ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED CONSTRUCTION AND IMPLEMENTATION OF HOTAZEL SOLAR DEVELOPMENT, NORTHERN CAPE

APPLICANT:

ABO WIND HOTAZEL PV (PTY) LTD

AGRICULTURAL SCOPING REPORT
JULY 2018

STUDY CONDUCTED AND REPORT COMPILED BY: C R LUBBE

CAPE ENVIRONMENTAL ASSESSMENT PRACTITIONERS (PTY) LTD
Reg. No. 2008/004627/07
VAT No 4720248386
Telephone: (044) 874 0365
Facsimile: (044) 874 0432
17 Progress Street, George
PO Box 2070, George 6530
Web: www.cape-eaprac.co.za

AGRICULTURAL SPECIALIST:
C R Lubbe
Telephone: 028 514 2359
6 Athlone Street
SWELLENDAM
6740

TABLE OF CONTENTS

1. INTRODUCTION 1
2. APPROACH AND METHODOLOGY 1
3. ASSUMPTIONS AND UNCERTAINTIES 1
4. DESCRIPTION OF THE PROPOSED PROJECT 1
5. THE POTENTIALLY AFFECTED ENVIRONMENT 1
   - 5.1 Locality 2
   - 5.2 Physical description 2
   - 5.3 Climate 2
   - 5.4 Geology 3
   - 5.5 Vegetation 4
   - 5 6 Topography 4
   - 5.8 Soil 5
   - 5.9 Vegetation 12
6. AGRICULTURAL POTENTIAL OF THE SITE 14
7. ASSESSMENT OF ACCESS ROAD AND GRID CONNECTION 16
   - 7.1 Access to site 18
   - 7.2 Grid Connection 19
8. ASSESSMENT OF PROPOSED DEVELOPMENT 20
   - 8.1 Loss of agricultural land 20
   - 8.2 Erosion and change of drainage patterns 20
   - 8.3 Pollution 20
9. CONCLUSION 21

Appendix A: Curriculum Vitae of Specialist
Appendix B: Declaration of Independence

List of Tables

Table 1: Climatic information 2
Table 2: Soil physical properties 14
Table 3: Components of the development 20

List of Figures

Figure 1: Location of farm York A 279 2
Figure 2: Geological Map 1984 Gravity Edition 3
Figure 3: Topographical map. 5
Figure 4: Land type map 2722 Kuruman 6
Figure 5: Land type inventory Ah 9 7
Figure 6: Soil survey Hotazel 8
Figure 7: Hand held auger with soil sample 9
Figure 8: Soil map Alternative 1 11

Figure 9: Soil map Alternative 2 ... 12
Figure 10: Vegetation ... 13
Figure 11: Grasses identified on site ... 14
Figure 12: Climatic interaction of rain, temperature and evaporation. ... 15
Figure 13: Grid connection Alternative 1 ... 16
Figure 14: Grid connections Alternative 2 ... 17
Figure 15: Access road and grid connection photos ... 18

1. INTRODUCTION

ABO Wind Hotazel (Pty) Ltd is applying for authorisation to construct a 100 Megawatt PV facility, to be known as Hotazel Solar, on the Remaining Extent (Portion 0) of Farm York A 279, situated in the District of Hotazel in the Northern Cape Province. The grid connection will be at one of the following: direct to the Hotazel Substation ±3 km north west or Loop-in-loop-out to one of the existing powerlines crossing the site.

The objectives of this study were to consider possible temporary and permanent impacts on agricultural production that may result from the proposed construction and operation of the PV Power Plant.

2. APPROACH AND METHODOLOGY

The approach was to compile a natural resource database for the study area. This would include all necessary information to determine the agricultural potential and risks for farming on this land unit. The proposed development would then be considered in terms of possible impacts it may impose on agricultural production of the unit and on the surrounding area.

The resource data was obtained from published data (AGIS) and then compared to a field survey done on 5 and 6 June 2018

3. ASSUMPTIONS AND UNCERTAINTIES

Regional information was mainly obtained through a desktop study. Climatic conditions, land use, land type and terrain are readily available from literature, GIS information and satellite imagery. This information was confirmed as far as possible at the time of the field survey.

The site was visited during the winter season, so that information on summer conditions remains the result of the desktop study.

4. DESCRIPTION OF THE PROPOSED PROJECT

ABO Wind Hotazel (Pty) Ltd is applying for authorisation to construct and operate a solar photovoltaic (PV) plant on the remaining extent (Portion 0) of the farm York A279, situated in the District of Hotazel in the Northern Cape Province. The Solar Plant will be known as Hotazel Solar and will consist of solar photovoltaic PV) technology with fixed, single of double axis tracking mounting structures, with a net generation capacity of 100 Megawatt.

Associated infrastructure will include, among others, an on-site switching station, auxiliary buildings, inverter-stations, access road and internal roads, a laydown area, an overhead transmission line and border fencing.

5. THE POTENTIALLY AFFECTED ENVIRONMENT

This section provides a general description of the immediate environment potentially affected by the construction, operation and closure of the proposed PV power plant.

5.1 Locality

The Hotazel PV facility is to be constructed near Hotazel on the remaining portion 0 of farm York A279. Access to the site is gained directly from the R31 provincial road

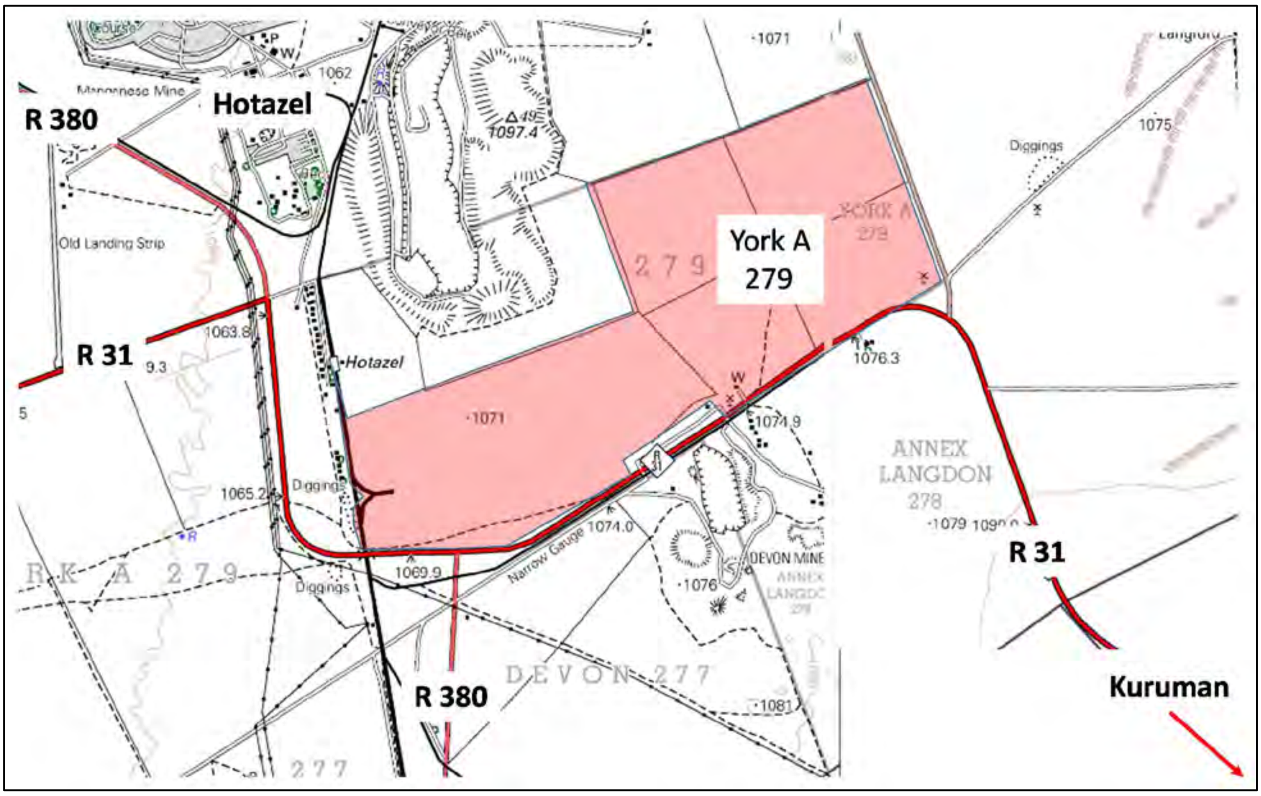


Figure 1: Location of farm York A279

5.2 Physical description

Due to the proximity of the farm to the town and mining areas, the associated infrastructures of these developments converge on the farm. Structures include a provincial road, railway lines, overhead transmission lines, a communication tower and mining areas. These structures restrict the management of the farming activities as it sub divides the farm.

