LAND CAPABILITY AND AGRICULTURAL IMPACT ASSESSMENT

For the proposed construction of a PV facility near PPC's Dwaalboom Plant

Limpopo Province

March 2021

COMPILED FOR:
Coastal And Environmental Services (Pty) Ltd

PREPARED BY:
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DECLARATION

The observations, conclusions and recommendations made in this report are based on the best available data and on best scientific and professional knowledge of the directors of INDEX (Pty) Ltd. The report is based on GIS programming and utilises satellite tracking to map survey points. Survey points are normally accurate to within 3 metres; which must be considered in the use of the information.

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General declaration:

- INDEX acted as the independent specialist in this application;
- Performed 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;
- There were no circumstances that may compromise INDEX's objectivity in performing such work;
- INDEX have expertise in conducting the specialist report relevant to this application, including knowledge of NEMA and its regulations and any guidelines that have relevance to the proposed activity;
- Have no and will not engage in conflicting interests in the undertaking of the activity.

The study was undertaken by Dr Andries Gouws. He is a registered member of SACNASP in the category of Agriculture.

Signature of specialist
for INDEX(PTY) LTD
1 February 2021

Summary and conclusions

Two potential sites were identified for the construction. A site directly east of the plant is preferred. An alternative site is located west of the plant.

Both sites are vacant and not used for any farming activities. There is also no farming infrastructure. This is grazing land, but because of the severe encroachment by *Dichrostachys cinerea*, it can no longer be used.

Historic images show that the lands have been vacant and likely have never been cultivated.

Dwaalboom experiences significant seasonal variation in monthly and annual rainfall. The statistical deviation is especially high in January and February – this is the period when the water requirement for summer crops is highest.

The grazing capacity for livestock is estimated at *6 hectares per large stock unit* (LSU).

The soil consists of deep red and brown clay loam with moderate and poorly developed blocky structure. The soil is largely free of mottles and course fragments that would impede arability. The dominant soil forms identified are *Hutton* and *Shortlands*.

The conclusion is that the land is not moderate or high potential land but rather has moderate to low capability.

The long term maize production yield is too low to be feasible. The projected income form livestock is too low to cover the minimum wage of even one labourer that is needed to tend the cattle.

According to the Screening Tool the site has mostly a high sensitivity. A detailed assessment performed by Index, however, found that t*he deep Shortlands and Hutton soils that occur on the site, coupled with the unfavourable climatic conditions for rainfed cropping makes the site only moderately sensitive. This is also the conclusion of DALRRD.*

Loss of land for cultivation or for grazing cannot be mitigated. It is however possible to upgrade land that is now not utilisable for grazing purposes because of the bush encroachment.

The impact of the development on agriculture is low, because:

- No high potential land will be lost;
- The land is encroached with sekelbos and is not available as grazing. The size of the area that will be impacted on is too small to make a meaningful contribution to food security;
- No farming infrastructure will be lost; and
- No job opportunities will be lost by implementation of the project.

The land is not used at present, mainly due to the severe bush density. Clearing the land could make large quantities of firewood available. Rather than burn the wood, the thicker parts can be cut as firewood or sold.

The PV site will be cleared of plants and will, therefore have no value in farming. The surrounding land will not be impacted on by implementing the project. There will be no loss and no mitigation is necessary.

It is the recommendation of the specialist that the project should be promoted because it does not have any negative impacts on agriculture.

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1 BACKGROUND

Coastal And Environmental Services (Pty) Ltd (CES) requested Index to submit an Agricultural Potential, Land Capability and Soil Assessment for the proposed construction of a 10MW Solar PV facility near PPC's Dwaalboom Plant in Thabazimbi Local Municipality, Limpopo Province.

The report will form part of the Environmental Impact Assessment process for the site footprint of 20 hectares. The site investigation took place in February 2021.

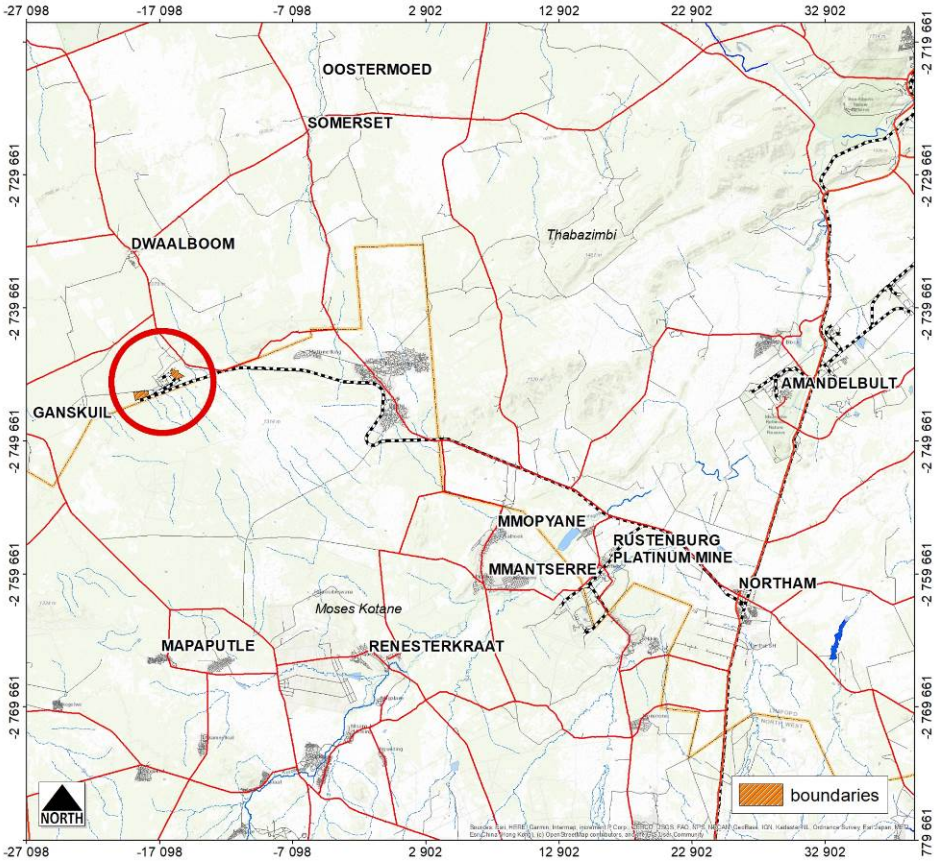


Figure 1. Location of the site

The main output will be to assess the following:

- Natural resource assessment as it relates to agricultural potential. The section will discuss soil, vegetation (grazing and browsing capacity), climate and water availability from ground and surface sources.
- Map the present land uses and farming infrastructure;
- Indicate land capability (potential);
- Determine the farming patterns of farmers the region; and
- Indicate the impact of the development on agriculture.

Agricultural potential is evaluated in terms of three components:

- Arable potential, which is described in the Capability Classes;
- The grazing potential will determine the stocking density and number of animals that the property can carry; and
- An estimation of potential loss of farm income.

Two sites were identified for the development of the Solar PV installation. A site directly east of the plant is the preferred and comprise of 52,3 ha within which a footprint of less than 20 ha will be under PV infrastructure.

An alternative site was specified and is located west of the plant. The size thereof is 57,6 hectares, also with a footprint of less than 20 ha. The sites are indicated in Figure 2 and Figure 3.

The assessment will focus on the preferred site and specifically the identified footprint.

2 PROCESS OF THE ASSESSMENT

The present land uses were identified from various satellite images, dated 2020.

Both the sites are encroached with *Dichrostachys cinerea (sekelbos)* and access was limited because of it. The land is not in a region identified as having a high arable potential (see Section 7 in this report).

Soil types that generally occur on the site were obtained from the database of land types (Department of Agriculture, Land reform and Rural Development).

The soil types and depths specific to this site were determined during a field survey with the use of a soil auger and/or soil probe and described according to the binomial soil classification system used in South Africa. The number of soil observations was deemed adequate to make conclusions regarding the agricultural potential of the site as a whole.

