ENVIRONMENTAL IMPACT ASSESSMENT

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

APPLICANT: Bloemsmond Grid (Pty) Ltd

AGRICULTURAL ASSESSMENT REPORT
JUNE 2019

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1. INTRODUCTION

Bloemsmond Grid (Pty) Ltd is applying for authorisation to construct overhead power lines to connect the proposed Bloemsmond PV facilities to the national grid. The grid connection infrastructure will facilitate the connection of the five Bloememond PV Projects to the National Grid via the Upington Main Transmission Substation (MTS).

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 grid alignment.

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 22-24 May 2019

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 during the beginning of the winter season, so that information on summer conditions remains the result of the desktop study.

4. DESCRIPTION OF THE PROPOSED PROJECT

Technology proposed for the PV developments consists of arrays of photovoltaic (PV) solar panels each with a net generating capacity of 100MW. In order to connect to the National Grid, each of the PV developments will connect via the Bloemsmond Collector Substation (Location: 28°35'16.57"S; 21° 2'33.88"E) to the Upington MTS (**Error! Reference source not found.**). Four overhead power lines are required for the Bloemsmond Grid Connection Infrastructure:

- **B3BC**: a single circuit 33kV or 132kV line from Bloemsmond 3 substation/ switching station to the Bloemsmond Collector Substation
- **B4BC**: a single circuit 33kV or 132kV line from Bloemsmond 4 substation/ switching station to the Bloemsmond Collector Substation
- **B5BC**: a single circuit 33kV or 132kV line from Bloemsmond 5 substation to the Bloemsmond Collector Substation
- **COLLECTOR-MTS:** a double circuit 132kV line from the Bloemsmond Collector Substation to the Upington MTS

There are two alternative routes for **B4BC**, **B5BC** and **COLLECTOR-MTS**:

B4BC:

- Eastern alternative (preferred): a single circuit 33kV or 132kV line from Bloemsmond 4 eastern alternative substation running to the eastern boundary of Portion 14 of Bloemsmond 455, and then south along the boundary and west to the Bloemsmond Collector Substation
- Western alternative: a single circuit 33kV or 132kV line from Bloemsmond 4 western alternative substation running along the western boundary to the Bloemsmond Collector Substation

B5BC:

- Eastern alternative (preferred): a single circuit 33kV or 132kV line from Bloemsmond 5 eastern alternative substation running along the eastern boundary to the Bloemsmond Collector Substation
- Western alternative: a single circuit 33kV or 132kV line from Bloemsmond 5 western alternative substation running along the western boundary to the Bloemsmond Collector Substation

Two proposed layouts are being considered for the connection between the **Bloemsmond Collector and the Upington MTS**: Alterative A to the north and Alternative B to the south.

- Alternative A is approximately 10.5 km in length and routes via the approved/ constructed Dyasonsklip Substation and on to the Upington MTS, and
- Alternative B goes southwards from the Bloemsmond Collector along the eastern boundary of Bloemsmond Farm 455 and then runs adjacent to the Eskom Aries-Upington 400kV servitude and is approximately 9.5 km from the Bloemsmond 455 farm boundary to the Upington MTS.

The grid connection infrastructure comprises switching stations / substations, three single circuit 33kV or 132kV lines from on-site facility substations to the Bloemsmond Collector Substation, and one double circuit 132KV power line from the Bloemsmond Collector Substation to the Upington Main Transmission Substation (MTS). There will be an internal network of access roads which will measure up to 8 m width and a maximum of 15 km in length. Two main access roads are proposed along the Eastern Alternative and the Western Alternative boundaries which connect to the N14 national road.

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

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 Grid Connection.

5.1 Locality

The alignment for the grid connection runs north of the N14, approximately 25 km south west of Upington in the Kai Garib Municipality Northern Cape. See Figure 1 and **Error! Reference source not found.**.

