to provide adequate capacity for the Topline development, but also for future water demand increases. The following upgrades are proposed:
 - o Construction of a new 12l/s mobile river pump station with a duty and standby pump.
 - New 125mm diameter Class 6 PVC pipeline between the river pump station and the existing potable water storage reservoir.
 - Upgraded Water Treatment Works capable of delivering 24m³/h on the existing treatment works site
 - o A new 360m³ sectional steel reservoir next to the upgraded water treatment works
 - o A new 250m3 sectional steel pressure tower on the highest point to the north.
 - A new 24l/s uplifting pump station at the treatment works.
 - o A new 200mm pipeline between the lifting pump station and the pressure tower.
- Bulk Sewage Infrastructure There is currently no bulk sewer infrastructure. Recommended Topline bulk sewer infrastructure construction (excluding internal sewer lines) are as follows (shown on the drawing above):
 - Construction of two new sewer pump stations capable of delivering 6.7 l/s direct to the Waste Water Treatment plant.
 - o New 110mm diameter Class 6 PVC pipelines (2100m & 1300m) between the pump stations and a new Waste Water Treatment Plant (oxidation ponds).
 - Construction of a Waste Water Treatment Plant (oxidation ponds) with a capacity of 0.5Ml per day.
- Roads and Access: No bulk infrastructure upgrading required on the roads.
- Storm Water Management: No bulk infrastructure upgrading required on the storm water.
- Electricity Supply Formal bulk upgrade process to be finalised between Eskom and !Kheis Municipality.
- Electrical Load Centre The existing Load Centre "Topline Nommer 2" can accommodate the future additional load, with only minor modification to be done in the Load Centre and as agreed with the Municipality's Electrical Department.



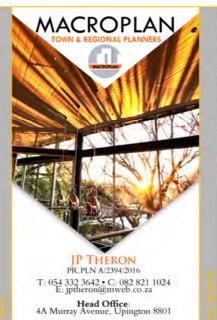
In conclusion, the engineering services are not in place (water and sewer) to meet the standard requirements. The infrastructure will have to be upgraded regardless of the implementation of the Topline 248 houses development in order to meet current and expected future needs. The upgrading should be done in such a way as to take into consideration the Topline 248 Houses development.





Design:	JP Theron (Pr. Pln. A/2394/2016)
Drawn:	JP Theron (Pr. Pln. A/2394/2016)
Date:	August 2020
Scale:	1:1750 (A1)
Plan nr:	Concept Layout Plan

Colour & Numbers	Land Use Description	Total	Schedule of Sizes			Colour &	Land Use	Total		Schedule of	Sizes
		Units	average size per erf	total area covered by land use	d percentage of study area covered by use	Numbers	Description	Units	average size per erf	total area covered by land use	percentage of study area covered by use
ALCOHOL:	Open Space Zone I						Undetermined Zone	1			
	Open Space Zone II	12					Business Zone I	2			
	Open Space Zone III	1					Business Zone II				
	Agricultural Zone I						Business Zone III				
	Agricultural Zone II					-	Business Zone IV				
	Resort Zone II	1				100	Business Zone V				
	Residential Zone I	247					Business Zone VI				
	Residential Zone II						Industrial Zone I				
	Residential Zone III						Industrial Zone II				
	Residential Zone IV						Industrial Zone IV				
	Residential Zone V						Industrial Zone IV	1			
	Residential Zone VI						Utility Zone I	1			
	Institutional Zone I						Utility Zone II				
	Institutional Zone II	1				3.3.1.66	Utility Zone III				
	Institutional Zone III						Transport Zone I	1			
	Authority Zone I	1					Transport Zone II				
	Authority Zone II	-					Transport Zone III	-			
	Special Zone					Total:		266			



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BOTANICAL ASSESSMENT

TOPLINE (SAALSKOP) HOUSING PROJECT

PROPOSED FORMALIZATION AND DEVELOPMENT OF 248 NEW ERVEN ON ERVEN 1, 16, 87, SAALSKOP & PLOT 2777, BOEGOEBERG SETTLEMENT, TOPLINE, !KHEIS LOCAL MUNICIPALITY,NORTHERN CAPE PROVINCE



18 July 2020

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

Registered Professional Botanical, Environmental and Ecological Scientist

©

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EXECUTIVE SUMMARY

VEGETATION

Bushmanland Arid Grassland

TYPE

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

VEGETATION ENCOUNTERED

Of the 36 ha footprint about 12 ha is already disturbed or settled. The vegetation can be described as a sparse low and open shrubland (1 m in height) usually dominated by *Senegalia mellifera* (Swarthaak) in combination with *Tetraena decumbens* (=*Zygophyllum*) and *Justicia australis*, but with the occasional *Vachellia tortilis* or *Boscia albitrunca* in between. The presence of *Vachellia tortilis* was somewhat surprising as this must be almost on the western edge of its distribution range. Although the veld was in relative good condition, species diversity was low, which is most probably the result of grazing practices, coupled with the current drought conditions. Grasses were scarce and the vegetation seemed to be reduced to hardy or pioneer species. The ephemeral water courses were generally in good condition.

CONSERVATION PRIORITY AREAS

According to the Northern Cape CBA maps the proposed site falls within a CBA area. However, there is no alternative on Municipal land that will not impact on the CBA.

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

CONNECTIVITY

The transformation of the site will destroy connectivity on the site, but should not result in a significant impact on the surrounding area, where connectivity is still excellent.

LAND-USE

The footprint is on municipal land in close proximity to the town of Topline. About 35% of the footprint is disturbed or already settled. The area is grazed by livestock, which can be seen in the condition and diversity of species encountered (coupled with the effects of the on-going drought).

PROTECTED PLANT SPECIES

The most significant botanical aspect of this site is the presence of a protected Sheppard tree (*Boscia albitrunca*) (refer to Table 2) and a number of Northern Cape Nature Conservation Act, protected species (Refer to Table 3).

MAIN CONCLUSION

The proposed development footprint is located on Municipal property, adjacent to existing town developments. The activity is expected to result in a permanent transformation of approximately 36 ha of land, of which approximately 65% is still covered by indigenous vegetation used for livestock grazing. 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 $\underline{\textbf{Low}}$ impact, which can be reduced to a $\underline{\textbf{Low}}$ 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 !Kheis 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

Note: The terms of reference must be attached.

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.

Signature of the specialist:

PB Consult (Sole Proprietor)

Name of company:

16 July 2020

Date:

CONTENTS EXECUTIVE SUMMARY...... INDEPENDENCE & CONDITIONS......II RELEVANT QUALIFICATIONS & EXPERIENCE OF THE AUTHORII DECLARATION OF INDEPENDENCE......III 1.1. 2.1. 2.2. 2.3. 4.1. 4.1.1. 4.2. Vegetation encountered 6 Existing disturbance footprint6 4.2.1. 4.2.2. 4.3. 4.4. 4.5. 4.6. 4.6.1. 4.6.2. 4.6.3. 4.6.4. 5.1. 5.2. 6.1. IMPACT MINIMISATION RECOMMENDATIONS.......21 7.1. APPENDIX 1: COMPLIANCE WITH APPENDIX 6 OF GN. NO. 982 (4 DECEMBER 2014)23

APPENDIX 2: CURRICULUM VITAE – P.J.J. BOTES......24

LIST OF TABLES: Table 3: Plant species protected in terms of the NCNCA encountered within the study area......14 LIST OF PHOTOS: Photo 1: Showing some of the housing already established in the northern corner of the proposed footprint (looking from east to west Photo 4: Disturbed open area in the south eastern corner of the proposed footprint (a portion of this area seems to be used as a sporting Photo 5: The disturbed area shown in red in Figure 6. It seems as if spoil had been dumped in this area......8 Photo 6: A further picture of the disturbed area indicated by the red area in Figure 6.8 Photo 7: Typical sparse open shrubland dominated by Senegalia mellifera with scattered individuals of Vachellia tortilis (in picture) and

1. INTRODUCTION

There is an urgent need for the establishment of additional residential erven in the sub-economical market in the !Kheis Local Municipality. Seven towns have been identified for the proposed development of a number of new erven at each town. They are:

Boegoeberg: 550 erven;
Gariep: 135 erven;
Groblershoop: 1500 erven;
Grootdrink: 370 erven;
Opwag: 730 erven;
Topline: 248 erven; and
Wegdraai: 360 erven.

Macroplan has been appointed by the Barzani Group (on behalf of COGHSTA) 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.

This report refers to the proposed development of approximately 248 new erven on a 36 ha of municipal land adjacent to Topline.

The proposed footprint supports one vegetation type namely, Bushveld Arid Grassland (considered "Least Threatened" in terms of the National list of ecosystems that are threatened and in need of protection). Desktop studies suggest that the veld may still be in good condition, and it overlaps a terrestrial critical biodiversity area (CBA1) as identified in the 2017 Northern Cape Biodiversity Spatial Plan.

The settlement of Topline was another surprise in that the veld and area next to the settlement was in reasonably good condition, with littering and illegal dumping of waste not very obvious. The residents of Topline should be commended for the relative neatness of their town.

1.1. TERMS OF REFERENCE

The terms of reference for this appointment were to:

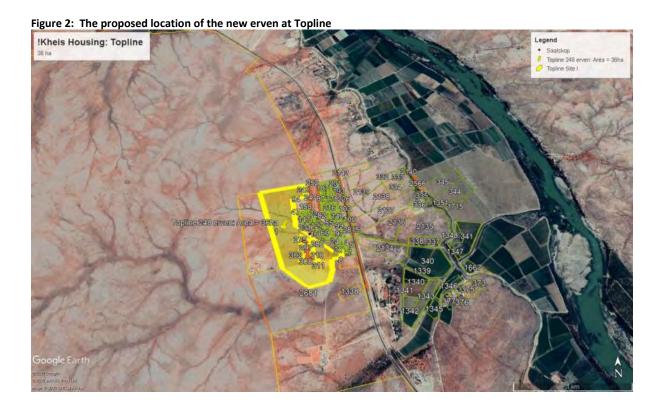
- Evaluate the proposed site(s) in order to determine whether any significant botanical features will be impacted as a result of the proposed development.
- Determine and record the position of any plant species of special significance (e.g. protected tree species, or rare or endangered plant species) 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.

STUDY AREA 2.

2.1. **LOCATION & LAYOUT**

Topline is located just off the N10, about 25 km north of Groblershoop on your way to Upington in the !Kheis Local Municipality of the Northern Cape Province (Figure 1). The proposed new erven will include the formalisation of the areas already settled, Erf 1, 16, 87, Saalskop & Plot 2777, Boegoeberg Settlement (GPS Coordinates 28° 45' 12.03"S; 21° 50' 17.13"E).



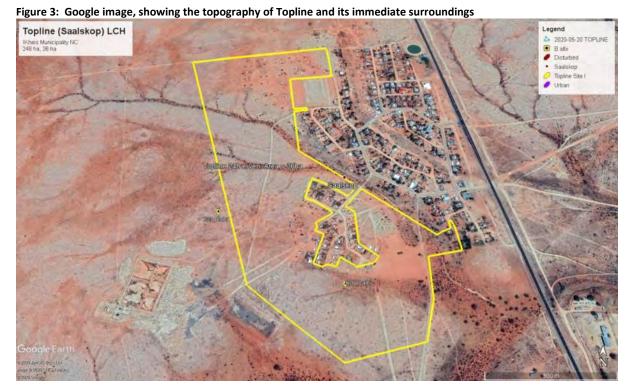


2.2. CLIMATE

All regions with a rainfall of less than 400 mm per year are regarded as arid. Topline receives less than a 100 mm of rain per year, mainly in mid-summer December to March the highest (40 mm) in February/March, with its lowest rainfall (0 mm)during winter (June to August). It is also important to note that rainfall can be highly erratic and can vary significantly per annum on any specific location. Daily temperatures vary from 23° C -37° C during the hot summer months (December / January) and drops down to between 8° C - 17° C during the colder winter months (June – July) (www.worldweatheronline.com).

2.3. TOPOGRAPHY & SOILS

The proposed Topline settlement is located on slightly undulating landscape characterised by a number of ephemeral drainage lines, sloping east towards the Orange River (Figure 3). The slope is minimal, with a maximum slope of less than 3%.

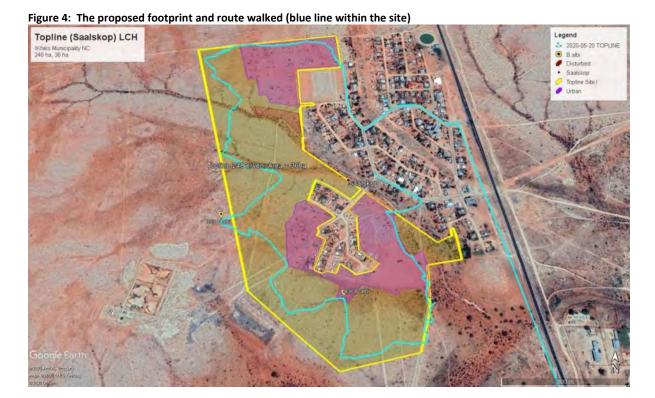


According to Mucina & Rutherford (2006), the geology for Bushmanland Arid Grassland vegetation is dominated by mudstones and shales of the Ecca Group (Prince Albert and Volksrust Formations) and Dwyka tillites, both of the early Karoo age. About 20% of rock outcrops are formed by Jurassic intrusive dolerite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

3. EVALUATION METHOD

Desktop studies coupled with a site visit were performed. The site visit was conducted on the 20th of May 2020. 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 the Northern Cape is currently in the midst of one of its worst drought periods in a long time, and although some summer rains had fallen (deducted from the presence of a number of grass species) it was not yet enough to really trigger a display of annual herbs.



However, the author is confident that a fairly good understanding of the biodiversity 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).

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 <u>concentrated in many local centres of endemism</u>. 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 Topline 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 expected within the proposed footprint, namely **Bushmanland Arid Grassland** (Figure 5). This vegetation type is classified as "Least Threatened" (GN 1002, December 2011) although statutory conservation targets have not yet been met.

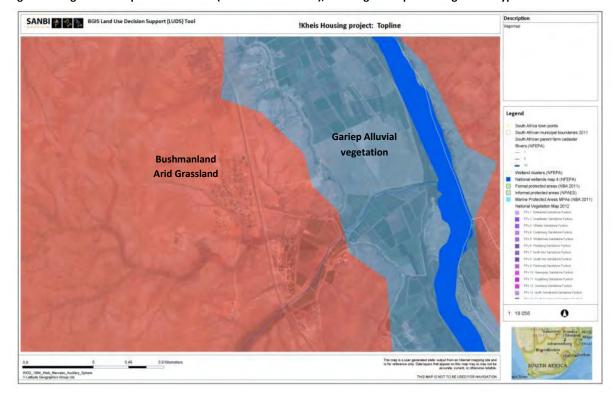


Figure 5: Vegetation map of South Africa (2012 beta 2 version), showing the expected vegetation types

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 <u>arid landlocked</u> 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 <u>no effect of the ameliorating influences of the oceans.</u>

Rainfall is low and unreliable, peaking in March. <u>Droughts are unpredictable and often prolonged.</u> <u>Summers are hot and winters cold</u> with temperature extremes ranging from -5°C in winter to 43°C in summer. However, <u>rainfall intensity can be high</u> (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 <u>potential for soil erosion</u>. In semi-arid environments such as the Nama-Karoo, <u>nutrients are generally located near the soil surface</u>, making it vulnerable to sheet erosion (Mucina *et. al.*, 2006). In contrast with the Succulent Karoo, the Nama-Karoo is <u>not particularly rich in plant species</u> and <u>does not contain any centre of endemism</u>. <u>Local endemism is very low</u>, which might indicate a relative youthful biome linked to the remarkable geological and environmental homogeneity of the Nama-Karoo. <u>Rainfall seasonality and frequency are too unpredictable and winter temperatures too low to enable leaf succulent dominance</u> (as in the Succulent Karoo). It is also <u>too dry in summer for dominance by perennial grasses</u> alone and the <u>soils generally to shallow and rainfall too low for dominance by trees</u>. But soil type, soil depth and local differences in moisture availability can cause <u>abrupt changes in vegetation structure and composition</u> (e.g. small drainage lines support more plant species than surrounding plains) (Mucina *et. al.*, 2006).

4.2. VEGETATION ENCOUNTERED

The proposed development footprint is about 36 ha in size (Figure 6) of which about 12 ha are already settled or disturbed as a result of urban related activities (refer to the purple and red areas in Figure 6). However, the vegetation on the remainder of the site was in in relative good condition, although the impact of continuous grazing activities coupled with the recent drought can be seen in the veld. A number of ephemeral drainage lines cross the property as it drains the surroundings towards the Orange River.



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: Areas already settled or being settled, about 11.09 ha in size (Photo 1 Photo 4).
- Red areas: Areas of physical disturbance, which include areas excavated or areas where spoil and other material were dumped (stored), about 0.55 ha in size (Photo 5 Photo 6);



Photo 1: Showing some of the housing already established in the northern corner of the proposed footprint (looking from east to west over the site).



Photo 2: Looking from west to east over the northern portion of the proposed footprint (already settled area).



Photo 3: Some of the settlement encountered in the western centre area of the proposed new footprint.



Photo 4: Disturbed open area in the south eastern corner of the proposed footprint (a portion of this area seems to be used as a sporting field – soccer).



Photo 5: The disturbed area shown in red in Figure 6. It seems as if spoil had been dumped in this area.



Photo 6: A further picture of the disturbed area indicated by the red area in Figure 6.

4.2.2. Remaining natural veld

The site was characterised by shallow to slightly deeper red sandy soils on weathering rock dominated by quartz, with calcrete sometimes observed (Photo 7 & Photo 8). The vegetation can be described as a sparse low and open shrubland (1 m in height) usually dominated by Senegalia mellifera (Swarthaak) in combination with Tetraena decumbens (=Zygophyllum) and Justicia australis, but with the occasional Vachellia tortilis or Boscia albitrunca in between. The presence of Vachellia tortilis was somewhat surprising as this must be almost on the western edge of its distribution range.



Photo 7: Typical sparse open shrubland dominated by *Senegalia mellifera* with scattered individuals of *Vachellia tortilis* (in picture) and *Boscia albitrunca* sometimes forming a third over layer.

Species diversity was again very low, which is most probably the result of grazing practises, coupled with the current drought conditions. Grasses were scarce and the vegetation seemed to be reduced to hardy or pioneer species.



Photo 8: Open sparse vegetation encountered in the western portion of the proposed footprint. Note the *Senegalia mellifera* in the background and the *Tetraena decumbens* in the foreground.

The following plants were also observed, scattered throughout the footprint: Acanthopsis hoffmannseggiana, Adenium oleifolium, Aizoon burchellii, Aloe claviflora (very common), Aptosimum lineare A. spinescens, Blepharis mitrata, Euphorbia gariepina, Euphorbia spinea (occasionally), Geigeria ornativa, Kleinia longiflora, Lycium cinereum, Phaeoptilum spinosum, Rhigozum trichotomum, Rogeria longiflora, Tapinanthus oleifolius and Tetraena rigida. The invasive alien tree, Prosopis species were also commonly observed in the south eastern corner of the site.



Photo 9: Typical vegetation associated with the ephemeral drainage lines. Dominated by *Senegalia mellifera* and other larger shrubs like *Lycium* and *Rhigozum* species, with *Vachellia tortilis* also occasionally encountered.



Photo 10: Apart from one or two low shrubs in poor condition, this was the only Sheppard tree (*Boscia albitrunca*) of some stature observed within the footprint.

As is typical in the Bushmanland Grassland vegetation the ephemeral drainage lines are characterised by a denser and higher riparian vegetation. In this case the vegetation associated with these water courses were dominated by *Senegalia mellifera* and larger shrubs like *Lycium cinereum Rhigozum trichotomum* and *Phaeoptilum spinosum* with *Vachellia tortilis* also occasionally encountered.

4.3. <u>Critical biodiversity areas maps</u>

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.



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

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.

- <u>Critical biodiversity areas (CBA's)</u> 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.
- <u>Ecological support areas (ESA's)</u> 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 <u>terrestrial CBA</u>. However, there is no alternative site within the Municipal town boundaries that is not located within the CBA.

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 2 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 indigenous species encountered within or near the proposed footprint

No.	Species name	ecies name FAMILY Status		Alien & invader plant (AIP)
1.	Acanthopsis hoffmannseggiana	ACANTHACEAE	LC	
2.	Adenium oleifolium	APOCYNACEAE	LC NCNCA, Schedule 2 Protected (all species in this Family)	Apply for a NCNCA Flora permit (DENC)
3.	Aizoon burchellii	AIZOACEAE	Not evaluated NCNCA, Schedule 2 Protected (all species in this Family)	Apply for a NCNCA Flora permit (DENC)
4.	Aloe claviflora	ASPODELACEAE	LC NCNCA, Schedule 2 Protected (all species in this Family)	Apply for a NCNCA Flora permit (DENC)
5.	Aptosimum lineare	SCROPHULARIACEAE	LC	
6.	Aptosimum spinescens	SCROPHULARIACEAE	LC	
7.	Blepharis mitrata	ACANTHACEAE	LC	
8.	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)
9.	Euphorbia gariepina	EUPHORBIACEAE	LC	Apply for a NCNCA

No.	Species name	FAMILY	Status	Alien & invader plant (AIP)
			NCNCA, Schedule 2 Protected (all species in this Genus)	Flora permit (DENC)
10.	Euphorbia spinea	EUPHORBIACEAE	LC NCNCA, Schedule 2 Protected (all species in this Genus)	Apply for a NCNCA Flora permit (DENC)
11.	Geigeria ornativa	ASTERACEAE	LC	
12.	Justicia australis (=Monechma genistifolium)	ACANTHACEAE	LC	
13.	Kleinia longiflora	ASTERACEAE	LC	
14.	Lycium cinereum	SOLANACEAE	LC	
15.	Phaeoptilum spinosum	NYCTAGINACEAE	LC	
16.	Rhigozum trichotomum	BIGONACEAE	LC	
17.	Rogeria longiflora	PEDALIACEAE	LC	
18.	Senegalia mellifera (=Acacia mellifera)	FABACEAE	LC	
19.	Tapinanthus oleifolius	LORANTHACEAE	LC	
20.	Tetraena decumbens (=Zygophyllum decumbens)	ZYGOPHYLLACEAE	LC	
21.	Tetraena rigida (=Zygophyllum rigidum)	ZYGOPHYLLACEAE	LC	
22.	Vachellia tortilis subsp. heteracantha	FABACEAE	LC	

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).

• One species protected in terms of the NFA was observed, namely **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

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

NO.	SPECIES NAME	COMMENTS	RECOMMENDATIONS
035 B albi	Boscia albitrunca S28° 45' 21.7" E21° 50' 13.0"	Large tree (2.5 m tall) but with signs of being grazed.	To be protected Located outside the footprint.
036 B albi	Boscia albitrunca S28° 45' 28.2" E21° 50' 25.7"	Large tree (3.2 m tall) subject to human interference (Photo 10).	To be protected Located within livestock pen.



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.	Adenium cf. oleifolium Schedule 2 protected		Search & rescue: Only one individual observed. Individuals within footprint to be transplanted to surrounding area.
2.	Aizoon burchellii Schedule 2 protected		Species protection through topsoil conservation.
3.	Aloe claviflora	Very common throughout the site	Very common plant in this area.
	Schedule 2 protected		Protection through topsoil conservation.
4.	Boscia albitrunca		Refer to Table 2.
	Schedule 2 protected		
5.	Euphorbia gariepina Schedule 2 protected		Occasionally observed. Larger <i>Euphorbia</i> tends to transplant very poorly. Species protection through topsoil conservation.
6.	Euphorbia spinea Schedule 2 protected		Occasionally observed. Very common plant in this area. Species protection through topsoil conservation.

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

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:

- <u>Location</u>: The proposed development footprint is located on Municipal property, next to the existing town. Portions of the proposed footprint had already been settled.
- Activity: The proposed activity is expected to result in a permanent transformation of approximately 36 ha of land, of which more than 60% is still covered by indigenous vegetation.
- **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.
- <u>Land use and cover</u>: The footprint is on municipal land in close proximity to the town of Topline.
 About 35% of the footprint is disturbed or already settled. The area is grazed by livestock, which can
 be seen in the condition and diversity of species encountered (coupled with the effects of the ongoing drought).
- Vegetation status: The vegetation is not considered a threatened vegetation type, but conservation targets have not yet been met. Of the 36 ha footprint about 12 ha is already disturbed or settled. The vegetation can be described as a sparse low and open shrubland (1 m in height) usually dominated by Senegalia mellifera (Swarthaak) in combination with Tetraena decumbens (=Zygophyllum) and Justicia australis, but with the occasional Vachellia tortilis or Boscia albitrunca in between. The presence of Vachellia tortilis was somewhat surprising as this must be almost on the western edge of its distribution range. Although the veld was in relative good condition, species diversity was low, which is most probably the result of grazing practices, coupled with the current drought conditions. Grasses were scarce and the vegetation seemed to be reduced to hardy or pioneer species. The ephemeral water courses were generally in good condition.
- Conservation priority areas: According to the Northern Cape CBA maps the proposed site falls within a CBA area. However, there is no alternative on Municipal land that will not impact on the CBA. The site will not impact on any recognised centre of endemism.
- <u>Connectivity</u>: The transformation of the site will destroy connectivity on the site, but should not result in a significant impact on the surrounding area, where connectivity is still excellent.
- <u>Watercourses and wetlands</u>: Not evaluated in this study as a separate freshwater impact assessment has been commissioned as part of the NEMA EIA process.
- <u>Protected or endangered plant species</u>: The most significant botanical aspect of this site is the presence of a protected Sheppard tree (*Boscia albitrunca*) (refer to Table 2) and a number of Northern Cape Nature Conservation Act, protected species (Refer to Table 3).
- <u>Alien and Invasive Plant species</u>: The south eastern portion of the proposed site (next to the town) has been invaded by the alien invasive *Prosopis* tree. These plants should be removed responsibly before development commence.

6.1. <u>IMPACT ASSESSMENT</u>

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

				lm	pac	t as	sessment	t
Aspect	Mitigation	CV	Lik	Dur	Ext	Sev	Significance	Short discussion
Geology & soils: Potential impact on special habitats (e.g.	Without mitigation	2	1	5	2	1	18	No special habitats observed.
true quartz or "heuweltjies")	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	Without mitigation	2	3	5	1	2	22	Permanent transformation of approximately 36 ha of indigenous vegetation used for livestock grazing.
activities.	With mitigation	2	2	3	1	1	14	Potential beneficial socio-economic impact (much needed housing project).
	ı							<u> </u>
Vegetation status: Loss of vulnerable or endangered	Without mitigation	3	3	5	2	2	36	Permanent transformation of 36 ha of slightly disturbed Bushmanland Arid Grassland (Least Threatened).
vegetation and associated habitat.	With mitigation	2	2	3	1	1	14	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
0	I							T
Conservation priority: Potential impact on	Without mitigation	3	3	5	2	3	39	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.
protected areas, CBA's, ESA's or Centre's of Endemism.	With mitigation	2	2	3	1	2	16	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
C	I							I who are the second of the se
Connectivity: Potential loss of ecological migration corridors.	Without mitigation	2	3	5	2	2	24	The transformation will destroy connectivity within the site, but will not result in a significant impact on the surrounding area, where connectivity is still excellent
	With mitigation	2	2	3	2	2	18	Refer to recommendations for NFA- & NCNCA protected plant species (Table 2 & 3).
		ı	ı	ı	ı			
Watercourses and wetlands: Potential impact on	Without mitigation						0	N/a (Refer to the Freshwater specialist report).
natural water courses and it's ecological support areas.	With mitigation						0	
Drotacted 9	I							A number of protected or
Protected & endangered plant species:	Without mitigation	3	3	5	2	3	39	A number of protected species were observed, most notably a number of nationally protected tree species.
Potential impact on threatened or protected plant 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	Without mitigation						0	No alien invasive plants observed
plant infestation as a result of the activities.	With mitigation						0	

				lm	pac	t as	sessment				
Aspect	Mitigation	CV	Lik	Dur	Ext	Sev	Significance	Short discussion			
Veld fire risk: Potential risk of yeld	Without	1	2	3	2	2	9	Veld fire risk low.			
fires as a result of the	mitigation	-	_	J	_	_		Veid life risk tow.			
activities.	With mitigation	1	1	1	1	1	4	Address fire danger throughout construction.			
Cumulative impacts: Cumulative impact associated with	Without mitigation	3	3	5	2	3	39	Permanent transformation of approximately 36 ha of natural veld for urban development.			
proposed activity.	With mitigation	2	2	3	2	2	18	Refer to all the mitigation recommendations above.			
	1										
The "No-Go" option: Potential impact associated with the	Without mitigation	3	3	4	2	2	33	Slow degradation of natural veld as a result of illegal dumping, physical disturbances and grazing practices.			
No-Go alternative.	With mitigation						0				

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

- The transformation of 36 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, located on Municipal land that will not impact on the same CBA. In this case, about 35% of the proposed footprint is already impacted as result of existing settlement and the remaining veld can only be described as disturbed.

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 development footprint is located on Municipal property, adjacent to existing town developments. The activity is expected to result in a permanent transformation of approximately 36 ha of land, of which approximately 65% is still covered by indigenous vegetation used for livestock grazing. 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 <u>Medium-Low</u> impact, which can be reduced to a <u>Low</u> 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).
- Before any work is done search & rescue as discussed in Table 3 must be completed.
- 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.

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

Specialist reports

a)	Details of –	Refer to:
a)	(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 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
I)	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
	(iA) regarding the acceptability of the proposed activity or activities; and	executive summary (Pag
	(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

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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Dept. of Natural Sciences, Stellenbosch University 1989.

Hons. BSc (Plant Ecology), Stellenbosch University, 1989

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(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

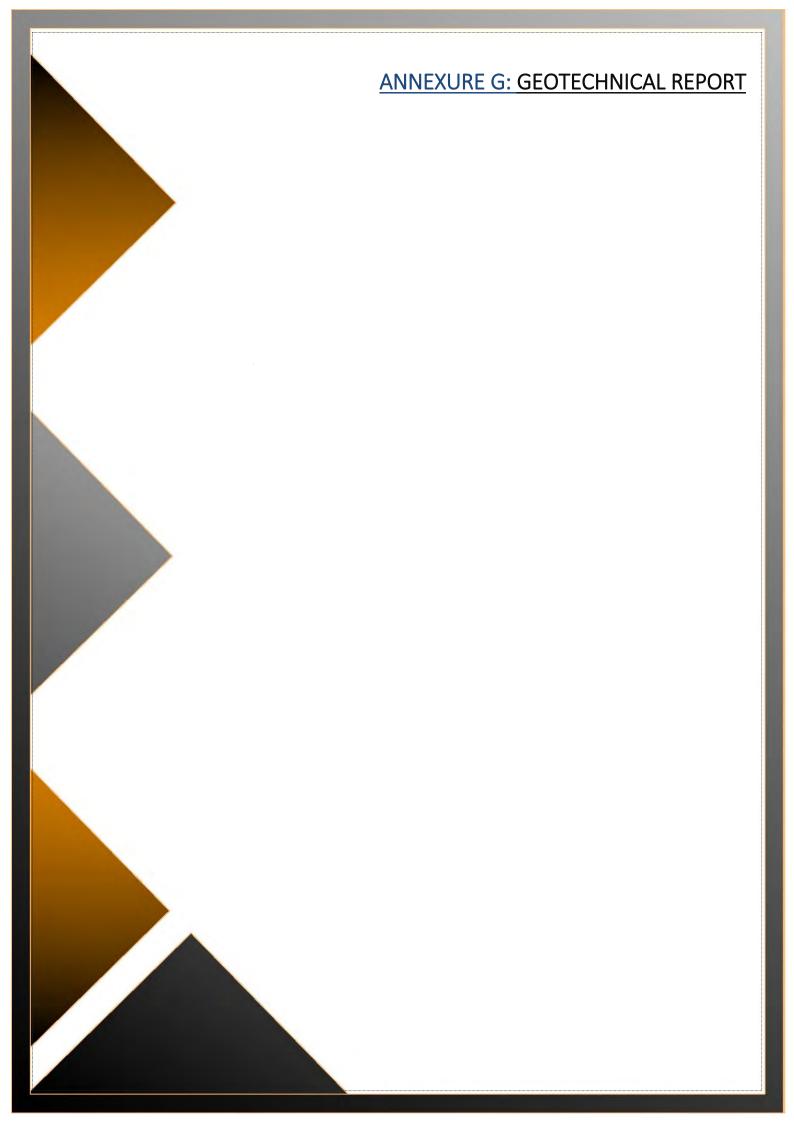
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GEOTECHNICAL CONDITIONS ON ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMENT: A REPORT FOR THE EXPANSION AND FORMALISATION OF THE TOPLINE COMMUNITY

2020/J09/MCP_01









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EXECUTIVE SUMMARY

1 INTRODUCTION

It is envisaged to develop some 36 hectare of land on Erven 1, 16 and 87 Saalskop (Topline); and Plot 2777 of Boegoeberg Settlement as an expansion and formalization of the existing Topline community. For this purpose Cedar Land Geotechnical Consult (Pty) Ltd was appointed as sub consultant to Macroplan to conduct a geotechnical investigation on the properties.

2 SITE DESCRIPTION

2.1 Site Location

The village of Topline is located directly to the west and adjacent to the National Route 10 between Upington and Groblershoop in the Northern Cape. It is some 25 km from Groblershoop. The area of investigation consisting of Erven 1, 16 and 87 Saalskop (Topline); and Plot 2777 of Boegoeberg is located on the perimeter of the village, on the western and southern sides thereof. The size of the property is 36 hectare.

2.2 Topography and Drainage

The land investigated is located between 864,0mamsl and 851,00mamsl. Topographical it can be divided into three sections. These three sections are bordered by two centrally located non-perennial water courses, joining into one on the eastern perimeter of the area of investigation. The three areas can be described as follows;

- Northern Section: This section is located between the northern limit of investigation up to the northern-most gully and initially slopes at 1,0% due south. After a distance of some 230 meters the slope increases to 4,6% terminating at the water course.
- Central Section: The central section is present as a ridge striking northwest to southeast between the two water courses. Slope of the central part of the ridge is virtually flat at less than 1%, while the two flanks slope at 4,3% towards the south and northeast.
- Southern Section: This section is located from the southern water course, terminating at the southern limit of investigation. The eastern and western limits of this section are characterized by very flat surfaces with slopes less than 1%. The remainder central part of the site is characterised by a low and undulating landscape, generally sloping towards the east at 2%.

Drainage takes place by means of surface sheetwash. The sheetwash is disposed of in the watercourses as described above. A berm of approximately two meters high is present on the eastern bank of the water course between the existing village and the water course.

2.3 Vegetation and Landscape

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. On site it was found that in the areas where natural vegetation is present it consists of a sparse stand of Acacia melliflora, prosopis glandulosa and Boscia albitrunca. Stands of aloe claviflora are present.

2.4 Climatic Conditions

The area is located in a summer-rainfall region with mean annual precipitation between 70mm to 200mm; mean maximum summer temperature of 38°C and mean minimum winter temperature of -0,6°C. Frost incidence varies between 10 and 35 days per year. The development of whirl winds are common on hot summer days. The Thornthwaithe moisture index is less than -40; and the Weinert N value approximately 35.

2.5 Existing Facilities

2.5.1 Informal Housing

Informal housing consisting of galvanized iron structures and some reed structures is present in the northern and southern parts of the site, directly adjacent to the existing village. Electricity is provided to overhead high mast street lighting.

2.5.2 Vacant Land

Vacant, undeveloped land extends from the informal housing to the limits of the area of investigation to the north, west and south of Topline.

3 NATURE OF INVESTIGATION

3.1 Test Pitting

On 7 July 2020 28 test pits were excavated with a Bell 315SK TLB on hire from ALS Plant Rentals. The TLB was equipped with a 600mm wide bucket. 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 seven 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.

4 GEOLOGY, SOILS AND GROUNDWATER

4.1 Geology

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 Kaaien Terrane and the site is located on Kalkwerf granite-gneiss that is intrusive into the Groblershoop Formation of the Brulpan Group.

Bedrock occurs on site as strongly foliated, gneissic rock. In thin section the granite-gneiss can be seen to have suffered extreme deformation, with quartz grains completely recrystallized, showing deformation bands and undulose extinction. The rest of the rock is made up of plagioclase, muscovite, chloritized biotite, occasional garnet, epidote, hornblende and other accessory minerals. Physically the granite-gneiss is described as dirty white mottled light green and pink, massive, micaceous, hard rock, varying to dark grey speckled dull dark red, closely jointed and coarse grained, hard rock.

4.2 Soil Profile

4.2.1 Colluvium

Colluvium consists of pegmatitic gravels, weather resistant scree of quartz and quartzite fragments contained in a sandy matrix. Nodules of calcrete may be contained in the colluvium. The consistency of the colluvium varies between loose and medium dense. The horizon of colluvium was between 100mm and 600mm thick in the test pits.

4.2.2 Made Ground

What appears to be areas levelled and fill material provided for construction of a dam and soccer field

are present on site. The origin of the surface soil is unsure, and it may also originate as debris of the non-perennial stream in which vicinity these test pits are located. This fill is described as light brown, loose, fine sand. The horizon of fill extended to depths varying between 200mm and 700mm in the test pits. However, the soil profile may be of unknown variable composition and depth.

4.2.3 Residual Granite-gneiss

A superficial horizon of residual granite-gneiss is described as abundant clast supported, fine, angular gravels of granite-gneiss in a matrix of light brown, fine sand, with a medium dense consistency.

4.2.4 Waste

Substantial areas of stockpiles of rubble are present in the vacant land. Such rubble consists of items varying from household waste, excavated calcrete to builder's rubble.

4.2.5 Mokalanen Formation

4.2.5(i) Hardpan Calcrete

Hardpan calcrete is present as outcrops or underlies the colluvium, occurring from depths between 100mm and 600mm minimum, extending to 200mm to 800mm maximum, at which stage refusal of excavation occurred. The hardpan calcrete can be described as dirty white, very fine grained and very dense.

4.2.5(ii) Nodular Calcrete

Isolated occurrences of nodular calcrete underlie the colluvium, extending to 600mm and 800mm deep at which depth refusal of excavation occurred. The nodular calcrete can be described as abundant clast supported medium coarse, rounded and subrounded nodules of calcrete in a matrix of very dense, calcareous cemented, fine sand.

4.3 Groundwater

4.3.1 Perched Water

Perched groundwater was not encountered in any of the test pits excavated for this investigation. It is anticipated that perched water will generally not prove problematic on the site.

4.3.2 Permanent Groundwater

The probability for drilling successfully for water in the area is between 40% and 60%, and the probability that such a borehole will yield more than 2l/s is between 10% and 20%. Groundwater is expected to occur at depths less than 15 meters in compact, argillaceous strata.

5 CONDITIONS OF EXCAVATION

On average over the entire site bedrock or refusal of excavation on very dense hardpan calcrete was encountered at depths between 100mm minimum and 1100mm maximum, averaging 520mm deep. The implication of this is that should trenches require excavated depths to 1000mm, 48% of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 63% of the excavation may be classified as hard.

6 SITE CLASS DESIGNATION

6.1 Geotechnical Zone I

The zone is classed as R, meaning that the proposed horizon for founding is stable and negligible soil movement is expected. The distribution thereof encompasses 47% of the proposed area for development. Slope across the land is less than 2%. Considering the limited slope and the favourable geotechnical site classification, two foundation design alternatives are applicable to the zone, namely conventional strip foundations or slab-on-the-ground foundations placed directly on bedrock or very dense pedocrete.

6.2 Geotechnical Zone II

The zone is classed as R, meaning that the proposed horizon for founding is stable and negligible soil movement is expected. The distribution thereof encompasses 45% of the proposed area for development. Slope across the land is approximately between 2% and 6%. The use of slab-on-the-ground foundations will require additional works in the form of the construction of an engineered fill or cutting to establish a level platform for construction. The more viable foundation alternative therefore remains founding by conventional strip foundations.

6.3 Geotechnical Zone III

This zone comprises 8% of the area investigated. The zone is characterized by surface materials consisting of calcrete that have been partially removed for construction and have been rehabilitated by importing fine, granular materials; levelled to provide a soccer field and what appears to be a shallow earth dam. Other parts of the area are covered by stockpiles of excavated calcrete and an

unrehabilitated borrow pit is also present. To establish structures in this zone will require rehabilitating the borrow pit, possibly using the available stockpiles of calcrete and levelling out the entire area to provide a reasonably level surface for construction. This will include cut to fill earthworks and compacting the material to a density of at least 93% modified AASHTO. All in all an engineered solution is required to rehabilitate the area to a standard acceptable foe residential development. Such a design will require deviating the water course that drains onto the area. The development potential of the area is regarded as poor and is classified P(Reworked ground) with anticipated settlement consisting of highly variable compression, exceeding 20mm, but highly variable, thus S to S2.

7 SURFACE HYDROLOGY

The average slope across the larger part of the land is less than 2%. In Geotechnical Zone II the slope less between 2% and 6%, that is over 45% of the site. This slope of less than 2% has a detrimental influence on especially the design of a stormwater disposal system depending on gravity to dissipate of the surface water due to downpours. No steep slopes are present on the property.

The non-perennial water courses on site are contained in well-defined, narrow gullies and may be regarded as being of lesser importance, requiring no additional precautionary measures to ensure the safety of the population against flooding. However, a deviated gully drains into the southeastern part of the site into Geotechnical Zone III.

8 MATERIALS UTILIZATION

- Trench Backfilling: None of the materials are suitable for selected fill or pipe bedding. With exception of the hardpan calcrete all materials can be used for normal backfill.
- Layerworks for Paved or Segmental Block Paving: The hardpan calcrete is of G5 and G6 quality and hence suitable for the construction of layerworks up to subbase and base course level for lightly trafficked roads.
- 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. However, calcrete is often used for this purpose and is the most suitable material available.

9 OTHER CONSIDERATIONS

- Undermining: The area is not subject to undermining.
- Seismic Activity: The Peak Ground Acceleration expected in 50 years is 0,04g. A low risk for the development of earth tremors therefore exist.
- Soil Corrosivity: The in-situ soils and pedocretes are not corrosive due to acidic properties. All soil materials can be regarded as corrosive due to high soluble salt contents.

0	omite: 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.												

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2020/J09/MCP_01

INDEX

		PAGES
1	INTRODUCTION	1
2	TERMS OF REFERENCE	1
3	AVAILABLE INFORMATION	1
4	SITE DESCRIPTION	2
5	NATURE OF INVESTIGATION	6
6	SITE GEOLOGY AND GEOHYDROLOGY	7
7	GEOTECHNICAL EVALUATION	17
8	SITE CLASS DESIGNATIONS	26
9	FOUNDATION RECOMMENDATIONS AND SOLUTIONS	30
10	DRAINAGE	33
11	SPECIAL PRECAUTIONARY MEASURES	34
12	CONCLUSIONS	34
13	RECOMMENDATIONS	40
14	SOURCES OF REFERENCE	41
15	ADDENDUM A: TEST PIT PROFILES	
16	ADDENDLIM B. RESLILTS OF MATERIALS TESTING	

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GEOTECHNICAL CONDITIONS ON ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMENT: A REPORT FOR THE EXPANSION AND FORMALIZATION OF THE TOPLINE COMMUNITY

1 INTRODUCTION

It is envisaged to develop some 36 hectare of land on Erven 1, 16 and 87 Saalskop (Topline); and Plot 2777 of Boegoeberg Settlement as an expansion and formalization of the existing Topline community. For this purpose Cedar Land Geotechnical Consult (Pty) Ltd was appointed as sub consultant to Macroplan as per the minutes of the start-up meeting of the project held in the offices of Macroplan on 20 May 2020 to conduct a geotechnical investigation on the properties.

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 source of available information recording available data obtained in the larger Upington to Groblershoop area have been consulted for background information:

 Breytenbach FJ: Contract NRA N010-110-2012/1F: Geotechnical Investigation for Four Bridge Widenings on the National Route 10 Section 11 between Groblershoop (km 0,0) and Lambrechtsdrift (km 61,1), issued by Soilkraft cc on behalf of Bvi Engineers on 8 March 2012.