5.3 Climate

The Kalahari region has consistent temperatures with summer and early autumn rainfall. Winters are very dry. The wettest part appears in the east with a mean annual precipitation (MAP) of 500mm/annum and driest in the west with 120 mm/annum. The MAP for the whole Ecozone is 250 mm/annum. The region is classified as an arid zone with desert climate. The following specific parameters are applicable:

Table 1: Climatic information

Climate						
Rainfall		**Evaporation**	**Temperature**			
Month	**Monthly mm**	**Monthly mm**	**Max °C**	**Min °C**	**Mean °C**	**Heat units**
January	63	270	33.7	18.5	26.1	499.1

February	60	284	32.4	17.9	25.1	422.8
March	79	294	29.7	15.8	22.7	393.7
April	33	277	25.7	11	18.8	264
May	21	210	23.2	6.1	14.6	142.6
June	08	193	20.6	2.3	11.4	33
July	00	144	20.4	2	11.2	37.2
August	03	115	23.1	4	13.6	111.6
September	06	91	23.6	8.7	17.4	222
October	16	106	29.7	12.5	21.1	344.1
November	30	154	31.7	15.2	23.4	402
December	43	213	33.0	17.4	25.2	471
Total/Mean	**362**	**2351**	27.2	10.95	19.2	

5.4 Geology

The geology belongs to the super group KALAHARI with the occurrence of the Transvaal Rooiberg and Griqualand–West sequences.

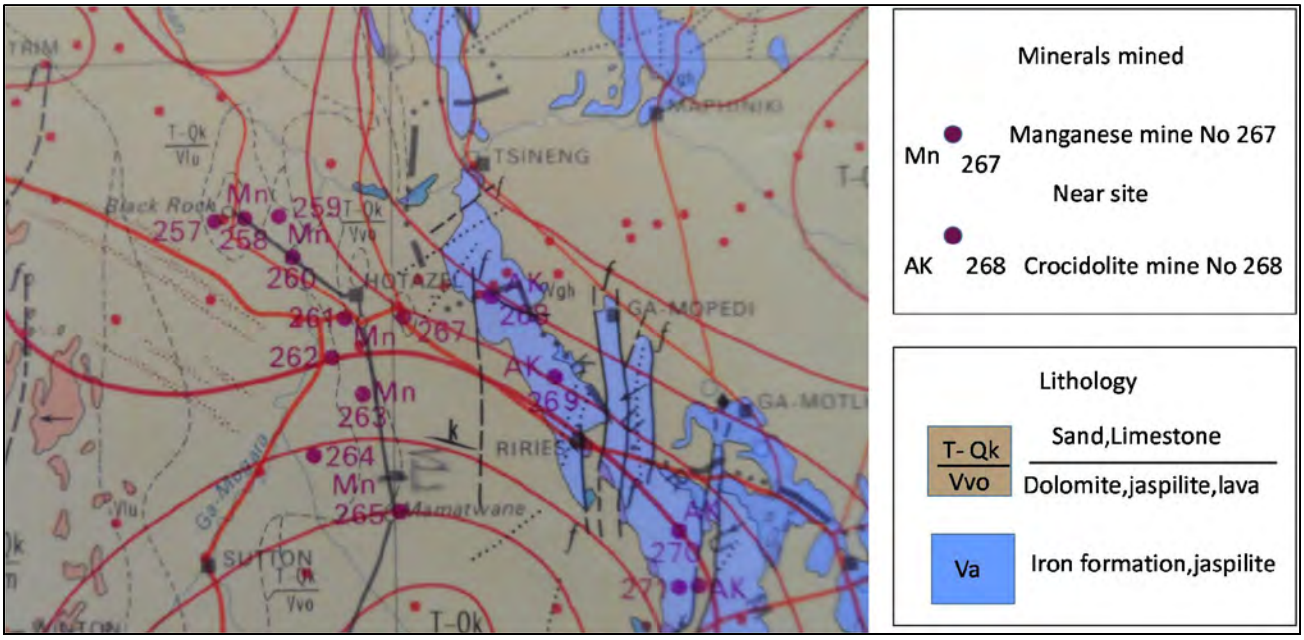


Figure 2: Geological Map 1984 Gravity Edition

Lithology (parent material) indicated on the Geological map (Figure 2) refers to the primary outcrop as Sand and Limestone (T- Qk) and the sub outcrop (Vvo) as Dolomite, Jaspilite and Lava.

The Sand is also known as loess, which is sediment made up from silt sized particles of sand and clay, normally highly calcareous, deposited by wind.

Limestone is a sedimentary rock consisting largely of calcium carbonate, which is usually derived from shells of minute marine or fresh water animals. Sand clay and minerals such as magnesia or iron oxide are also present.

Dolomite consists of carbonate of calcium and magnesium. Dolomite usually occurs as invisible crystals, but in very large rock masses. The origin of dolomite is partly biochemical as it was formed by the precipitation due to the action of algae. The band of dolomite formed is interspersed with shale and minerals.

As with limestone, dolomite is soluble in water and can be released into the soil profile with the clay of the shale and nutrients of minerals.

The map also indicates some Manganese mines in the vicinity of the proposed PV facility.

5.5 Vegetation

This site is classified by Acocks as tropical bush and savannah bushveld within the Kathu Bushveld Biome. Typical trees include Camel thorn Acacia (*Acacia erioloba),* Umbrella Acacia (*Acacia tortilis).* Black thorn Acacia (*Acacia mellifera).* Indigenous and alien Mesquite *Prosopis* species are invasive in degraded and disturbed areas.

Indicator grasses include the following:

Common name	**Botanical name**	**Gazing value**	**Ecological value**
Small Bushman Grass	Stipagrostis Obtusa	Very high	Decreaser
Lemann's Love Grass	Eragrostis Lehmanniana	Medium	Advancer
Tassel Three-awn	Aristida Congesta	Very low	Advancer
Carrying Capacity		13 ha/ Large Stock Unit (LSU))	
Land Use		Livestock and Game farming	

5 6 Topography

The site has an almost level topography with the straight shape and slope gradient of 0,5 %

Features captured on Topographical map 2722BB Hotazel include Arterial road R31, Main road R320, Railway station and railway lines, power lines, a wind pump, a communication tower, mine dumps and excavations, prominent rock outcrops, erosion and sand, a narrow gauge track, a hiking trail, cadastral and internal fences, and contours at 20 m intervals.

The cross section in Figure 3 provides information regarding the shape of the slope of the development footprint. It shows a straight shape for the foot slope (4).

This information is valuable when interpreting the land type data as this will indicate what soil forms can be expected in each terrain unit.

The terrain slope can be calculated using the difference in vertical height (20 m) divided by difference in horizontal distance (4000 m) X 100. The slope is 0.5%.

It is expected to find deeper soils on concave soils with water locked soils at foot slopes and valley bottoms.

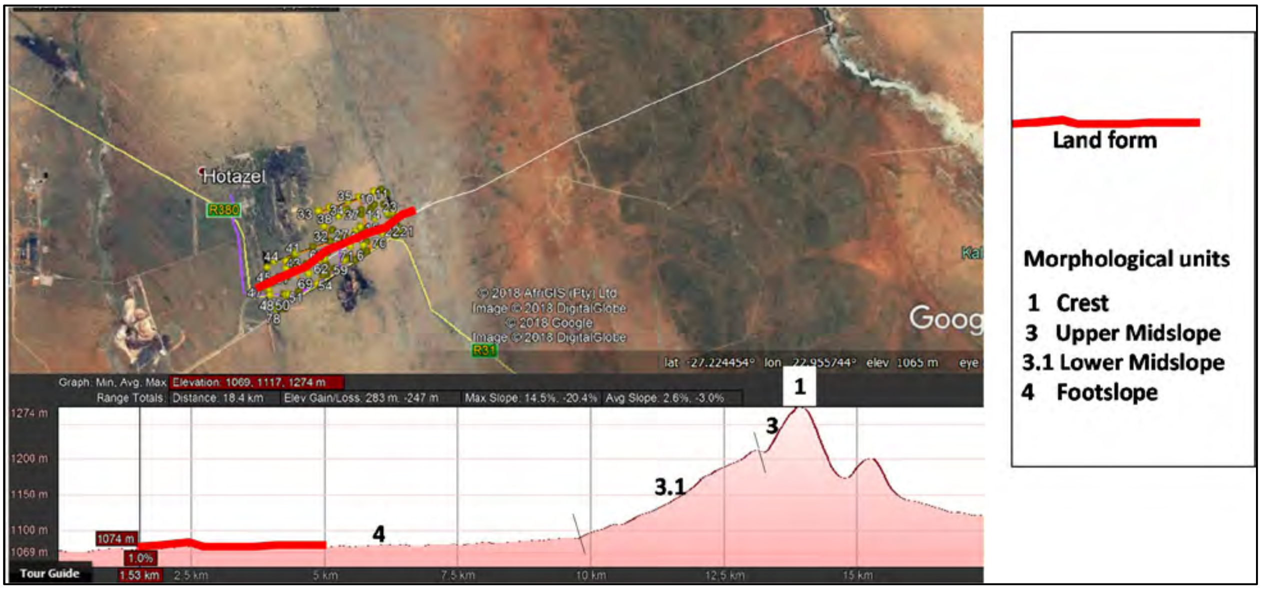


Figure 3: Topographical map.

