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**Soil and Agricultural Potential Scoping Report for the  
Proposed Hyperion Power Dual Fuel Facility**

**Submitted by TerraAfrica Consult cc**

Mariné Pienaar

**6 October 2020**

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## Declaration of the Specialist

### Details of Specialist

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### Declaration of Independence

I, Mariné Pienaar, hereby declare that TerraAfrica Consult, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

I further declare that I was responsible for collecting data and compiling this report. All assumptions, assessments and recommendations are made in good faith and are considered to be correct to the best of my knowledge and the information available at this stage.



TerraAfrica Consult cc represented by M Pienaar

October 2020

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## 1. INTRODUCTION

Terra-Africa Consult cc was appointed by Savannah Environmental (Pty) Ltd to conduct the agricultural compliance assessment as part of the Scoping and Environmental Impact Assessment process for the proposed development of a thermal power dual facility. The proposed development will also include an access road.

The development area for this project are located approximately 15km north of Kathu within in the Gamagara Local Municipality which falls within jurisdiction of the John Taolo Gaetsewe District Municipality of the Northern Cape Province. The proposed infrastructure will be developed on the following properties:

### Thermal power dual fuel facility

- Remainder of the Farm Lyndoch 432

### Access road route

- Portion 1 of Farm 464

## 2. TERMS OF REFERENCE

The terms of reference applicable to the soil and agricultural potential scoping assessment include the following:

- Conduct a desktop assessment of the baseline soil and agricultural properties for the proposed development area and access road route
- Identify site sensitivities to the proposed project pertaining to the soil properties, associated land capabilities and the agricultural potential of the project area.
- Identify potential impacts that will be caused by the project and that will have to be assessed as part of the detail study phase.
- Identify a plan of study that will include the methodology to be followed during the detailed soil and agricultural potential impact assessment that will form part of the final EIA report that will be submitted.

## 3. METHODOLOGY

The proposed infrastructure layout was superimposed on four data sets to determine the anticipated sensitivities of the properties to the development. The data sets are:

- The National Land Capability Evaluation Raster Data Layer was obtained from the DAFF to determine the land capability classes of the project assessment zone according to this system. The data was developed using a spatial evaluation modelling approach (DAFF, 2017).