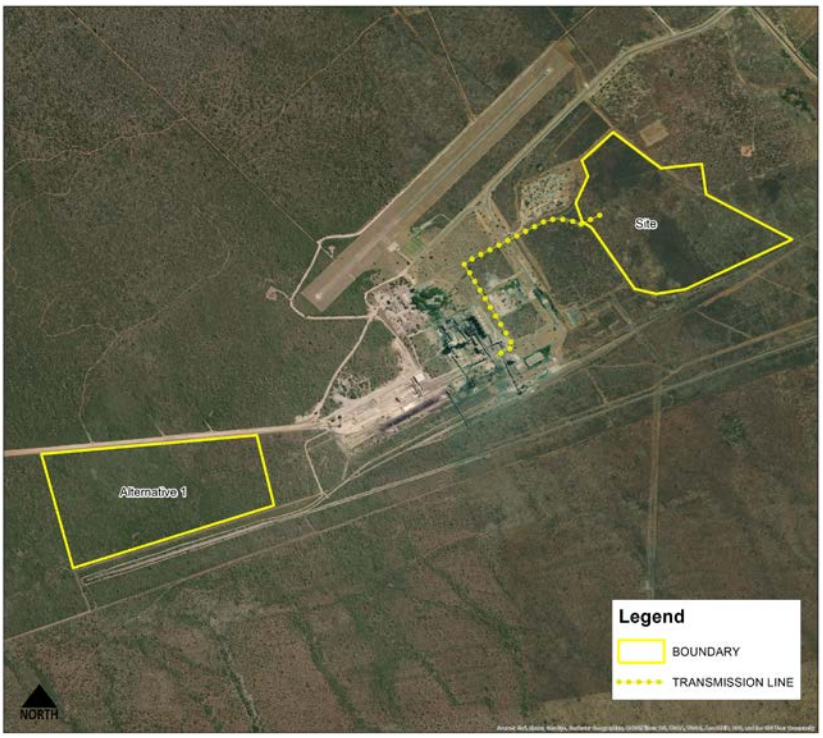


Figure 2. Site and alternative locations

Thirteen photos were recorded. Their positions are indicated in Figure 3 with the photos provided in the Addenda.

There is no water available for irrigation and the climate is not suitable for rainfed crop production.

No land is under irrigation on either of the sites and analysis of available water for irrigation purposes was therefore not necessary.

- The soils are classified according to the binomial soil classification system for Southern Africa.
- Soil capability is described according the system in use by the DALRRD.
- The agricultural sensitivity description is according to the Sensitivity Tool of the Department of the Environment.

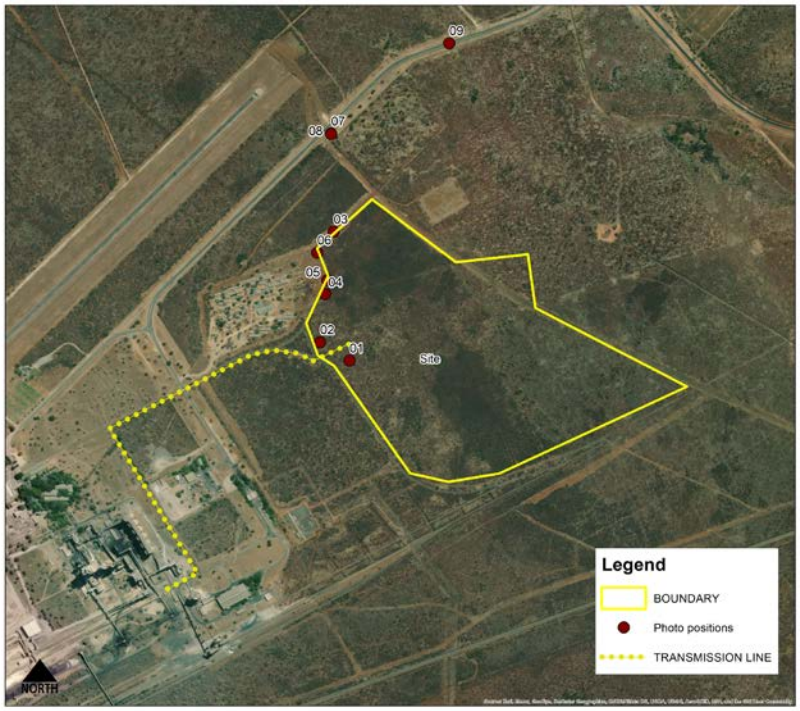


Figure 3. Photo positions

3 AGRICULTURAL LAND USES

Both sites are vacant and not used for any farming activities. There is also no farming infrastructure. This is grazing land, but because of the severe encroachment by *Dichrostachys cinerea*, it can no longer be used.

Historical images show that the sites have been vacant for more than 15 years and have likely never been cultivated.

Some cultivated lands were found some distance to the north of the site. However, it is also clear from the satellite images that these lands are not planted every year, but only when adequate soil moisture is stored in the pre-season that will allow a reasonable chance that a crop can be planted and harvested.

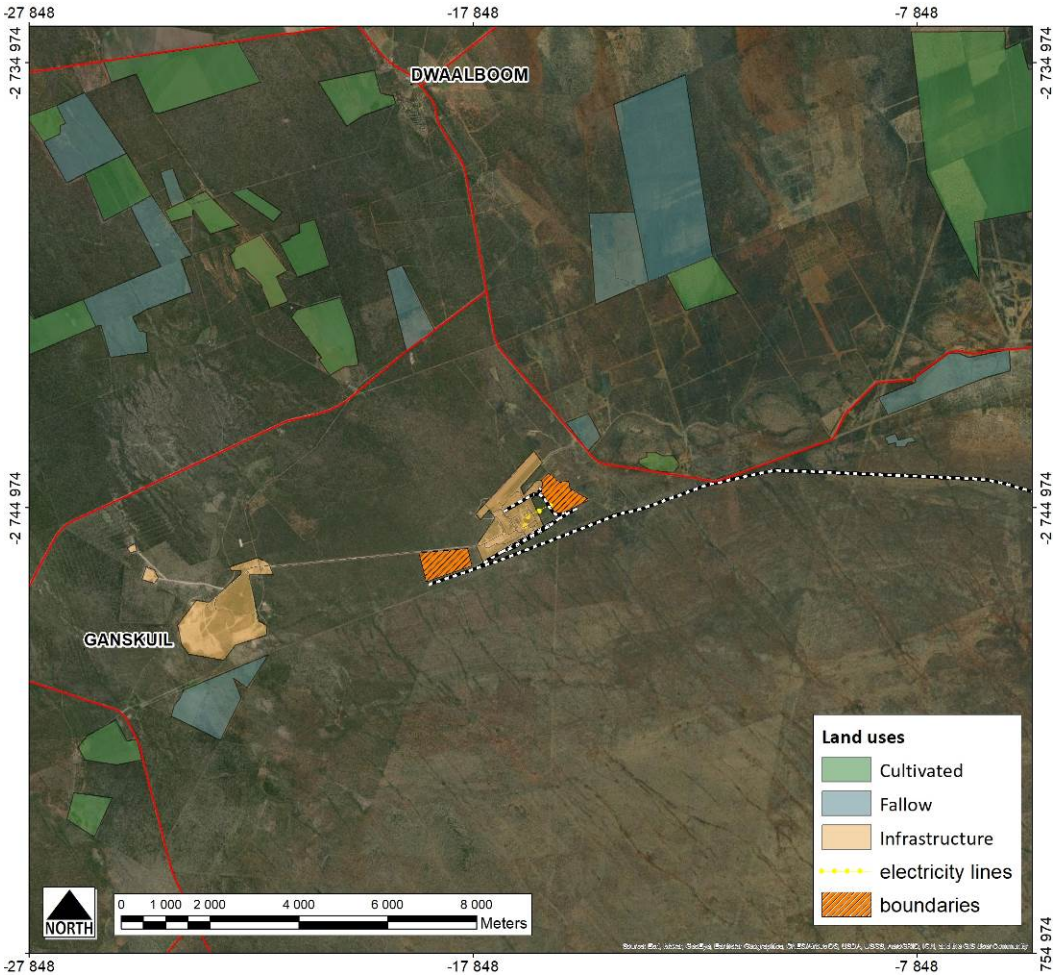


Figure 4. Regional land uses

4 NATURAL RESOURCES

4.1 Climate

Dwaalboom experiences significant seasonal variation in monthly and annual rainfall. The statistical deviation is especially high in January and February – this is the period when the water requirement for summer crops is highest.

From the low total rainfall and the high monthly variation perspective, therefore, the climate is not very suitable for summer rainfall cropping.

