COMPLAINCE STATMENT FOR THE PROPOSED CONSTRUCTION OF THE IPELEGENG OXIDATION PONDS AND TWO GRAVITY OUTFALLMSEWER LINES

PREPARED FOR

ENVIROWORKS

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DSA
Digital Soils Africa

+27 83 703 3002

www.dsafrica.co.za

darren@dsafrica.co.za

Kemsley Street

Port Elizabeth

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BACKGROUND TO THE STUDY

Digital Soils Africa (Pty) LTD (DSA) were tasked by EnviroWorks to undertake an Agricultural Compliance Statement for the Environmental Authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"), Environmental Impact Assessment ("EIA") Regulations, 2014. As per GN960 of 2019, read with Section 24(5)(a) of the NEMA. An Environmental Screening Report (ESR) was generated for the application using the National Web-based Screening Tool. The ESR classifies the area as being of medium sensitivity for the *Agricultural* theme.

The Compliance Statement is reported according to the protocol for the specialist assessment and minimum report content requirements for the environmental impacts on agricultural resources (GN320 of 2020).

Moedi Consulting Engineers proposes to construct an oxidation pond system and two gravity outfall sewer lines near Schweizer-Reneke, North West Province. The configuration of the existing sewer system entails that all wastewater generated in Ipelegeng gravitates to five (5) pumping stations. The current pumping system installed on site are not sufficient to convey wastewater to the Waste Water Treatment Plant (WWTP) and this results in spillages occurring due to the overloading of infrastructure. The motivation for the proposed project is twofold. Firstly, it will address the current capacity shortfall by reducing the inflow volume at pumping stations, and secondly, it will optimise the current sewer network to operate more efficiently by decreasing the pumping and repumping of sewage. It is proposed that two "cut-off" gravity outfall lines is installed to reduce the load on the pumping stations and furthermore, it is proposed that an oxidation pond are constructed to decommission Pumping Station A. Please refer to Figure 1 for the layout of the proposed construction of the two gravity outfall sewer lines and oxidation pond system.

The proposed construction of the oxidation pond system will be in the vicinity of Pumping Station A. The establishment of a pond system will ensure that wastewater accumulates in the system regardless of external factors. Thus, the construction of this pond system will eradicate sewer spillages immediately. Since the oxidation pond system does not require any electrical or mechanical equipment, the application is considered to be the most suitable cost-effective solution for the Ipelegeng sewer lines. The proposed development footprint is primarily zoned as Agricultural with the surrounding environment being zoned as residential areas.

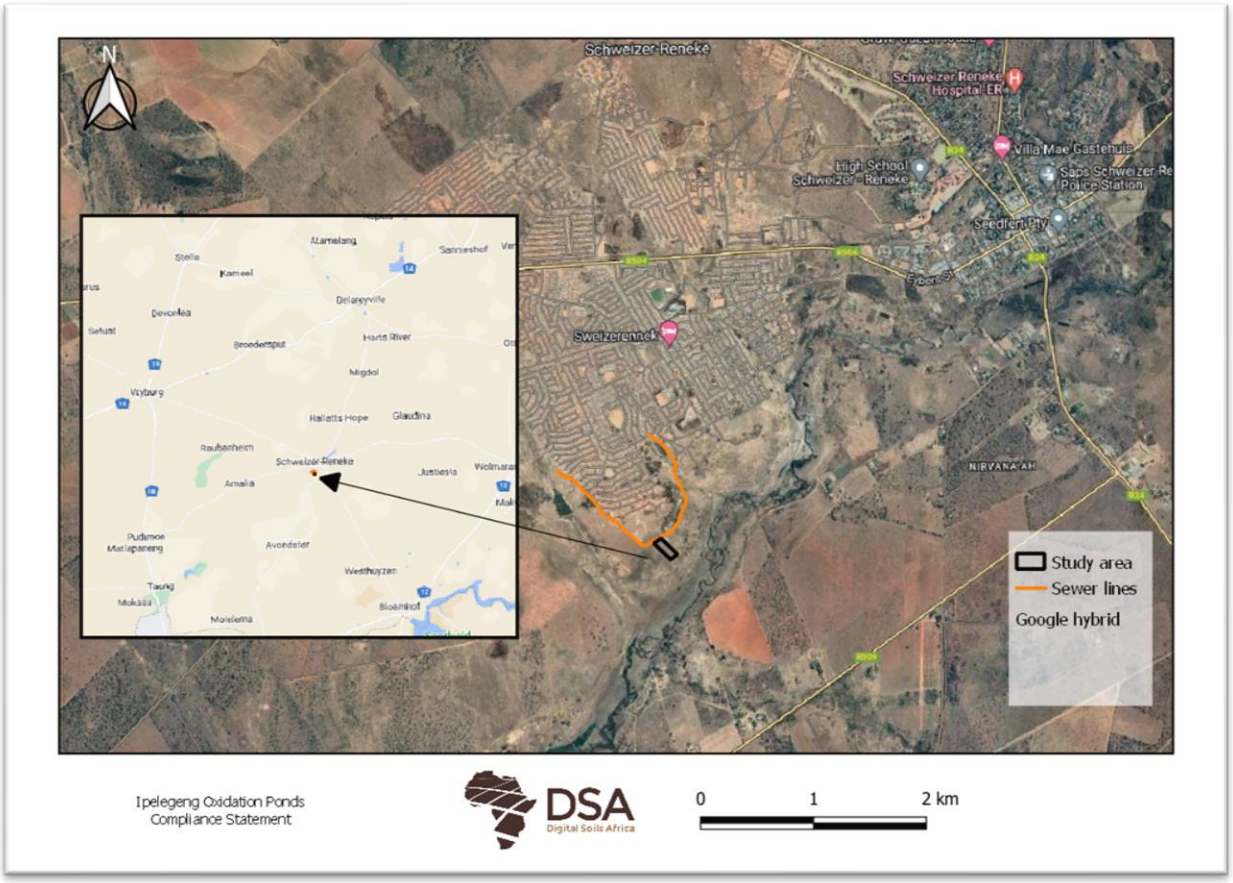
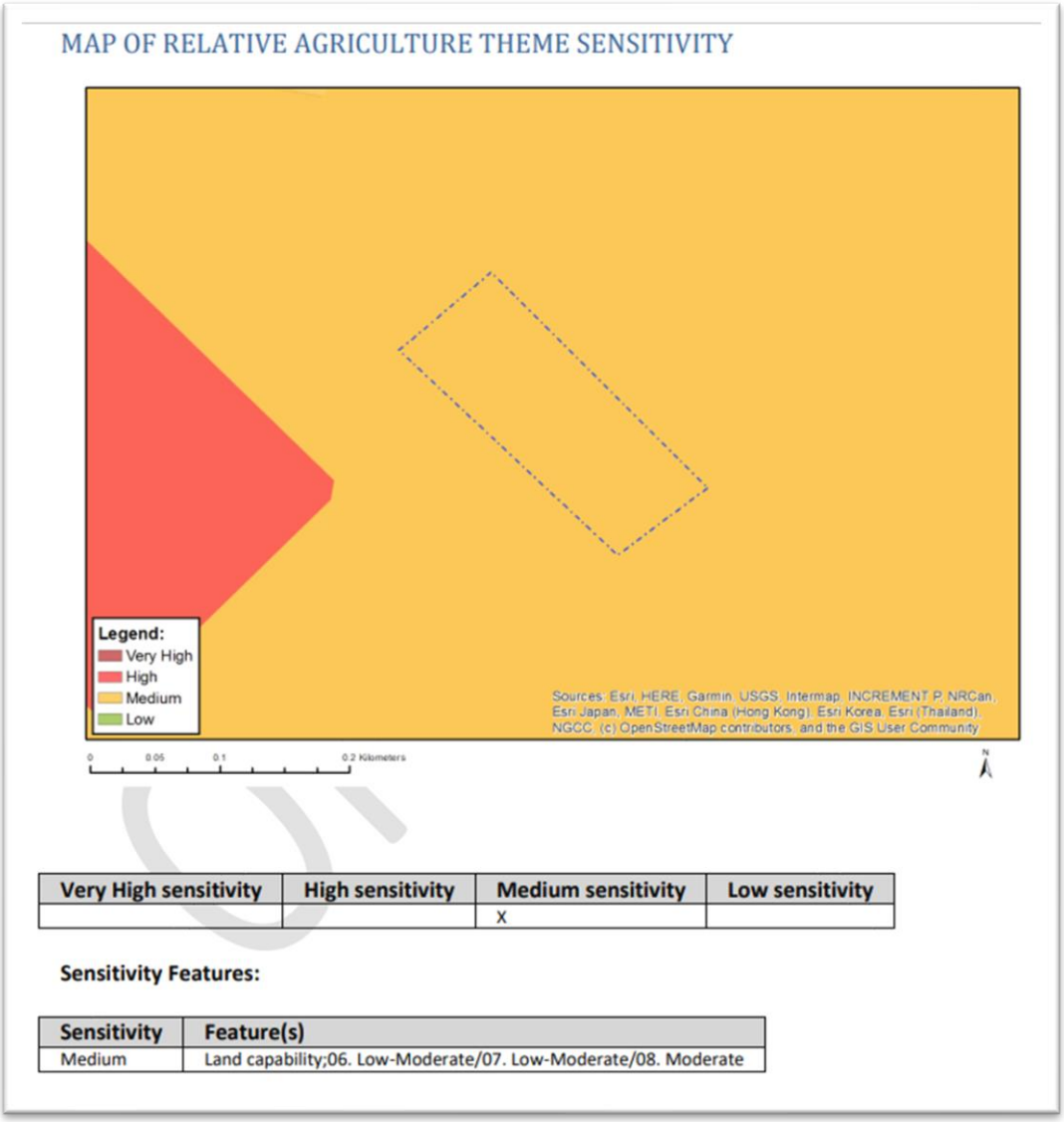


