COMPLIANCE STATEMENT FOR CILLIE POND SYSTEM, PART OF THE KAKAMAS WASTE WATER TREATMENT WORKS PROJECT, NEAR KAKAMAS, NORTHERN CAPE PROVINCE

PREPARED FOR

ENVIROAFRICA

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DSA
Digital Soils Africa

+27 83 703 3002

www.dsafrica.co.za

darren@dsafrica.co.za

Kemsley Street

Port Elizabeth

Directors:
Dr Darren Bouwer
Prof Johan Van Tol
Prof George Van Zijl

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BACKGROUND TO THE STUDY

Digital Soils Africa (Pty) LTD (DSA) were tasked by Atlantic Energy Partners 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 Very High sensitivity for the *Agricultural* theme.

The intention of the Kakamas Waste Water Treatment Works (WWTW) project is to relocate and construct one or more new Wastewater Treatment Plants and ancillary works to provide sufficient treatment capacity to avoid any public health risks, as well as environmental health risks. This desktop study is focused specifically on the aerated facultative pond system proposed for Lutzburg and Cillie villages.

SITE LOCATION

The study area, also called Cillie proposed pond system, is located within the small village of Cillie, approximately 5 km from Kakamas (Figure 1). The study area is located within the Kai! Garib Local Municipality, within the Northern Cape Province of South Africa.

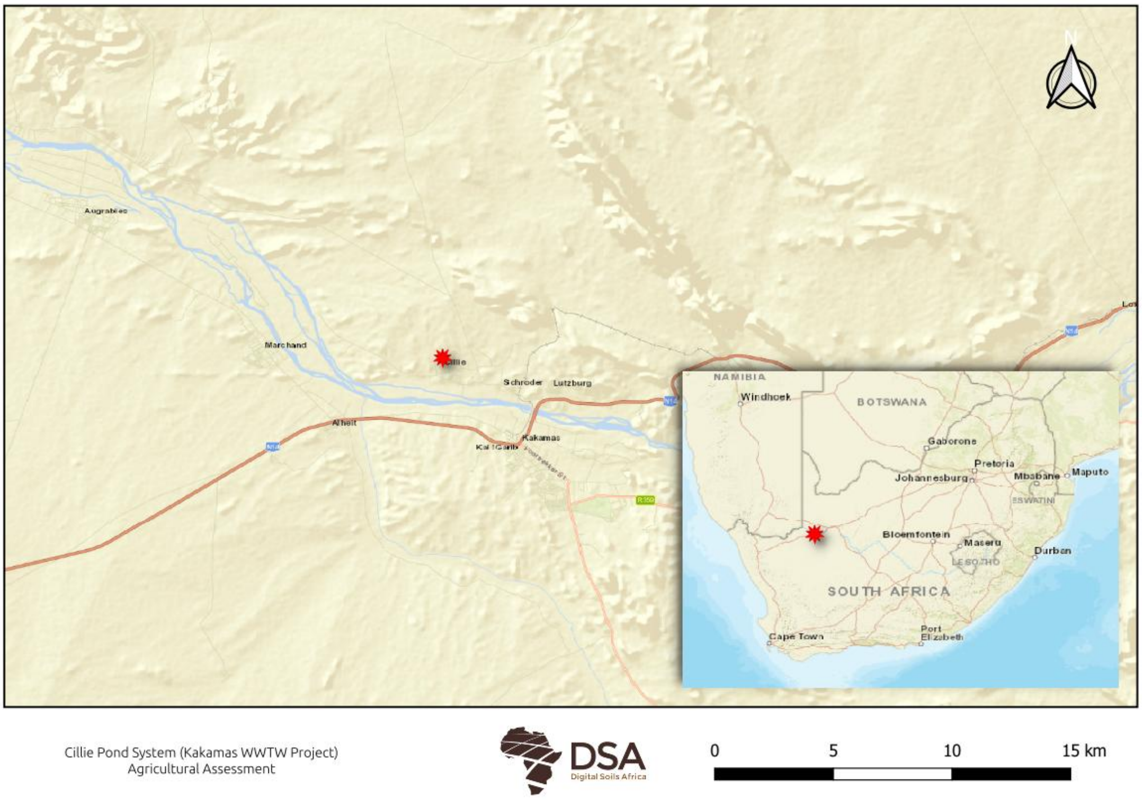

FIGURE 1: LOCATION OF THE STUDY AREA IN THE NORTHERN CAPE PROVINCE.

The layout of the Cillie proposed pond system is presented in **Error! Reference source not found.**. The layout shows the proposed 450 m³ aerated facultative pond system for Cillie and Lutzburg. The proposed pond system requires approximately 2.3 ha of area for development.