4 SITE DESCRIPTION

4.1 Site Location

The village of Topline is located directly to the west and adjacent to the National Route 10 between Upington and Groblershoop in the Northern Cape. It is some 25 km from Groblershoop. The area of investigation consisting of Erven 1, 16 and 87 Saalskop (Topline); and Plot 2777 of Boegoeberg is located on the perimeter of the village, on the western and southern sides thereof. The size of the property is 36 hectare.

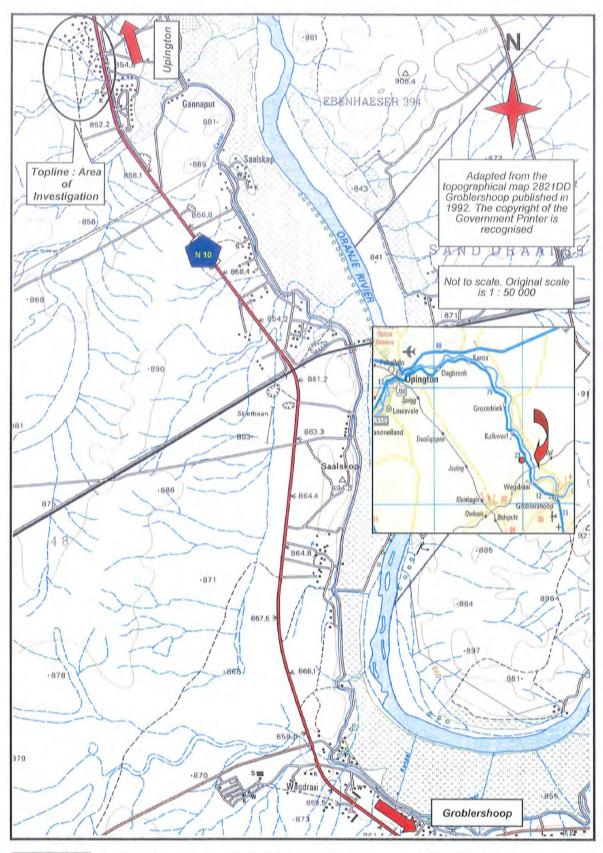
Refer to the attached Figure 1: Locality Plan.

4.2 Topography and Drainage

The land investigated is located between 864,0mamsl and 851,00mamsl. Topographical it can be divided into three sections. These three sections are bordered by two centrally located non-perennial water courses, joining into one on the eastern perimeter of the area of investigation. The three areas can be described as follows;

- Northern Section: This section is located between the northern limit of investigation up to the northern-most gully and initially slopes at 1,0% due south. After a distance of some 230 meters the slope increases to 4,6% terminating at the water course.
- Central Section: The central section is present as a ridge striking northwest to southeast between the two water courses. Slope of the central part of the ridge is virtually flat at less than 1%, while the two flanks slope at 4,3% towards the south and northeast.
- Southern Section: This section is located from the southern water course, terminating at the southern limit of investigation. The eastern and western limits of this section are characterized by very flat surfaces with slopes less than 1%. The remainder central part of the site is characterised by a low and undulating landscape, generally sloping towards the east at 2%.

Drainage takes place by means of surface sheetwash. The sheetwash is disposed of in the watercourses as described above. The drainage courses are contained in narrow, steeply





LOCALITY PLAN

FIGURE 1

sloping and well defined gullies. A berm of approximately two meters high is present on the eastern bank of the water course between the existing village and the water course.

4.3 Vegetation and Landscape

Based on the work done by Mucina^{Reference} ^{14,1} 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 stand of Acacia melliflora, prosopis glandulosa and Boscia albitrunca. Stands of aloe claviflora are present, although these plants are removed for herbal medication and extension of urbanization.

4.4 Climatic Conditions

The area is located in a summer-rainfall region with mean annual precipitation between 70mm to 200mm; mean maximum summer temperature of 38°C and mean minimum winter temperature of -0,6°C. Frost incidence varies between 10 and 35 days per year. The development of whirl winds are common on hot summer days. The Thornthwaithe moisture index is less than -40; and the Weinert N value approximately 35. The climate can thus be described as arid. The importance of this is that mechanical breakdown of bedrock will take place rather than chemical decomposition, limiting the formation of secondary minerals such as expansive montmorillonite clay.

4.5 Existing Facilities

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

4.5.1 Informal Housing

Informal housing consisting of galvanized iron structures and some reed structures is present in the northern and southern parts of the site, directly adjacent to the existing village. Electricity is provided to overhead high mast street lighting. Some residents have created small vegetable and flower gardens on the stands.



CONDITIONS OF REFUSAL OF EXCAVATION IN HARDPAN CALCRETE



WASTE DUMPS OF CALCRETE, CONCRETE ROCK AND SANDY MATERIAL



SITE CONDITIONS IN OPEN VELD. NOTE COLLUVIAL DEPOSITS OF WHITE QUARTZ GRAVELS



CONDITIONS IN TOPLINE VILLAGE



4.5.2 Vacant Land

Vacant, undeveloped land extends from the informal housing to the limits of the area of investigation to the north, west and south of Topline.

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 7 July 2020 28 test pits were excavated with a Bell 315SK TLB on hire from ALS Plant Rentals. The TLB was equipped with a 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, the guidelines for test pit profiling 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 AAE are indicated on this figure.

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. 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.

Soil testing consisted of the following:

- Conductivity and pH determinations on seven 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.

TABLE 1: SOIL PROFILING PARAMETERS

CONSISTENCY: GRANULAR SOILS

SPT		GRAVELS & SANDS	DRY	SPT	SIL	TS & CLAYS and combinations with	UCS
N		Generally free draining soils	DENSITY	N		SANDS.	(kPa)
			(kg/m^a).			Generally slow draining soils	
<4	Very	Crumbles very easily when scraped with	< 1450	<2	Very	Pick point easlily pushed in 100mm.	<50
	loose	geological pick. Requires power tools for			soft	Easily moulded by fingers.	
4- 10	Loose	Small resistance to penetration by sharp	1450-1600	2-4	Soft	Pick point easlily pushed in 30mm to 40mm.	50-125
		pick point, requires many blows by pick point				Moulded by fingers with some pressure.	
10-30	Medium	Considerable resistance to penetration by	1600- 1750	4-8	Firm	Pick point penetrates to 10 mm.	125-250
	dense	sharp pick point.				Very difficult to mould with fingers.	
	Dense	Very high resistance to penetration by sharp				Slight indentation by pick point.	
30-50		pick point. Requires many blows by pick point	1750- 1925	8-15	Stiff	Cannot be moulded by fingers. Penetrated	250-500
		for excavation.				by thumb nail.	
	Very	High resistance to repeated blows of			Very	Slight indentation by blow of pick point.	
>50	dense	geological pick. Requires power tools for	> 1925	15-30	stiff	Requires power tools for excavation.	500-1000
		excavation.					

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

CONSISTENCY: COHESIVE SOILS

Ī		
	Dry	No water detectable
	Slightly moist	Waterjust discemable
	Moist	Water easily discemable
	Very moist	Watercan be squeezed out
	Wet	Generally belowwater table

SOIL STRUCTURE

	COLOUR	Intact	No structure present.			
		Fissured	Presence of discontinuities, possibly cemented.			
Speckled	Very small patches of colour <2 mm	Slickensided	Very smooth, glossy, often striated discontinuity			
Mottled	lmegular patches of colour 2-6mm		planes.			
Blotched	Large irregular patches 6-20mm	Shattered	Presence of open fissures. Soil break into gravel size			
Banded	Approximately parallel bands of varying colours		blocks.			
Streaked	Randomly orientated streaks of colour	Microshattered	Small scale shattering, very closely spaced open			
Stained	Local colour variations : Associated with discontinuity		fissures. Soil breaks into sand size crumbs.			
	surfaces	Residual structures	Residual bedding, laminations, foliations etc.			

ORIGIN

Alluvium, hillwash, talus etc.
Weathered from parent rock, eg residual granite
Femorete, silorete, calorete 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.	0,5-2,0
	Under light hammer blows disintegrate to a friable state.	
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

6 SITE GEOLOGY AND GEOHYDROLOGY

The geology of the area between Upington and Groblershoop appears to consist of granitoid rock in the north, grading into metamoprphic rocks towards Groblershoop, but 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 McCarthy^{Reference 14.2}, Cornell^{Reference 14.3} and Moen^{Reference 14.4} were consulted. Of these three references, the latter two can be regarded as site specific. However, there is disagreement

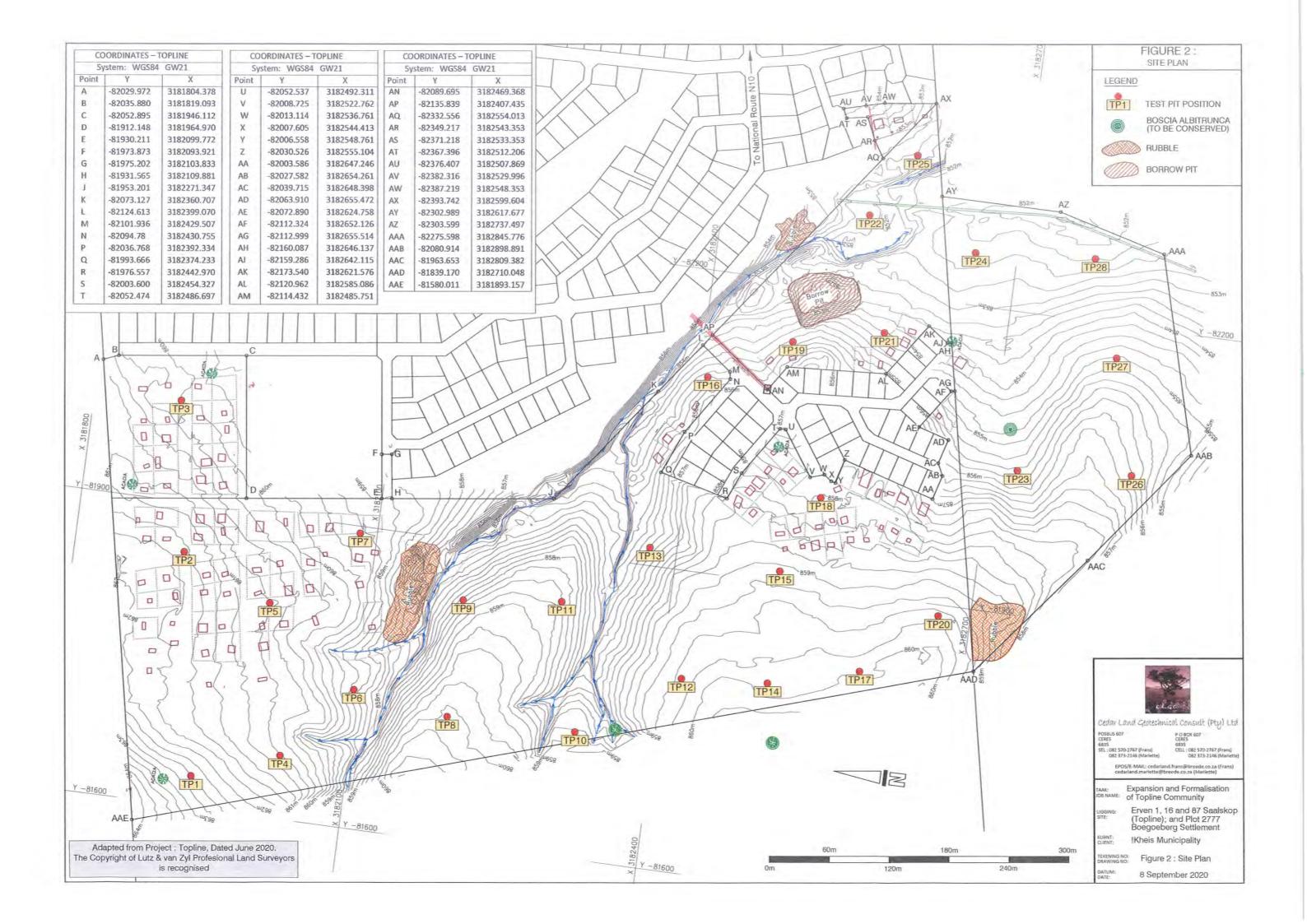


TABLE 2 : SUMMARY OF SOIL TESTING

r													
		UNIFIED	J 9	SC	GW-GM	GM-GC	GW-GM	GM-GC	MS	GM-GC	SM-SC	S	GW-GM
	SOIL CLASS	PRA	A-1-a(0)	A-1-a(0)	A-2-4(0)	A-1-b(0)	A-1-a(0)	A-1-b(0)	A-1-b(0)	A-1-b(0)	A-2-4(0)	A-2-4(0)	A-1-a(0)
	0)	СОГТО	G5				95					6 1	
	MDD	(kgm ⁻³)	2,067				1845					2134	
	OMC	(%)	8,8				10,2					8,2	
	> %	0,002mm	4,1	6,	9,0	9,0	4,0	2,0	0,5	8,0	1,0	2,8	0,2
IING	CONDUCTIVITY	(Sm ⁻¹)		0,05		0,11			0,15	90'0	60'0	90'0	0,06
SOIL IES	Ho			7,87		7,82			7,74	7,69	7,85	7,78	7,58
2 : SUMMARY OF SOIL LESTING	ACTIVITY		Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low
E 2 : SUI	3		21	19	34	25	35	22	33	25	25	19	34
IABLE	Ы		4,0	3,0	8,0	4	ĸ	ъ	ဖ	4	4	ო	4
	œΜ		2,20	1,90	2,40	2,10	2,50	2,00	1,90	2,00	1,30	1,00	2,40
	SOIL	TYPE	Sandy gravel	Sandy gravel	Rock fragments	Sandy gravel	Sandy gravel	Sandy gravel	Rock fragments	Sandy gravel	Sand & gravel	Fine sand	Sandy gravel
	SOIL	ORIGIN	Hardpan calcrete	Hardpan calcrete	Bedrock granite-gneiss	Hardpan calcrete	Hardpan calcrete	Hardpan calcrete	Bedrock granite-gneiss	Hardpan calcrete	Fill/ Alluvium	Fill/ Alluvium	Nodular calcrete
	DEPTH	(mm)	300-600	100-300	400-800	200-500	100-800	300-500	300-600	100-500	0-500	002-0	200-700
	H IMMAS	NO (CLG)	U9256	U9257	U9258	U9258	U9260	U9261	U9262	U9263	U9264	U9265	U9266
	TEST	ם	2	ĸ	ø	7	13		6	20	24	25	27

between the two sources regarding the stratigraphic classification of the major subdivisions of the Namaqua-Natal province. As the work produced by Cornell is regarded as the reference document, his approach is adopted for this report.

Some 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.
- Province: A tectono-stratigraphic province is defined as a large area of contiguous structural fabric with well-defined boundaries which formed during a particular, geochronologically defined, tectono-metamorphic event. A province is further subdivided in sub-provinces and sub-provinces into terranes.
- *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.

6.1 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 sub provinces and terranes, based on marked changes in the lithostratigraphy across structural discontinuities. The five domains so recognized are the Richtersveld Sub province, 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 3.

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. What is important for this report is that in the case of the Kaaien terrane, the formation of metaquartzites, deformed early Namaquan volcano-sedimentary rocks and deformed, but thermally metamorphosed bimodal volcanic rocks resulted, amongst others. These rocks are at present referred to as the Brulpan Group. The Brulpan Group was intruded by the Kalkwerf

gneiss, on which Topline is located. The intrusion of the Kalkwerf gneiss into the Kaaien terrane is dated some 950Ma to 1000Ma ago.

The regional geology is indicated on Figure 4: Regional Geology. The Kalkwerf gneiss is indicated in light brown hatched red and referenced as Mkk on the figure.

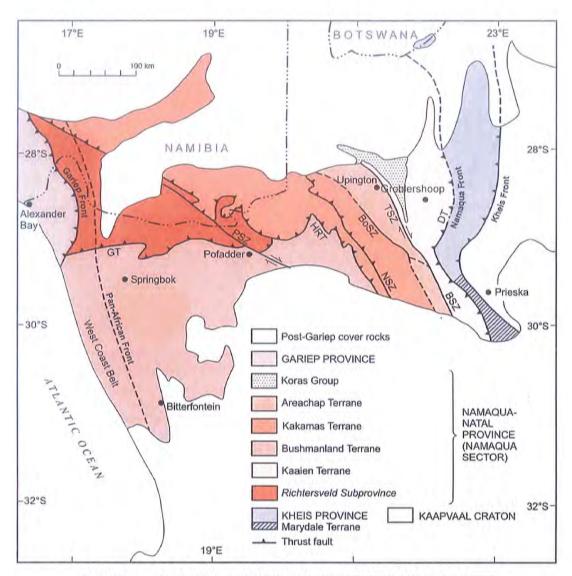
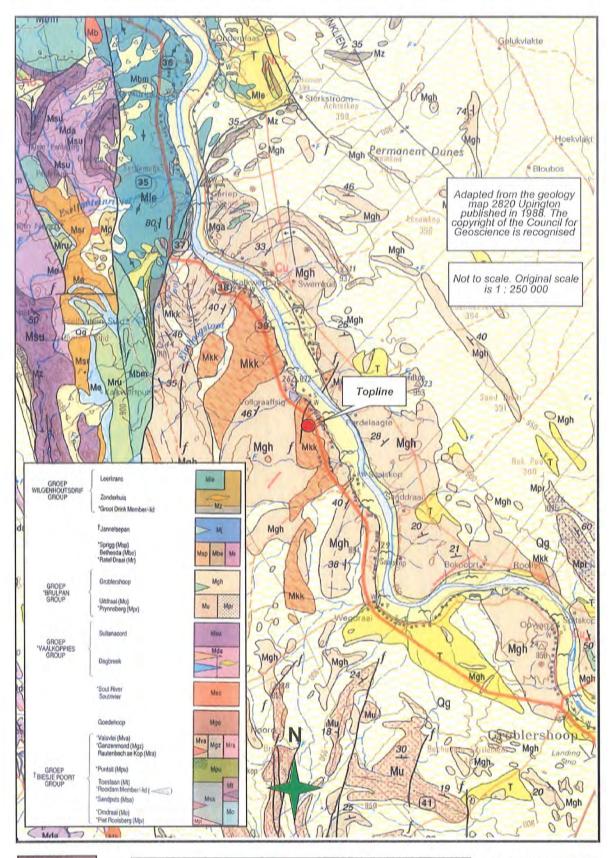


FIGURE 3: TECTONIC SUBDIVISION OF THE NAMAQUA SECTOR

6.2 Site Geology

The site geology is illustrated on Figure 5. The soil and pedocretes cover all contacts of various rock types, thus hampering field investigations. The inferred material boundaries must be accepted as indicative of the actual conditions only.

Bedrock on site occurs as Kalkwerf granite-gneiss. The Kalkwerf granite-gneiss intruded into the Groblershoop Formation, forming large, deeply weathered and poorly exposed outcrops in





TOPLINE: REGIONAL GEOLOGY

FIGURE 4



the Saalskop/Topline area. It is a strongly foliated, gneissic rock with a well-developed augen structure, which has been deformed by subsequent phases of deformation into both tight and open folds, with local development of strong lineation. In thin section the granite can be seen to have suffered extreme deformation, with quartz grains completely recrystallized, showing deformation bands and undulose extinction. The rest of the rock is made up of plagioclase, muscovite, chloritized biotite, occasional garnet, epidote, hornblende and other accessory minerals. On site the granite gneiss was encountered as dirty white mottled light green and pink, massive, micaceous, hard rock, varying to dark grey speckled dull dark red, closely jointed and coarse grained, hard rock.

6.3 Soil Profile

6.3.1 Colluvium

Although the surface soil deposits may easily be regarded as alluvial sands transported by the Orange River, this is not the case. Moen (Reference 14.4 page 149) describes the presence of alluvium and terrace gravels associated with the Orange River as being present on the northeastern banks of the river in the area between Grootdrink and Groblershoop and not on he western bank where T.

On site colluvium as surface deposit was found in all the test pits except TP's 3, 22, 24, 25 and 27. In TP's 1, 2, 4 to 21, 23, 26 and 28 the colluvium consists of pegmatitic gravels, weather resistant scree of quartz and quartzite fragments contained in a sandy matrix. Nodules of calcrete may be contained in the colluvium. The consistency of the colluvium varies between loose and medium dense. The horizon of colluvium was between 100mm and 600mm thick in the test pits.

6.3.2 Made Ground

What appears to be areas levelled and fill material provided for construction of a dam and soccer field was encountered in TP's 22, 24 and 25. The origin of this surface soil is unsure, and it may also originate as debris of the non-perennial stream in which vicinity these test pits are located and can arguably also be regarded as alluvium. It is clear that the course of the stream was deviated for the provision of these facilities. However, the quality of the material differs totally from any other found on site, and it is thus regarded as imported fill. This fill is described as light brown, loose, fine sand. The horizon of fill extended to depths varying between 200mm and 700mm in the test pits.

6.3.3 Residual Granite-gneiss

A superficial horizon of residual granite-gneiss was encountered in TP 25 only. It is described as abundant clast supported, fine, angular gravels of granite-gneiss in a matrix of light brown, fine sand, with a medium dense consistency. The horizon underlies the fill material in the test pit, extending to a depth of 800mm only.

6.3.4 Mokalanen Formation

Calcrete of the Mokalanen Formation, Kalahari Group, is present as an ubiquitous surface duricrust on site. Moen (Reference 14.4 page147) and Partridge^{Reference 14.5} disagree regarding the origin of the calcrete. Moen regards the calcrete as being of Tertiary age, but some doubt whether the outcrops are of the same age and in some localities it may still be in the process of forming. Partridge describes the age of the calcrete as straddling the boundary between the Pliocene and Quaternary, making it some 2,6 to 2,8 million years old. It was deposited under arid conditions and possibly reflects a climatic interval of global aridification.

The engineering properties of calcrete may differ widely for samples taken from the same locality. It is therefore important to provide some background in this regard to aid in the understanding of these conditions.

Brink^{Reference 14.6} states that during pedocrete development, clay and silt become flocculated and cemented into larger silt to gravel-sized complexes of varying strength and porosity. These particles and aggregations may or may not break down during laboratory testing and under compaction. The mineralogy of the cementing material and of the clay fraction is different from those of normal, temperate zone soils on which current specifications for soil testing and classification is based. Calcrete can therefore be expected to exhibit differences in behaviour from those of traditional soil materials.

Whereas in traditional soil mechanics it is assumed that all the water is outside the particles, calcrete aggregates retain moisture and this affects conventional moisture content and Atterberg limit determinations. Palygorskite which is the dominant clay in calcrete has approximately the same plasticity index as some smectites, which can be regarded as highly expansive. However, the palygorskite has a non-expansive lattice and a hollow, needle-like shape instead of the usual flaky particle shape of most other clays. It has the lowest shrinkage limit and dry density and the highest optimum moisture content and shear strength of all clays.

Be it as it may, calcrete was encountered as the dominant lithic material on site, in virtually a continuous cover over the granite-gneiss. It appears as if outcrops of granite-gneiss are

present in low-lying areas of the site where the cover of duricrust has been eroded away by water. The calcrete is present as either dense to very dense nodular calcrete or hardpan calcrete.

6.3.4(i) Hardpan Calcrete

Hardpan calcrete was encountered in TP's 1 to 5, 8, 11 to 15, 17, 18, 20, 21, 23 and 26. It is present as outcrops or underlies the colluvium, occurring from depths between 100mm and 600mm minimum, extending to 200mm to 800mm maximum, at which stage refusal of excavation occurred. Moen reports the calcrete to be up to five meters thick in the area. In TP 3 the hardpan calcrete was encountered as an outcrop and similar conditions were noted elsewhere on site. The hardpan calcrete can be described as dirty white, very fine grained and very dense.

6.3.4(ii) Nodular Calcrete

Nodular calcrete, including boulder calcrete, was encountered in TP's 16, 17 and 28. It was present at 200mm deep in TP's 16 and 28 underlying the colluvium, extending to 600mm and 800mm deep at which depth refusal of excavation occurred. In TP 27 it was present as an outcrop, extending to 700mm deep, at which stage refusal of excavation occurred. The nodular calcrete can be described as abundant clast supported medium coarse, rounded and subrounded nodules of calcrete in a matrix of very dense, calcareous cemented, fine sand.

6.3.5 Waste

Substantial areas of stockpiles of rubble are present in the vacant land. Such rubble consists of items varying from household waste, excavated calcrete to builder's rubble. The presence of these stockpiles are indicated on Figure 2: Site Plan.

6.4 Groundwater

6.4.1 Perched Water

Perched groundwater was not encountered in any of the test pits excavated for this 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, except in the lesser drainage courses in the southeastern corner of the site 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 14,7} 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 between 10% and 20%. Groundwater is expected to occur at depths less than 15 meters in compact, argillaceous strata.

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 3% for all the samples tested.

7.1.2 Properties of Settlement

7.1.2(i) Colluvium

On site colluvium as surface deposit was found in all the test pits except TP's 3, 22, 24, 25 and 27. In TP's 1, 2, 4 to 21, 23, 26 and 28 the colluvium consists of pegmatitic gravels, weather resistant scree of quartz and quartzite fragments contained in a sandy matrix. Nodules of calcrete may be contained in the colluvium. The consistency of the colluvium varies between loose and medium dense. The horizon of colluvium was between 100mm and 600mm thick in the test pits. The consistency cannot be described as very loose, and voided soil matrices were not encountered in the colluvial horizons. The properties of the colluvium are thus such that it does not tend to excessive settlement.

7.1.2(ii) Residual Granite-gneiss

A superficial horizon of residual granite-gneiss was encountered in TP 25 only. It is described as abundant clast supported, fine, angular gravels of granite-gneiss in a matrix of light brown, fine sand, with a medium dense consistency. The consistency cannot be described as very

TABLE 3: SUMMARY OF ENGINEERING PROPERTIES

TEST	SAMPLE	DEPTH	DEPTH	SOIL	SOIL	SOIL	IL CLASS	COHESION1	FRICTION	COMPRESSIBILITY ²	EROSION	PERMEABILITY 2	SPECIFICATIONS FOR UNPAVED ROADS ³					SUITABILITY FOR ROAD	
PIT NO	NO	(mm)	ORIGIN	TYPE	PRA	UNIFIED	(kNm ⁻²)	ANGLE (°)		RESISTANCE ²⁺⁵	k (cms ^{-f})	MAXIMUM	OVERSIZE	GRADING	SHRINKAGE	CBR@	CONSTR	RUCTION4	
												SIZE	INDEX (I _o)	COEFFICIENT(G _o)	PRODUCT(S _p)	95% MOD	PAVED	UNPAVEI	
2	U9256	300-600	Hardpan calcrete	Sandy gravel	A-1-a(0)	GC	<5	28° to 35°	Very low	3	>3X10 ⁻⁷	63,0	3,0	19,4	58,0	56	Subbase & base	Ravels & corrugate	
5	U9257	100-300	Hardpan calcrete	Sandy gravel	A-1-a(0)	sc	5 to 10	30° to 35°	Low	5	(3±2)X10 ⁻⁷	37,5	9,0	16,5	64,5			Ravels &	
6	U9258	400-800	Bedrock granite-gneiss	Rock fragments	A-2-4(0)	GW-GM	<5	30° to 40°	Negligible	1 to 4	(2,7±1,3)X10 ⁻²	37,5	2,0	30,0	57,0			Ravels &	
11	U9258	200-500	Hardpan calcrete	Sandy gravel	A-1-b(0)	GM-GC	<5	28° to 40°	Negligible to very low	Highly	>3X10 ⁻⁷	28,0	0,0	23,0	70,0			Ravels a	
13	U9260	100-800	Hardpan calcrete	Sandy gravel	A-1-a(0)	GW-GM	<5	30° to 40°	Negligible	1 to 4	(2,7±1,3)X10 ⁻²	75,0	7,0	17,0	27,0	49	Subbase	Ravels corrugat	
18	U9261	300-500	Hardpan calcrete	Sandy gravel	A-1-b(0)	GM-GC	<5	28° to 40°	Negligible to very low	Highly	>3X10 ⁻⁷	37,5	3,0	24,5	126,0			Good	
19	U9262	300-600	Bedrock granite-gneiss	Rock	A-1-b(0)	SM	20 to 22	32° to 35°	Low	8	(7,5±4,8)X10 ⁻⁶	28,0	0,0	30,0	93,0			Ravels	
20	U9263	100-500	Hardpan calcrete	Sandy gravel	A-1-b(0)	GM-GC	<5	28° to 40°	Negligible to very low	Highly	>3X10 ⁻⁷	37,5	11,0	19,4	76,0			Ravels	
24	U9264	0-500	Fill/ Alluvium	Fine sand	A-2-4(0)	SM-SC	5 to 22	30° to 35°	Low	5 to 8	2,7X10 ⁻⁶ to 5X10 ⁻⁷	20,0	0,0	18,7	128,0			Good	
25	U9265	0-700	Fill/ Alluvium	Fine sand	A-2-4(0)	sc	5 to 10	30° to 35°	Low	5	(3±2)X10 ⁻⁷	14,0	0,0	7,8	115,5	7	Lower selected	Erodik	
27	U9266	200-700	Nodular calcrete	Sandy gravel	A-1-a(0)	GW-GM	<5	30° to 40°	Negligible	1 to 4	(2,7±1,3)X10 ⁻²	28,0	0,0	26,2	22,0			Ravels	

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.

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

⁴ Structural Design of Flexible Pavements for Interurban and Rural Roads (Draft TRH 4), Committee of State Road Authorities 1996.

⁵ Erosion resistance : 1 is best 10 is poor.

loose, and voided soil matrices were not encountered in the colluvial horizons. The properties of the residual granite-gneiss are thus such that it does not tend to excessive settlement.

7.1.2(iii) Pedocretes

Hardpan calcrete was encountered in TP's 1 to 5, 8, 11 to 15, 17, 18, 20, 21, 23 and 26. It is present as outcrops or underlies the colluvium, occurring from depths between 100mm and 600mm minimum, extending to 200mm to 800mm maximum, at which stage refusal of excavation occurred. Nodular calcrete, including boulder calcrete, was encountered in TP's 16, 17 and 28. It was present at 200mm deep in TP's 16 and 28 underlying the colluvium, extending to 600mm and 800mm deep at which depth refusal of excavation occurred. In TP 27 it was present as an outcrop, extending to 700mm deep, at which stage refusal of excavation occurred. Both materials are of very dense consistency. The soil matrices are either intact or calcareous cemented. 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) Made Ground

Made ground (fill) was encountered in TP's 22, 24 and 25. The origin of the surface soil is unsure, and it may also originate as debris of the non-perennial stream in which vicinity these test pits are located and can arguably also be regarded as alluvium. However, the quality of the material differs totally from any other found on site, and it is thus regarded as imported fill. This fill is described as light brown, loose, fine sand. The horizon of fill extended to depths varying between 200mm and 700mm in the test pits.

In principle the properties of settlement of the fill encountered in TP's 22, 24 and 25 cannot be regarded as a limiting factor towards residential development as it can be regarded as slightly compressible and the horizon is of limited thickness only, as per the test pits.

7.1.3 Corrosivity

When discussing soil corrosivity, it is applicable to consider the guidelines as proposed by EvansReference ^{14.8}. 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 7,58 and 7,87. 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 0,06Sm⁻¹ for the colluvium and some of the hardpan calcrete samples to 0,15Sm⁻¹ for the residual granite-gneiss. All soil materials can therefore be regarded as corrosive due to high soluble salt contents.

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 were not encountered on site and neither is it expected that such conditions can develop.

7.1.4 Materials Utilisation

7.1.4(i) Backfilling of Service Trenches

The hardpan calcrete is not suitable to be used for any type of backfill due to its tendency to break into boulder and cobble sized fragments on excavation. Such fragments cannot be compacted properly on backfilling.

All other materials, that is the colluvium, nodular calcrete 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 hardpan calcrete to be of G5 and G6 quality and the fill material of G9 quality. Based on the results of this limited testing the calcrete is suitable to be used for the construction of base and subbase courses of lightly trafficked paved streets in townships. Similarly the fill material is suitable only to be used for the construction of a road fill or lower selected layer.

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 BrinkReference ^{14,9} 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: Samples for materials testing were not retrieved from the colluvium. However, based on the high gravel content of the colluvium it is regarded as low to fairly compressible only.
- Fill/Alluvium: The fill is regarded as potentially only low compressible with cohesion (c₀) of 5 kNm⁻² to 22kNm⁻² and the effective stress envelope approximately 30° to 35°.
- Nodular Calcrete: The nodular calcrete is regarded as negligibly compressible with cohesion (c₀) less than 5 kNm⁻² and the effective stress envelope approximately 30° to 40°.
- Hardpan Calcrete: The hardpan calcrete is regarded as negligibly compressible with cohesion (c₀) less than 5kNm⁻² to 10kNm⁻² and the effective stress envelope approximately 28° to 40°.
- Residual Granite-gneiss: The residual granite-gneiss is regarded as negligibly compressible with cohesion (c₀) of less than 5kNm⁻² to 22Nm⁻² and the effective stress envelope approximately 30° to 40°.

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.

- *Fill/Alluvium*: The permeability of the fill is regarded as semi-pervious to impervious. The soil permeability coefficient varies between 2,7X10⁻⁶cms⁻¹ to 5,0X10⁻⁷cms⁻¹.
- Calcrete: The permeability of the calcrete is highly variable depending on the mode of deposition and regarded as pervious to impervious. The soil permeability coefficient varies between more permeable than 2,7X10⁻⁶cms⁻¹ to 5,0X10⁻⁷cms⁻¹.
- Residual Granite-gneiss: The residual granite-gneiss is regarded as pervious to impervious.

 The soil permeability coefficient varies between (7,5±4,8)X10-6cms-1.

7.1.5(iii) Erosion Potential

- Fill/Alluvium: The fill is regarded as moderately to poorly resistant against erosion. This condition can be attributed to the loose consistency thereof and non-cohesive nature of the material.
- Calcrete: Conflicting properties of susceptibility to erosion are recorded for the calcrete, varying from highly erodible to highly resistant against erosion. A holistic approach will be to consider the presence of calcrete as a very dense capping of competent material overlying the residual soils and bedrock. This capping has protected the underlying material successfully for more than one million years against erosion and can still hardly be removed even with mechanical equipment. The calcrete is therefore regarded as erosion resistant.

· Residual Granite-gneiss: The residual granite-gneiss is regarded as moderately to highly

susceptible to erosion.

7.2 Properties of Bedrock

The TLB used to excavate the test pits did not penetrate bedrock or hardpan calcrete to any

significant extent and refusal of excavation occurred within millimeters after encountering

bedrock. 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.

7.2.1 Granite-gneiss

Parametric calculations with Roclab software results for slightly weathered, closely jointed

and laminated, micaceous rich hard rock, granite-gneiss result in the following properties:

Cohesion: 5.14MPa

• Friction Angle: 33,2°

Tensile Strength: 0,032MPa

• Uni-axle Compressive Strength: 2,4MPa

Young's Modulus: 3402,2 MPa

All which show a moderately sound rock.

7.2.2 Calcrete

Although the calcrete fragments tested can be regarded as similar to sandy gravels, hardpan

calcrete can also be regarded as resembling massive rock in in-situ conditions. Voided

matrices were not encountered in the hardpan calcrete during the investigation. The results of

the materials testing on samples of the hardpan calcrete fragments approach that of the

nodular calcrete. However, it must be borne in mind that in in-situ conditions the properties of

hardpan calcrete approaches that of soft rock rather than a gravelly sand. The grading modulus of the samples of hardpan calcrete fragments tested varied between 1,90 and 2,50;

plasticity index between three and five; and clay content less than 2%. The activity of the

hardpan calcrete is described as low. The PRA classification of the calcrete is generally A-1-

a(0) to A-1-b(0); and the Unified classification varying between GC and GM. Based on these

properties and material classification the hardpan calcrete is regarded as non-expansive and

no consolidation settlement and no collapse settlement can thus be expected for structures

such as single storey units of masonry construction.

23

The test results of the hardpan calcrete reflect the properties of excavated fragments of material and not the intact mass of hardpan calcrete. It is therefore accepted that the properties of the very dense calcrete can be considered as tending towards soft rock to medium hard rock, limestone.

Brink (Reference 14.6) reports an average UCS of 32MPa for intact samples of hardpan calcrete from the Kalahari region. Using this as input to parametric calculations with Roclab software results for very dense calcrete tending to widely jointed, slightly weathered, medium hard rock, limestone result in the following properties:

• Cohesion : 1,08MPa

Friction Angle: 24°

Tensile Strength: 0,018MPa

• Uni-axle Compressive Strength: 550kPa

Young's Modulus : 2340MPa

All which show a sound pedocrete, not compressible, not permeable nor subject to erosion.

7.3 Excavation Classification with Respect to Services

7.3.1 Hand Excavation

7.3.1(i) Colluvium

The colluvium can be considered as suitable to be excavated by swing tools.

7.3.1(ii) Pedogenic Deposits

The nodular and hardpan calcrete are of dense to very dense consistency. Such material cannot be considered as suitable to be manually excavated and may as minimum require the use of a 55kW TLB and eventually the use of an excavator.

7.3.1(iii) Residual Granite-gneiss

Residual granite-gneiss is of medium 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. It must also be taken in consideration that the very dense pedocretes overlie the residual soils, which will in any case require mechanical equipment for excavation.

7.3.1(iv) Bedrock

Bedrock of granite-gneiss 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: All soil strata can be regarded as soft excavation. The combined thickness of these strata varied between 100mm and 800mm in the test pits, averaging 250mm prior to encountering conditions of intermediate or hard rock excavation.
- Intermediate Excavation: Refusal of excavation with a TLB occurred in most cases once
 very dense, hardpan calcrete or slightly weathered to unweathered rock was encountered.
 It was possible to penetrate between 100mm and 700mm into weathered granite-gneiss
 and hardpan calcrete, averaging 280mm thick, prior to encountering hard rock excavation.
- Hard Rock Excavation: Refusal of excavation occurred on conditions of hard rock excavation in all the test pits at depths varying between 100mm and 1100mm, averaging 520mm.

From the above it is clear that the transition of conditions of excavation is rapid from soft to hard rock excavation with limited intermediate excavation.

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.

7.4 Seismicity

A 10% probability of an event with magnitude less than 100cms⁻² to take place once in 50 years is regarded as favourable; and a natural seismic activity with magnitude exceeding 100cms⁻² is regarded as unfavourable. Based on a report compiled by Kijko^{Reference 14.10} a 10% probability exists that an earthquake with Peak Ground Acceleration exceeding of 0,04g may take place once in 50 years in Topline.

The closest source of seismic measurements to Grootdrink under control of the Council for Geoscience is Tontelbos at 31° 10' 12"S and 20' 30' 00"E.

- 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}

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.

8 SITE CLASS DESIGNATIONS

Based on the above discussions the property can be divided into three zones as per the guidelines posted by SANS 10400: Section H^{Reference 14.11}. The zonation is indicated on Figure 6: Site Class Designation.

8.1 Geotechnical Zone I

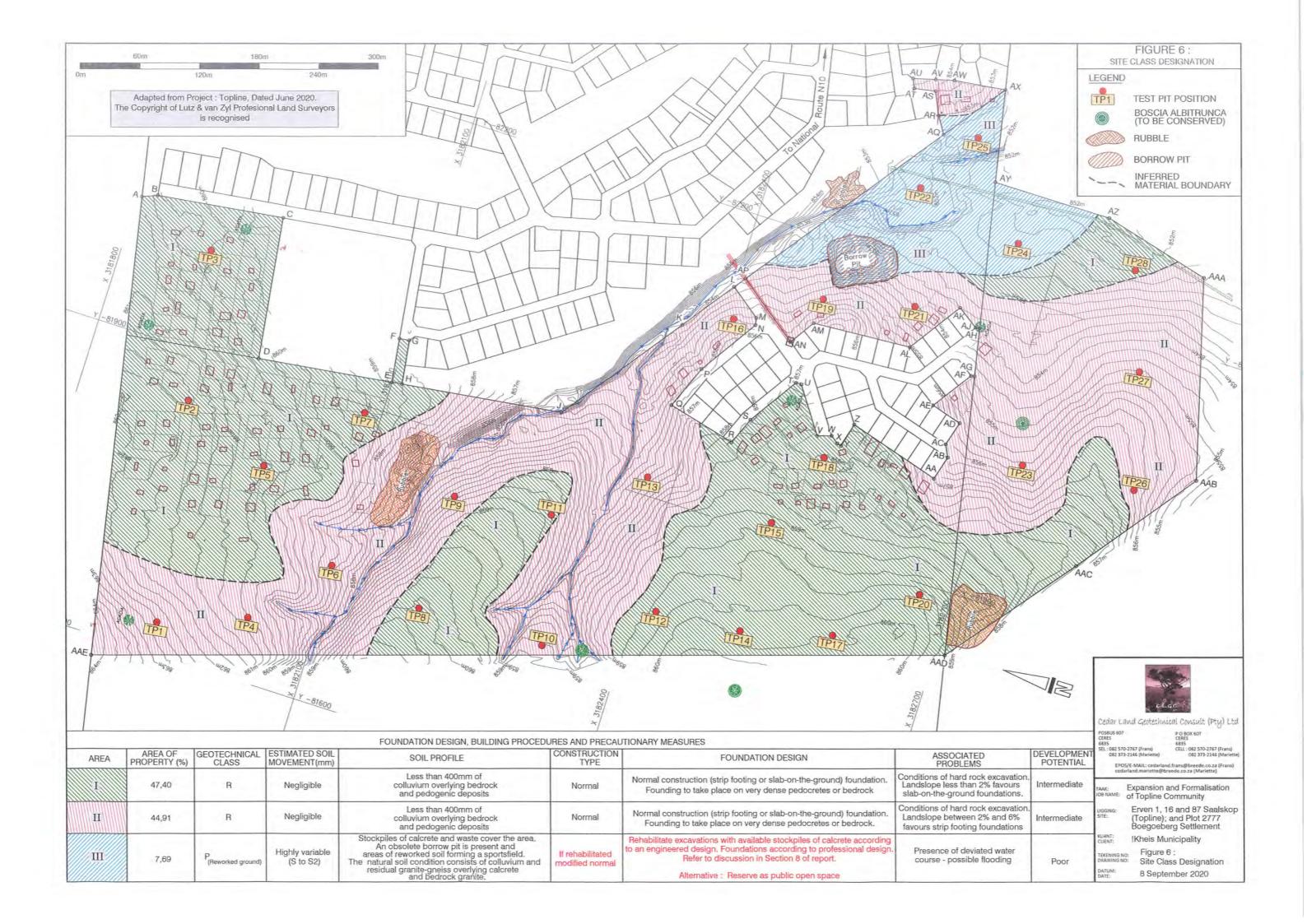
This zone comprises 47% of the area investigated. It is characterized by the materials profiles of TP's 2, 3, 5, 7, 8, 11, 12, 14, 15, 17, 18, 20 and 28. It is present in three separate areas on site. It consists of a superficial horizon less than 400mm thick comprising of colluvium and very dense calcrete. Several outcrops of calcrete occur in the area. Slope across the land is less than approximately 2%. 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, or on the very dense calcrete. The area is thus zoned as "R" and regarded as stable.

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
111	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 wehicles	4.3 to 4.8	24 to 48
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		
Х	Disasterous	Ground cracks badly; buildings destroyed; railway lines bent; landslides on steep slopes	7.0 to 7.3	400 to 700
XI	Very disasterous			400 to 700
XII	Catastrophic	Total destruction; objects thrown into the air; ground rises and falls in waves	>8.1	400 to 700

8.2 Geotechnical Zone II

This zone comprises 45% of the area investigated. It is characterized by the materials profiles of TP's 1, 4, 6, 9, 10, 13, 16, 19, 21, 23, 26 and 27. It is present in three separate areas on site. It consists of a superficial horizon less than 400mm thick comprising of colluvium,



residual soil and very dense calcrete. Several outcrops of calcrete occur in the area. Slope across the land is between 2% and 6% approximately. 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 or very dense calcrete. The area is thus zoned as "R" and regarded as stable.

