BASIC ASSESSMENT

PROPOSED CONSTRUCTION AND IMPLEMENTATION OF GEEL KOP GRID CONNECTION INFRASTRUCTURE NEAR UPINGTON, NORTHERN CAPE

APPLICANT: Geel Kop Grid (Pty) Ltd

AGRICULTURAL ASSESSMENT REPORT
NOVEMBER 2020

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1. INTRODUCTION

Geel Kop Grid (Pty) Ltd proposes the construction and operation of grid connection infrastructure for the seven proposed solar photovoltaic (PV) facilities near Upington in the Northern Cape Province.

Additional associated infrastructure will also be required for the grid connection solution, including access roads, feeder bays (inclusive of line bays, busbars, bus section and protection equipment), switching stations, a fibre and optical ground wire (OPGW) layout, insulation and assembly structures.

A grid connection corridor approximately 300m wide and 34 km long is being assessed to allow for the optimisation of the grid connection and associated infrastructure to accommodate the identified environmental sensitivities.

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 25-27 February 2020, 22-24 May 2019 and July 2014.

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 verified by the field survey.

The site was visited at the end of the summer (2020), and neighbouring sites at the beginning of the winter (2019) and in winter (2014). So there is a clear picture of seasonal conditions.

4. 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 Grid Connection.

4.1 Locality

The gridline will traverse a number of properties, including:

- Geel Kop Farm 456 Remaining Extent;
- Portion 5 of Farm Bloemsmond 455;
- Portion 14 of Farm Bloemsmond 455;
- Remainder of Farm Dyasonsklip 454;
- Portion 35 of Farm Mc Taggarts Camp 453;
- Remaining Extent Farm Mc Taggarts Camp Suid 636;
- Remainder of Farm 638 Tungsten Lodge; and

- Olyvenhouts Drift Settlement Agricultural Holding, Holding Number 1080.

The grid connection corridor is situated in the ZF Mgcawu District of the Northern Cape Province, in the Kai !Garib Local Municipality. Access to the site is from the N14, approximately 25km south-west of Upington. The gridline corridor of approximately 34 km by 300m will in total cover an area of approximately 1 020 ha and run on the west side of the N14 between Upington and Keimoes - see Figure 1, 2, 3 and 4 for the proposed layouts.

4.2 Description of the proposed infrastructure

The Geel Kop grid connection infrastructure will facilitate the connection of seven facility switching stations / substations to a collector switching station, and then a 132kV powerline will connect the collector switching station to the National Grid via the Upington Main Transmission Substation (MTS).

Five substations/switching stations are required for the Geel Kop grid connection, as indicated on Figure 1

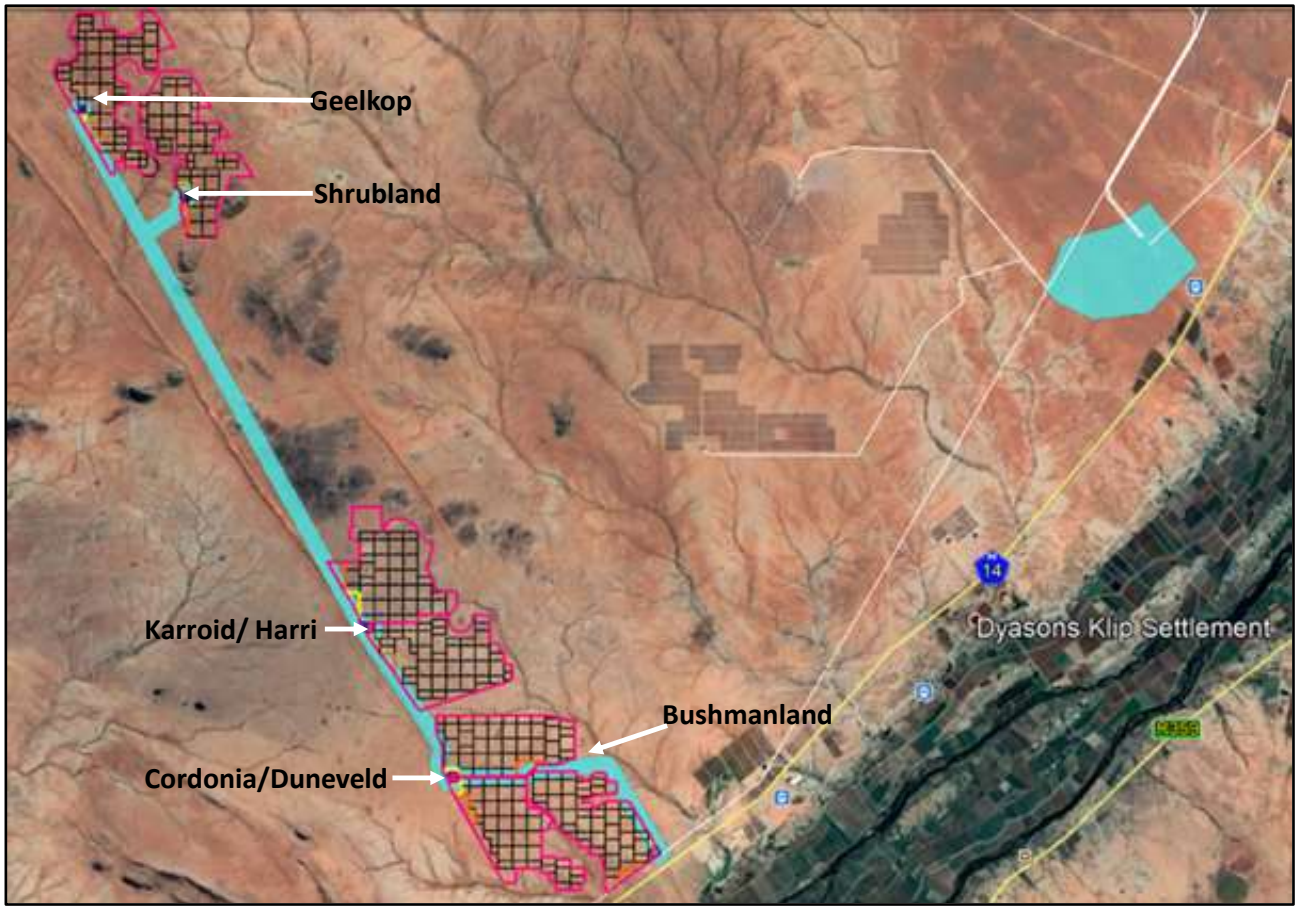


Figure 1: Substations/Switching stations locations

The substations/switching stations include:

- GK Solar PV switching station with a 100m X 50m footprint;
- Shrubland PV switching station with a 100m X 50m footprint;
- Karroid PV switching station/ Hari PV facility substation with 150m X 75 m footprint;
- Geel kop collector switching station with a 150m X75 m footprint; and
- Bushmanland PV collector switching station with a 150m X75 m footprint.

Corridor alignments between the substations/switching stations are as follows:

- a single or double circuit 33kV or 132kV power line connecting GK Solar PV switching station to Shrubland PV switching station;
- a single or double circuit 33kV or 132kV power line connecting Shrubland PV switching station and Karroid PV switching station / Hari PV facility substation;
- a single or double circuit 33kV or 132kV power line connecting Karroid PV switching station / Hari PV facility substation and Geel Kop collector switching station; and
- a single or double circuit 33kV or 132kV power line connecting Geel Kop collector switching station and Bushmanland PV facility substation/ collector switching station.

Two alternatives for the corridor alignments were considered. These are shown in Figures 2, 3 and 4.