Figure 5. The average rainfall (solid line) with 25th to 75th and 10th to 90th percentile bands

Summers are long, hot and partly cloudy and the winters are short, cool, dry and clear. Temperature typically varies from 4°C to 32°C and is rarely below 1°C or above 37°C.

The warm season lasts for 6 months, from mid-September to mid-March, with an average daily high temperature above 30°C. The hottest day of the year is in early January, with an average high of 32°C and low of 21°C.

The cool season lasts for 2 months, from end May to end July, with an average daily high temperature below 24°C. The coldest time of the year is early July, with an average low of 4°C and high of 22°C.

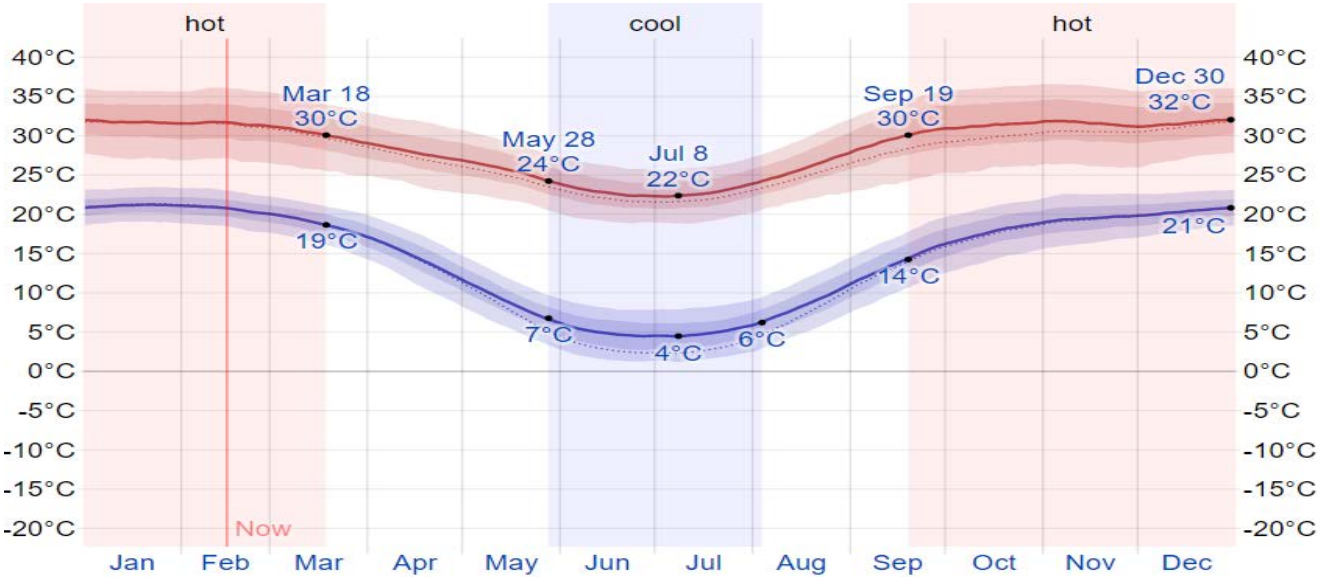


Figure 6. The daily average high and low Temp, with 10th to 90th percentile bands

The wind speed the site experiences have moderate seasonal variation. The windier part of the year lasts for 4 months, from August to December, with average wind speeds of more than 12,3 meters per second.

Wind damage to crops is not expected in this area.

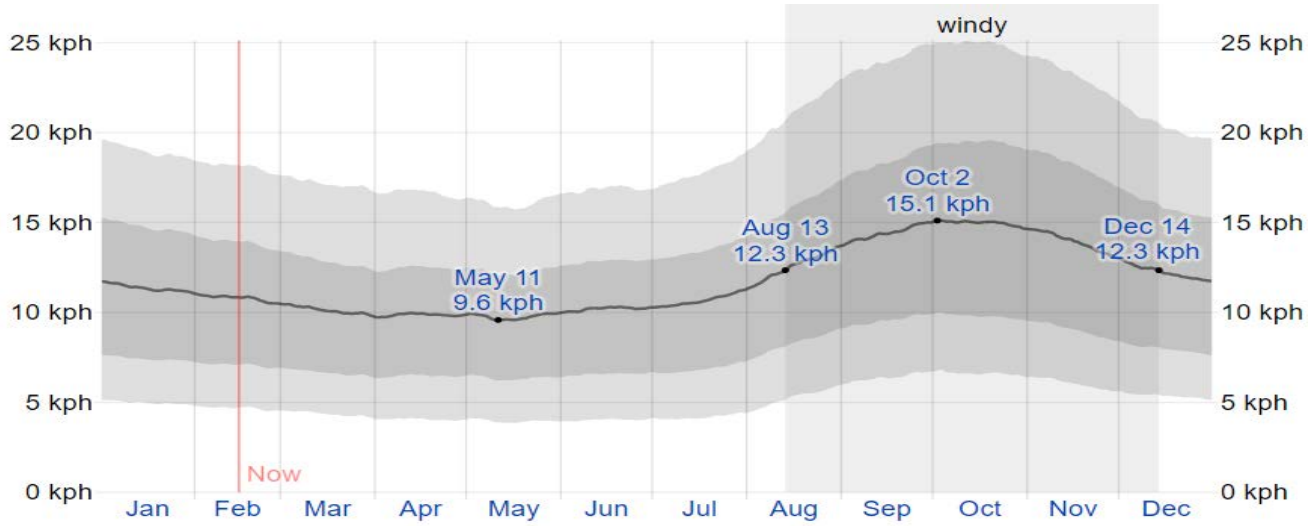


Figure 7. Average wing speed

4.2 Vegetation

Growing season

The growing season commences in December and lasts until the beginning of April. The dry season lasts for almost 7 months of the year. The winter period is dry with little vegetative growth.

The growing season period is when rainfall exceeds 50% of the potential evapotranspiration (see Figure 8).

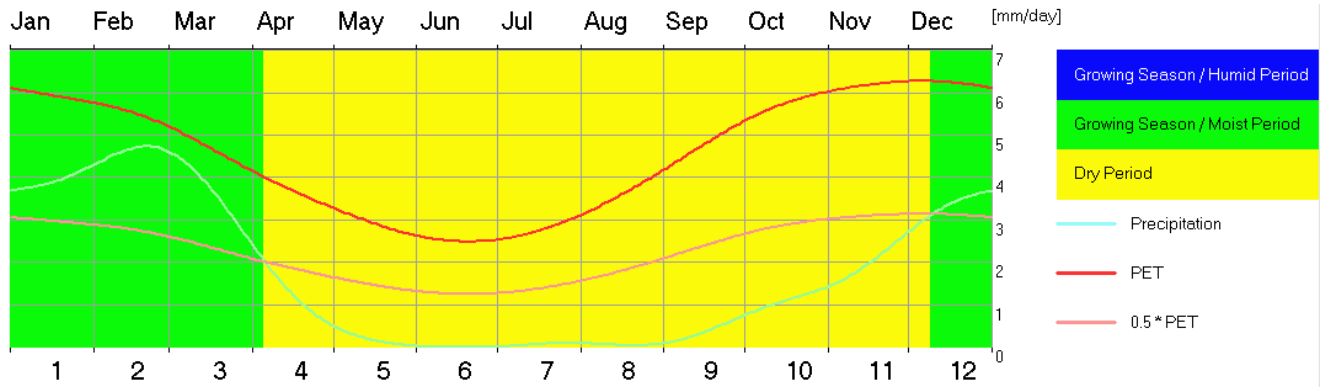


Figure 8. Growing season for Dwaalboom

Grazing capacity

As stipulated in Regulation 10 (1) of CARA, it is the responsibility of the DALRRD to provide the industry with a long term grazing capacity map for South Africa. This responsibility resides with the Directorate Land Use & Soil Management.

The grazing capacity for livestock of the natural veld, according to the Department of Agriculture, is estimated at *6 hectares per large stock unit* (LSU).

Satellite images indicate that there was a rapid increase in bush density over the past decade, and in particular, for the past 6 to 7 years. Densification by *Dichrostachys cinerea* (sekelbos) has a devastating effect on the grazing and browsing capacity of the veld on this property and in the bushveld region in general. Unless serious efforts are made to rectify the status quo, the veld will remain largely unsuitable for agricultural purposes.

The dominant grass is *Cenchrus ciliaris.* This is a highly palatable climax grass (see Photo 1 and 2 below).