8.3 Geotechnical Zone III

This zone comprises 8% of the area investigated. The zone is present in the south eastern part of the site. Test pits 22, 24 and 25 were excavated in the area, but they do not necessarily represent the natural soil profile thereof, as it is clear that the surface materials consisting of calcrete have been partially removed for construction and have been rehabilitated by importing fine, granular materials; levelled to provide a soccer field and what appears to be a shallow earth dam. These imported materials are of loose consistency. Other parts of the area are covered by stockpiles of excavated calcrete and an unrehabilitated borrow pit is also present. Access to excavate test pits in these features was not possible.

To establish structures in this zone will require rehabilitating the borrow pit, possibly using the available stockpiles of calcrete and levelling out the entire area to provide a reasonably level surface for construction. This will include cut to fill earthworks and compacting the material to a density of at least 93% modified AASHTO. All in all an engineered solution is required to rehabilitate the area to a standard acceptable foe residential development. Such a design will require deviating the water course that drains onto the area.

The development potential of the area is regarded as poor and is classified P(Reworked ground) with anticipated settlement consisting of highly variable compression, exceeding 20mm, but highly variable, thus S to S2.

8.4 Other Considerations

The contents of this subparagraph 8.4 largely fall outside the scope of a geotechnical investigation. However, it is given in good faith in an effort to find a solution to the presence of waste in the area.

The excavation of a large pit locally to bury and cover the waste is an exercise requiring environmental, geotechnical and groundwater inputs, amongst others. The provision of such a facility may require a considerable period of time, costs and construction to finalise.

Therefore, two options can be considered to deal with this waste:

8.4.1 Disposal at a Waste Site

The waste material can be removed and disposed at a waste site. However, this creates logistical and legal issues. Loading and transporting the waste to either Groblershoop or Upington will be expensive. It is also doubtful whether the waste sites at these two locations will accept the waste and can treat such a volume in a suitable manner.

8.4.2 Recycling

The suitability of the stockpiles of waste for recycling depends on the composition of the waste. Basically three components have been identified visually, namely:

- Household Waste: Including putrefied food, nappies, bubble sheet pill containers, clothing etc.
- · Recyclable Waste: Including plastic beverage bottles, glass, various metals and wood.
- Construction Waste: This includes blocks of concrete, bricks and stockpiles of calcrete.

To solve the issue it can be considered to involve the community by separating the waste. As the household waste represents a much smaller volume than the entire bulk of waste, this may potentially be disposed of at either Upington or Groblershoop. The recyclable may be sold. The construction waste can be crushed and used as fill material during construction. Such material may also be used as successfully as a gravel wearing course for streets in Topline.

8.4.3 Presence of Colluvial Quartz Gravels

White, colluvial quartz gravels are widely distributed in the area which is earmarked for residential development. There exists a big demand for such gravels as ornamental features in urban areas, especially for water-wise gardens. The community can benefit from the collecting and marketing these materials through a coordinated effort.

9 FOUNDATION RECOMMENDATIONS AND SOLUTIONS

The foundation design alternatives and ancillary issues as discussed in subparagraphs 9.1 and 9.2 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 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

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	POTENTIAL
Ī	- 47	R	Negligible	Less than 400mm of colluvium overlying bedrock and pedogenic deposits	Normal	Normal construction (strip footing or slab-on-the-ground) foundation. Founding to take place on very dense pedocretes or bedrock	Conditions of hard rock excavation. Landslope less than 2% favours slab-on-the-ground foundations.	Intermediate
II	45	R	Negligible	Less than 400mm of colluvium overlying bedrock and pedogenic deposits	Normal	Normal construction (strip footing or slab-on-the-ground) foundation. Founding to take place on very dense pedocretes or bedrock	Conditions of hard rock excavation Landslope between 2% and 6% favours strip footing foundations	Intermediate
JHL	8	P(Reworked ground)	Highly variable (S to S2)	Stockpiles of calcrete and waste cover the area. An obsolete borrow pit is present and areas of reworked soil forming a sportsfield. The natural soil condition consists of colluvium and residual granite overlying calcrete and bedrock granite.	If rehabilitated modified normal	Rehabilitate excavations with available stockpiles of calcrete according to an engineered design. Foundations according to professional design. Refer to discussion in Section 8 of the report. Alternative: Reserve as public open space	Presence of deviated water course - possible flooding	Poor

service trenches shall not be excavated parallel to buildings within 1500mm of the building perimeter.

9.1 Geotechnical Zone I

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 less than 2% only and the stable geotechnical site classification as per Section 8 above, two foundation design alternatives are applicable to the zone.

9.1.1 Strip Foundations

Foundations of 400mm wide placed directly on the very dense hardpan calcrete 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.

9.1.2 Slab-on-the-ground Foundations

This is the preferred method of founding. 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 the very dense hardpan calcrete.

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.

9.2 Geotechnical Zone II

The zone is classed as R, meaning that the proposed horizon for founding is stable and negligible soil movement is expected. The slope across the land varies between approximately 2% and 6%. Two founding alternatives can be considered:

9.2.1 Strip Foundations

The preferable founding alternative is foundations of 400mm wide strip footings placed directly on bedrock. 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.

9.2.2 Slab-on-the-ground Foundations

Considering the slope across the land of approximately 2% to 6% the use of slab-on-the-ground foundations may require additional works in the form of the construction of an engineered fill or cutting to establish a level platform for construction, but it still remains a viable alternative. This latter option of additional earthworks may be costly and hence is regarded as less attractive than conventional strip footings.

9.3 Geotechnical Zone III

The zone is classed as P(Reworked Ground)/(S-S2). Highly variable geotechnical conditions prevail, varying from stockpiles of calcrete, an old borrow pit to partially rehabilitated land and what appears to be a deviated water course.

Two option for land utilization are available, namely:

9.3.1 Land Rehabilitation

This will include backfilling and compaction of the existing borrow pit, for which the stockpiles of excavated calcrete and builders' rubble may be used. After which the land can be reshaped by a cut-to-fill operation to provide a reasonably level for construction. The course of the gully terminating on site need to be deviated or reinstated to its original position to ensure that the area is not subject to seasonal flooding or inundation. All such works shall be undertaken under supervision of a consulting engineer according to his design. On completion of the works, the elastic properties of the rehabilitated land can be determined by applicable materials testing, such as plate loads, and the foundation design of the structures be done accordingly. This will most probably consist of reinforced strip foundations.

9.3.1 Public Open Space

The recommended alternative is to set the land aside and use it as public open space. However, for good measure the borrow pit may be backfilled with the available stockpiles of calcrete and builders; rubble.

10 DRAINAGE

The water courses on site are contained in narrow and well-defined gullies of such extent that

they do not influence the various geotechnical site class designations. They are therefore not zoned separately. However, the presence of the deviated water course in the eastern part of the site near TP 22 may result in inundation of that area. Surface run-off may also collect in the old borrow-pit.

The slope of less than 2% in certain areas of the land is regarded as marginal and may result in problems with the design of stormwater and sewerage disposal systems depending on dissipation by gravity.

11 SPECIAL PRECAUTIONARY MEASURES

In Geotechnical Zones I and II no extraordinary features requiring special precautionary measures to decrease the impact of development on site are present on site. The decision whether development of Geotechnical Zone III shall proceed should be based on financial constraints and demand for housing.

12 CONCLUSIONS

The property is regarded as being of intermediate suitability for residential development in Geotechnical Zones I and II, with Geotechnical Zone III as poor. Founding conditions can be defined as R in the areas regarded as intermediate.

12.1 Factors Influencing the Development of the Site

12.1.1 Geotechnical Zones I and II

- The presence of hard rock and very dense hardpan calcrete close to the surface. The presence thereof will result in conditions of hard excavation. On the other hand it provides conditions favouring conventional methods of founding.
- The limited slope of less than 2% in Geotechnical Zone II will have a detrimental influence on the design of stormwater disposal systems and sewerage reticulation.
- The presence of waste material need to be addressed.

12.1.2 Geotechnical Zone III

- The presence of hard rock and very dense hardpan calcrete close to the surface. The presence thereof will result in conditions of hard excavation. On the other hand it provides conditions favouring conventional methods of founding.
- The presence of an apparently rerouted gully draining onto the site.

TABLE 6: INFLUENCE OF CONSTRAINTS PER GEOTECHNICAL ZONING

		KEY TO CLASSIFICATION			CLASSIFICATION PER GEOTECHNICAL ZONE				
CONSTRAINT	MOST FAVOURABLE (1)	INTERMEDIATE (2)	LEAST FAVOURABLE (3)	1	ll.	III			
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 soll heave potential anticipated	Moderate soil heave potential anticipated							
Highly compressible soil	Low soil compressibility anticipated	Moderate soil compressibility anticipated							
Erodibility of Soil	Low	Intermediate							
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 pedderates 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			Unrehabilitated and partially rehabilitated borrow areas			
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 delines 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" (Natel and Western Capé). 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						

- Areas of reworked soils, stockpiles of calcrete and builders' rubble and excavations for materials procurement.
- The presence of waste material need to be addressed.

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.

12.2 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 Kaaien Terrane and the site is located on Kalkwerf granitegneiss that is intrusive into the Groblershoop Formation of the Brulpan Group.

Bedrock occurs on site as strongly foliated, gneissic rock. In thin section the granite-gneiss can be seen to have suffered extreme deformation, with quartz grains completely recrystallized, showing deformation bands and undulose extinction. The rest of the rock is made up of plagioclase, muscovite, chloritized biotite, occasional garnet, epidote, hornblende and other accessory minerals. Physically the granite-gneiss is described as dirty white mottled light green and pink, massive, micaceous, hard rock, varying to dark grey speckled dull dark red, closely jointed and coarse grained, hard rock.

12.3 Soil Profile

12.3.1 Colluvium

On site the colluvium consists of pegmatitic gravels, weather resistant scree of quartz and quartzite fragments contained in a sandy matrix. Nodules of calcrete may be contained in the colluvium. The consistency of the colluvium varies between loose and medium dense. The horizon of colluvium was between 100mm and 600mm thick in the test pits.

12.3.2 Made Ground

What appears to be areas levelled and fill material provided for construction of a dam and soccer field was encountered in TP's 22, 24 and 25. The origin of the surface soil is unsure, and it may also originate as debris of the non-perennial stream in which vicinity these test pits are located. This fill is described as light brown, loose, fine sand. The horizon of fill extended

to depths varying between 200mm and 700mm in the test pits. However, the soil profile may be of unknown variable composition and depth. Access to the area is limited due to the high level of land disturbance.

12.3.3 Residual Granite-gneiss

A superficial horizon of residual granite-gneiss was encountered in TP 25 only. It is described as abundant clast supported, fine, angular gravels of granite-gneiss in a matrix of light brown, fine sand, with a medium dense consistency.

12.3.4 Waste

Substantial areas of stockpiles of rubble are present in the vacant land. Such rubble consists of items varying from household waste, excavated calcrete to builder's rubble.

12.3.5 Mokalanen Formation

12.3.5(i) Hardpan Calcrete

Hardpan calcrete is present as outcrops or underlies the colluvium, occurring from depths between 100mm and 600mm minimum, extending to 200mm to 800mm maximum, at which stage refusal of excavation occurred. The hardpan calcrete can be described as dirty white, very fine grained and very dense.

12.3.5(ii) Nodular Calcrete

Isolated occurrences of nodular calcrete underlie the colluvium, extending to 600mm and 800mm deep at which depth refusal of excavation occurred. The nodular calcrete can be described as abundant clast supported medium coarse, rounded and subrounded nodules of calcrete in a matrix of very dense, calcareous cemented, fine sand.

12.4 Groundwater

12.4.1 Perched Water

Perched groundwater was not encountered in any of the test pits excavated for this investigation. It is anticipated that perched water will generally not prove problematic on the site.

12.4.2 Permanent Groundwater

The probability for drilling successfully for water in the area is between 40% and 60%, and the probability that such a borehole will yield more than 2l/s is between 10% and 20%. Groundwater is expected to occur at depths less than 15 meters in compact, argillaceous strata.

12.5 Conditions of Excavation

On average over the entire site bedrock or refusal of excavation on very dense hardpan calcrete was encountered at depths between 100mm minimum and 1100mm maximum, averaging 520mm deep. The implication of this is that should trenches require excavated depths to 1000mm, 48% of the excavation may be classified as hard, requiring drilling and blasting. Should the required depth of excavation increase to 1500mm, 63% of the excavation may be classified as hard.

12.6 Site Class Designation

It is concluded that the entire area is regarded as suitable for residential development as follows:

12.6.1 Geotechnical Zone I

The zone is classed as R, meaning that the proposed horizon for founding is stable and negligible soil movement is expected. The distribution thereof encompasses 47% of the proposed area for development. Slope across the land is less than 2%. Considering the limited slope and the favourable geotechnical site classification, two foundation design alternatives are applicable to the zone, namely conventional strip foundations or slab-on-the-ground foundations placed directly on bedrock or very dense pedocrete.

Geotechnical conditions related to foundation design can be regarded as favourable, but the conditions of hard rock excavation close to the surface and slope less than 2% detract from the ease suitability of establishing services and overall the development potential is regarded as intermediate only.

12.6.2 Geotechnical Zone II

The zone is classed as R, meaning that the proposed horizon for founding is stable and negligible soil movement is expected. The distribution thereof encompasses 45% of the proposed area for development. Slope across the land is approximately between 2% and 6%.

The use of slab-on-the-ground foundations will require additional works in the form of the construction of an engineered fill or cutting to establish a level platform for construction. The more viable foundation alternative therefore remains founding by conventional strip foundations.

Geotechnical conditions related to foundation design can be regarded as favourable, but the conditions of hard rock excavation close to the surface detracts from the ease suitability of establishing services and overall the development potential is regarded as intermediate only.

12.5.3 Geotechnical Zone III

This zone comprises 8% of the area investigated. The zone is characterized by surface materials consisting of calcrete that have been partially removed for construction and have been rehabilitated by importing fine, granular materials; levelled to provide a soccer field and what appears to be a shallow earth dam. Other parts of the area are covered by stockpiles of excavated calcrete and an unrehabilitated borrow pit is also present. To establish structures in this zone will require rehabilitating the borrow pit, possibly using the available stockpiles of calcrete and levelling out the entire area to provide a reasonably level surface for construction. This will include cut to fill earthworks and compacting the material to a density of at least 93% modified AASHTO. All in all an engineered solution is required to rehabilitate the area to a standard acceptable foe residential development. Such a design will require deviating the water course that drains onto the area. The development potential of the area is regarded as poor and is classified P(Reworked ground) with anticipated settlement consisting of highly variable compression, exceeding 20mm, but highly variable, thus S to S2.

12.6 Land Slope

The average slope across the larger part of the land is less than 2%. In Geotechnical Zone II the slope less between 2% and 6%, that is over 45% of the site. This slope of less than 2% has a detrimental influence on especially the design of a stormwater disposal system depending on gravity to dissipate of the surface water due to downpours. The land slope also affects the design of the sewerage disposal but to a lesser extent as the gradient of the pipes can be adjusted according to design requirements.

No steep slopes are present on the property.

12.7 Areas Subject to Flooding

The non-perennial water courses on site are contained in well-defined, narrow gullies and

may be regarded as being of lesser importance, requiring no additional precautionary measures to ensure the safety of the population against flooding. However, a deviated gully drains into the southeastern part of the site into Geotechnical Zone III.

12.8 Materials Utilization

- Trench Backfilling: None of the materials are suitable for selected fill or pipe bedding. With exception of the hardpan calcrete all materials can be used for normal backfill.
- Layerworks for Paved or Segmental Block Paving: The hardpan calcrete is of G5 and G6
 quality and hence suitable for the construction of layerworks up to subbase and base
 course level for lightly trafficked roads.
- 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. However, calcrete is often used for this purpose and is the most suitable material available.

12.9 Other Considerations

- Undermining: The area is not subject to undermining.
- Seismic Activity: The Peak Ground Acceleration expected in 50 years is 0,04g. A low risk for the development of earth tremors therefore exist.
- Soil Corrosivity: The in-situ soils and pedocretes are not corrosive due to acidic properties.

 All soil materials can be regarded as corrosive due to high soluble salt contents.
- *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 9 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. More than one founding solution is applicable on the site, and the property developer can base his choice on financial constraints.

13.2 Materials Utilization

• Trench Backfill: With exception of the hardpan calcrete, the in-situ materials may be used for normal backfill of trenches. The hardpan calcrete shall be spoilt and not used at all for

this purpose. Material for pipe bedding and selected backfill shall be obtained from commercial sources.

- Layerworks for Paved or Segmental Block Paving: The hardpan calcrete is of G5 and G6 quality and hence suitable for the construction of layerworks up to subbase and base course level for lightly trafficked roads. 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.
- Wearing Course for Gravel Roads in Urban Areas: Material for the construction of a gravel wearing course shall be obtained from stockpiled or calcrete from a licensed borrow pit.

13.3 Conditions of Excavation

Although manual excavation is possible through the colluvium, residual soil and to some extent through the calcrete, 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 to remove the very dense pedocretes. It is recommended that adequate provision be made for hard rock excavation.

13.4 Land Slope

Slope across the 47% of the land is less than 2%. This is regarded as being of intermediate suitability for urban development only. This has an influence on especially the stormwater disposal system but to a lesser extent on the waste water design. In theory the slope of 2% to 6% on 53% of the land can be regarded as favourable for urban development, but the combination of the slope and presence of rock outcrops result in conditions less desirable for development.

14 SOURCES OF REFERENCE

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FJ Breytenbach, Pr Eng

For Cedar Land Geotechnical Consult (Pty) Ltd

8 September 2020

GEOTECHNICAL CONDITIONS ON ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMENT: A REPORT FOR THE EXPANSION AND FORMALISATION OF THE TOPLINE COMMUNITY

2020/J09/MCP_01

ADDENDUM A: TEST PIT PROFILES

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'03,2" S 21°50'08,7" E

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Cell: 082 570 2767

Email:

cedarland.frans@breede.co.za

			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00		Ground Surface				NOTES:
		Dry, light brown, loose, intact, fine SAND and matrix supported, medium coarse, subrounded and subangular gravels of quartz. Colluvium.				Refual of excavation at 300 mm on very dense
0.20-		Dirty white, very fine grained, very dense, hardpan <i>CALCRETE</i> . Pedogenic deposits.				hardpan calcrete.
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

SOIL PROFILE: TEST PIT 1

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'02,0" S 21°50'16,8" E

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			SA	AMPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-		Ground Surface Dry, light brown, loose, intact, fine SAND and matrix supported, medium coarse, subrounded and subangular gravels of quartz. Colluvium.				NOTES: 1 Refual of excavation at 600 mm on very dense hardpan calcrete.
		Dirty white, very fine grained, very dense, hardpan CALCRETE with pockets of light red brown, fine sand. Pedogenic deposits.	U9256	0,3-0,6	•	
	00000					
0.80-						Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00-		ALS Plant Hire	ole Diam		20	_

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020 Machine: Bell 315SK

SOIL PROFILE: TEST PIT 2

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'01,2" S 21°50'22,3" E

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			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-		Ground Surface Dirty white, very fine grained, very dense, hardpan <i>CALCRETE</i> . Pedogenic deposits.				NOTES: 1 Refual of excavation at 100 mm on very dense hardpan calcrete.
0.20-						
0.40-						
0.60-						
0.80-						₩atter encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00	-					

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

FIGURE: A3

SOIL PROFILE: TEST PIT 3

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'06,0" S 21°50'09,9" E

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			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-	ර සිදු දෙස්වූ දෙස දී වරදා වූ	Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light red, fine sand. Overall consistency is medium dense. Colluvium.				NOTES: 1 Refual of excavation at 700 mm on very dense hardpan calcrete.
0.60-		Dirty white mottled light brown, very fine grained, very dense, hardpan <i>CALCRETE</i> . Pedogenic deposits.				₩ Water encountered ₩ Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

SOIL PROFILE: TEST PIT 4

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'05,0" S 21°50'15,4" E

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			SA	MPLE	·	
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-		Ground Surface Dry, light brown, loose, intact, fine SAND and matrix supported, medium coarse, subrounded and subangular gravels of quartz. Colluvium.				NOTES: 1 Refual of excavation at 300 mm on very dense hardpan calcrete.
0.20-		Dirty white, very fine grained, very dense, hardpan <i>CALCRETE</i> . Pedogenic deposits.	U9257	0,1-0,3	0	na dpan calerete.
-						
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: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 5

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'08,1" S 21°50'12,7" E

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			SA	AMPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.20		Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light red, fine sand. Overall consistency is medium dense. Colluvium. Dirty white, very closely jointed, intensely laminated, very fine grained, medium weathered, soft rock becoming hard rock at depth, micaceous and schist-rich GRANITE-GNEISS with singular grains of fine gravel sized quartz grains. Joints are closed, smooth and clean.	U9258	0,4-0,8		NOTES: 1 Refual of excavation at 800 mm on hard rock, granite-gneiss. V Water encountered V Water level P Bottom of hole Approximate material change Disturbed sample Undisturbed sample
Date D	Orilled:	7/7/2020 V	lole Diam Vater Dep Sheet: 1 o	oth:	00 mn	1

SOIL PROFILE: TEST PIT 6

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'07,6" S 21°50'18,1" E

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			SA	AMPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00 0.20 0.40 0.60 1.00		Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light red, fine sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light green and pink, massive, micaceous, slightly weathered, hard rock, GRANITE-GNEISS with pockets of dirty white mottled light brown, very dense, hardpan calcrete.				NOTES: 1 Refual of excavation at 400 mm on hard rock, granite-gneiss. Water encountered Water level Bottom of hole Approximate material change Undisturbed sample Undisturbed sample
			d		1	Lancardon de la companya de la comp

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 7

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'11,2" S 21°50'12,2" E

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			SA	MPLE	····	
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00	್ಷದ್ವ ರಾದ್ಯ ರ	Ground Surface Abundant, clast supported, medium coarse, subangular and				NOTES:
0.20-	ින් දෙන් දෙන් දෙන් දෙන් දෙන් දෙන් දෙන් තිර කිරීම නිත්ත නිත්ත නිත්ත නිත්ත තින් කිරීමේ කිරීමේ දෙන් දෙන් දෙන්	Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown fine sand. Overall consistency is medium dense. Colluvium.				Refual of excavation at 400 mm on very dense hardpan calcrete.
0.40-		Dirty white mottled light grey, very fine grained, very dense, hardpan <i>CALCRETE</i> .				
-						
0.60-						
0.80-						₩ater encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00-						

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020 Machine: Bell 315SK

SOIL PROFILE: TEST PIT 8

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'11,2" S 21°50'16,5" E

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			SA	MPLE	,	
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-	10, a c 10, a	Overall consistency is medium dense. Colluvium.				NOTES: 1 Refual of excavation at 600 mm on hard rock, granite-gneiss.
0.20-		Dirty white mottled light green and pink, massive, micaceous, slightly weathered, hard rock, <i>GRANITE-GNEISS</i> with pockets of dirty white mottled light brown, very dense, hardpan calcrete.				
0.40-						
0.60-						
0.80-						▼ Water encountered ▼ Water level ▼ Bottom of hole Approximate material change • Disturbed sample ■ Undisturbed sample
1.00-		ALC Diamet Him	-la Diam		20	

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 9

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'15,4" S 21°50'12,3" E

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		SA	MPLE		
Depth (m) Legend	PROFILE	Number	Type	Symbol	Remarks
0.00 0.	Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light green and pink, massive, micaceous, slightly weathered, hard rock, GRANITE-GNEISS with pockets of dirty white mottled light brown, very dense, hardpan calcrete.				NOTES: 1 Refual of excavation at 400 mm on hard rock, granite-gneiss. Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020 Machine: Bell 315SK

SOIL PROFILE: TEST PIT 10

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

Contractor: ALS Plant Hire

SOIL PROFILE: TEST PIT 11

Date Drilled: 7/7/2020

Machine: Bell 315SK

LOCATION: 28°45'14,4" S 21°50'17,0" E

Cedar Land Geotechnical

Consult (Pty) Ltd

P O Box 607

Ceres

Cell: 082 570 2767

Email:

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

FIGURE: A11

cedarland.frans@breede.co.za

			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-	್ಷದ್ದು ರ್ಯದ್ದು ಕ	Ground Surface				NOTES:
0.20	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dirty white mottled light grey, very fine grained, very dense, harden calcrete.				Refual of excavation at 500 mm on very dense hardpan calcrete.
_		r edogeriic deposits.				
0.40			U9259	0,2-0,5	0	
0.40						
0.60-						
0.80-						Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00-						

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'18,6" S 21°50'14,8" E

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Ceres 6835

Cell: 082 570 2767

Email:

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			SA	MPLE	7	
Depth (m)	Legend	PROFILE	Number	Туре	Symbol	Remarks
0.00	್ಷದ್ವ ರ್ಷವೃತ	Ground Surface				NOTES:
0.20-	2018 2018 2018 2019 2019 2019 2019 2019 2019 2019 2019	Colluvium.				1 Refual of excavation at 300 mm on very dense hardpan calcrete.
-		Dirty white mottled light grey, very fine grained, very dense, hardpan <i>CALCRETE</i> . Pedogenic deposits.				
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: 7/7/2020

Machine: Bell 315SK

SOIL PROFILE: TEST PIT 12

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45′17,0" S 21°50′19,4" E

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Cell: 082 570 2767

Email:

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				SA	MPLE		
Depth (m)	Legend	PROFILE		Number	Туре	Symbol	Remarks
0.00-	, a, a, a, a, a	Ground Surface Abundant, clast supported, medium coarse, subangular and					NOTES:
-		subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white, very fine grained, very dense, hardpan <i>CALCRETE</i> tending to boulder calcrete. Calcrete occurs en mass as horizontal lenses < 50 mm thick. Pedogenic deposits.					1 Refual of excavation at 800 mm on very dense hardpan calcrete.
0.40-			-	U9260	0,1-0,8	0	
_							
0.80-							▼ Water encountered ▼ Water level □ Bottom of hole □ Approximate □ material change □ Disturbed sample ■ Undisturbed sample
	tractor: A	ALS Plant Hire		ole Diam)0 mn	1

Date Drilled: 7/7/2020

Machine: Bell 315SK

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 13

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'21,4" S 21°50'15,1" E

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Cell: 082 570 2767

Email:

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		SA	AMPLE		
Depth (m)	PROFILE	Number	Type	Symbol	Remarks
0.00	Pedogenic deposits.				NOTES: 1 Refual of excavation at 400 mm on very dense hardpan calcrete. Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

SOIL PROFILE: TEST PIT 14

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'21,3" S 21°50'19,2" E

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Ceres

Cell: 082 570 2767

Email:

cedarland.frans@breede.co.za

			S/	AMPLE		
Depth (m)	Legend	PROFILE	Number	Туре	Symbol	Remarks
0.00-		Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white, very fine grained, very dense, hardpan CALCRETE with matrix supported inclusions of dull light grey quartz fragments, 1 cm diameter maximum. Pedogenic deposits.				NOTES: 1 Refual of excavation at 300 mm on very dense hardpan calcrete. V Water encountered V Water level V Bottom of hole Approximate material change Undisturbed sample Undisturbed sample Undisturbed sample
1.00-						

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

SOIL PROFILE: TEST PIT 15

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'18,1" S 21°50'25,9" E

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Email:

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			SA	MPLE	·	
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00		Ground Surface				NOTES:
0.20-	00000000000000000000000000000000000000	Abundant, clast supported, medium coarse, rounded and				1 Refual of excavation at 600 mm on very dense nodular calcrete.
0.40		subrounded, nodules of <i>CALCRETE</i> in a matrix of very dense, calcareous and cemented, fine sand. Pedogenic deposits.				
-						
0.60-						
0.80-						Water encountered Water level
1.00-						

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

SOIL PROFILE: TEST PIT 16

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45′24,3" S 21°50′16,0" E

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Email:

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		SA	AMPLE			
Depth (m) Legend	PROFILE	Number	Туре	Symbol	Remarks	
0.00	Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light grey, very fine grained, very dense, hardpan CALCRETE. Pedogenic deposits.				NOTES: 1 Refual of excavation at 200 mm on very dense hardpan calcrete. Water encountered Water level Bottom of hole Approximate material change Disturbed sample	
Contractor: ALS Plant Hire Date Drilled: 7/7/2020			neter: 60 oth: of 1	00 mn	n	
SOIL PROFILE: TEST PIT 17			FIGURE: A17			

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'22,3" S 21°50'22,1" E

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Cell: 082 570 2767

Email:

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			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-		Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense.				NOTES: 1 Refual of excavation at 500 mm on very dense
0.20-		Colluvium.	U9261	0-0,3		hardpan calcrete.
_		Dirty white mottled light grey, very fine grained, very dense, voided, hardpan CALCRETE.				
0.40		Voids are filled with light red fine sand. Pedogenic deposits.				
0.60	00000					
_						
0.80-						₩ Water encountered ₩ Water level Dottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00-						

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 18

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45′20,7" S 21°50′27,6" E

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			SA	AMPLE		
Depth (m)	Legend	PROFILE	Number	Туре	Symbol	Remarks
0.00	୍ପ୍ର _ଓ ୍ଦ୍ର ଓ ବୁଦ୍ର ଓ ଦୁଦ୍ର ଓ	Ground Surface Abundant, clast supported, medium coarse, subangular and				NOTES:
0.20	**************************************	subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium.				Refual of excavation at 600 mm on hard rock, granite-gneiss.
0.40		weathered, hard rock, <i>GRANITE-GNEISS</i> . Joints are closed, smooth and clean.				
			U9262	0,3-0,6	0	
0.60-						
0.00						
0.80-						₩ Water encountered ₩ Water level □ Bottom of hole □ Approximate material change □ Disturbed sample Undisturbed sample
1.00-						

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020 Machine: Bell 315SK

SOIL PROFILE: TEST PIT 19

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'26,6" S 21°50'18,4" E

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		SA	MPLE		
Depth (m)	PROFILE 66 6	Number	Type	Symbol	Remarks
0.00	Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light grey, very fine grained, very dense, voided, hardpan CALCRETE. Voids are filled with light red fine sand. Pedogenic deposits.	U9263	0,1-0,5	•	NOTES: 1 Refual of excavation at 500 mm on very dense hardpan calcrete.
1.00					₩ Water encountered ₩ Water level ₩ Bottom of hole Approximate material change Disturbed sample Undisturbed sample
Contrac		ole Diam		00 mn	1

Date Drilled: 7/7/2020

Machine: Bell 315SK

Water Depth: Sheet: 1 of 1

SOIL PROFILE: TEST PIT 20

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'23,6" S 21°50'28,4" E

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Cell: 082 570 2767

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		SA	AMPLE		
Depth (m) Legend	PROFILE	Number	Type	Symbol	Remarks
0.00	Dirty white mottled light grey, very fine grained, very dense, voided, hardpan <i>CALCRETE</i> . Voids are filled with light red fine sand. Pedogenic deposits.				NOTES: 1 Refual of excavation at 400 mm on very dense hardpan calcrete.
1.00					₩ Water encountered ₩ Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 21

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'22,6" S 21°50'32,6" E

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Cell: 082 570 2767

Email:

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			J L			
		SA	MPLE	·		
Depth (m) Legend	PROFILE	Number	Туре	Symbol	Remarks	
0.00	Ground Surface FILL: consisting of slightly moist, light brown, loose, intact, fine				NOTES:	
0.20	sand. Made ground.				1 Refual of excavation at 400 mm on hard rock, granite-gneiss.	
	Dark grey speckled dull red, closely jointed, coarse grained, slightly weathered, hard rock, <i>GRANITE-GNEISS</i> . Joints are closed, smooth and clean.					
0.40	**					
0.60						
0.80					₩ater encountered ₩ater level Bottom of hote Approximate material change Disturbed sample Undisturbed sample	
Date Drilled	Contractor: ALS Plant Hire H Date Drilled: 7/7/2020 W		neter: 6 pth: of 1	 00 mr	n	
SOIL PROF	FIGURE:	A22	·	A MARINE AND A STATE OF THE STA		

FIGURE: A22 SOIL PROFILE: TEST PIT 22

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'28,5" S 21°50'24,1" E

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Ceres

Cell: 082 570 2767

Email:

cedarland.frans@breede.co.za

			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00		Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light grey, very fine grained, very dense, voided, hardpan CALCRETE.				NOTES: 1 Refual of excavation at 600 mm on very dense hardpan calcrete.
0.40		Voids are filled with light red fine sand. Pedogenic deposits.				
	00000					
0.80 —						▼ Water encountered ▼ Water level ▼ Bottom of hole Approximate material change ■ Disturbed sample ■ Undisturbed sample

Contractor: ALS Plant Hire Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

SOIL PROFILE: TEST PIT 23

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'26,2" S 21°50'31,8" E

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			SA	MPLE	r	
Depth (m)	Legend	PROFILE	Number	Туре	Symbol	Remarks
0.00-		Ground Surface FILL: consisting of slightly moist, light brown, loose, intact, fine sand. Made ground.				NOTES: 1 Refual of excavation at 900 mm on hard rock, granite-gneiss.
0.20 —			U9264	0-0,5	0	
0.40-						
0.60		Dark grey speckled dull red, closely jointed, coarse grained, slightly weathered, hard rock, <i>GRANITE-GNEISS</i> . Joints are closed, smooth and clean.				
0.80-						Water encountered Water level Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00-						
Date	Date Drilled: 7/7/2020		lole Dian Vater De _l Sheet: 1 c	oth:	00 mn	n
			FIGURE: A24			

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN 6835

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'23,9" S 21°50'35,0" E

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Cell: 082 570 2767

Email:

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			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-		Ground Surface FILL: consisting of slightly moist, light brown, loose, intact, fine sand. Made ground.				NOTES: 1 Refual of excavation at 1100 mm on hard rock, granite-gneiss.
0.40-			U9265	0-0,7	•	
0.60-		Abundant, clast supported, fine, angular GRAVELS of granite- gneiss in a matrix of dry, light brown, fine sand.				
0.80-		Overall consistency is medium dense. Residual granite-gneiss. Dark grey speckled dull red, closely jointed, coarse grained, slightly weathered, hard rock, <i>GRANITE-GNEISS</i> . Joints are closed, smooth and clean.				Water encountered Water level
1.20-						r Bottom of hole Approximate material change - Disturbed sample - Undisturbed sample

Contractor: ALS Plant Hire Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

SOIL PROFILE: TEST PIT 25

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'32,2" S 21°50'24,5" E

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Cell: 082 570 2767

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PROFILE Ground Surface Abundant, clast supported, medium coerse, subangular and subrounded, GRAVELS of quantz in a matrix of dry, light brown, line sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light grey, very fine grained, very dense, voided, hardpan calcrete. Dirty white mottled light grey, very fine grained, very dense, voided, hardpan calcrete filed with light red line sand. Pedogenic deposits. Wiser encountered Wiser encountered Wiser e				SA	MPLE		
Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, line sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light grey, very fine grained, very dense, voided, hardpan CALCRETE. Voids are filled with light red fine sand. Pedogenic deposits. 2 Water encountered Water level Storm of the material change Undistarbed sample	Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
	0.20 — 0.40 — - 0.60 —		Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown, fine sand. Overall consistency is medium dense. Colluvium. Dirty white mottled light grey, very fine grained, very dense, voided, hardpan CALCRETE. Voids are filled with light red fine sand.				T Refual of excavation at 400 mm on very dense hardpan calcrete. Water encountered Water level Bottom of hole Approximate material change Disturbed sample

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020 Machine: Bell 315SK

SOIL PROFILE: TEST PIT 26

Hole Diameter: 600 mm

Water Depth: Sheet: 1 of 1

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'31,2" S 21°50'28,7" E

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Email:

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			SA	MPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.00-		Ground Surface Abundant, clast supported, medium coarse, rounded, CALCRETE concretions in a matrix of dry, pale light brown, fine calcareous sand. Overall consistency is medium dense. Pedogenic deposits. Abundant, clast supported, medium coarse, rounded and subrounded, nodules of CALCRETE in a matrix of very dense, calcareous and cemented, fine sand. Pedogenic deposits.				NOTES: 1 Refual of excavation at 700 mm on very dense nodular calcrete.
-			U9266	0,2-0,7		
0.80-	100000 100000 100000000000000000000000					
1.00-					<u></u>	

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 27

PROJECT: EXPANSION AND FORMALISATION OF TOPLINE COMMUNITY

LOGGED BY: FJB

SITE: ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMEN

DATE LOGGED: 7/7/2020

CLIENT: !KHEIS MUNICIPALITY

LOCATION: 28°45'30,1" S 21°50'32,2" E

Cedar Land Geotechnical

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Cell: 082 570 2767

Email:

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			SA	AMPLE		
Depth (m)	Legend	PROFILE	Number	Type	Symbol	Remarks
0.60-		Ground Surface Abundant, clast supported, medium coarse, subangular and subrounded, GRAVELS of quartz in a matrix of dry, light brown fine sand. Overall consistency is medium dense. Colluvium. Abundant, clast supported, medium coarse, rounded and subrounded, nodules of CALCRETE in a matrix of very dense, calcareous and cemented, fine sand. Pedogenic deposits.				NOTES: 1 Refual of excavation at 800 mm on very dense nodular calcrete. V Water encountered V Water level P Bottom of hole Approximate material change Disturbed sample Undisturbed sample
1.00-						

Contractor: ALS Plant Hire

Date Drilled: 7/7/2020

Machine: Bell 315SK

Hole Diameter: 600 mm

Water Depth:

Sheet: 1 of 1

SOIL PROFILE: TEST PIT 28

GEOTECHNICAL CONDITIONS ON ERVEN 1, 16 AND 87 SAALSKOP (TOPLINE); AND PLOT 2777 BOEGOEBERG SETTLEMENT: A REPORT FOR THE EXPANSION AND FORMALISATION OF THE TOPLINE COMMUNITY

2020/J09/MCP_01

ADDENDUM B: RESULTS OF MATERIALS TESTING



Tel: 011 828 0279 Fax: 011 828 0279 Email: info@roadlab.co.za

Web: www.roadlab.co.za

Date Reported: 2020-08-05

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

0.050

0.020

0.005

0.002

3,7

2,2

2,0

1,4

Project : Topline Infrastructure Upgrade

Attention: Frans Breytenbach

Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

Sample No. : U9256

Position : TP 2

Layer Type : 300-600mm

Sample Colour : Dark Brown

Sample Type : Gravel Quartz & Calc

Sieve Size(mm)	% Passing		2.000 - 0.425	18
100.0	100		0.425 - 0.250	9
75.00	100	Soil	0.250 - 0.150	15
63.00	94	M M	0.150 - 0.075	19
50.00	93		< 0.075	39
37.50	90	Effective	Size	0,069
28.00	80		ty Coefficient	195,7
20.00	68	-	e Coefficient	0,5
14.00	61			
5.000	43	Oversize	Index	3,0
2.000	35	Shrinkag	je Product	58,0
0.425	29	Grading	Coefficient	19,4
0.250	26	Grading	Modulus	2,20
0.150	21		Liquid Limit	
0.075	14	g	Plasticity Index	4.0
0.060	4,2	rberg	Linear Christman	2.0

Linear Shrinkage

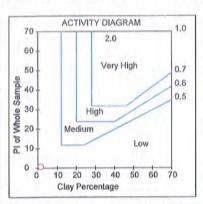
PI < 0.075

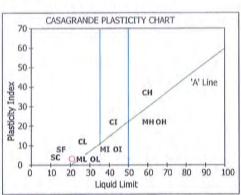
Unified Soil Classification

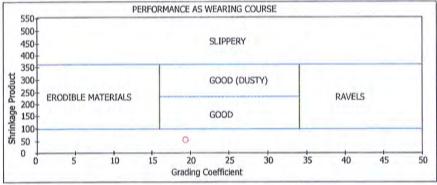
US Highway Classification

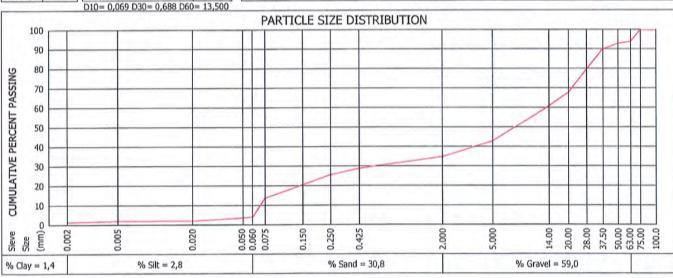
2.0

A-1-a(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



Accreditation No. T0296 Prog.ver 10.7 (2019/11/07) D Juckers Technical Signatory

.../of ...