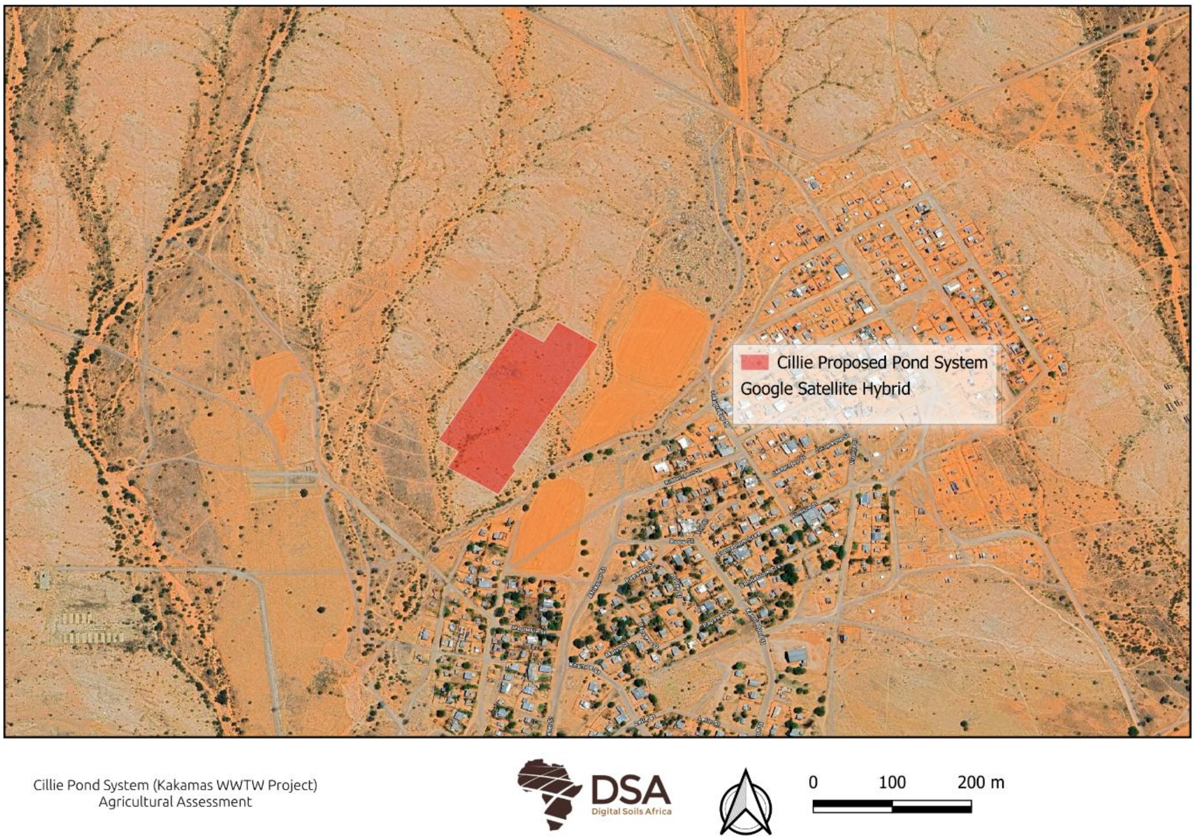

FIGURE 2: THE PROPOSED LAYOUT OF THE DEVELOPMENT.

ENVIRONMENTAL SCREENING TOOL

Agricultural sensitivity, as reported in the screening tool, is based upon the land use (SANLC, 2014) and land capability (Department of Agriculture, Forestry and Fisheries, 2017, also referred to as DAFF, 2017).

All cultivated land is considered a high sensitivity, while irrigation and unique crops, are considered very high sensitivity, irrespective of the land capability. The land use in the screening tool is based on the South African Nation Land Cover (SANLC, 2014). Meanwhile, there have been two more updated versions of the land use (2018 and 2020).

According to the Department of Agriculture, Forestry and Fisheries (2017), land capability is defined as the most intensive long-term use of land for purposes of rainfed farming determined by the interaction of climate, soil, and terrain. The following weight was given to each attribute when calculating the Land Capability:

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

According to the National Web based Environmental Screening Tool, the agricultural sensitivity is classified as Very High agricultural sensitivity (Figure 3Figure 3), this is due to the land use being situated within a Northern Cape Protected Agricultural Area (PAA) (Figure 4). The land capability (DAFF, 2017) classifies the soils as having a land capability of low or low to moderate (Figure 5). There is no crop boundaries found within the study area (Figure 4).

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	04. Low-Very low
Low	05. Low
Medium	07. Low-Moderate
Very High	Orange River PAA

FIGURE 3: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL.

FIGURE 4: THE FIELD CROP BOUNDARIES AS USED IN THE SCREENING TOOL.