5.8 Soil

Soil and terrain information was obtained from the Land Type database. The desktop review provided a baseline agricultural and land use profile, focusing on the specific geographical area potentially impacted by the proposed project.

Land type refers to an area with similar climate, topography and soil distribution patterns, which can be demarcated on a scale of 1:250 000.

The land type map, 2722 Kuruman, is reflected in Figure 4 and the inventory for the map appears in Figure 5.

The map shows that the pedosystem **Ah 9** was allocated to the location. **Ah** represents the land type in respect of the terrain form, soil pattern and climate. This refer to red or yellow high base status soils >300 mm deep. The **9** is the first available number allocated to a land type identified on the map. Thus **Ah 9** was given to the 9th land type which qualified for inclusion the broad soil pattern (or map unit) Ah.

The pedosystem is predominately located on a Footslope (95%) with a slope gradient of less than 1 %.

The dominant soil type predicted is an apedal, fine sandy textured soil with effective soil depth in excess of 1200 mm.

Very low mechanical limitations are predicted.

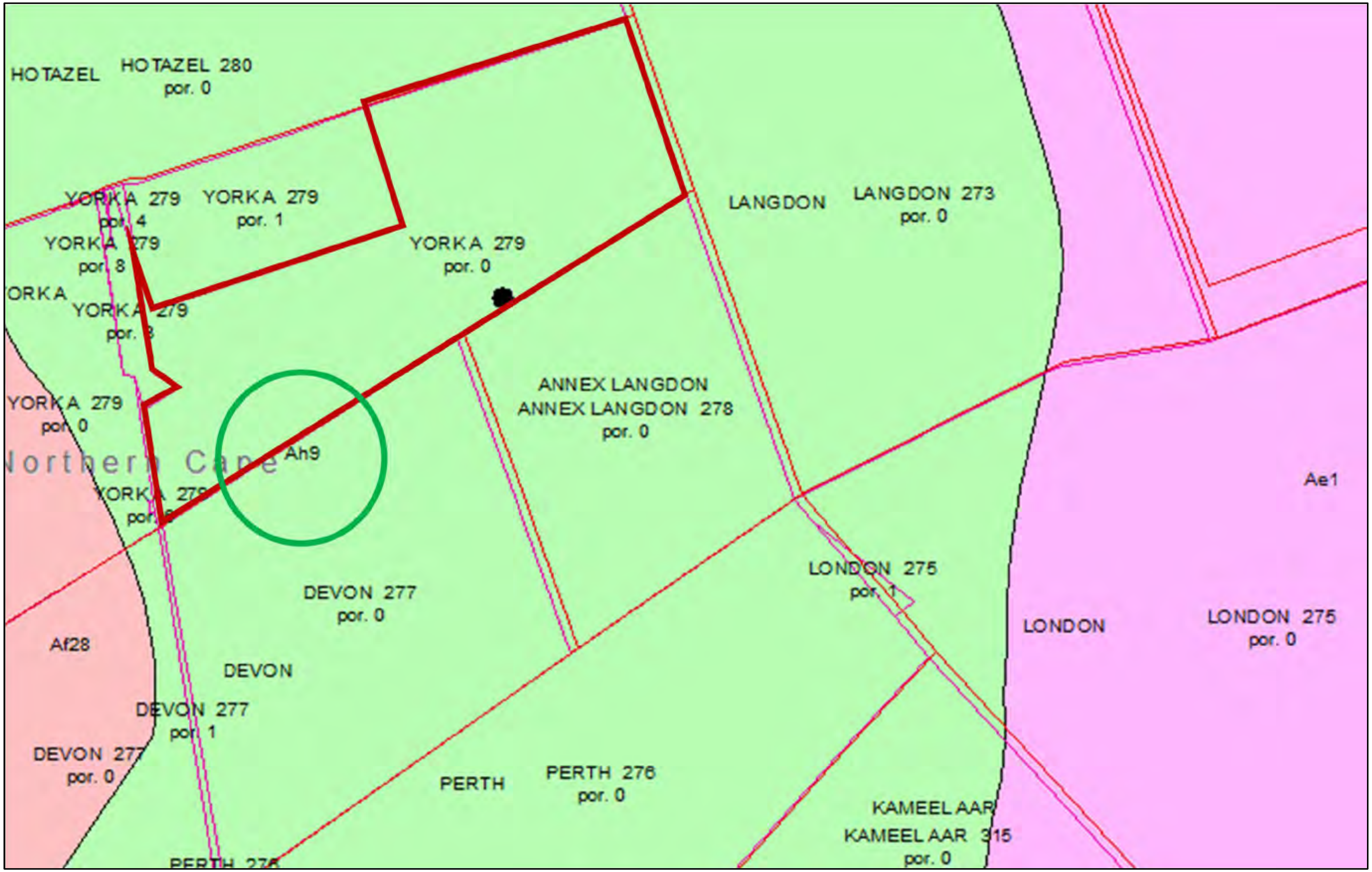


Figure 4: Land type map 2722 Kuruman

LAND TYPE / *LANDTIP* ....: **Ah9**
CLIMATE ZONE *KLIMAATSONE* ...... : 5S
Area / *Oppervlakte* .... : 89190 ha
Estimated area unavailable for agriculture
Beraamde oppervlakte onbeskikbaar vir landbou : 1080 ha

Occurrence (maps) and areas *Voorkoms (kaarte) en oppervlakte* :
2722 Kuruman (89190 ha)

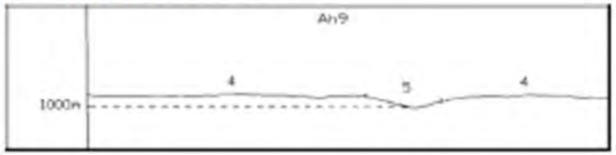
Inventory by *Inventaris deur* :
J F Eloff en A T P Bennie

Modal Profiles *Modale profiele* :
None / Geen

Terrain uni *Terreineenhei*	4	5
% of land type % *van landtipe*	95	5
Area *Oppervlakte (ha)*	84730	4460
Slope / *Helling (%)*	0 - 1	1 - 3
Slope length *Hellingslengte (m)*	)00 - 10000	200 - 1200
Slope shape *Hellingsvorm*	Z	Z
MB0, MB1 (ha)	83883	1784
MB2 - MB4 (ha)	847	2676

Soil series or land classes *Grondseries of landklasse*	**Depth** *Diepte* (mm)	MB	ha	%	ha	%	**Total** *Totaal* ha	%	**Clay content %** *Klei-inhoud %* A	E	B21	Hor	**Texture** *Tekstuur* Class / *Klas*	**Depth limiting material** *Diepte-beperkende materiaal*
Sunbury Cv30	>1200	0	35587	42			35587	39.9	2-4		3-6	B	fiSa	
Mangano Hu33	>1200	0	15251	18			15251	17.1	3-6		6-10	B	fiSa	
Annandale Cv33	>1200	0	15251	18			15251	17.1	3-6		6-10	B	fiSa	
Roodepoort Hu30, Gaudam Hu31	>1200	0	10168	12			10168	11.4	2-4		3-6	B	fi/meSa	
Sandspruit Cv31	>1200	0	6778	8			6778	7.6	2-4		3-6	B	meSa	
Mispah Ms10, Kalkbank Ms22	100-250	3	847	1	2230	50	3077	3.5	6-10			A	fiSa	R,ka
Maputa Fw10, Motopi Fw20, Fernwood Fw11, Langebaan Fw21	>1200	0	847	1	1338	30	2185	2.5	3-6		4-8	B	fiSa	
Shorrocks Hu36	>1200	0			446	10	446	0.5	7-10		15-18	B	fiSaLm	
Pans/Panne		4			446	10	446	0.5						

Terrain type *Terreintipe* : A1
Terrain form sketch *Terreinvormskets*



For an explanation of this table consult LAND TYPE INVENTORY (table of contents)
Ter verduideliking van hierdie tabel kyk LANDTIPE - INVENTARIS (inhoudsopgawe)