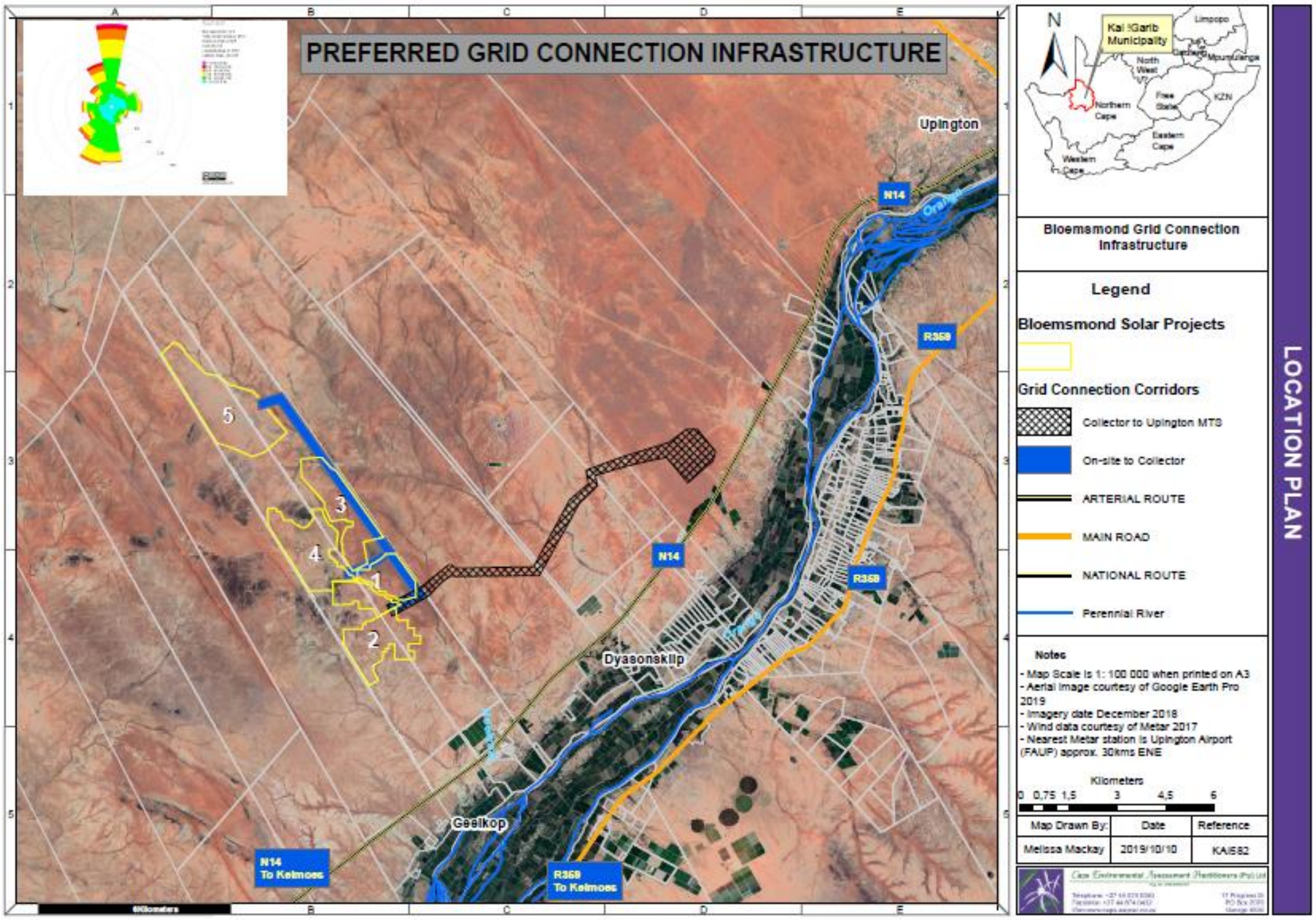

Figure 1: Location of the proposed Grid Infrastructure

There are two alternative routes for **B4BC**, **B5BC** and **COLLECTOR-MTS**:

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5.2 Land cover

Characteristic of the environment is the narrow strip known as the Gariep river valley between the physiographic regions Southern Kalahari and Bushmanland – see Figure 2. Intensive cultivation takes place on the alluvial soils in this buffer around the Gariep River. Only extensive livestock farming takes place on the land not in economic reach of the river. Cultivation is also only possible with expensive amelioration of the soils and provision of irrigation.