FIGURE 1: LOCATION OF THE STUDY AREA IN THE NORTH WEST PROVINCE.

ENVIRONMENTAL SCREENING TOOL

According to the National Web based Environmental Screening Tool, the agricultural sensitivity is classified as medium agricultural sensitivity (Figure 2). The Land capability (Department of Agriculture, Forestry and Fisheries, 2017), classify the soil as having a land capability class of 6 (Low-Moderate) to 8 (Moderate).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 2: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL.

RESULTS

CLIMATE CAPABILITY

The area falls in a steppe climate, which occur in areas with cold winters and warm summers. The Köppen-Geiger climate classification is BSh which is considered hot semi-arid (steppe) climate. The average annual temperature is 18.4 °C. A summer rainfall pattern is evident with an annual precipitation of about 533 mm. Precipitation is the lowest in July, with an average of 5 mm. The greatest amount of precipitation occurs in January, with an average of 106 mm. The site has a semi-arid climate (*FIGURE 3*). Therefore, there are limitations to the cultivation of dry land crops.

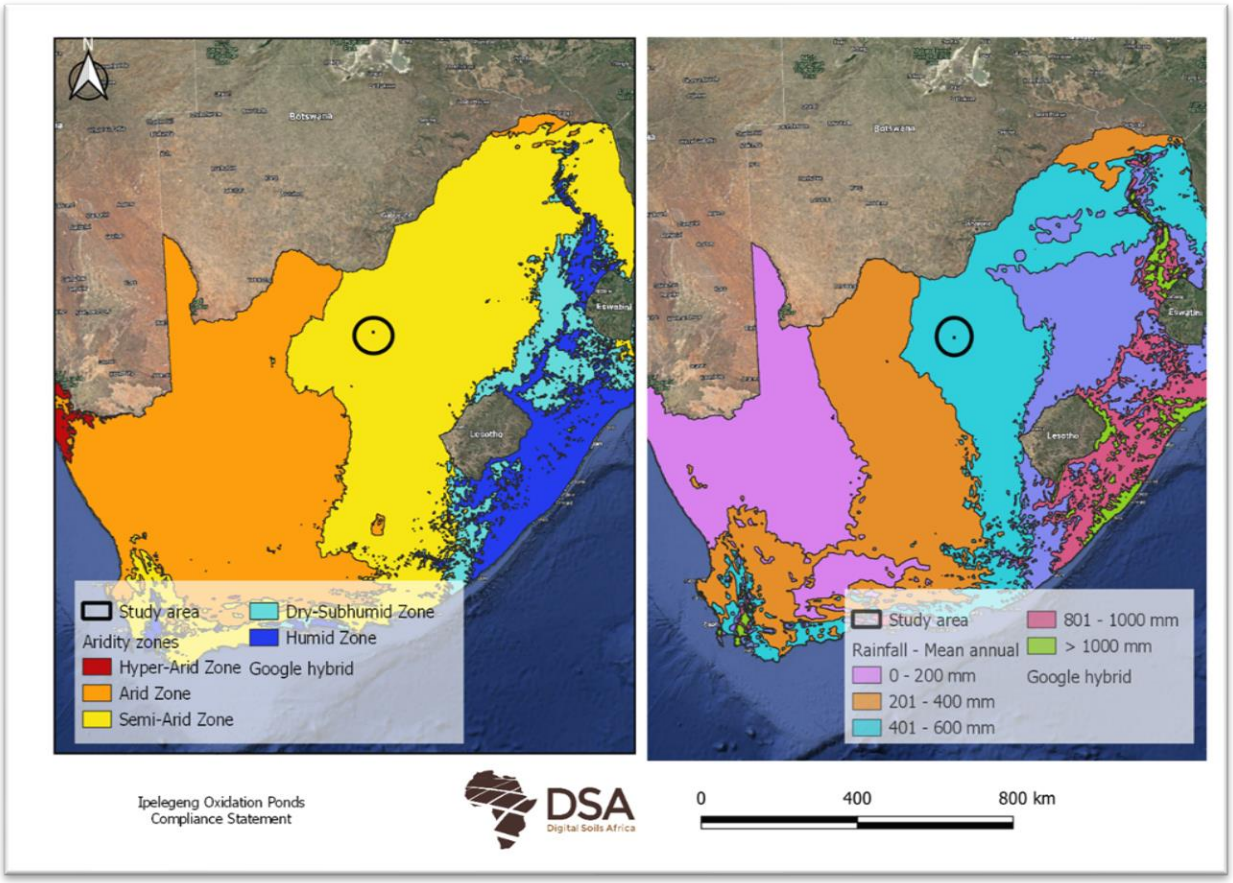


FIGURE 3: CLIMATE OF THE SITE AND THE SURROUNDING AREA (SCHULZE, 2007).

TABLE 1: CLIMATIC PROPERTIES OF SCHWEIZER-RENEKE (CLIMATE-DATA.ORG).