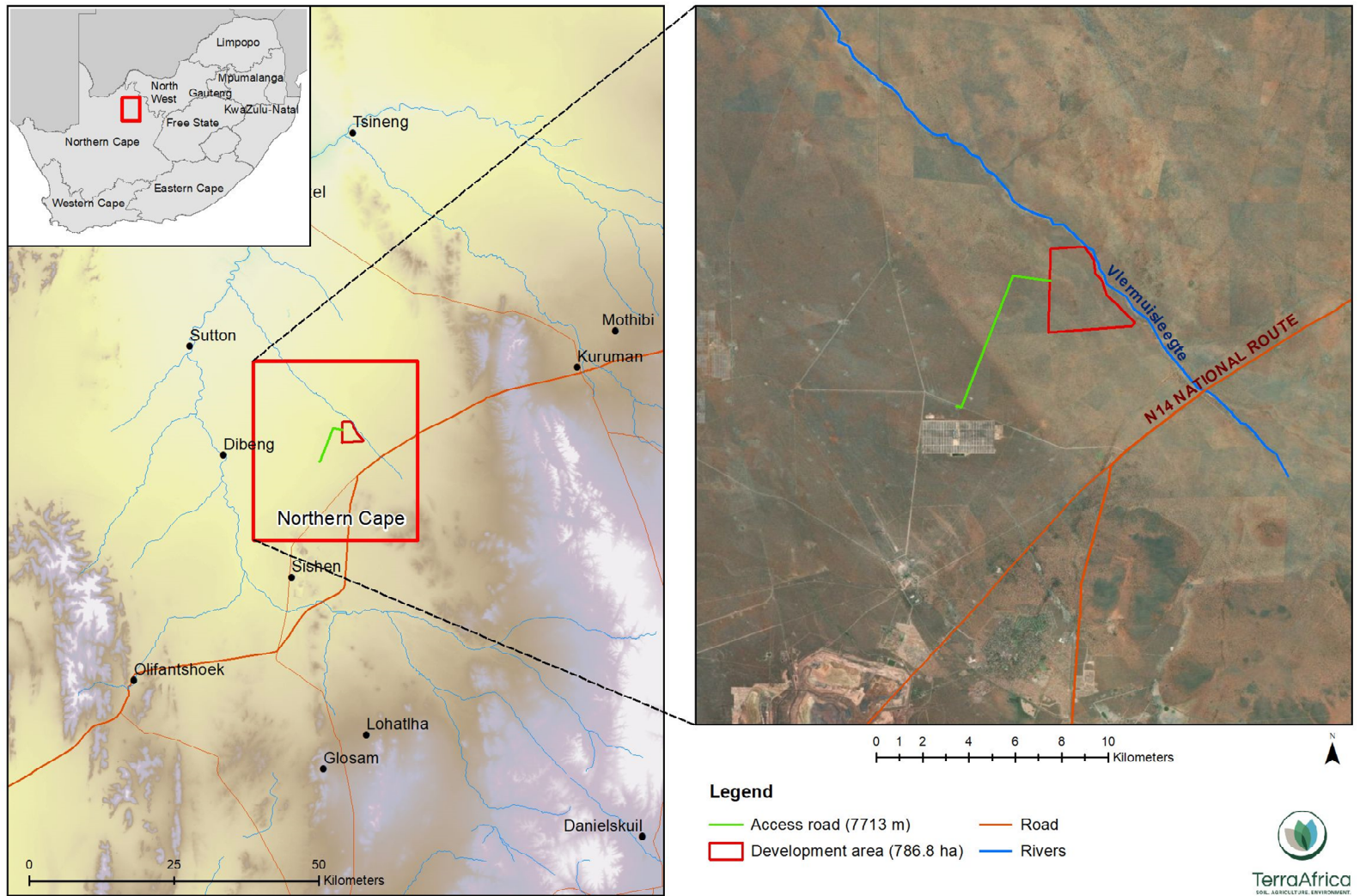


Figure 1 Locality of the proposed Hyperion thermal power dual facility and power line

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- The long-term grazing capacity for South Africa 2018 was analysed for the area and surrounding area of the project assessment zone. This data set includes incorporation of the RSA grazing capacity map of 1993, the Vegetation type of SA 2006 (as published by Mucina L. & Rutherford M.C.), the Land Types of South Africa data set as well as the KZN Bioresource classification data. The values indicated for the different areas represent long term grazing capacity with the understanding that the veld is in a relatively good condition.
  - The Northern Cape Field Crop Boundaries (November 2019) was analysed to determine whether the proposed project assessment zone falls within the boundaries of any crop production areas. The crop production areas may include rainfed annual crops, non-pivot and pivot irrigated annual crops, horticulture, viticulture, old fields, small holdings and subsistence farming.
  - Land type data for the project assessment zone was obtained from the Institute for Soil Climate and Water (ISCW) of the Agricultural Research Council (ARC) (Land Type Survey Staff, 1972 – 2006). The land type data is presented at a scale of 1:250 000 and entails the division of land into land types, typical terrain cross sections for the land type and the presentation of dominant soil types for each of the identified terrain units.