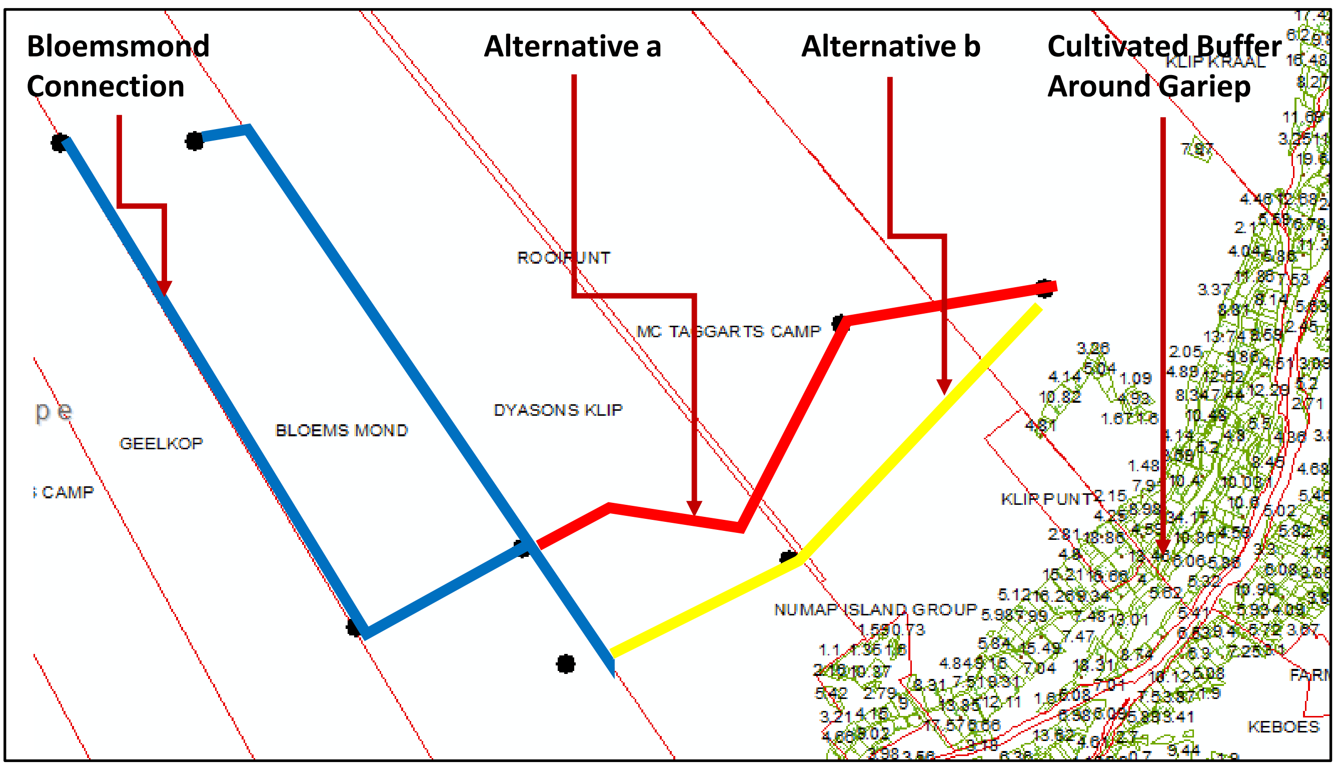


Figure 2: Land cover

5.3 Drainage

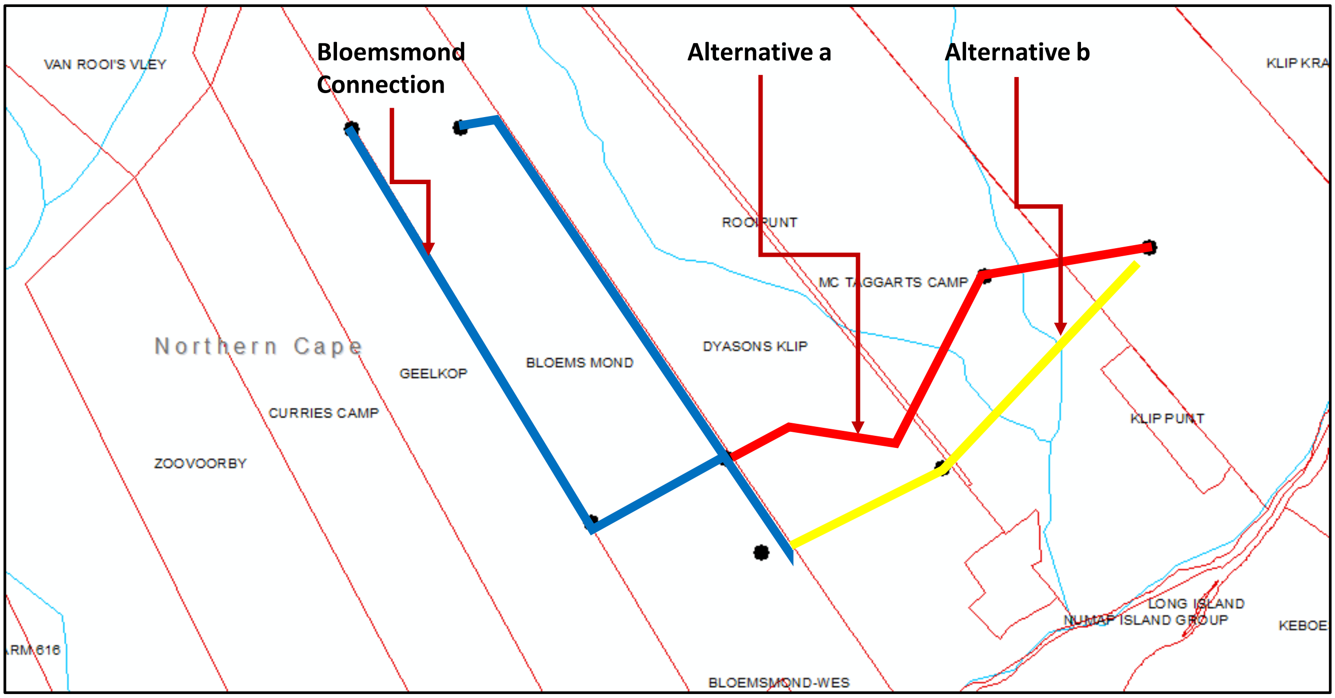


Figure 3: Catchment area D73F

The grid alignment lies in Quaternary catchment D73F of the Gariep River. The effected area is positioned on a lower foot slope with level plains as can be seen in Figure 3. The slope gradient is less than 5%. Storm water drains towards two well-defined drainage lines west and east of the site or caught in depressions or small pans. Only seasonal rivers exist

5.3 Vegetation

The grid alignment is situated in the Nama Karoo Bushmanland region as indicated in Figure 4. In general, the vegetation is an open shrub land, dominated by small woody shrubs and white Bushman Grass, *Stipagrostis* species. Succulents occur in some areas.