Photo 1. Dense stands of *Dichrostachys cinerea*

Photo 2. *Dichrostachys cinerea* and *Cenchrus ciliaris*

4.3 Soil

The southern portion of the site is located on sedimentary material and in the northern part, on granitic material. The alternative development site is volcanic material with influence of the dolomite and quartzite, which occurs directly to its south.

The general soil patterns for land in the region as indicated by DALRRD, are red and yellow apedal soils with moderately developed blocky structure. The clay content of the soil is normally less than 15% (refer to Figure 9 for the general soil patterns).

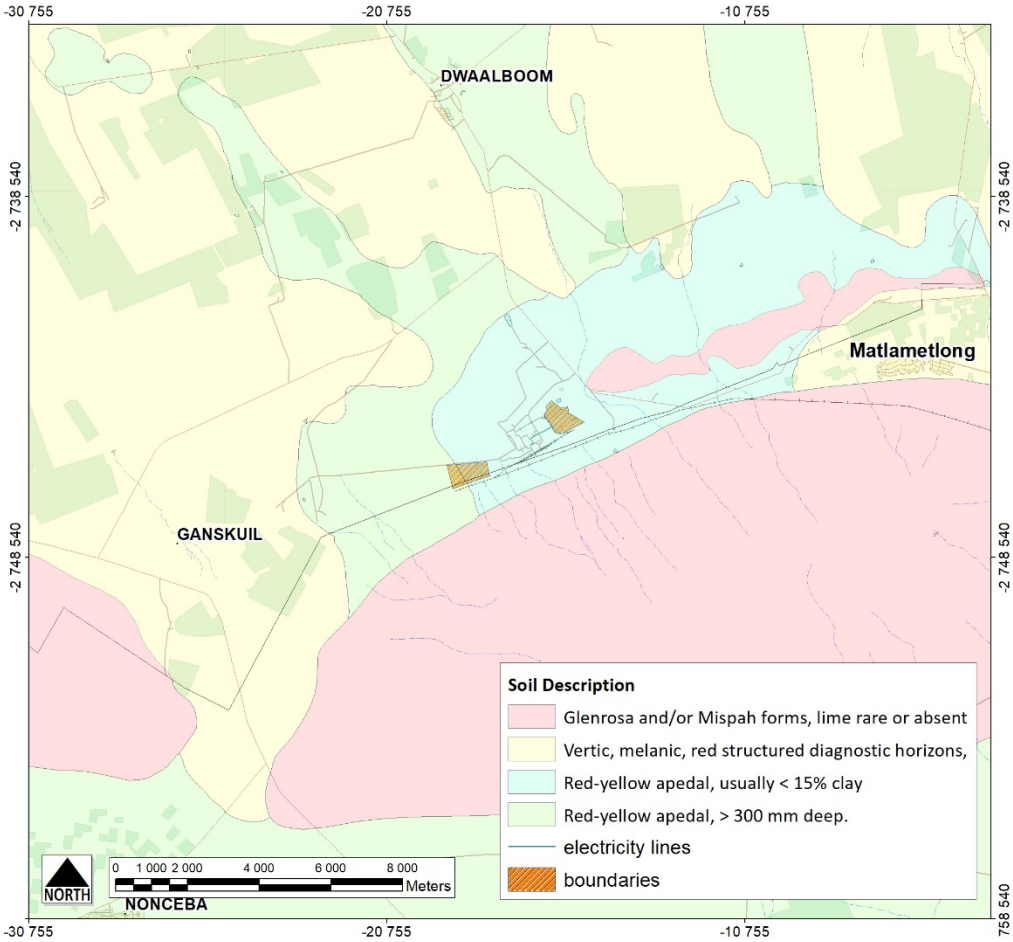


Figure 9. Soil types in the region (ENPAT)

Because of the dense stands of sekelbos, there was limited access to the site and a detailed analysis of the soil, therefore, was not possible. However, the observations of the soil profile were found to have fairly similar properties and it was therefore concluded that the entire site would consist of deep reddish brown soil.

Observations made on the site shows an accumulation of clay deeper in the profile. The subsoil has a clay content of more than 45% (Photo 3). This is likely due to hill wash from the dolomite and igneous rock. The soil is sticky when wet and has a high water holding capacity but has a slow water infiltration rate. There were no flakes on the surface where standing water was found, indicating that the soil has little smectic clays.

Calcium concretions are common and can be found throughout the profile. The soil consists of deep red and brown clay loam with moderate and poorly developed blocky structure. The soil is largely free of mottles and course fragments that would impede arability. It will be difficult to cultivate in the wet state because of the soil properties discussed above, and as confirmed by the places where vehicles got stuck.

The dominant soil forms identified are *Hutton* and *Shortlands* (Photo 4).

Photo 3. Rounded sausage from clay – indicating clay content exceeding 45%

Photo 4. Hutton soil of deeper than 700mm

5 HIGH POTENTIAL LAND

Land with high agricultural potential must be protected in terms of the mandate of the DALRRD. This should not be interpreted as *soil* potential only – the evaluation should include the impact that topography and climate have on suitability for different crops and on crop yield.

The potential of land is defined by the land's viability as a farming unit. This is described in CARA and HUAL and in other legislation and guidelines that are used by the DALRRD.

However, land and soil properties will determine if land is arable and is often the only criterion that is used instead of including the financial viability.

Norms and standards in terms of CARA (Conservation of Agricultural Resources Act) and HUAL (National Policy of the Preservation of High Potential Land)

National policy on the protection of high potential and unique agricultural land published by Department of Agriculture in 2006 relates to subdivision of land and a change in land use, states that *Protection of high potential agricultural land for food security remains the primary responsibility of the Department of Agriculture*.

Draft Policy on the Preservation and Development of Agricultural Land Framework Bill published for discussion in 2014, although not finally approved, does however, indicate the thinking of the Department of Agriculture on land uses, rezoning and of the protection of agricultural land.

In terms of legislation high potential cropping land includes:

- Land capability classes I to III;
- Unique agricultural land;
- Irrigated land; and
- Land suitable for irrigation.

Essentially, its objective is to protect high potential land from being exploited for non-farming purposes. The definitions in the Bill states that:

- High Potential Agricultural Land means the best land available for, suited to and capable of *consistently producing optimum yields* of a wide range of agricultural products (food, feed, forage, fibre and oilseed), with minimum damage to the environment, and
- Unique Agricultural Land means land that is or can be used to produce specific high value crops. It is not usually of high potential but important to agriculture due to a specific combination of location, climate or soil properties that makes it highly suited for a specific crop when managed with specific farming or conservation methods. This includes land of high local importance where it is useful and environmentally sound to encourage continued agricultural production, even if some or most of the land is of mediocre quality for agriculture and is not used for particularly high value crops.

Irrigated land is automatically viewed as high potential land. This then necessitates that registered water rights are in place with DWS. The registration will determine the extent of cultivation that may take place on any piece of land.

Change of land use applications must be submitted to the Minister of DALRRD in terms of Act 70 of 1970. The deeds office will only consider the application for rezoning and subdivision if rezoning authorisation has been approved by DALRRD.

6 LAND CAPABILITY

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. It is considered by many practicing land use planning as one of the few methods to describe the potential of land for development.

The evaluation involves consideration of:

- Difficulties in land use owing to physical land characteristics,
- The risks of land damage from erosion and other causes; and
- Climate.

For the purposes of this study, the classic eight-class land capability system (Klingebiel & Montgomery, 1961) will be used for the evaluation.

Land capability is classified according to guidelines that were published by the National Department of Agriculture in AGIS. More recent guidelines that they developed have not been published yet.

Land Capability is determined by the collective effects of soil, terrain and climate features and shows the most intensive long-term use of land for rain-fed agriculture. At the same time, it indicates the permanent limitations associated with the different land-use classes (refer to Table 2).

- Order A: Arable land – high potential land with few limitations (Classes i and ii)
- Order B: Arable land – moderate to severe limitations (Classes iii and iv)
- Order C: Grazing and forestry land (Classes v, vi and vii)
- Order D: Land not suitable for agriculture (Class viii)

Table 1. Land capability classes – intensity of land uses

LAND CAPABILITY				Grazing and Forestry			Crop production			
Order		Class	Wildlife	Forestry	Veld	Pastures	Limited	Moderate	Intensive	Very
Arable	A	i								
		ii								
	B	iii								
		iv								
Non arable	C	v								
		vi								
		vii								
	D	viii								

Note: the shaded area indicate the suitable land use

Land use capability of the site

The analysis indicates that all the soil is high potential land but that it falls into Land Capability Class iv due to climatic constraints.