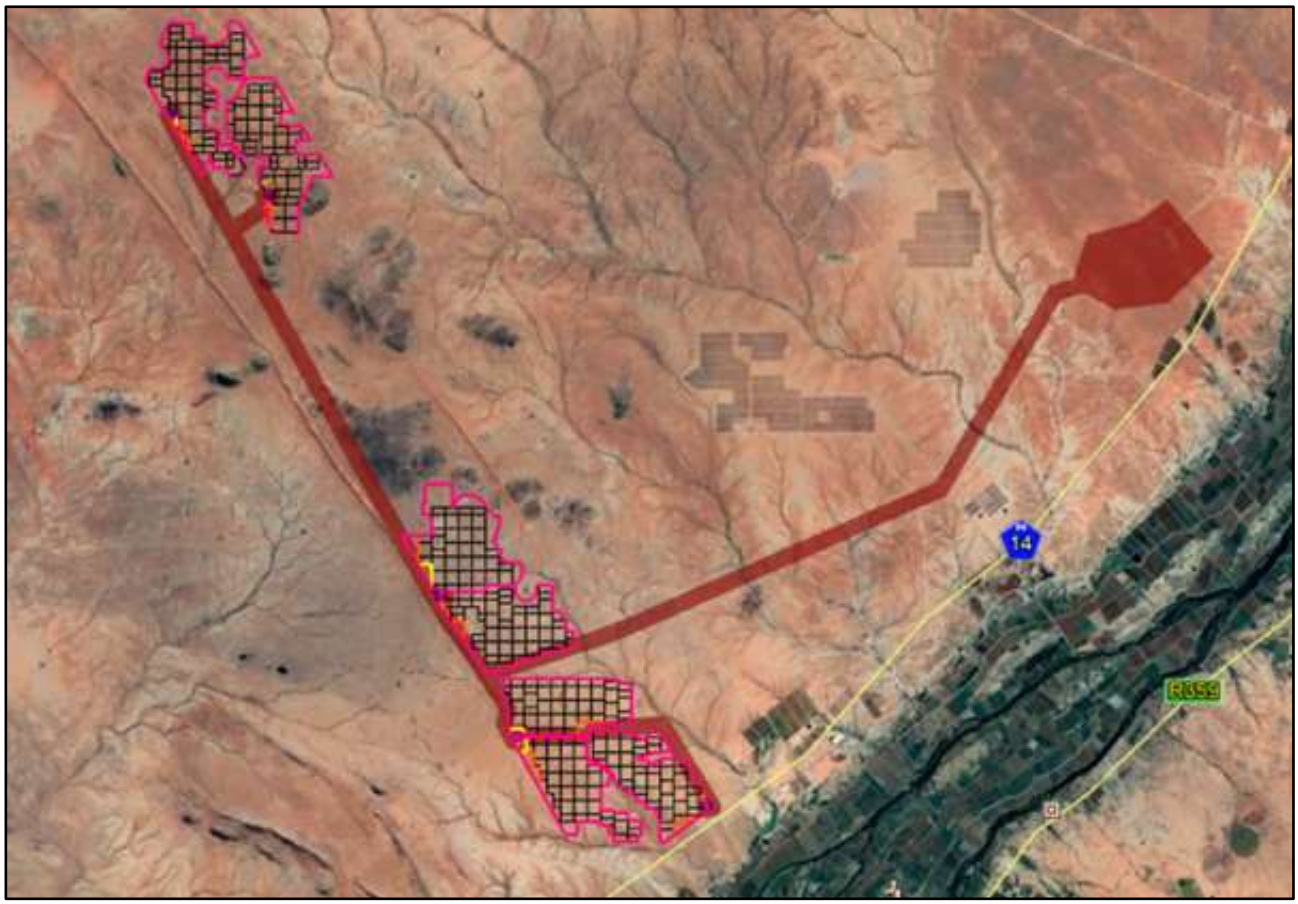


Figure 2 Location of alternative 1

Alternative 1[1]: A double circuit 132kV line from the Geel Kop collector switching station to the Upington MTS, parallel to the Eskom Aries-Upington 400kV 110m servitude.

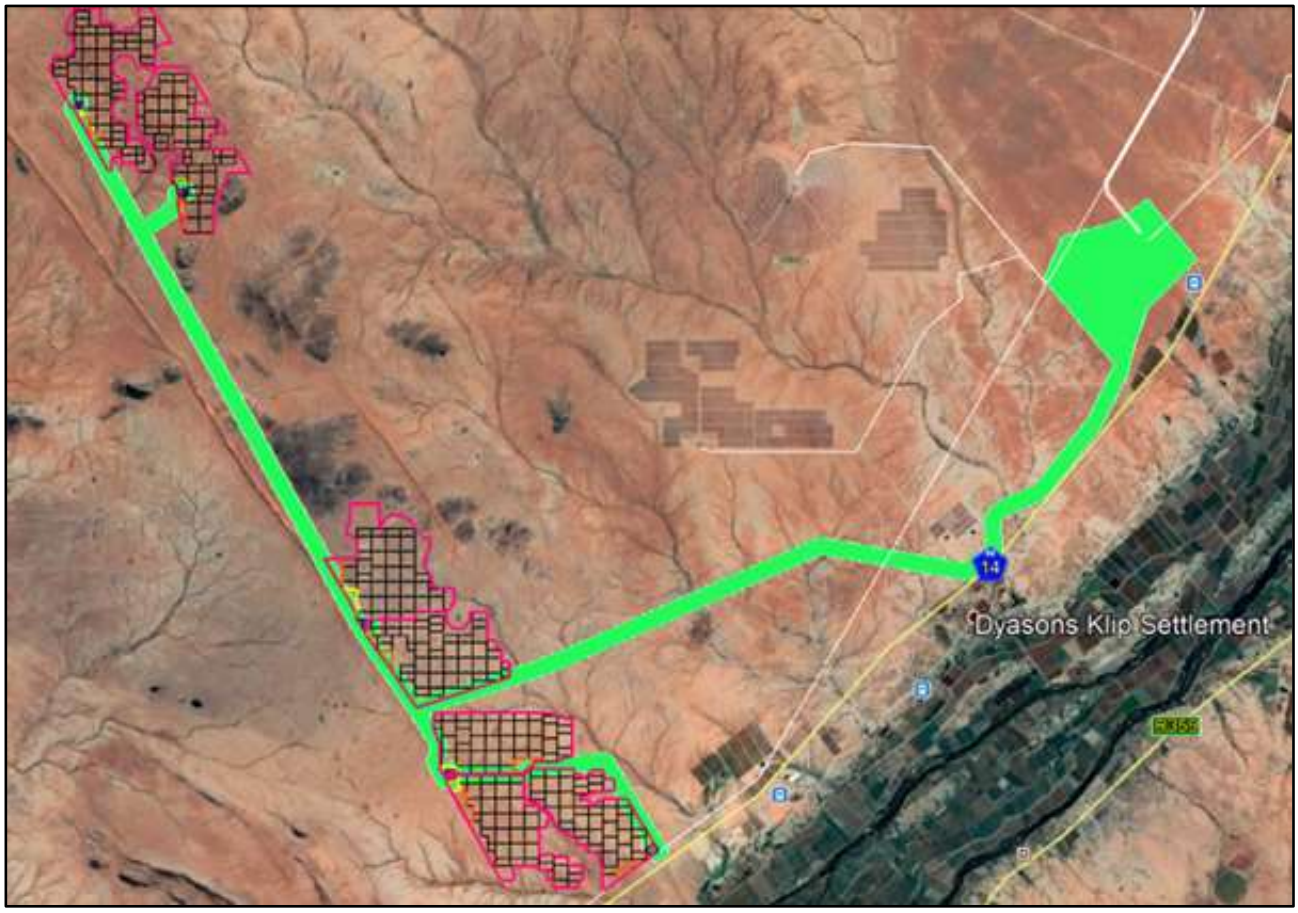


Figure 3: Location of updated alternative 1 (preferred)

Updated Alternative 1 (preferred): A double circuit 132 KV powerline from Geel Kop collector switching station to the Upington MTS. This powerline will run parallel with the Aries-Upington 400kV Powerline (authorised but not yet constructed) for approximately 7.2km, whereafter it turns towards and along the N14 to the MTS.

[1] Due to conflicting land use activities on the RE Farm 628, the previously preferred alternative 1 has been eliminated from further consideration in the environmental process and has been replaced with a new alternative, Updated Alternative 1.