Trees and bigger shrubs are mostly confined to rocky areas, but there are some woody plants on the plains, especially where the soils are shallow, along drainage lines or seasonal watercourses. On the flats, the *Rhigozum* species and *Rhus* species tend to be more common.

The grazing capacity is low at 31 to 35 hectares per large stock unit (LSU). The Normalised Difference Vegetation Index (NDVI) is low.[1]

The area falls in the transition between Kalahari Karroid Shrubland and Bushmanland Arid Grasslands.

[1] *NDVI refers to a mathematical formula applied to satellite imagery to provide information on plant activity or vigour. It is an indicator of active vegetation cover.*

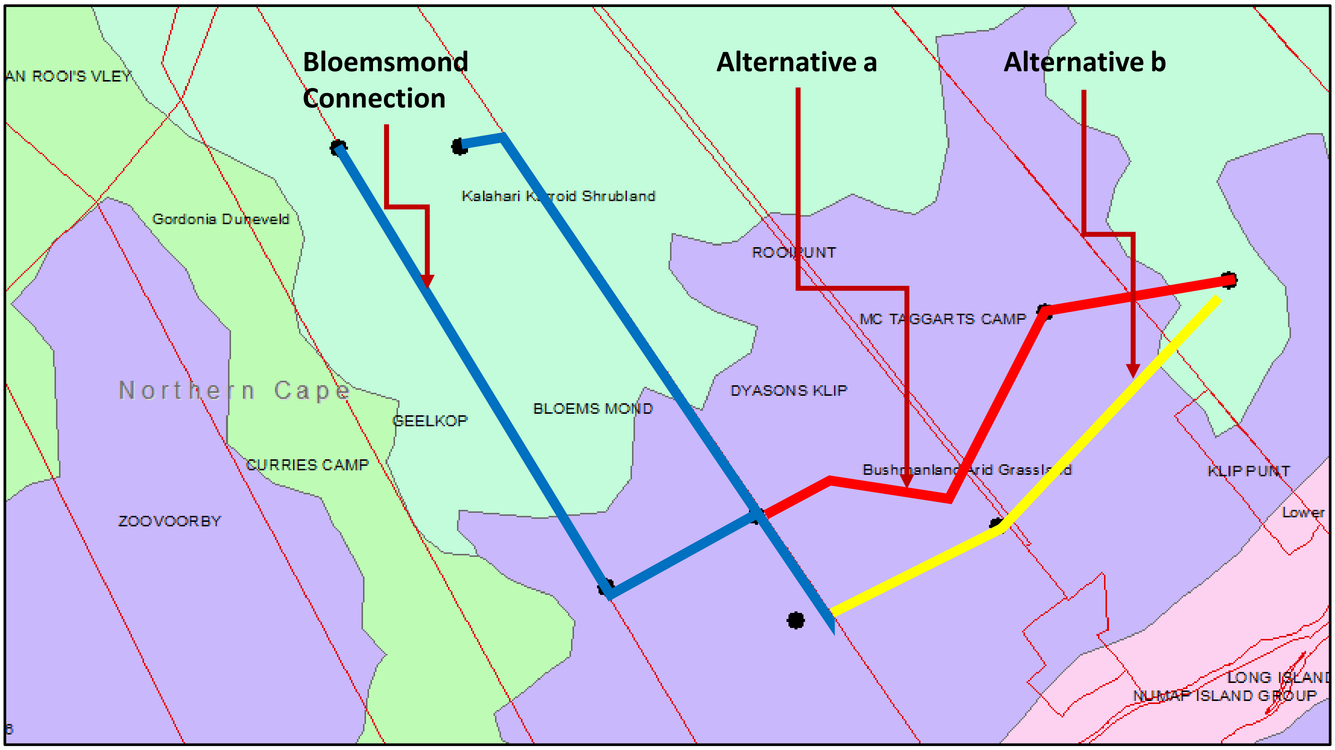


Figure 4: Vegetation map

5.5 Climate

The region is classified as an arid zone with desert climate. Specific parameters are shown in Table 1.