Table 2. Land capability of soil groups

Soil Group	Area (ha)	Land Capability	Flood	Erosion	Depth	Texture	Drainage	Mechan-isation	Climate
Preferred site	52,3	iv	0	0	2	2	1	0	4
Alternative site	57,6	iv	0	0	2	2	1	0	4

DALRRD in their Comprehensive Atlas Ver 2.1 published maps that indicate land capability.

Figure 10. Land capability as indicated by the Comprehensive Atlas Ver 2.1

According to their analysis the soils consist of deep reddish brown and yellow apedal soils with a clay content of less than 15%. It does appear that the climatic constraints decide the Land Use category. The site falls in the category of marginal potential arable land with a rating of Class iv.

The conclusion is that the land is not moderate or high potential land that must be protected but rather has moderate to low capability.

7 CROP AND BEEF PRODUCTION

7.1 Assumptions

The footprint of the site is less than 20 hectares. This is the area that is potentially influenced by construction and which will be lost to agricultural production.

According to the land use potential analyses in Section 6, the land has a marginal potential for crop farming under rainfed conditions. Some farmers in the general area nevertheless cultivate land but have to practice specialised production techniques – the soil is tilled to absorb water and as soon as sufficient water available, the farmer would plant, with the hope that additional rains will see the crop through.

The livestock stocking density is estimated at 6 hectares per LSU. The 20 hectares will, therefore, deprive grazing to 3 LSUs.

7.2 Potential

Maize was selected as the indicator crop to determine the potential loss of agricultural production of summer crops if the land is removed from farming and used for other activities. According to the DALRRD, 2019. http://daffarcgis.nda.agric.za and the South African Atlas of Agrohydrology and Climatology, Water Research Commission, Pretoria, the maize long term maize yield is estimated at 2,48 tonnes per hectare.

Land capability Class iv is marginally arable and not able to consistently and economically produce crops.

The long term maize production projected yield according to the Comprehensive Agricultural Atlas at 2,4 tonnes per hectare (Figure 11). At this yield maize production is not feasible - the loss is calculated at R1 197 (see the addenda for details). Even at this low yield, maize can contribute to the fodder flow of livestock, especially during the dry winter period.

As indicated earlier, the veld on the footprint can carry three LSU. The gross margin for livestock production is about R5 704 per LSU per year. Based on these assumptions, it is estimated that the gross enterprise income from livestock is R17 112.

Labour cost to tend to the cattle is R58 500 (one worker at minimum wage). The implication is that the income is unable to cover even the labour cost.

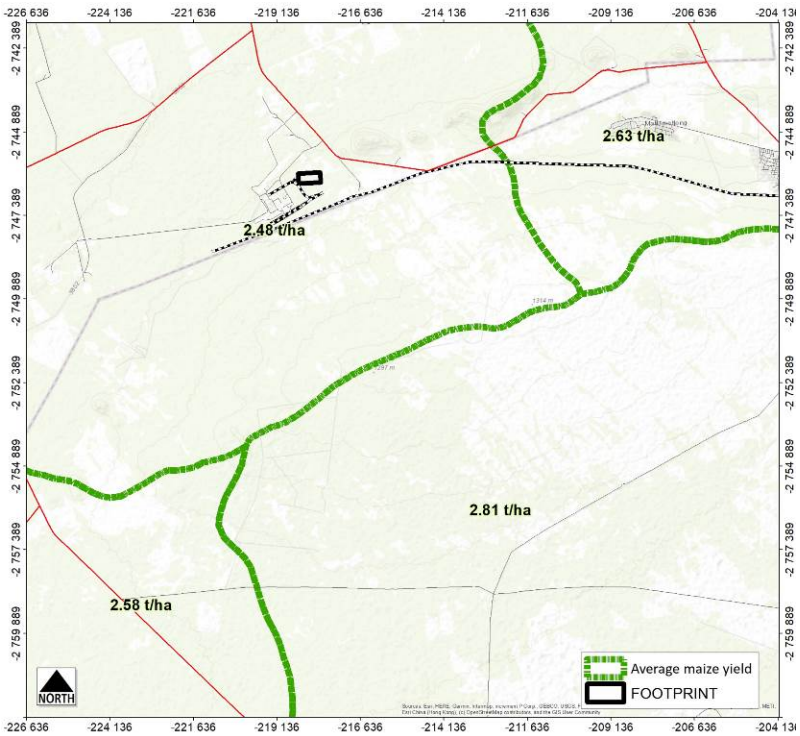


Figure 11. Expected long term maize yield (DALRRD)

7.3 Legal status

Virgin land may be cultivated without the approval of the Minister of DALRRD. Also in terms of NEMA, land that had not been cultivated for more than 10 years is considered as virgin land.

Historic satellite images (Figure 12 and Figure 13) indicate that the land has not been cultivated before.

The implication is that the land may not be cultivated without approval.

Figure 12. Status of cultivation in 2006

Figure 13. Status of cultivation in 2020

8 SENSITIVITY ANALYSIS

The Department of Environmental Affairs published Notice 648 of NEMA in May 2019 that describes the minimum criteria when applying for environmental authorisation. This notice applies specifically to energy generation projects. Nevertheless, it is more broadly used to also include other developments.

This protocol provides the criteria for the assessment and reporting of impacts on agricultural resources for activities requiring environmental authorisation. The protocol describes the level of environmental sensitivity determined by the national web-based environmental screening tool which for agricultural resources. It is based on the most recent land capability evaluation as provided by DALRRD.

The sensitivity analyses, is not perfect in terms of describing the site specific impacts, mainly because it is based on very broad data. Figure 14. Indicates the result of the screening tool.

According to the screening tool, the site has high sensitivity. Results of the evaluation by using the tool are provided in the addenda.

For land with a very high or high sensitivity, the following will apply:

In the case where the site status is different to that of the screening tool, an Agricultural Compliance Statement is to be provided by a registered soil scientist/ agricultural specialist as input to the Scoping Report. It should provide evidence of the changed agricultural resource sensitivity. This motivation will be assessed by the Competent Authority.

For land with a medium and low sensitivity, the following will apply:

In the case where the site status is different to that of the screening tool, an Agricultural Compliance Statement is to be provided by a registered soil scientist/agricultural specialist. It should provide evidence of the changed agricultural resource sensitivity.

The Agricultural Compliance Statement must be prepared on the site being submitted. The preferred development site and must verify that:

- The site is of *medium* or *low* sensitivity for agricultural resources; and
- Whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site.

Analysis for this development

According to the Screening Tool the site has mostly of high sensitivity.

The detailed assessment performed by Index, however, found the following:

The deep Shortlands and Hutton soils that occur on the site, coupled with the unfavourable climatic conditions for rainfed cropping makes the site only moderately sensitive. This is also the conclusion that DALRRD came to as indicated in their Comprehensive Atlas ver 2.1

A compliance statement as required by the protocol is provided in the addenda.

9 IMPACT ASSESSMENT

9.1 Assumptions

Land uses

The impact assessment is done for a land use change from agriculture to other. At present the land use is vacant.

The footprint of the development is less than 20 hectares.