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature	23.7 °C	23 °C	21.3 °C	17.7 °C	14.3 °C	10.9 °C	10.7 °C	13.9 °C	18.1 °C	21.1 °C	22.5 °C	23.6 °C
Min. Temperature	17.7 °C	17.3 °C	15.5 °C	11.8 °C	7.8 °C	4.4 °C	3.8 °C	6.4 °C	10.1 °C	13.4 °C	15.2 °C	17.1 °C
Max. Temperature	29.9 °C	29 °C	27.5 °C	24.1 °C	21.4 °C	18.3 °C	18.4 °C	21.9 °C	26.1 °C	28.7 °C	29.8 °C	30.3 °C
Rainfall mm	106	79	71	42	16	11	5	11	13	42	57	80
Humidity	51%	54%	55%	55%	49%	49%	42%	34%	29%	32%	36%	45%
Rainy days	11	9	9	5	2	1	1	1	2	5	7	10
avg. Sun hours	11.3	10.8	10.1	9.4	9.3	9.0	9.3	9.8	10.5	11.1	11.4	11.6

Climate capability is highest weighted factor (40%) in the calculation of the Land capability (DAFF, 2017) which is used in the Screening Tool to determine the agricultural sensitivity. Soil capability (30%) and Terrain capability (30%) contribute the remaining considerations. The climate capability consists of 9 values, with 1 being the lowest value and 9 being the highest value (There is however no evaluation value of 1 & 2).

The Climate capability determined by the following factors:

- Moisture supply capacity (50%)
- Physiological capacity (20%)
- Climatic constraints (30%)

The Climate capability according to the Department of Agriculture, Forestry and Fisheries, 2017, is a value of 4 (Figure 4). This is considered a Low-Moderate Climate capability.

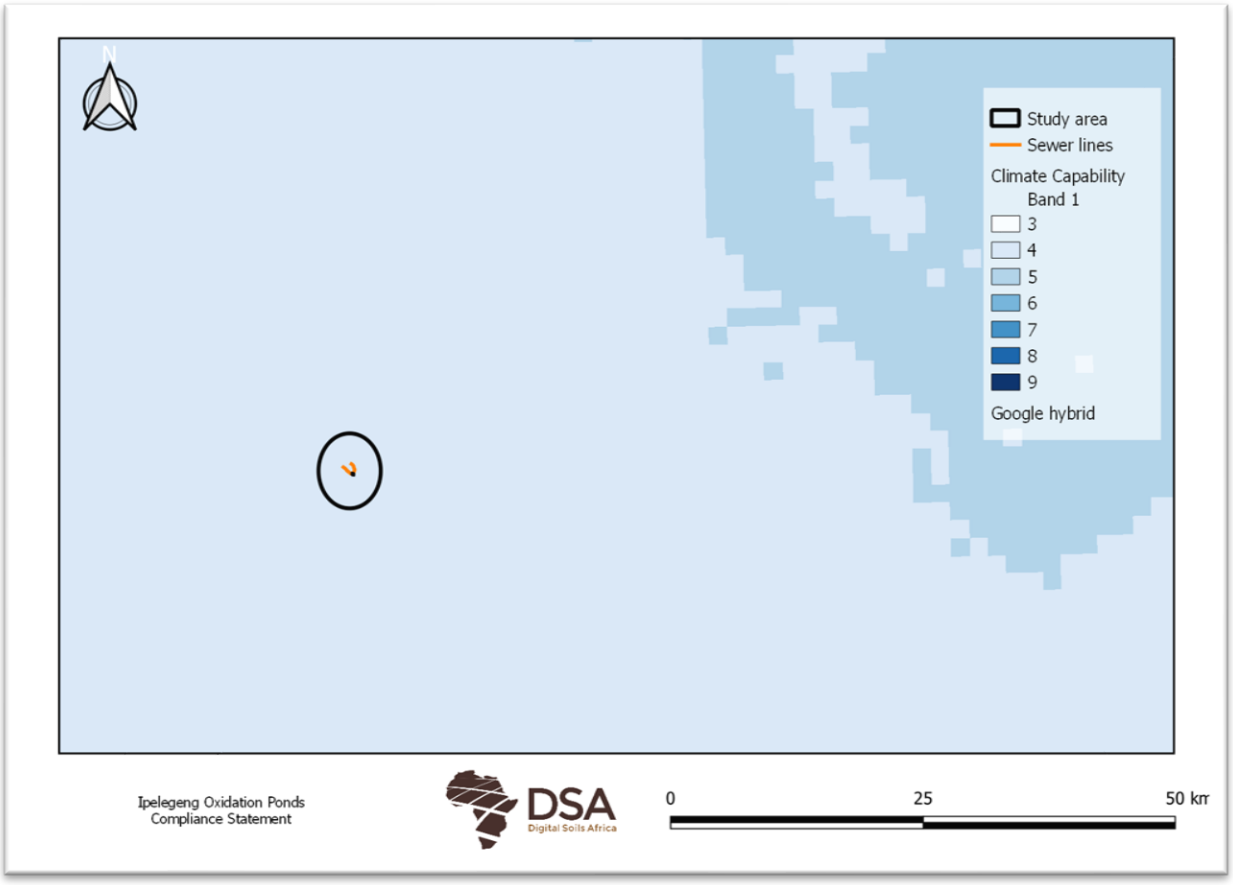


FIGURE 4: THE CLIMATE CAPABILITY OF THE SITE AND SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2017).

SOIL CAPABILITY

The Soil capability consists of 9 values, with 1 being the lowest value and 9 being the highest value. The main factors contributing to the Soil capability consist of:

- Plan available water (80%)
- Soil sensitivity (17%)
- Soil fertility (3%)

The Soil capability according to the Department of Agriculture, Forestry and Fisheries, 2017, varies from values of 4 (north-western and south-eastern side) to values of 6 (centre) (Figure 5). This is considered a Low-Moderate to Moderate-High Soil capability.