Table 1: Climatic information of the area

Rainfall	
Annual rainfall	0-200mm
Summer rainfall	<62.5mm
Winter rainfall	<62.5mm
Variation in rainfall	40 to 50%
Temperature	
Mean maximum temperature	>35°C
January Temperature	>27.5°C
Mean minimum temperature	2-4°C
July temperature	<7.5°C
Temperature range	>15°C
First frost expected	21-31 May
Last frost expected	01-10 September
Hours of sunshine	>80%
Evaporation	>2400mm
Humidity	<30%

5.6 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, Kinzigite 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:

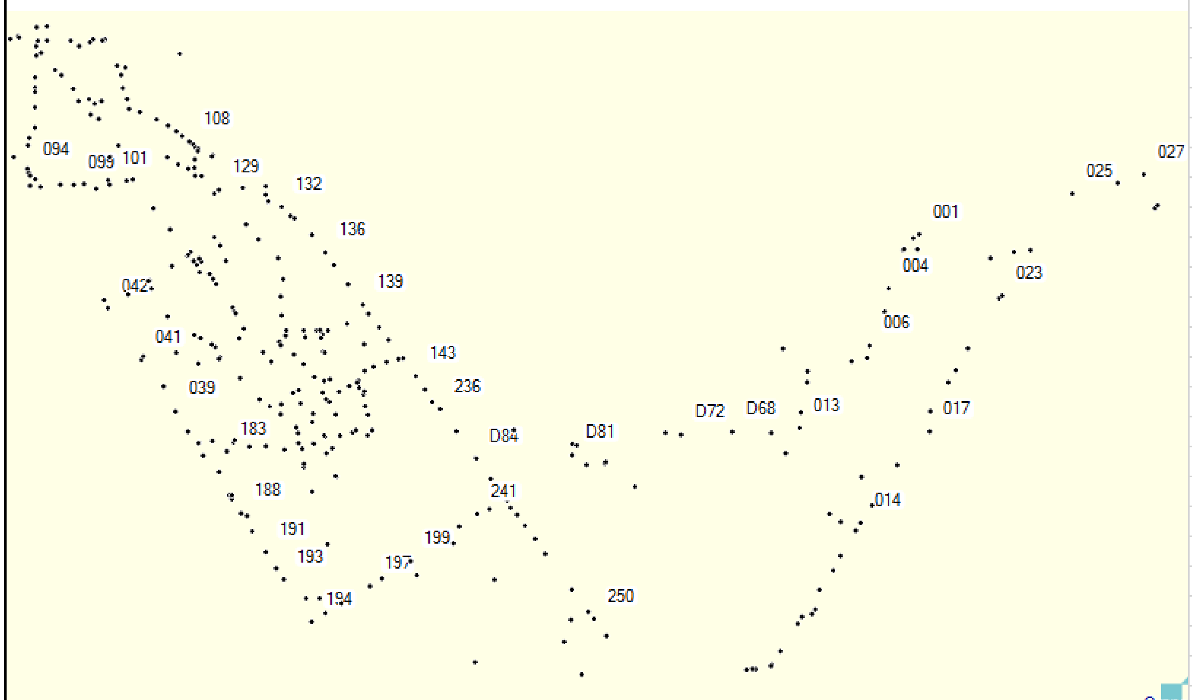
- Soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils;
- Lime generally present in part or most of the landscape;
- Red and yellow well drained sandy soil with high base status;
- Freely drained, structure less soils;
- Favourable physical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

On 22-24 May 2019, the site was visited to conduct a field study. A soil augering survey was carried out, assigning a unique number to each augering point and capturing the physical and morphological information on a coding sheet. The observation points, their coordinates and results are shown in Figure 5.

The dominant soil profile is a shallow red sandy top soil, limited by hardpan carbonate and/or rock. See Table 2 and Table 3.

Table 2: Dominant Soil Profile

Soil Properties	**A Horizon Topsoil**	**B Horizon Sub-soil**	**C-Horizon Sub-strata**
Texture	Fine sand	0	Rock
Consistency	Loose	Very solid and hard	
Structure	Single grain	Massive	
Colour	Red	Black	
Horizon Depth	200mm	0	
Depth limitation	Rock		
Effective Depth	200mm		
Terrain position	Foot slope		
Geology	Granite		
Slope shape	Undulating		
Slope gradient	2%		
Moisture availability	Low		
Erosion potential	Low		
Soil Form	Mispah		
Soil Family	Myhill		
Veld condition	**Rating**		
Plant cover	Cover is sparse with some bare areas		
Types of grasses most common	Moderate and poor grazing grasses		
Soil surface condition	Moderate levels of topsoil loss		
Bush encroachment level	Medium infestation		
Soil type	Sandy soil		