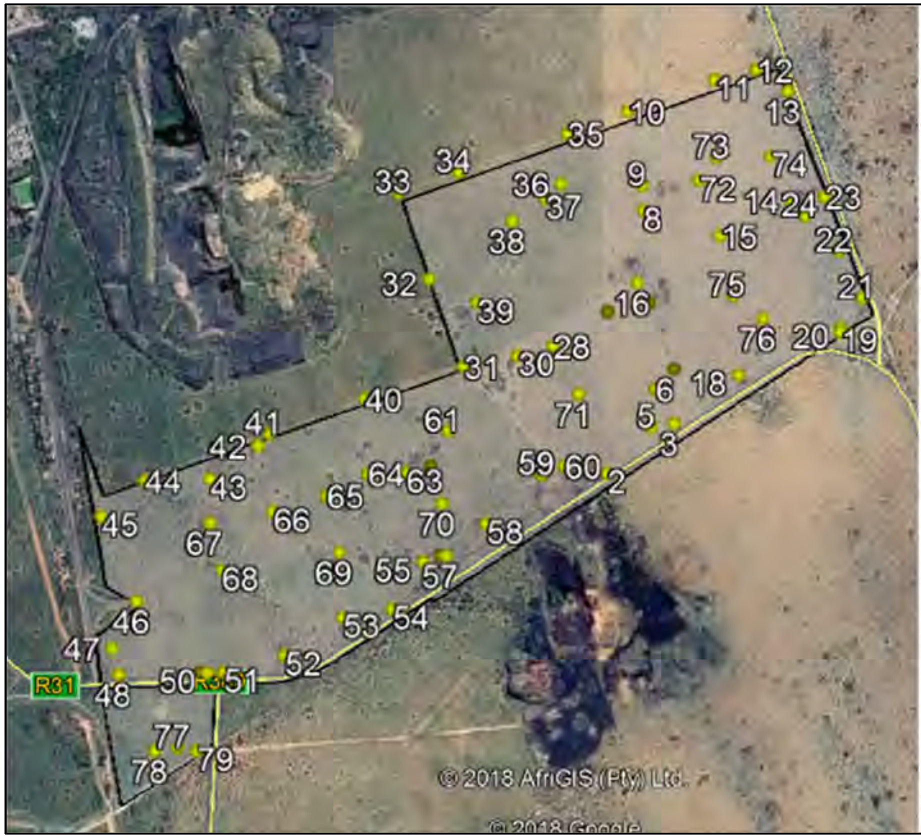
Geology: Aeolian sand of Recent age with a few outcrops of Tertiary Kalahari beds (surface limestone, silcrete and sandstone) in the riverbeds.

Geologie Eoliese sand van Resente ouderdom met enkele dagsome van Tersiere Kalaharilae (oppervlakkalksteen, silkreet en sandsteen) in die rivierlope.

Figure 5: Land type inventory Ah 9

On 5 and 6 June 2018, the site was visited to conduct a soil survey.

An augering survey was carried out, assigning a unique number to each augering point and capturing the physical and morphological information on an observation coding sheet. The observation points and its coordinates are shown in Figure 6.



OBS	Coordinates	OBS	Coordinates	OBS	Coordinates
2	S27 13.368 E22 59.645	31	S27 13.081 E22 59.212	56	S27 13.589 E22 59.143
3	S27 13.234 E22 59.848	32	S27 12.845 E22 59.108	57	S27 13.591 E22 59.158
5	S27 13.244 E22 59.778	33	S27 12.613 E22 59.014	58	S27 13.504 E22 59.280
6	S27 13.142 E22 59.791	34	S27 12.557 E22 59.198	59	S27 13.372 E22 59.448
7	S27 12.910 E22 59.773	35	S27 12.454 E22 59.524	60	S27 13.349 E22 59.516
8	S27 12.661 E22 59.753	36	S27 12.589 E22 59.506	61	S27 13.255 E22 59.165
9	S27 12.593 E22 59.751	37	S27 12.628 E22 59.458	62	S27 13.348 E22 59.113
10	S27 12.394 E22 59.707	38	S27 12.689 E22 59.359	63	S27 13.367 E22 59.038
11	S27 12.308 E22 59.969	39	S27 12.909 E22 59.252	64	S27 13.370 E22 58.923
12	S27 12.281 E23 00.094	40	S27 13.169 E22 58.915	65	S27 13.430 E22 58.799
13	S27 12.339 E23 00.190	41	S27 13.263 E22 58.625	66	S27 13.473 E22 58.637
14	S27 12.634 E23 00.201	42	S27 13.295 E22 58.592	67	S27 13.502 E22 58.447
15	S27 12.729 E22 59.986	43	S27 13.384 E22 58.446	68	S27 13.630 E22 58.482
16	S27 12.856 E22 59.737	44	S27 13.389 E22 58.249	69	S27 13.582 E22 58.837
17	S27 13.088 E22 59.848	45	S27 13.485 E22 58.118	70	S27 13.450 E22 59.147
18	S27 13.104 E23 00.041	46	S27 13.714 E22 58.225	71	S27 13.156 E22 59.559
19	S27 12.988 E23 00.348	47	S27 13.840 E22 58.151	72	S27 12.580 E22 59.922
20	S27 12.977 E23 00.350	48	S27 13.911 E22 58.170	73	S27 12.518 E22 59.975
21	S27 12.896 E23 00.415	49	S27 13.904 E22 58.416	74	S27 12.514 E23 00.139
22	S27 12.769 E23 00.345	50	S27 13.906 E22 58.439	75	S27 12.891 E23 00.023
23	S27 12.623 E23 00.301	51	S27 13.904 E22 58.487	76	S27 12.952 E23 00.115
24	S27 12.676 E23 00.243	52	S27 13.859 E22 58.671	77	S27 14.108 E22 58.348
27	S27 12.933 E22 59.647	53	S27 13.757 E22 58.847	78	S27 14.116 E22 58.280
28	S27 13.026 E22 59.482	54	S27 13.735 E22 58.997	79	S27 14.117 E22 58.406
30	S27 13.052 E22 59.375	55	S27 13.607 E22 59.090		

Figure 6: Soil survey Hotazel

The soil sampling was done with a hand auger and textural analysis by finger method. Soil was augered to a depth of 1.2m. No restrictions were encountered to even 1.5 m. Some points showed colouring differences from 800mm (see Figure 7) but not noted as a specified horizon.

Figure 7: Hand held auger with soil sample

The following field forms represent observations recorded during the field visit:

Dominant soil profile (represented by observation form 16)

OBS	16	COMMENT													
LAT	27.214260	SLOPE GRAD		1			MOISTURE		L						
LONG	22.995610	SLOPE SHAPE		R			EROSION		L						
	FORM	Cv	TSD	120	WET	0	HOR	TYPE	DEPTH	COL	CLAY	S-GR	CONS	STRUC	STONE
	FAM	3100	ESD	120	C	I	1	A	30	7.5YR5/6	6	Vf	5	sg	0
	ROUGH	1	ASD		GEO	L2	2	B	120	7.5YR5/8	6	Vf	5	a	0
	TERR_POS	6	LTN		PHOTO		3								
	L.COVER/USE:														
	VIS.VELD.COND	A		B		C		D		E		TOTAL			

Exceptions in soil profile description:

Observation points 20, 23 and 60 (represented by observation form 60)

OBS	60	COMMENT		bleached A											
LAT	27.220410	SLOPE GRAD		1			MOISTURE		L						
LONG	22.987020	SLOPE SHAPE		R			EROSION		L						
	FORM	Fw	TSD	120	WET	0	HOR	TYPE	DEPTH	COL	CLAY	S-GR	CONS	STRUC	STONE
	FAM	1210	ESD	120	C	I	1	A	30	10YR5/4	6	Vf	5	sg	0
	ROUGH	1	ASD		GEO	L2	2	B	120	10YR5/6	6	Vf	5	sg	0
	TERR_POS	6	LTN	E	PHOTO		3								
	L.COVER/USE:														
	VIS.VELD.COND	A		B		C		D		E		TOTAL			

Observation point 19

OBS	19	COMMENT		ou pad lyk soos Cg											
LAT	27.216460	SLOPE GRAD		1			MOISTURE		L						
LONG	23.005800	SLOPE SHAPE		R			EROSION		L						
	FORM	Wb	TSD	20	WET	0	HOR	TYPE	DEPTH	COL	CLAY	S-GR	CONS	STRUC	STONE
	FAM	1000	ESD	20	C	I	1	A	20	10YR4/4	6	F	5	sg	20
	ROUGH	1	ASD		GEO	L2	2								
	TERR_POS	6	LTN	ma	PHOTO		3								
	L.COVER/USE:														
	VIS.VELD.COND	A		B		C		D		E		TOTAL			

The dominant soil form on site is Clovelly with an effective depth of 1200+ mm. The sub-dominant is Fernwood and is closely related to Clovelly, with the same texture, colour and soil depth.

The Witbank soil is on an old road.

Observation point 48 is in a borrowing pit and the area is sensitive to erosion. The connection line to the Grid is suggested to follow through this point.

After comparison of the various soil forms and its locations, two alternative soil maps were drafted in line with the two alternative layouts. See Figure 8 and Figure 9.