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Date Reported: 2020-08-04

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project: Topline Infrastructure Upgrade

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 IN	ORMATION AND PROPERTI	ES	
SAMPL	E NO.	U9256			
HOLE NO./ Kn	/ CHAINAGE	TP2			
ROAD NO./ N		S28° 45' 02,0" E21° 50' 16,8"			
LAYER TEST	ED/SAMPLED	300-600mm			
SAMPLE	DEPTH	300-600mm			
DATE SA	The second secon	2020-07-08			
COLOUR O		Dark Brown			
TYPE OF	And the second s	Mix Quartz+Calcrete			
7777			EVES *(SANS 3001-GR1:201	0, SANS 3001-GR2:201	0)
	100.0 mm				
	75.0 mm	100			
	63.0 mm	94			
	50,0 mm	93			
SIEVE	37.5 mm	90			
	28.0 mm	80			
ANALYSIS	20.0 mm	68			
(GR 1)	14.0 mm	61			
% PASSING	5.0 mm	43			
	2.0 mm	35 29			
	0.425 mm	14			
GM %	0.075 mm	2,2			
GIVI 70			ANALYSIS (SANS 3001-PR5:	2011)	
COARSE SAND	2.000 - 0.425	18	1	1	
COARSE FINE SAND	0.425 - 0.250	9			
	0.250 - 0.150	15			
MEDIUM FINE SAND	0.150 - 0.075	19			
FINE FINE SAND	0.150 - 0.075	39			
SILT CLAY	0.075		I S ANALYSIS - *(SANS 3001-G	P10:2010)	
ATTERBERG	LIQUID LIMIT	21	5 ANALTSIS - (GANG 3001-C	10.2010)	
	PLASTICITY INDEX	3.6			
LIMITS (%)	LINEAR SHRINKAGE	2.0			
SANS GR10,GR11	H.R.B.	A-1-a(0)			
OLARCIFICATION	COLTO	G5			
CLASSIFICATION	TRH 14	G5			
	and the second s	the first of the first of the party of the first of	 - *(SANS 3001-GR30:2010, S	NS 3001-GR40:2010)	
SANS GR30	OMC %	6,8	- (3/1/3 3001-3/30.2010, 3/	103 3001-3140.2010)	
		2067			
MAX. DRY DENSITY	MDD (kg/m³) COMP MC %	6,8	_		
CIMELL IV. 60					
SWELL % @	MOD NRB PRO 100 %	0,01 0,02 0,04 88			
	98 %	73			
C.B.R. SANS GR40	97 %	67			
	95 %	56			
		46			
	93 %	35			
					To be a second s
STABILISI		Not Applicable			
TEST		CBR			
SAMPLING	METHOD	TMH 5			
	HEN SAMPLED	Cold			

Deviation from Test Method :

Remarks and Notes:

Opinions and interpretations are not included in our scope of works. (T0296)
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Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project: Topline Infrastructure Upgrade

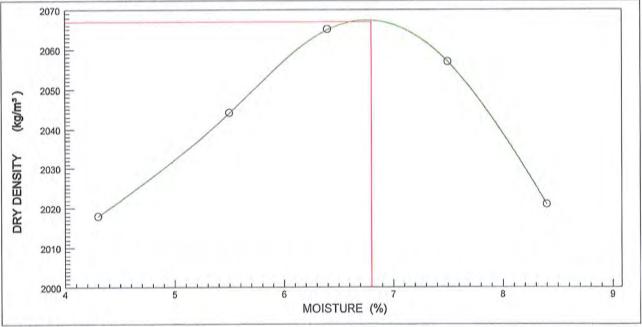
Attention: Frans Breytenbach

Determination Maximum Dry Density & Optimum Moisture Content Test Report

SANS 3001 - GR20/GR30

		5/	4N2 2001 - GI	120/0130					
	SAMPLE NO.			U9256					
CONT	AINER FOR SA	MPLING		Black Bags					
SIZE / AP	PROX. MASS C	OF SAMPLE		98kg					
MOISTUR			Moist						
LAYER T	ESTED / SAMP	LED FROM				300-600mr	n		
MAT	ERIAL DESCRI	PTION			Mix C	alcrete + Qu	artzstone		
HOLE	NO./ km / CHA	NAGE				TP2			
	ROAD NO.			Not Specified					
	DATE RECEIVE	ED		2020-07-09					
	DATE SAMPLE	D		2020-07-08					
(LIENT MARKI	NG			S28° 48	5' 02,0"; E21	° 50' 16,8"		
C	DLOUR AND T	YPE			D	ark Brown G	ravel		
POINT NO.	1	2	3	4	5				
DRY DENSITY (kg/m³)	ISITY (kg/m³) 2018	2044	2065	2057	2021				
MOISTURE (%)	4,3	5,5	6,4	7,5	8,4				
************	DELIGITAL	(landard) - 0007	-	1	ODTINALINA MAC	ICTUDE CO	NITENIT (9/) :	C 0	

MAXIMUM DRY DENSITY (kg/m3): 2067 OPTIMUM MOISTURE CONTENT (%): 6,8 2070



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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Job Request No.: RU3525

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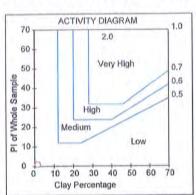
Attention: Frans Breytenbach

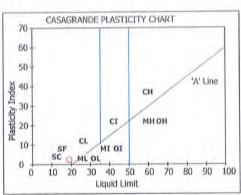
Project: Topline Infrastructure Upgrade

Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

Sample No. : U9257 Position : TP 5 : 100-300mm Layer Type Sample Colour : Orange Brown Sand : Mix Calcrete+Quartzs Sample Type

Sieve Size(mm)	% Passing		2.000 - 0.425	14
100.0	100	<u>_</u>	0.425 - 0.250	11
75.00	100	Soil	0.250 - 0.150	16
63.00	100	Σ.	0.150 - 0.075	20
50.00	100		< 0.075	40
37.50	91	Effective	Size	0,064
28.00	80	Uniformi	ty Coefficient	136,7
20.00	74		Curvature Coefficient	
14.00	67			9,0
5.000	55	Oversize	Oversize Index	
2.000	50	Shrinkag	Shrinkage Product	
0.425	43	Grading	Coefficient	16,5
0.250	38	Grading	Modulus	1,90
0.150	30		Liquid Limit	19
0.075	20	D	Plasticity Index	3,0
0.060	6,1	Atterberg Limits	Linear Shrinkage	1,5
0.050	5,5	± €		-1-
0.020	3,3		PI < 0.075	
0.005	2,7	Unified Soil Classification		SC
0.002	1,3	US Highway Classification		A-1-b(0)



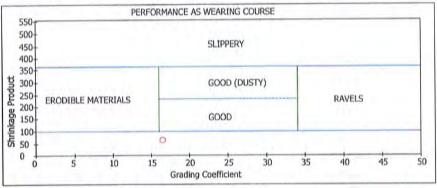


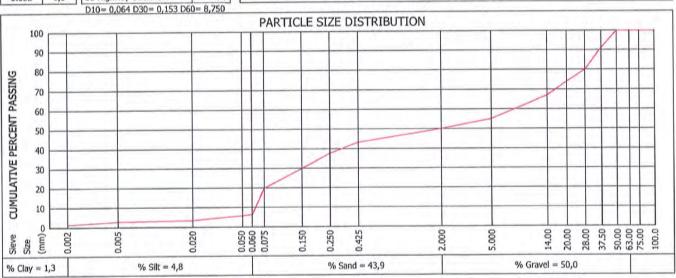
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Date Reported: 2020-08-12

Tel: 011 828 0279 Fax: 011 828 0279





Deviation from Test Method:

Remarks and Notes: Chemistry: pH = 7.87 [SANS 5854] & Conductivity = 0.05 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).

The test results reported relate to the samples tested.

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Date Reported: 2020-08-12

Job Request No.: RU3525

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Sample Type

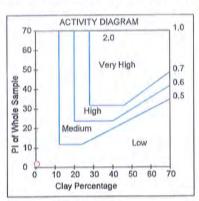
Project: Topline Infrastructure Upgrade

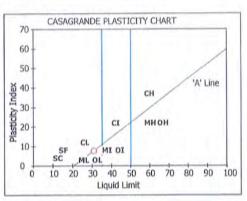
Attention: Frans Breytenbach

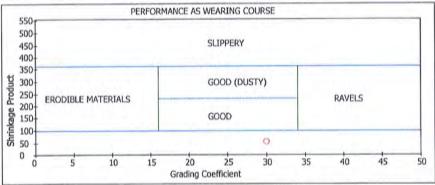
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

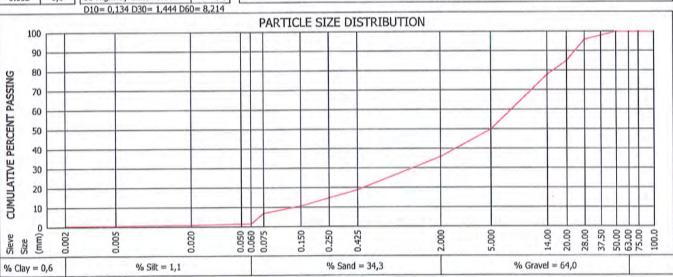
Sample No. : U9258 : TP 6 Position Layer Type : 400-800mm Sample Colour : Light Brown Grey Gra : Weathered Granite

Sleve Size(mm)	% Passing		2.000 - 0.425	46
100.0	100		0.425 - 0.250	12
75.00	100	Soil	0.250 - 0.150	12
63.00	100	Σ	0.150 - 0.075	11
50.00	100		< 0.075	20
37.50	98	Effective	Size	0,134
28.00	96	Uniform	ity Coefficient	61,3
20.00	85	-	Curvature Coefficient	
14.00	78			
5.000	50	Oversize	Oversize Index	
2.000	36	Shrinkag	Shrinkage Product	
0.425	19	Grading	Coefficient	30,0
0.250	15	Grading	Modulus	2,40
0.150	11		Liquid Limit	31
0.075	7,1	g	Plasticity Index	8
0.060	1,7	tterber	Linear Shrinkage	3.0
0.050	1,6	Atterberg		5.0
0.020	1,1	-	PI < 0.075	
0.005	0,8	Unified Soil Classification		GW-GM
0.002	0,6	US High	A-2-4(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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Report compiled by : Juraine Okkies



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Date Reported: 2020-08-21

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project: Topline Infrastructure Upgrade

Attention: Frans Breytenbach

Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

 Sample No.
 : U9259

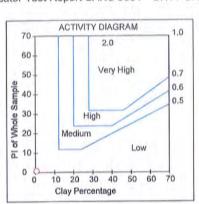
 Position
 : TP 11

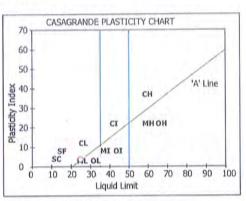
 Layer Type
 : 200-500mm

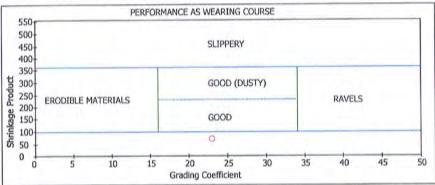
 Sample Colour
 : Brown Gravel

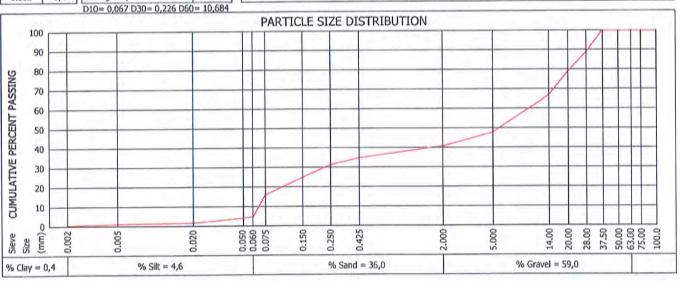
 Sample Type
 : Mix Calcrete+Quartzs

Sleve Size(mm)	% Passing		2.000 - 0.425	15 9
100.0	100	- 1	0.425 - 0.250	
75.00	100	Soil	0.250 - 0.150	15
63.00	100	Σ "	0.150 - 0.075	22
50.00	100		< 0.075	39
37.50	100	Effective	Size	0,067
28.00	89	Uniformity Coefficient		159,5
20.00	79	Curvature Coefficient		0,1
14.00	67			0,0
5.000	48	Oversize Index		
2.000	41	Shrinkage Product		70,0
0.425	35	Grading	Coefficient	23,0
0.250	32	Grading	Modulus	2,10
0.150	25		Liquid Limit	25
0.075	16	D	Plasticity Index	4
0.060	5,0	tterber	Linear Shrinkage	2,0
0.050	4,2	Atterberg		2,0
0.020	1,8	PI < 0.075		
0.005	1,3	Unified Soil Classification		GM-GC
0.002	0,4	US Highway Classification		A-1-b(0)









Deviation from Test Method:

Remarks and Notes: Chemistry: pH = 7.82 [SANS 5854] & Conductivity = 0.11 S/m [SANS 6240]

Opinions and interpretations are not included in our scope of works. (T0296)

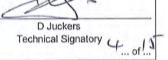
The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).

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Date Reported: 2020-07-17

Job Request No.: RU3525

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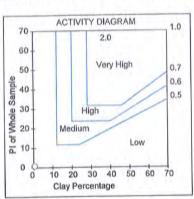
Attention: Frans Breytenbach

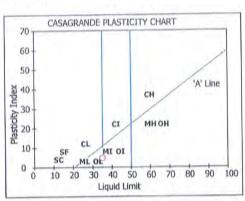
Project: Topline Infrastructure Upgrade

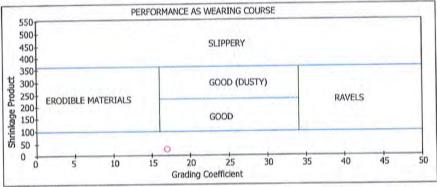
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

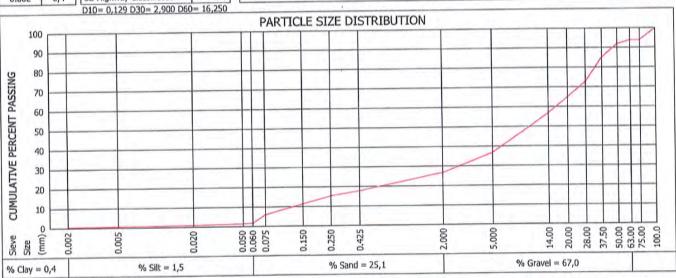
Sample No. : U9260
Position : TP 13
Layer Type : 100-800mm
Sample Colour : Light Brown Gravel
Sample Type : Weathered Cal+OCC Qu

Sieve Size(mm)	% Passing		2.000 - 0.425	32
100.0	100		0.425 - 0.250	11
75.00	94	Soil	0.250 - 0.150	15
63.00	94		0.150 - 0.075	20
50.00	92		< 0.075	22
37.50	85	Effective	Size	0,129
28.00	73		ty Coefficient	126,0
20.00	65	Curvature Coefficient		4,0
14.00	57			7,0
5.000	37	Oversize Index		
2.000	27	Shrinkaç	je Product	27,0
0.425	18	Grading Coefficient		17,0
0.250	16	Grading	Modulus	2,50
0.150	12		Liquid Limit	35
0.075	6,1	E 10	Plasticity Index	5
0.060	1,9	tterber	Linear Shrinkage	1,5
0.050	1,6	Atterberg		-,5
0.020	1,1	-	PI < 0.075	
0.005	0,7	Unified 9	GW-GM	
0.002	0,4	US High	A-1-a(0)	









Deviation from Test Method : Remarks and Notes :

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The samples were subjected to analysis according to (SANS)(TMH5)(DOT)(ASTM).
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Date Reported: 2020-07-24

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project : Topline Infrastructure Upgrade

Attention: Frans Breytenbach

		CAMPLE INF	RMATION AND PROPERTIES
		The second secon	RMATION AND PROPERTIES
SAMPL		U9260	
HOLE NO./ Km	/ CHAINAGE	TP13	
ROAD NO./ N ROAD NO./ N		S28° 45' 17,0"; E21° 50' 19,4"	
LAYER TESTE	D/SAMPLED	100-800mm	
SAMPLE	DEPTH	100-800mm	
DATE SA	MPLED	2020-07-08	
COLOUR O		Light Brown	
TYPE OF	SAMPLE	Mix Ironst+Calcrete	50 4/044/0 2004 CR4-2010 CANC 2001 CR2-2010\
	The second secon	AND RESIDENCE AN	VES *(SANS 3001-GR1:2010, SANS 3001-GR2:2010)
	100.0 mm	100	
	75.0 mm	94	
	63.0 mm	94	
	50.0 mm	92 85	
SIEVE	37.5 mm	73	
ANALYSIS	28.0 mm 20.0 mm	65	
(GR 1)	14.0 mm	57	
% PASSING	5,0 mm	37	
70 F AGOING	2.0 mm	27	
	0.425 mm	18	
	0.075 mm	6	
GM %		2,5	
		SOIL MORTAR	NALYSIS (SANS 3001-PR5:2011)
COARSE SAND	2.000 - 0.425	32	
COARSE FINE SAND	0.425 - 0.250	11	
MEDIUM FINE SAND	0.250 - 0.150	15	
FINE FINE SAND	0.150 - 0.075	20	
SILT CLAY	0.075	22	
OILT OLT		ATTERBERG LIMIT	ANALYSIS - *(SANS 3001-GR10:2010)
ATTERBERG	LIQUID LIMIT	35	
LIMITS (%)	PLASTICITY INDEX	5	
SANS GR10,GR11	LINEAR SHRINKAGE	1.5	
OANO ORTO,ORTT	H.R.B.	A-1-a(0)	
CLASSIFICATION	COLTO	G6	
OLAGOII IOATION	TRH 14	G6	
	CALI	FORNIA BEARING RATIO	*(SANS 3001-GR30:2010, SANS 3001-GR40:2010)
SANS GR30	OMC %	10,2	
MAX. DRY DENSITY	MDD (kg/m³)	1845	
WAY DIVI DENDITI	COMP MC %	10,4	
SWELL % @	MOD NRB PRO	0,01 0,03 0,06	
SVVELL 70 (B)	100 %	103	
	98 %	77	
C.B.R.	97 %	66	
SANS GR40	95 %	49	
SANS GRAU	93 %	37	
	90 %	24	
	ER IN LAB	Not Applicable	
	TYPE	CBR	
	3 METHOD	TMH 5	
WEATHER W	HEN 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.

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Report compiled by : Juraine Okkies



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Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project : Topline Infrastructure Upgrade

Attention: Frans Breytenbach

Determination Maximum Dry Density & Optimum Moisture Content Test Report

SANS 3001 - GR20/GR30

SAMPLE NO.					U9260		
NER FOR SAI	MPLING		Black Bags				
SIZE / APPROX. MASS OF SAMPLE					97kg		
MOISTURE CONDITION OF SAMPLE					Moist		
LAYER TESTED / SAMPLED FROM					100-800mm	Caracteristic Co.	
MATERIAL DESCRIPTION				Mix Weather	ed Calcrete	+ OCC Quartz	
HOLE NO./ km / CHAINAGE				TP13			
					Not Specified		
ATE RECEIVE	D		2020-07-09				
ATE SAMPLE	D		2020-07-08				
IENT MARKIN	VG			S28° 45	' 17,0"; E21°	50' 19,4"	
LOUR AND TY	/PE		Light Brown Gravel				
1	2	3	4	5			
1856	1875	1883	1867	1850			
8,5	9,4	10,5	11,4	12,3			
֡֡֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜֜	NER FOR SAI ROX, MASS C CONDITION O STED / SAMPI RIAL DESCRII NO./ km / CHA ROAD NO. ATE RECEIVE ATE SAMPLE JENT MARKIN LOUR AND TY	NER FOR SAMPLING ROX, MASS OF SAMPLE CONDITION OF SAMPLE STED / SAMPLED FROM RIAL DESCRIPTION NO./ km / CHAINAGE ROAD NO. ATE RECEIVED ATE SAMPLED IENT MARKING LOUR AND TYPE 1 2 1856 1875	NER FOR SAMPLING ROX. MASS OF SAMPLE CONDITION OF SAMPLE BTED / SAMPLED FROM RIAL DESCRIPTION NO./ km / CHAINAGE ROAD NO. ATE RECEIVED ATE SAMPLED IENT MARKING LOUR AND TYPE 1 2 3 1856 1875 1883	NER FOR SAMPLING ROX. MASS OF SAMPLE CONDITION OF SAMPLE BTED / SAMPLED FROM RIAL DESCRIPTION NO./ km / CHAINAGE ROAD NO. ATE RECEIVED ATE SAMPLED IENT MARKING LOUR AND TYPE 1 2 3 4 1856 1875 1883 1867	NER FOR SAMPLING ROX. MASS OF SAMPLE CONDITION OF SAMPLE STED / SAMPLED FROM RIAL DESCRIPTION Mix Weather NO./ km / CHAINAGE ROAD NO. ATE RECEIVED ATE SAMPLED IENT MARKING S28° 45 LIG 1 2 3 4 5 1856 1875 1883 1867 1850	RER FOR SAMPLING RER FOR SAMPLE ROX. MASS OF SAMPLE CONDITION OF SAMPLE BTED / SAMPLED FROM RIAL DESCRIPTION RIAL DESCRIPTION Mix Weathered Calcrete NO./ km / CHAINAGE ROAD NO. ATE RECEIVED ATE SAMPLED IENT MARKING LOUR AND TYPE 1856 1875 1883 1867 1850 Black Bags Most 97kg Moist 100-800mm Mix Weathered Calcrete 2020-800 100-800mm Mix Weathered Calcrete 2020-07-09 2020-07-09 2020-07-09 2020-07-09 2020-07-08 2020-0	RER FOR SAMPLING RER FOR SAMPLE ROX. MASS OF SAMPLE CONDITION OF SAMPLE CONDITION OF SAMPLE BY CONDITION OF SAMPLE CONDITION OF SAMPLE Moist 100-800mm Mix Weathered Calcrete + OCC Quartz TP13 ROAD NO. ROAD NO. ATE RECEIVED ATE SAMPLED IENT MARKING COUR AND TYPE 100-800mm Mix Weathered Calcrete + OCC Quartz TP13 2020-07-09 2020-07-09 2020-07-09 Light Brown Gravel 1 2 3 4 5 1856 1875 1883 1867 1850

MAXIMUM DRY DENSITY (kg/m3): 1884

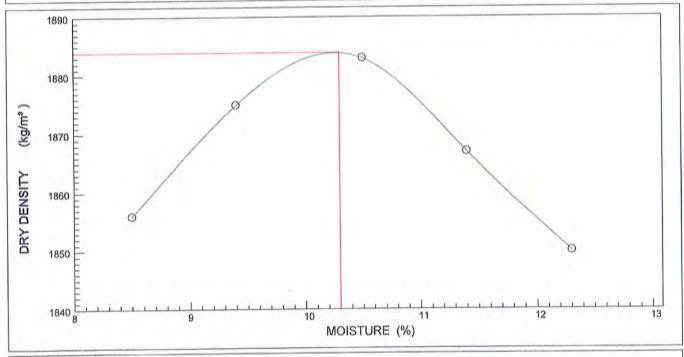
OPTIMUM MOISTURE CONTENT (%): 10,3

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Date Reported: 2020-07-17

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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









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Date Reported: 2020-08-12

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

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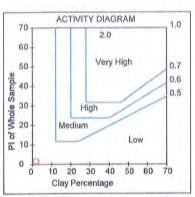
Project : Topline Infrastructure Upgrade

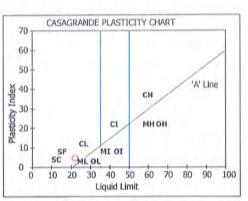
Attention: Frans Breytenbach

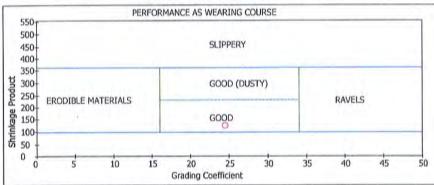
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

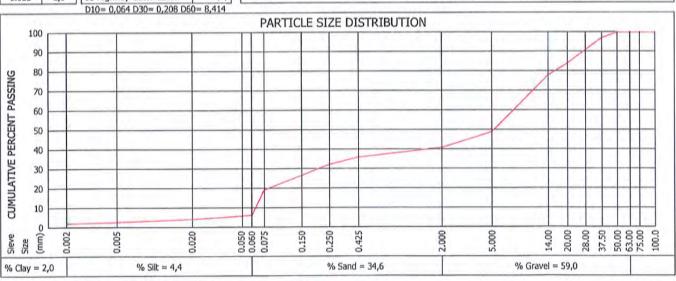
Sample No. : U9261
Position : TP 18
Layer Type : 0-300mm
Sample Colour : OrangeBrown Gravel
Sample Type : Mix Quartzstone

Sieve Size(mm)	% Passing		2.000 - 0.425	13
100.0	100		0.425 - 0.250	9
75.00	100	Soil	0.250 - 0.150	13
63.00	100	Σ.	0.150 - 0.075	19
50.00	100		< 0.075	46
37.50	97	Effective	Size	0,064
28.00	91	Uniformi	Uniformity Coefficient	
20.00	84	Curvature Coefficient		131,5
14.00	78			-
5.000	49	Oversize Index		126,0
2.000	41	Shrinkag	Shrinkage Product	
0.425	36	Grading	Coefficient	24,5
0.250	32	Grading	Modulus	2,00
0.150	27		Liquid Limit	22
0.075	19	g	Plasticity Index	5
0.060	6,4	tterber	Linear Shrinkage	3.5
0.050	5,9	Atterberg		3.5
0.020	4,2	PI < 0.075		
0.005	2,8	Unified S	GM-GC	
0.002	2,0	US Highway Classification		A-1-b(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: 2020-08-06

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

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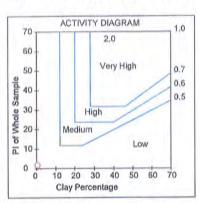
Project: Topline Infrastructure Upgrade

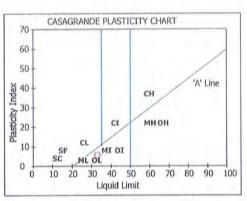
Attention: Frans Breytenbach

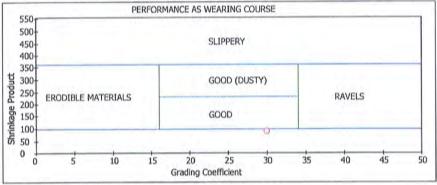
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

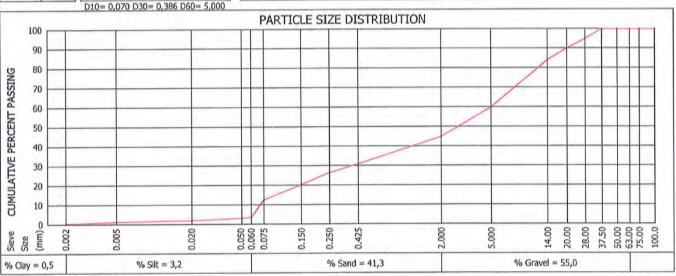
Sample No. : U9262
Position : TP 19
Layer Type : 300-600mm
Sample Colour : Light Brown Gravel
Sample Type : Mix Weathered Quartz

Sieve Size(mm)	% Passing		2.000 - 0.425	32
100.0	100	-	0.425 - 0.250	10
75.00	100	Soil	0.250 - 0.150	14
63.00	100	Σ	0.150 - 0.075	16
50.00	100		< 0.075	29
37.50	100	Effective	Size	0,070
28.00	95		ty Coefficient	71,4
20.00	90	-		
14.00	84		Curvature Coefficient	
5.000	60	Oversize	Oversize Index	
2.000	45	Shrinkag	Shrinkage Product	
0.425	31	Grading	Coefficient	30,0
0.250	27	Grading	Modulus	2,10
0.150	20		Liquid Limit	33
0.075	13	g	Plasticity Index	6
0.060	3,7	tterber	Linear Shrinkage	3,0
0.050	3,3	Atterberg		3,0
0.020	2,1	-	PI < 0.075	
0.005	1,4	Unified Soil Classification		SM
0.002	0,5	US High	A-1-b(0)	









Deviation from Test Method:

Remarks and Notes: Chemistry: pH = 7.74 [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). The test results reported relate to the samples tested.

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Report compiled by : Juraine Okkies



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9... of 15



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Date Reported: 2020-08-12

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

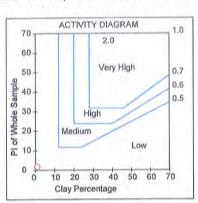
Project: Topline Infrastructure Upgrade

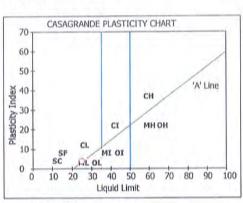
Attention: Frans Breytenbach

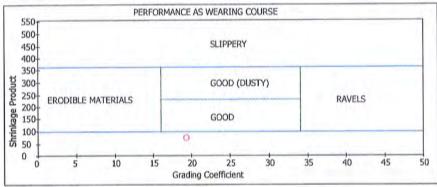
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

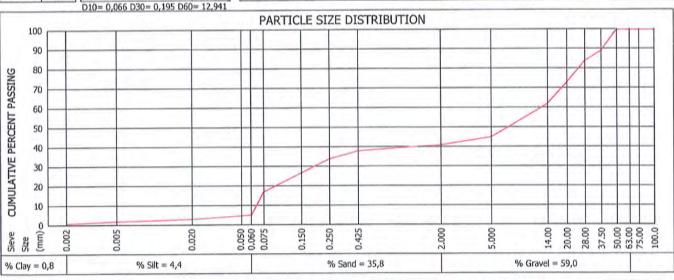
Sample No. : U9263 : TP 20 Position Layer Type : 100-500mm Sample Colour : Dark Brown Gravel : Mix Calcrete+Quartz Sample Type

Sieve Size(mm)	% Passing		2.000 - 0.425	9
100.0	100	-	0.425 - 0.250	9
75.00	100	Soil	0.250 - 0.150	17
63.00	100	υ, Σ	0.150 - 0.075	24
50.00	100		< 0.075	41
37.50	89	Effective	Size	0,066
28.00	84	Uniform	ity Coefficient	196,1
20.00	73	-	Curvature Coefficient	
14.00	62	-		
5,000	45	Oversize	Oversize Index	
2.000	41	Shrinkag	Shrinkage Product	
0.425	38	Grading	Grading Coefficient	
0.250	34	Grading	Modulus	2,00
0.150	27		Liquid Limit	25
0.075	17	D	Plasticity Index	4
0.060	5,2	Atterberg	Linear Shrinkage	2,0
0.050	4,8	費う		2,0
0.020	3,1		PI < 0.075	
0.005	1,9	Unified S	GM-GC	
0.002	0,8	US High	A-1-b(0)	









Deviation from Test Method:

Remarks and Notes: Chemistry: pH = 7.69 [SANS 5854] & Conductivity = 0.06 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).

The test results reported relate to the samples tested.

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Prog.ver 10.7 (2019/11/07)

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Technical Signatory

... of ..



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Date Reported: 2020-08-21

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Attention: Frans Breytenbach

Project : Topline Infrastructure Upgrade

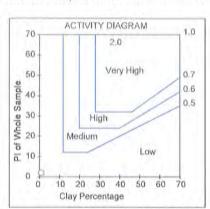
Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

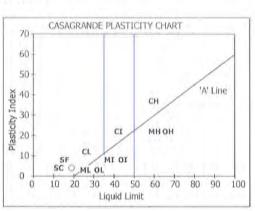
Sample No. : U9264 Position : TP 24 : 0-500mm Layer Type

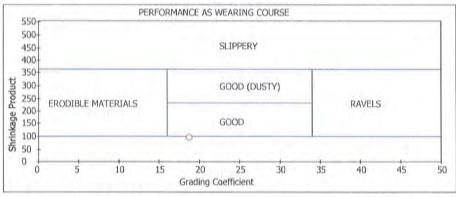
Sample Colour : Reddish Brown Gravel

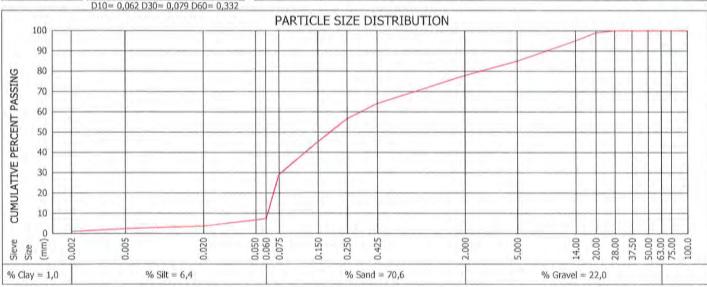
Sample Type : Mix Quartziticstone

Sieve Size(mm)	% Passing		2.000 - 0.425	18
100.0	100		0.425 - 0.250	9
75.00	100	Soil	0.250 - 0.150	15
63.00	100	Σ	0.150 - 0.075	21
50.00	100		< 0.075	37
37.50	100	Effective	Size	0,062
28.00	100	Uniform	ity Coefficient	5,4
20.00	99	100000000000000000000000000000000000000		0,3
14.00	95		Curvature Coefficient	
5.000	85	Oversize Index		0,0
2.000	78	Shrinkag	Shrinkage Product	
0.425	64	Grading	Coefficient	18,7
0.250	57	Grading	Modulus	1,30
0.150	45		Liquid Limit	19
0.075	29	5	Plasticity Index	4.0
0.060	7,4	tterber		1.5
0.050	6,7	Atterberg	Linear Shrinkage	1.5
0.020	3,7		PI < 0.075	
0.005	2,4	Unified Soil Classification		SC
0.002	1,0	US High	US Highway Classification	









Deviation from Test Method

Remarks and Notes: Chemistry: pH = 7.85 [SANS 5854] & Conductivity = 0.09 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). The test results reported relate to the samples tested.

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Report compiled by : Juraine Okkies



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Date Reported: 2020-07-17

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project : Topline Infrastructure Upgrade

Attention: Frans Breytenbach

Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

Sample No. : U9265

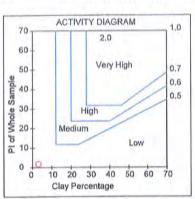
Position : TP 25

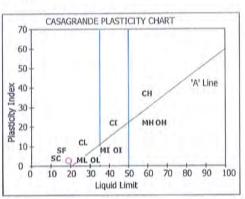
Layer Type : 0-700mm

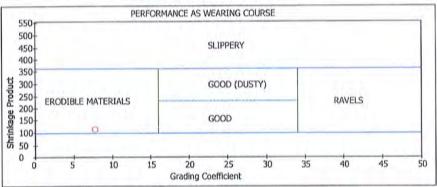
Sample Colour : Dark Brown

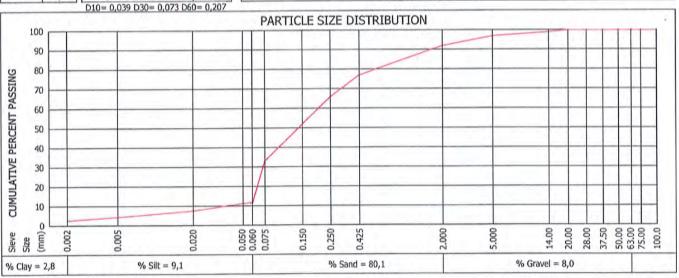
Sample Type : Mix Quartzstone

Sieve Size(mm)	% Passing		2.000 - 0.425	16
100.0	100		0.425 - 0.250	12
75.00	100	Soil	0.250 - 0.150	15
63.00	100	N. A.	0.150 - 0.075	21
50.00	100		< 0.075	36
37.50	100	Effective	Size	0,039
28.00	100		lty Coefficient	5,3
20.00	100			
14.00	99	Curvature Coefficient		0,7
5.000	97	Oversize Index		0,0
2.000	92	Shrinkage Product		115,5
0.425	77	Grading	Coefficient	7,8
0.250	66	Grading	Modulus	1,00
0.150	52		Liquid Limit	19
0.075	33	g	Plasticity Index	3.0
0.060	12	tterber		1.5
0.050	11	Atterberg	Linear Shrinkage	1.5
0.020	7,7	-	PI < 0.075	
0.005	4,5	Unified S	SC	
0.002	2,8	US High	A-2-4(0)	









Deviation from Test Method:

Remarks and Notes: Chemistry: pH = 7.78 [SANS 5854] & Conductivity = 0.06 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).
The test results reported relate to the samples tested.

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Report compiled by : Juraine Okkies



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Date Reported: 2020-07-24

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project: Topline Infrastructure Upgrade

Attention : Frans Breytenbach

Determination	of the Camornia Bear		t SANS 3001 - GR1 / GF		
		47 1111	ORMATION AND PROPERTIE	S	
SAMPL		U9265			
HOLE NO./ Km	/ CHAINAGE	TP25			
ROAD NO./ N ROAD NO./ N		S28° 45' 23,9" E21° 50' 35,0"			
LAYER TESTE	D/SAMPLED	0-700mm			
SAMPLE	DEPTH	0-700mm			
DATE SA	MPLED	2020-07-08			
COLOUR O	F SAMPLE	Light Brown			
TYPE OF		Mix Quartz Sand			
	SIEVE A	NALYSIS - % PASSING SI	EVES *(SANS 3001-GR1:2010,	SANS 3001-GR2:2010)	
	100.0 mm	ATT TO SERVICE			
	75.0 mm				
	63.0 mm				
	50.0 mm				
GIEVE	37.5 mm				
SIEVE ANALYSIS	28.0 mm	100			
(GR 1)	20.0 mm 14.0 mm	99			
% PASSING	5.0 mm	97			
76 FAGSING	2.0 mm	92			- 1
	0.425 mm	77			
	0.075 mm	33			
GM %		1,0	1		
		SOIL MORTAR	ANALYSIS (SANS 3001-PR5:2	011)	
COARSE SAND	2.000 - 0.425	16			
COARSE FINE SAND	0.425 - 0.250	12			
MEDIUM FINE SAND	0.250 - 0.150	15			
FINE FINE SAND	0.150 - 0.075	21			
SILT CLAY	0.075	36	THE RESERVE THE PARTY OF THE PA		
0.0.		ATTERBERG LIMITS	S ANALYSIS - *(SANS 3001-GF	R10:2010)	
ATTERBERG	LIQUID LIMIT	19			
LIMITS (%)	PLASTICITY INDEX	3.3			
SANS GR10,GR11	LINEAR SHRINKAGE	1.5			
DANG CITTO, CITT	H.R.B.	A-2-4(0)			
CLASSIFICATION	COLTO	G9			
GEAGGII IOATTIGIT	TRH 14	G10			
			- *(SANS 3001-GR30:2010, SA	NS 3001-GR40:2010)	
SANS GR30	OMC %	8,2			
MAX. DRY DENSITY	MDD (kg/m³)	2134			
	COMP MC %	8,4			
SWELL %@	MOD NRB PRO	0,01 0,02 0,04			
GAACTE 10 (B)	100 %	9			
	98 %	8			
C.B.R.	97 %	8			
SANS GR40	95 %	7			
SANO GIVIO	93 %	7			
	90 %	6			
441.000					
STABILISI		Not Applicable			
TEST		CBR			
SAMPLING		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.

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Report compiled by: Juraine Okkies



Accreditation No. T0296 Prog.ver 10.7 (2019/11/07)





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Date Reported: 2020-07-23

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project : Topline Infrastructure Upgrade

Attention : Frans Breytenbach

Determination Maximum Dry Density & Optimum Moisture Content Test Report

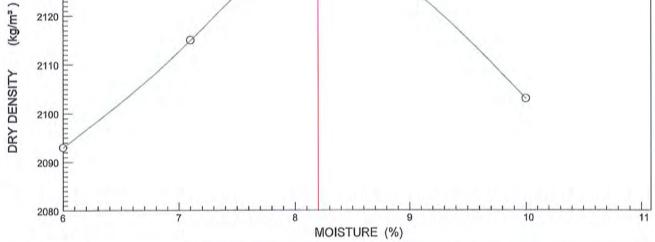
SANS 3001 - GR20/GR30

		-		T T T T T T T T T T T T T T T T T T T				
	SAMPLE NO.					U9265		
CONTAINER FOR SAMPLING			Black Bags					
SIZE / APPROX. MASS OF SAMPLE			91kg					
MOISTURE CONDITION OF SAMPLE				Moist				
LAYER TESTED / SAMPLED FROM				0-700mm				
MATERIAL DESCRIPTION				Mix Quartz				
HOLE NO./ km / CHAINAGE				TP25				
ROAD NO.				Not Specified				
	DATE RECEIVE	ED		2020-07-09				
DATE SAMPLED				2020-07-08				
CLIENT MARKING				S28° 45' 23,9"; E21° 50' 35,0"				
COLOUR AND TYPE				Light Brown S.Sand				
POINT NO.	1	2	3	4	5			
DRY DENSITY (kg/m³)	2093	2115	2133	2124	2103			
MOISTURE (%)	6,0	7,1	8,0	9,1	10,0			

MAXIMUM DRY DENSITY (kg/m²): 2134

OPTIMUM MOISTURE CONTENT (%): 8,2

2140
2130
2120



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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Sanas
Testing Laboratory
Accreditation No. T0296

Accreditation No. T0296 Prog.ver 10.7 (2019/11/07)



13 of ...



1401

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Date Reported : 2020-08-06

Job Request No.: RU3525

Ceder Land Geotechnical Consult (Pty) Ltd

PO Box 607 Ceres 6835

Project: Topline Infrastructure Upgrade

Attention: Frans Breytenbach

Foundation Indicator Test Report SANS 3001 - GR1 / GR3 / GR10

Sample No. : U9266

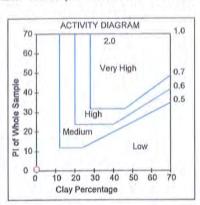
Position : TP 27

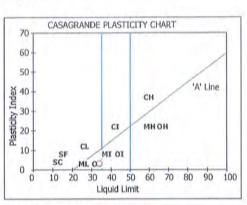
Layer Type : 200-700mm

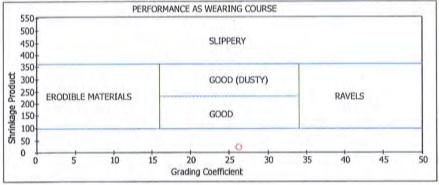
Sample Colour : Light Brown Gravel

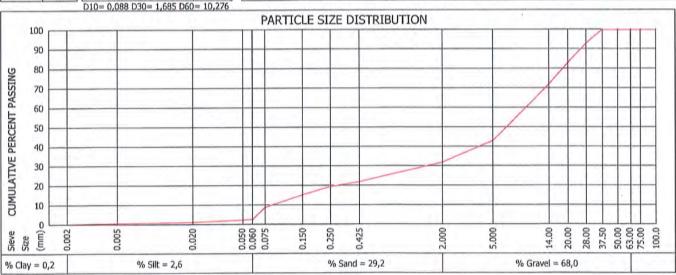
Sample Type : Mix Weathered Quartz

Sieve Size(mm)	% Passing		2.000 - 0.425	29	
100.0	100		0.425 - 0.250	9	
75.00	100	Soil	0.250 - 0.150	14	
63.00	100	ν. Σ	0.150 - 0.075	20	
50.00	100		< 0.075	29	
37.50	100	Effective	Size	0,088	
28.00	93	Uniformi	116,8		
20.00	83		Uniformity Coefficient Curvature Coefficient		
14.00	72			3,1	
5.000	43	Oversize	Oversize Index		
2.000	32	Shrinkag	Shrinkage Product		
0.425	22	Grading	Grading Coefficient		
0.250	20	Grading	Grading Modulus		
0.150	15		Liquid Limit	34	
0.075	8,9	D	Plasticity Index	4.0	
0.060	2,8	Atterberg	Linear Shrinkage	1.0	
0.050	2,4	를		1.0	
0.020	1,3	~	PI < 0.075		
0.005	0,7	Unified S	Unified Soll Classification		
0.002	0,2	US Highway Classification		A-1-a(0)	









Deviation from Test Method:

Remarks and Notes: Chemistry: pH = 7.58 [SANS 5854] & Conductivity = 0.06 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). The test results reported relate to the samples tested.

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Report compiled by : Juraine Okkies













PHASE 1 HIA REPORT !KHEIS TOWNSHIP EXPANSION TOPLINE NORTHERN CAPE

PROPOSED TOWNSHIP EXPANSION ON
ERVEN 1, 16, 87, SAALSKOP (TOPLINE) & PLOT 2777,
BOEGOEBERG SETTLEMENT (KENHARDT),
FARM BOEGOEBERGNEDERSETTING RE/48, !KHEIS LOCAL MUNICIPALITY,
ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE.

REFERENCE: NC/21/2018/PP (TOPLINE 248)/BH0069

PREPARED FOR: ENVIROAFRICA

PREPARED BY:

HEIDI FIVAZ & JAN ENGELBRECHT
UBIQUE HERITAGE CONSULTANTS

29 JUNE 2020

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For this project, Mr Engelbrecht was responsible for the field survey of the development footprint, identification of heritage resources, and recommendations. Ms Fivaz was responsible for research and report compilation. The desktop study was conducted by Sky-Lee Fairhurst and the PIA was completed by Elize Butler.

Declaration of independence:

We, Jan Engelbrecht and Heidi Fivaz, partners of UBIQUE Heritage Consultants, hereby confirm our independence as heritage specialists and declare that:

- we are suitably qualified and accredited to act as independent specialists in this application;
- we do not have any vested interests (either business, financial, personal or other) in the proposed development project other than remuneration for the heritage assessment and heritage management services performed;
- the work was conducted in an objective and ethical manner, in accordance with a professional code of conduct and within the framework of South African heritage legislation.

Date: 2020-06-29

Signed:

J.A.C. Engelbrecht & H. Fivaz

UBIQUE Heritage Consultants

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JAN ENGELBRECHT CRM ARCHAEOLOGIST

Jan Engelbrecht is accredited by the Cultural Resources Management section of the Association of Southern African Professional Archaeologists (ASAPA) to undertake Phase1 AlAs and HIAs in South Africa. He is also a member of the Association for Professional Archaeologists (ASAPA). Mr Engelbrecht holds an honours degree in archaeology (specialising in the history of early farmers in southern Africa (Iron Age) and Colonial period) from the University of South Africa. He has 12 years' experience in heritage management. He has worked on projects as diverse as the Zulti South HIA project of Richards Bay Minerals, research on the David Bruce heritage site at Ubombo in Kwa-Zulu Natal, and various archaeological excavations and historical projects. He has worked with many rural communities to establish integrated heritage and land use plans and speaks Zulu fluently. Mr Engelbrecht established Ubique Heritage Consultants during 2012. The company moved from KZN to the Northern Cape and is currently based at Askham in the Northern Cape within the Dawid Kruiper Local Municipality in the Kgalagadi region. He had a significant military career as an officer, whereafter he qualified as an Animal Health Technician at Technikon RSA and UNISA. He is currently studying for his MA Degree in Archaeology.

HEIDI FIVAZ

ARCHAEOLOGIST & OBJECT CONSERVATOR

Heidi Fivaz has been a part of UBIQUE Heritage Consultants since 2016 and is responsible for research and report compilation. She holds a B.Tech. Fine Arts degree (2000) from Tshwane University of Technology, a BA Culture and Arts Historical Studies degree (2012) from UNISA and received her BA (Hons) Archaeology in 2015 (UNISA). She has received extensive training in object conservation from the South African Institute of Object Conservation and specialises in glass and ceramics conservation. She is also a skilled artefact and archaeological illustrator. Ms Fivaz is currently completing her MA Archaeology at the University of South Africa (UNISA), with a focus on historical and industrial archaeology. She is a professional member of the Association of South African Archaeologists and has worked on numerous archaeological excavation and surveying projects over the past ten years.