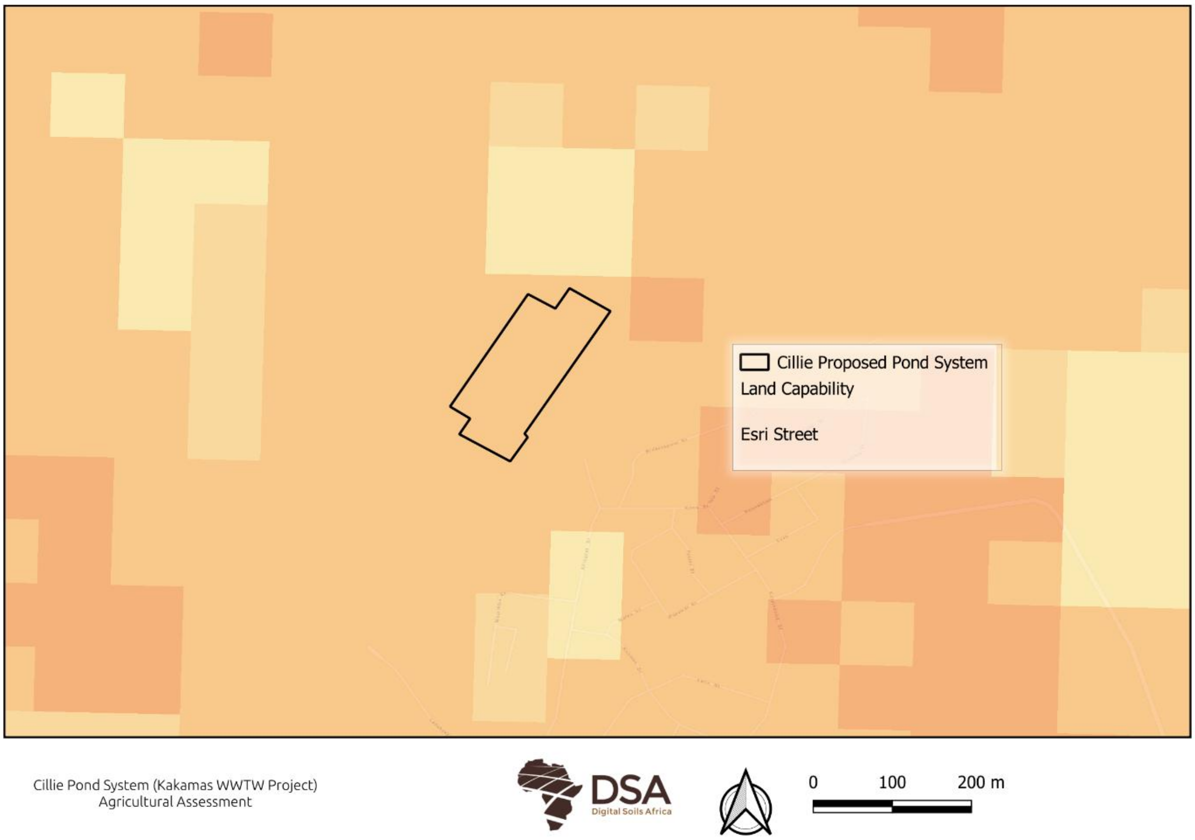

FIGURE 5:THE LAND CAPABILITY OF THE STUDY AS USED IN THE SCREENING TOOL.

Preservation and Development of Agricultural Land Framework Act (PD-ALF) is in the process of being published. The new statutory framework will replace the Subdivision of Agricultural Land Act, Act 70 of 1970.

Protected Agricultural Area, as in the draft framework, is defined as *"an agricultural land use zone, protected for purposes of food production and ensuring that high potential and best available agricultural land are protected against non-agricultural land uses in order to promote long-term agricultural production and food security."*

The study area is situated within a Protected Agricultural Area (Figure 6).

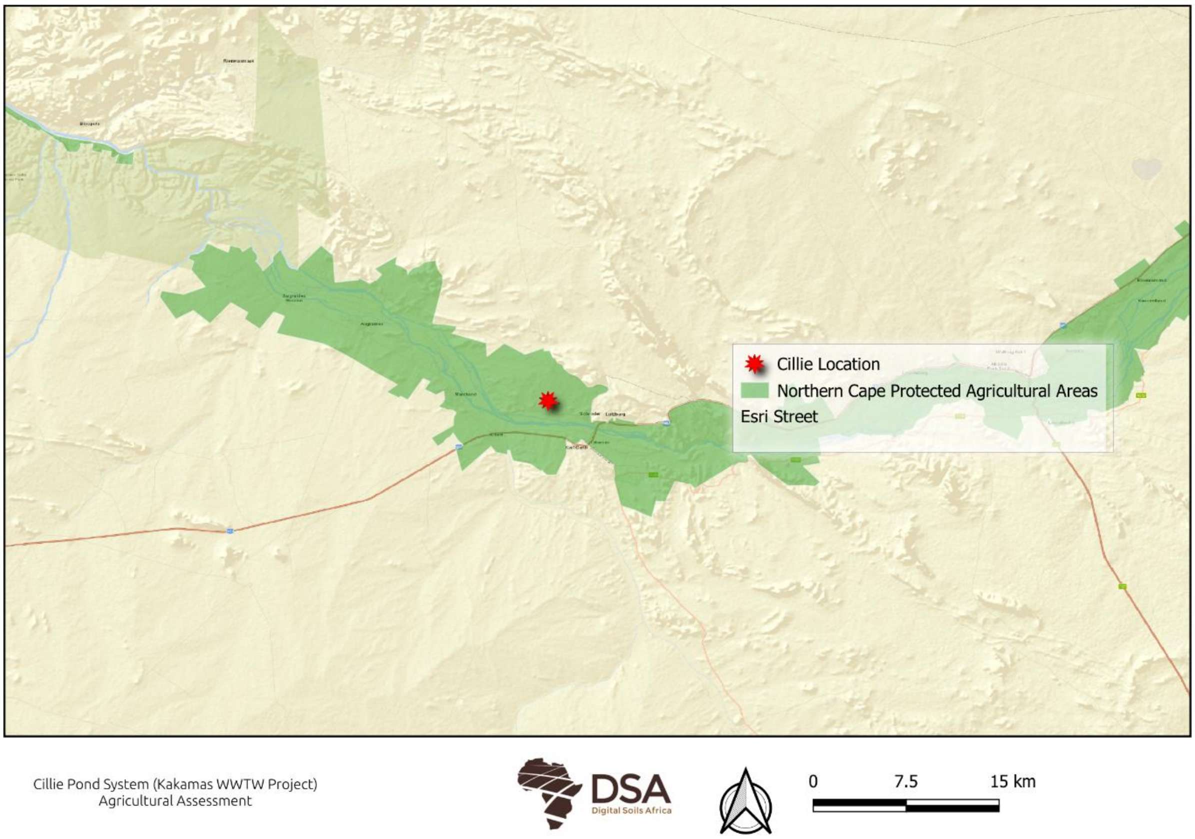

FIGURE 6: THE PROTECTED AGRICULTURAL AREAS FOR THE STUDY AREA.

As per the protocol, Terms of Reference applicable to an "Agricultural Compliance Statement" is as follows:

- The compliance statement must be prepared by a soil scientist or agricultural specialist registered with the SACNASP. (**pg26**)
- The compliance statement must:
- be applicable to the preferred site and proposed development footprint **(pg6)**;
- confirm that the site is of "low" or "medium" sensitivity for agriculture**(pg25)**;

- indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site **(pg25)**.
- The compliance statement must contain, as a minimum, the following information:
- contact details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vitae **(pg25)**;
- a map showing the proposed development footprint (including supporting infrastructure) with a 50m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool **(pg7)**;
- confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimise fragmentation and disturbance of agricultural activities **(pg25)**;
- a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not, of the proposed development and a recommendation on the approval, or not, of the proposed development **(pg25)**;
- any conditions to which the statement is subjected **(pg25)**;
- in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase **(not applicable).**
- where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr **(not applicable)**;
- and a description of the assumptions made and any uncertainties or gaps in knowledge or data **(pg**Error! Bookmark not defined.**)**.