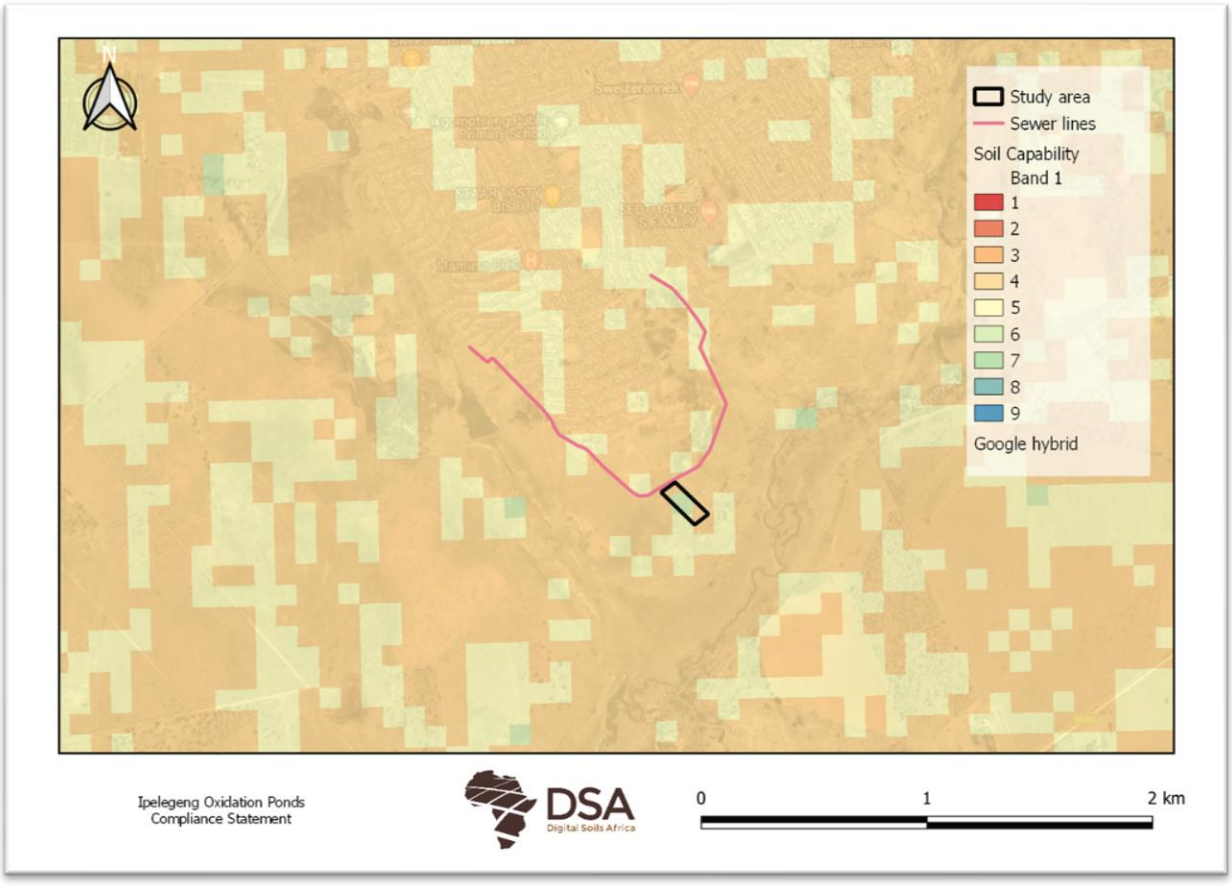


FIGURE 5: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2017).

TERRAIN CAPABILITY

Terrain plays an important role in a plants' physiological growth requirements, and from a sensitivity and accessibility perspective, Therefore, the two terrain modelling concerns included in the terrain capability modelling exercise were plant physiology and terrain sensitivity. The Terrain capability consists of 9 values, with 1 being the lowest value and 9 being the highest value.

The Terrain capability according to the Department of Agriculture, Forestry and Fisheries, 2017, is a value of 6 and 7. This is considered a Moderate-High to High Terrain capability.

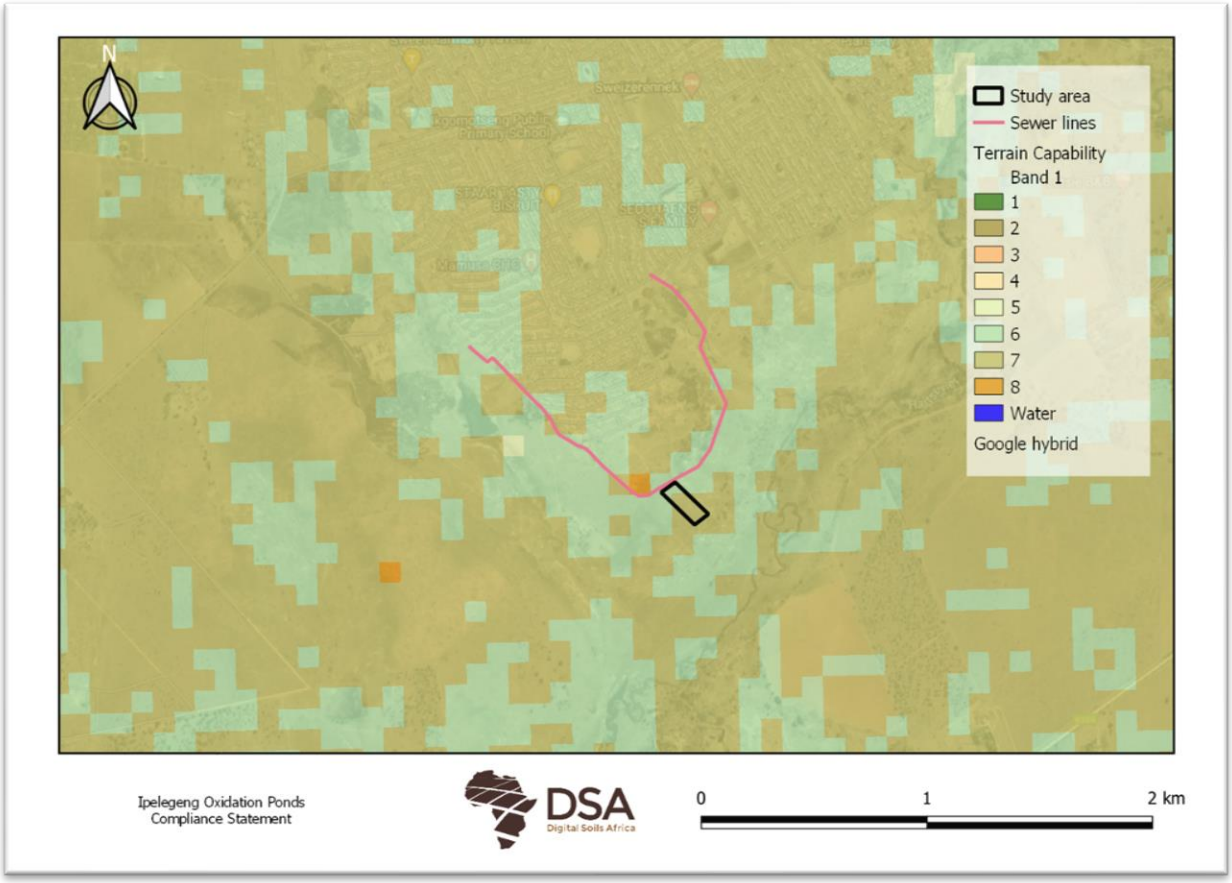


FIGURE 6: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2017).

LAND CAPABILITY

The new Land capability (Department of Agriculture, Forestry and Fisheries, 2017) has fifteen classes, as opposed to the eight classes described by Schoeman et al. (2002). The data is usable on a scale of 1:50 000 – 1: 100 000, therefore, not suitable for farm scale recommendations. Classes 1 to 7 are of low land capability and only suitable for wilderness or grazing. Classes 8 to 15 are considered to have arable land capability with the potential for high yields increasing with the land capability class number. The feature which creates the medium sensitivity are Land capability values of between 6 and 8, which are considered Low-Moderate and Moderate arable soils.

TABLE 2: LAND CAPABILITY CLASS AND THE DESCRIPTION OF THE CLASS

Land Capability Class	Description
1-2	Very Low
3-4	Very Low to Low
5	Low
6-7	Low to Moderate
8	Moderate
9-10	Moderate to High
11	High
12-13	High to Very High
14-15	Very High