EXECUTIVE SUMMARY

Project description

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA), to conduct a cultural heritage assessment to determine the impact of the proposed township expansion on Erven 1, 16, 87, Saalskop (Topline) and Plot 2777, Boegoeberg Settlement, on the Farm Boegoebergnedersetting RE/48, !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape, on any sites, features, or objects of cultural heritage significance.

Findings and Impact on Heritage Resources

Eleven incidences of ESA/MSA lithic material were recorded across the development footprint. These include a few formal tools like scrapers and a Fauresmith hand axe, but the lithic assemblage predominantly consists of informal tools and knapping debris. The lithics are all banded ironstone formation (BIF), an abundant raw material within the area. The material was documented as surface scatters, with no archaeological context. The resources will be affected negatively by the proposed development, but due to the low significance of the material, the impact is negligible.

The proposed development is underlain by sediments of Kalkwerf Gneiss which in places intrude upon the Groblershoop Formation (Brulpan Group). Underlying these rocks are deposits of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System (SAHRIS), the Palaeontological Sensitivity of the Kalkwerf Gneiss is insignificant. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development. The Kalkwerf Gneiss consists of biotite, epidote, garnet, strained quartz, and perthite augen, with some granophyric intergrowth muscovite. It is therefore recommended that the project be exempt from further palaeontological studies (Butler 2020).

Recommendations

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:

1. No significant heritage sites or features were identified within the surveyed sections of Topline township, on Erven 1, 16, 87, Saalskop (Topline) and Plot 2777, Boegoeberg Settlement, Farm Boegoebergnedersetting RE/48. The Early/Middle Stone Age cultural material identified is not conservation worthy. No further mitigation is recommended



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with regards to these resources. Therefore, from a heritage point of view, we recommend that the proposed development can continue.

- 2. The Topline cemetery is situated well outside the development footprint. This site is graded as IIIB and is of High Local Significance. No further mitigation is recommended with regards to these resources. No graves were identified within the development footprint.
- 3. Due to the zero to low 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. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2020).
- 4. 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 evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.

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ii

TABLE OF CONTENTS

EX	ECU	TIVE	SUMMARY	
I	Proje	ect de	escription	
I	ind	ings a	and Impact on Heritage Resources	
F	Reco	omme	endations	
TAI	BLE	OF FI	GURES	i\
AB	BRE	VIATI	ONS	\
GL	OSS	SARY.		٠١
1.	IN	ITROD	DUCTION	1
-	1.1	Scop	oe of study	1
-	1.2	Assu	ımptions and limitations	2
2.	TE	ERMS	OF REFERENCE	3
4	2.1.	Statu	tory Requirements	3
	2.	1.1 G	eneral	3
	2.	1.2 N	ational Heritage Resources Act 25 of 1999	3
	2.	1.3 H	eritage Impact Assessments/Archaeological Impact Assessments	4
	2.	1.4 D	efinitions of heritage resources	4
	2.	1.5 N	lanagement of Graves and Burial Grounds	5
3.	S	TUDY	APPROACH AND METHODOLOGY	7
3	3.1	Desl	ktop study	7
	3.	1.1	Literature review	7
3	3.2	Field	d study	7
	3.	2.1	Systematic survey	7
	3.	2.2	Recording significant areas	8
	3.	2.3	Determining significance	8
	3.	2.4	Assessment of development impacts	g
3	3.3	Oral	history	11
3	3.4	Rep	ort	11
4.	PF	ROJEC	CT OVERVIEW	12
4	4.1	Tech	nnical information	12
4	4.2	Des	cription of the affected environment	16
5.	Н	ISTOR	RICAL AND ARCHAEOLOGICAL BACKGROUND	18
į	5.1	Regi	on	18
	5.	1.1 S	tone Age	18
	5.	1.2 Ir	on Age	19
	5.	1.3 H	listorical period	20
į	5.2	Loca	al	21
į	5.3	Topl	ine (Saalskop), Wegdraai, Opwag, Groblershoop, Boegoeberg (Brandboom)	23



	5.3.1 Stone Age	23
	5.3.2 Historical period	24
	5.2.3 Graves and Burials	26
	5.2.4 Oral history	27
6.	IDENTIFIED RESOURCES AND HERITAGE ASSESSMENT	28
6	1 Surveyed area	28
6	2 Identified heritage resources	29
6	3 Discussion	31
	6.3.1 Archaeological features	
	6.3.2 Graves	
	6.3.3 Palaeontological resources	
7.	ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT	
8.	RECOMMENDATIONS	
9.	CONCLUSION	
10.	BIBLIOGRAPHY	
	ENDIX A	
	KPANSION, !KHEIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORT APE PROVINCE	
С	APE PROVINCE	
TA! Figu	APE PROVINCE	46 nage
TAI Figu prov Figu	RAPE PROVINCE BLE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality	46 nage 13
TAI Figu prov Figu indi Figu	RAPE PROVINCE BLE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In rided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality	46 nage 13
TAL Figu prov Figu indii Figu indii Figu	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. re 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated	46 mage 13 14 d on
Figure Figure Chiefigure Chiefigu	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In rided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920	46 mage 13 14 d on 15 on
TAL Figu prov Figu indi Figu Chie Figu Good	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In rided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. re 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated of Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/)	46 nage 13 14 d on 15 on 15
TAL Figu prov Figu indi Figu Chie Figu Good Figu	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan	46 nage 13 14 d on 15 on 15
Figure Figure Good Figure Figure Figure Good Figure	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan	46 nage 13 14 d on 15 on 16 map of 25
TAL Figu prov Figu indi Figu Chie Figu Good Figu Lan Figu	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. re 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated of Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/) re 5 Locality of the development footprint Topline !Kheis Local Municipality indicated gle Earth Satellite imagery. re 6 Views of the affected development area. re 7 Detail of 1913 Topographical map of Upington, and detail of 1914 topographical geberg, available at https://digitalcollections.lib.uct.ac.za/ re 8 Survey tracks across the development footprint.	46 nage 13 14 d on 15 on 16 map of 25
Figu prov Figu indi Figu Chie Figu Figu Lan Figu Figu Figu	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. re 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated of Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/)	46 nage 13 14 d on 15 on 16 map of 25 28
Figure Fi	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. re 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated of Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/)	46 nage 13 14 d on 15 on 16 map of 25 28 30 33
Figure Fi	REPROVINCE The 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. The 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. The 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. The 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated of Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/). The 5 Locality of the development footprint Topline !Kheis Local Municipality indicated gle Earth Satellite imagery. The 6 Views of the affected development area. The 7 Detail of 1913 Topographical map of Upington, and detail of 1914 topographical geberg, available at https://digitalcollections.lib.uct.ac.za/. The 8 Survey tracks across the development footprint. The 9 Distribution of identified heritage resources across Topline township, Farm goebergnedersetting No. 48. The 10 Photographic selection of archaeological material recorded. The 11 Selection of photographs of the Topline town cemetery.	46 nage 13 14 d on 15 on 16 map of 25 28 30 33
Figure Fi	RE OF FIGURES re 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. In ided by Macroplan. re 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on 1: 250 000 WGS2820-2920. re 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality cated on Google Earth Satellite imagery. re 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated of Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/)	46 mage 13 14 d on 15 on 16 map of 28 30 33 33



ABBREVIATIONS

AIA: Archaeological Impact Assessment

ASAPA: Association of South African Professional Archaeologists

BIA: Basic Impact Assessment
CRM: Cultural Resource Management
ECO: Environmental Control Officer

EIA: Environmental Impact Assessment*

EIA: Early Iron Age*

EMP: Environmental Management Plan

ESA: Earlier Stone Age

GPS: Global Positioning System
HIA: Heritage Impact Assessment

LIA: Late Iron Age
LSA: Later Stone Age

MEC: Member of the Executive Council

MIA: Middle Iron Age

MPRDA: Mineral and Petroleum Resources Development Act

MSA: Middle Stone Age

NEMA: National Environmental Management Act

NHRA: National Heritage Resources Act

OWC: Orange River Wine Cellars

PRHA: Provincial Heritage Resource Agency
SADC: Southern African Development Community
SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System

GLOSSARY

Archaeological:

- material remains resulting from human activity which are in a state of disuse and are in or on land and are older than 100 years, including artefacts, human and hominid remains and artificial features and structures;
- rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and is older than 100 years (as defined and protected by the National Heritage Resources Act (NHRA) (Act No. 25 of 1999) including any area within 10 m of such representation;
- wrecks, being any vessel or aircraft, or any part thereof, which were wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation;
- features, structures and artefacts associated with military history, which are older than 75 years and the sites on which they are found.



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^{*}Although EIA refers to both Environmental Impact Assessment and the Early Iron Age both are internationally accepted abbreviations it must be read and interpreted in the context it is used.

Stone Age: The first and longest part of human history is the Stone Age, which began

with the appearance of early humans between 3-2 million years ago. Stone Age people were hunters, gatherers and scavengers who did not live in permanently settled communities. Their stone tools preserve well and are

found in most places in South Africa and elsewhere.

Earlier Stone Age: >2 000 000 - >200 000 years ago Middle Stone Age: <300 000 - >20 000 years ago Later Stone Age: <40 000 - until the historical period

Iron Age: (Early Farming Communities). Period covering the last 1800 years, when

immigrant African farmer groups brought a new way of life to southern Africa. They established settled villages, cultivated domestic crops such as sorghum, millet and beans, and herded cattle as well as sheep and goats. As they produced their own iron tools, archaeologists call this the Iron Age.

Early Iron Age: AD 200 - AD 900 Middle Iron Age: AD 900 - AD 1300 Later Iron Age: AD 1300 - AD 1850

Historic: Period of arrival of white settlers and colonial contact.

AD 1500 to 1950

Historic building: Structures 60 years and older.

Fossil: Mineralised bones of animals, shellfish, plants and marine animals. A trace

fossil is the track or footprint of a fossil animal that is preserved in stone or

consolidated sediment.

Heritage: That which is inherited and forms part of the National Estate (historic

places, objects, fossils as defined by the National Heritage Resources Act

25 of 1999).

Heritage resources: These mean any place or object of cultural significance, tangible or

intangible.

Holocene: The most recent geological period that commenced 10 000 years ago.

Palaeontology: Any fossilised remains or fossil trace of animals or plants which lived in the

geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site that contains such fossilised remains or traces

Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and

reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity that may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse

activities.

Mitigation: Anticipating and preventing negative impacts and risks, then to minimise

them, rehabilitate or repair impacts to the extent feasible.

A 'place': a site, area or region;



- a building or other structure which may include equipment, furniture, fittings and articles associated with or connected with such building or other structure;
- a group of buildings or other structures which may include equipment, furniture, fittings and articles associated with or connected with such group of buildings or other structures;
- an open space, including a public square, street or park; and
- in relation to the management of a place, includes the immediate surroundings of a place.

'Public monuments and memorials': mean all monuments and memorials-

- erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government; or
- which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual;

'Structures':

any building, works, device or other facility made by people and which are fixed to land, and include any fixtures, fittings and equipment associated therewith.



1. INTRODUCTION

1.1 Scope of study

The project involves the expansion of the Topline township on Erven 1, 16, 87, Saalskop (Topline) and Plot 2777, Boegoeberg Settlement (Kenhardt), on the Farm Boegoebergnedersetting RE/48 in the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape. UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with the National Environmental Management Act 107 of 1998 (NEMA), and in compliance with Section 38 of the National Heritage Resources Act 25 of 1999 (NHRA), to conduct a cultural heritage assessment (AIA/HIA) of the development area.

The assessment aims to identify and report any heritage resources that may fall within the development footprint; to determine the impact of the proposed development on any sites, features, or objects of cultural heritage significance; to assess the significance of any identified resources; and to assist the developer in managing the documented heritage resources in an accountable manner, within the framework provided by the National Heritage Resources Act (Act 25 of 1999) (NHRA).

South Africa's heritage resources are both rich and widely diverse, encompassing sites from all periods of human history. Resources may be tangible, such as buildings and archaeological artefacts, or intangible, such as landscapes and living heritage. Their significance is based upon their aesthetic, architectural, historical, scientific, social, spiritual, linguistic, economic or technological values; their representation of a time or group; their rarity; and their sphere of influence.

The integrity and significance of heritage resources can be jeopardised by natural (e.g. erosion) and human (e.g. development) activities. In the case of human activities, a range of legislation exists to ensure the timeous and accurate identification and effective management of heritage resources for present and future generations.

The result of this investigation is presented within this heritage impact assessment report. It comprises the recording of heritage resources present/ absent and offers recommendations for the management of these resources within the context of the proposed development.

Depending on SAHRA's acceptance of this report, the developer will receive permission to proceed with the proposed development, taking into account any proposed mitigation measures.



1.2 Assumptions and limitations

It is assumed that the description of the proposed project, as provided by the client, is accurate. Furthermore, it is assumed that the public consultation process undertaken as part of the Environmental Impact Assessment (EIA) is comprehensive and does not have to be repeated as part of the heritage impact assessment.

The significance of the sites, structures and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. The various aspects are not mutually exclusive, and the evaluation of any site is done with reference to any number of these aspects. Cultural significance is site-specific and relates to the content and context of the site.

All possible care has been taken during the comprehensive field survey and intensive desktop study to identify sites of cultural importance within the development areas. However, it is essential to note that some heritage sites may have been missed due to their subterranean nature, or due to dense vegetation cover. No subsurface investigation (i.e. excavations or sampling) were undertaken since a permit from SAHRA is required for such activities. Therefore, should any heritage features and/or objects such as architectural features, stone tool scatters, artefacts, human remains, or fossils be uncovered or observed during construction, operations must be stopped, and a qualified archaeologist contacted for an assessment of the find. Observed or located heritage features and/or objects may not be disturbed or removed in any way until such time that the heritage specialist has been able to assess the significance of the site (or material) in question.



2. TERMS OF REFERENCE

An HIA/ AIA must address the following key aspects:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

In addition, the HIA/AIA should comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency.

2.1. Statutory Requirements

2.1.1 General

The Constitution of the Republic of South Africa Act 108 of 1996 is the source of all legislation. Within the Constitution the Bill of Rights is fundamental, with the principle that the environment should be protected for present and future generations by preventing pollution, promoting conservation and practising ecologically sustainable development. With regard to spatial planning and related legislation at national and provincial levels the following legislation may be relevant:

- Physical Planning Act 125 of 1991
- Municipal Structures Act 117 of 1998
- Municipal Systems Act 32 of 2000
- Development Facilitation Act 67 of 1995 (DFA)

The identification, evaluation and management of heritage resources in South Africa are required and governed by the following legislation:

- National Environmental Management Act 107 of 1998 (NEMA)
- KwaZulu-Natal Heritage Act 4 of 2008 (KZNHA)
- National Heritage Resources Act 25 of 1999 (NHRA)
- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)

2.1.2 National Heritage Resources Act 25 of 1999

The NHRA established the South African Heritage Resources Agency (SAHRA) together with its Council to fulfil the following functions:

coordinate and promote the management of heritage resources at national level;



- set norms and maintain essential national standards for the management of heritage resources in the Republic and to protect heritage resources of national significance;
- control the export of nationally significant heritage objects and the import into the Republic of cultural property illegally exported from foreign countries;
- enable the provinces to establish heritage authorities which must adopt powers to protect and manage certain categories of heritage resources; and
- provide for the protection and management of conservation-worthy places and areas by local authorities.

2.1.3 Heritage Impact Assessments/Archaeological Impact Assessments

Section 38(1) of the NHRA of 1999 requires the responsible heritage resources authority to notify the person who intends to undertake a development that fulfils the following criteria to submit an impact assessment report if there is reason to believe that heritage resources will be affected by such event:

- the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- the construction of a bridge or similar structure exceeding 50m in length;
- any development or other activity that will change the character of a site
 - o exceeding 5000m2 in extent; or
 - o involving three or more existing erven or subdivisions thereof; or
 - o involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- the rezoning of a site exceeding 10 000m² in extent; or
- any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.

2.1.4 Definitions of heritage resources

The NHRA defines a heritage resource as any place or object of cultural significance, i.e. of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. These include, but are not limited to, the following wide range of places and objects:

- 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.

Furthermore, a place or object is to be considered part of the national estate if it has cultural significance or other special value because of—

- its importance in the community, or pattern of South Africa's history;
- its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- its importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects;
- its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
- its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.

2.1.5 Management of Graves and Burial Grounds

- Graves younger than 60 years are protected in terms of Section 2(1) of the Removal of Graves and Dead Bodies Ordinance 7 of 1925 as well as the Human Tissues Act 65 of 1983.
- Graves older than 60 years, situated outside a formal cemetery administered by a local Authority are protected in terms of Section 36 of the NHRA as well as the Human Tissues Act of 1983. Accordingly, such graves are the jurisdiction of SAHRA. The procedure for Consultation Regarding Burial Grounds and Graves (Section 36(5) of NHRA) is applicable to graves older than 60 years that are situated outside a formal cemetery administrated by a local authority. Graves in the category located inside a formal cemetery administrated by a local authority will also require the same authorisation as set out for graves younger than 60 years over and above SAHRA authorisation.

The protocol for the management of graves older than 60 years situated outside a formal cemetery administered by a local authority is detailed in Section 36 of the NHRA:

(3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—



- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (b) destroy, damage, alter, exhume, 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; or
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.
- (4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources authority.
- (5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—
 - (a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and
 - (b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.
- (6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in cooperation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—
 - (a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and
 - (b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.



3. STUDY APPROACH AND METHODOLOGY

3.1 Desktop study

The first step in the methodology was to conduct a desktop study of the heritage background of the area and the site of the proposed development. This entailed the scoping and scanning of historical texts/records as well as previous heritage studies and research around the study area.

By incorporating data from previous CRM reports done in the area and an archival search, the study area is contextualised. The objective of this is to extract data and information on the area in question, looking at archaeological sites, historical sites and graves in the area.

No archaeological site data was available for the project area. A concise account of the archaeology and history of the broader study area was compiled (sources listed in the bibliography).

3.1.1 Literature review

A survey of the literature was undertaken to obtain background information regarding the area. Through researching the SAHRA APM Report Mapping Project records and the SAHRIS online database (http://www.sahra.org.za/sahris), it was determined that several other archaeological or historical studies had been performed within the broader vicinity of the study area. Sources consulted in this regard are indicated in the bibliography.

3.2 Field study

Phase 1 (AIA/HIA) requires the completion of a field study to establish and ensure the following:

3.2.1 Systematic survey

A systematic survey of the proposed project area to locate, identify, record, photograph and describe sites of archaeological, historical or cultural interest, was completed.

UBIQUE Heritage Consultants inspected the proposed development and surrounding areas on 20, 21 & 25 May 2020 and completed a controlled-exclusive, pre-planned, pedestrian survey. We conducted an inspection of the surface of the ground, wherever the surface was visible. This was done with no substantial attempt to clear brush, sand, deadfall, leaves or other material that may cover the surface and with no effort to look beneath the surface beyond the inspection of rodent burrows, cut banks and other exposures fortuitously observed.

The survey was tracked with a handheld Garmin global positioning unit (Garmin eTrex 10).



3.2.2 Recording significant areas

GPS points of identified significant areas were recorded with a handheld Garmin global positioning unit (Garmin eTrex 10). Photographs were taken with a Canon IXUS 185 20-megapixel camera. Detailed field notes were taken to describe observations. The layout of the area and plotted GPS points, tracks and coordinates, were transferred to Google Earth and QGIS and maps were created.

3.2.3 Determining significance

Levels of significance of the various types of heritage resources observed and recorded in the project area will be determined to the following criteria:

Cultural significance:

- Low A cultural object being found out of context, not being part of a site or

without any related feature/structure in its surroundings.

- Medium Any site, structure or feature being regarded less important due to several

factors, such as date and frequency. Likewise, any important

object found out of context.

- High Any site, structure or feature regarded as important because of its age

or uniqueness. Graves are always categorised as of a high importance.

Likewise, any important object found within a specific context.

Heritage significance:

Grade I Heritage resources with exceptional qualities to the extent that they are

of national significance

- Grade II Heritage resources with qualities giving it provincial or regional

importance although it may form part of the national estate

- Grade III Other heritage resources of local importance and therefore worthy of

Conservation

Field ratings:

i. National Grade I significance should be managed as part of the national

estate

ii. Provincial Grade II significance should be managed as part of the provincial

estate

iii. Local Grade IIIA should be included in the heritage register and not be

mitigated (high significance)

iv. Local Grade IIIB should be included in the heritage register and may be

mitigated (high/ medium significance)



٧.	General protection A (IV A)	site should be mitigated before destruction (high/ medium
		(*)

significance)

vi. General protection B (IV B) site should be recorded before destruction (medium

significance)

vii. General protection C (IV C) phase 1 is seen as sufficient recording and it may be

demolished (low significance)

Heritage value, statement of significance:

- a. its importance in the community, or pattern of South Africa's history;
- b. its possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage;
- c. its potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage;
- d. its importance in demonstrating the principal characteristics of a particular class of south Africa's natural or cultural places or objects;
- e. its importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
- f. its importance in demonstrating a high degree of creative or technical achievement at a particular period;
- g. its strong or special association with a particular community or cultural group for social, cultural or spiritual reasons;
- h. its strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and
- i. sites of significance relating to the history of slavery in South Africa.

3.2.4 Assessment of development impacts

A heritage resource impact may be defined broadly as the net change, either beneficial or adverse, between the integrity of a heritage site with and without the proposed development. Beneficial impacts occur wherever a proposed development actively protects, preserves or enhances a heritage resource, by minimising natural site erosion or facilitating non-destructive public use, for example. More commonly, development impacts are of an adverse nature and can include:

- destruction or alteration of all or part of a heritage site;
- isolation of a site from its natural setting; and / or
- introduction of physical, chemical or visual elements that are out of character with the heritage resource and its setting.



Beneficial and adverse impacts can be direct or indirect, as well as cumulative, as implied by the examples. Although indirect impacts may be more difficult to foresee, assess and quantify, they must form part of the assessment process. The following assessment criteria have been used to assess the impacts of the proposed development on possible identified heritage resources:

Criteria	Rating Scales	Notes			
Nature	Positive Negative Neutral	An evaluation of the type of effect the construction operation and management of the proposed development would have on the heritage resource.			
	Low	Site-specific affects only the development footprint.			
Extent	Medium	Local (limited to the site and its immediate surroundings, including the surrounding towns and settlements within a 10 km radius);			
	High	Regional (beyond a 10 km radius) to national.			
	Low	0-4 years (i.e. duration of construction phase).			
Duration	Medium	5-10 years.			
	High	More than 10 years to permanent.			
	Low	Where the impact affects the heritage resource in suc way that its significance and value are minimally affects			
Intensity	Medium	Where the heritage resource is altered, and its significant and value are measurably reduced.			
	High	Where the heritage resource is altered or destroyed to the extent that its significance and value cease to exist.			
	Low	No irreplaceable resources will be impacted.			
Potential for impact on irreplaceable	Medium	Resources that will be impacted can be replaced, with effort.			
resources	High	There is no potential for replacing a particular vulnerable resource that will be impacted.			
Consequence, (a combination of extent, duration, intensity, and the potential for impact on irreplaceable resources).	Low	A combination of any of the following: - Intensity, duration, extent and impact on irreplaceable resources are all rated low. - Intensity is low and up to two of the other criteria are rated medium. - Intensity is medium and all three other criteria are rated low.			
,	Medium	Intensity is medium and at least two of the other criteria are rated medium.			



Criteria	Rating Scales	Notes			
	High	Intensity and impact on irreplaceable resources are rated high, with any combination of extent and duration.			
	i iligii	Intensity is rated high, with all the other criteria being rated medium or higher.			
Probability (the	Low	It is highly unlikely or less than 50 % likely that an impact will occur.			
likelihood of the	Medium	It is between 50 and 70 % certain that the impact will occu			
impact occurring)	High	It is more than 75 % certain that the impact will occur, or it			
		is definite that the impact will occur.			
		Low consequence and low probability.			
	Low	Low consequence and medium probability.			
		Low consequence and high probability.			
Significance		Medium consequence and low probability.			
(all impacts including potential	Medium	Medium consequence and medium probability.			
cumulative		Medium consequence and high probability.			
impacts)		High consequence and low probability.			
		High consequence and medium probability.			
	High	High consequence and high probability.			

3.3 Oral history

Where possible, people from local communities would be interviewed to obtain information relating to the surveyed area.

3.4 Report

The results of the desktop research and field survey are compiled in this report. The identified heritage resources and anticipated direct, indirect, and cumulative impacts that the development of the proposed project may have on the identified heritage resources will be presented objectively. Alternatives, should any significant sites be impacted adversely by the proposed project, are offered. All effort will be made to ensure that all studies, assessments, and results comply with the relevant legislation and the code of ethics and guidelines of the Association of South African Professional Archaeologists (ASAPA). The report aims to assist the developer in managing the documented heritage resources in a responsible manner, and to protect, preserve, and develop them within the framework provided by the National Heritage Resources Act of 1999 (Act 25 of 1999).



4. PROJECT OVERVIEW

UBIQUE Heritage Consultants were appointed by EnviroAfrica cc as independent heritage specialists in accordance with Section 38 of the NHRA and the National Environmental Management Act 107 of 1998 (NEMA), to conduct a cultural heritage assessment to determine the impact of the proposed development of Topline township, on Erven 1, 16, 87, Saalskop (Topline) and Plot 2777, Boegoeberg Settlement, Farm Boegoebergnedersetting RE/48 in the !Kheis Local Municipality, on any sites, features, or objects of cultural heritage significance.

The project entails the expansion of the Topline community. A total of 248 new erven will be created. The project includes the formalisation of the existing informal houses located around the town. The size of the study area is 36 ha. The community of Topline is located on the western bank of the Orange River, next to the N10, approximately 22 km northwest of Groblershoop.

4.1 Technical information

Project description					
Project name	EIS LOCAL MUNICIPALITY TOWNSHIP EXPANSION: TOPLINE				
Description	ne expansion and upgrade of housing and infrastructure at Topline township in the Kheis Local Municipality and within the ZF Mgcawu District Municipality in the orthern Cape Province. Reference: NC/21/2018/PP				
Developer					
!Kheis Local Municipality in c	poperation with the Barzani group and Macroplan Regional and Town Planners				
Contact information	Topline Community !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.				
Development type	Housing (Township expansion)				
Landowner					
!Kheis Local Municipality					
Contact information	054-332 3642 or 054- 833 9500				
Consultants					
Environmental	EnviroAfrica cc.				
Heritage and archaeological	UBIQUE Heritage Consultants				
Paleontological	Banzai Environmental				
Property details					
Province	Northern Cape				
District municipality	ZF Mgcawu				
Local municipality	!Kheis				
Topo-cadastral map	1:50 000 2821DD				
Farm name	Erf 1, Saalskop (Topline) Plot 2777, Boegoeberg Settlement Erf 16, Saalskop (Topline) Erf 87, Saalskop (Topline) Farm Boegoebergnedersetting RE/48				
Closest town	Groblershoop				
GPS Co-ordinates	28°45'12.03"S; 21°50'17.13"E, 28°45'26.20"S; 21°50'33.54"E, 28°45'17.45"S; 21°50'27.72"E, 28°45'1.34"S; 21°50'21.54"E				
Property size					



Development footprint size 36 ha					
Land use					
Previous	Agriculture				
Current	Agriculture and limited informal houses				
Rezoning required	Yes				
Sub-division of land	Yes				
Development criteria in terms of	Section 38(1) NHRA Yes/No)			
Construction of a road, wall, power line, pipeline, canal or other linear forms of development or barrier					
exceeding 300m in length.					
Construction of bridge or similar structure exceeding 50m in length.					
Construction exceeding 5000m ² .					
Development involving three or more existing erven or subdivisions.					
Development involving three or more erven or divisions that have been consolidated within the past					
five years.					
Rezoning of site exceeding 10 000m ² . Yes					
Any other development category, public open space, squares, parks, recreation grounds.					

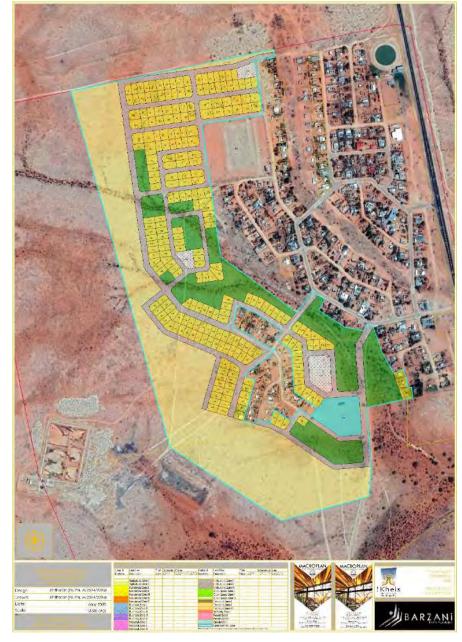


Figure 1 Proposed township expansion at Saalskop (Topline), !Kheis Local Municipality. Image provided by Macroplan.



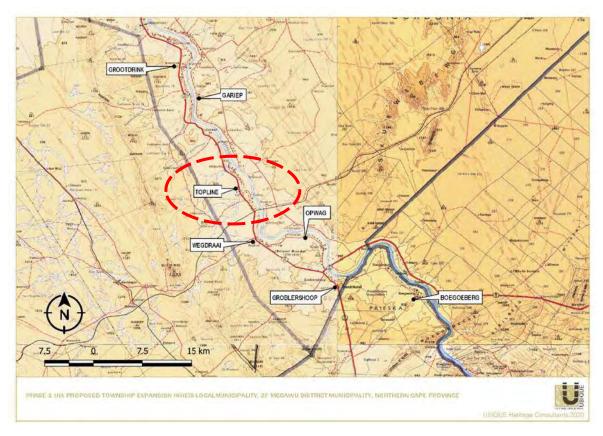


Figure 2 Regional locality of the development footprint, Topline, !Kheis Local Municipality indicated on 1: 250 000 WGS2820-2920.

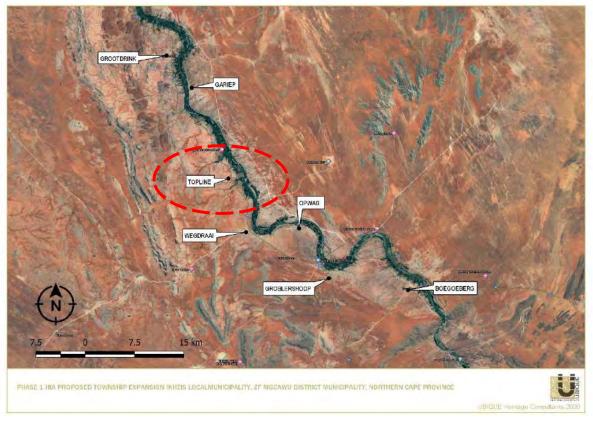


Figure 3 Regional locality of the development footprint, Topline, !Kheis Local Municipality indicated on Google Earth Satellite imagery.





Figure 4 Locality of the development footprint, Topline, !Kheis Local Municipality indicated on Chief Surveyor-General ArcGIS Web Map (source https://csg.esri-southafrica.com/)



Figure 5 Locality of the development footprint Topline !Kheis Local Municipality indicated on Google Earth Satellite imagery.



4.2 Description of the affected environment

The development area falls within Bushmanland Arid Grassland. It is characterised by extensive to irregular plains on a slightly sloping plateau. The white grass (*Stipagrostis* species) dominated grassland gives this vegetation type the character of semidesert 'steppe'. In places, low shrubs of *Salsola* change the vegetation structure. Vegetation identified in the development footprint includes camel thorn trees (*Acacia erioloba*), blackthorn trees (*Acacia mellifera*), silky bushman grass (*Stipagrostis uniplumis*), three thorn/driedoring (*Rhigozum trichotomum*), skaapbossie (*Aizoon schellenbergii*), shepherd tree (*Boscia albitrunca*), suurgras (*Enneapogon desvauxii*), tall bushman grass (*Stipagrostis hirtigluma*), silky bushman grass (*Stipagrostis uniplumis*), kortbeen boesmangras (*Stipagrostis obtuse*), pencil milkbush (*Euphorbia lignose*) and aloe (*Aloe argenticuada*). The soils of the area are mostly red-yellow freely drained apedal soils (Mucina & Rutherford 2006). There are deposits of banded ironstone formation (BIF), calcrete, quartz and quartzite on the surface.

The study area consists of flat open vacant fields with a few trees scattered throughout the footprint. The entire terrain slightly slopes towards the east, in the direction of the existing settlement and the N10. The development footprint is bounded in the north, south, and west by vacant land, and in the east, by the N10. There are several dry riverine running from west to east, and one prominent dry riverine flows from northwest to southeast through the footprint. Some of the dry riverine eroded into large furrows, especially in the central-east and south-eastern parts of the footprint. Several areas have minor damage due to water erosion. Anthropogenic disturbances are prevalent throughout the footprint, such as dumping sites for garbage, rubble, stone, and soil. Evidence of construction earthmoving machinery is visible in certain areas. Informal housing exists on parts of the development footprint.

Figure 6 Views of the affected development area.











5. HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

5.1 Region

The Northern Cape is rich in archaeological sites and landscapes that reflect the complex South African heritage from the Stone Age to Colonial history.

5.1.1 Stone Age

The Stone Age is the period in human history when lithic material was mainly used to produce tools (Coertze & Coertze 1996). In South Africa, the Stone Age can be divided into three periods. It is, however, important to note that dates are relative and only provide a broad framework for interpretation. The division of the Stone Age, according to Lombard et al. (2012) is as follows:

Earlier Stone Age: >2 000 000 - >200 000 years ago Middle Stone Age: <300 000 - >20 000 years ago Later Stone Age: <40 000 - until the historical period.

In short, the Stone Age refers to humans that mainly utilised stone as their technological marker. Each of the sub-divisions represents a group of industries where the assemblages share attributes or common traditions (Lombard et al. 2012). The ESA is characterised by flakes produced from pebbles, cobbles, and percussive tools, as well as objects created later during this period such as large hand axes, cleavers and other bifacial tools (Klein 2000). The MSA is associated with small flakes, blades, and points. The aforementioned are commonly inferred to have been made and utilised for hunting activities and had numerous functions (Wurz 2013). Lastly, the LSA is characterised by microlithic stone tools, scrapers, and flakes (Binneman 1995; Lombard et al. 2012). The LSA is also associated with rock art. Numerous LSA rock art sites, mainly in the form of rock engravings and paintings have been identified in the Northern Cape (Beaumont 2008; Kruger 2018; Morris 1988). These sites are commonly found on slopes, hilltops, rocky outcrops and occasionally in riverbeds (Kruger 2018). Banded ironstone occurs on several sites throughout the Northern Cape and appears to have been a favoured raw material for making stone tools due to its superior flaking qualities (Morris 2012). Prominent sites that exemplify these periods in the Nama-Karoo Biome are Rooidam and Bundu Farm (Earlier Stone Age and Middle Stone Age), and Biesje Poort 2, Bokvasmaak 3, Melkboom 1, Vlermuisgat, and Jagtpan 7 (Later Stone Age) (Lombard et al. 2012).

Within the region, Stone Age sites and complexes have been, and are still being investigated in some detail. For instance, in the Kathu landscape, the longest preserved lithostratigraphic and archaeological sequence of human occupation has been documented and excavated. Evidence of 500 000-year-old hafted stone points, ancient specularite working (and mining), and associated Ceramic Later Stone Age material have been recorded on the eastern side of Postmasburg and Doornfontein. Older transitional ESA/MSA Fauresmith sites at Lyly Feld, Demaneng, Mashwening, King, Rust & Vrede, Paling, Gloucester and Mount Huxley have been recorded (Beaumont 2004; Beaumont 2013; Beaumont & Morris 1990; Beaumont & Vogel 2006; Morris 2005; Morris & Beaumont 2004; Porat et al. 2010; Thackeray et al. 1983; Walker et al. 2014; Wilkins et al. 2012).



Beaumont et al. (1995) commented that thousands of square kilometres of Bushmanland are covered by low-density lithic scatters. It is therefore not surprising that Stone Age sites and lithic scatters were identified by CRM practitioners between the Garona substation and the Gariep/Orange River in numerous surveys conducted during the recent years. Scatters of MSA material have been recorded close to Griekwastad, Hotazel. Postmasburg and Kenhardt, Pofadder, Marydale, and in the Upington district (Dreyer 2006, 2012, 2014; Pelser & Lombard 2013; PGS Heritage 2009, 2010; Webley 2013). MSA and LSA tools, as well as rock engravings, were also found at Putsonderwater, Beeshoek and Bruce (Morris 2005; Snyman 2000; Van Vollenhoven 2012b; Van Vollenhoven 2014).

Archaeological surveys have shown that rocky outcrops, hills, drainage lines, riverbanks and confluences, are prime localities for archaeological finds (Lombard 2011). Sites can likewise be found close to local sources of highly prized raw materials such as previously mentioned banded iron formations (BIF), as well as jasperlite and specularite (Morris 2012; Kruger 2015; 2018). If any such features occur in the study area, Stone Age manifestations can be anticipated.

5.1.2 Iron Age

The Iron Age (IA) is characterised by the use of metal (Coertze & Coertze 1996: 346). There is some controversy about the periods within the IA. Van der Ryst & Meyer (1999) have suggested that there are two phases within the IA, namely:

- Early Iron Age (EIA) 200 1000 AD
- Late Iron Age (LIA) 1000 1850 AD

However, Huffman (2007) suggests instead that there are three periods within the Iron Age; these periods are:

- Early Iron Age (EIA) 250 900 AD
- Middle Iron Age (MIA) 900 1300 AD
- Late Iron Age (LIA) 1300 1840 A.D.

Thomas Huffman believes that a Middle Iron Age should be included within this period. His dates have been widely accepted in the IA field of archaeology.

The South African Iron Age consists of farming communities who had domesticated animals, cultivated plants, manufactured, and made use of ceramics and beads, smelted iron for weapons and manufactured tools (Hall 1987). Iron Age people were often mixed farmers/agropastoralists. These agropastoralists generally chose to live in areas with sufficient water for domestic use along with arable soil that could be cultivated with an iron hoe. Most Iron Age (IA) settlements were permanent settlements, consisting of features such as houses, raised grain bins, storage pits and animal kraals/byres this is in contrast to the temporary camps of pastoralists and hunter-gatherers (Huffman 2007). It is evident in the archaeological record that IA groups had migrated with their material culture (Huffman 2002).



The majority of the IA groups in southern Africa preferred to occupy the central and eastern parts of southern African from about 200 AD. The San and Khoi remained in the western and southern parts (Huffman 2007; Van Vollenhoven 2014). IA sites are scarce, but not unheard-of in the Northern Cape. IA sites have predominantly been recorded in the northeastern part of the province. Kruger (2018) suggested that environmental factors delegated the spread of IA farming westwards during the 17th century. Settlement in the Northern Cape was constrained mainly to the areas east of the Langeberg Mountains. The Later Iron Age (LIA) was accompanied by extensive stone walled settlements, such as the Thlaping capital Dithakong, approximately 40 km north of Kuruman (De Jong 2010). The Sotho-Tswana and Nguni speaking societies, who are the descendants of the LIA mixed farming communities, moved into a region already sparsely inhabited by LSA Khoisan groups. De Jong (2010) commented that LIA communities eventually assimilated many LSA Khoisan groups, and only a few had managed to survive independently. Some of the surviving groups included the Koranna and the Griqua. This period of contact has often been referred to as the Ceramic LSA. It is represented by sites such as the earlier mentioned Blinkklipkop specularite mine near Postmasburg and Kathu Pan (De Jong 2010). LIA people briefly utilised the area close to the Orange River in the Northern Cape, mining copper, and there is even evidence of an IA presence as far as the Upington area in the 18th century (Kruger 2018; Van Vollenhoven 2014).

5.1.3 Historical period

The historical period within the region coincides with the incursion of white traders, hunters, explorers, and missionaries into the interior of South Africa. Buildings and structures associated with the early missionaries, travellers, and traders such as PJ Truter's and William Somerville (arriving in 1801), Donovan, Burchell and Campbell, James Read (arriving around 1870) William Sanderson, John Ryan and John Ludwig's (De Jong 2010; Snyman 2000) arrival during the 19th century, and the settlement of the first white farmers and towns, are still evident in the Northern Cape. Numerous heritage reports that provide a synthesis of the incursions of travellers, missionaries and the early European settlers have been captured on the SAHRIS database.

San hunter-gatherer groups utilised the landscape for thousands of years, and Khoi herders moved into South Africa with their cattle and sheep approximately 2000 years ago. With the arrival of the Dutch settlers in the Cape in the mid-17th century, clashes between the Europeans and Khoi tribes in the Cape Peninsula resulted in the Goringhaiqua and Goraxouqua migrating north towards the Gariep/Orange River in 1680. These tribes became collectively known as the Korannas, living as small tribal entities in separate areas (Penn 2005).

Because of its distance from the Cape Colony, this arid part of South Africa's interior was generally not colonised until relatively recent. According to history, the remote northern reaches of the Cape Colony were home to cattle rushers, gunrunners, river pirates and various manner of outlaws. Distribution of land to colonial farmers only occurred from the 1880s onwards when Government-owned land was surveyed, divided into farms, and transferred to farmers. More permanent large-scale settlement however only started in the late 1920s, and the first farmsteads were possibly built during this period. The region remained sparsely populated until the advent of the 20th century (De Jong 2010, Penn 2005).



The region has been the backdrop to various incidents of conflict. Numerous factors such as population growth, increasing pressure on natural resources, the emergence of power blocs, attempts to control trade, and the emergence of the Griquas, and penetration of the Koranna and early white communities from the south-west resulted in a period of instability in the Northern Cape. With the introduction of loan farms, in the second half of the 18th century, an influx of newcomers such as trekboers, European game hunters and livestock thieves contributed to the volatility and sociocultural stress and transformation in the region (Millo 2019).

The *Difaqane/Mfecane*, which began in the late-18th century, affected the Northern Cape Province around 1820, which was much later than the rest of southern Africa (De Jong 2010; Mlilo 2019). During this time, there was an incursion of displaced refugees associated with the Fokeng, Tlokwa, Hlakwana and Phuting groups into the northeast (De Jong 2010). The arrival of large numbers of Great Trek Boers from the Cape Colony to the borders of Bechuanaland and Griqualand West in 1836 caused friction with many Tswana groups and the missionaries of the London Mission Society. The conflict between Boer and Tswana communities escalated in the 1860s and 1870s when the Koranna and Griqua communities and the British government became involved. The Koranna wars took place during 1879-1880.

According to Breutz (1953, 1954), and Van Warmelo (1935), several Batswana tribes, including the different Thlaping and Thlaro sections as well as other smaller groups, take their 18th and 19thcentury roots back to the area around Groblershoop, Olifantshoek, the Langeberg (Majeng) and Korannaberg ranges in the western part of the region. After Britain annexed Bechuanaland in 1885, the land of the indigenous inhabitants was limited to a few reserves. After the failed Tswana revolt in 1895, the British continued to divide the Tswana land up, and grant it to settling colonial farmers.

The Northern Cape was critical in the Anglo-Boer War (1899-1902), and significant battles took place within 120 km of Kimberley, including the battle of Magersfontein. Boer guerrilla forces roamed the entire Northern Cape region and skirmishes between Boer and Brits were regular occurrences. Furthermore, many graves in the region tell the story of battles fought during the 1914 Rebellion (Hopkins 1978).