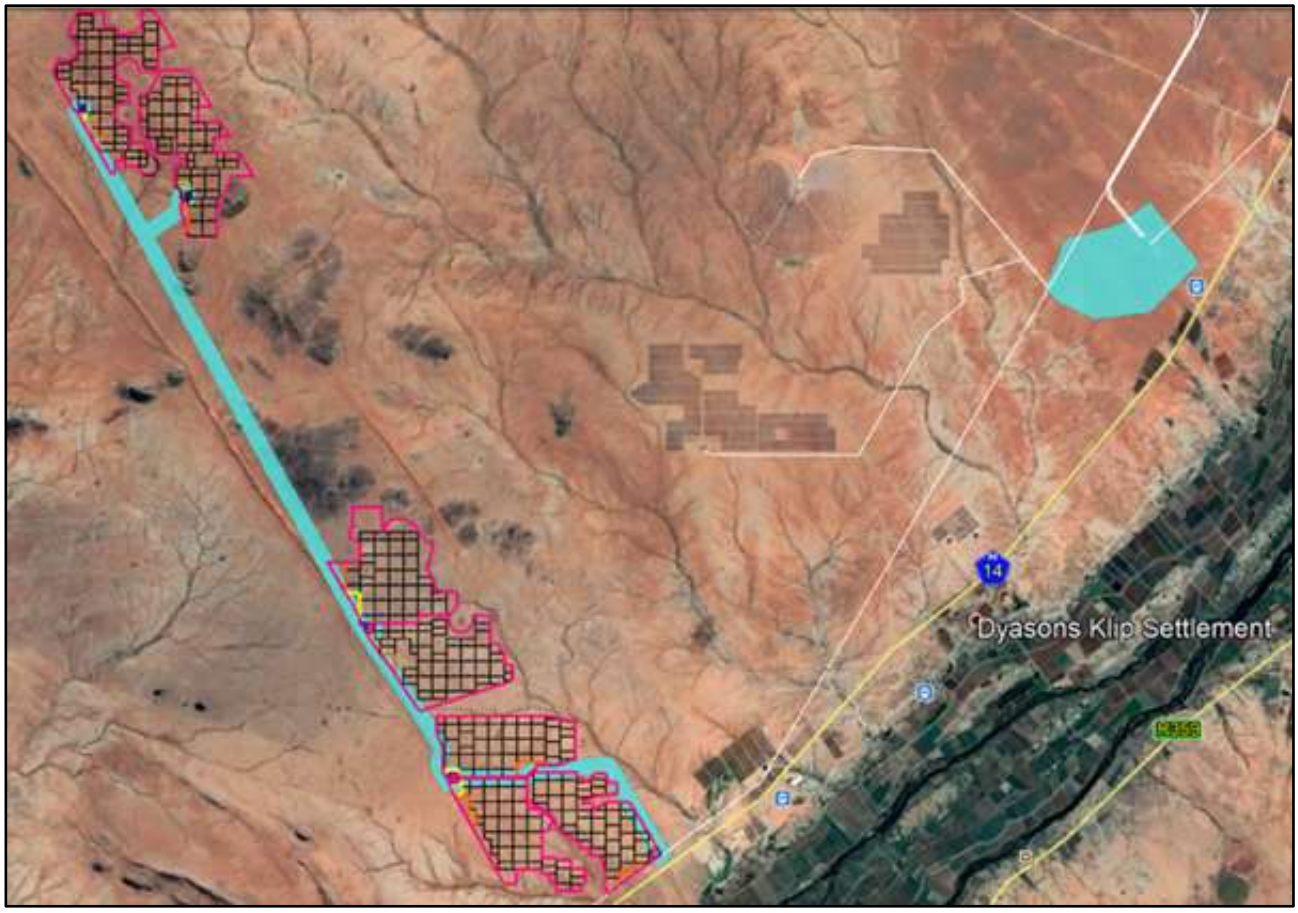


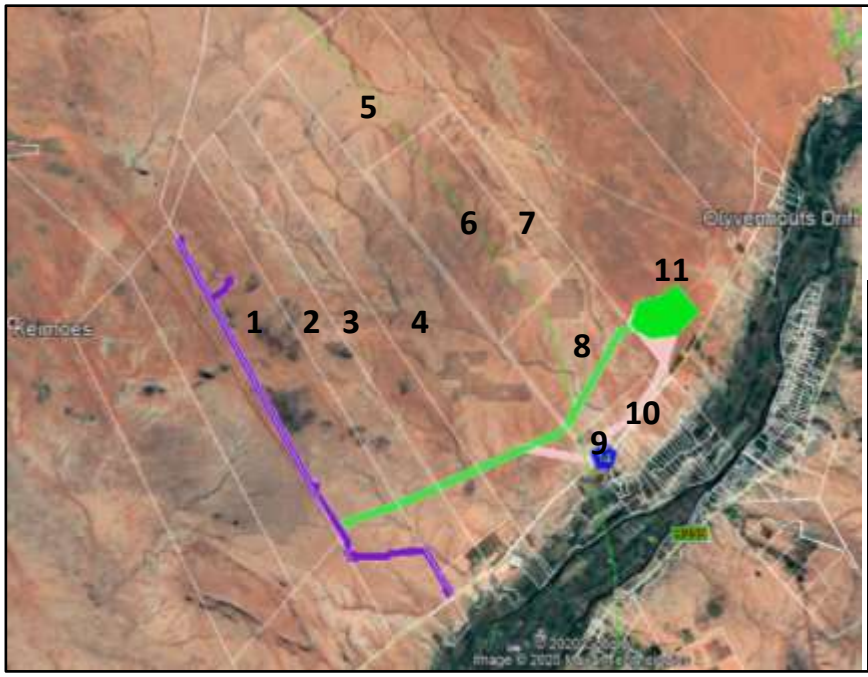
Figure 4: Location of alternative 2

Alternative 2: A loop in loop out (LILO) from the Bushmanland PV collector switching station into the McTaggerts / Oasis 132kV powerline, and reconductored as a double circuit 132kV line back to the Upington MTS.

The preferred alternative will be constructed on the following properties namely:

- Remaining Extent Farm Geel Kop 456
- Portion 5 of Farm Bloemsmond 455
- Portion 14 of Farm Bloemsmond 455
- Remainder of Farm Dyasonsklip 454
- Portion 35 of Farm Mc Taggarts Camp 453
- Remaining Extent Farm Mc Taggarts Camp Suid 636
- Remainder of Farm 638 Tungsten Lodge
- Olyvenhouts Drift Settlement Agricultural Holding, Holding Number 1080,

Figure 5 shows the compilation of the properties.



Number	Farm	Portion
1	Geelkop 456	0
2	Bloemsmond 455	5
3	Bloemsmond 455	14
4	Dyasonsklip 454	0
5	Rooipunt 617	0
6	Mctaggardscamp 453	3
7	Klip punt 452	12
8	Tungsten Lodge 638	0
9	Mctaggardscamp 453	43
10	Gordoniard 636	0
11	Olyvenhouts Drift Settlement AH 1080	0

Figure 5: Compilation map

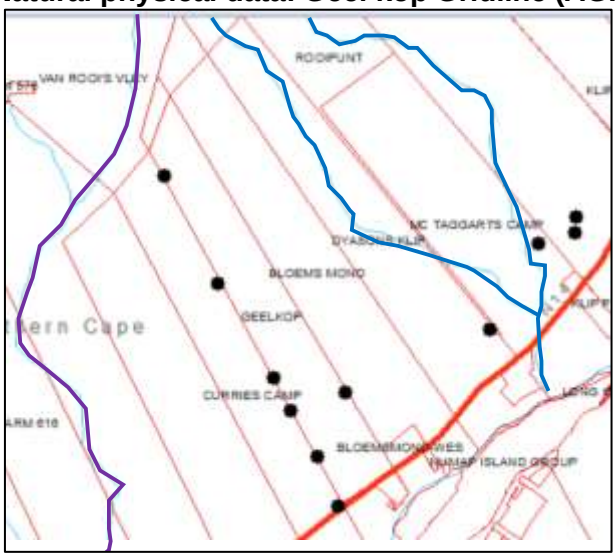
The access roads will not exceed 8m in width. Access to the grid connection infrastructure will be possible via existing roads in close vicinity to the infrastructure. Apart from these existing roads, the proposed solar PV facilities will contain access roads that can also be used to access the infrastructure.

Formal roads will not be constructed underneath the power lines for maintenance purposes; access will be limited to jeep tracks.

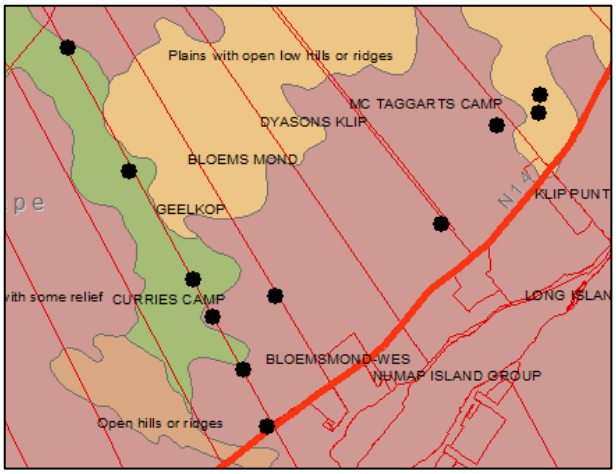
4.3 Natural Physical Data

Information about the natural physical data of the grid connection route was abstracted from thematic maps and is shown in Figure 6.

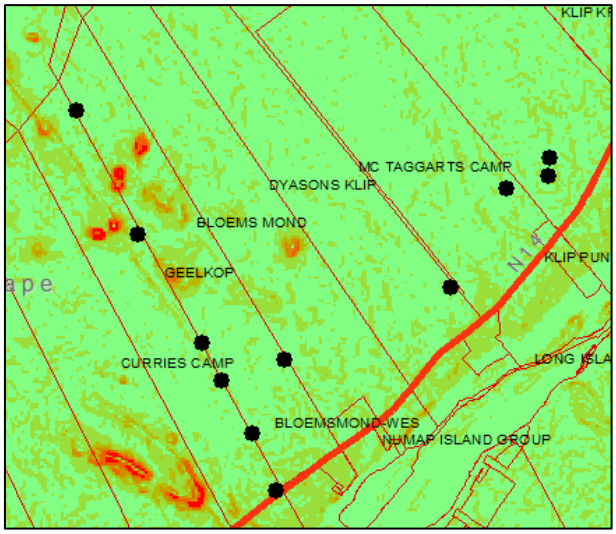
Natural physical data: Geel kop Gridline (AGIS)



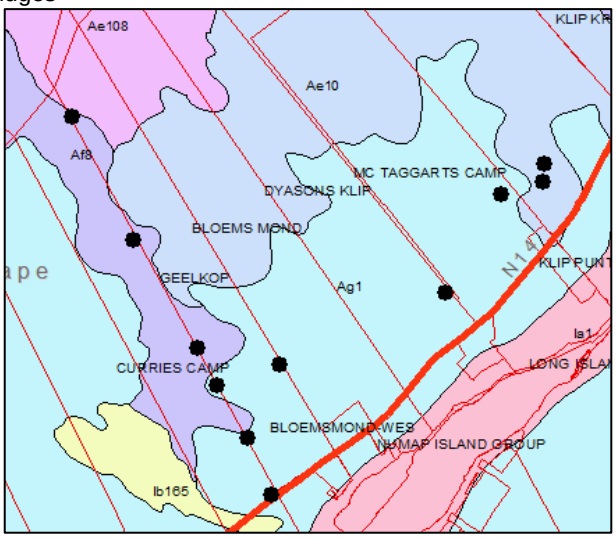
Drainage
Water management area
D 73 F Orange River



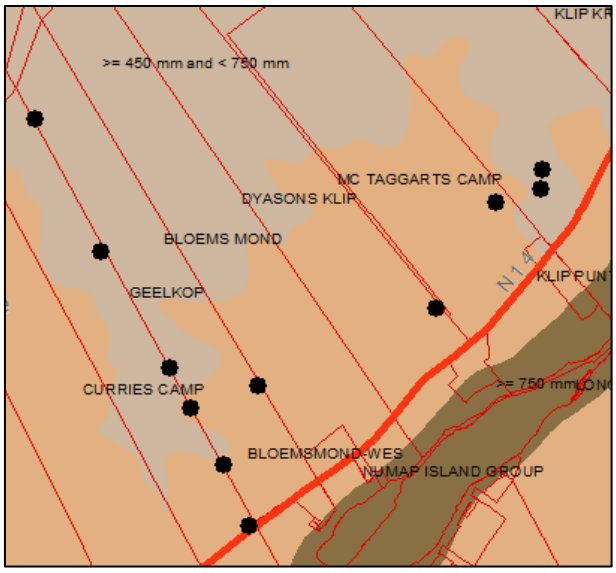
Terrain Type Rolling or irregular plains with some relief (Green) and
Level plains with some relief (Purple)Plains with open hills or ridges



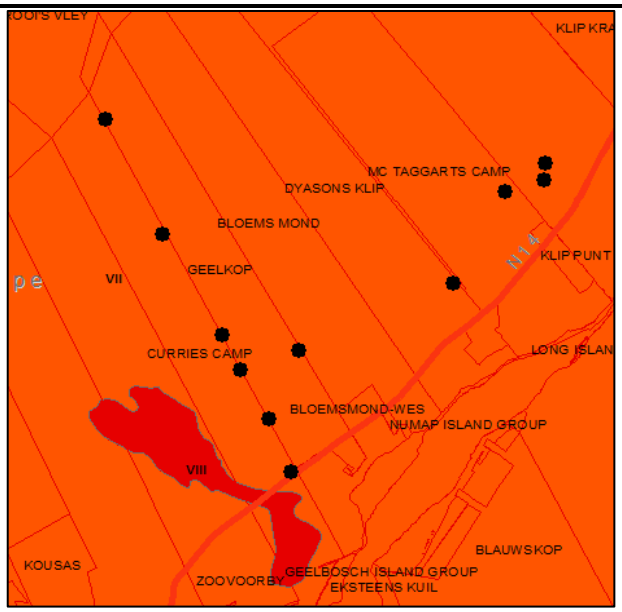
Average Slope : Majority of area <2% with some 2 -5 % Slopes red >20%