OBS	LAT	LONG	FORM	FAM	ESD
101	28.54356	21.00040	Py	1000	70
94	28.54264	20.98999	Ms	1000	<35
42	28.55936	21.00037	Ms	1000	<35
41	28.56574	21.00472	Ms	1000	<35
39	28.57211	21.00918	Ms	1000	<35
183	28.57704	21.01590	Ms	1000	<35
188	28.58460	21.01778	ms	1000	<35
191	28.58945	21.02099	Ms	1000	<35
193	28.59284	21.02334	Ms	1000	<35
194	28.59803	21.02699	Ms	1000	<35
197	28.59365	21.03461	Py	1000	70
199	28.59058	21.03992	Ms	1000	<35
241	28.58476	21.04863	Py	1000	40
250	28.59769	21.06388	Ms	1000	<35
108	28.53882	21.01100	Ms	1000	<35
129	28.54477	21.01490	Py	1000	70
132	28.54684	21.02306	Ms	1000	<35
136	28.55249	21.02877	Py	1000	40
139	28.55894	21.03368	Ms	1000	<35
143	28.56773	21.04059	Py	1000	<35
236	28.57182	21.04380	Ms	1000	<35
D84	28.57790	21.04852	Ms	1000	<35
D81	28.57746	21.06104	Ms	1000	<35
D72	28.57497	21.07526	Ms	1000	<35
D68	28.57462	21.08196	Ms	1000	<35
13	28.57413	21.08196	Py	1000	40
4	28.55692	21.10240	Py	1000	30
1	28.55022	21.10638	Ms	1000	<35
25	28.54523	21.12643	Ms	1000	<35
27	28.54286	21.13575	Ms	1000	<35
23	28.55781	21.11725	Ms	1000	<35
17	28.57458	21.10779	Ms	1000	<35
14	28.58582	21.09873	Ms	1000	<35

Figure 5: Soil survey

Table 3: Sub dominant Soil Profile (less than 20% of the area)

Soil Properties	**A Horizon Topsoil**	**B Horizon Sub-soil**	**C-Horizon Sub-strata**
Texture	Very fine sand	Very fine sand	Hardpan Carbonate
Consistency	Loose to very loose	Loose to very loose	
Structure	Single grain	Apedal	
Colour	Red	Red	
Horizon Depth	300mm	500mm	>500mm
Depth limitation	Hardpan Carbonate hard setting		
Effective Depth	500mm		
Terrain position	Foot Slope		
Geology	Granite		
Slope shape	Strait		
Slope gradient	< 5 %		
Moisture availability	Low		
Erosion potential	Low		
Soil Form	Plooysburg		
Soil Family	Brakkies		
Veld condition	**Rating**		
Plant cover	Cover is sparse with some bare areas		
Types of grasses most common	Moderate and poor grazing grasses		
Soil surface condition	Moderate levels of topsoil loss		
Bush encroachment level	Medium infestation		
Soil type	Sandy soil		

In summary, the effective rooting depth and the texture of the soil renders it not suitable for cultivation:

Effective rooting depth

The dominant area surveyed has an effective depth of less than 30cm. The restriction is rock and hard carbonates sub-surface layers. The top surface is also rough with a high level of surface rock. Cultivation is not possible because of these mechanical restrictions.

The root development area is restricted by carbonate hard setting or rock. The stony nature reduces available soil for root development and water retention, and creates a high mechanical risk for agricultural machinery.

Localised observations exceeding 40 cm were found but the area it would represent as a uniform, workable unit, would be less than 9 ha

Texture

The clay content of the top horizon is 6% and the sub-horizon is 6% with medium sand grade. The texture class is sand.

The sand grade of top soil influences the stability and erodibility potential.

A low clay percentage results in low water holding capacity and low nutrient availability, which leads to low soil fertility.

Supporting imagery of the area is shown in Figure 6. Photos were taken at the observation points mentioned in the captions.

094 Mispah 20 cm with stones in topsoil

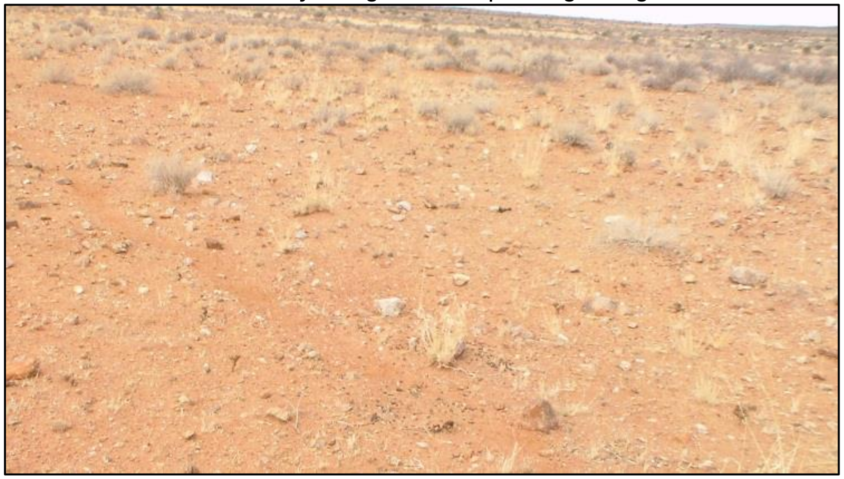
101 Plooysburg 70 cm, silt over burden

042 Plooysburg 40 cm deep, sparse grazing, Large bare areas, at gate game fence

188 Surface stone

197 Plooysburg 70 cm, sparse grazing

241 Plooysburg 40 cm, sparse grazing



108 Mispah 30 cm, hard carbonate surfaces

132 Mispah 30 cm, constructed dam, hard carbonate surface

143 Ploosburg 40cm, sparse veld

013 Plooysburg 40 cm, sheet erosion

009 Surface carbonate, streamline, *Acacia erioloba*

007 Settlement, hard carbonate surface

004 Plooysburg 40 cm

026 Mispah 20 cm, sparse veld, lines converge

025 Mispah 20 cm, sparse veld near Uppington MTS

024 Single pole used for overhead lines

021 Rock outcrop in streamline

016 Sparse veld, carbonate surface

Figure 6: Imagery of the surveyed area.