Land use potential classes

High potential land is defined as follows:

Land best suited to, and capable of consistently producing acceptable levels of goods and services for a wide range of agricultural enterprises in a sustainable manner, taking into consideration expenditure of energy and economic resources; and includes:

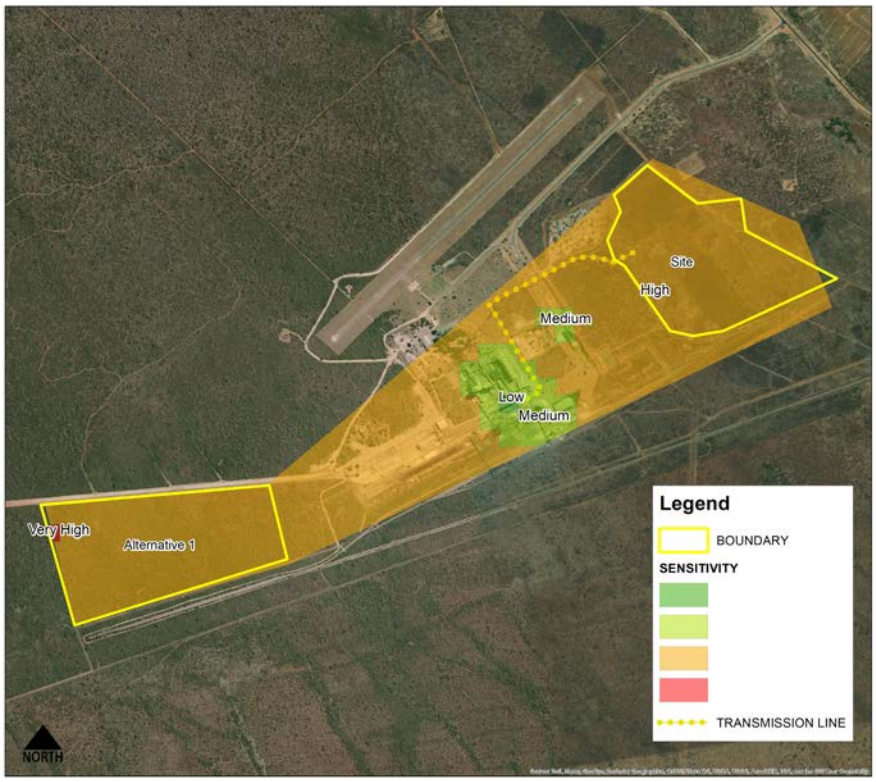


Figure 14. Agricultural sensitivity – (sensitivity tool)

- Land Capability Classes i, ii and iii;
- Unique agricultural land;
- Irrigated land; and
- Land suitable for irrigation (deep well-drained soils and assuming irrigation water is available).

9.2 Rating criteria

The following rating was used to indicate impacts:

Extent

- 1: Local - extend to the site and its immediate surroundings.
- 2: Regional - impact on the region but within the province.
- 3: National - impact on an interprovincial scale.

- 4: International - impact outside of South Africa.

Magnitude

Degree to which impact may cause irreplaceable loss of resources.

- 1: Low - natural and social functions and processes are not affected or minimally affected.
- 2: Medium - affected environment is notably altered; natural and social functions and processes continue albeit in a modified way.
- 3: High - natural or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.
- 4: Very high – Will affect the continued viability of the system/environment.

Duration

- 1: Short term: 0-5 years.
- 2: Medium term: 5-11 years.
- 3: Long term: impact ceases after the operational life cycle of the activity either because of natural processes or by human intervention.
- 4: Permanent: mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Probability

- 1: Rare/Remote - the event may occur only in exceptional circumstances.
- 2: Unlikely - the event could occur at some time.
- 3: Moderate - the event should occur at some time.
- 4: Likely - the event will probably occur in most circumstances.
- 5: Almost certain - the event is expected to occur in most circumstances.

Significance

Provides an overall impression of an impact's importance, and the degree to which it can be mitigated. The range for significance ratings is as follows:

- 0 – Impact will not affect the environment.
- 1 – No impact.
- 2 – Residual impact.
- 3 – Impact cannot be mitigated.

9.3 Impact rating

The significance of each potential impact is calculated using the following formula:

Significance points = (duration + extent + irreplaceable + reversibility + magnitude) x probability

The unmitigated and mitigated scenarios for each potential environmental impact should be rated as per Table 4 below.

Table 3. Significance rating

Score	Significance	Description of Rating
2 – 10	Low Significance	No specific management action required
10 – 20	Medium-low significance	Administrative management actions required
20 – 40	Medium significance	Management and monitoring action plans required
40 – 60	Medium-high significance	Specific management and monitoring plans required
>60	High significance	Detailed plans required, potential red flag impact

Table 4. Impact rating

IMPACT	Extent	Probability	Reversibility	Irreplaceable	Duration	Magnitude	TOTAL (SP)	Significance	MITIGATION	Significance after mitigation
LOSS OF HIGH POTENTIAL LAND										
Loss of land	1	1	1	1	1	0	**4**	**L**	The land is not cultivated and has likely never been. The land has only moderate potential. **There will be no loss and no mitigation is necessary.**	**L**
LOSS OF GRAZING LAND										
Loss of land	1	4	2	4	3	2	**44**	**MH**	The loss on regional scale is low. Some potential grazing land on a local scale will be lost. An offset to the loss to clear the balance of the land of sekelbos and then to maintain the veld. Introducing goats were found to improve veld conditions. **There will be no loss and no mitigation is necessary.**	**ML**
LOSS OF AGRICULTURAL PRODUCTION										
Loss of crop production	1	1	1	1	1	0	**4**	**L**	The land is not cultivated and has likely never been. Therefore, no loss of production will occur. The land is virgin and may not be cultivated without authorisation. **There will be no loss and no mitigation is necessary.**	**L**
Loss of animal production	1	4	2	2	4	3	**48**	**MH**	The land is not used for grazing but after bush clearing can gainfully be used for grazing and browsing. Some grazing on a local scale will be lost. The potential income from livestock is estimated at R17 112 per year. This will not even cover the labour cost to tend the animals. **There will be no loss and no mitigation is necessary.**	**L**

IMPACT	Extent	Probability	Reversibility	Irreplaceable	Duration	Magnitude	TOTAL (SP)	Significance	MITIGATION	Significance after mitigation
LOSS OF AGRICULTURAL INFRASTRUCTURE										
Direct loss	1	1	1	1	1	1	**5**	**L**	There is now no agricultural infrastructure. **There will be no loss and no mitigation is necessary.**	**L**
LOSS OF JOB OPPORTUNITIES										
Direct loss	1	1	1	1	1	1	**5**	**L**	The land is not used at present. Bush-clearing and maintenance of the veld on the rest of the property can create temporary and permanent jobs. **There will be no loss and no mitigation is necessary.**	**L**

9.4 Mitigation

Loss of land for cultivation or for grazing cannot be mitigated. It is however possible to upgrade land that is now not utilisable for grazing purposes because of the bush encroachment.

Densification of bush often occurs when old cultivated lands become fallow or when the grazing regimes are incorrect. There are some positive impacts when implementing the project that offsets any negatives. These will be discussed below.

- During implementation

The land is not used at present, mainly due to the severe bush density. Clearing the land will make large quantities of wood available. Rather than burn the wood, the thicker parts can be cut as firewood.

Sekelbos and other trees that are removed from the PV footprint can be made available to the local community or even sold in the towns and cities to generate an income. This could create temporary employment or even create business opportunities for the local population.

- During operation

The PV site will be cleared of plants and will, therefore have no value in farming. The surrounding land will not be impacted on by implementing the project. There will be no loss and no mitigation is necessary.

10 CONCLUSIONS

The study found that t*he deep Shortlands and Hutton soils that occur on the site, coupled with the unfavourable climatic conditions for rainfed cropping makes the site only moderately sensitive. This is also the conclusion of DALRRD.*

The impact of the development on agriculture is low:

- No high potential land will be lost;

- The land is encroached with sekelbos and is not available as grazing. The size of the area that will be impacted on is too small to make a meaningful contribution to food security;
- No farming infrastructure will be lost ,and
- No job opportunities will be lost by implementation of the project.

It is the recommendation of the specialist that the project should be promoted because it does not have any negative impacts on agriculture.

11 ADDENDA

11.1 References

1) Grieser, J., 2006. Local Climate Estimator. Agromeeoolgy Group, FAO. Rome
2) Grondklassifikasie Werkgroep, 1991. Grondklassifikasie, 'n Taksonomiese sisteem vir Suid Afrika, Departement van Landbou-ontwikkeling, Pretoria.
3) Department of Agriculture, 2019. http://daffarcgis.nda.agric.za/Comp_Atlas_v2/
4) South African Atlas of Agrohydrology and Climatology, Water Research Commission, Pretoria

11.2 Gross margins

Maize Dryland		Rand
Yield		2.4
R/t		2 800.00
INCOME		
SAFEX	R/TON	2 800.00
Total deductions	R/TON	260
Net Farm Gate Price	R/TON	2 540.00
GROSS INCOME	**R/HA**	**6 096.00**
EXPENDITURES		
Crop insurance	R/HA	0
Fertilizer	R/HA	1 748.00
Seed	R/HA	2 231.00
Fuel	R/HA	869
Herbicide	R/HA	1 027.00
Insecticide	R/HA	95
Fungicides	R/HA	395
Repairs and maintenance	R/HA	672
Casual labour	R/HA	256
TOTAL VARIABLE EXPENDITURE	**R/HA**	**7 293.00**
GROSS MARGIN:	**R/HA**	**-1 197.00**

Livestock	RAND
Income	8 500.00
Costs	2 796.10
Summer lick	305.5
Winter lick	912.6
Veterinary	190
Bull cost	150
Marketing	58
Transport	20
Labour	560
Farm Fodder	350
Repairs and maintenance	250
Margin	**5 703.90**

11.3 Climate classes | Climate parameters

The climate classes as defined by the Task Team (1987) were adopted and are defined in the following table. In order to bring these concepts under parameters, a methodology was designed whereby the climate of the country was analysed and evaluated in terms of moisture, temperature and other constraints.