## **4. BASELINE DESCRIPTION**

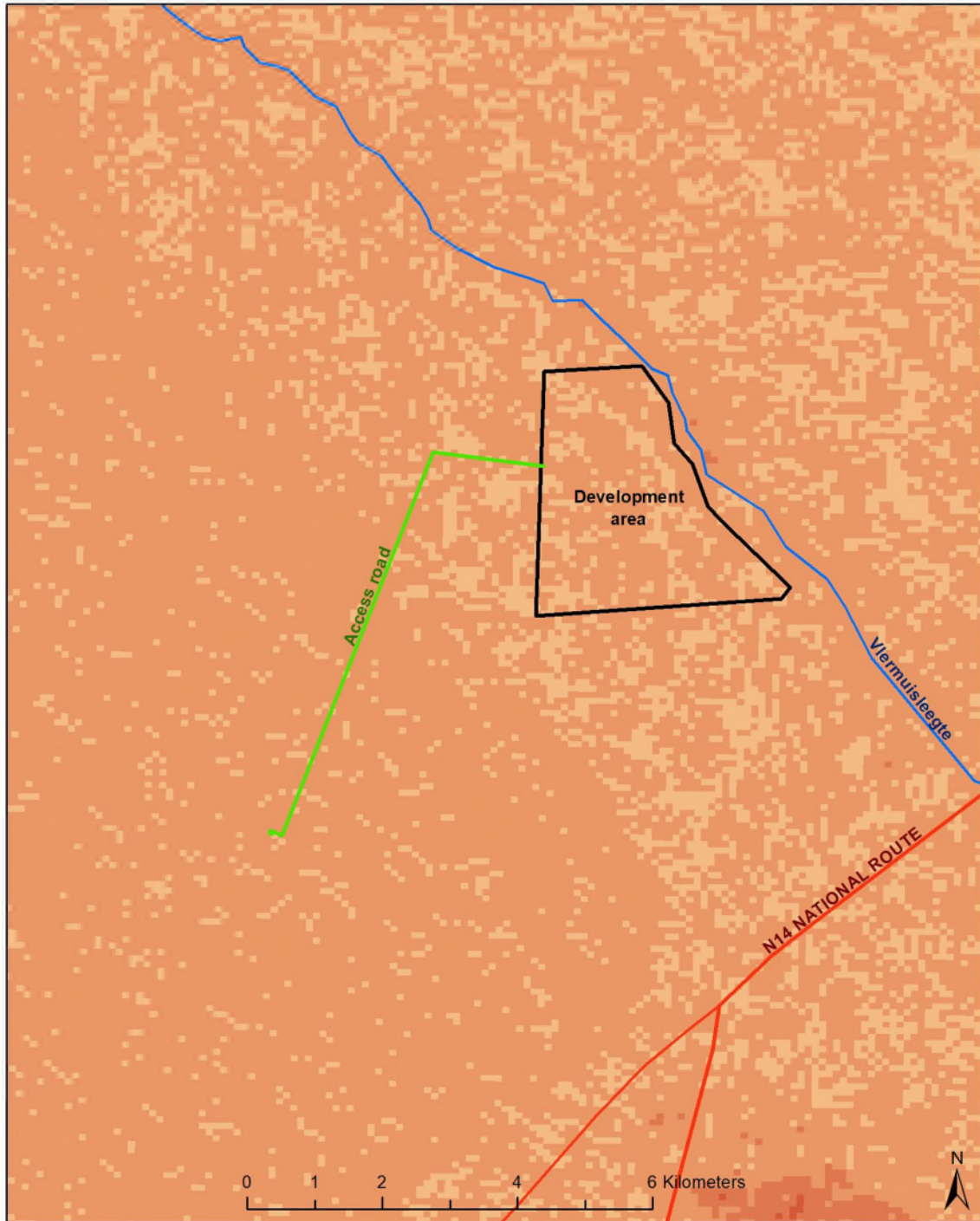
### **4.1 Land capability**

The proposed access road alignment traverses through an area that largely has Low (Class 05) land capability. The north-eastern side of the alignment falls in an area where Low land capability areas are interspersed with Low-Moderate (Class 06) land capability. The development area of 786.8 ha consists of a similar combination of Low and Low-Moderate land capability classes. The distribution of these land capability classes in and around the project area, is depicted in **Figure 2**. Both these classes are indicative that the area is suitable for livestock grazing and is considered not suitable for arable agriculture under rainfed conditions.

### **4.2 Field crop boundaries**

The position of field crops around the proposed Hyperion thermal power dual fuel facility development area and access road, is illustrated in **Figure 3**. There are no field crop boundaries within this area. The nearest crop field boundaries are approximately 15km away to the northeast of the project area and according to this data, consist of old fields. Further away to the northeast, a centre pivot irrigation area is present (approximately 3.5 km south of the R31). Small fields with planted pasture and/or rainfed crop production are located further away to the north, north-east, south-west and west of the proposed development area.

Following this data, there is no risk that rainfed or irrigated crop production will be affected by the proposed development.