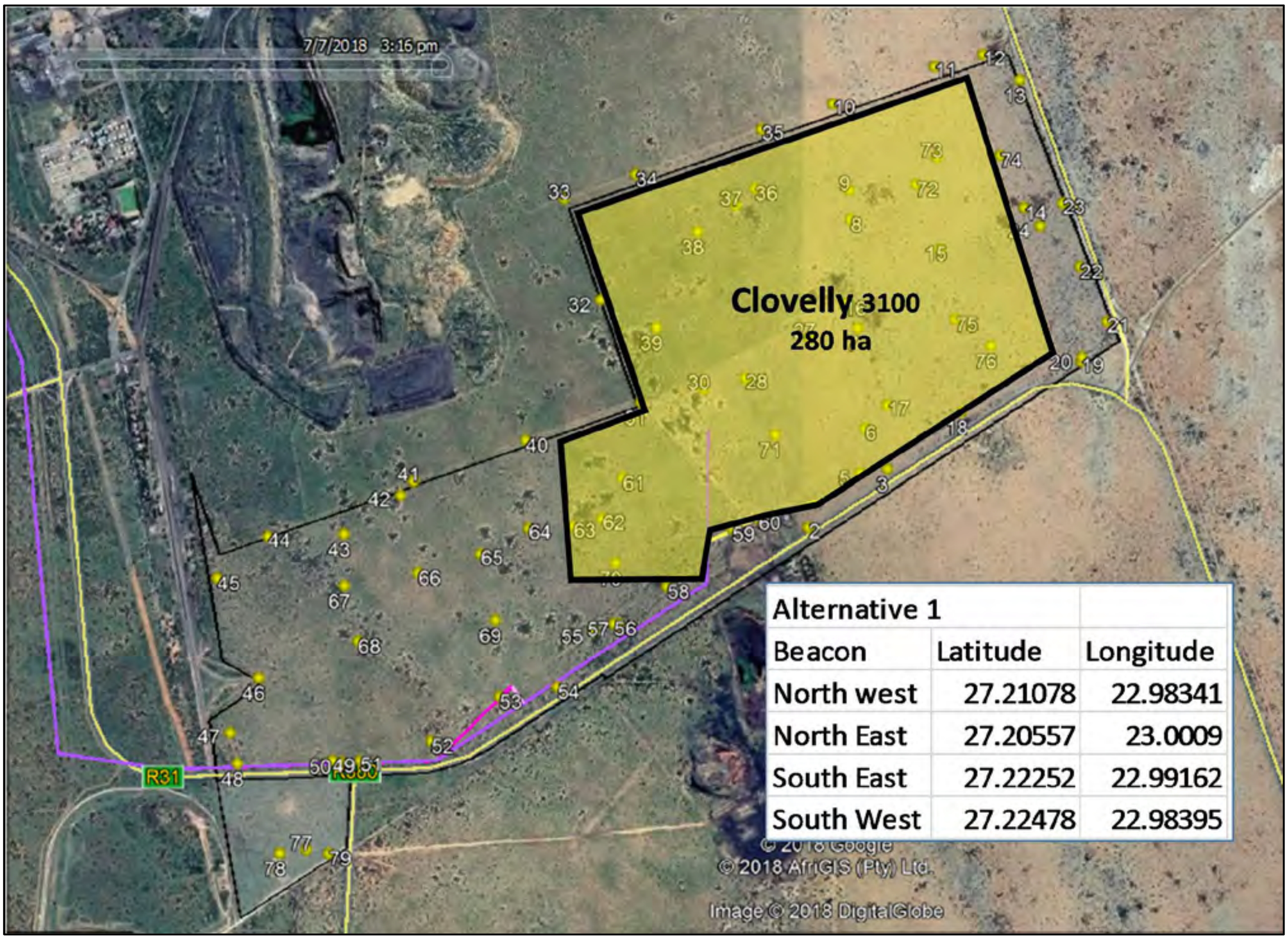
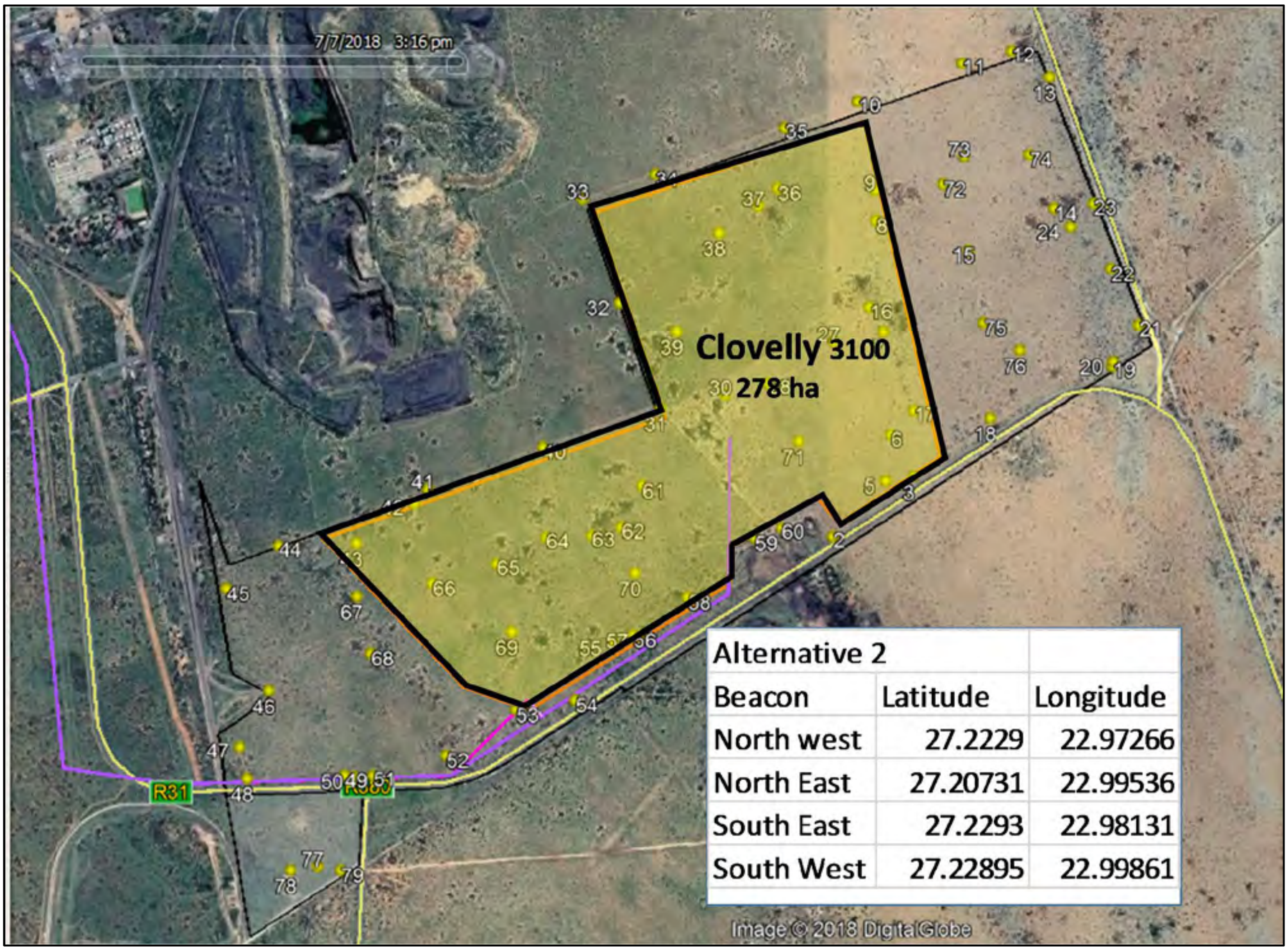


Figure 8: Soil map Alternative 1



Alternative 2		
Beacon	Latitude	Longitude
North west	27.2229	22.97266
North East	27.20731	22.99536
South East	27.2293	22.98131
South West	27.22895	22.99861

Figure 9: Soil map Alternative 2

5.9 Vegetation

A veld condition assessment by visual acknowledgement was done simultaneous with the soil survey. The photos in Figure 10 show the veld condition. The vegetation type is Savanna (Kathu biome). The composition of the grazing varies from open grass with low to heavy encroachment of Black Thorn acacia (*Acacia mellifera*), as can been seen in Figure 10. Encroachment takes place when veld is over-grazed or where construction took place.

Acacia haematoxylon

Acacia hebeclada

Acacia erioloba

***Over* grazing bush encroachment**

OBS 33 Mining north of site

Savanna *veld A haematoylon and A erioloba*

Figure 10: Vegetation

The grasses identified on site are shown in Figure 11.

(a) *Eragrostis pallens a p*erennial and un-palatable grass with low grazing value

b) Tassel Three–awn (*Aristida congesta*), which has low grazing value but is important to cover bare patches, thus preventing erosion

c) Annual Three-awn *Aristida adscensionis,a*nnual grass with low grazing value,

(d) Sand Quik *Schmidtia pappophorroides* , which has high gazing value

Figure 11: Grasses identified on site

6. AGRICULTURAL POTENTIAL OF THE SITE

The agricultural potential of the land is vested in the interaction of the soil physical properties and climatic conditions.

Table 2 gives a summary of the soil physical properties.

Table 2: Soil physical properties

Clovelly Setlagole			
Soil Properties	A Horizon Topsoil	B Horizon Sub-soil	C-Horizon Sub-strata
Texture	Very fine sand	Very fine sand	Not specified
Consistency	Loose to very loose	Loose to very loose	
Structure	Single grain	Apedal	
Colour	Strong Brown	Strong Brown	
Horizon Depth	300mm	>1200mm	>1500 mm
Depth limitation	None < 1500 mm		
Effective Depth	1200 mm		
Carbon content	Low <3%		
Consistency	Loose		

Terrain position	Foot Slope
Geology	Dolomite formations/Aeolian sand
Slope shape	Strait
Slope gradient	1%
Moisture availability	Low
Erosion potential	Low. Susceptible to wind erosion if vegetation is altered.
Leaching status	Eutrophic
Transition	Non Luvic

Although the soil has a depth in excess of 1500 mm, the effective wetting depth is limited by the texture of the soil and rainfall. This is mainly because of the excessive drainage and poor water holding capacity of the soil (sand can only retain 12% of rainfall). Low carbon and clay content lead to low nutrient availability to plants. Consistency is the degree of cohesion and adhesion within the soil mass or its resistance to deformation. With a loose consistency, the soil is very vulnerable if not covered with vegetation.