RESULTS

CLIMATE CAPABILITY

The climate is characterized as arid and dry, typical of a desert region. The Köppen-Geiger climate classification is BWh. The average annual temperature is 21.6 °C. Rainfall in this area is very low, with an annual precipitation of about 148 mm. The site has an arid climate (Figure 7). Therefore, cultivation of dry land crops will be difficult.

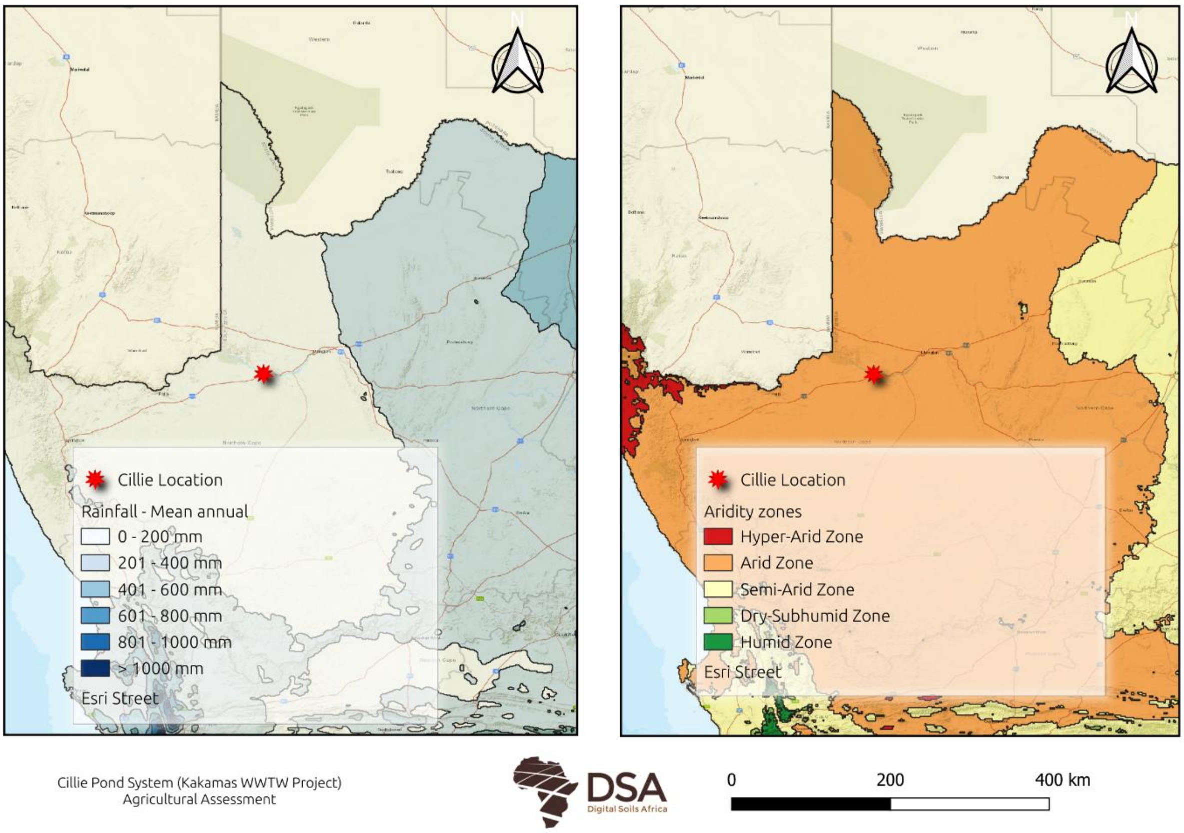

FIGURE 7: CLIMATE OF THE SITE AND THE SURROUNDING AREA (SCHULZE, 2007).

TABLE 1: CLIMATIC PROPERTIES OF KAKAMAS, NORTHERN CAPE PROVINCE (CLIMATE-DATA.ORG).

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature	28.9 °C	28.7 °C	26.5 °C	21.6 °C	17 °C	13 °C	12.9 °C	14.9 °C	18.8 °C	23.1 °C	25.5 °C	27.7 °C
Min. Temperature	20.9 °C	21.2 °C	19.2 °C	14.9 °C	10.4 °C	6.4 °C	6 °C	7.1 °C	10.3 °C	14.5 °C	16.8 °C	19.1 °C
Max. Temperature	36 °C	35.6 °C	33.3 °C	28.3 °C	24.1 °C	20.2 °C	20.3 °C	22.7 °C	26.9 °C	30.8 °C	33.1 °C	35.2 °C
Rainfall (mm)	23	20	24	19	11	5	3	2	4	10	10	17
Humidity (%)	26%	28%	32%	39%	41%	46%	40%	33%	25%	22%	21%	23%
Rainy days (d)	3	3	3	2	1	1	1	1	1	1	1	2
avg. Sun (hours)	12.2	11.6	10.8	9.9	9.2	8.7	8.9	9.4	10.4	11.3	12.0	12.4

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 of the study area, according to the Department of Agriculture, Forestry and Fisheries, 2017, has a value of 3 (Figure 8Figure 8). This is considered a Low climate capability.