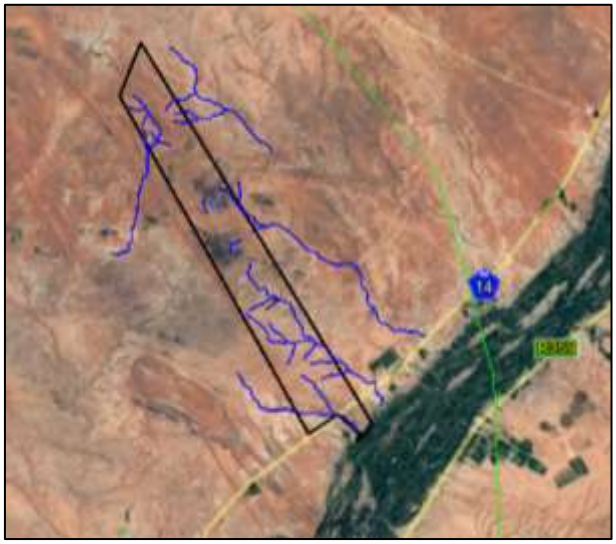
Land type (All red soils with high base status, >300 mm deep): Light purple: Ae108: no dunes, leaching status calcareous; Blue: Ae10: no dunes leaching status eutrophic; Turquois: Ag1: no dunes; Dark blue: Af8: with dunes.



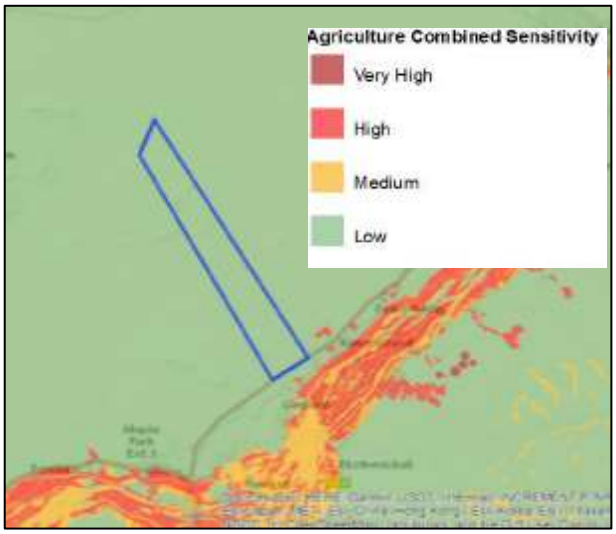
Grey: Soil depth range 450mm to 750mm.
Strong brown: Soil depth range shallower than 450 mm.



National Land Capability: Red VIII - Negligible agricultural value due to severe limitations. Pure sands strongly dominant. Orange VII: Grazing Woodland or Wildlife



Erosion Sensitivity: Drainage lines



Agricultural Combined Sensitivity Low

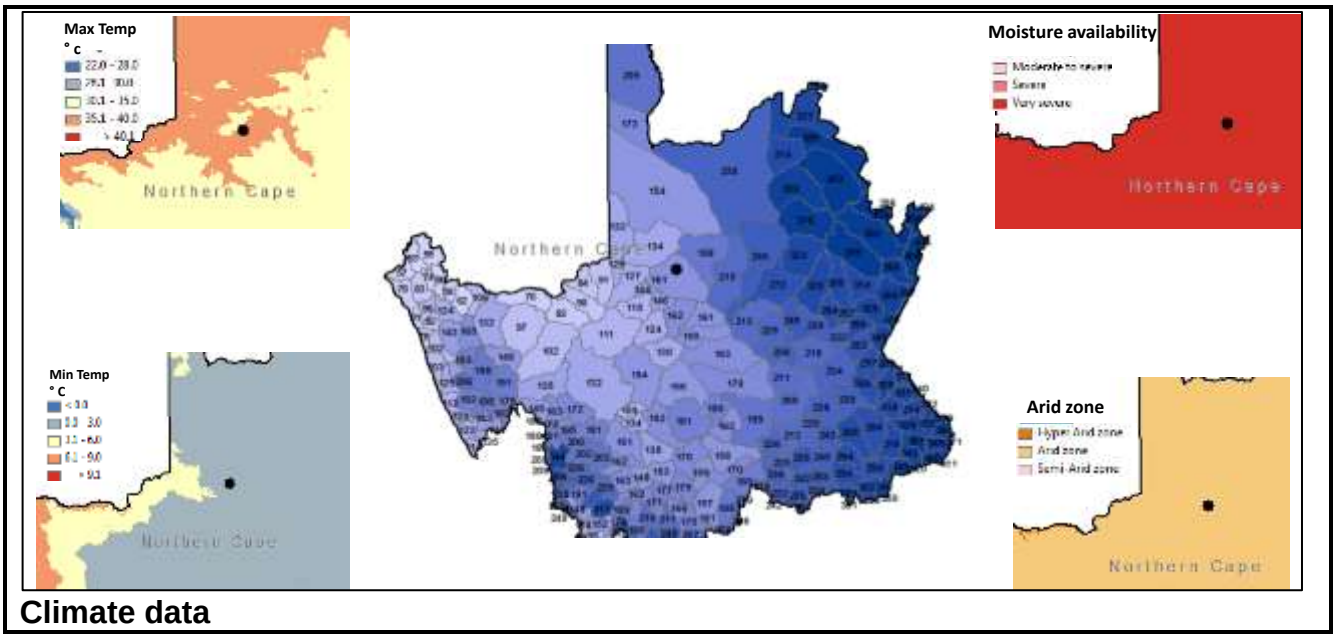


Figure 6: Thematic maps

Specific climatic parameters are shown in Table 1.

Table 1: Climatic information of the area

Rainfall	
Annual rainfall	161 mm
Summer rainfall	<62.5mm
Winter rainfall	<62.5mm
Variation in rainfall	40 to 50%
Temperature	
Mean maximum temperature	>35ºC
January Temperature	>27.5ºC
Mean minimum temperature	2-4ºC
July temperature	<7.5ºC
Temperature range	>15ºC
First frost expected	21-31 May
Last frost expected	01-10 September
Hours of sunshine	>80%
Evaporation	>2400mm
Humidity	<30%

4.4 Geology

The area lies in the Kalahari geological group of the Namaqualand metamorphic complex. This is the youngest of the geological groups formed in the past 65 million years.

The lithology (mineralogical composition and texture of rocks) of this area consists of:

Sand: During a very dry period in Southern Africa some 100 000 years ago sand was transported from the Namib dessert by strong and continuous winds and distributed over the Kalahari.

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

Sedimentary and Volcanic rocks (parent material of soils) found in the area include Migmatite, Schist, Gneiss and granite.

Soil: Calcic soils are prone to develop under the climatic conditions and geology of the area.

Calcic soils originate in arid climates with the accumulation of secondary lime, forming a distinctive horizon consisting chiefly of calcite. In calcic soils, either hardpan carbonate or a soft carbonate horizon or (rarely) gypsic horizon dominates the morphology of the sub-soil.

AGIS indicates the typical profile for soils in this region as follows:

- Soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils;
- Lime generally present in part or most of the landscape;
- Red and yellow well drained sandy soil with high base status;
- Freely drained, structure less soils;
- Favourable physical properties; and
- Soils may have restricted soil depth, excessive drainage, high erodibility

4.5 Sensitivity

The DEA Screening Tool classify the area as “low Agricultural Combined Sensitivity” and “very high Landscape (Solar) sensitivity”. The location is also within the Development Zone for Renewable Energy Development. See Table 2 for the Screening Tool Report.

Table 2: DEA Screening Tool Report

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity
Agriculture Theme				X
Animal Species Theme				X
Aquatic Biodiversity Theme	X			
Archaeological an dCultural Heritage Theme			X	
Avian Theme		X		
Bats Theme				X
Civil Aviation (Solar PV) Theme				X
Defence Theme				X
Landscape (Solar) Theme	X			

Paleontology Theme			X	
Plant Species Theme			X	
RFI Theme			X	
Terrestrial Biodiversity Theme	X			

5. FIELD STUDY

On 25-27 February 2020, 22-24 May 2019 and July 2014, different sites were visited to conduct field studies. All of these field studies are relevant to the proposed grid connection corridor.

Figure 7 shows the results of the soil surveys. The soils observed show similarities in texture, structure and colour, but differs in the type and depth of the depth limiting layer. There was a specific soil catena identified with soils deeper than 600 mm, mainly located in the valley bottoms and localised as single observations between the majorities of soils less than 300 mm deep.

Table 3 presents typical soil profiles encountered.