Figure 12 shows the interaction of rain and temperature expected for the specific site.

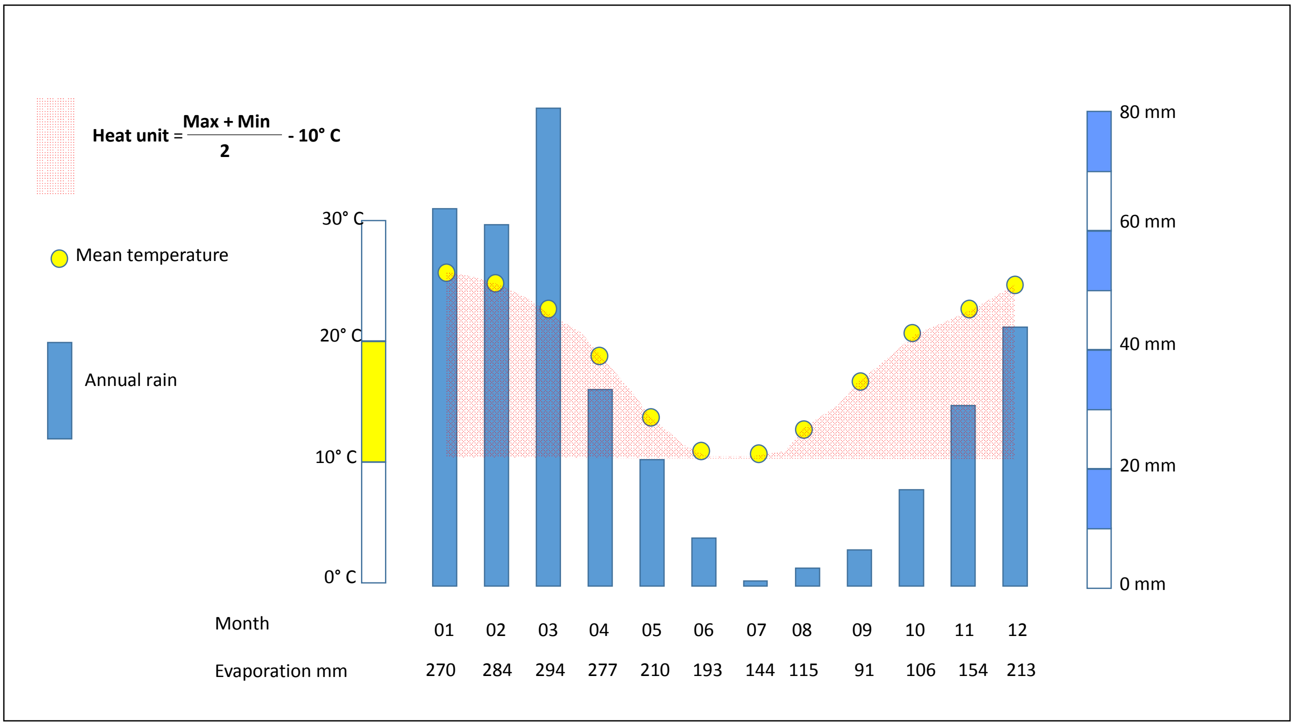


Figure 12: Climatic interaction of rain, temperature and evaporation.

A crop requires specific elements to yield successfully at the end of its growing season, of which heat and moisture are the most important. The time when these elements are required, are of significant importance.

As an example, maize is usually planted when 650-850 heat units can be expected for a minimum period of 61 days, thus, during the summer months. The peak of the rain season on site is in March, the end of the growing season. This is also when the highest evaporation is recorded. In Figure 12, the yellow dots show the mean temperature and the red zone the expected heat units. The required planting date and necessary follow up rain combination is not found.

Sustainable cash crop production is not recommended under these conditions.

The farm is used as a grazing unit for cattle. The unit is bordered by mining activities to the north and south, roads on the south and east side and railroad on the west side. The unit is divided in five grazing camps with handling facilities near the homestead (observation point 60) and a diversion kraal (observation point 16).

With a usable area of 509 ha and suggested carrying capacity of 13 ha/LSU, a herd of 39 LSU can safely be allowed grazing the area.

7. ASSESSMENT OF ACCESS ROAD AND GRID CONNECTION

The proposed alternative access roads, grid connections and overhead line are shown in Figure 13 and Figure 14. The photos in Figure 15 illustrate the area along these lines.