5.2 Local

During 1778, Swedish-born traveller and explorer Hendrik Wikar reached the middle and lower reaches of the Orange River after a long land journey that started in Cape Town. As a deserter from the service of the Dutch East India Company, Wikar spent several years within the area and compiled a report of his experiences in exchange for a pardon (Ross 1975). He documented his encounters with Khoisan communities who called themselves the *Einiqua*, or *River People*. The *Einiqua* were divided into three "kraals": the *Namnykoa* near the Augrabies Falls, the *Kaukoa* on islands west of Keimoes, and the *Aukokoa* of Kanoneiland and other islands to the east. Their kraals consisted of a considerable amount of sheep and cattle, and they collected plants, hunted game, and cultivated dagga but no other crops, according to Wikar (Ross 1975). Amongst the



pastoralist communities living on the islands were the *Anoe eis* people whom Wikar characterised as "Bushmen". They possessed no domesticated stock, subsisted by fishing, game-trapping, hunting and the gathering of plant foods (Morris & Beaumont 1991). Colonel Robert Jacob Gordon who visited the area in 1779, however, remarked that they were actually *Einiqua* (i.e. Khoi) who had "lost their cattle as a result of an argument with the *Namneiqua* village (Morris & Beaumont 1991). The San and Khoekhoe hunter-gatherers in the region had reached a form of stability by the early 18th century (Milo 2019). The area west of the Langeberg and east of Upington was occupied by IA groups such as the BaTlaping. Their influence had reached as far down the river as Upington (Morris 1992).

By the 18th century, the *Basters* had focused on the Orange River (and Namaqualand) as destinations of sanctuary from colonial rule and social oppression present in the Cape Colony (Millo 2019; Van der Walt 2015). The term "*Baster*" characterises a group of people of mixed percentage (white and Khoekhoe or slave and Khoekhoe) who possessed property and who was culturally European. In 1882, the first 81 farms north of the Gariep/Orange River between Groblershoop and the Augrabies Falls were allocated almost exclusively to *Basters* (Morris 1992). During the late 19th century, more white people started moving to the Gordonia area, and by the turn of the century, some 13 Afrikaner families had settled at Keimoes (De Beer 1992; Van der Walt 2015). The aftermath of the scorched earth policy of the South African War (Anglo-Boer War), resulted in many farmers moving to new areas, in search of greener pastures, and settlement next to the Gariep/Orange River provided ample irrigation for one's crops.

Since the 1880s, the irrigation of the Orange River played a central role in the economic advancement of the area around Upington (Legassick 1996). The development of the canal systems was integral in irrigating extensive vineyards and orchards and the expansion of substantial agricultural enterprises within the area (Engelbrecht & Fivaz 2018). Dutch Reformed Church missionary Reverend C.H.W. Schröder and Special Magistrate for the Northern Border John H. Scott, are credited with formalising and extending the irrigation system. However, when Schröder first came to Upington in July 1883, there were already people in the area of Keimoes that used irrigation and planted fields. Moolman (1946) and Legassick (1996) mentions how the *Baster* farmers diverted river water to their gardens, albeit crudely. The *Basters*' irrigation scheme has been attributed to the ingenuity of Abraham September. Legassick (1996) commented that "the small, white-painted, stone house where Abraham September lived when he undertook this work survives to this day, though the house and the land upon which it stands have long passed from the hands of the September family".

The early Portuguese sailors referred to the Gariep/Orange River as the St Anthonio, and Simon van der Stel marked it as the Vigiti Magna on maps from 1685. The elephant hunter Jacobus Coetzee called it the "de Groote Rivier" (the Great River) in 1760 and land-surveyor Carel Brink noted in 1761 that the river is known to the local island inhabitants as the Tyen Gariep (Our River). The missionary Campell also spoke of the Gariep, Gareeb, and Garib, as the name the Korannas used. On the evening of 17 August 1779, Robert Gordon took his rowboat out to the middle of the river, raised and toasted the Netherland's flag, and proclaimed the river in the name of the Prince van Oranje. Maps from this date forward name the river as the Orange River (Oranjeriver), but colloquially it is still known as the Gariep or Grootrivier. !Kheis Municipality is named in recognition

of the first permanent residents of the area. !Kheis is a Khoi name meaning "a place where you live", or "a home".

De Jong (2010) classifies the cultural landscape along the Gariep/Orange River as predominantly historic farmland. In the Lower Orange River environment, farms display heritage features that typically occur in the district, such as their large size, irrigation furrows and pipelines, fences, tracks, farmsteads, and irrigated fields. Farmsteads are clustered close to rivers and primary roads (De Jong 2010). According to De Jong (2010), this class of landscape is of relatively low heritage sensitivity because it can absorb adverse effects of new development through some mitigation.

5.3 Topline (Saalskop), Wegdraai, Opwag, Groblershoop, Boegoeberg (Brandboom)

Various HIA and AIA reports have been conducted in and around the vicinity of Groblershoop, Boegoeberg, Opwag, Topline and Wegdraai study areas. These include, but are not limited to, the farms situated around the study areas. These farms include Buchuberg 263, Farm 292, Farm 387 Sanddraai 391, Bokpoort 390 and Kleinbegin 115.

5.3.1 Stone Age

The distribution of archaeological sites in the area has been characterised by Morris (2012) as stone artefacts along the Orange River; stone artefacts situated on the calcrete plain east of the Orange River; stone artefact scatters between dunes. Scatters of stone artefacts in and around the Groblershoop- Boegoeberg area have been reported by Beaumont (2008), Engelbrecht & Fivaz (2019) Dreyer (2006, 2012, 2013, 2015), Morris (2006, 2007, 2012, 2014), Orton & Webley (2013), Van der Walt (2012); Van Ryneveld (2007), Van Schalkwyk (2011, 2020), Van Vollenhoven (2014), and Webley (2013). The lithics that have in the area have been attributed to the ESA, MSA, and the LSA. Raw materials include chalcedony, jasperlite, quartzite and banded ironstone formation (BIF), as well as meta-quartzite. These scatters of lithics generally have little to no context. Predominantly heritage reports describe the recorded stone artefacts in the area to be of poor preservation and with limited heritage significance.

During his survey on the Farms Sanddraai and Bokpoort, situated in the vicinity of Saalskop (Topline) and Wegdraai, Morris (2012) reported MSA materials scattered amongst the calcrete surface deposits at the edges of borrow pits along the Loop 16 on the Sishen-Saldanha railway line. Dreyer's (2012) survey documents a single scatter of worked chalcedony, BIF, quartz and meta-quartz artefacts near a calcrete outcrop, with a substantial collection of flakes on the slopes along the River at Sanddraai.

Engelbrecht & Fivaz (2019) documented several MSA and LSA scatters on Farm 387, Portion 18, Groblershoop. Apart from low-density MSA and LSA artefact scatters, they documented moderate to high densities of MSA/LSA open lithic scatters with flakes, scrapers, cores, microliths and



incidences of local ceramics. Two sites recorded next to the Orange/Gariep River are probable hunter/herder sites, while five sites located on the dunes are believed to be knapping sites (Engelbrecht & Fivaz 2019). On the Farm 292 located near Groblershoop, Beaumont (2008) found low densities of Stone Age artefacts. On a section of Farm 387 Webley (2013) recorded background scatters of MSA artefacts of quartzite and BIF cobbles throughout the study area.

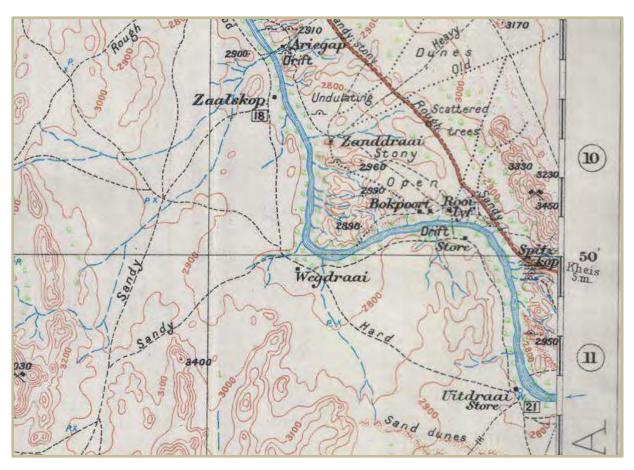
The majority of the artefacts across the landscape are randomly scattered. Nevertheless, it has been found that dense scatters of artefacts appear on and around small koppies. Several MSA and LSA stone artefact scatters have been identified on the eastern margins of the Orange River, Groblershoop (Webley 2013). The informally flaked hornfels cobbles and quartz flakes recorded along the shore may indicate the presence of LSA occupations (Webley 2013). The LSA scatters on the eastern shore, are believed to be of medium significance as they can potentially inform us "on hunter-gatherer and pastoralist settlement patterns along the River" (Webley 2013).

In Orton & Webley's (2013) report for the proposed Boegoeberg Hydropower station approximately 14.6 - 24 km south/southeast from the Brandboom/Boegoeberg study area, they mention several exciting finds. They found a small ephemeral archaeological Later Stone Age site on the sandy floodplain just downstream of the Boegoeberg Dam/Weir. This site consisted of a scatter of rocks that may likely have been used to anchor a hut, in association with two artefacts and one fragment of OES (Orton & Webley 2013). Orton & Webley (2013) recorded a cluster of stone walls on the south side of the river and the mountain slope close to the power line crossing point. The presence of pre-colonial stonewalling in the Groblershoop and Boegoeberg study areas is rare. This archaeological site is approximately 17 km from the Brandboom/Boegoeberg study area. The features included straight walls, semi-circles, L-shapes and small mounds of rocks. Very little associated archaeological material was discovered on the surface. They note in the report that these stone walls are typical of pre-colonial walling from the Karoo and some may have been hunting blinds. They also documented scatters of MSA stone artefacts above the cliff at Boegoeberg Weir/Dam, and a few LSA grindstones and other isolated artefacts in the area.

5.3.2 Historical period

It was around 1870 that the first Colonial farmers had settled in the Groblershoop area (Orton & Webley 2013). The town of Groblershoop originally developed on the farm Uitdraai (Engelbrecht & Fivaz 2019). Military topographic maps from 1908 and 1913 show a sparsely populated area, with numerous tracks across the sandy plains. There were halts situated at Zaalskop, Wegdraai, Uitdraai, Winstead and a hotel at Dabep. Access to water at Wegdraai was via a steep and narrow approach, at Uitdraai, there were a large well and tank situated underneath the house and a store where a supply of forage could be obtained. A weir was constructed across the Orange River at Buchuberg, with a turbine historic water turbine driven by solid-oak gears in the Orange River on the Farm Winstead. This historic water turbine was built in 1913 (Engelbrecht & Fivaz 2019). All along the eastern shore of the Orange River, locations of "native huts and kraals" are indicated.





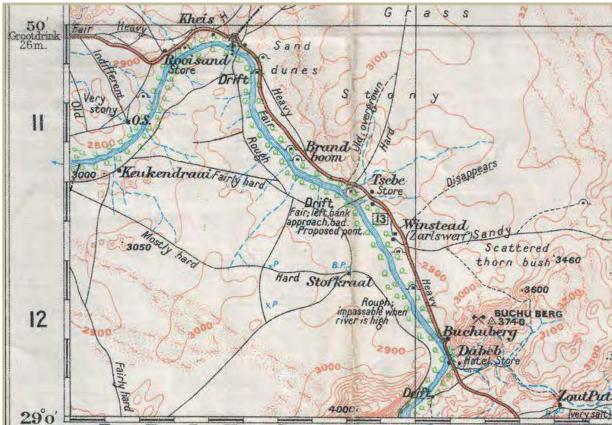


Figure 7 Detail of 1913 Topographical map of Upington, and detail of 1914 topographical map of Langeberg, available at https://digitalcollections.lib.uct.ac.za/



Groblershoop developed as a result of the development of the Boegoeberg Dam and water channels in 1929 (Van Schalkwyk 2019; 2020). The town was initially known as Sternham, with the first house dating to 1912. In 1935, the town was renamed to Groblershoop, after a former Minister of Agriculture: Mr PGW Grobler. Mr Grobler assisted in the development of the Boegoeberg Dam and the irrigation project in 1929. He had played a substantial role in this development and creating employment for the poor-white community and boosting progress in the region (Engelbrecht & Fivaz 2019). The idea for the construction of the weir and irrigation canal was first considered in 1872. Proposals for the project was rejected in 1896, and again in 1907, for being too expensive (Orton & Webley 2013). After about 20 years of preparatory work, the construction of the Boegoeberg Dam began in May 1929. The dam was completed in 1932, and the canal in 1934. Even children as young as nine years old were employed to work on the construction of the dam and irrigation canals. It is believed that about 50 people (39 being children) died during the construction of the project (Orton & Webley 2013). The Boegoeberg Dam itself is a significant heritage structure (Orton & Webley 2013).

Minimal artefacts and structures dating to the historical/colonial period have been recorded on sites in the vicinity of the Groblershoop and Brandboom/Boegoeberg study areas or on the farms surrounding Topline (Saalskop), Wegdraai, and Opwag. Nevertheless, AIA and HIA reports state that it is not uncommon to find colonial-era builds/artefacts in the area. Morris (2012) noted colonial-era traces such as the agricultural modification of the riverbank, a railway bridge, and a stone structure, close to the Orange River, on the farms of Sanddraai 391 and Bokpoort 390. During Webley's (2013) survey for the proposed construction of the Eskom Groblershoop Substation and the Garona-Groblershoop 132 kV powerline, she found a stone reservoir (25m x 25m) lined with plaster, with a gutter made of stone running around the margins to collect water. She notes that there were various rusted farm implements nearby (Webley 2013). Orton & Webley (2013) have noted that there are a few farm buildings in the area, such as a house dating to the late-19th or early-20th century, considered to be of high heritage significance. Another structure, built with traditional materials like sun-dried bricks, mud and mortar, plastered in modern cement in 1956 (date inscribed by the entrance steps) was documented.

5.2.3 Graves and Burials

During the construction of the Boegoeberg Dam, severe gastroenteritis and malaria resulted in the deaths of many children. Most of the headstones in the cemetery at the dam mark children's graves (https://graves-at-eggsa.org). Orton & Webley (2013) recorded an informal graveyard alongside the access road to Zeekoebaart. An isolated grave about one metre off the edge of the road, as well as two isolated graves in the sandy floodplain just downstream of the weir was also documented (Orton & Webley 2013). Several graves dating to the Second Anglo Boer War (1899-1902), belonging to the Dragoon mounted infantry unit, are present in the area (Van Vollenhoven 2014). Seven graves dating to the 1914 Rebellion have been recorded about 25 km from Groblershoop on the road to Griquastad (Webley 2013).

In 1956 Senator A. S. Brink of Keimoes had donated archaeological objects to the South African Museum in Cape Town. Rudner (1971) wrote that the majority of the objects were found in 1934



on the former farm Grootdrink, between Upington and Prieska, during the construction of an irrigation canal from the Boegoeberg Dam. On the southern bank of the river, the flooding of the canal exposed old burials. The human remains were buried in a squatting (crouching) position with their arms folded in front of the legs. Along with the graves, several ostrich eggshell (OES) flasks, one filled with powdered specularite iron, OES beads and bored stone (one of them heart-shaped), several pots and other objects were discovered (Rudner 1971).

5.2.4 Oral history

No interviews with locals were conducted regarding the history of the area.

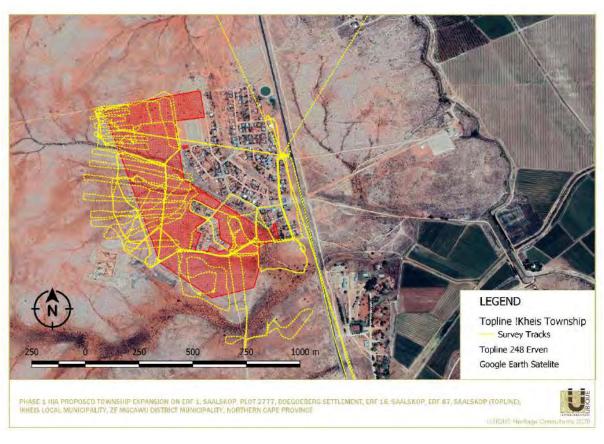


6. IDENTIFIED RESOURCES AND HERITAGE ASSESSMENT

6.1 Surveyed area

The area surveyed for the impact assessment was dictated by the Google Earth map of the development footprints provided by the client.

The pedestrian survey was conducted in predominantly 40-50 m transects. Areas that have been severely disturbed were surveyed in wider transects or only scoped. The survey extended beyond the development footprints to take into consideration the full impact of the development by investigating probable areas on the landscape adjacent to the development footprints that may contain heritage.



 $\textbf{\textit{Figure 8}} \ \text{Survey tracks across the development footprint.}$



6.2 Identified heritage resources

HERITAGE RESOURCES RECORDING

Stone Age Resources Identified

Otone Age Nesources Identified					
Point ID & Site Name	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
WP 022	Type lithic/s	Core, scraper and flakes debris	ESA/ MSA	28° 45' 07.5" S	Field Rating IV C
TPL002	Raw material	BIF		21° 50' 10.0" E	
Boegoeberg	N in m ² .	6/100m ²			Low significance
Settlement RE/48/1	Context	Scatter. No context			
	Additional				No mitigation
WP 023	Type lithic/s	Flakes, chunks, scrapers and	ESA/	28° 45' 07.7" S	Field Rating IV C
TPL003		chips	MSA	21° 50' 12.1" E	
Boegoeberg	Raw material	BIF	_		Low significance
Settlement RE/48/1	N in m ² .	8/150m ²	_		Nie odlika ilo
	Context	Scatter. No context			No mitigation
WD 004	Additional	Object a seed flad	F04 /	000 451 00 0" 5	Field Dati - 1970
WP 024	Type lithic/s	Chunks and flakes	ESA/	28° 45' 33.3" S	Field Rating IV C
TPL004 Boegoeberg	Raw material	BIF	MSA	21° 50' 23.2" E	Low significance
Settlement	N in m ² .	5/100m ²	_		Low significance
RE/48/2681	Context	Scatter. No context	_		No mitigation
	Additional				No miligation
WP 025	Type lithic/s	Chips and flakes	ESA/	28° 45' 33.0" S	Field Rating IV C
TPL005	Raw material	BIF	MSA	21° 50' 25.7" E	Tiola Hading IV 0
Boegoeberg	N in m ² .	3/200m ²	7		Low significance
Settlement	Context	Scatter. No context	-		
RE/48/2681	Additional				No mitigation
WP 026	Type lithic/s	Core, scraper and flakes	ESA/ MSA	28° 45' 05.3" S 21° 50' 09.6" E	Field Rating IV C
TPL006	Raw material	BIF			
Boegoeberg	N in m ² .	6/200m ²			Low significance
Settlement RE/48/1	Context	Scatter. No context			
	Additional				No mitigation
WP 027	Type lithic/s	Axe/cleaver, chunks, scraper	ESA/	28° 45' 04.1" S 21° 50' 08.2" E	Field Rating IV C
TPL007	Raw material	BIF	MSA		
Boegoeberg	N in m ² .	5/200m ²			Low significance
Settlement RE/48/1	Context	Scatter. No context			
	Additional	Fauresmith hand-axe			No mitigation
WP 028	Type lithic/s	Chunks	ESA/ MSA	28° 45' 02.4" S 21° 50' 06.2" E	Field Rating IV C
TPL008	Raw material	BIF			
Boegoeberg	N in m ² .	6/100m ²			Low significance
Settlement RE/48/1	Context	Scatter. No context			N
	Additional				No mitigation
WP 029	Type lithic/s	Chunks and chips	ESA/ MSA	28° 45' 06.0" S 21° 50' 05.9" E	Field Rating IV C
TPL009	Raw material	BIF			
Boegoeberg Settlement RE/48/1	N in m ² .	6/200m ²			Low significance
Jewenieni RE/48/1	Context	Scatter. No context			No mitigation
	Additional				No mitigation
WP 030	Type lithic/s	Chunks, flake and scraper	ESA/	28° 45' 21.4" S 21° 50' 10.3" E	Field Rating IV C
TPL010	Raw material	BIF	MSA		
Boegoeberg	N in m ² .	4/500m ²			Low significance
Settlement RE/48/1	Context	Scatter. No context			



	Additional				No mitigation
WP 031 TPL011	Type lithic/s	Core, chunks and scrapers	ESA/ MSA	28° 45' 13.8" S 21° 50' 12.0" E	Field Rating IV C
Boegoeberg	Raw material N in m ² .	BIF 7/100m ²	IVISA	21°50 12.0 E	Low significance
Settlement RE/48/1	Context Additional	Scatter. No context	-		No mitigation
WP 032	Type lithic/s	Cores, chunks, scraper and flake	ESA/	28° 45' 16.8" S	Field Rating IV C
TPL012	Raw material	BIF	MSA	21° 50' 08.5" E	
Boegoeberg	N in m ² .	6/200m ²			Low significance
Settlement RE/48/1	Context	Scatter. No context			
	Additional				No mitigation

Graves Identified

Point ID & Site Name	Description		Period	Location	Field rating/ Significance/ Recommended Mitigation
WP 021 TPL001 Boegoeberg Settlement RE/48	Grave markers Inscription Graves' Orientation	Cemetery Cast/West	1960's to current	28° 45' 25.7" S 21° 50' 40.6" E	Field Rating of Local Grade IIIB High/medium significance
	Dimensions/ Extent Additional	Approximately 2-3 ha. Outside development footprint. Topline official cemetery			Mitigation Required: fencing

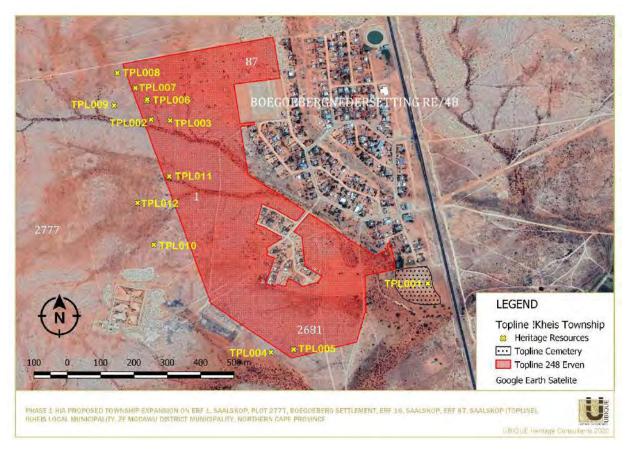


Figure 9 Distribution of identified heritage resources across Topline township, Farm Boegoebergnedersetting No. 48.



6.3 Discussion

6.3.1 Archaeological features

A total of eleven occurrences of background scatter lithic material was found across the surveyed area. Nine low-density scatters were recorded across Erf 1 (TPL002-003, TPL006- 012), and two incidences of lithic material were recorded in the southern section of the development footprint (TPL004 & TPL005). The lithic assemblages consist predominantly of informal tools such as knapping debitage like chunks, chips and flakes, with cores, and a few scrapers. The raw material, banded ironstone formation (BIF), is readily available throughout the area. The identified archaeological sample is small, of low significance, and therefore of little scientific value. The cultural material may either be a representation of the transition between ESA and MSA, or a mere mixture of ESA and MSA artefacts. A potential Fauresmith bifacial hand axe, a lithic indicative of the transition between the Earlier and Middle Stone Ages, was recorded at TPL007 (Lotter et al. 2016; Underhill 2011; Dr Van der Ryst pers. comm 2020). The found lithic material shows various degrees of weathering and are without substantial archaeological context or matrix, and are therefore deemed of minor scientific importance, and not conservation worthy (NCW).

These sites are given a 'General' Protection C (Field Rating IV C). This means these sites have been sufficiently recorded (in Phase 1). It requires no further action.

6.3.2 Graves

The formal Topline cemetery is situated to the southeast of the development footprint. No other graves were found within the study area.

These sites are given a 'Local Grade IIIB" rating. This means the graves should be included in the heritage register and may be mitigated (high/ medium significance).











32



Figure 10 Photographic selection of archaeological material recorded.









Figure 11 Selection of photographs of the Topline town cemetery.



6.3.3 Palaeontological resources

The Topline (Saalskop) study area is underlain by sediments of Kalkwerf Gneiss which in places intrude into the Groblershoop Formation (Brulpan Group). Underlying these rocks are Precambrian Transvaal Supergroup deposits. According to the SAHRIS PalaeoMap, the Palaeontological Sensitivity of the Kalkwerf Gneiss is insignificant as these rocks are igneous in origin or too highly metamorphosed (Almond & Pether 2008) to contain fossils. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development. The Kalkwerf Gneiss consists of biotite, epidote, garnet, strained quartz, perthite augen with some granophyric intergrowth muscovite. The proposed development is not fossiliferous and will not lead to detrimental impacts on palaeontological resources (Butler 2020). Elize Butler from Banzai Environmental, therefore, recommends an exemption from further palaeontological studies for this project (see Appendix 1).

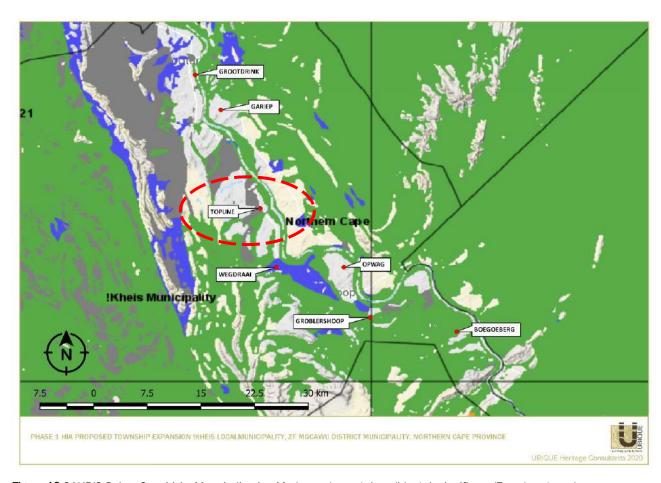


Figure 12 SAHRIS PalaeoSensitivity Map, indicating Moderate (green), Low (blue), Insignificant/Zero (grey), and Unknown (clear) palaeontological significance in the study area (https://sahris.sahra.org.za/map/palaeo).



7. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

Description	Development Impact		Mitigation	Field rating/ Significance			
Archaeological							
The eleven occurrences of ESA/MSA surface scatters across the development footprint.	Nature Extent Duration Intensity Potential of impact on irreplaceable resource Consequence Probability of impact Significance	Negative Low High High High High High	No mitigation required.	Field Rating IV C Low significance			
Graves							
2. The formal Topline cemetery.	Nature Extent Duration Intensity Potential of impact on irreplaceable resource Consequence Probability of impact Significance	Neutral Low Low High Low Low Low Low Low	No mitigation required.	Field Rating of Local Grade IIIB (high significance)			
Paleontological							
3. The Palaeontological Sensitivity of the Groblershoop Formation (Brulpan Group) and the Kalkwerf Gneiss is insignificant, and the underlying Precambrian Transvaal Supergroup deposits are moderate.	Nature Extent Duration Intensity Potential of impact on irreplaceable resource Consequence Probability of impact Significance	Neutral Low High Low Low Low Low Low Low Low	No mitigation required.	N/A			

The impact of the development will have a negative impact on the identified heritage resources on Erf 1, and Plot 2681, Topline township, Boegoebergnedersetting RE/48. The lithic material is without any substantial archaeological context and deemed not conservation worthy. The negative impact is, therefore, negligible. The burial ground is well outside the development footprint and should not be affected by the proposed project. The probability of the development impacting on palaeontological heritage during the construction phase is regarded as minimal to zero, and the significance of the impact occurring, low.



8. RECOMMENDATIONS

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:

- 1. No significant heritage sites or features were identified within the surveyed sections of Topline township, on Erven 1, 16, 87, Saalskop (Topline) and Plot 2777, Boegoeberg Settlement (Kenhardt), Farm Boegoebergnedersetting RE/48. The Early/Middle Stone Age cultural material identified is not conservation worthy. No further mitigation is recommended with regards to these resources. Therefore, from a heritage point of view, we recommend that the proposed development can continue.
- 2. The Topline cemetery is situated well outside the development footprint. This site is graded as IIIB and is of High Local Significance. No further mitigation is recommended with regards to these resources. No graves were identified within the development footprint.
- 3. Due to the zero to low 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. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2020).
- 4. 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 evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or costs incurred as a result of such oversights.



9. CONCLUSION

This HIA has identified no significant heritage resources that will be impacted negatively by the proposed development. The proposed expansion of the Topline township, on Erven 1, 16, 87, Saalskop (Topline) and Plot 2777, Boegoeberg Settlement (Kenhardt), Farm Boegoebergnedersetting RE/48 in the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape, may continue.



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APPENDIX A

PALAEONTOLOGICAL EXEMPTION LETTER FOR THE PROPOSED TOPLINE TOWNSHIP EXPANSION, !KHEIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE





PALAEONTOLOGICAL EXEMPTION LETTER FOR THE PROPOSED TOPLINE TOWNSHIP EXPANSION, !KHEIS LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

Reference: NC/21/2018/PP

(Topline 248) / BH0069

Issue Date: 13 June 2020

Client: UBIQUE Heritage Consultants

Declaration of Independence

I, Elize Butler, declare that -

General declaration:

- I act as the independent palaeontological specialist in this application
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting palaeontological impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in section 38 of the NHRA when preparing the application and any report relating to the application;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information
 in my possession that reasonably has or may have the potential of influencing any
 decision to be taken with respect to the application by the competent authority; and the
 objectivity of any report, plan or document to be prepared by myself for submission to the
 competent authority;
- I will ensure that information containing all relevant facts in respect of the application is
 distributed or made available to interested and affected parties and the public and that
 participation by interested and affected parties is facilitated in such a manner that all
 interested and affected parties will be provided with a reasonable opportunity to participate
 and to provide comments on documents that are produced to support the application;
- I will provide the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not
- All the particulars furnished by me in this form are true and correct;
- I will perform all other obligations as expected a palaeontological specialist in terms of the
 Act and the constitutions of my affiliated professional bodies; and
- I realise that a false declaration is an offence in terms of regulation 71 of the Regulations and is punishable in terms of section 24F of the NEMA.

Disclosure of Vested Interest

I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

PALAEONTOLOGICAL CONSULTANT: Banzai Environmental (Pty) Ltd

CONTACT PERSON: Elize Butler

Tel: +27 844478759

Email: elizebutler002@gmail.com

SIGNATURE:

EXECUTIVE SUMMARY

Banzai Environmental was commissioned by UBIQUE Heritage Consultants to write a Palaeontological Exemption Letter for the proposed Topline Township Expansion in !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

The proposed development is underlain by sediments of Kalkwerf Gneiss which in places intrude the Groblershoop Formation (Brulpan Group). Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System, the Palaeontological Sensitivity of the Kalkwerf Gneiss is insignificant as these rocks are igneous in origin or too highly metamorphosed (Almond & Pether 2008) to contain fossils. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development. The Kalkwerf Gneiss consists of biotite, epidote, garnet, strained quartz, perthite augen with some granophyric intergroths muscovite.

This is a recommended exemption from further Palaeontological studies as the proposed development is unfossiliferous and will not lead to detrimental impacts on the palaeontological resources.

TABLE OF CONTENT

1	INTRODUCTION6	
2	QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR9	
3	LEGISLATION9	
3.1	National Heritage Resources Act (25 of 1999)	9
4	GEOLOGICAL AND PALAEONTOLOGICAL HISTORY10	
5	GEOGRAPHICAL LOCATION OF THE SITE	
6	FINDINGS AND RECOMMENDATIONS	
7	REFERENCES	

LIST OF FIGURES

INTRODUCTION

The Barzani Group appointed Macroplan Town and Regional Planners to proceed with the completion of the Town Planning process for the proposed Topline Township Expansion on Erf 1, Saalskop, Plot 2777, Boegoeberg Settlement, Erf 16, Saalskop, Erf 87, Saalskop (Topline) !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province (Figure 1-2). UBIQUE Heritage Consultants was appointed to conduct the Heritage Impact Assessment while Banzai Environmental was in turn appointed to conduct the Palaeontological Exemption Letter.

The proposed Topline Township Expansion comprises of the creation of new erven, as well as the formalisation of the existing informal houses that are located around the town. The Topline Township Expansion will accommodate 248 erven on 36 Ha. This project will fill an urgent need for residential erven in the sub-economic market.

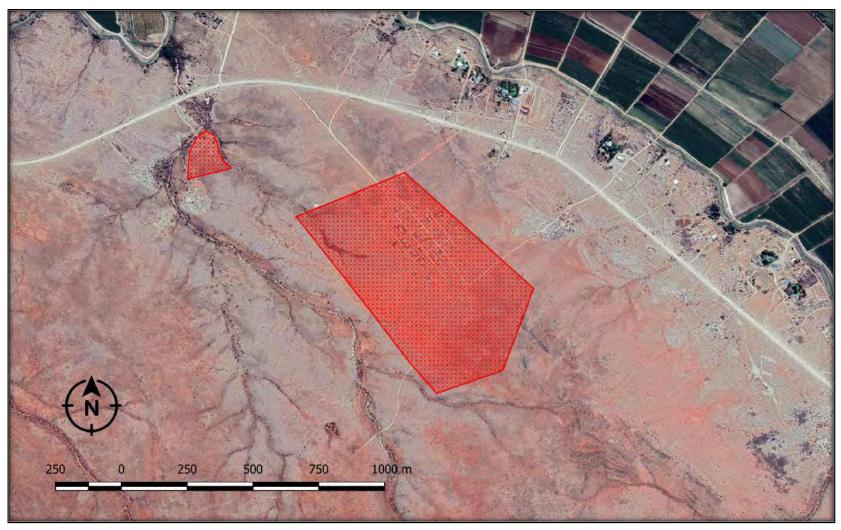


Figure 13: Google Earth Image of the proposed Topline Township Expansion on Erf 1, Saalskop, Plot 2777, Boegoeberg Settlement, Erf 16, Saalskop, Erf 87, Saalskop (Topline) !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Map modified from Ubique Consultants.

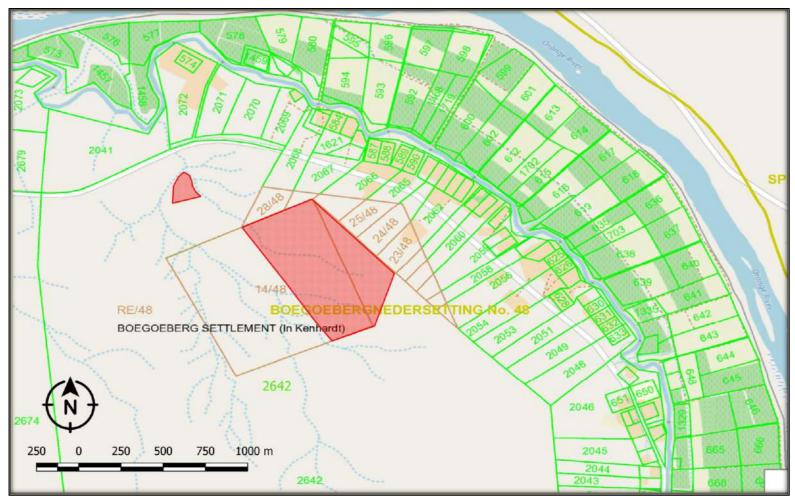


Figure 14: Topographical map indicating the locality of the proposed Topline Township Expansion on Erf 1, Saalskop, Plot 2777, Boegoeberg Settlement, Erf 16, Saalskop, Erf 87, Saalskop (Topline) !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province. Map modified from Ubique Consultants.

QUALIFICATIONS AND EXPERIENCE OF THE AUTHOR

The author (Elize Butler) has an MSc in Palaeontology from the University of the Free State, Bloemfontein, South Africa. She has been working in Palaeontology for more than twenty-four years. She has extensive experience in locating, collecting and curating fossils, including exploration field trips in search of new localities in the Karoo Basin. She has been a member of the Palaeontological Society of South Africa for 12 years. She has been conducting PIAs since 2014.

LEGISLATION

o National Heritage Resources Act (25 of 1999)

Cultural Heritage in South Africa, includes all heritage resources, is protected by the National Heritage Resources Act (Act 25 of 1999) (NHRA). Heritage resources as defined in Section 3 of the Act include "all objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens".

Palaeontological heritage is unique and non-renewable and is protected by the NHRA. Palaeontological resources may not be unearthed, moved, broken or destroyed by any development without prior assessment and without a permit from the relevant heritage resources authority as per section 35 of the NHRA.

This Palaeontological Desktop Assessment forms part of the Heritage Impact Assessment (HIA) and adhere to the conditions of the Act. According to **Section 38 (1)**, an HIA is required to assess any potential impacts to palaeontological heritage within the development footprint where:

the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;

the construction of a bridge or similar structure exceeding 50 m in length;

any development or other activity which will change the character of a site— (exceeding 5 000 m² in extent; or

involving three or more existing erven or subdivisions thereof; or

involving three or more erven or divisions thereof which have been consolidated within the past five years; or

the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority

the re-zoning of a site exceeding 10 000 m² in extent;

or any other category of development provided for in regulations by SAHRA or a Provincial heritage resources authority.

GEOLOGICAL AND PALAEONTOLOGICAL HISTORY

The proposed Topline Township Expansion on Erf 1, Saalskop, Plot 2777, Boegoeberg Settlement, Erf 16, Saalskop, Erf 87, Saalskop (Topline) !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province is depicted on the 1:250 000 2820 Upington Geological Map (Council of Geoscience, Pretoria). The proposed development is underlain by sediments of Kalkwerf Gneiss (Mkk) which in places intrude the Groblershoop Formation (Brulpan Group). Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System, the Palaeontological Sensitivity of the Kalkwerf Gneiss is insignificant as these rocks are igneous in origin or too highly metamorphosed (Almond & Pether 2008) to contain fossils. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development. The Kalkwerf Gneiss consists of biotite, epidote, garnet, strained quartz, perthite augen with some granophyric intergroths muscovite.

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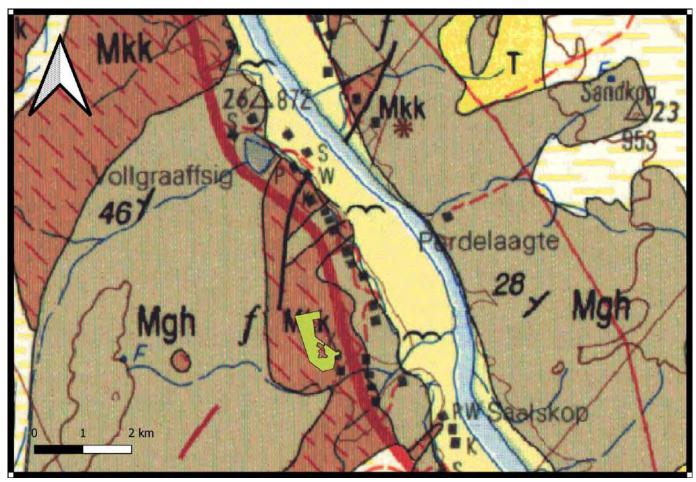


Figure 15: Extract of the 1:250 000 2820 Upington geological map indicating the surface geology of the proposed Topline Township Expansion on Erf 1, Saalskop, Plot 2777, Boegoeberg Settlement, Erf 16, Saalskop, Erf 87, Saalskop (Topline) !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

Legend to Map and short explanation.

Mgh – Groblershoop Formation, Brulpan Group- Quartz-muscovite schist, quartzite, quartz-amphibole schist.

Mkk- Kalkwerf Gneiss

T-Tertiary

GEOGRAPHICAL LOCATION OF THE SITE

The Topline Township Expansion is located about 25 km northwest (western side of the Orange River) of Groblershoop, !Kheis Local Municipality, ZF Mgcawu District Municipality. The town, Topline, is situated along the N10 road between Grootdrink, in a northerly direction and Wegdraai, in a southerly direction.

No.	Town	Total Size of the study area	Total Erven	Property Descriptions	Title Deed Numbers	Coordinates	Ownership
	6 Topline 36ha		Erf 1, Saalskop (Topline)	T11369/1994	28°45'12.03"5; 21"50'17 13"E	IKheis Local Municipality	
6		36ha	248	Plot 2777, Boegoeberg Settlement	T81655/2002	28°45'26.20"S; 21°50'33.54"E	!Kheis Local Municipality
				Erf 16, Saalskop (Topline)	T1548 7 /2001	28°45'17.45"5; 21°50'27.72"E	!Kheis Local Municipality
				Erf 87, Saalskop (Topline)	T228 7 9/1999	28°45'1.34"S; 21°50'21,54"E	Kheis Local Municipality

• FINDINGS AND RECOMMENDATIONS

The proposed development is underlain by sediments of Kalkwerf Gneiss which in places intrude the Groblershoop Formation (Brulpan Group). Underlying these rocks are rocks of the Precambrian Transvaal Supergroup. According to the PalaeoMap of South African Heritage Resources Information System the Palaeontological Sensitivity of the Kalkwerf Gneiss is insignificant as these rocks are igneous in origin or too highly metamorphosed (Almond & Pether 2008) to contain fossils. The cherts, dolomites and iron formations of the underlying Transvaal Supergroup are too deep to affect the proposed development. The Kalkwerf Gneiss consists of biotite, epidote, garnet, strained quartz, perthite augen with some granophyric intergrowths muscovite.

This is a recommended exemption from further Palaeontological studies as the proposed development is unfossiliferous and will not lead to detrimental impacts on the palaeontological resources.

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Palaeontological Exemption - Olyvenhouts Drift Settlement, Upington, Northern Cape 29 June 2020





WATER USE LICENSE APPLICATION FOR THE PROPOSED URBAN DEVELOPMENT AT GROBLERSHOOP, NORTHERN CAPE

FRESH WATER REPORT

A REQUIREMENT IN TERMS OF SECTION 21 OF THE NATIONAL WATER ACT MAY 2020











Index

	Abbreviations	3
	List of Figures	4
	List of Tables	4
1	Introduction	6
2	Seven Townships	7
3	Legal Framework	8
4	!Kheis Municipality Overview	9
5	Groblershoop Climate	11
6	Vegetation	12
7	Quaternary Catchment	12
8	Drainage lines	12
9	Topline Housing Project	14
10	Topline Housing Drainage Line	15
11	Biomonitoring the Lower Orange River	22
12	Impacts on the Lower Orange River	22
13	Lower Orange River Biomonitoring Results	23
14	Sampling Site	25
15	Present Ecological State	27
16	Ecological Importance	30
17	Ecological Sensitivity	32
17.1	Ecological Sensitivity Drainage line	32
17.2	Ecological Sensitivity Orange River	32
18	Possible Impacts	32
19	Mitigation Measures	33
20	Impact Assessment	33
21	Risk Matrix	35
22	Resource Economics	37
23	Site visits: General Observations	39
24	Conclusions	40
25	References	41
26	Declaration	42
27	Résumé	43
28	Appendix	46
28.1	Biomonitoring Score Sheet	46
28.2	Methodology used in determining significance of impacts	47
28.3	Risk Matrix Methodology	51

TOPLINE FRESH WATER REPORT

Abbreviations

Northern Cape Department: Co-Operative Governance,

Human Settlements and Traditional Affairs COGHSTA

Critical Biodiversity Area

Department of Water and Sanitation

Ecological Importance

El

Ecological Sensitivity

ES

Ecological Support Area

EN

Environmental Impact Assessment

EA

Electronic Water Use License Application (on-line) eWULAA

Government Notice GN High density poly-ethelene **HDPE** Hectares ha LWU Legal water use 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

Figure 1	Public participation	5
Figure 2	Seven Townships	7
Figure 3	!Kheis Municipality	9
Figure 4	Climate Groblershoop	11
Figure 5	Drainage lines	13
Figure 6	Topline Housing	14
Figure 7	Topline housing drainage lines	15
Figure 8	N10 road bridge	16
Figure 9	Saalskop	16
Figure 10	Beridge closer to town	17
Figure 11	Topline drainage lines	18
Figure 12	Berm	19
Figure 13	Household waste	19
Figure 14	Waste disposal site	19
Figure 15	WWTWs	20
Figure 16	Intake structure	21
Figure 17	Graves	21
Figure 18	Lower Orange River biomonitoring results	24
Figure 19	Sampling Site	25
Figure 20	Orange River at sampling site	25
Figure 21	Upper drainage line tree line	26
Figure 22	Resource Economic Footprint of the Drainage Line	38
Figure 23	Aloe claviflora	40
Figure 24	Minimum Requirements for a S21(c) and (i) Application	40
List of Tab	les	
Table 1	Biomonitoring in the Lower Orange River	24
Table 2	Habitat Integrity	27
Table 3	Present Ecological State of the Drainage Line	28
Table 4	Present Ecological State of the Orange River	29
Table 5	Ecological Importance	30
Table 6	Impact Assessment	33
Table 7	Risk Matrix	36
Table 8	Goods and Services	37

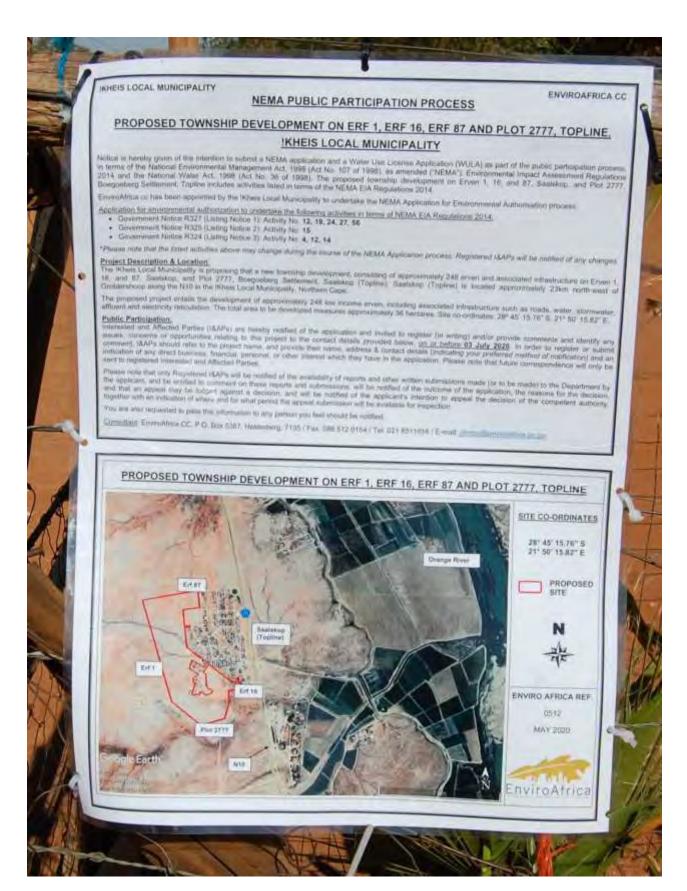


Figure 1 Public participation

1 Introduction

On 14 May 2020, an email message was received from Mr Len Fourie, director at Macroplan of Upington:

"The appointment of Gobetla Beplannings Dienste TA Macroplan by the Barzani Group (on behalf of COGHSTA) received on the 17th of April 2020 and the attached documentation have reference.