**Legend**

**Land capability (DAFF)**

- 03. Low-Very low
- 04. Low-Very low
- 05. Low
- 06. Low-Moderate

- Access road (7713 m)
- Development area (786.8 ha)
- Road
- Rivers



Figure 2 Land capability classification of the proposed Hyperion power dual facility and access road



**Legend**

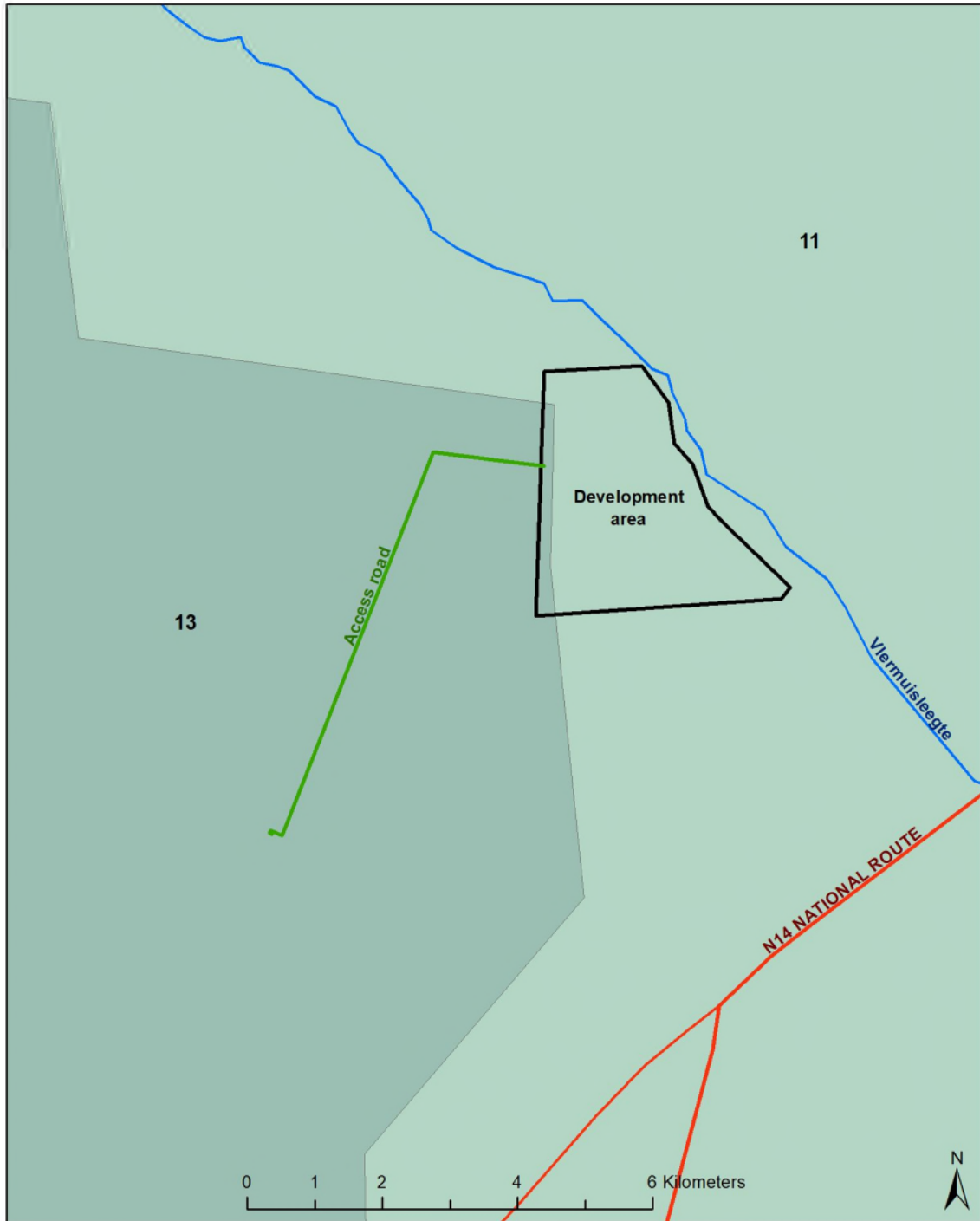
**Field crops**

- Old Fields
- Pivot Irrigation
- Rainfed Annual Crop Cultivation / Planted Pastures