11.3.1 Climate classes

Class	Limitation rating	Description
C1	None to slight	Favourable for growing a wide range of adapted crops.
C2	Slight	Less favourable than C1 and may limit choice of crops or yields.
C3	Moderate	Water stress, extremes of temperature and/or damage from frost, wind or hail restricts choice of crops and yield potential.
C4	Moderate to severe	Less favourable than C3. Low and unreliable rainfall, extremes in temperature and severe damage from frost or wind restricts regular crop production. Risks in cropping are high.
C5	Severe	Unfavourable (mainly rainfall) for growing crops.
C6	Very severe	Unfavourable for plant production. One or more of the following extremes occur: Severe aridity, extremes in temperature

Note: The climate class is determined by the worst parameter class, e.g. for a land type to qualify for climate class C2, one or more climate parameters may be not worse than class C2.

11.4 Content of the Agricultural Agro-Ecosystems Assessment

The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify the extent of the impact of the proposed development on the agricultural resources;

Whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.

Description of the status quo - the following aspects as a minimum must be considered in the baseline description of the complete agro-ecosystem:

- The soil forms, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope;
- Where applicable, the vegetation composition, available water sources as well as agro- climatic information;
- The current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 3 years, expressed as an annual figure and broken down into production units;
- The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure;
- Existing impacts on the site, located on a map where relevant (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).

Assessment of Impacts - the following aspects as a minimum must be considered in the predicted impact of the proposed development on the complete agro-ecosystem:

- Change in productivity for all agricultural activities based on the figures of the past 3 years, expressed as an annual figure and broken down into production units;
- Change in employment figures (both permanent and casual) expressed as an annual figure;
- Any alternative development footprints within the proposed development site which would be of "medium" or "low" sensitivity for agricultural resources as identified by the national web-based environmental screening tool.

The findings of the Agricultural Agro-Ecosystem Assessment must be written up in an Agricultural Agro-Ecosystem Report.

This report must contain, as a minimum, the following information:

- Details and relevant experience as well as the SACNASP registration number of the soil scientist/agricultural specialist/s preparing the assessment including a curriculum vita;
- A signed statement of independence by the specialist;
- The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;
- A description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant;
- A map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the national environmental screening tool;
- An indication of the potential losses in production, profits and employment from the change of the agricultural land use as a result of the proposed development;
- Confirmation that the proposed development will generate more long-term economic and social benefits for the country as a whole than that which would be generated by agricultural activities on the affected land with regards to agricultural resources;
- Additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc.;
- Information on the current agricultural activities being undertaken on adjacent land parcels;
- Confirmation from the soil scientist/agricultural specialist that all reasonable measures have been considered in the micro-siting of the development to minimise fragmentation and disturbance of agricultural activities;
- A substantiated statement from the soil scientist/agricultural specialist with regards to agricultural resources on the acceptability of the development and a recommendation on the approval or not of the development;
- Any conditions to which the statement is subjected;
- Where required, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr);
- A description of the assumptions made and any uncertainties or gaps in knowledge;

In addition, where the activity is related to the generation of renewable energy of 20 MW or more, the report must contain:

- Calculations of the total development footprint area for each land parcel as well as the total footprint area of the development (including supporting infrastructure);

- Confirmation as to whether the development footprint is in line with the development limits set in Table 1, including where applicable any deviation from the set development limits and motivation to support the deviation, including;
- Where relevant, reasons why the proposed development footprint is required to exceed the limit;
- Where relevant, reasons why this exceedance will be in the national interest;
- Where relevant, reasons why there are no alternative options available including evidence in terms of alternatives assessed.
- A map showing the approved renewable energy applications within a 50 km radius of the proposed development.

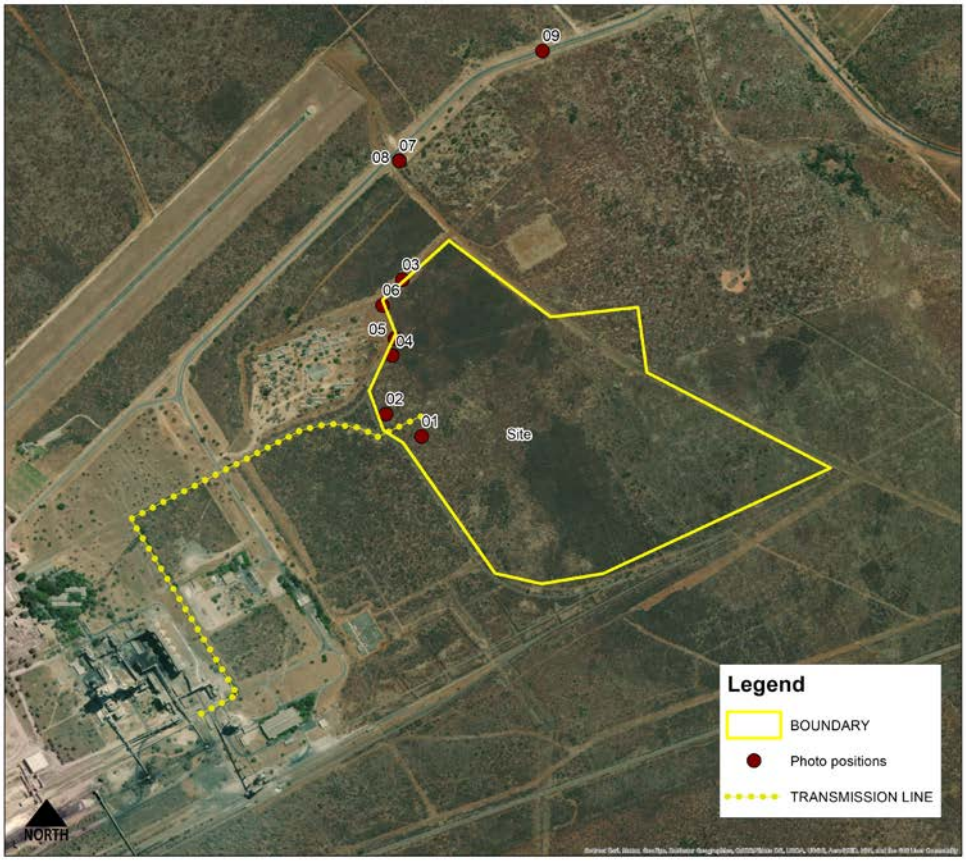
11.5 Compliance statement in terms of 2014 EIA regulations