"We hereby confirm that Macroplan has been appointed as Town and Regional Planners to handle the formal Town Planning Process in accordance with the SPLUMA legislation (Act 16 of 2013). The mentioned process is for the provision of much needed residential erven in the sub-economic market that is of National and Provincial interest for towns in the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape Province.

"Macroplan and all sub-consultants were requested to proceed with site verification, site visits, contour mapping, specialists environmental studies, geotechnical studies, as well as civil and engineering investigations for the mentioned project asap due to the importance of continued service delivery in the !Kheis Local Municipal area. Your firm as a sub-consultant of Macroplan is hereby requested to proceed with organising the site visits to the following areas that is located within the !Kheis Local Municipality."

This adequately explains the situation.

Enviro Africa of Somerset West was subsequently appointed to carry out the EIA, in terms of NEMA, together with the public participation process (Figure 1).

Likewise, WATSAN Africa was appointed to produce the Fresh Water Report and carry out the WULA in terms of the NWA. The required site visits were conducted on 20 and 21 May 2020.

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.

This then is the fifth of 7 reports. 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.

2 Seven Townships

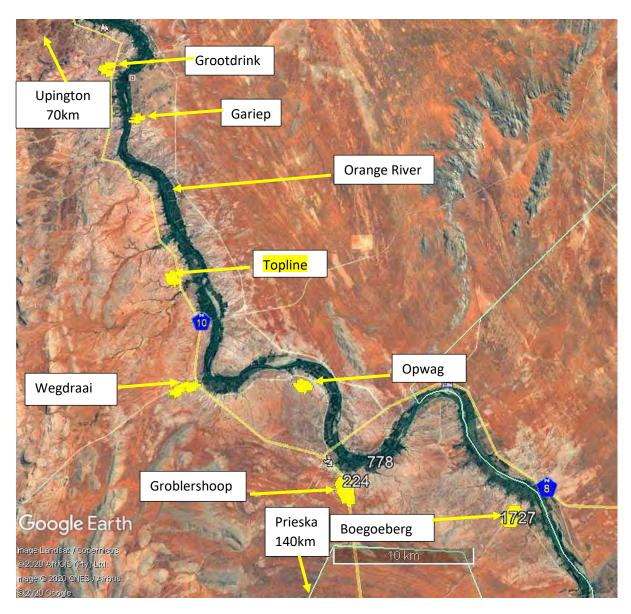


Figure 2 Seven townships

The seven townships that are being considered for extension are depicted in Figure 2. Topline is highlighted in yellow and is the subject of this Fresh Water Report.

3 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

4 !Kheis Municipality Overview



Figure 3 !Kheis Municipality

According to available information

(municipalities.co.za/1181/kheis-local-municipality)

Area 11 107km² Population 16 566 (2016)

Households 4344

The municipal offices are located in Groblershoop.

Only 59% of the houses were listed as formal dwellings, 41% were connected to the urban sewerage system, 62% had formal refuse removal, 21% had piped water and 74% had electricity. As from the year 2020, 500 more households were provided with solar panels and batteries to provide electricity.

The average fertility rate over the past 5 years was 2.67%

(https://irr.org.za/reports/freefacts/files/00-2014-freefacts-2014-february-2020-draft.pdf)

This means, according to available demographic data, that currently at least 116 new houses are required every year.

To address any backlog and to make provision for future housing requirements, new plots are demarcated in the following locations:

Groblershoop	1500
Boegoeberg	550
Opwag	730
Wegdraai	360
Topline	248
Grootdrink	370
Gariep	135

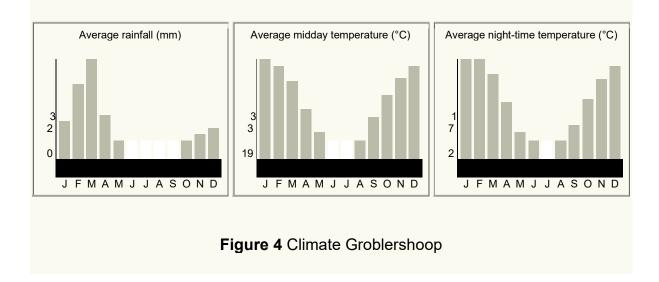
Urban development is specifically required along the Orange River, where large-scale and labour-intensive farming of vineyards under irrigation sparks human settlements.

The municipality appointed the town and regional planning company Macroplan of Upinton to lay out the new plots in these 7 townships.

5 Climate Groblershoop

http://www.saexplorer.co.za/south-africa/climate/groblershoop_climate.asp

Groblershoop is the closest locality to Topline of which climatic data is available. Normally it receives about 108mm of rain per year, with most rainfall occurring mainly during autumn. The chart below (Figure 4, lower left) shows the average rainfall values for Groblershoop per month. It receives the lowest rainfall (0mm) in June and the highest (32mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Groblershoop range from 19°C in June to 33°C in January. The region is the coldest during July when the mercury drops to 2°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.



Groblershoop and surrounds is located in the Nama Karoo, which is from all points of view an arid area. For 4 months of the year there is no rainfall at all.

According to

https://weatherspark.com/y/86570/Average-Weather-in-Groblershoop-South-Africa-Year-Round

the dry season at Groblershoop lasts up to 6.4 months from April to November.

The evaporation rate in the nearby Upington, 70km to the north, is more than 2500mm per year. This is 27 times more than the annual precipitation.

http://www.dwaf.gov.za/orange/Low Orange/upington.aspx

The local economy (agriculture) is entirely dependent on irrigation out of the Orange River.

6 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_Floodplain Wetland, despite that most of it today is manicured agriculture.

7 Quaternary Catchment

Topline is in the D73D quaternary catchment.

8 Drainage Lines

The landscape around much of the Lower Orange River and the Sak River is dominated by a dense succession of drainage lines, each with their own subcatchment. The drainage lines 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 5).

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 formed over millennia, even since geological times.

The vegetation in these arid parts is sparse, with a low diversity op plant species and a limited habitat variability. Drainage lines are often overgrown with a mature stand of sweet thorn *Vachellia karoo*, together with some other scrub and low trees such as *Searsia* species. In other parts the dominant tree is swarthaak *Senegalia mellifera*. This considerably adds to the habitat variability of the region. These tree lines stretch over the otherwise barren landscape and provide a linear connected habitat that would have been entirely absent if it was not for the shallow ground water in the unconfined aquifer in the drainage line's alluvium. Likewise, these tree lines provide habitat and nourishment to a variety of fauna that would have been entirely absent, was it not for the gradual migration of shallow ground water along the drainage lines.

All over the arid and semi-arid landscape of the western half of South Africa, these tree lines are considered to have a special and high conservation value.

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.

The conservation of drainage lines along the Lower Orange River deserves and demands attention by decision-making authorities, environmental practitioners, the conservation and farming community alike. As more of these drainage lines are impacted upon, and because impacts are radical by nature, because sections of drainage lines are replaced by vineyards or other forms of agriculture, or transformed into return flow infrastructure, the necessity for a widely accepted conservation policy becomes urgent as development escalates.



Figure 5 Drainage Lines

9 The Topline Housing Project

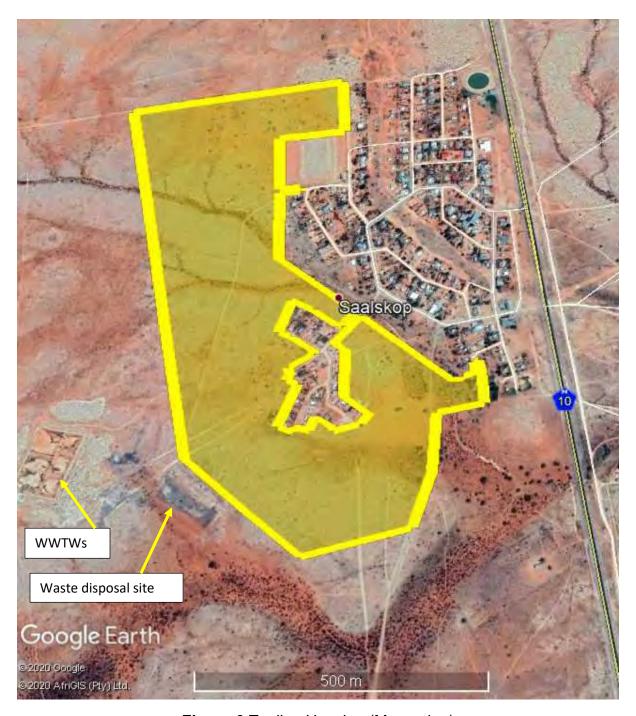


Figure 6 Topline Housing (Macroplan)

The new housing is going to be to the south and to the west of the existing housing, 36 hectares in total, with the centre part left out because there are already houses (Figure 6).

10 Topline housing drainage line

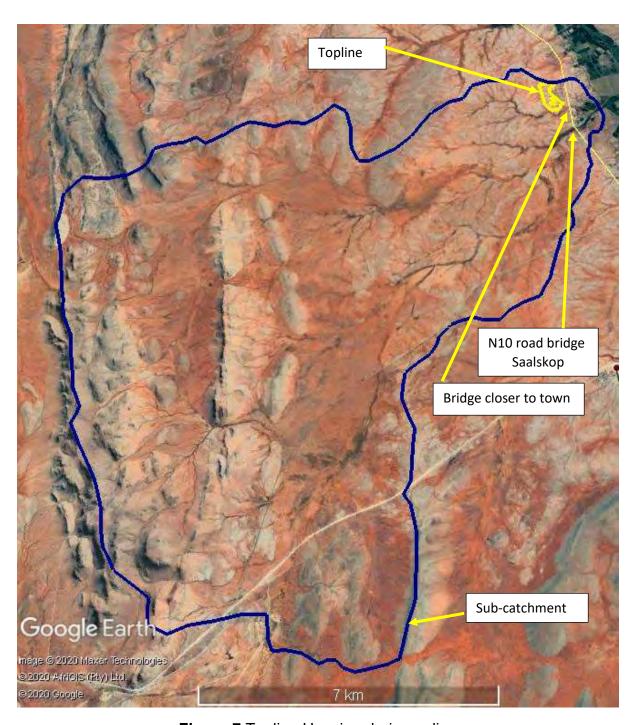


Figure 7 Topline Housing drainage line

The sub-catchment is fairly large with a surface area of 16 800ha and a circumference of 62km.

The western watershed boundary is demarcated with a north to south running rocky ridge. A lower parallel ridge can be seen in the middle of the sub-catchment (Figure 7). Otherwise the landscape is very flat.

The drainage line passes underneath the N10 road bridge south of Topline (Figure 8). Here the drainage line is sign posted as the Saalskop River (Figure 9). The town of Topline is marked as Saalskop on Google Earth, after the river, probably before the current name came into being.



Figure 8 N10 road bridge

The N10 road bridge is a substantial bridge with adequate room to let through a large flood (Figure 1).



Figure 9 Saalskop

The drainage line is split up into four major tributaries, the longest one being further south (Figure 7).

One of these tributaries also passes underneath the N10 trunk road closer to town (Figure 7) through a substantial bridge (Figure 1).



Figure 10 Bridge closer to town

The rocky parts are devoid of sand, but there are wide sandy deposits lower down on both sides of the central ridge (Figure 7). This indicates that the flow is slow during storm events, with a high rate of sand re-deposition.

From the highest point on the western ridge at 1210masl to the point where the drainage line passes underneath the irrigation canal alongside the Orange River at 853masl over a distance of 18.1km, the mean slope is 2 vertical metres in every 100 horizontal metres. This is an even slope, but enough to give rise to a flow capable of significant erosion. The slope from the toe of the ridge is much more even, hence the flow is less erosive than the average slope suggests. The sandy deposits are sparsely covered with a stand of trees and shrub, mostly swarthaak.

Most of the flow out of the sub-catchment passes Topline on the south. Only an insignificantly small part of storm water passes through the town. It passes the existing town along the south western boundary (Figure 7 and 11). It passes underneath the N10 through the bridge closer to town (Figure 10).

Storm water should not be a problem, but evidently the residents do not share this view, as a berm was cast all along the bank of the drainage line, probably to keep the storm water out of the built-up area (Figure 13)

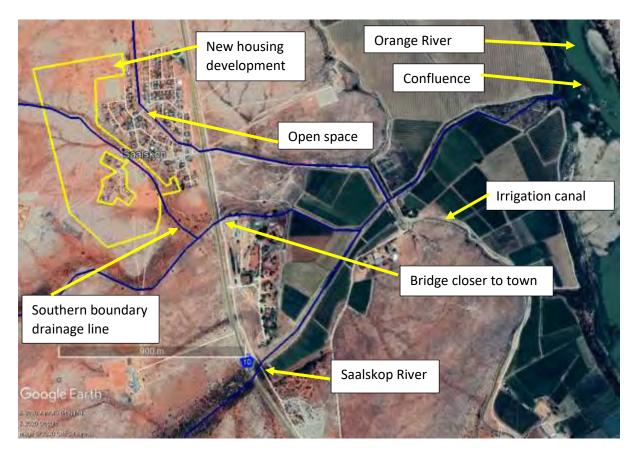


Figure 11 Topline drainage lines

When the new housing development is added, this southern westerly boundary drainage line would pass right through the middle of town.

There is another drainage line through the northern part of town, but all that remained is urban open space (Figure 11).

From the road bridge closer to town, the drainage line is fairly natural to where it reaches the vineyards, from where it is canalised into irrigation return channels, right to the confluence with the Orange River (Figure 11).

The boundary drainage line contains a lot of household waste (Figure 14). Outside of town, towards the south, is an area that is used as a waste disposal site (Figure 15).



Figure 12 Berm



Figure 13 Household waste



Figure 14 Waste disposal site

The defunct WWTWs outside of town is a prominent feature of the landscape (Figure 1).



Figure 15 WWTWs

This is a properly and professionally constructed anaerobic pond system. At the time of the site visit, the ponds were dry and the HDPE liners were ripped out. From the

dried-out sludge in the intake structure, it was evident that this WWTWs was once used, but soon after fell into disrepair.



Figure 16 Intake structure

The WWTW and concomitant infrastructure was constructed at great cost (Figure 14). Currently this can probably be regarded as unfruitful expenditure.



Figure 17 Graves

There were graves in the buffer zone of the boundary drainage line (Figure 17).

1 Biomonitoring the Lower Orange River

The biomonitoring was carried out according to the description of Dickens & Graham (2002).

Biomonitoring was carried out on the Lowers Orange River during site visits for successive WULAs. So far 12 samples have been analyzed at 11 localities (Table 1). 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.

12 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.

13 Lower Orange River Biomonitoring Results

The biomonitoring results have been captured in Table 1 and depicted in Figure 18.

The classes from A to F in Figure 18 has been assigned for mature rivers on flood plains such as the Lower Orange River.

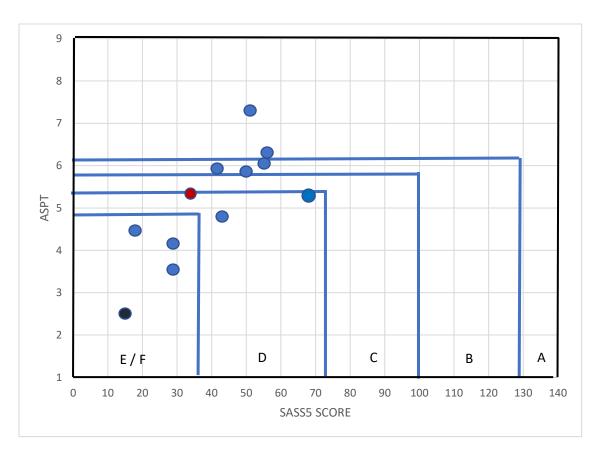
Only 2 of the samples were classified a good and relatively unimpacted (Class A). Four were in Class B and C, which can be regarded as acceptable under the circumstances of an impacted river reach. These classes can possible be labelled as the ideal, a compromise between agriculture and aquatic ecological 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 1 Biomonitoring in the Lower Orange River

Locality	Coordinates	Date	SASS 5	No Taxa	ASPT
Augrabies Lair trust Augrabies Lair Trust Groblershoop Kakamas Triple D Hopetown Sewer Hopetown Sewer Keimoes Housing Upington Erf 323 Upington Affinity Styerkraal Grootdrink Bridge Turksvy Dam	28°38'41.53S 20°26'08.49E 28°38'41.53S 20°26'08.49E 28°52'31.80S 21°59'13.49E 28°45'08.37S 20°35'06.16E 29°36'05.07S 24°06'05.00E 29°36'08.06S 24°21'06.16E 28°42'37.12S 20°55'07.81E 28°27'11.91S 21°16'14.02E 28°27'11.91S 21°16'14.02E 28°27'25.28S 21°15'01.87E 28°17'15.30S 21°03'50.87E 28°27'09.21S 21°17'20.72E	5/09/17 5/10/17 14/8/18 15/8/18 7/10/18 7/10/18 8/02/19 12/2/19 20/5/19 21/5/19 17/5/20 17/5/20	18 43 41 50 29 29 51 56 54 15 34 69	4 9 7 9 7 8 7 9 9 6 7	4.5 4.8 5.9 5.6 4.1 3.6 7.3 6.2 6 2.5 5.3 5.3



Integrity Class	Description
Class	
Α	Pristine; not impacted
В	Very Good; slightly impacted
С	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 18 Lower Orange River Biomonitoring Results

The red dot on the graph represents the result at the Grootdrink Bridge. All of the other dots represent previous sampling.

14 Sampling Site



Figure 19 Sampling Site



Figure 20 Orange River at Sampling Point

The sampling point (Figure 19, Figure 20) was chosen downstream as far as possible in order to pick up the combined impact of all of the housing projects along the reach of the Orange River from Boegoeberg to Grootdrink. This, of course, is not a realistic view, because the impact of agriculture would dwarf any other, if it could be separated,

which is not possible. So, the reasoning is rather theoretical, not entirely realistic, but nevertheless required in terms of the WULA requirements.

However, if the cumulative impact of raw sewage from the many townships in the Orange River would ever realize as a threat, a biomonitoring result at this location would be of great benefit to assess the situation.

Moreover, sewage and its concomitant microbiological contamination would be a serious threat to the grape, other fruit and food export industry.

The sampling point was chosen because of accessibility. The dense stand of reeds renders most of the river's banks out of reach. There was a break in the reeds, probably kept open by local fishermen.

The available habitat was emerging vegetation (reeds), submerged vegetation (a single strand of parrot's feather), bedrock and muddy bottom.

The SASS5 score was only 34, which low and can be attributed to the limited available habitat. The ASPT came to 5.3, which can be expected for a mature river reach such as the Orange River at Grootdrink Bridge. The score indicated a "fair" rating, with some if it lost but with most ecological functioning still intact.



Figure 21 Upper drainage line tree line

15 Present Ecological State (PES)

Table 2 Habitat Integrity according to Kleynhans, 1999

A	Unmodified, natural	90 – 100
В	Largely natural with few modifications. A small change in natural habitats and biota, but the ecosystem function is unchanged	80 – 89
С	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 2 and 3) 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.

This is a fairly large sub-catchment, with only the very downstream part developed. Most of the sub-catchment is in a near-pristine condition with the only impacts a dirt road and grazing farm animals. The bottom part is heavily developed into vineyards and into the Topline township. This sharp contrast poses difficulties for the evaluation of the PES. How much weight should the upper catchment carry and how much should the bottom part weigh? Nevertheless, the WULA requires a PES and this then is the best estimate.

Table 3 Present Ecological State of the Drainage Line

Instream				
				Maximum
	Score	Weight	Product	score
Water abstraction	24	14	336	350
Flow modification	19	13	247	325
Bed modification	19	13	247	325
Channel modification	19	13	247	325
Water quality	17	14	238	350
Inundation	19	10	190	250
Exotic macrophytes	23	9	207	225
Exotic fauna	14	8	112	200
Solid waste disposal	10	6	60	150
Total		100	1884	2500
% of total			75.4	
Class			С	
Riparian				
Water abstraction	24	13	312	325
Inundation	19	11	209	275
Flow modification	19	12	228	300
Water quality	17	13	221	325
Indigenous vegetation removal	21	13	273	325
Exotic vegetation encroachment	21	12	252	300
Bank erosion	23	14	322	350
Channel modification	19	12	228	300
Total			2045	2500
% of total			81.8	
Class			В	

The instream habitat scores a "C", with the loss of ecological functioning, but with some of it still intact.

The riparian habitat scores a "B", which is near-pristine (Figure 1) for most of the sub-catchment.

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 Grootdrink 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 4 Present Ecological State Orange River

Instream				
				Maximum
	Score	Weight	Product	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			С	
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			С	

However, the river at Groottdrink was less impacted than further downstream, as at Kakamas. The river at Grootdrink 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 Topline is not about to change the PES of the Orange River at Grootdrink.

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 5).

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 5 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 Line

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 Probable Impacts

These paragraphs are about the possible impacts of the proposed Topline development on the aquatic. The existing developments are household waste in the drainage lines, untreated sewage, trampling by humans and livestock and graves in the buffer zone. It is assumed that the new houses will not be constructed within the 32m buffer zone. The new houses will add to the existing impacts.

The proposed impact of this development on the Orange River is insignificant. However, the cumulative impact of all developments along the Orange River in the !Kheis municipality can be substantial.

19 Mitigation Measures

The most significant and entirely necessary measure that can be taken is that proper municipal services should resume. This is particularly appropriate to the sewage situation, as well as household waste collection and disposal in a properly managed sanitary landfill. In fact, expansion of the Topline township, as well as that of all of the other townships, should not commence unless municipal services have been restored.

A proper cemetery should be provided, away from any drainage line.

It would be difficult to curb the number of farm animals, but an attempt should nevertheless be made.

The significant combined impact of the various developments stem from the sewage and waste issues must be addressed. Adequate municipal services should resume.

20 Impact Assessment

Table 6 Impact Assessment

Description of impact									
Cumulative impact of sewage and solid waste ending up in the drainage line and Orange River									
Mitigation n	neasures								
Construction	only during	the dry seas	son, limit the	foot print, vege	tate disturbed	areas.			
Type Nature								Irreplaceability	
Without mitig	gation	1							
Cumulative	Regional	Medium	Long term	Medium	Probable	Certain	Reversible	Replaceable	
With mitigation measures									
Cumulative	Local	Low	Short term	Low	Unlikely	Sure	Reversible	Replaceable	

Description	of impact

Impact of graveyards on the drainage line riparian zone

Mitigation measures

Provide a proper cemetary

Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability	
Without mitigation									
Negative	Regional	Medium	Long term	Medium	Probable	Certain	Reversible	Replaceable	
With mitigation measures									
Negative	Local	Low	Long term	Zero	Unlikely	Sure	Reversible	Replaceable	

Description of impact

Impact of animal husbandry, trampling by humans of drainage lines

Mitigation measures

Try and limit number of animals, educate people

Try and min trained of armitale, educate people									
Type Nature	Spatial Extent	Severity	Duration	Significance	Probability	Confidence	Reversibility	Irreplaceability	
Without mitigation									
Negative	Regional	Medium	Long term	Medium	Probable	Certain	Reversible	Replaceable	
With mitigation measures									
Negative	Local	Low	Long term	Low	Unlikely	Sure	Reversible	Replaceable	

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).

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 7 is a replica of the Excel spreadsheet that has been adapted to fit the format of this report. The numbers in Table 7 (continued) represent the same activities as in Table 7, with sub-activities added.

The methodology is tabled in the Appendix.

There were no visible signs of sewage in the drainage line downstream from Topline, even though the WWTWs was out of order. Likewise, further down the drainage line little household waste was detected. Sewage and waste poses risks, but at this stage it was rates as "Low". This may change as the Topline grows.

The graves at this stage pose a small and local risk. He goats in the drainage line can be destructive, but at this stage do not seem to pose a major risk.

The only risk of importance is the possibility of a sewage spill and urban waste 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 Topline 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.

Table 7 Risk Matrix

No.	Activity	Aspect	Impact	Significance	Risk Rating
1	Sewage collection and treatment	Sewage spill	Sewage contamination in the drainage line and Orange River	45	Low
2	Urban solid waste	Waste ending up in the drainage line and in the river	Pollution of the river	51	Low
3	Graves	Digging up riparian zone	Habitat destruction	42.5	Low
4	Animal husbandry	Trampling	Riparian habitat destruction	45	Low

Table 7 Continued Risk Rating

No	Flow	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Conse- quence
1 2 3 4	1 1 1	2 1 1 1	2 2 2 2	1 1 1 2	1.5 1.25 1.25 1.5	1 1 1	2 2 2 2	4.5 4.25 4.25 4.5

No	Frequency of activity	Frequency of impact	Legal issues	Detection	Likelihood	Significance	Risk Rating
1	2	2	5	1	10	45	Low
2	3	3	5	1	12	51	Low
3	2	2	5	1	10	42.5	Low
4	2	2	5	1	10	45	Low

22 Resource Economics

Table 8. Goods and Services

Goods & Services	Score
Flood attenuation Stream flow regulation Sediment trapping Phosphate trapping Nitrate removal Toxicant removal Erosion control Carbon storage Biodiversity maintenance Water supply for human use Natural resources Cultivated food Cultural significance Tourism and recreation Education and research	4 4 3 2 2 2 4 2 5 0 0 1 0 0

0 Low 5 High

The goods and services delivered by the environment, in this case the drainage line at the new Topline 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 21) is an accepted manner to visually illustrate the resource economic footprint the drainage line, from the data in Table 8.

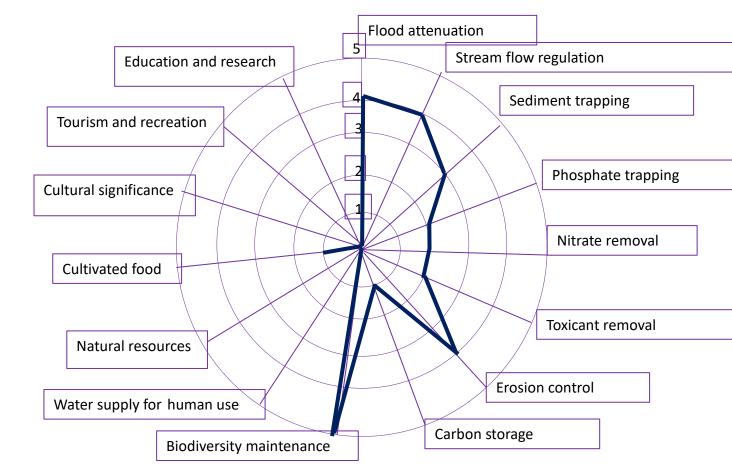


Figure 22. Resource Economics Footprint of the Drainage Line

The size of the star shape attracts the attention of the decision-makers. This shape (spider diagram, Figure 21) is small, depressed on the left, indicating that the water course has a small economic foot print. Because of the vegetation in the riparian zone (Figure 1), its contribution towards biodiversity is significant, given the otherwise barren landscape.

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 seven !Kheis townships 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.

It should be noted that functional municipal services are part and parcel of the !Kheis Municipality's Technical Director's KPA's, stated in his published service contract. However, wastewater and solid waste management are not pertinently mentioned in this contract, which may explain why these services are not satisfactory.

This is not only a tangible threat to human health and human well-being at !Kheis, 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.

There is no shortage of the aloe *Aloe claviflora* (Figure 23) in the district. They are plentiful and not endangered in any way, although aloes are protected plants in terms of legislation. These aloes are cleared from plots where people are putting up their houses. There will be a major clearance once the new housing schemes are launched. These aloes have a considerable monetary value if sold in cities such as Pretoria, Johannesburg and Cape Town. A formal scheme should be devised to collect and sell these aloes, the proceeds could be transferred to a reputable NGO, for community-based projects, such as building class rooms or additions to clinics.

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.



Figure 23 Aloe claviflora

24 Conclusions

Figure 24 has been adapted from one of the most recent DWS policy documents.

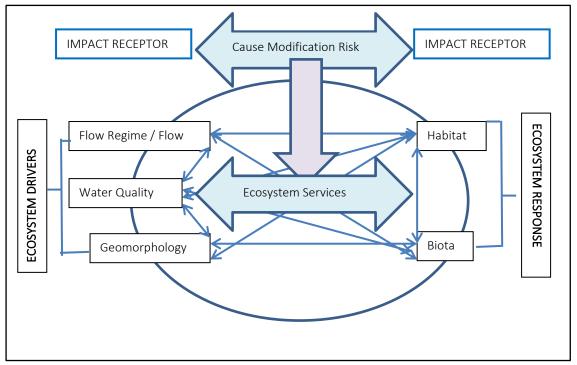


Figure 24 Minimum Requirements for a S21(c) and (i) Application

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 24). 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 Topline.

25 References

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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: 11 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 Program manager.	2007 -2011						
City of Cape Town Acting Head: Scientific Services, Manager: Hydrobiology.	1999-2007						
Department of Water & Sanitation, South Africa Senior Scientist	1989 – 1999						
Tshwane University of Technology, Pretoria Head of Department	1979 – 1998						

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
- Fresh Water Report, Muggievlak Storm Water Canal, Vredenburg
- Fresh Water Report, Marksman's Nest Rifle Range, Malmesbury
- Biodiversity Report, Muggievlak Storm Water Canal, Vredenburg
- 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 Agricultural Development, Upington

28 Appendix

28.1 Biomonitoring Score Sheet

SASS5 Score	Sheet									
Date	17 May 20 Taxon		Weight	Score	Taxon	Weight	Score	Taxon	Weight	Score
Locality	Orange River	Porifera	5		Hemiptera			Diptera		
	Grootdrink Bridge	Coelenterata	1		Belostomatidae	3		Athericidae	10	
		Turbellaria	3		Corixidae	3	3	Blepharoceridae	15	
		Oligochaeta	1		Gerridae	5		Ceratopogonidae	5	
Coordinates	28°27' 15.30"	Huridinea	3		Hydrometridae	6		Chironomidae	2	2
	21°17'03.50"	Crustacea			Naucoridae	7		Culicidae	1	
		Amphipodae	13		Nepidae	3		Dixidae	10	
DO mg/l	8.6	Potamonautidae	3		Notonectidae	3	3	Empididae	6	
Temperature °C	17.2	Atyidae	8	8	Pleidae	4	4	Ephydridae	3	
pH	7.15	Palaemonidae	10		Veliidae	5		Muscidae	1	
EC mS/m	33	Hydracarina	8		Megaloptera			Psychodidae	1	
		Plecoptera			Corydalidae	10		Simuliidae	5	5
SASS5 Score	34	Notonemouridae	14		Sialidae	8		Syrphidae	1	
Number of Taxa	7	Perlidae	12		Trichoptera			Tabanidae	5	
ASPT	5.3	Ephemeroptera			Dipseudopsidae	10		Tipulidae	5	
		Baetidae 1 sp	4	4	Ecnomidae	8		Gastropoda		
Other Biota	Tadpoles	Baetidae 2 sp	6		Hydropsychidae 1 sp	4		Ancylidae	6	
		Baetidae >3 sp	12		Hydropsychidae 2 sp	6		Bulinidae	3	
		Caenidae	6		Hydropsychidae <2 sp			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			Calamoceratidae	11		Pelecipoda		
		Teloganodidae	12		Glossostomatidae	11		Corbiculidae	5	
		Trichorythidae	9		Hydroptilidae	6		Sphariidae	3	
		Odonata			Hydrosalpingidae	15		Unionidae	6	
		Calopterygidae	10		Leptostomatidae	10		Omomuuc		
		Clorocyphidae	10		Leptosceridae	6				
		Chorolestidae	8		Petrothrincidae	11				
		Coenagrionidae	4		Pisulidae	10				
		Lestidae	8		Sericostomatidae	13				
		Platycnemidae	10		Coleoptera	13				
		Protoneuridae	8		Dyticidae	5	5			
		Aesthnidae	8		Elmidae Dryopidae	8				
		Corduliidae	8		Gyrinidae	5				
		Gomphidae	6		Haliplidae	5				
		Libellulidae	4		Helodidae	12				
					Hydraenidae	8				
		Lepidoptera	12		•	5				
		Pyralidae	12		Hydrophilidae Limnichidae	10				
						10				
C				42	Psephenidae	10	45			
Score				12			15			7

46

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 28.2.1 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

Critorio	Poting	Description
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/	High	Natural and / or social functions and / or processes are severely altered
Severity	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
impaot	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 Probable Possible Unlikely	>90% likelihood of the impact occurring 70 – 90% likelihood of the impact occurring 40 – 70% likelihood of the impact occurring <40% likelihood of the impact occurring
Confidence	Certain Sure Unsure	Wealth of information on and sound understanding of the environmental factors potentially affecting the impact Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact 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 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 The activity will lead to a permanent loss of resources.

28.3 Risk Matrix Methodology

Negative Rating							
TABLE 1- SEVERITY							
How severe does the aspects impact on the environment and resource	ce quality ch	naracterisitics	(flow regin	ne, water	quality, geon	norfology, biota	a, 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				
TABLES BURNTON		I			I	-	
TABLE 3 – DURATION		<u> </u>					
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 lov	wer status	but can be	improved	over th	is period th	rough mitiga	ition
			P			0 - 0-	
ILITE OF THE ACTIVITY PEN FIN AND/OF REC DERMANENTLY LOWER	red						
Life of the activity, PES, EIS and/or REC permanently lower More than life of the organisation/facility, PES and EIS sco							
More than life of the organisation/facility, PES and EIS sco							
More than life of the organisation/facility, PES and EIS scot TABLE 4 – FREQUENCY OF THE ACTIVITY How often do you do the specific activity?				1			
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More than life of the organisation/facility, PES and EIS score TABLE 4 – FREQUENCY OF THE ACTIVITY How often do you do the specific activity? Annually or less 6 monthly Monthly				1 2 3			
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More than life of the organisation/facility, PES and EIS scol TABLE 4 – FREQUENCY OF THE ACTIVITY How often do you do the specific activity? Annually or less 6 monthly Monthly Weekly Daily TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT How often does the activity impact on the environment?				1 2 3 4 5			
More than life of the organisation/facility, PES and EIS scol TABLE 4 – FREQUENCY OF THE ACTIVITY How often do you do the specific activity? Annually or less 6 monthly Monthly Weekly Daily TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT How often does the activity impact on the environment? Almost never / almost impossible / >20%				1 2 3 4 5			
More than life of the organisation/facility, PES and EIS scol TABLE 4 – FREQUENCY OF THE ACTIVITY How often do you do the specific activity? Annually or less 6 monthly Monthly Weekly Daily TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT How often does the activity impact on the environment? Almost never / almost impossible / >20% Very seldom / highly unlikely / >40%				1 2 3 4 5			
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More than life of the organisation/facility, PES and EIS scol TABLE 4 – FREQUENCY OF THE ACTIVITY How often do you do the specific activity? Annually or less 6 monthly Monthly Weekly Daily TABLE 5 – FREQUENCY OF THE INCIDENT/IMPACT How often does the activity impact on the environment? Almost never / almost impossible / >20% Very seldom / highly unlikely / >40% Infrequent / unlikely / seldom / >60% Often / regularly / likely / possible / >80% Daily / highly likely / definitely / >100% TABLE 6 – LEGAL ISSUES How is the activity governed by legislation? No legislation	res, a E or			1 2 3 4 5			
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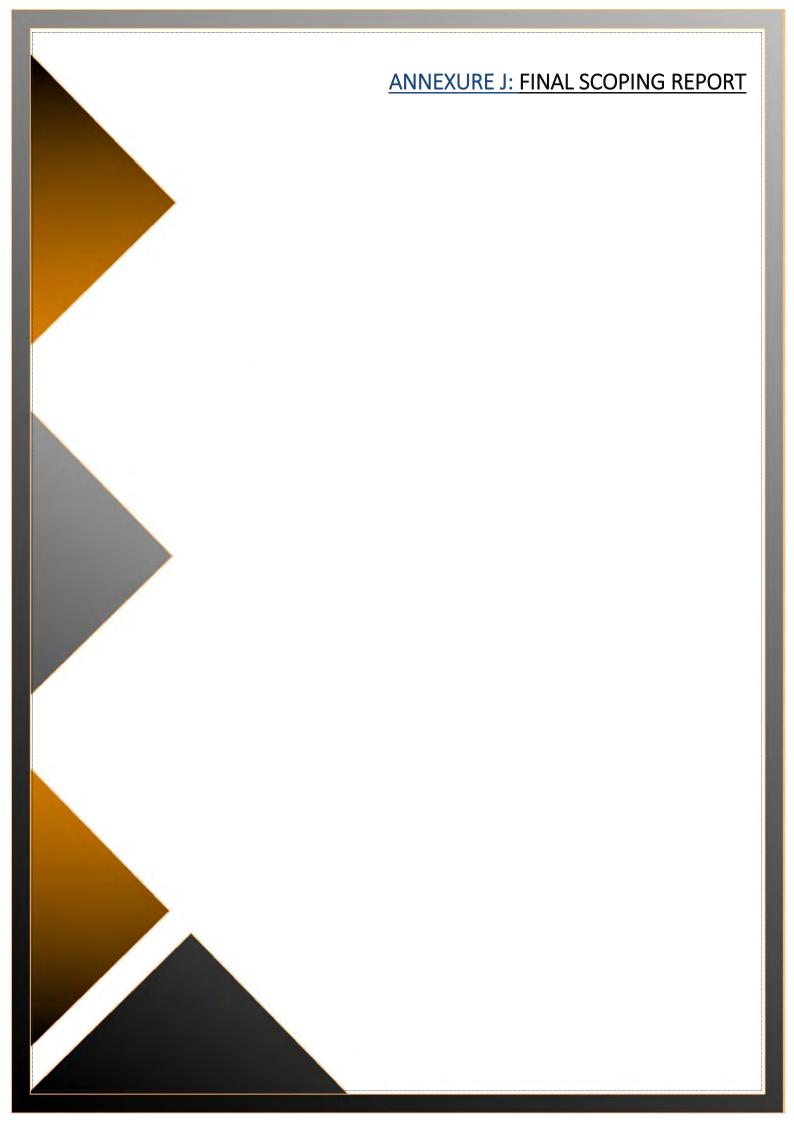
TOPLINE FRESH WATER REPORT 51

TABLE 7 – DETECTION How quickly can the impacts/risks of the activity be observed on the environment (water resource 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 a	activities to be considered for a GA	a range scare

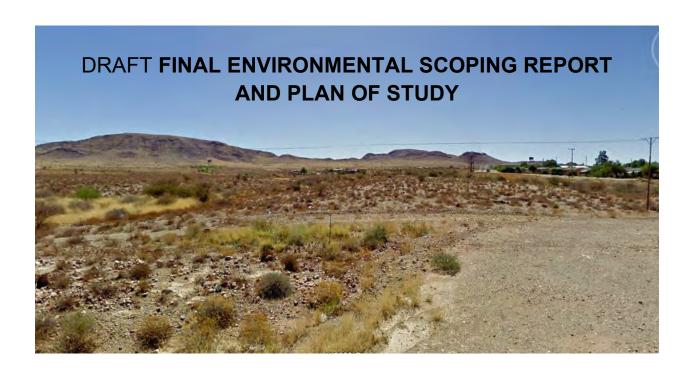
TABLE 9: CALCULATIONS

Consequence = Severity + Spatial Scale + Duration
Likelihood=Frequency of Activity + Frequency of Incident +Legal Issues + Detection
Significance \Risk= Consequence X Likelihood





PROPOSED TOWNSHIP DEVELOPMENT ON ERF 1, ERF 16, ERF 87 AND PLOT 2777, TOPLINE, !KHEIS LOCAL MUNICIPALITY



SEPTEMBER 2020

!KHEIS LOCAL MUNICIPALITY

PROPOSED TOWNSHIP DEVELOPMENT ON ERF 1, ERF 16, ERF 87 AND PLOT 2777, TOPLINE, !KHEIS LOCAL MUNICIPALITY

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CONTENTS

1.	INTE	RODUCTION	6
2.	NEE	D AND DESIRABILITY	8
	2.1	NEED	8
	2.2	DESIRABILITY	10
3.	LEG	AL REQUIREMENTS	12
	3.1	THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA	12
	3.2	NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998)	12
	3.3	NATIONAL HERITAGE RESOURCES ACT	15
	3.4	EIA GUIDELINE AND INFORMATION DOCUMENT SERIES	15
	3.6	NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT	16
	3.7	NATIONAL FORESTS ACT	16
	3.8	NORTHERN CAPE CONSERVATION ACT, ACT 09 OF 2009	16
	3.9	THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (ACT 16 OF 2013)	16
4.	ALT	ERNATIVES	17
	4.1	SITE ALTERNATIVES	17
	4.2	ACTIVITY ALTERNATIVES	17
	4.3	LAYOUT ALTERNATIVES	17
	4.4	NO-GO ALTERNATIVE	17
5.	SITE	DESCRIPTION	18
	5.1	LOCATION	18
	5.2	VEGETATION	19
	5.3	FRESHWATER	21
	5.4	CLIMATE	21
	5.5	SOCIO-ECONOMIC CONTEXT	22
	5.6	HERITAGE FEATURES	23
6.	SER	VICES	24
	6.1	WATER	
	6.2 6.3	SEWERROADS	
	6.4	STORMWATER	24
	6.5 6.6	SOLID WASTE (REFUSE) REMOVALELECTRICITY	
7.		IRONMENTAL ISSUES AND POTENTIAL IMPACTS	23
8.	DET	AILS OF THE PUBLIC PARTICIPATION PROCESS	28
9.	PLA	N OF STUDY FOR THE EIA	30
	9.1.1	TASKS TO BE UNDERTAKEN	30
	9.2	PUBLIC PARTICIPATION AND INTERESTED AND AFFECTED PARTIES	32

9.3 CRITERIA FOR SPECIALIST ASSESSMENT OF IMPACTS33
10. CONCLUSION AND RECOMMENDATIONS
11. DETAILS AND EXPERTISE OF THE EAP
This Draft Scoping Report was prepared by Clinton Geyser who has a MSc. Degree in
Environmental Management. He has been working as an Environmental Assessment Practitioner
since 2009 and is currently employed at EnviroAfrica CC
The whole process and report was supervised by Bernard de Witt who has more than 20 years'
experience in environmental management and environmental impact assessments
FIGURES
Figure 1: Map showing proposed site for the Topline Housing development
Figure 2. Socioeconomic status associated with the proposed Topline Housing Development10
Figure 3: Map showing the surrounding landscape11
Figure 4: Locality Map (1: 50 000) showing location of the proposed Topline site18
Figure 5: Vegetation types associated with the proposed Topline Housing development20
Figure 6: CBA associated with the proposed Topline development20
Figure 7: NFEPA wetland and drainage lines, identified during the desktop study21
Figure 8. Summary of the EIA process and public participation process32
TABLES
TABLES
Table 1. Detailed Project Plan as per NEMA Scoping and EIA Regulations 2014Error! Bookmark no
defined.
Table 2: Criteria used for evaluating impacts Error! Bookmark not defined
Table 3: The stated assessment and information Error! Bookmark not defined
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APPENDICES

APPENDIX1: PUBLIC PARTICIPATION PROCESS

APPENDIX 1A: NOTIFICATION LETTERS

APPENDIX 1B: ADVERTISEMENTS (PROOF OF ADVERT)

APPENDIX 1C: SITE NOTICES AND LETTER DROPS

APPENDIX 1C.1: PROOF OF POSTER

APPENDIX 1D: LIST OF I&APS
APPENDIX 1E: C&R TABLE
APPENDIX 1E.1: COMMENTS

APPENDIX 2: SUPPORTING INFORMATION

APPENDIX 2A: LOCALITY AND BIODIVERSITY MAPS

APPENDIX 2B: SITE PLAN

APPENDIX 2C: SITE OVERVIEW PHOTOS

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

The !Kheis Local Municipality is proposing a new township development, consisting of approximately 248 erven and associated infrastructure on Erf 1, Erf 16, Erf 87, and Plot 2777, Topline, !Kheis Local Municipality.