- Access road (7713 m)
- Development area (786.8 ha)
- Road
- Rivers



Figure 3 Locality of field crops around the development area of the Hyperion thermal power dual fuel facility and access road



**Legend**

**Grazing capacity (ha/LSU)**

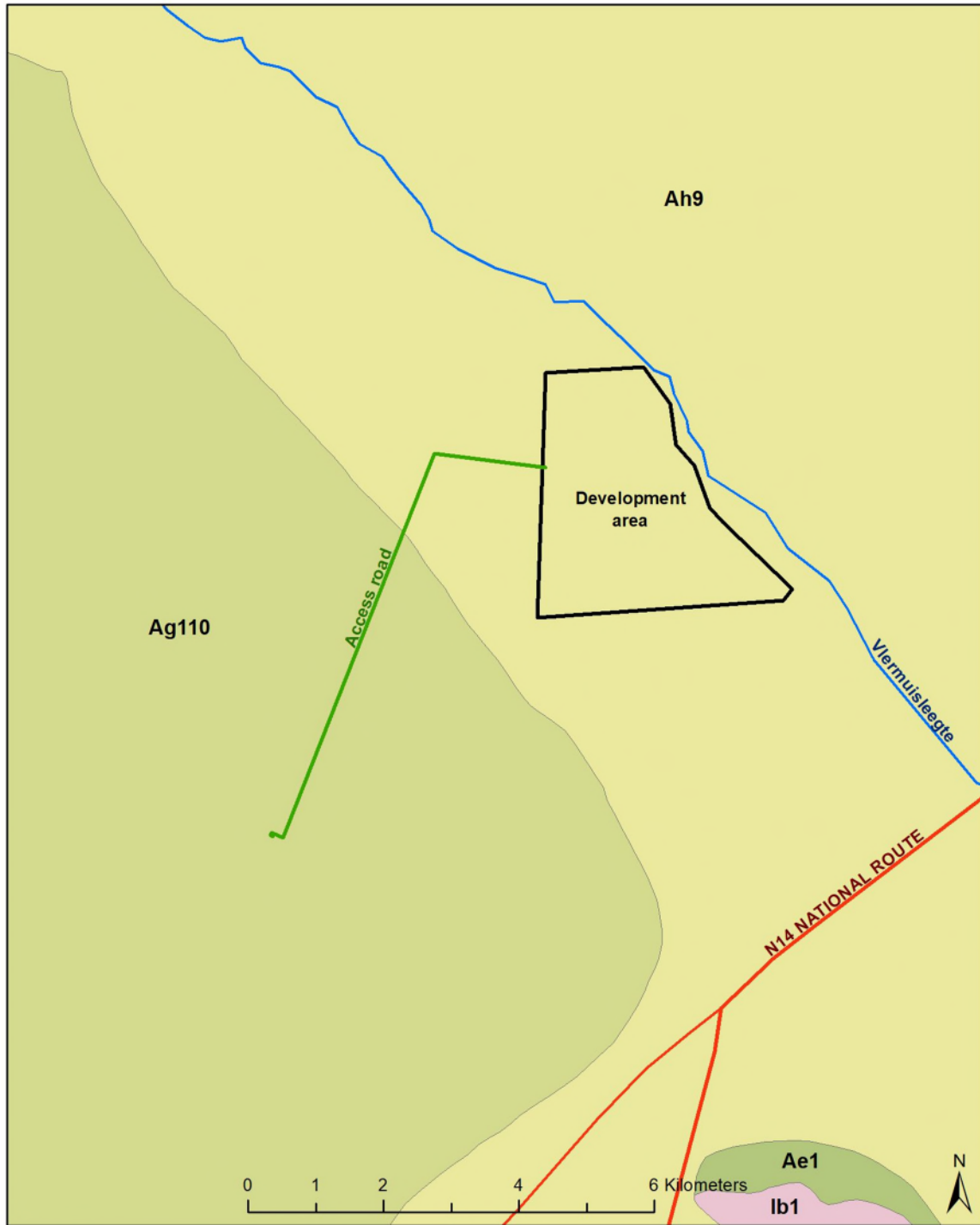
- 11
- 13

- Access road (7713 m)
- Development area (786.8 ha)
- Road
- Rivers



Figure 4 Long-term grazing capacity of the proposed development area and access road