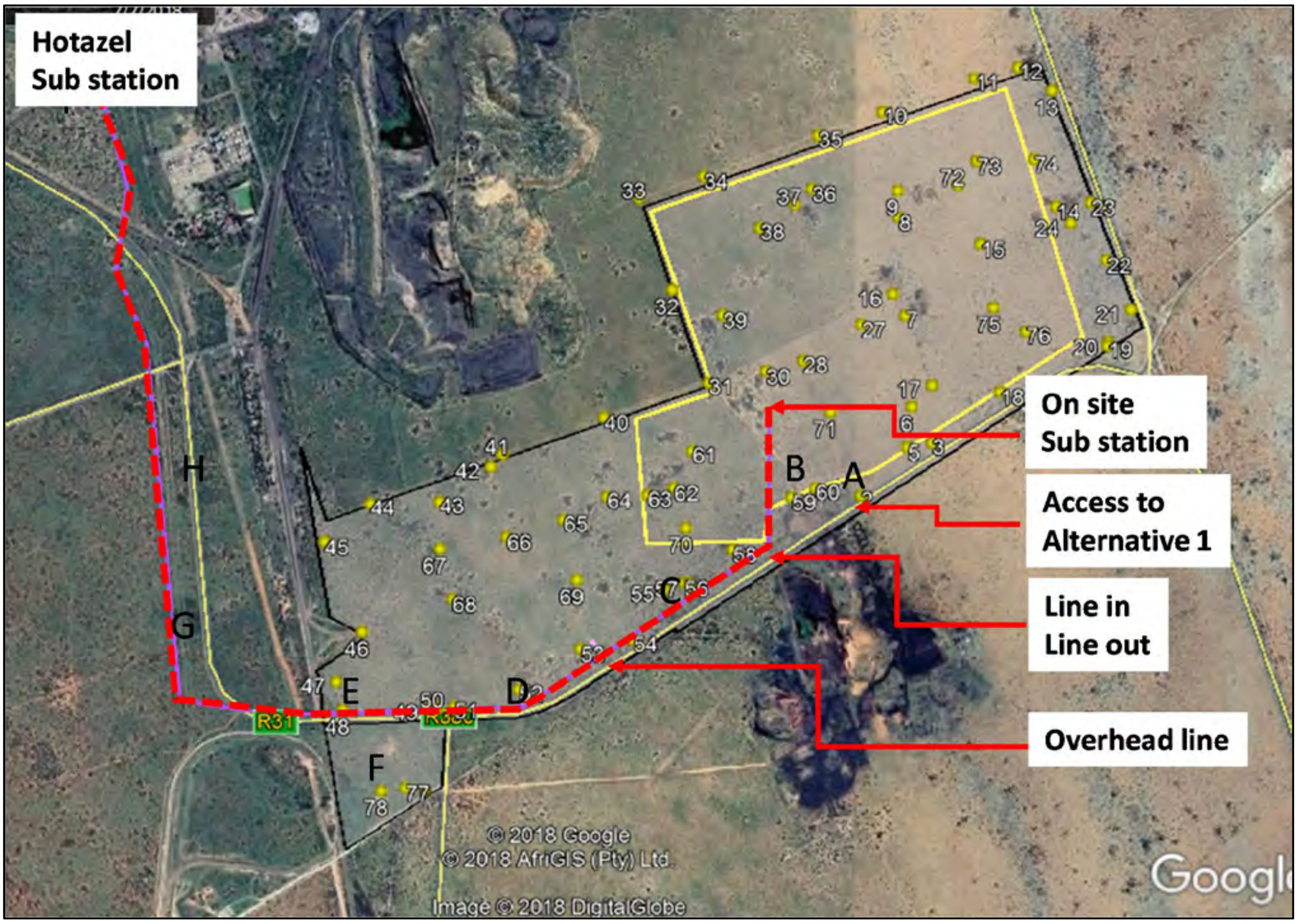


Figure 13: Grid connection Alternative 1

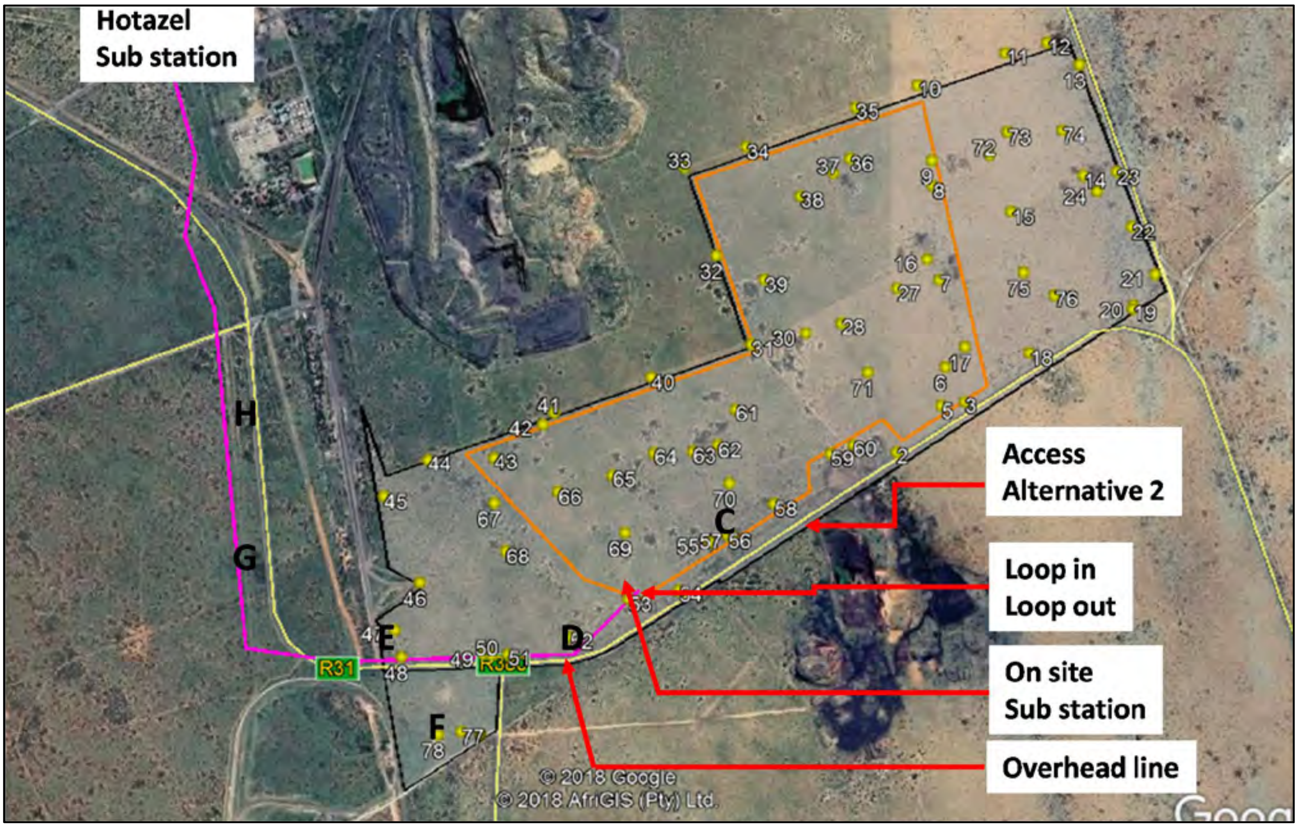


Figure 14: Grid connections Alternative 2

A Existing entrance to farmstead (OBS 2)

B Veld condition near OBS 60


C Access to Alternative 2 OBS 56


D Single line at OBS 50


E Edge of borrowing pit at OBS 48


F First merger of incoming lines south of R31. Foto from OBS 77


G In overhead line corridor west of R31 (Google photo)

G Enroute to Hotazel (Google photo)

Figure 15: Access road and grid connection photos

7.1 Access to site

Access to the site in Alternative 1 is directly from the R31 provincial road as shown in Figure 13 and Figure 15 as **A.** The R31 connects Kuruman and Hotazel and is in a good condition. Access to the 132 kV Eskom line, currently under construction, is also at this point.

Access to the site in Alternative 2 is also directly from the R31 provincial road, but as shown in Figure 14 and Figure 15 as **C.**

The dominant soil is a Clovelly 3100 with a soil depth of >1200 mm. The soil is valued as low potential, due to the low clay content (<10%), loose consistency of top and sub-soil and arid climate. Black thorn Acacia is prominent.

Precautionary measures must be taken to mitigate the risk of ground disturbances with the construction of the access road. Attention should be given to drainage, water flow, erosion, and the existence of *Acacia eriloba.*

7.2 Grid Connection

Alternative 1

Alternative 1 is demonstrated in Figure 13 and Figure 15. The connection to the grid will be from the onsite substation (S27.219144 E23.6275) as shown in Figure 13 to the Hotazel Substation (S27.20591 E 22.96261). There is a possibility to connect with a loop-in-loop-out at point (S 27.225087 E 22.990116)

The overhead line stretches from the onsite substation, up to point **E** on the proposed site. From **E** towards Hotazel it follows the existing alignment of Eskom power lines.

The dominant soil is Clovelly 3100 with a soil depth of >1200 mm. The soil is of low potential because of the low clay content (<10%), loose consistency of top and sub soil and arid climate.

At **OBS 59** and **48,** the land is disturbed, possibly used as a borrowing pit. Precautionary measures must be taken to mitigate the risk of erosion during construction of the overhead line.

Alternative 2

Figure 14 and Figure 15 shows this alternative. The connection to the grid will be from the onsite substation (S27.219144 E22.989775) as shown in Figure 14 to the Eskom Substation at Hotazel (S27.20591 E22.96261). A possibility exists to connect with a loop-in-loop-out at point (S 27.229960 E 22.981897).

The overhead line is for the stretch from the onsite substation, up to point **E** on the proposed site. From E towards Hotazel it follows the existing alignment of Eskom power lines.

The dominant soil is a Clovelly 3100 with a soil depth of >1200 mm. The soil is valued as low potential because of the low clay content (<10%), loose consistency of top and sub soil and arid climate.

At **OBS 59** and **48,** the land is disturbed, possibly used as a borrowing pit. Precautionary measures must be taken to mitigate the risk of erosion during construction of the overhead line.

The overhead line will have a low impact on agricultural production, as grazing can continue and the lines are in a compact, narrow gauge.

8. ASSESSMENT OF PROPOSED DEVELOPMENT

The development proposed is to construct a commercial photovoltaic (PV) solar energy facility (SEF) on ± 275 ha agricultural land. The approximate area that each component of the SEF will occupy is summarised in Table 3.

Table 3: Components of the development

SEF Component	Estimated Area	% of Development Area (275 ha)	% of Farm Area (636.7946 ha)
PV Structures/modules	±250 ha	90.91%	39.26%
Internal roads	±18 ha	6.55%	2.83%
Auxiliary buildings	±1 ha	0.36%	0.16%
Substation	±1 ha	0.36%	0.16%
Other	±5 ha	1.82%	0.78%

From the estimate above, the potential impacts that the facility may have on agricultural development of the farm, are:

8.1 Loss of agricultural land

The total size of the farm is 636 ha. With a carrying capacity of 13 ha /LSU 48 large stock units are the maximum animals allowed for sustained grazing on the farm.

The proposed PV facility will have a footprint of 275 ha which means a loss of 21 large stock units.

The current manageable area is down sized to 509 ha due to separation by the road and railway line. This allows only 39 LSU to graze which is not an economical unit on its own.

8.2 Erosion and change of drainage patterns

With the construction, the removal of vegetation makes the area vulnerable to wind erosion. Mitigating measures should be put in place to control possible erosion. Change of drainage patterns should be addressed although the flat slope and high infiltration rate ensure a low risk for it to happen.

8.3 Pollution

During construction of all the components may impact on the soil due to possibe spillages of concrete and fuel.

These three aspects will form the baseline of investigation during the impact assessment.

It may further contribute towards the cumulitative effect of the increasing number of renewable energy facilities on the regional agricultural community.

9. CONCLUSION

The proposed PV facility is planned on a site with a high coincidence of natural and manmade features that determine the feasibility of such a structure.

Geology and climate dictates the soil characteristics to be found in this location, which is a sandy textured soil with low cohesive structure .The soil will have a high base status due to low leaching that took place.

The soil and climate combination restricts cash crop production, due to low water retention, excessive drainage, low nutrient adsorbsion with high fertilizer requirements and high susceptibility to wind erosion.

The arid conditions restrict choice of crops to be planted.

Due to the limiting conditions set out above, the site is classified as Class VI capability, in terms of which it is unsuited for cultivation and restricts utilisation to grazing, woodland or wildlife.

The concentration of mines in the area increases the need for infrastructure to support the mining activities. These include urbanisation, railways, roads and electricity provision. These all impact on agricultural land.

The challenge is to reach a compromise that will ensure the safety and prosperity of all these role players.

I am confident that such a solution can be found if the necessary consideration and mitigation measures are applied.

C R LUBBE 26 July 2018
AGRICULTURAL SPECIALIST

LIMITATIONS

This Document has been provided subject to the following limitations:

(i) This Document has been prepared for the particular purpose outlined in it. No responsibility is accepted for its use in other contexts or for other purpose.