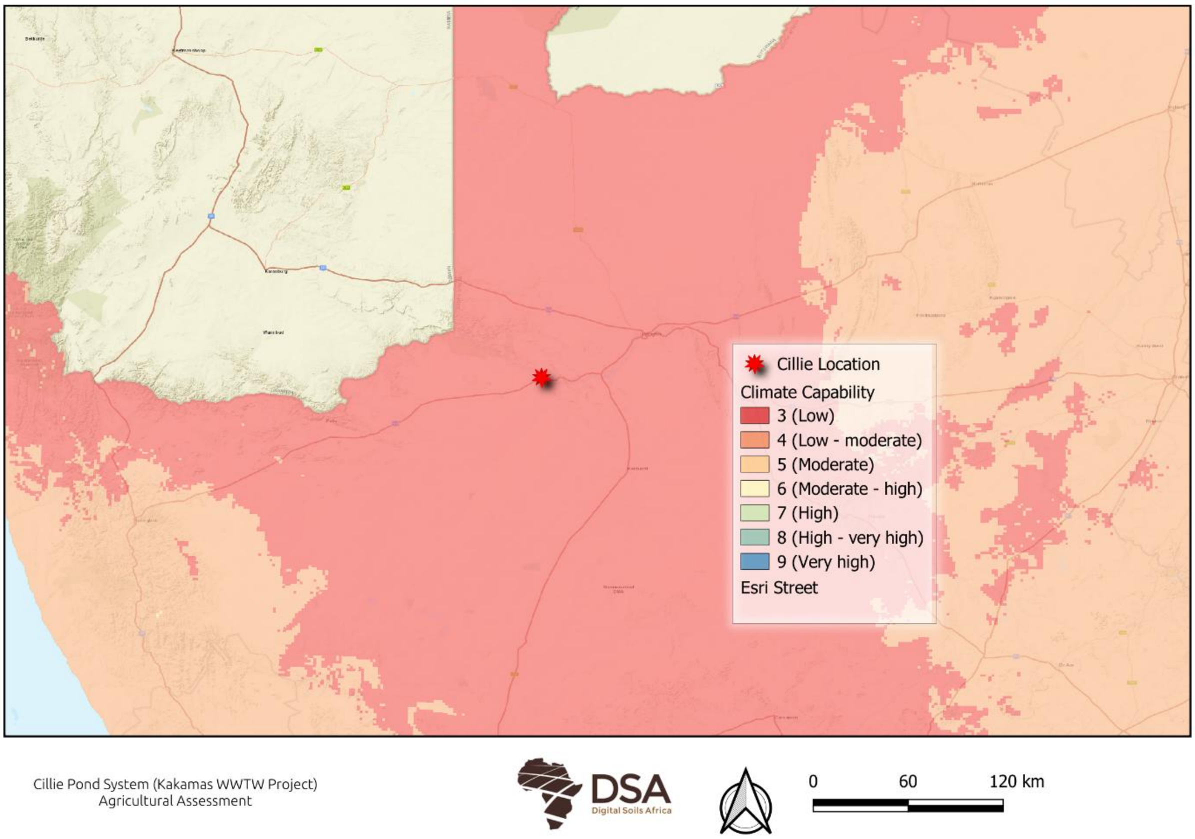

FIGURE 8: THE CLIMATE CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

SOIL

LANDTYPE

A land type is an area which can be demarcated at a scale of 1:250 000 with similar soil forming factors and therefore soil distribution patterns. A land type does therefore not represent uniform soil polygons, but rather information regarding the occurrence of different soils on different terrain units can be obtained from the land type inventory. Land type data was used in calculating the soil capability (DAFF, 2017), and therefore, indirectly used in the Screening tool for estimating the agricultural sensitivity.

The entire study area is situated upon the Ag broad land type and specifically the Ag2 land type (Land Type Survey Staff, 1972 – 2002) (Figure 9). The Ag broad land type is characterised as freely-drained, shallow (< 300 mm deep), red and sandy soils that comprise > 40% of the land type (Land Type Survey Staff, 1972 – 2002). The Ag2 land type mainly (> 60%) consist of Terrain units 3 and 4 and soil forms Hutton and Mispah that dominate the land type. The Hutton soil form generally has a high agricultural potential due to deep limiting layer, while the Mispah soil form generally has a low agricultural potential due to its shallow limiting layer that inhibit root growth.

FIGURE 9: LANDTYPES FOUND IN THE STUDY AREA AND THE SURROUNDING AREA (LAND TYPE SURVEY STAFF, 1972 – 2002).

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 of the study area, according to the DAFF (2017), has a value of 3 (Low) (Figure 10). Overall, the soil capability of the study area is Low.