6. LAND CAPABILITY FOR AGRICULTURE

Land capability involves considering the risk of land damage from erosion and other causes, the difficulties in cultivation because of physical land characteristics and climatic conditions.

The potential agricultural capability of the site is largely unsuitable for cultivation, based on the natural resources present, including the following limiting factors:

- Low annual rainfall, high evaporation and extreme temperatures restrict dry land cultivation;
- The very shallow soil depth with its limited water holding capacity restricts root development;
- The very fine sand grade of top soil influences the stability and increases erodibility potential; and
- Low clay percentage results in low water holding capacity and low nutrient availability, resulting in low soil fertility.

Erosion Potential

In this arid climate, the erosivity (the potential ability of rain to cause erosion) is low, but the erodability (vulnerability of the soil to erosion) is high due to the low clay percentage and shallow soil depth. Possible erosion caused by water is low, due to the characteristics of the terrain, i.e.:

- Low annual rainfall
- Regular slope of 1.6%
- Length of slope is short
- Small catchment area, because water drain naturally away from the ridge.

The risk of erosion caused by wind is high, due to the low clay percentage of the soil and the fact that the soil is usually dry - therefore prone to blow away. To combat this erosion, vegetation is needed, but the severe climatic conditions prevent possible mechanical conservation measures. However, this erosion risk already exists and the proposed grid connection lines will have a low impact.

The area is adjacent to a dune, which shows the effects of wind erosion (OBS 101).

The land is classified as Capability Class VII, which limits its use largely to pasture, range and woodland. Continuing limitations that cannot be corrected include:

- Severe erosion hazard;
- Stoniness;
- Shallow rooting zone;
- Low water holding capacity; and
- Severe climate.

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

The agricultural activities are mainly extensive livestock farming comprising of cattle, Boer goat and exotic game species such as Gemsbok (Oryx gazelle) and Springbok with colour variation.

In the past cultivation were only concentrated to the buffer around the Gariep 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. The intensive practises are still bounded close to the river with extensive grazing for the bulk of the farmlands.

8. STRUCTURES ON SITE

Structures on site comprise mainly fences, and water and handling facilities for livestock. However, a large portion of the internal fencing is being demolished. Construction of PV facilities is taking place on Dyasonsklip and Mc Taggarts. On Mc Taggarts, the Olyvenhouts Drift Settlement is in direct line of the alternative **b** alignment.

9. ASSESSMENT OF PROPOSED DEVELOPMENT

The Bloemsmond grid connection infrastructure will facilitate the connection of five facility substations to a collector substation, and then a 132kV powerline will connect the collector substation to the National Grid via the Upington Main Transmission Substation (MTS)

The impact on the land will be in the process of excavation and construction of the pylons this process include establishment of laydown areas, access roads and transportation of equipment.

In Figure 7, 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 construction of access roads	Footprint has low interference with grazing

Figure 7: Construction of pylon

From the description above, the potential impacts that the grid line may have on agricultural development of this stretch of land, are:

10.1 Loss of agricultural land

Approximately 10 km of servitude would be required for the connection line (Alternative a or b). With a width of 31 -36 m, this comes to 38 ha. The area would however still be available for grazing after rehabilitation.

10.2 Erosion and change of drainage patterns

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

10.3 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.

10. POTENTIAL IMPACTS ON THE AGRICULTURAL ENVIRONMENT

11.1 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).

11.2 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 facility: laydown area, concrete foundations of the auxiliary buildings, inverter stations subterranean cabling, main access 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: Refuelling normally takes place in the laydown area. Proactive measures must be taken which include constructing of a designated area where refuelling 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 38 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 are followed and roads upgraded for use during the lifespan of the facility. With the appropriate planning, the same lifestyle can be maintained during the existence of the facility.		
Cumulative impacts: Low .		
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 posts to eliminate need for foundations. 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. Affected areas will be rehabilitated, as the impact will only be applicable during construction phase.		

The establishment of the PV Solar facility 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. Affected areas will be rehabilitated when operation has ceased.		

11.3 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 up to 36ha.		
	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 are followed and roads upgraded for use during the live span 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: Low .		
Residual Risks: No, after decommissioning this impact will be reversed when rehabilitation has been completed.		

11.4 Possible impacts during decommissioning phase

All components of the facility 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 auxiliary buildings, inverter stations subterranean cabling, main access 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: Refuelling normally takes place in the workshop of the control building. A designated area for refuelling 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 licenced landfill contractor.		
Cumulative impacts: No, site-bound.		
Residual Risks: Yes, It is impossible to clear the affected area completely.		