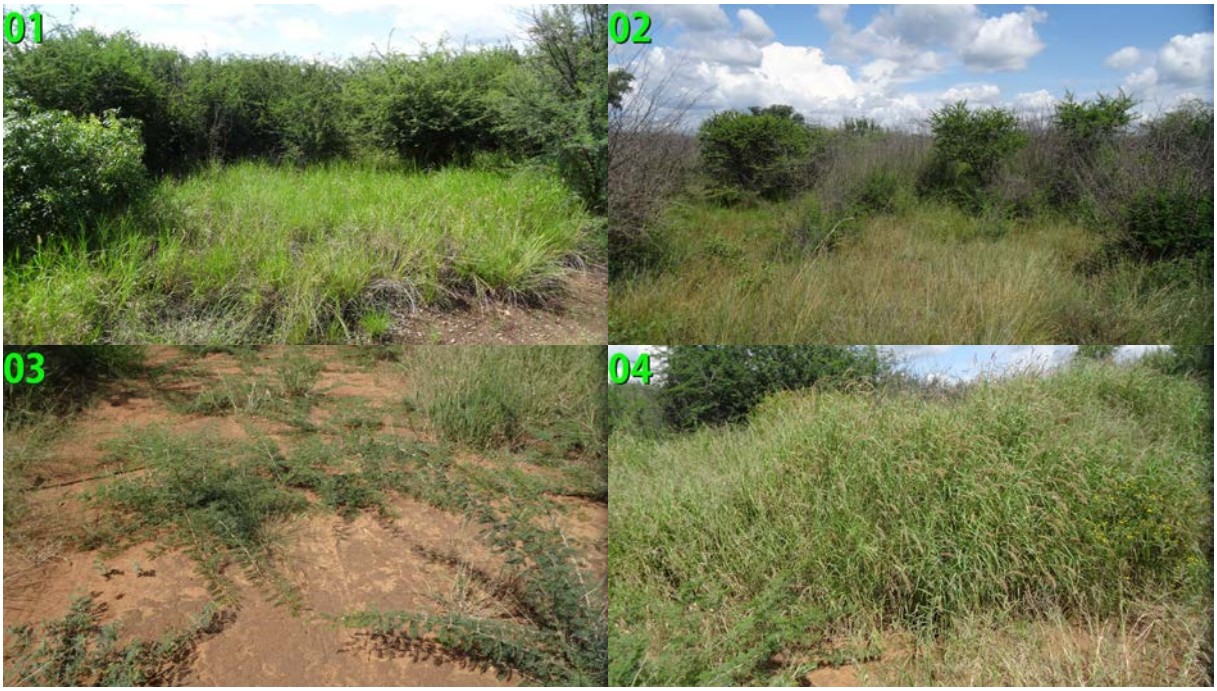
Environmental authorization in terms of 2014 EIA regulations requires a sensitivity analyses as indicated by the screening tool of the Department.

The impact will be for the rezoning of land for mixed use.

1. Dr Andries Gouws compiled the agricultural report and is qualified as soil scientist and land use evaluation specialist. He is also registered with SACNASP in agricultural. The registration certificate and CV are attached;
2. A signed statement of independence by the specialist is provided in the preamble to the report;
3. A map showing the land and its present uses is provided in Figure 3;
4. The size of the land is 227 hectares. Approximately 123 hectares of high potential land will we impacted on by to development;
5. The detailed assessment of the farming resources found deviations regarding sensitivity as indicated by the web-based screening tool. The deviations are because some areas have shallow soils and rock outcrops that were erroneously indicated as *high* sensitivity.
6. No specific condition for implementing the project is required or recommended;
7. There are no gaps in information or specific areas of concern that needs of significance.

11.6 Photos of the site



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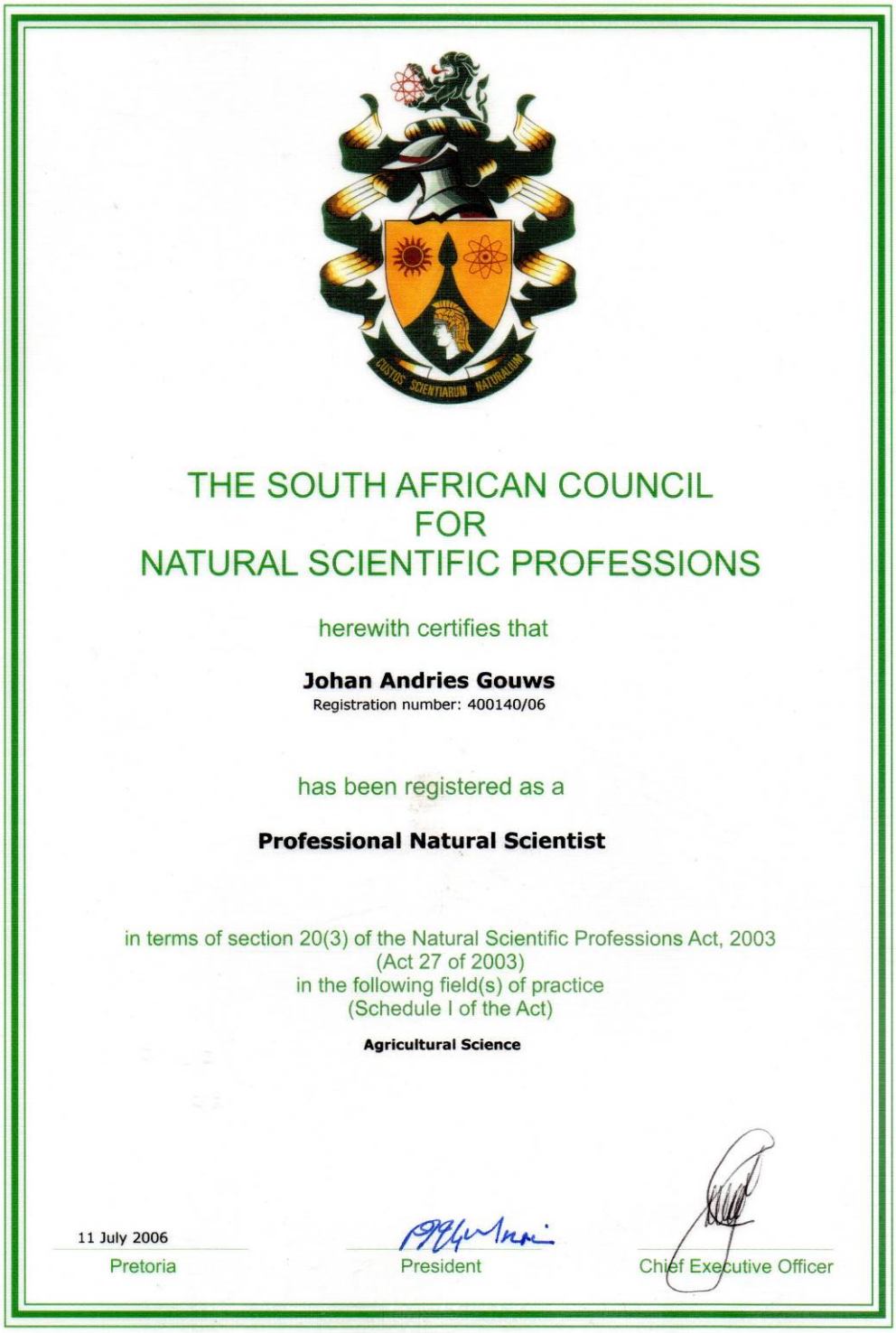
11.7 SACNSP registration



THE SOUTH AFRICAN COUNCIL
FOR
NATURAL SCIENTIFIC PROFESSIONS

herewith certifies that

Johan Andries Gouws
Registration number: 400140/06

has been registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following field(s) of practice
(Schedule I of the Act)

Agricultural Science

11 July 2006		
Pretoria	President	Chief Executive Officer

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	
NEAS Reference Number:	
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014

PROJECT TITLE

Environmental Impact Assessment for the Development of a 10MW AC Solar Photovoltaic (PV) Plant and Associated Infrastructure on Portion 2 of Farm Schoongezicht 238 KP, Dwaalboom, Limpopo Province

Specialist:	Andries Gouws		
Contact person:	Andries Gouws		
Field of Specialisation:	Agriculture		
Physical Address:	227 Eridanus Street		
	Waterkloof Ridge		
	0108		
Postal address:	P O Box 26275, Monument Park		
Postal code:	0105	**Cell:**	082 807 6717
Telephone:		**Fax:**	
E-mail:	index@iafrica.com		
Professional affiliation(s) and registration number (if any)	SACNASP, Soil Science Society of South Africa		

Name of the Environmental Assessment Practitioner (EAP):	Dr Anthony Avis		
Company Name:	Coastal and Environmental Services (Pty) Ltd.		
Postal address:	67 African Street, Makhanda,		
Postal code:	6140	**Cell:**	+27 606 715 914
Telephone:	046 622 2364	**Fax:**	n/a
E-mail:	g.shaw@cesnet.co.za		

4.2 The specialist appointed in terms of the Regulations_

I, **Andries Gouws** 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; and
- All the particulars furnished by me in this form are true and correct.

Signature of the specialist:

Index

Name of company (if applicable):

1 July 2021

Date:

Signature of the Commissioner of Oaths for project/application:

1 July 2021

Date:

FRANCOIS GOUWS
COMMISSIONER OF OATHS
PRACTISING ATTORNEY (RSA)
414 SUSSEX AVENUE
LYNNWOOD, PRETORIA

Designation:

Official stamp (below)