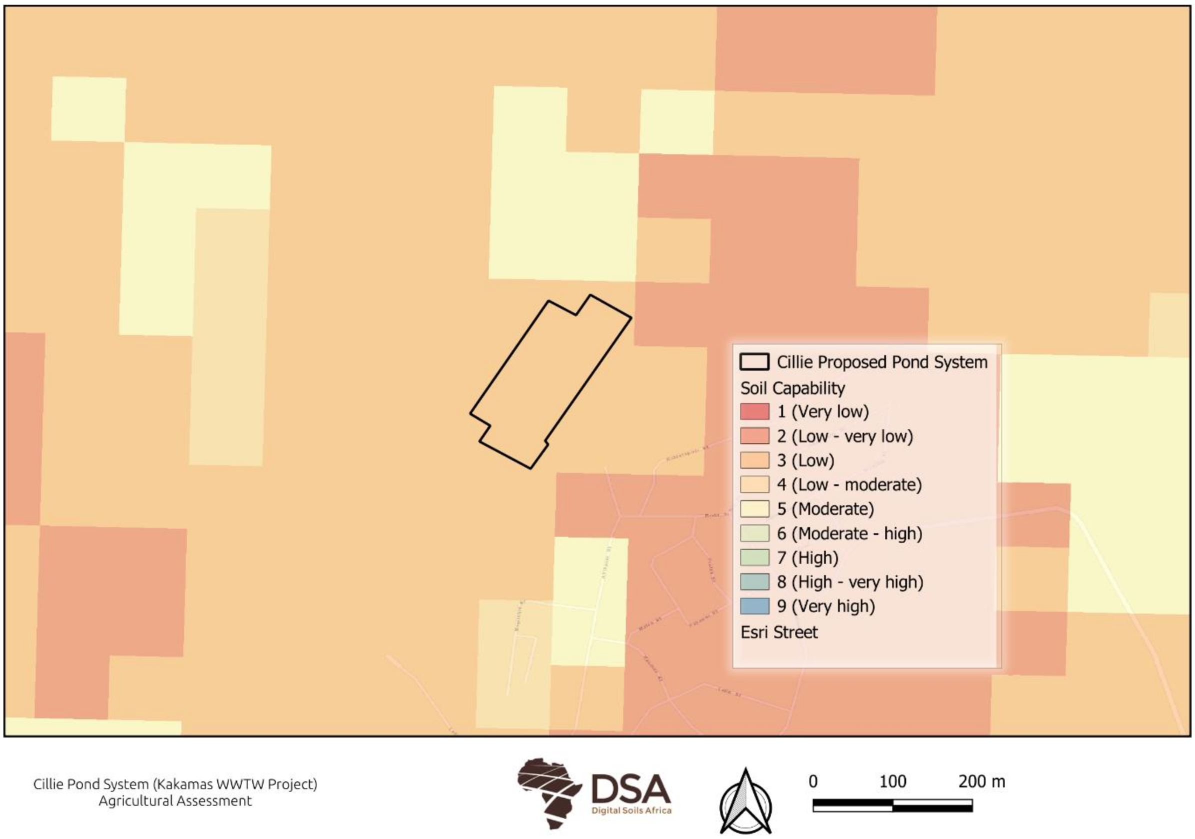

FIGURE 10: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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 of the entire study area, according to the DAFF (2017), is 7 (High), which indicates a relatively flat terrain (Figure 11).

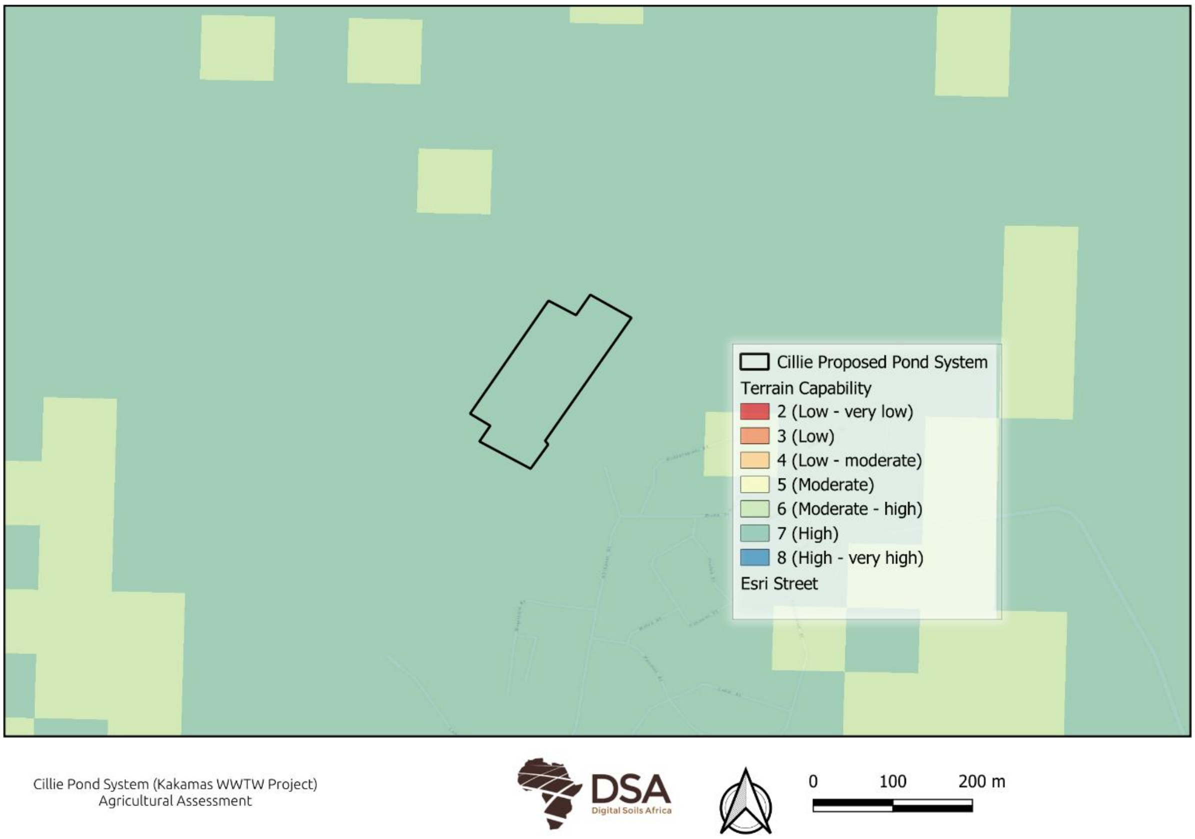

FIGURE 11: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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.

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

Land Capability Class	Description	
1-2	Very Low	Not arable
3-4	Very Low to Low	Not arable
5	Low	Not arable
6-7	Low to Moderate	Not arable
8	Moderate	Arable
9-10	Moderate to High	Arable
11	High	Arable
12-13	High to Very High	Arable
14-15	Very High	Arable

The study area has a land capability of 5 (Low), which falls in the non-arable category (1-7) (Figure 12Figure 12).Figure 12