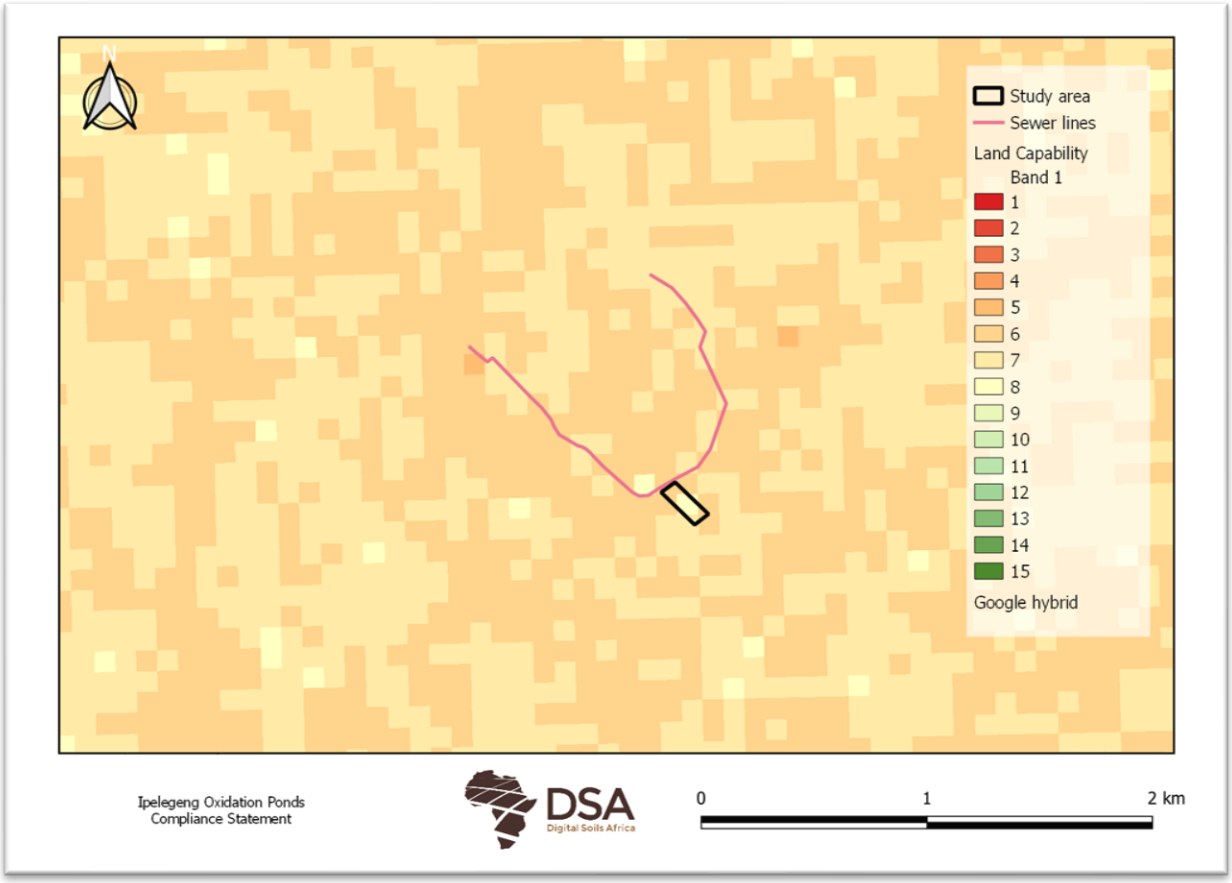


FIGURE 7: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2017).

GRAZING CAPACITY

The unit used in the grazing capacity is hectares per large stock unit (ha/LSU). The site has a very high grazing capacity of 7 ha/LSU (Figure 8). A homogeneous unit of vegetation expressed as the area of land required (in hectares) to maintain a single animal unit (LSU) over an extended number of years without deterioration to vegetation or soil. Where an LSU = An animal with a mass of 450 kg and which gains 0.5 kg per day on forage with a digestible energy of 55%. (Trollope et. Al., 1990). The area is therefore not suitable for livestock grazing as the oxidation pond area is 1.5 ha, and 7 ha/ LSU is required for livestock grazing.

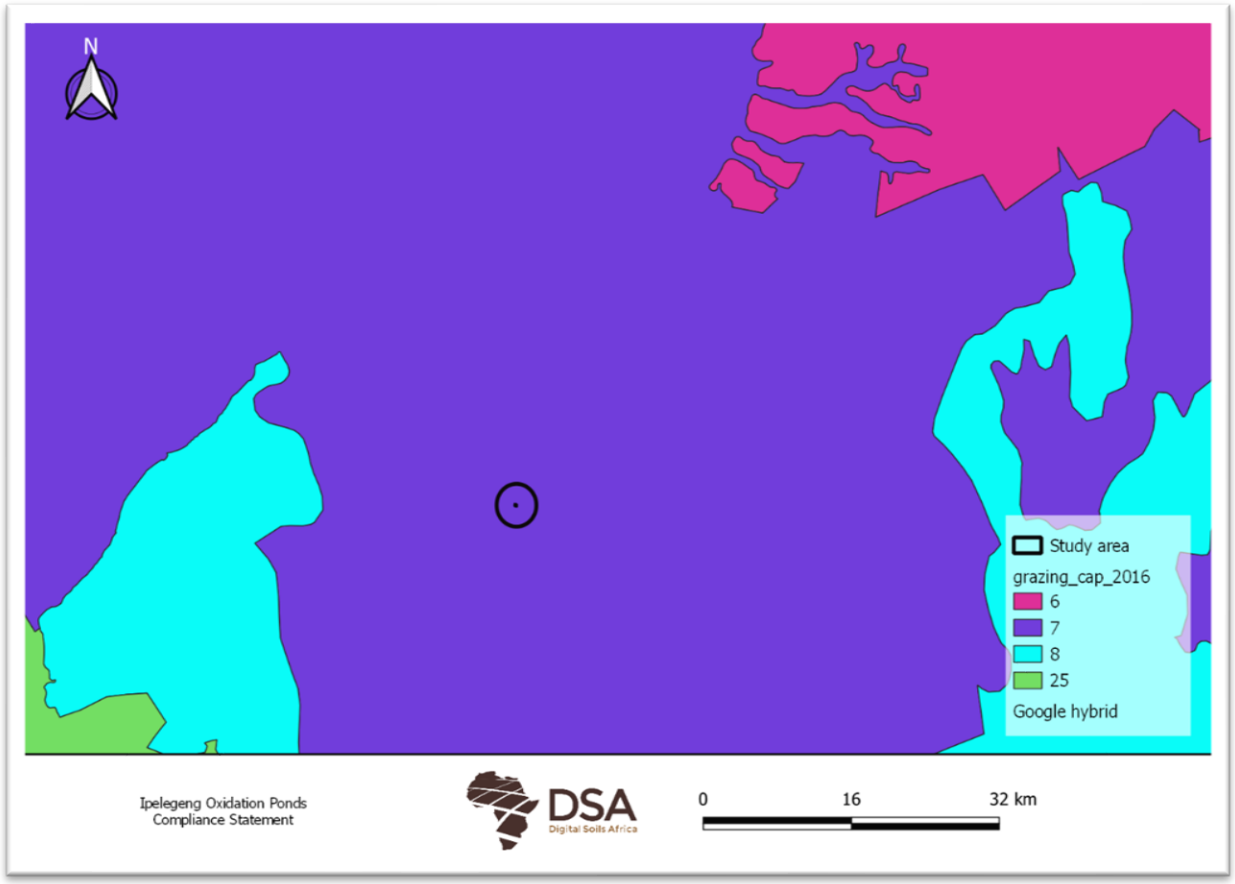


FIGURE 8: GRAZING CAPACITY FOR THE SITE AND THE SURROUNDING AREA.

LAND USE

South African National Land-Cover 2020 (SANLC 2020) (Figure 9) was used as a guide and verified with field observations. The primary land uses are 4 and 13 (open woodland and natural grassland). The sewage lines fall in areas mainly used for Residential Formal (low veg / grass-49) and Residential Informal (low veg / grass-53).