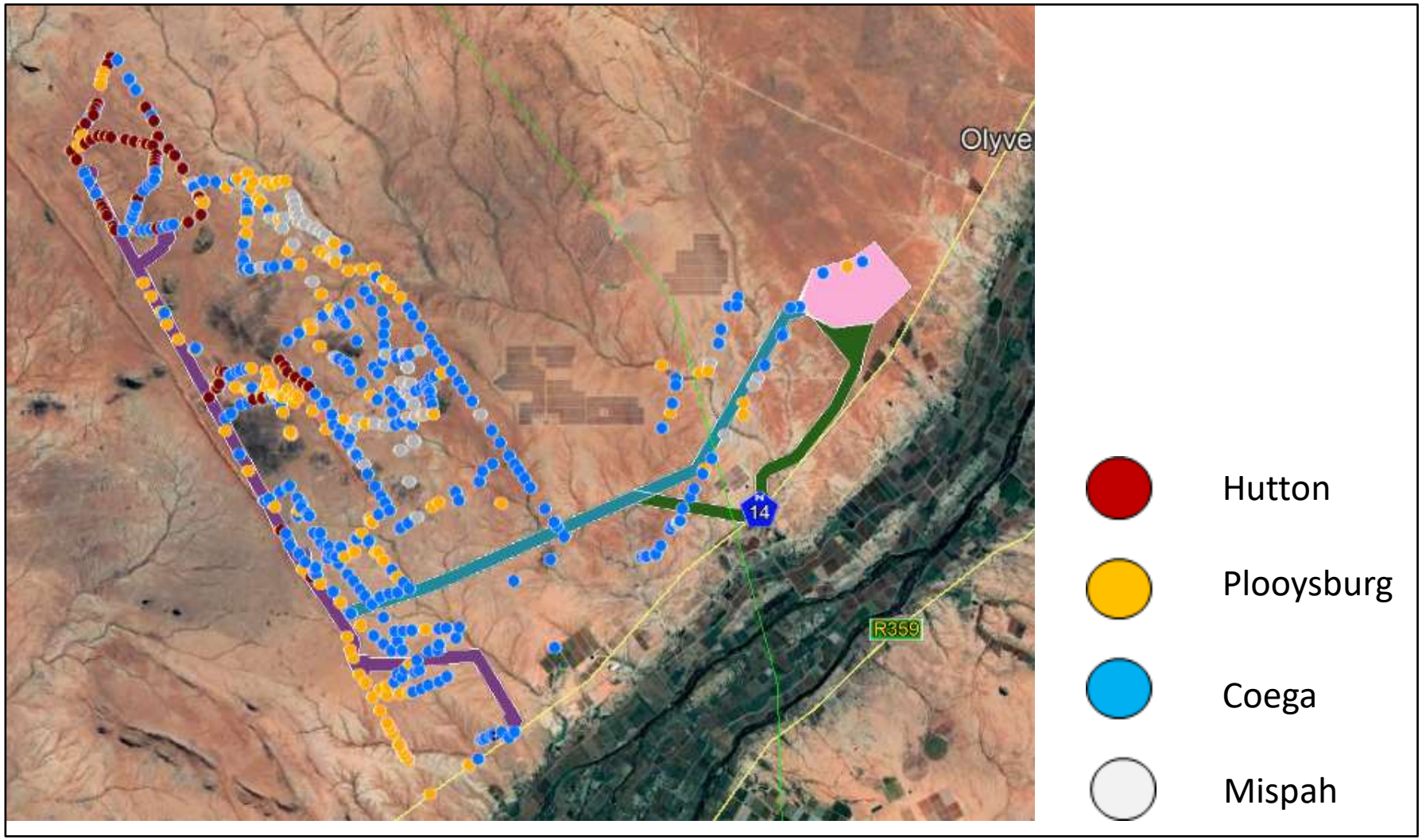


Figure 7: Soil survey

Table 3: Reference Soil Profiles

OBS	283	COMMENT		Koppie											
LAT	28.55589	SLOPE GRAD			2%		MOISTURE		L						
LONG	20.97211	SLOPE SHAPE		V			EROSION		M						
	FORM	Py	TSD	61	WET	0	HOR	TYPE	DEPTH	COL	CLAY	S-GR	CONS	STRUC	STONE
	FAM	1000	ESD	61	C	I	1	A	20	10R4/6	6	f	5	sg	0
	ROUGH	2	ASD	61	GEO	D4	2	B	61	10R4/6	6	f	5	a	0
	TERR_POS	4	LTN	h	PHOTO		3								
	L.COVER/USE:	med 3 Thorn poor grass low K bush Grazing													
	VIS.VELD.COND	A	2	B	5	C	5	D	4	E	2	TOTAL	18		

Soil Properties	**A Horizon Topsoil**	**B Horizon Sub-soil**	**C-Horizon Sub-strata**
Texture	Medium sand	Medium sand	Hardpan carbonate
Consistency	Loose to very loose	Loose to very loose	
Structure	Single grain	Apedal	
Colour	Red	Red	
Horizon Depth	200mm	600mm	>700mm
Depth limitation	Hardpan Carbonate		
Effective Depth	600mm		
Terrain position	Footslope		
Geology	Undifferentiated basic rock		
Slope shape	Convex		
Slope gradient	< 5 %		
Moisture availability	Low		
Erosion potential	High		
Soil Form	Plooysburg		
Soil Family	Brakkies		
Land cover and use	Medium *Rhigozum* infestation with poor grazing grasses and low Karoo bush cover. Used for grazing. Slight levels topsoil loss.		

OBS	77	COMMENT													
LAT	28.60513	SLOPE GRAD			4		MOISTURE		I						
LONG	21.00459	SLOPE SHAPE		V			EROSION		M						
	FORM	Cg	TSD	20	WET	0	HOR	TYPE	DEPTH	COL	CLAY	S-GR	CONS	STRUC	STONE
	FAM	1000	ESD	20	C	I	1	A	20	10R4/6	6	f	5	sg	0
	ROUGH	2	ASD	20	GEO	D4	2								
	TERR_POS	4	LTN	h	PHOTO		3								
	L.COVER/USE:	Exposed Hard Carbonate med 3 Thorn low grass and K bush Grazing													
	VIS.VELD.COND	A	1	B	4	C	1	D	4	E	2	TOTAL	12		

Soil Properties	**A Horizon Topsoil**	**B Horizon Sub-soil**	**C-Horizon Sub-strata**
Texture	Fine sand	Massive	Hardpan Carbonate
Consistency	Loose to very loose	Very solid and hard	
Structure	Single grain	Hard setting horizon	
Colour	Red	Off white	
Horizon Depth	200mm	>300mm	>500mm
Depth limitation	Hardpan Carbonate hard setting		
Effective Depth	200mm		
Terrain position	Foot Slope		

Geology	Undifferentiated basic rock
Slope shape	Concave
Slope gradient	< 5 %
Moisture availability	Low
Erosion potential	High
Soil Form	Coega
Soil Family	Nabies
Land cover and use	Medium *Rhigozum* infestation with poor grazing grasses and medium Karoo bush cover. Used for grazing. Large exposure of surface. Hard carbonate and rock

OBS	229	**COMMENT**	Earth dam											
LAT	28.56820	**SLOPE GRAD**	2%			**MOISTURE**	L							
LONG	20.98431	**SLOPE SHAPE**	R			**EROSION**	M							
	FORM	Hu	**TSD**		**WET**	0	**HOR**	**TYPE**	**DEPTH**	**COL**	**CLAY**	**S-GR**	**CONS**	**STRUC**	**STONE**
	FAM	3100	**ESD**	30	**C**	I	**1**	**A**	20	2.5YR4/6	6	m	5	sg	0
	ROUGH	3	**ASD**	30	**GEO**	D4	**2**	**B**	30	2.5YR4/5	6	m	5	a	0
	TERR_POS	4	**LTN**	rr	**PHOTO**		**3**								
	L.COVER/USE:	Three thorn karoo bush grass													
	VIS.VELD.COND	**A**	**1**	**B**	**4**	**C**	**1**	**D**	**4**	**E**	**2**	**TOTAL**	12		

Soil Properties	**A Horizon Topsoil**	**B Horizon Sub-soil**	**C-Horizon Sub-strata**
Texture	Medium sand	Medium sand	
Consistency	Loose to very loose	Loose to very loose	
Structure	Single grain	Apedal	
Colour	Red	Red	
Horizon Depth	200mm	300mm	>500mm
Depth limitation	Hardpan Carbonate hard setting		
Effective Depth	300mm		
Terrain position	Foot Slope		
Geology	Undifferentiated basic rock		
Slope shape	Concave		
Slope gradient	< 5 %		
Moisture availability	Low		
Erosion potential	High		
Soil Form	Hutton		
Soil Family	Stella		
Land cover and use	Medium *Rhigozum* infestation with poor grazing grasses and low Karoo bush cover. Used for grazing. Slight levels topsoil loss.		

The photos in Figure 8 show the scenery at certain observation points along the grid line. The numbers at the photos corresponds with observation point numbers in Figure 9