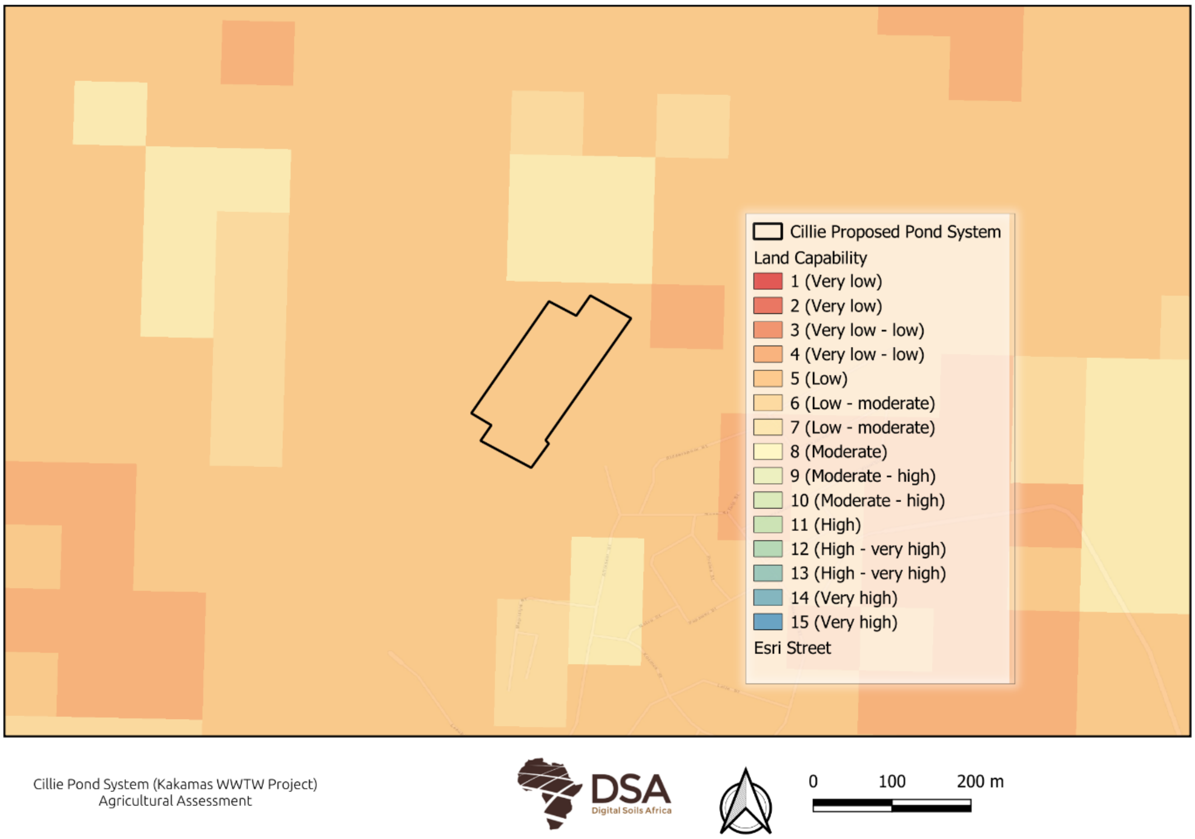

FIGURE 12: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017).

GRAZING CAPACITY

The unit used in the grazing capacity is hectares per large stock unit (ha/LSU). The site has a low grazing capacity of 36 ha/LSU (Figure 13Figure 13). 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).

FIGURE 13: GRAZING CAPACITY FOR THE SITE AND THE SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2016).

LAND USE

South African National Land-Cover 2020 (SANLC 2020) (GeoTerraImage, 2020) was compared to the 2014 Land Cover to determine if there was a land use change since 2014, and there was very little conflicting classification in the study area. SANLC 2020 classifies the study area as either low shrubland (11) or other bare land (31) (Figure 14).

TABLE 3: LEGEND TO FIGURE 14

No.	Class Name	Class Definition
11	Low Shrubland (Nama Karoo)	This is the same as class 8, Low Shrubland, but now represents low, indigenous karoo-type vegetation communities, which have been identified using image-based spectral models, but which fall spatially inside the SANBI defined boundaries for Nama Karoo vegetation communities.
31	Other Bare	Other natural, semi-natural or man-created non-vegetated areas. Typically associated with permanent or near permanent bare ground sites that have insufficient spatial or temporal characteristics to be otherwise classified.