(ii) CR Lubbe did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Document. Conditions may exist which were undetectable at the time of this study. Variations in conditions may occur from time to time.

(iii) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted for incomplete or inaccurate data supplied by others.

(iv) This Document is provided for sole use by the client and its professional advisers and is therefore confidential. No responsibility for the contents of this Document will be accepted to any person other than the Client.

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Van Oudtshoorn F, 1994. *Gids tot Grasse van Suid-Afrika*. Briza, Arcadia

KEY QUALIFICATIONS:

National Higher Diploma in Agriculture (Irrigation), Technikon Pretoria, 1982
Certificate in Stereoscopic Interpretation, Geology and Resource Classification and Utilisation, Department of Agriculture, 1979
National Diploma in Agriculture, Technikon Pretoria, 1976

OTHER EDUCATION:

Certificate in Turf Grass Management, Technikon Pretoria, 1987
Certificate in Landscape Management, Technikon Pretoria, 1988
Cultivated pastures (Mod 320), University of Pretoria, 1995
FSC Auditors Course (Woodmark, UK), Sappi Ltd, 2003
NOSA Health and Safety Certificate, 1996
Certificate of Competence: Civil Designer - Design Centre and Survey and Design (Knowledge Base, August 2005)

EMPLOYMENT RECORD:

July 2006 to date	**CR LUBBE** Self employed Involved in various projects (see project related experience).	
June 2004- June 2006	**Gauteng Department of Agriculture Conservation and Environment** (Component: Technology Development and Support) **Acting Assistant Director: Resource Planning and Utilization**	**Johannesburg, SA**
Jan 1997 – May 2004	**CR LUBBE** **Self employed** Involved in various projects (See Project related experience below)	**Pretoria, SA**
1980 to 1996	**Technikon Pretoria** **Lecturer** Teaching Agricultural Engineering and Land Use Planning subjects. Teaching included practical courses, examination and moderation	**Pretoria, SA**
1974 - 1979	**Department of Agriculture (Transvaal Region)** **Senior Extension Technician** Farm Planning, Surveying, Design of soil conservation systems, Agricultural Extension.	**Carolina and Ermelo, SA**

SUMMARY OF EXPERIENCE

Has 42 years of experience in planning and managing natural resources to ensure optimal utilisation, without exploiting such resources to the detriment of future generations.

Fourteen years experience as a soil consultant, doing mainly soil surveys, terrain classification and agricultural potential studies. Reports include a variety of maps and GIS aspects thus play a large role in these surveys and studies.

Seventeen years of lecturing agricultural engineering subjects: Soil Conservation Techniques I, II and III, which dealt with the surveying, design and drawing of soil conservation structures; Farm Planning, which dealt with optimal resource utilization and Agricultural Mechanization, which dealt with the implements and machinery used to mechanize farming.

Ten years experience in the survey, design and supervising the construction of soil conservation structures in the agricultural field, mainly for farm planning.

PROJECT RELATED EXPERIENCE

PROJECTS UNDERTAKEN IN INDIVIDUAL CAPACITY

Cape EA — **Apr 2015**
Agricultural Impact Assessment : EIA for the Construction and Operation of two Photovoltaic Power Stations at Kathu in the Northern Cape.

Savannah Environmental — **Mar 2015**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Wind Farm near Moorreesburg, Western Cape.

Department of Agriculture, Forestry and Fisheries — **Mar 2015**
Eastern Cape Land Capability Verification Survey

Department of Agriculture, Forestry and Fisheries — **Dec 2014**
Western Cape Land Capability Verification Survey

Cape EA **Aug 2014**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station at Upington (RE Cap 5)in the Northern Cape.

Cape EA **Aug 2014**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station at Postmasburg (RE Cap 5)in the Northern Cape.

Cape EA **Aug 2014**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station at Upington (Joram) in the Northern Cape.

Cape EA **Aug 2014**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station at Copperton (RE Cap 5) in the Northern Cape.

Cape EA **Aug 2014**
Agricultural Impact Assessment : EIA for the Establishment of a Cemetery at Zoar, near Ladismith in the Western Cape. .

Cape EA **Aug 2014**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station at Copperton (RE Cap 5) in the Northern Cape.

Macroplan **Jun 2014**
Agricultural Impact Assessment: Application for rezoning of Agricultural land at Upington (Sweet Sensation), Northern Cape

Macroplan **Mar 2014**
Agricultural Potential Study: Application for change of land use at Upington (McTaggarts), Northern Cape

Agricultural Development Corporation **Jan to March 2014**
Design of Feedlot infrastructure and stock watering systems for Kenana Sugar in Sudan.

Cape EA **Nov 2013**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station in the Richtersveld, Western Cape.

Cape EA **Jul 2013**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station at Upington in the Northern Cape.

Cape EA **Oct 2012**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station near Danielskuil in the Northern Cape.

Senter360 **Oct 2012**
Agricultural Potential Study for a Food Security Development Units in the Democratic Republic of the Congo.

Africa Livestock Project Development Consortium **Aug 2012**
Agricultural Impact Assessment for the Construction and Operation of a Beef Cattle Handlings Facility for a Sugar Company in Northern Sudan

Van Zyl Environmental Consultants **Mar 2012**
Agricultural Impact Assessment : EIA for the Construction and Operation of a Photovoltaic Power Station in the Northern Cape.

Bushveld Eco Services **Nov 2011**
Design and cost estimate of a stock watering system in the Lephalale disctrict.

WSM Leshika **Sep 2011**
Soil suitability survey for two new upcoming farmers at Vhuawela & Tshoga in the Limpopo Province.

National Department of Agriculture **Aug 2011**
Soil survey investigating soil potential for change of land use at the Levendal Development in the Paarl district, Western Cape.

Van Zyl Environmental Consultants **Mar 2011**
Agricultural Impact Assessment : EIA for the Construction and Operation of four Photovoltaic Power Stations in the Northern Cape.

WSM Leshika **Nov 2010**
Potential assessments and land use plans for four new upcoming farmers in the Limpopo Province.

FP Botha **Apr 2010**
Potential assessments and land use plans for various new Limpopo agricultural development hubs

Golder Associates Africa (Pty) Ltd **May 2009 – Apr 2010**
Potential assessments and Landuse plans for the resettlement of land tenants at Mafube Coal Mine in the Belfast district of the Mpumalanga Province
Sappi **Vryheid, RSA**
Undertook reconnaissance soil surveys on various plantations and farms in the Vryheid and Piet Retief districts to establish forestation potential and evaluation for species choice (covering a total area of 5173 ha).

Environmentek, CSIR **Nelspruit, RSA**
Undertook soil and terrain classification surveys on the Jessievale (8313 ha) and New Agatha (1 700 ha) plantations.

Safcol (Komatieland) **Limpopo Province**
Undertook environmental, soil and terrain classification surveys on the Thatevondo (4 500 ha), Mafela (920 ha) and Mmamatola (1 263 ha) plantations.

Measured Farming **Gabon, Swaziland & RSA**
Undertook soil and terrain classification surveys on Ranch Lope and Ranch Suba in Gabon, Kubuta Farm in Swaziland and on the farms Madikwe in the Limpopo Province and Stoffelsrus in the Free State, South Africa.

Loxton Venn and Associates **Potgietersrus, RSA**
Assess comparative soils and area for relocating Village Ga-Sekhaolelo on Overysel 815LR to Rooibokfontein 812LR and Village Ga-Puka on Swartfontein 818 LR to Armoed on Potgietersrus Platinum Mine.

Department of Water Affairs and Forestry **Gauteng**
GPS survey and alien identification for mapping of Jukskei and Swartspruit areas, as part of the Working for Water Program.

Sustainable Forestry Management Ltd **Limpopo and Mpumalanga**
Participated in a due diligence audit on various SAFCOL plantations in the Limpopo and Mpumalanga Provinces as part of the preparation of a British company's tender to purchase these plantations.

Mustek Engineering **Ghana**
Survey to provide a detailed inventory of the forest resources in 17 specified Forest Reserves in Ghana to develop a practical and operationally sound methodology for monitoring the natural forest resources in Ghana, based on satellite imagery for the Ghana Forestry Commission.

Afrigis Environmental Solutions, Pretoria
Various Soil Surveys and Landuse Plannings – Domestic and Neighbouring Countries

Rural Integrated Engineering, Pretoria
Various Soil Surveys and Landuse Plannings

Africa Land-Use Training, Modimole
Lectures at Basic Farm Planning Course (Limpopo and Gauteng)

Appendix B

Declaration of Independence

CR Lubbe was appointed by Abo Wind Hotazel PV (Pty) Ltd via Cape Environmental Assessment Practitioners (Pty) Ltd, the EAP, to conduct an independent agricultural scoping study for the proposed Hotazel PV Power Plant in the Northern Cape.

He is not a subsidiary or in any way affiliated to Abo Wind Hotazel PV (Pty) Ltd.

CR Lubbe also does not have any interest in secondary developments that may arise from the authorisation of the proposed project.

Christo Lubbe

CR Lubbe

26 July 2018