178 GK Solar Coega 200 mm

115 Shrubland PV Hutton 700 mm

284 Plooysburg 600 mm

71 Coega 100 mm

77 Karroid /Hari Switching station Coega 100 mm

85 Coega 100 mm

115 Bushmanland PV Coega 200 mm

46 Plooysburg 300 mm

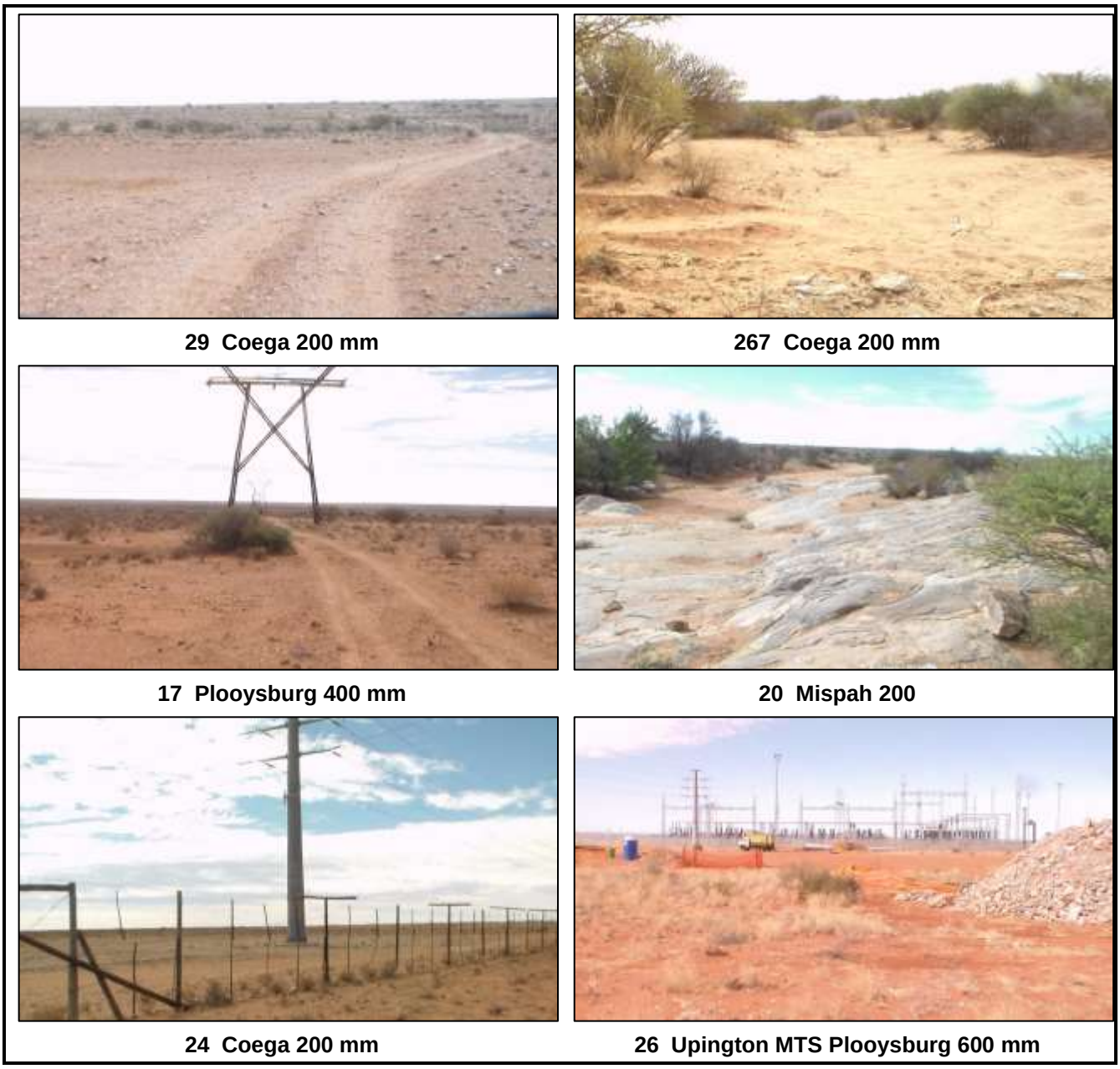


Figure 8: Imagery of the surveyed area

From results of the field studies, a soil potential map for the gridline was generated (Figure 9). Because of the similarities in soil properties, a soil profile based on effective depth was compiled with depth ranges in increments of 300 mm.

This map is used as reference to identify possible impacts on drainage or loss of high potential soil.

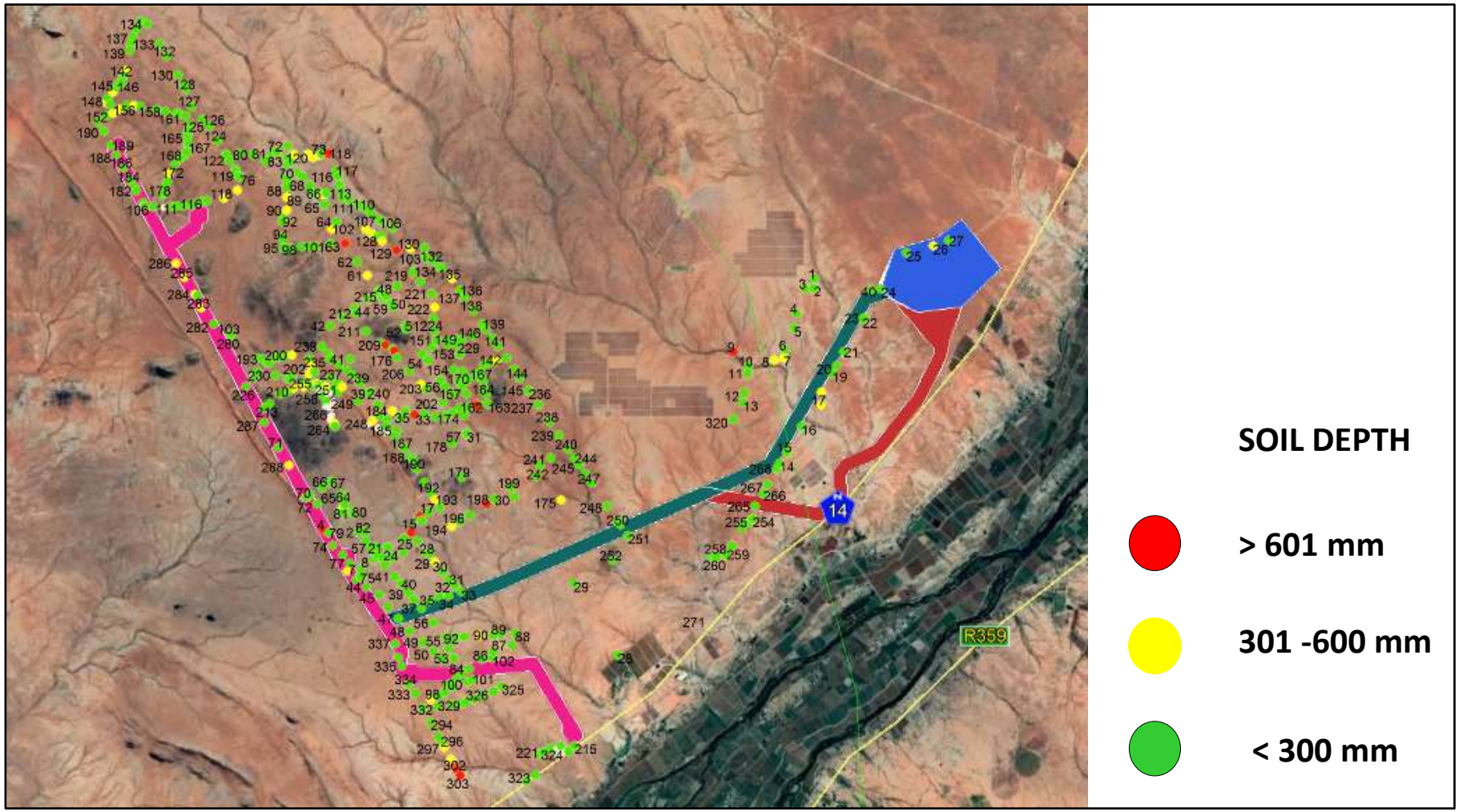


Figure 9: Combined Soil potential and drainage map for gridline

Drainage sensitivity

Only seasonal drainage lines occur in the region and on this farm. Because of the flatness of the terrain, depressions or pans with no outflow are formed, which catch some of the run-off. The rest is drained with multiple drainage lines to more defined drainage lines or seasonal streams. Vegetation grows on the outskirts of these lines. Shrubs and small trees are found, amongst others Acacia species, including *Acacia erioloba* and *Rhigozum trichototum.* When the construction of the transmission line is undertaken, clearing and crossing of these lines will take place. Possible impacts on the drainage lines may include erosion if the natural flow is obstructed by road crossings. Other possible impacts include soil pollution with fuel or cement and damage to protected plant species during vegetation clearance for construction.

With the construction of this gridline, the only clearing will be at the foundations of the supporting pylons. This is because the line will be constructed next to the existing access roads or running parallel to the Eskom Aries-Upington 400kV 110m servitude. Formal roads will not be constructed underneath the power lines for maintenance purposes; access for maintenance will be limited to jeep tracks.

Loss of high potential agricultural soil

The screening with the DEA tool reported low combined agricultural sensitivity, which can be interpreted as a lack of high potential soil. The combination of very shallow and stony soils with the harsh conditions of the climate endorse this prediction. The establishment of vineyards on these soils is only possible with amelioration and supporting irrigation.

6. PAST AND CURRENT AGRICULTURAL ACTIVITIES ON SITE AND THE REGION

The site is currently utilised for extensive livestock farming. The livestock comprises of a small herd of cattle. Boer goats were initially farmed with in the past as the nameplate at the farm entrance suggest. Due to animal theft and control of wild animals praying on them, the farmer stopped this venture. There is no evidence of past or current cultivation on the site.

In the past, cultivation concentrated at the buffer around the Gariep River and not advancing to the northern side of the N14. In the last five years, several Vineyards were established on the northern side as well as packaging and selling facilities. These intensive practices are established close to the river, while extensive grazing take place on the bulk of the farmlands.

Figure 10 shows the agricultural activities on the site as well as in the region, which is extensive grazing, except for the intensive cultivation on the buffer zone of the Gariep River.

The proposed infrastructure will be within the Renewable Energy Development Zone (REDZ).