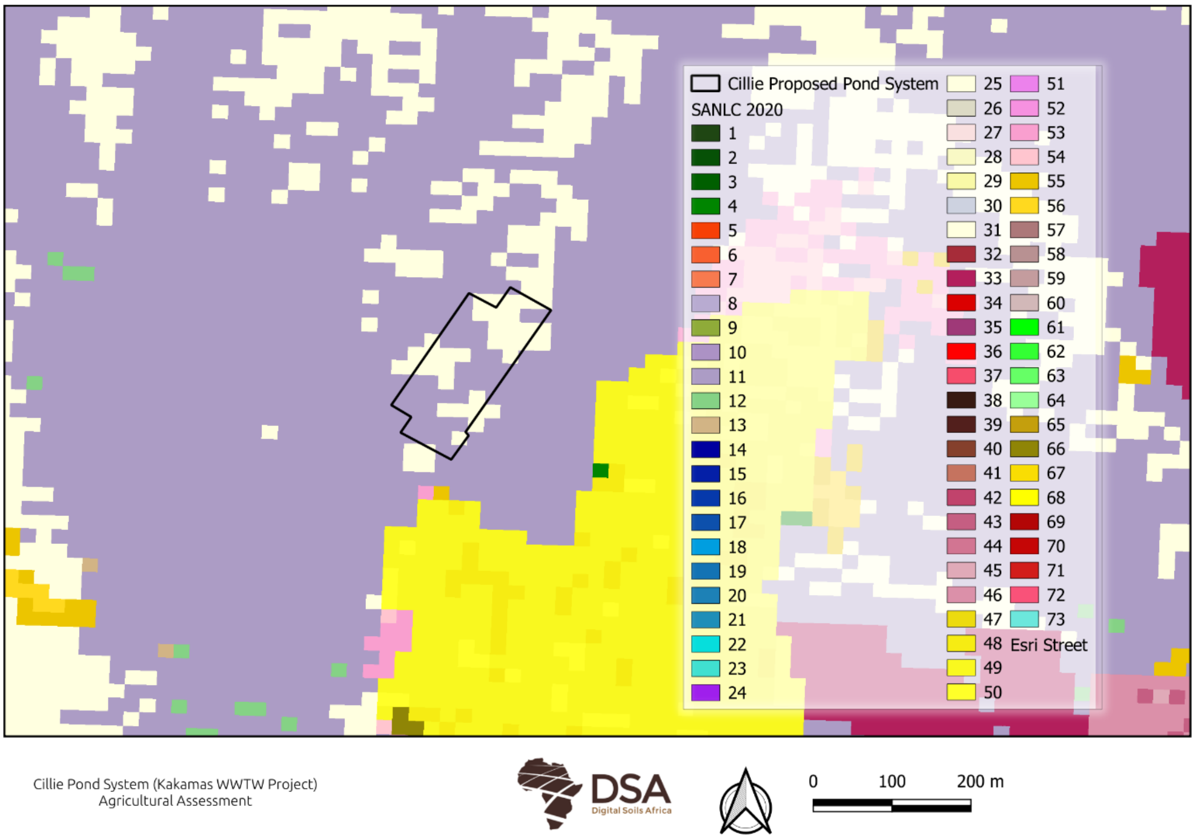

FIGURE 14: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

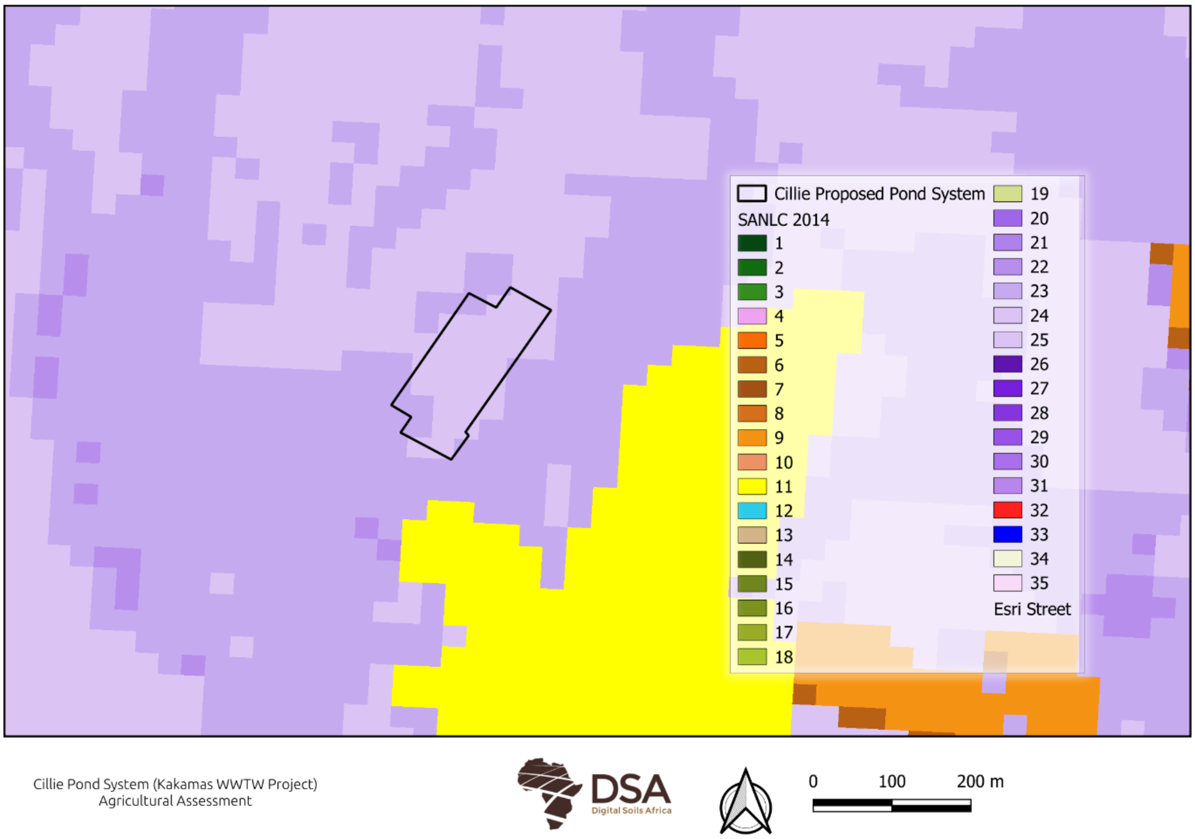

FIGURE 15: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

From Figures 16-18, the land-use did not change from being either low shrubland or bare land (Figure 16).

FIGURE 16: GOOGLE EARTH IMAGE (2013) OF THE STUDY AREA.

FIGURE 17: GOOGLE EARTH IMAGE (2018) OF THE STUDY AREA.

FIGURE 18: LATEST GOOGLE EARTH IMAGE (2023) OF THE STUDY AREA.

COMPLIANCE STATEMENT

This Agricultural Compliance Statement conforms with the Environmental Authorization requirements stipulated by the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"). The Environmental Screening Report (ESR) generated through the National Web-based Screening Tool identifies the study area as having very high agricultural sensitivity due to the study area showing viticulture with low to moderate land capability.

The Cillie proposed pond system is situated within a protected agricultural area and a high terrain capability. Overall, the study area has an arid climate with a low climate capability. The study area has a low soil capability and is situated upon the Ag broad land type and specifically the Ag2 broad land type, which includes the Hutton and Mispah soil forms. The study area also has a low grazing capacity of 36 ha/LSU. Finally, the land use of the study area is predominantly low shrubland and/or other bare land.

The land capability in the Northern Cape is generally low due to the arid conditions; however, the agricultural potential largely depends on irrigation from the Orange River. Based on satellite imagery, the site appears to be situated on either carbonate-containing soils or shallow soils — both of which are unsuitable for irrigation.

Consequently, the agricultural potential appears low based on the topsoil colour. Given the need and desirability of the project, it is the specialist's opinion that the project will not interfere with agricultural activities and should proceed.

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: >120 **Total Publications: 6**

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