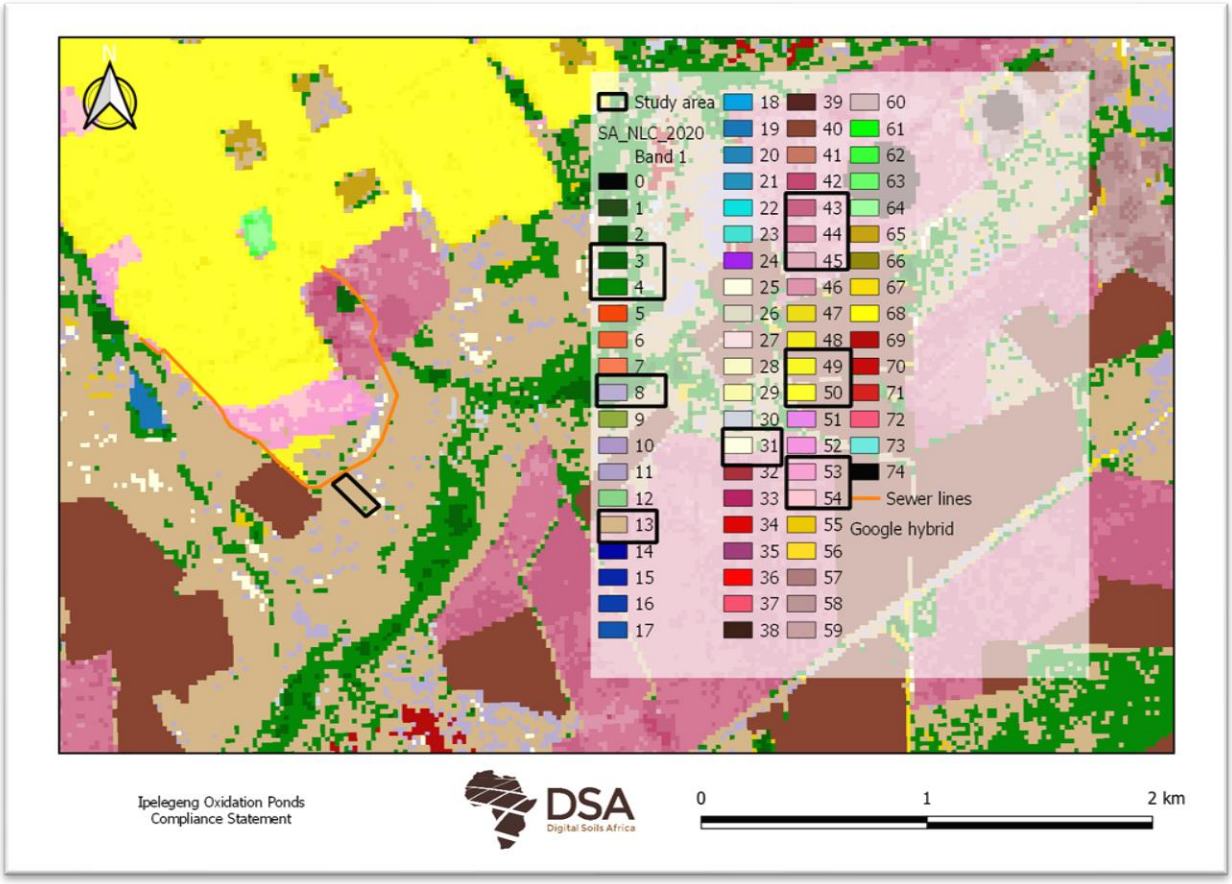


FIGURE 9: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

SITE VERIFICATION

LAND USE

Photographs of the surrounding vegetation are presented in **Error! Reference source not found.**. The photographs verify the SANLC 2020 classification of natural grassland and that no agricultural activities are imposed on by the proposed activities.

FIGURE 10 PHOTOGRAPHS OF THE EXISTING VEGITATION

SOIL STUDY

Auger and visual observations were made in the study area (Figure 11). The observation was classified Molopo soil form and had a moderate depth of 800 mm before a restricting layer was found. The Molopo soil consists of orthic horizon overlying a yellow brown apedal, with a soft carbonate underneath. It has a medium dryland capability and a Land capability of 8 (Moderate).

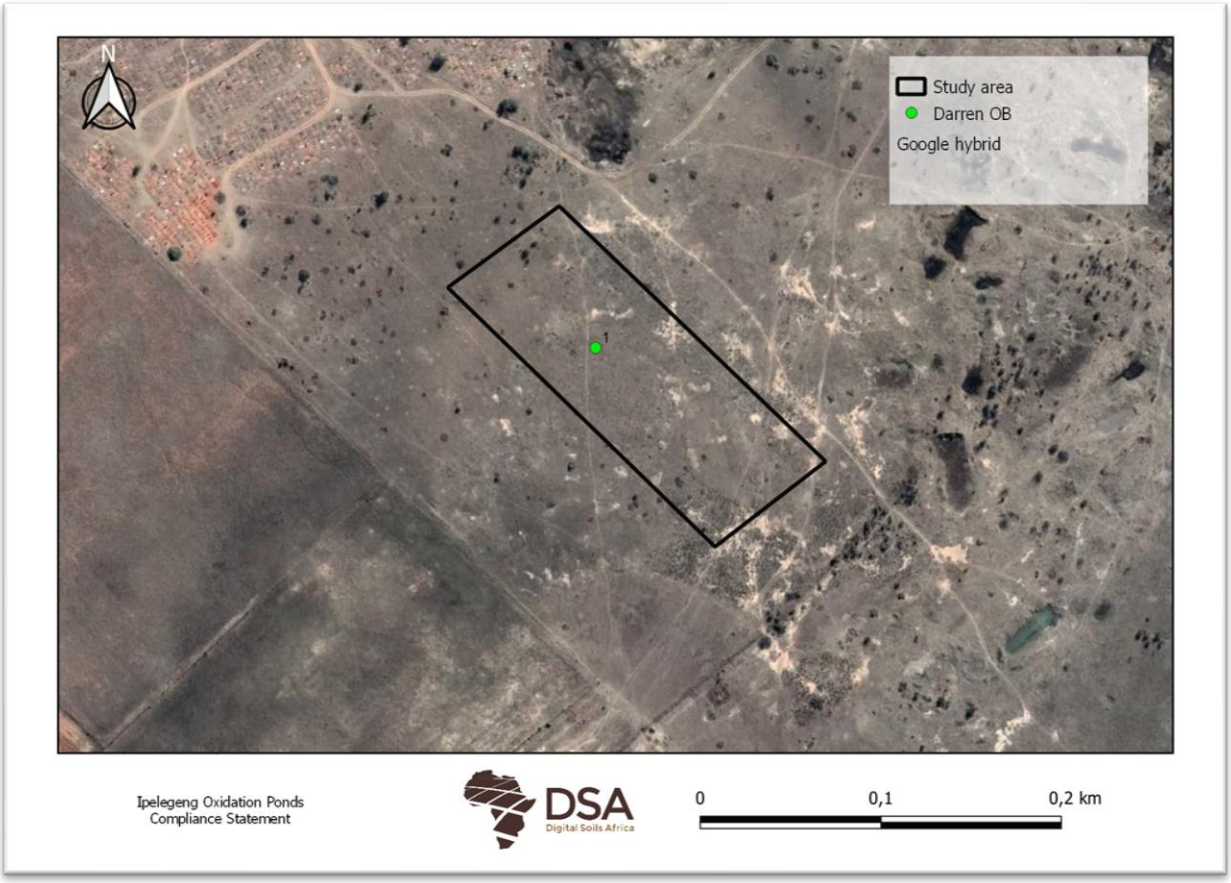


FIGURE 11: POSITIONS OF THE OBSERVATIONS MADE DURING THE STUDY.