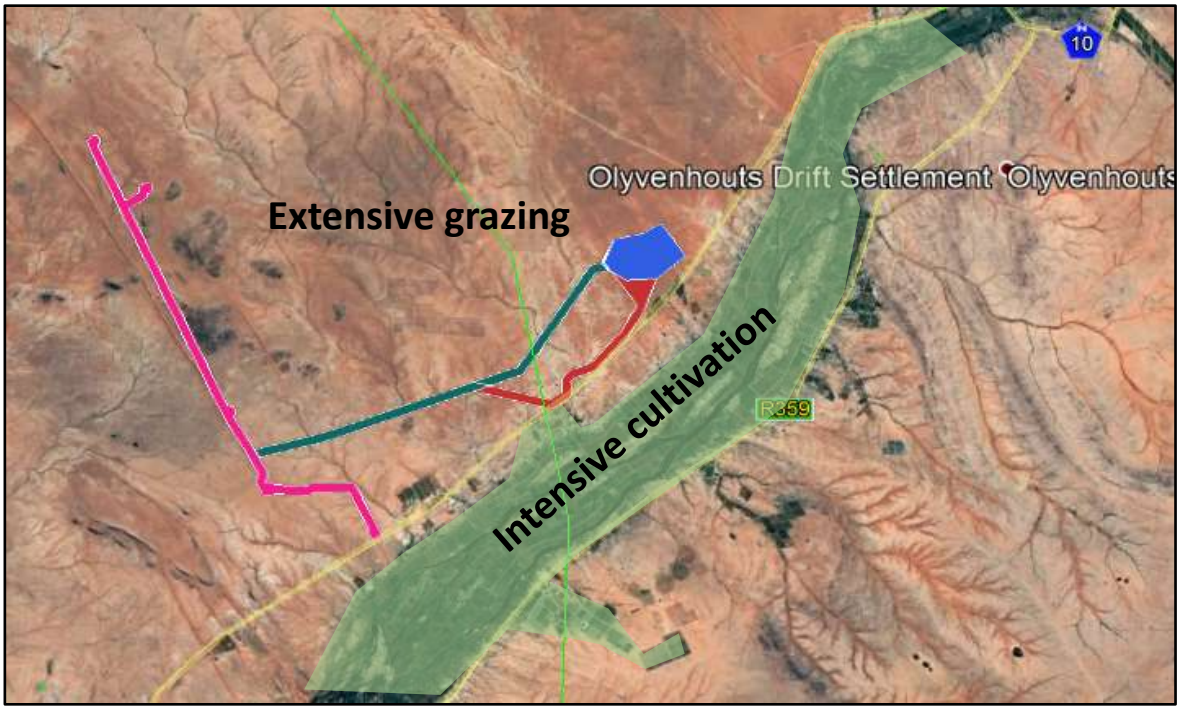


Figure 10: Agricultural activities in the region of the farm

7. STRUCTURES ON SITE

Structures on the grid connection route comprise mainly of fences and water and handling facilities for livestock. On three of the farms to be crossed by the gridline, the construction of PV facilities is in process, namely on Dyasonsklip, Mc Taggarts and Olyvenhoutsdrift. On three farms vineyards were established, i.e. on Bloemsmond, Dyasonsklip and Mc Taggarts.

8. ASSESSMENT OF PROPOSED DEVELOPMENT

The Geel Kop grid connection infrastructure will facilitate the connection of seven facility substations/switching stations to a collector switching station, and then a 132kV powerline will connect the collector switching station to the National Grid via the Upington Main Transmission Substation (MTS).

Impacts on the land will lie in the process of excavation and construction of the pylons. This process includes the establishment of laydown areas, access roads and transportation of equipment.

In Figure 11, the main process to erect the pylon is illustrated with an indication of its permanent footprint after construction.

Excavation for foundation

Rehabilitated excavated area.

Rubble used for filling or construction of access roads (however formal roads will not be constructed underneath the power lines for maintenance purposes and access will be limited to jeep tracks)

Footprint has low interference with grazing

Figure 11: Construction of pylon

From the description in Figure 11, the potential impacts that the grid line may have on agriculture in this stretch of land, are:

8.1 Loss of agricultural land

Approximately 34 km of servitude would be required for the connection line. With a width of 31 m, this comes to 105.4 ha. The area would however still be available for grazing after rehabilitation.

8.2 Erosion and change of drainage patterns

During construction, the removal of vegetation makes the area vulnerable to wind and water erosion. Mitigating measures should be put in place to prevent erosion.

8.3 Pollution

During construction of all the components, possibe spillages of concrete and fuel may pollute the soil.

Mitigating measures for the prevention or rehabilitation of such incidents have to be followed.

9. POTENTIAL IMPACTS ON THE AGRICULTURAL ENVIRONMENT

9.1 Methodology to assess impacts

Potential impacts of the proposed project on agriculture were identified and evaluated. Impacts identified through the study were rated in terms of the following criteria:

- The nature, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The extent, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The duration, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) –assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) -assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long-term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The magnitude, quantified on a scale from 0-10, where a score is assigned:
  - 0 is small and will have no effect on the environment
  - 2 is minor and will not result in an impact on processes
  - 4 is low and will cause a slight impact on processes
  - 6 is moderate and will result in processes continuing but in a modified way
  - 8 is high (processes are altered to the extent that they temporarily cease)
  - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- The probability of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale, and a score assigned:
  - Assigned a score of 1–5, where 1 is very improbable (probably will not happen)
  - Assigned a score of 2 is improbable (some possibility, but low likelihood)
  - Assigned a score of 3 is probable (distinct possibility)
  - Assigned a score of 4 is highly probable (most likely)
  - Assigned a score of 5 is definite (impact will occur regardless of any
  - prevention measures)
- the significance, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and

- the status, which will be described as either positive, negative or neutral,
- the degree to which the impact can be reversed,
- the degree to which the impact may cause irreplaceable loss of resources,
- the degree to which the impact can be mitigated.
- The significance is calculated by combining the criteria in the following formula:

  S = (E+D+M)P

  S = Significance weighting

  E = Extent

  D = Duration

  M = Magnitude

  P = Probability

- The significance weightings for each potential impact are as follows:

  - <30 points: Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
  - 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
  - >60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

9.2 Possible impacts during construction

Soil pollution with contaminants during the construction phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the construction of all facets of the infrastructure: laydown area, concrete foundations of the pylons, and jeep tracks.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium Term (2)	Very short (1)
Magnitude	Low (4)	Minor(2)
Probability	Probable (3)	Probable(3)
Significance	**Low (21)**	**Low (12)**
Status (Positive or negative)	Negative	Negative
Reversibility	Partly reversible	Fully reversible
Irreplaceable loss of Resources	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: Refueling normally takes place in the laydown area. Proactive measures must be taken which include constructing of a designated area where refueling can take place. This area must have an impervious floor with low wall that will keep the spillage inside. This area should be cleaned with absorbent material on a regular basis. The use of cut-off drains must be incorporated to divert upslope clean storm water around the site into a natural drainage system. On the down slope, polluted water must be collected via a cut-off drain into a leachate collection and recovery system.		

When spillage accidently takes place, it should be removed and replaced with unpolluted soil. The clean soil can be sourced from excavations nearby. The polluted soil must be piled at a temporary storage facility with a firm waterproof base and is protected from inflow of storm water. It must have an effective drainage system to a waterproof spillage collection area. Contaminated soil must be disposed of at a hazardous waste storage facility.
Cumulative impacts: No, site-bound
Residual Risks: Yes, it is impossible to clear the affected area completely.

The establishment of the grid will be done at the expense of agricultural land. The area to be lost for agricultural development would be the servitude of 105.4 ha.		
	Without mitigation	**With mitigation**
Extent	Local – Regional (3)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	**Medium (39)**	**Low (20)**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of Resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: The general objective is to position the grid on the lowest potential soil and not in places that may have an impact on agricultural activities, drainage lines and places with a sensitive nature, such as protected tree species. Existing road alignments should followed as far as possible during the lifespan of the facility. With the appropriate planning, the same lifestyle can be maintained during the existence of the facility.		
Cumulative impacts: Impact is low due to agricultural potential of the local area. With increasingly adding of facilities, the impact will become more of significance if not mitigated.		
Residual Risks: No, after decommissioning this impact will be reversed when rehabilitation has been completed.		

The construction of the gridline will cause impairment of the land capability with the potential risk of erosion		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (2)
Duration	Short term (2)	Short term (2)
Magnitude	Low (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium(30)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: Clear trees and bushes selectively, leaving grass un-disturbed. Use mechanised machinery when installing pylons. Construct on alternate strips to combat possible erosion.		

Cumulative impacts: No cumulative impacts are expected to occur, as all impacts will be site bounded.
Residual Risks: No. Effected areas will be rehabilitated, as the impact will only be applicable during construction phase.

The establishment of the Grid infrastructure may alter drainage patterns with construction and cause erosion		
	Without mitigation	**With mitigation**
Extent	Local (2)	Local (1)
Duration	Long term (2)	Long term (2)
Magnitude	Low (2)	Low (2)
Probability	Probable (2)	Probable (2)
Significance	**Low(12)**	**Low (10)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: Establish structures on the contour. Use grass strips to regulate flow speed		
Cumulative impacts: No, all impacts will be site bounded.		
Residual Risks: No. Effected areas will be rehabilitated when operation has ceased.		

9.3 Possible impacts during operational phase

The establishment of the grid will be done at the expense of agricultural land. The area to be lost for agricultural development would be a servitude of 105.4 ha		
	Without mitigation	**With mitigation**
Extent	Local – Regional (3)	Local (2)
Duration	Long-term (4)	Long-term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	improbable (2)
Significance	**Medium (39)**	**Low (20)**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: The general objective is to position the grid on the lowest potential soil and not in places that may have an impact on agricultural activities, drainage lines and places with a sensitive nature. Existing road alignments should be utilised during the lifespan of facility. With the appropriate planning, the same live style can be achieved during the lease period of the facility from the land so occupied by the facility.		
Cumulative impacts: Impact is low due to agricultural potential of the local area. With the addition of further facilities, the impact will become more of significance if not mitigated.		
Residual Risks: No, after decommissioning this impact will be reversed when rehabilitation has been completed.		

9.4 Possible impacts during decommissioning phase

All components should be dissembled and roads demolished. Rehabilitation should focus on:

- Demolish and removal of structures
- Demolish related roads
- Establish cultivation environment
- Stabilisation of erosion
- Reinstall camp fences and stock watering

Soil pollution with contaminants during the decommissioning phase may take place, including spillages of hydrocarbon (fuel oil) and cement. This is possible during the decommissioning of all facets of the facility: laydown area, demolished concrete foundations of the pylons and switching stations and internal service roads.		
	Without mitigation	**With mitigation**
Extent	Local (1)	Local (1)
Duration	Medium Term (2)	Very short (1)
Magnitude	Low (4)	Minor(2)
Probability	Probable (3)	Probable(3)
Significance	**Low(21)**	**Low (12)**
Status (Positive or negative)	Negative	Negative
Reversibility	Partly reversible	Fully reversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Mitigation: Refueling normally takes place in the workshop of the control building. A designated area for refueling must be constructed with an impervious floor and low wall that will keep the spillage inside. Any spillage must be cleaned with absorbent material as soon as possible and disposed into clearly marked containers. Where spillage takes place, contaminated soil must be excavated and replaced with unpolluted soil. The contaminated soil should be collected by a licensed landfill contractor.		
Cumulative impacts: No, site-bound.		
Residual Risks: Yes, It is impossible to clear the affected area completely.		