The total area to be developed measures 36 (thirty-six) hectares. The proposed site is located approximately 21km north-west of Groblershoop, adjacent to the N10 and the approximately 2km west of the Orange River. The proposed site for the Topline Housing Development is located within Ward 1 of the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape. The proposed site is located at the following location: 28°45'16.25"S; 21°50'18.67"E.

The applicant is !Khosi 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 EIA and the Public Participation Process required in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA).

This Scoping Report, which will be submitted to the Department of Environment and Nature Conservation (DE&NC) for consideration, forms part of the EIA process.

The purpose of this Draft 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 authorised 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.

1.2 DESCRIPTION OF THE PROPOSED ACTIVITY

The !Kheis Local Municipality is proposing a new township development, consisting of approximately 248 erven and associated infrastructure on Erf 1, Erf 16, Erf 87, and Plot 2777, Topline, !Kheis Local Municipality.

The total area to be developed measures 36ha. The proposed site is located approximately 21km northwest of Groblershoop, adjacent to the N10 and the approximately 2km west of the Orange River. The proposed site for the Topline Housing Development is located within Ward 1 of the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape. The proposed site is located at the following location: 28°45'16.25"S; 21°50'18.67"E.

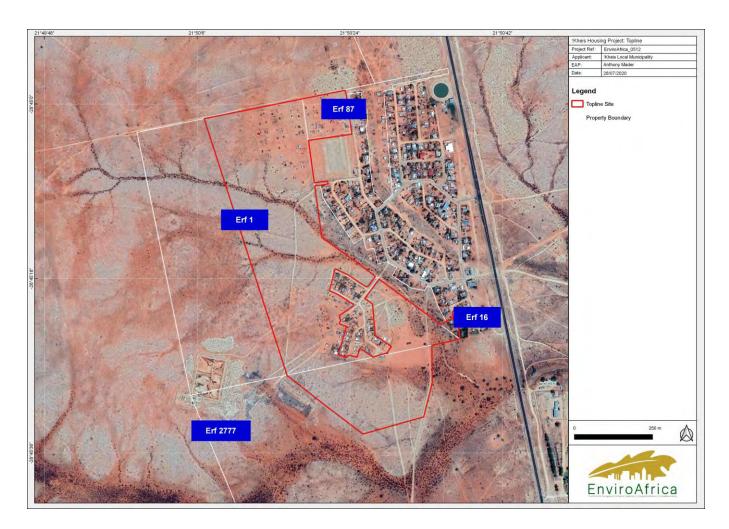


Figure 1: Map showing proposed site for the Topline Housing development. Source: QGIS, version 3.10.

2. NEED AND DESIRABILITY

In terms of the National Environmental Management Act, as amended, EIA 2014 regulations 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 !Kheis Local Municipality.

The !Kheis Local Municipality's aims to promote socioeconomic development through the eradication of backlogs associated with water and sanitation, electricity, and housing, as well as improve basic services within Topline. In order to meet the needs of the community within Topline, the Council resolved that a project business plan be submitted to Co-operative Governance, Human Settlements and Traditional Affairs (COGHSTA) as well as the construction of 248 erven in Topline over the short to medium term, along with associated infrastructure. As per the !Kheis Integrated Development Plan (IDP) 2019/2020, a key performance indicator includes the provision of infrastructure and basic service through securing suitable land for human settlement projects, where suitable land was previously identified in Boegoeberg, Topline, Wegdraai, Grootdrink, Gariep, and Opwag. The provision of affordable housing units remains a high priority for the Municipality which will restore the dignity of poor people by providing shelter and access to basic human rights as enshrined in the Constitution of South Africa.

The proposed !Kheis housing development falls in line with the !Kheis IDPs key strategic and development objectives of the KLM, to improve and maintain basic service delivery through specific infrastructural projects including human settlements, water, sanitation, electricity, as well as streets and storm water management¹. As per the Land Development Plan/ Rural Spatial Development Framework (2014), Topline is classified as a Low Development Potential/High Human Development Need (Category 3 Investment type = Small-scale Monetary capital, basic services and social capital).

The demographic profile of the KLM includes the total population of 16 637 individuals in 2011 with a total number of 4 145 households. This community requires formalized, state-instituted housing, and associated, infrastructure. The proposed development will distribute the density of the population, improve community member's standard of living, as well as access to essential services including roads, electricity, water supply, appropriate sewage disposal infrastructure, and environmental health in the area. Therefore, the proposed development will enable adequate housing to be constructed, thereby promoting access to basic service delivery as well as socioeconomic development in Boegoeberg and its surroundings.

The proposed Topline Housing development is in line with the !Kheis IDPs key strategic and development objectives, namely to improve and maintain basic service delivery through specific infrastructural projects

¹ Integrated Development Plan of !Kheis Municipality, 2017-2022 (Review for 2019 – 2020 Financial Year).

including human settlements and basic services, in the poverty-stricken Grootdrink Township. According to the SDF, the population in Topline increased from 959 (in 2001) to 1398 in 2011 (where 52% of the population are male and 48% female). Therefore, this community requires formalized, state-instituted housing, and associated, infrastructure. The proposed development will distribute the density of the population, improve community member's standard of living, as well as access to essential services including roads, electricity, water supply, appropriate sewage disposal infrastructure, and environmental health in the area. Therefore, the proposed development will enable adequate housing to be constructed, thereby promoting access to basic service delivery as well as socioeconomic development in the Topline Township and its surroundings. !Kheis Local Municipality is committed to the vision of the National Government of which it committed itself towards accelerating shared growth to halve poverty and unemployment and promote social inclusions. Housing is one of the social inclusions in this vision.

The majority of the KLM population is located in five settlements, namely: Grootdrink, Topline, Wegdraai, Groblershoop and Boegoeberg, with the largest of those settlements being Groblershoop, Grootdrink and Wegdraai. With regards to the functional age groups, 60% of KLM's population is of working age (15--64). Grootdrink (40%) and Boegoeberg (40%) have the highest percentages of population aged between 0 and 14, which is decidedly higher than the district percentage of 28%. Education levels and school attendance have increased in KLM. Grootdrink has the lowest percentage individuals with Gr.12 at 9,1%, while Topline has the highest percentage of individuals with 'no schooling' at 17,5%. In comparison Groblershoop has the highest percentage of individuals with Gr.12 (18,5%) and individuals with higher education (1,7%).

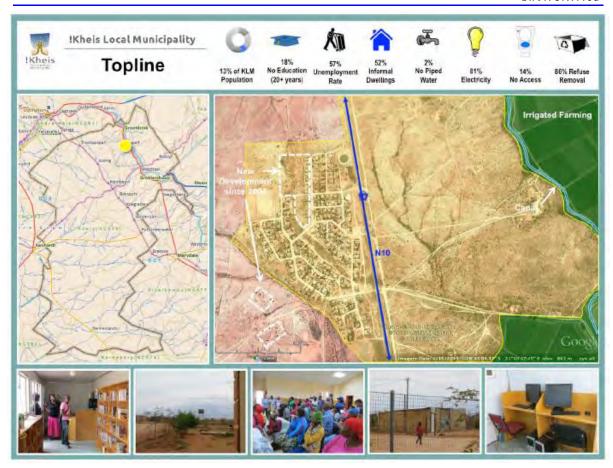


Figure 2. Socioeconomic status associated with the proposed Topline Housing Development.

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 adjacent to the existing residential area of Saalskop. The proposed site is located adjacent to the N10, allowing accessibility and linking to the existing services infrastructure. Any upgrades or additional services infrastructure that will be required will be investigated, and included in the Environmental Impact Report (EIR).

The desirability and location of the proposed development will be further investigated in the Environmental Impact Report, and the town planning motivational report.

2.2.2 Compatibility with the Surrounding Area

The proposed site is adjacent to the existing residential area of Saalskop. As stated above, this would provide accessibility and allow the proposed development to link to the existing services infrastructure.

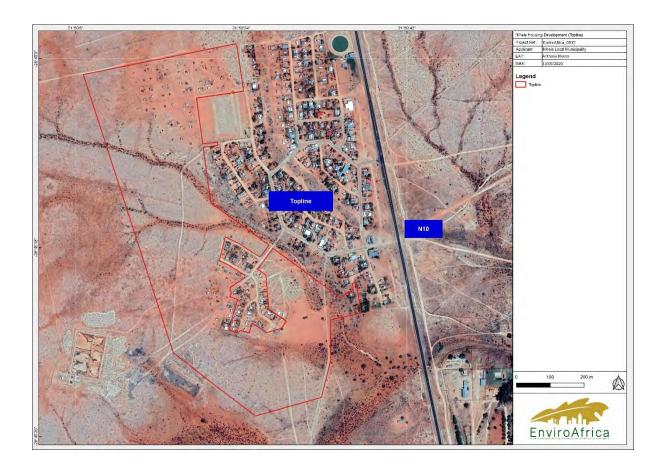


Figure 3: Map showing the surrounding landscape, as well as the location of the proposed development in location with the existing residential areas. Note, the proposed site for development is located adjacent to the N10. QGIS, version 3.10.

3. LEGAL REQUIREMENTS

The current assessment is being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, NEMA), to be read with section 24 (5): NEMA EIA Regulations 2014. 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.

According to the regulations of Section 24(5) of NEMA, authorisation is required for the following listed activities for the proposed agricultural development:

Government Notice R327 (Listing Notice 1) listed activities:

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;

- 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; or
- (b) where the entire road falls within an urban area; or
- (c) which is 1 kilometre or shorter
- The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except 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.
- The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre;
 - (i) where the existing reserve is wider than 13,5 meters; or
 - (ii) where no reserve exists, where the existing road is wider than 8 metres;

excluding where widening or lengthening occur inside urban areas.

Government Notice R325 (Listing notice 2) listed activities:

- 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
- 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.

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 will be 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 EMP.
- Where waste cannot be avoided, it will be minimised and remedied through the implementation and adherence of the Environmental Management Programme (EMP) 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.
- 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 <u>site</u> 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 may also require authorizations under the National Water Act (Act N0. 36 of 1998). The Department of Water and Sanitation, who administer that Act, will be a leading role-player in the EIA.

If, and as required by the Department of Water and Sanitation, a 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 NATIONAL FORESTS ACT

The National Forests Act, 1998 (Act 84 of 1998) (NFA) makes provisions for the management and conservation of public forests.

In terms of section 15(1) of the National Forests Act, 1998, no person may

- (a) cut, disturb. damage or destroy any protected tree; or
- (b) posses, collect. remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except
 - (i) under a license granted by the Minister; or
 - (Ii) in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

3.8 NORTHERN CAPE CONSERVATION ACT, ACT 09 OF 2009

On the 12th of December 2011, the new Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect, which 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. The NCNCA is a very important Act in that it put a whole new emphasis on a number of species not previously protected in terms of legislation.

It also put a new emphasis on the importance of species, even within vegetation classified as "Least Threatened" (in accordance with GN 1002 of 9 December 20011, promulgated in terms of the National Environmental Management Biodiversity Act 10 of 2004). Thus, even though a project may be located within a vegetation type or habitat previously not considered under immediate threat, special care must still be taken to ensure that listed species (fauna & flora) are managed correctly.

3.9 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (ACT 16 OF 2013)

The subject area falls under the jurisdiction of the 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.

4. ALTERNATIVES

Alternatives to the proposed development are very 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.

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 !Kheis 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, to be incorporated into the layout. 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. These will be compiled with input from the municipality and its requirements, as well as input and/or recommendations of the various specialists, as well as input from Interested and Affected Parties, including the community

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 !Kheis 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 approximately 64km south-east of Upington (as the crow flies) and approximately 19km north west for Groblershoop (as the crow flies). The proposed site is located adjacent to the N10 and approximately 2km west of the Orange River. The proposed site is situated within Ward 1 of the !Kheis Local Municipality, ZF Mgcawu District Municipality, Northern Cape. The proposed site is located at the following location: 28°45'16.25"S; 21°50'18.67"E.

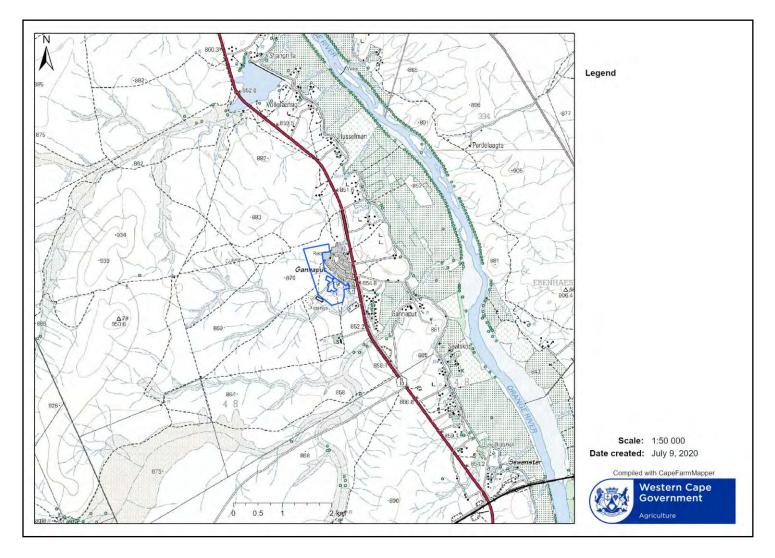


Figure 4: Locality Map (1: 50 000) showing location of the proposed Topline site for development.

5.2 VEGETATION

According to 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 expected on the majority of the proposed site, namely Bushmanland Arid Grassland (Least Threatened). The Lower Gariep Alluvial Vegetation type, located east of the proposed site for development, is an Endangered ecosystem type associated with the Orange River.

The Bushmanland Arid Grassland vegetation type is distributed throughout the Northern Cape Province, spanning about one degree of latitude from around Aggeneys in the west to Prieska in the east. The southern border of the unit is formed by edges of the Bushmanland Basin while in the northwest this vegetation unit borders on desert vegetation (northwest of Aggeneys and Pofadder). The northern border (in the vicinity of Upington) and the eastern border (between Upington and Prieska) are formed with often intermingling units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland and Gordonia Duneveld. Most of the western border is formed by the edge of the Namaqualand hills. The altitude throughout this vegetation type ranges from 600–1 200 m².

The vegetation component comprises of extensive-to-irregular plains on a slightly sloping plateau sparsely vegetated by grassland dominated by white grasses (*Stipagrostis* spp) giving this vegetation type the character of semidesert 'steppe'. In certain places, low shrubs of *Salsola* change the vegetation structure. In years of abundant rainfall rich displays of annual herbs can be expected. From a conservation perspective, the vegetation type is categorized as Least Threatened (LT) with a conservation target of 21%. Only small patches statutorily conserved in Augrabies Falls National Park and Goegab Nature Reserve. Very little of the area has been transformed. Erosion is very low (60%) and low (33%)².

The proposed site for the development of the Topline Housing Project is located within a Critical Biodiversity Area (CBA) (Figure 6). Critical biodiversity areas (CBA's) are terrestrial and aguatic 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. However, there is no alternative on Municipal land that will not impact on the CBA. The site will not impact on any recognised centre of endemism. The 2016, Northern Cape CBA Map (Figure 6) 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.

² Mucina and Rutherford, (2006). The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia, 19.

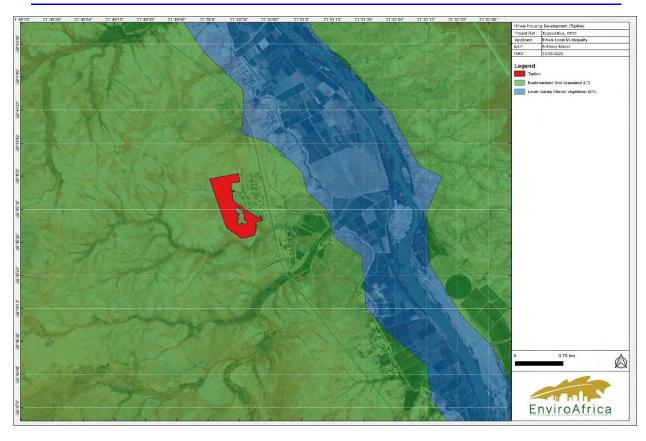


Figure 5: Vegetation types associated with the proposed Topline Housing development. Source: QGIS,



Figure 6: CBA associated with the proposed Topline site for development. Source: BGIS, 2020.

5.3 FRESHWATER

From the SANBI National Freshwater Ecosystem Priority Areas map (see Figure 6 below), no NFEPA wetlands were identified during the desktop study. Two drainage lines run through the site.

The source and nature of this water is to be investigated during the Scoping Phase, and if these are determined to be natural watercourses/wetlands, the impact of the proposed development on these watercourses are to investigated in the Environmental Impact Report. The Orange River is also located approximately 2km east of the site.

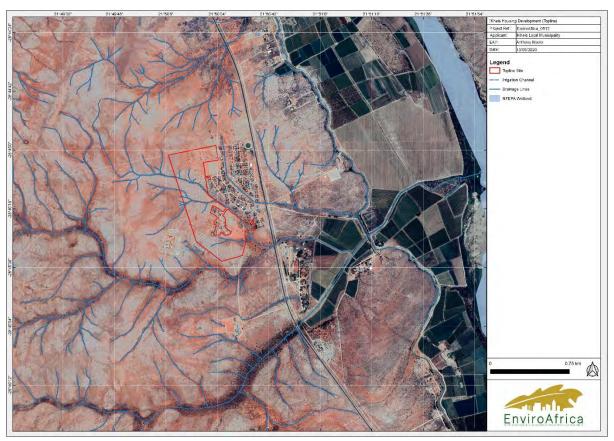


Figure 7: NFEPA wetland and drainage lines, identified during the desktop study. Source: QGIS, version 3.10.

5.4 CLIMATE

Climate data for Upington will be used, the nearest town (approximately 90km from Groblershoop) with reliable data. The Upington area is regarded as an arid area (regions with a rainfall of less than 400 mm per year are regarded as arid). This area normally receives about 180 mm of rain per year, with rainfall largely in summer. It receives the least amount of rain in winter (July), and the most amount during March.

The average annual temperature is 19.3°C, with an average of 26.2°C in January, and 11.5°C in July.

5.5 SOCIO-ECONOMIC CONTEXT

Housing is a national need, including in the !Kheis Local Municipality. The !Kheis Local Municipality's aims to promote socioeconomic development through the eradication of backlogs associated with water and sanitation, electricity, and housing, as well as improve basic services within Topline. In order to meet the needs of the community within Topline, the Council resolved that a project business plan be submitted to Co-operative Governance, Human Settlements and Traditional Affairs (COGHSTA) as well as the construction of 248 erven in Topline over the short to medium term, along with associated infrastructure. As per the !Kheis Integrated Development Plan (IDP) 2019/2020, a key performance indicator includes the provision of infrastructure and basic service through securing suitable land for human settlement projects, where suitable land was previously identified in Boegoeberg, Topline, Wegdraai, Grootdrink, Gariep, and Opwag. The provision of affordable housing units remains a high priority for the Municipality which will restore the dignity of poor people by providing shelter and access to basic human rights as enshrined in the Constitution of South Africa.

The proposed !Kheis housing development falls in line with the !Kheis IDPs key strategic and development objectives of the KLM, to improve and maintain basic service delivery through specific infrastructural projects including human settlements, water, sanitation, electricity, as well as streets and storm water management³. As per the Land Development Plan/ Rural Spatial Development Framework (2014), Topline is classified as a Low Development Potential/High Human Development Need (Category 3 Investment type = Small-scale Monetary capital, basic services and social capital).

The demographic profile of the KLM includes the total population of 16 637 individuals in 2011 with a total number of 4 145 households. This community requires formalized, state-instituted housing, and associated, infrastructure. The proposed development will distribute the density of the population, improve community member's standard of living, as well as access to essential services including roads, electricity, water supply, appropriate sewage disposal infrastructure, and environmental health in the area. Therefore, the proposed development will enable adequate housing to be constructed, thereby promoting access to basic service delivery as well as socioeconomic development in Boegoeberg and its surroundings.

The proposed Topline Housing development is in line with the !Kheis IDPs key strategic and development objectives, namely to improve and maintain basic service delivery through specific infrastructural projects including human settlements and basic services, in the poverty-stricken Grootdrink Township. According to the SDF, the population in Topline increased from 959 (in 2001) to 1398 in 2011 (where 52% of the population are male and 48% female). Therefore, this community requires formalized, state-instituted housing, and associated, infrastructure. The proposed development will distribute the density of the population, improve community member's standard of living, as well as access to essential services including roads, electricity, water supply, appropriate sewage disposal infrastructure, and environmental health in the area. Therefore, the proposed development will enable adequate housing to be constructed, thereby promoting access to basic service delivery as well as socioeconomic development in the Topline Township and its surroundings. !Kheis Local Municipality is committed to the vision of the National Government of which it committed itself towards accelerating shared growth to halve poverty and unemployment and promote social inclusions. Housing is one of the social inclusions in this vision.

The majority of the KLM population is located in five settlements, namely: Grootdrink, Topline, Wegdraai, Groblershoop and Boegoeberg, with the largest of those settlements being Groblershoop, Grootdrink and

³ Integrated Development Plan of !Kheis Municipality, 2017-2022 (Review for 2019 – 2020 Financial Year).

Wegdraai. With regards to the functional age groups, 60% of KLM's population is of working age (15--64). Grootdrink (40%) and Boegoeberg (40%) have the highest percentages of population aged between 0 and 14, which is decidedly higher than the district percentage of 28%. Education levels and school attendance have increased in KLM. Grootdrink has the lowest percentage individuals with Gr.12 at 9,1%, while Topline has the highest percentage of individuals with 'no schooling' at 17,5%. In comparison Groblershoop has the highest percentage of individuals with Gr.12 (18,5%) and individuals with higher education (1,7%).

5.6 HERITAGE FEATURES

Due to the nature and size of the proposed development, potential heritage resources may be affected by the 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.

6. SERVICES

Due to the scale of the development, the availability of bulk services for the development will need to be investigated. The !Kheis Local Municipality will more than likely be the service provider for the bulk services.

BVi Engineers will prepare the Bulk Engineering Services Reports on the external services for the proposed 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, the 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. The main entrance to the development is expected to be from an access road off the N10.

A Traffic Impact Assessment will be conducted to determine the design of the internal roads, including any upgrades that will be required to existing roads to provide adequate access to the site, or if new access points will be needed.

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:

7.1 BOTANICAL

A botanical impact assessment will be conducted to determine if there is any sensitive or endangered vegetation on the proposed site. Due to the size of the development (approximately 36ha), there will be a loss of vegetation during the construction phase of the project.

A Botanical Impact Assessment will be conducted, which will describe and assess the botanical sensitivity of the area. The terms of reference for this study required a baseline analysis of the flora of the property, including the broad ecological characteristics of the site.

The botanical assessment will include the following:

- The significance of the potential impact of the proposed project, alternatives and related activities

 with and without mitigation on biodiversity pattern and process at the site, landscape and regional scales.
- Recommended actions that should be taken to prevent or, if prevention is not feasible, to mitigate impacts.

7.2 FRESHWATER

Freshwater ecosystems were identified on desktop analysis, and due to the size and nature of the development and the unknown source of standing water within the development site, a freshwater impact assessment will be conducted. Any potential impacts to the Orange River will also be investigated.

The terms of reference for the Freshwater assessment are as follows:

- Literature review and assessment of existing information
- Site Assessment of the proposed activities and impact on the associated freshwater systems. This will include an assessment of the freshwater ecological condition, using river health indices such as in-stream and riparian habitat integrity, aquatic macro-invertebrates and riparian vegetation to determine set back lines and geomorphological condition of the streams, which will then determine the overall Ecostatus of the streams and provide data that will inform the Water Use Licence Application of the project.
- Describe ecological characteristics of freshwater systems and compile report based on the data and information collected in the previous two tasks, describe ecological characteristics of the freshwater systems, comment on the conservation value and importance of the freshwater systems and delineate the outer boundary of the riparian zones/riverine corridors.
- Evaluate the freshwater issues on the site and propose mitigation measures and measures for the rehabilitation of the site as well as setback lines for future development.

- Compilation of the documentation for submission of the water use authorisation application (WULA) to the Department of Water and Sanitation (if deemed necessary).

7.3 HERITAGE

The possible impact on heritage resources has been identified as a possible environmental impact as a result of the development.

A Heritage Impact Assessment will be conducted on the site.

The terms of reference for the heritage and archaeological study are as follows:

- To determine whether there are likely to be any important archaeological sites or remains that might be impacted by the proposed development;
- To identify and map archaeological sites/remains that might be impacted by the proposed development:
- To assess the sensitivity and conservation significance of archaeological sites/remains in the inundation area;
- To assess the status and significance of any impacts resulting from the proposed development,
- To identify measures to protect any valuable archaeological sites/remains that may exist within the estimated inundation area.

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, and that the sense of place is not expected to be significantly altered by the proposed development, 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

Potential 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 1**.

Public Participation will be conducted for the proposed development in accordance with the requirements outlined in Regulation 41 of the NEMA EIA Regulations 2014. 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 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.

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): Notification letters will be circulated to residents adjacent to/within close proximity of the project site. Appendix 1C

R41 (2) (b) (iii): An initial notification letter will be sent to the municipal Ward councillor at the !Kheis Local Municipality, for the ward in which the site is situated.

R41 (2) (b) (iv): No notification letter will be sent to the !Kheis Local Municipality as the municipality is the Applicant

R54 (2) (b) (v): The Draft Scoping Report and notification letters 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 Cooperative Governance, Human Settlements and Traditional Affairs
- SANRAL
- Department of Environment and Nature Conservation

South African Heritage Resources Agency

R41 (2) (c) (i): An advertisement was placed in the local newspaper.

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 will be given more than 30-days to register and/or comment on the Draft Scoping Report.

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 find attached in Appendix 1:

- Proof of Notice boards, advertisements and notices that were sent out
- List of potential interested and affected parties
- Summary of issues raised by interested and affected parties

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 <u>accepted</u> by the D:E&NC):

The NEMA Application Form will be submitted to D:E&NC along with the Draft Scoping Report which will be available for a 60-day comment period starting from the <u>3rd August 2020 to 7th October 2020</u>. Comments received during the Public Participation Process will be incorporated into the Final Scoping Report, to be submitted to D:E&NC for a decision.

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.

Table 1: Detailed Project Plan as per NEMA Scoping and EIA Regulations 2014 (as amended): !Kheis Housing Development: Topline Housing Development

No.	Action			Timeline	
1		ion meeting with client and appointment of environmental assessment practitioner (EAP) for environmental authorisation (EA) application			
2	Appointment of speciassessments	cialists for EIR	Botanical Specialist Freshwater Specialist Archaeological Specialist	7 th May 2020	
3	Draft Scoping Report comp	10-14 th May 2020			
4	EAP site visit			19 th May 2020	
5	Public participation (PP): - Letter drops (Adj - Poster placeme board of AgriMa boundary of the tuckshops/ store - Advertisement p	19 th May 2020			
	Specialist site visits	Botanical Assessmen	nt (Mr Peet Botes)	18-22 nd May 2020	
6		Freshwater Assessment (Dr Dirk Van Driel)		18-22 nd May 2020	
		Archaeological Assessment (Mr Jan Engelbrecht)		18-31 st May 2020	
7	Advert comment period ends (60-day comment period as per new directions)			14 th August 2020	
Application and Scoping Phase					

⁴As per section 4 of the 'Directions Regarding Measures to Address, Prevent and Combat the Spread of COVID-19 Relating to National Environmental Management Permits and Licenses', published on the 5th June 2020 by the Department of Environment, Forestry and Fisheries (DEFF). These new directions state that any notice given after the 5th June 2020 requires an extended 30-day comment period in addition to the legislated 30-day comment period (total of 60-day comment period). If PP was conducted before the 27th March 2020, the formal comment period between 27th March and 5th June 2020 are null and void and therefore, restarted on the 6th June 2020. The initial comment period must be extended by additional 21 days (total of 51 day). Please note that we are still waiting for directives from DEFF on application timelines. These Directives published on the 5th June 2020 apply to Level 3 Lockdown Period and are subject to change. <u>Please note</u>: the dates above may be subject to change should the Department of Environmental Affairs, Forestry and Fisheries (DEFF) and the Department of Environment and Nature Conservation (DENC) issue any new directives and legislated timeframes. The final decision (No. 18) may be expedited on request by the applicant.

8	Application Form Compilation and Submission (Competent Authority have 10 days to respond)			
9	EAP to compile the draft Scoping Report (SR) (incl. the Plan of Study for EIA) and submit with Application Form	7 days		
10	If in order, the Department to acknowledge the application.			
11	EAP to notify I&APs (incl. the State departments) EAP to notify the registered I&APs (incl. the State departments) of the availability of the draft SR.			
12	Commenting period of 30 days + 30days for I&APs and State departments to comment.			
13	EAP to consider the comments received and complete the final SR.	3 days		
14	Following the commenting period the EAP to submit the Final SR together with any comments received on the final SR to the Department (within 74 days of submission of the Application Form)			
15	Department to acknowledge SR & Plan of Study for EIA.	10 days		
16	If in order, the Department to accept the SR & Plan of Study for EIA (within 43 days + 30 days of receipt of Final SR)	73 days		
Application and Scoping Phase				
	Application and Scoping Phase			
17	Application and Scoping Phase EAP to undertake the EIA and compile the draft EIA Report ("EIAR") (including the draft EMP)	40 days		
17 18		40 days 7 days		
	EAP to undertake the EIA and compile the draft EIA Report ("EIAR") (including the draft EMP) EAP to notify registered I&APs (incl. the State departments) of the availability of the draft EIAR for	-		
18	EAP to undertake the EIA and compile the draft EIA Report ("EIAR") (including the draft EMP) EAP to notify registered I&APs (incl. the State departments) of the availability of the draft EIAR for comment.	7 days		
18 19	EAP to undertake the EIA and compile the draft EIA Report ("EIAR") (including the draft EMP) EAP to notify registered I&APs (incl. the State departments) of the availability of the draft EIAR for comment. Commenting period of 60 days for I&APs and State departments.	7 days 60 days		
18 19 20	EAP to undertake the EIA and compile the draft EIA Report ("EIAR") (including the draft EMP) EAP to notify registered I&APs (incl. the State departments) of the availability of the draft EIAR for comment. Commenting period of 60 days for I&APs and State departments. EAP to consider the comments received and complete the final EIAR. Following the commenting period the EAP to submit the final EIR together with any comments	7 days 60 days 7 days		
18 19 20 21	EAP to undertake the EIA and compile the draft EIA Report ("EIAR") (including the draft EMP) EAP to notify registered I&APs (incl. the State departments) of the availability of the draft EIAR for comment. Commenting period of 60 days for I&APs and State departments. EAP to consider the comments received and complete the final EIAR. Following the commenting period the EAP to submit the final EIR together with any comments received on the final EIR to the Department.	7 days 60 days 7 days 7 days		

EIA PROCESS				
TASK	TIMEFRAMES			
Submit NEMA Application and Draft Scoping Report (FSR) and Plan of Study for EIA to D:E&NC and distribute to registered I&APs for comment	July 2020			
Submit Final Scoping Report 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.	December 2020			
Compile the Draft Environmental Impact Report (EIR) for public comment based on specialist information.	December 2020			
Submit Draft EIR for public comment.	January 2021			
Receive responses to the Draft EIR.	March 2021			
Preparation of a FINAL EIR and submission to D:E&NC.	April 2021			

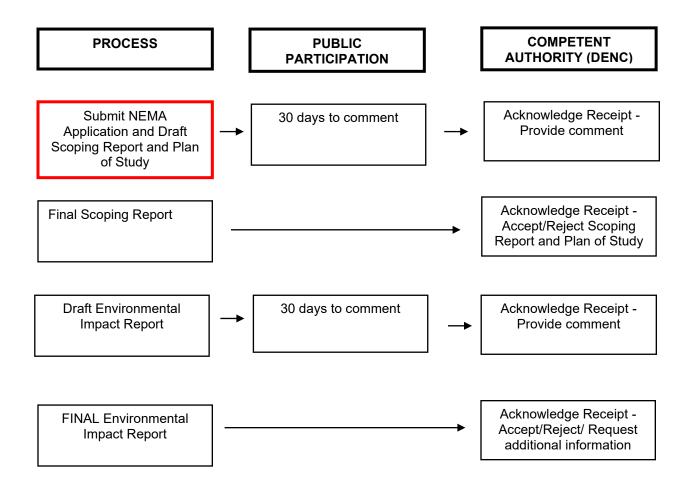


Figure 8. Summary of the EIA process and public participation process. The red indicates the stages where the competent authority will be consulted during the process.

9.2 PUBLIC PARTICIPATION AND INTERESTED AND AFFECTED PARTIES

Please refer to Figure 7 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. 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 Environmental Impact Report (EIR). The Final EIR will then be submitted to D:E&NC for consideration and decision-making.

Correspondence with I&APs will be via post, fax, telephone, email 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.

9.3 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

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 2: 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 Positive: The activity will have a social/ economical/ environmental benefit Describe whether the Impact is Neutral: The activity will have no affect **Negative:** The activity will be socially/ economically/ environmentally positive, negative (or neutral). harmful Degree of Confidence in Unsure/Low: Little confidence regarding information available (<40%) predictions Probable/Med: Moderate confidence regarding information available (40-State the degree of confidence in predictions based on availability of **Definite/High:** Great confidence regarding information available (>80%) information and specialist knowledge Significance No change: A potential concern which was found to have no impact when (The impact on each component is evaluated determined by a combination of the **Very low:** Impacts will be site specific and temporary with no mitigation above criteria and defined as follows) necessary. The significance of impacts shall be Low: The impacts will have a minor influence on the proposed assessed with and without development and/or environment. These impacts require some thought to mitigations. The significance of adjustment of the project design where achievable, or alternative mitigation identified impacts on components of measures the affected biophysical or socio-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. economic environment (and, where relevant, with respect to potential The impact can be lessened or improved by an amendment in the project legal requirement/s) shall be design or implementation of effective mitigation measures. described as follows: 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 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 3: 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:				
	Duration			
	Extent			
Ratings	Intensity			
Ratings	Probability of impact			
	Status of Impact (Positive/negative)			
	Degree of confidence			
Significances	Significance without Mitigation			
	Significance <u>WITH</u> Mitigation			
considered, achieved indicated, is given uncertain and 5 be consideration uncertained when the consideration uncertained in the cons	certainty of a mitigation measure ving the end result to the extent on a scale of 1-5 (1 being totally eing absolutely certain), taking into ertainties, assumptions and gaps in			
	nts (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 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 Draft 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:

- Biodiversity Assessment
- Freshwater Assessment
- Heritage Impact Assessment

Any further issues raised as a result of the Public Participation Process will be dealt with during the 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 Public Participation Process and Scoping Phase, it is evident that an Environmental Impact Assessment (EIA) is required. *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 Draft Scoping Report was prepared by Clinton Geyser who has a MSc. Degree in Environmental Management. He has been working as an Environmental Assessment Practitioner since 2009 and is currently employed at EnviroAfrica CC.

Report compiled by Clinton Geyser -

Qualifications:

- BSc. Earth Sciences, Majors in Geology and Geography and Environmental Management (1998 2000) and:
- BSc. (hons): Geography and Environmental Management (2001) and;
- MSc. Geography and Environmental Management (2002), all from the University of Johannesburg.

Expertise:

Clinton Geyser has over ten years' experience in the environmental management field as an Environmental Assessment Practitioner and as an Environmental Control Officer, having worked on a variety of projects in the Western, Eastern and Northern Cape. Previous completed applications include, but not limited to:

- Civil engineering infrastructure including pipelines, Wastewater Treatment Works, and roads in the Western and Northern Cape.
- Agricultural developments, including reservoirs and dams, in the Western and Northern Cape.
- Telecommunications masts in the Western and Eastern Cape
- Housing Developments in the Western and Northern Cape.
- Resort developments in the Western and Northern Cape.
- Cemeteries in the Western Cape
- Waste Management Licences in the Western Cape

Employment:

Previous employment as an EAP: Doug Jeffery Environmental Consultants (2009 – 2012) Current employment: EnviroAfrica cc (2012 – present).

The whole process and report was supervised by Bernard de Witt who has more than 20 years' experience in environmental management and environmental impact assessments.



Reference: NC11/4/3-10/11-10 Fax Number: Date: 21 October 2020 Direct Line: Website: Email: dekockr@nra.co.za

Mr JP Theron **MACROPLAN**

PO Box 987

UPINGTON 8800

+27 (0) 21 910 1699 +27 (0) 21 957 4618 www.nra.co.za



Email: jptheron@mweb.co.za

Dear Mr Theron,

NATIONAL ROUTE 10 SECTION 11: PROPOSED TOWNSHIP ESTABLISHMENT PROJECT TOPLINE FORMALISATION: ERF 1, SAALSKOP (TOPLINE), KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE; ERF 16, SAALSKOP (TOPLINE), KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE; ERF 87, SAALSKOP (TOPLINE), KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE; PLOT 2777, BOEGOEBERG STTLEMENT, KENHARDT RD, !KHEIS LOCAL MUNICIPALITY, NORTHERN CAPE PROVINCE:

The above application has reference.

The following is noted:

- It is an extension of the existing township;
- No direct access from the N10 is requested.

The South African National Roads Agency SOC Limited (SANRAL) has no objection or comment to this request.

Yours Sincerely

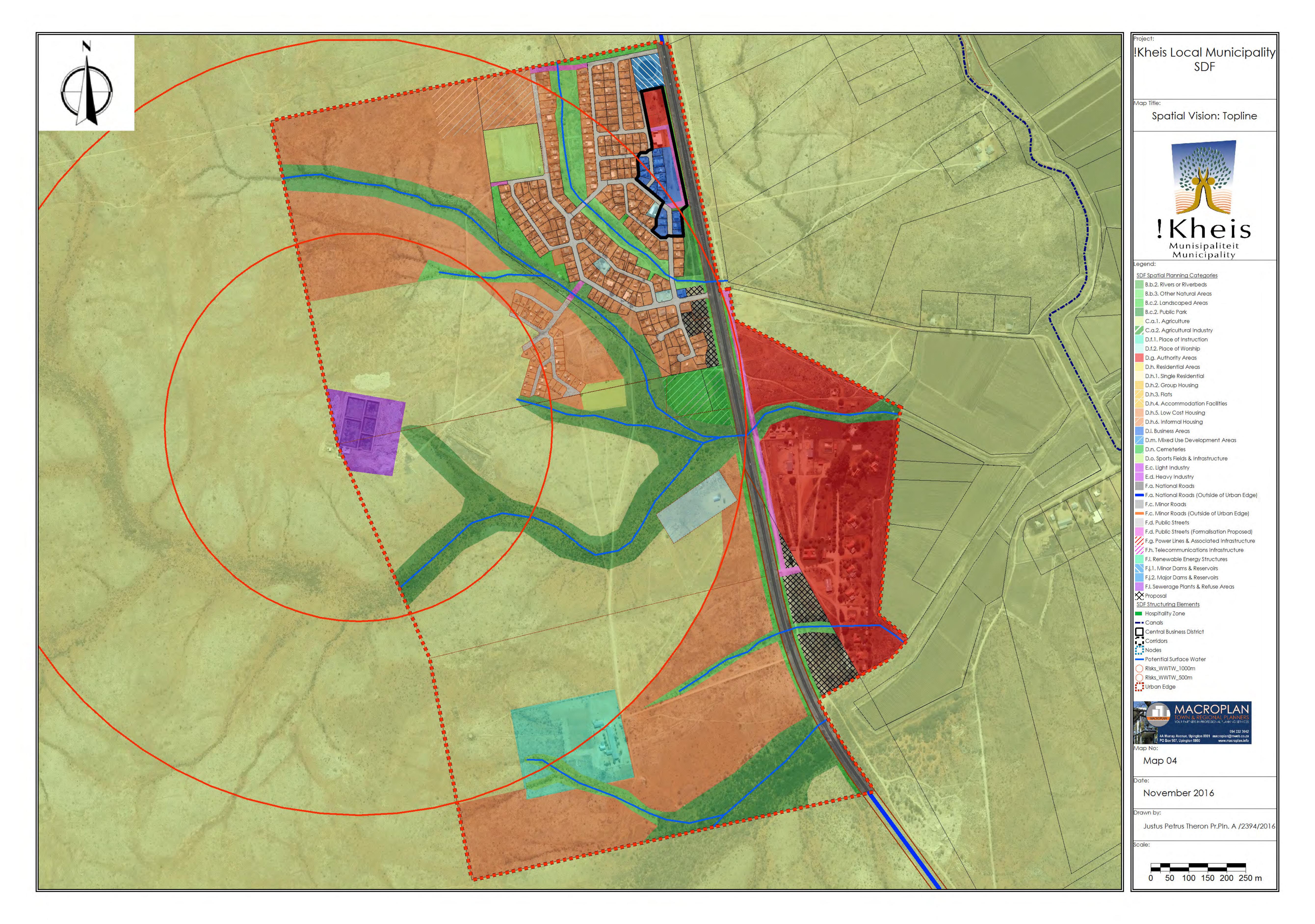
Richard

Mrs Rene de Kock STATUTORY CONTROL

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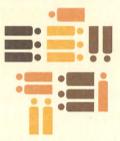
Western Region 1 Havenga Street, Oakdale, Bellville, 7530 | Private Bag X19, Bellville, South Africa, 7535 | Tel +27 (0) 21 957 4600 Fax +27 (0) 21 910 1699 Email info@sanral.co.za | Visit us at www.sanral.co.za











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

I.D. 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

A/2394/2016 REGISTRATION NUMBER:

CHAIRPERSON

REGISTRAR



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

I.D. 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.

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REGISTRAR

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DATE

REGISTRATION NUMBER: A/1322/2006