**Legend**

**Land type**

- Ae1
- Ag110
- Ah9
- Ib1

- Access road (7713 m)
- Development area (786.8 ha)
- Road
- Rivers



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Figure 5 Land type classification of the proposed development area and access road

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### 4.3 Grazing capacity

The ideal grazing capacity of a specified area is an indication of the long-term production potential of the vegetation layer growing there to maintain an animal with an average weight of 450 kg (defined as 1 Large Stock Unit (LSU)) with an average feed intake of 10 kg dry mass per day over the period of approximately a year. This definition includes the condition that this feed consumption should also prevent the degradation of the soil and the vegetation. The grazing capacity is therefore expressed in a number of hectares per LSU (ha/LSU) (South Africa, 2018).

Following the metadata layer obtained from DAFF, the grazing capacity of the largest section of the development area, is 11 ha/LSU. (**Error! Reference source not found.**). A narrow strip along the western boundary of the development area as well as the proposed power line alignment, have grazing capacity of 13 ha/LSU.

Since the proposed infrastructure within the development area will be fenced off, it will no longer be available for livestock grazing. Similarly, the access road will be stripped of vegetation in preparation of the road surface and will no longer be suitable for livestock grazing.

### 4.4 Land type classification

The entire development area as well as the north-eastern section of the access road of Land Type Ah9. The remaining section of the access road, consist of Land Type Ag110. The characteristics of the land types are described below.

#### Land Type Ah9

Land Type Ah9 consists of only two terrain units where Terrain Unit 4 is the vast flat areas that dominates the landscape and Terrain Unit 5 is the areas of slight depression where endorheic pans can develop. Therefore, the landscape can be described as flat to very slightly undulating with slopes ranging between 0 and 3%. The soil formed from Aeolian sand of Recent age and the riverbeds in the larger area around the Project area formed on outcrops of Tertiary Kalahari beds (in most cases limestone layers can be seen where it has been exposed through sediment transport by water and wind). The texture of soil in this land type is dominated by sand with the clay fraction estimated as always less than 10%. Deep Hutton and Clovelly soil forms (deeper than 1200 mm) constitutes the largest portion of this land type with very limited possibility for finding shallow, rocky soils of the Mispah and Glenrosa forms over the entire land type area (an estimated 3.5%).

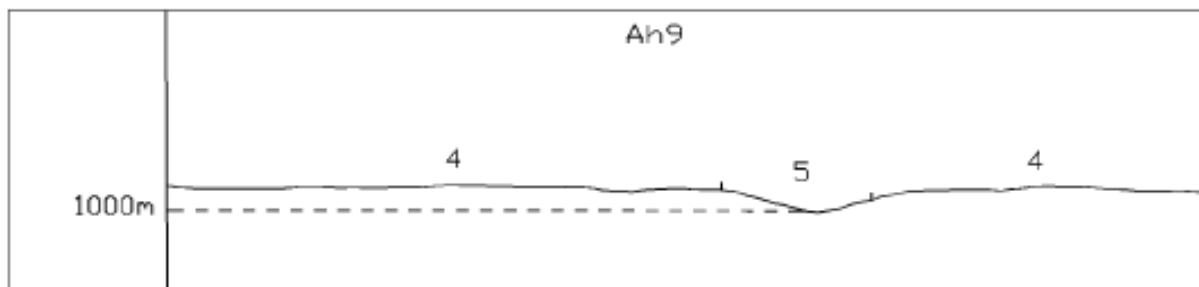


Figure 6 Terrain form sketch of Land Type Ah9

### Land Type Ag110

Similar to Land Type Ah9, Land Type Ag110 also consists of only two terrain units where Terrain Unit 4 represent flat areas that dominates the landscape and Terrain Unit 5 are the areas of slight depression at a variety of elevations where endorheic pans can develop. The landscape can is also flat to very slightly undulating with slopes ranging from between 0 and 2%. However, the underlying geology differs from that of Land Type Ah9. The soil in this land type overlies surface limestone, alluvium and red wind-blown sand of Tertiary to Recent age with a few occurrences of amygdaloidal andesitic lava of the Ongeluk Formation.

The texture of soil in this land type is dominated by sand and sandy loam with the clay fraction estimated as always less than 15%. This land type mainly consists of shallow soil profiles of the Hutton and Mispah forms with an estimated 18.5% of areas in this land type consisting of deeper soil profiles of the Hutton form.

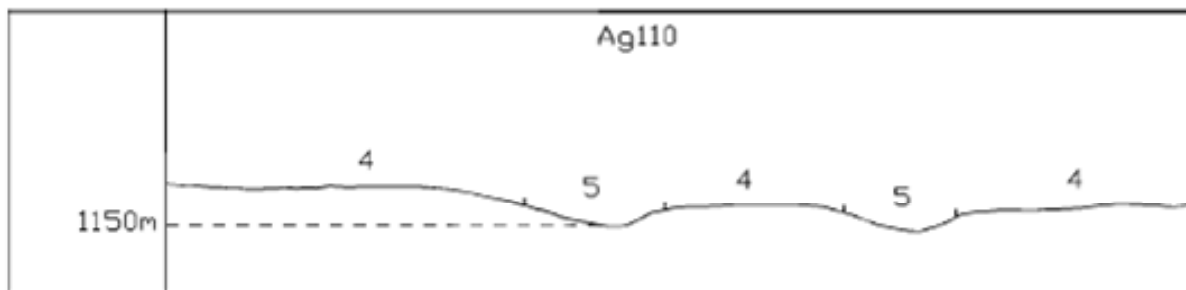


Figure 7 Depiction of the terrain forms of Land Type Ag110

## **5. POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT**

### **5.1 Project description**

The facility will be a hybrid facility consisting of a dispatchable, dual fuel (liquid or gas) thermal generation plant in combination with a solar plant. There will be a single point of connection to the utility (Eskom). The facility will aim to meet the bid requirement of being 100% dispatchable between the hours of 05h00 and 21h30. Where possible and where available, solar power will be utilised to meet the demand however where solar power is not available (typically between the hours of 5h00 and 07h00 and again between 18h00 and 21h30), thermal generation will be utilised. It is currently estimated that between 50 – 65% of the demand will be met utilising solar power with the remaining 35 – 50 % being met with thermal generation. The facility will be controlled by a joint controller that will have the capability of assessing the demand and regulating the power supply from the solar and thermal facilities accordingly.

## 5.2 Potential impacts on soil

The anticipated impacts of the proposed project on soil are soil compaction, erosion, soil pollution and the loss of soil fertility from the topsoil horizons to be stripped and stockpiled during the construction phase. Below follows a description of the impacts anticipated:

The most significant impact will most likely be caused by the traversing of vehicles over the terrain during the construction phase. This will result in soil compaction. Soil compaction affects the infiltration of rain into the soil and will increase the risk of erosion as a result of this. Deep level soil compaction (as caused by heavy vehicle traffic) is difficult to alleviate.

<b>Impact: Soil compaction</b>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Soil compaction reduces the water infiltration rate of soil that increase the risk of run-off	Negative	Local	None
<b>Description of expected significance of impact</b> Wherever the impact occurs (where heavy vehicles traverse) the impact is expected to be of moderate significance.			
<b>Gaps in knowledge &amp; recommendations for further study</b> <ul style="list-style-type: none"> <li>The interpretation of the soil data available from the previous soil assessment of the Hyperion PV project areas, will be analysed whether the soil physical properties of the site are particularly sensitive to soil compaction.</li> </ul>			

Soil erosion is considered another possible impact, especially where vegetation will be removed during the construction phase of the project.