Figure 12 displays the photograph of the Molopo soil form. The orthic horizon was chromic throughout the study area. The yellow brown was aluvic, indicating that there is no clay increase with depth. The yellow brown had a depth of 800 mm, whereafter the soft carbonate horizon was found. Since no cultivation occurred on the study area, a medium agricultural sensitivity is calculated.

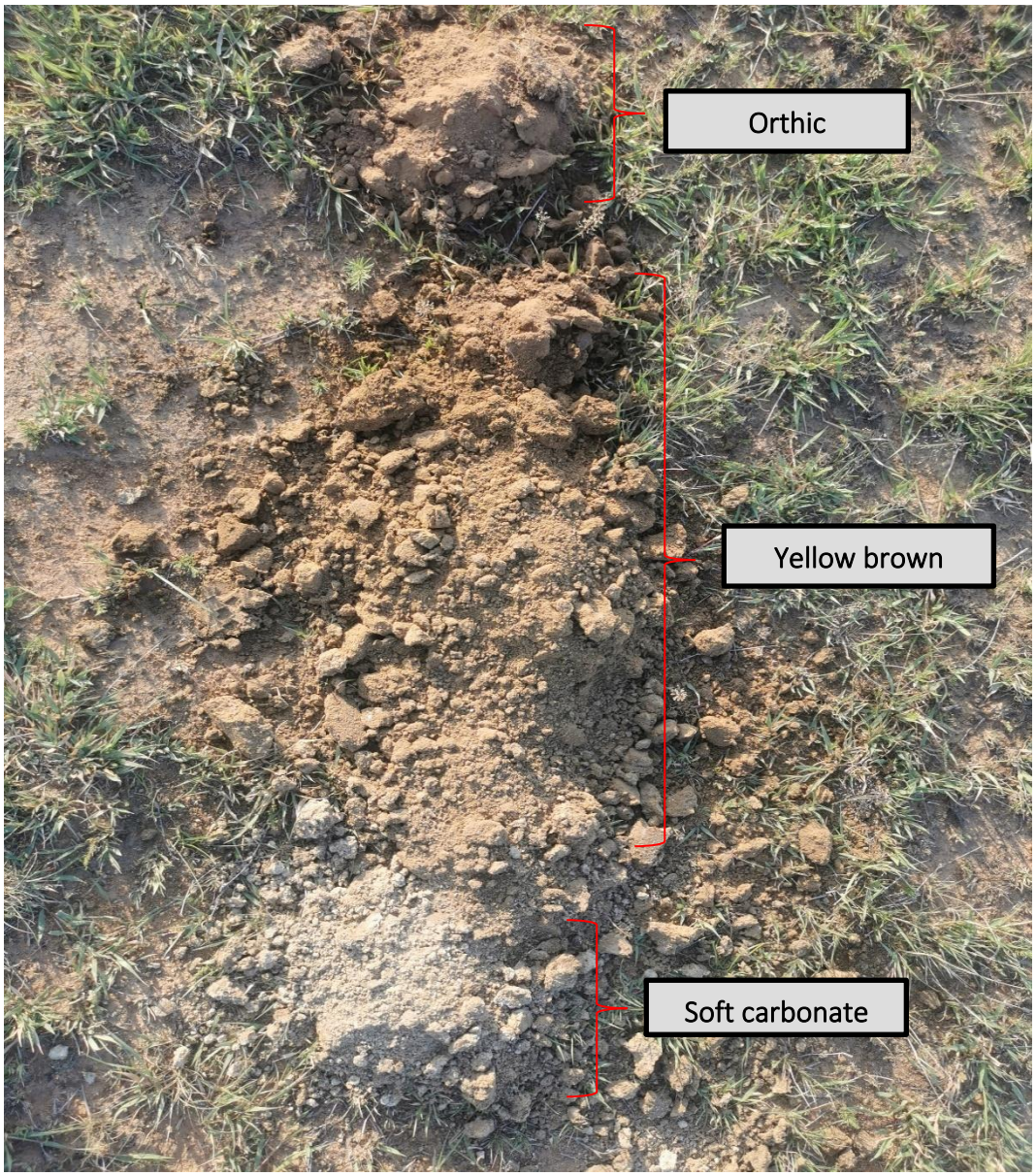


FIGURE 12: MOLOPO SOIL FORM

The Land capability of the site was calculated and had a value of 6 (Low-Moderate) and was associated with the Molopo soil form (Figure 13). The soil and Terrain capabilities are Low-Moderate and Moderate-High, while the climate capability (Low-Moderate-4) is the limiting factor giving the soil a Low-Moderate (Class 06) land capability. The water holding capacity is low and there are limitations to root development to a depth of 800 mm. The formula used by the Department of Agriculture, Forestry and Fisheries, 2017:

Land capability = Climate (40%) + Terrain (30%) + Soil (30%)

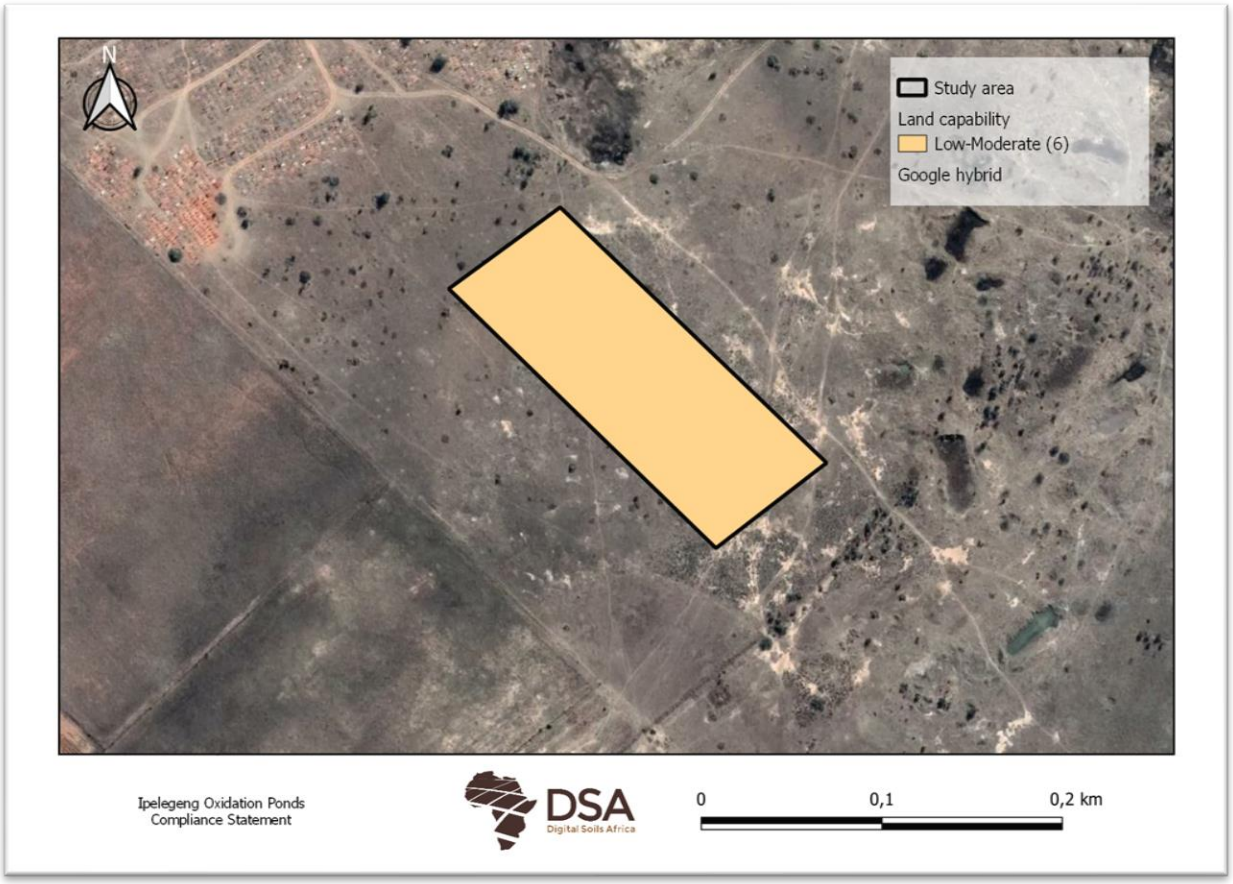


FIGURE 13: LAND CAPABILITY MAP OF THE STUDY AREA.