11. CUMULATIVE IMPACT ASSESSMENT

There are various renewable energy projects being built along the Gariep buffer, inter alia on the two neighbouring farms Dyasonsklip and Mc Taggarts. These are shown on Figure 8.

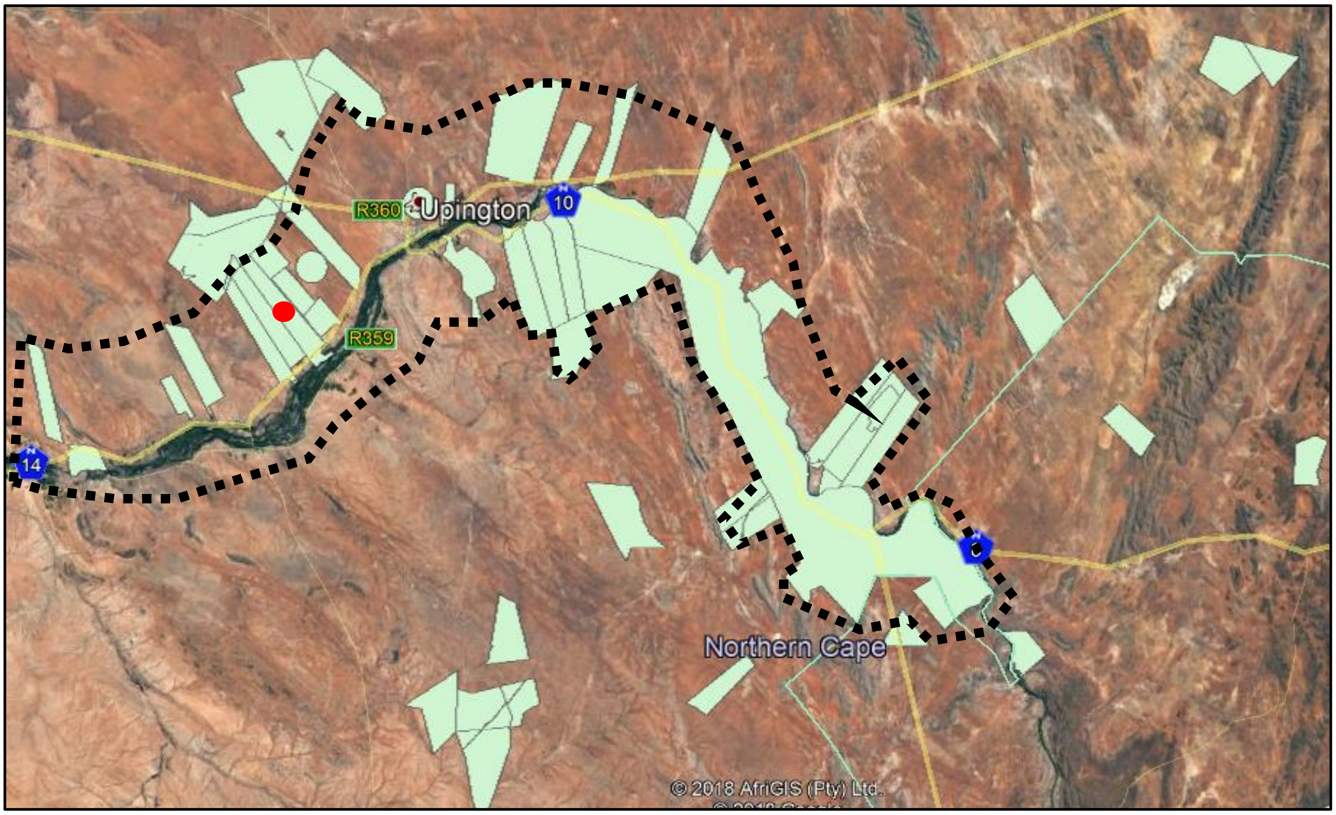


Figure 8: Cumulative impact overview (red circle indicates the approximate position of the Bloemsmond PV projects, which include the facility and collector substations)

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

12.1 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.

12.2 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 facilities 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.

11.3 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.		

12. 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	

13. CONCLUSION

With reference to applicable sections of the Regulations for Renewable energy in terms of Act 70 of 1970 & Act 43 of 1983, it can be stated that the proposed site will not suffer major agricultural impacts by the development. The reasons include aspects such as soil potential, geology, climate, loss of cultivating land and stock farming and other possible impacts.

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

The findings of this study indicate that the preferred grid alignment (eastern alignment from facility substation to collector and Alternative A from Collector to MTS) will have minimal impacts on agriculture, locally and on site, and will have very little influence on the current commercial farming.

C R LUBBE 28 June 2019
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 Bloemsmond Grid (Pty) Ltd via Cape Environmental Assessment Practitioners (Pty) Ltd, the EAP, to conduct an independent agricultural assessment study for the proposed Bloemsmond Grid Connection line in the Northern Cape.

He is not a subsidiary or in any way affiliated to Bloemsmond Grid (Pty) Ltd.

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

CR Lubbe

28 June 2019