<b>Impact: Soil erosion</b>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Bare soil surfaces are prone to loss of soil particles as a result of wind and water movement	Negative	Local	None
<b>Description of expected significance of impact</b> The impact is expected to be of moderate significance.			
<b>Gaps in knowledge &amp; recommendations for further study</b> <ul style="list-style-type: none"> <li>The interpretation of the soil data available from the previous soil assessment of the Hyperion PV project areas, will be analysed to determine the erodibility risk of the soil in the development area.</li> </ul>			

In any area where topsoil will be stripped for construction purposes, the inherent soil fertility and in situ soil horizon organisation will be compromised.

<b>Impact: Loss of soil fertility through disturbance of in situ horizon organisation</b>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>

Earthworks as part of construction of the hybrid facility will result in disturbance of in situ soil profiles	Negative	Local	None
<b>Description of expected significance of impact</b> Low to moderately low significance			
<b>Gaps in knowledge &amp; recommendations for further study</b> <ul style="list-style-type: none"> <li>The results of the previous soil survey that was conducted will be used to determine the sensitivity of the in situ profiles to this impact.</li> </ul>			

Chemical soil pollution may occur as a result of oil and fuel spills from construction vehicles as well as any other waste products that may be generated on site and not properly handled.

<b>Impact: Soil chemical pollution</b>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Oil and fuel spillages as well as waste generation during the project cycle will result in soil chemical pollution.	Negative	Local	None
<b>Description of expected significance of impact</b> The significance of this impact is moderate to high.			
<b>Gaps in knowledge &amp; recommendations for further study</b> <ul style="list-style-type: none"> <li>The only knowledge gap is the full project description that includes detail of activities and materials that may result in soil pollution during the different project phases.</li> </ul>			

### Potential impacts on land use

The only impact on land use will be the change of land use from cattle farming to that of renewable energy generation. The cumulative impact on land use is that portions of land that were previously used for agriculture in the region are converted into alternative land uses. There is also other proposed renewable energy projects in the area that will cumulatively reduce the areas currently available for agriculture.

<b>Impact: Change in land use</b>			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
The proposed project will change the current land use from agriculture to energy generation	Neutral/Positive	Local	None
<b>Description of expected significance of impact</b> The proposed project may have a moderate to major positive impact on the current land use and in the worst case, have a neutral impact.			
<b>Gaps in knowledge &amp; recommendations for further study</b> The economic viability of livestock farming within the development area, will be calculated during the detail study phase.			

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## Potential impacts on land capability

The land capability of the area where the proposed project will be located will not be affected by the proposed project.

<b>Impact</b> Change in the land capability of the site			
<b>Issue</b>	<b>Nature of Impact</b>	<b>Extent of Impact</b>	<b>No-Go Areas</b>
Where in situ soil profiles are disturbed by construction activities, the land capability may be altered	Negative	Local	None
<b>Description of expected significance of impact</b> The site has low to low-moderate land capability and the proposed project will reduce the land capability of the surface infrastructure footprint.			
<b>Gaps in knowledge &amp; recommendations for further study</b> » The final land capability will be determined using the data from the original assessments for the Hyperion Solar PV projects.			

## 6. PLAN OF STUDY

The existing Soil, Land Use, Land Capability and Agricultural Potential Assessments will be reviewed. The data points of the spatial data that was generated by the field surveys of these projects, will be re-interpreted for the soil and land capability mapping of the final Soil and Agricultural EIA-level report to be submitted for the proposed Hyperion thermal power dual fuel facility, and access road.

The report will be prepared in alignment with all the relevant NEMA regulations as well as General Notice 320 of 2020 that specifically address Agricultural Compliance reporting for the renewable energy sector.

## 7. CONCLUSION

Following the desktop analysis of available data, it is concluded that the proposed development of the Hyperion power dual fuel facility and supporting infrastructure, will affect land with low to medium soil and agricultural sensitivity. No no-go areas have been identified for the proposed project from the perspective of soil and agricultural resource conservation.

It is anticipated that the proposed project will have very limited impact on the soil properties and land capability while the land use will change from livestock farming to generation of renewable energy. The detailed assessment and subsequent reporting will provide in-depth detail on all these aspects.

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## 8. LIST OF REFERENCES

- Crop Estimates Consortium, 2019. *Field crop boundary data layer (NC province)*, 2019. Pretoria. Department of Agriculture, Forestry and Fisheries.
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