COMPLIANCE STATEMENT

According to the Environmental Screening Tool, the agricultural sensitivity is classified as medium agricultural sensitivity due to the Low-Moderate to Moderate Land capability (Figure 2). Based on the observations made on site and analysis of the data collected, the proposed site for the development is considered as medium sensitivity (Figure 14) for the following reasons:

- The moderate depth of the yellow brown apedal (800 mm).
- The Low-Moderate land capability calculated by the Department of Agriculture, Forestry and Fisheries, 2017.
- The absence of cultivated lands, with the primary land use being natural grassland.
- The absence of livestock and the small area (1.5 ha) which would not be able to sustain one large livestock unit.

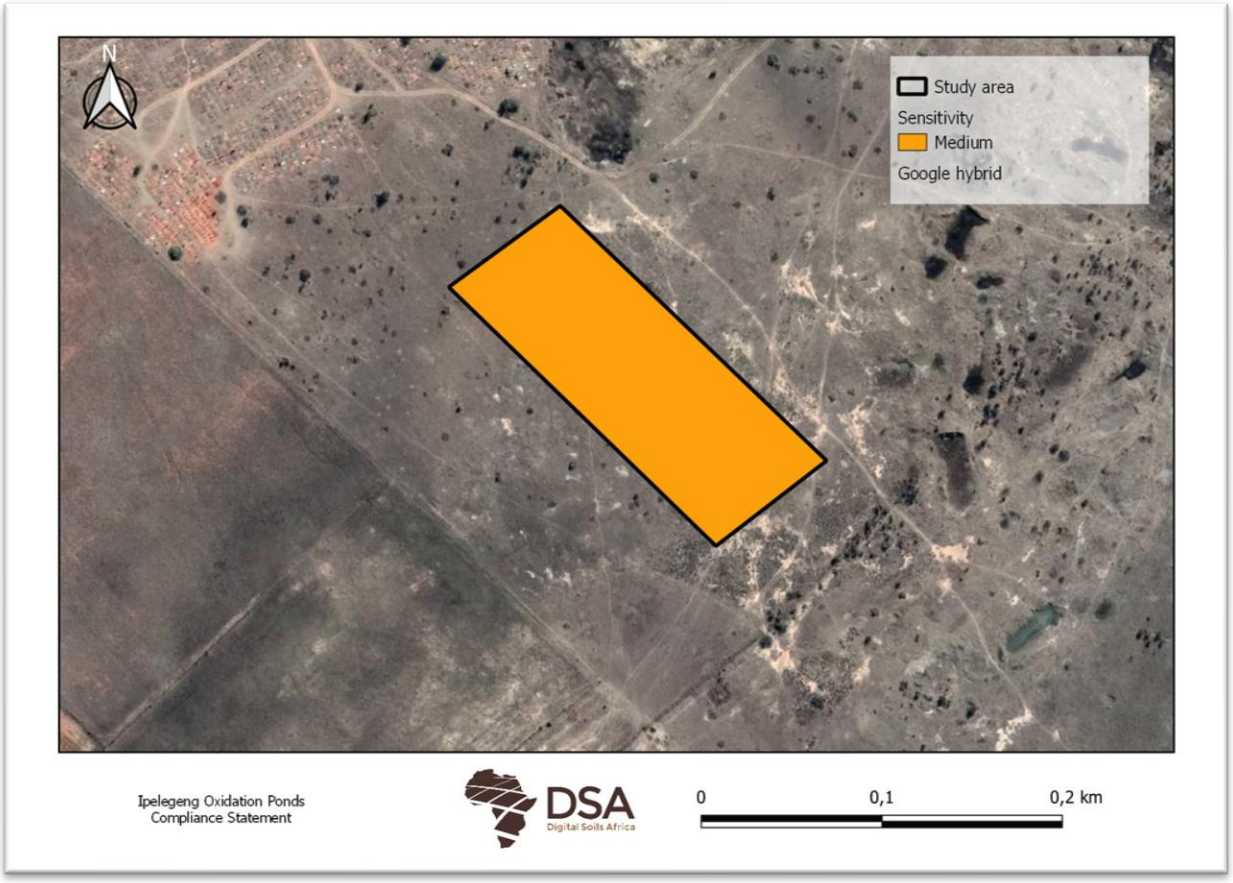


FIGURE 14: AGRICULTURAL SENSITIVITY OF THE STUDY AREA.

Due to the medium sensitivity and lack of current agricultural activity, it is the specialist's opinion that the proposed development will not have a significant impact on agricultural in the area. In terms of agricultural sensitivity, the proposed development should thus be allowed to proceed at the identified site.

APPENDIX 1: SPECIALIST CV

DR DARREN BOUWER

EDUCATION

PhD Soil Science	University of the Free State	2018
M.Sc. Soil Science	University of the Free State	2013
B.Sc. Soil Science (Hon)	University of the Free State	2009
B.Sc. Soil Science	University of the Free State	2008
Matric certificate	Queens College	2005

PROFESSIONAL AFFILIATIONS

- SACNASP- Pri Nat Sci 400081/16
- Member of the Soil Science Society of South Africa
- Member of the Soil Classification Work Group
- Member of South African Soil Surveyors Organisation

WORK EXPERIENCE

- **Digital Soils Africa** / Soil Scientist - May 2012 – Present
- **Ghent University** / Researcher- January 2016 - December 2016
- **University of the Free State**/ Assistant Researcher- January 2011- December 2015

PUBLICATIONS

Total consultancy reports: >100 **Total Publications: 5**

Most relevant:

Bouwer, D., Le Roux, P. A., van Tol, J. J., & van Huyssteen, C. W. (2015). Using ancient and recent soil properties to design a conceptual hydrological response model. Geoderma, 241, 1–11.

Van Zijl, G. M., Bouwer, D., van Tol, J. J., & le Roux, P.A.L. (2014). Functional digital soil mapping: A case study from Namarroi, Mozambique. Geoderma, 219-220, 155–161.

SPECIALIST DECLARATION

I, Darren Bouwer, declare that –

- I act as the independent specialist in this application;
- I regard the information contained in this report to be true and correct;
- I do not have a conflict of interest in this project;
- I will conduct the work relating to the project in an objective manner.

Dr Darren Bouwer
PhD Soil Science
Pri Nat Sci 400081/16

APPENDIX 2: OBSERVATION DETAILS

LON	LAT	OBSERVATION	SOIL FORM	A	DEPTH A	B	DEPTH B	C	DEPTH C
25.2964041959	-27.2176570034	1	Molopo	Orthic	200	yellow brown	700	soft carbonate	800