10. CUMULATIVE IMPACT ASSESSMENT

There are various renewable energy projects being built along the Gariep river buffer, inter alia on the two neighbouring farms Dyasonsklip and Mc Taggarts. These are shown on Figure 12.

Figure 12: Cumulative impact overview

When investigating the cumulative impact of similar developments, the most common concerns are

- Loss of agricultural land;
- Altering drainage patterns; and
- Changing agricultural character to industrial

10.1 Loss of agricultural land

The loss of agricultural land will have a low significance since the gridline will be constructed on land with severe limitations to cultivation and which restricts its use to grazing, woodland or wildlife. As for the grazing component, it will still be able to be used as such.

10.2 Altering drainage patterns

The grid will be located in a low rainfall area with level topography and on soil with a very fast infiltration rate, from which a low runoff is expected.

The effect of infrastructure on the flow direction of the surface runoff will be low. This is because of the multiple drainage lines, each with a small catchment area that will not result in high concentration of runoff water before it can be discharged in the primary drainage line.

10.3 Changing agricultural character to industrial

The land cover has changed over the last years. Previously, vineyards were only established south of the N14. Now new vineyards, packing facilities and outlets for produce appear on the northern side. The agricultural character became more industrial.

Possible impacts

The quantity of available soil for agricultural production decreases as result of the footprints of these facilities. The quality of soil decreases in the way the construction of these structures alters the workability of the soil. This includes the physical deformation in the soil profile.		
	Overall impact of proposed project considered in isolation	**Cumulative impact of the projects in the area**
Extent	Local – Regional (1)	Regional(2)
Duration	Long Term (4)	Long Term (4)
Magnitude	Low(4)	Moderate (6)
Probability	Probable (3)	Probable (3)
Significance	**Low (27)**	**Medium (36)**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of Resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: Ensure that most infrastructure features are erected on transformed or non-arable land. Implement stormwater management as an integral part of planning and as a guideline for the positioning of structures. Use existing roads and conservation structures to the maximum in the planning and operation phases. Rehabilitate disturbed areas as soon as possible after construction.		

Clearing of vegetation increases flow speed and a lower infiltration tempo increases silt transport.		
	Overall impact of proposed project considered in isolation	**Cumulative impact of the projects in the area**
Extent	Local (1)	Regional(2)
Duration	Long Term (4)	Long Term (4)
Magnitude	low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (18)**	**Medium (30)**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No

Can impacts be mitigated?	Yes	Yes
Mitigation: Erosion and sediment control with proper water run-off control planning.		

Chemicals, hazardous substances and waste used or generated during live span of the facility accumulate and Pollute soil will become contaminated		
	Overall impact of proposed project considered in isolation	**Cumulative impact of the projects in the area**
Extent	Local (1)	Regional(2)
Duration	Long Term (4)	Long Term (4)
Magnitude	low (4)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (18)**	**Medium (30)**
Status (Positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Mitigation: Appropriate handling and storage of chemicals and hazardous substances and waste should be done.		

11. ENVIRONMENTAL MANAGEMENT PROGRAMME

The following should be included in the Environmental Management Programme:

Objective: Prevent and clean up soil pollution		
Project components	• Substation; • Access roads; • Power line; • All other infrastructure (site camp, batching plant etc.).	
Potential impact	Pollution of soil by fuel, cement and other toxic materials	
Activity/risk source	Soil will become contaminated	
Mitigation: Target/Objective	All solid waste must be collected at a central location at each construction site and stored temporary until it can be removed to an appropriate landfill site in the vicinity. The target should be to minimise spillages and soil contamination.	
Mitigation: Action/control	**Responsibility** Construction manager Maintenance team	**Timeframe** Lifespan of facility
Performance Indicator	No spillages	
Monitoring	Regular inspections of terrain and various infrastructure units.	

Objective: Conservation of soil		
Project components	• Substation; • Access roads; • Power line; • All other infrastructure (site camp, batching plant etc.).	
Potential impact	Erosion of revegetated land	
Activity/risk source	Soil get unusable and unproductive	
Mitigation: Target/Objective	Apply conservation measures.	
Mitigation: Action/control	**Responsibility** Construction Manager Maintenance team Environmental manager	**Timeframe** Lifespan of facility
Performance Indicator	No water run-off problems / erosion	
Monitoring	Regular inspections of terrain	

12. CONCLUSION

With reference to applicable sections of the Regulations for Renewable Energy in terms of Act 70 of 1970 and Act 43 of 1983, it can be stated that the proposed site will not suffer major agricultural impacts as a result of the proposed development.

The gridline is to be constructed on soil with low agricultural value, classified unsuited for cultivation. The limiting environmental conditions further restrict its use to grazing, woodland or wildlife.

The findings of this study indicate that the proposed grid alignment will have minimal impacts on agriculture, locally and on site, and will have very little influence on the current commercial farming.

The land is currently used for livestock farming. The infrastructure required for such practice is still intact, but due to conditions not in control of the farmer, farming practice has changed from small stock to a small herd of cattle. Theft and insufficient control of predators praying on livestock made small stock farming uneconomical. During the field study, a pack of at least five jackal was spotted, roaming the field freely.

The alignment of the access roads and grid connection will have a low impact on the environment if the required mitigation is applied.

The development site is located in the zone for Renewable Energy Development and the Agricultural Combined Sensitivity rated as low.

From an agricultural and land use perspective, the application should be authorised.

Christo Lubbe

C R LUBBE 19 November 2020
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

Curriculum Vitae - Christiaan Rudolf Lubbe

KEY QUALIFICATIONS:

- National Higher Diploma in Agriculture (Irrigation), Technikon Pretoria (Now Tshwane University of Technology), 1982.
- Certificate in Stereoscopic Interpretation, Geology and Resource Classification and Utilisation, Department of Agriculture, 1979.
- National Diploma in Agriculture, Technikon Pretoria (Now Tshwane University of Technology), 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
- NOSA Health and Safety Certificate, 1996
- FSC Auditors Course (Woodmark, UK) Sappi Ltd, 2003
- Certificate of Competence: Civil Designer - Design Centre and Survey and Design (Knowledge Base, August 2005)

SUMMARY

Work experience of 49 years were progressively gained whilst working as a land use planner (1971-1979 - Extension technician); Lecturer in agricultural engineering and conservation subjects (1980- 1997) and Agricultural Consultant (1998 onwards). Always striving to find the equilibrium in using the natural resources for agricultural production.

CHRONOLOGICAL EMPLOYMENT

Period	1971-1980
Company	Department of Agriculture Transvaal region
Position occupied	Final: Senior Extension Technician
Farm planning, technical support, general agricultural extension.	
• Resource potential analyses, Soil classification, Veld evaluation. • Conservation practices on arable land: Include water runoff planning, surveying and design of conservation works. Demonstration of building and inspection of completed structures. • Conservation practices on non-arable land. Veld classification evaluation and management planning. • Survey and design of stock watering systems. Inspection of completed system. • Participated in the development of target areas which included soil survey and water run off planning • Assistance with experimental conservation and agronomy trials.	

Period	1980-1996
Company	Technicon Pretoria
Position occupied	Lecturer
Lecture subjects required to obtain a National Diploma in Agriculture.	
Subjects lectured Land use planning Soil conservation techniques Agricultural mechanisation Pasture science 1 A Drainage	

Period	January 1997 – May 2004
Company	Self employed
Position occupied	Agricultural Consultant (Land use planner)
Soil and veld survey for land capability classification.	

- Physical audit and stock taking of Irrigation Scheme infrastructure at Loskop Dam, Hartebeespoort Dam, Buffelspoort Dam, Bospoort Dam, Roodekopjes Dam and Vaalkop Dam.
- Potential assessments and land use plans for four new upcoming farmers in the Limpopo Province.
- Undertook reconnaissance soil surveys on various plantations and farms.
- GPS survey and alien identification for mapping of Jukskei and Swartspruit areas, as part of the Working for Water Program.
- Participated in a due diligence audit on various plantations in the Limpopo and Mpumalanga Provinces as part of the preparation for a British company's tender to purchase these plantations.
- 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.
- Lectures Basic Farm Planning short courses in Limpopo and Gauteng.

Period	June 2004 – June 2006
Company	Gauteng Department of Agriculture Conservation and Environment
Position occupied	Acting Assistant Director Resource planning and Utilization
Site classification, evaluation, land use planning and farming extension in general.	
• Plan the utilization of agricultural resources in the Province for sustainable agricultural production and economic development • Provide advanced scientific and practical information, advice and training (formal and informal) pertaining to land use planning to stakeholders, in order to maximise their ability to utilise their farm land effectively. • Irrigation design and technical support. • Evaluate Scoping Reports for development and exemption for EIA application. • Capability surveys for Land Reform for Agricultural Development Land • Member of technical working group for the zonation of high potential land in Gauteng	

Period	July 2006 to date
Company	Self employed
Position occupied	Land Use Consultant
Period of employment	14 years
Compile agricultural potential studies	
Land capability classification and evaluation as part of • Environmental Impact Assessments • Motivation report for change in land use • Verification of desktop studies. • Specialised agricultural ventures.	
Agricultural impact studies for Scoping and EIA relating to : • Construction of renewable energy facilities (Various solar as well as wind and hydro electrical) • Rezoning municipal boundary (Witsand) • Construction packaging facility (Augrabies) • Construction desalination plant (Witsand) • Establish new graveyard (Zoar) • Feasibility study feedlot (Sudan) • Mapping potential agricultural land (Kongo) • Verifying desktop studies	

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Specialist:	C R Lubbe		
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E-mail:	dale@cape-eaprac.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, Christiaan Rudolf Lubbe, declare that –

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

C R Lubbe
Name of company (if applicable):

19 November 2020
Date: