AGRICULTURAL COMPLAINCE STATEMENT FOR KAKAMAS, NORTHERN CAPE

PREPARED FOR

ENVIROAFRICA

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BACKGROUND TO THE STUDY

Digital Soils Africa (Pty) LTD (DSA) were tasked by Enviro Africa, to undertake an Agricultural Assessment 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).

SITE LOCATION

The study site is in Kakamas, Northern Cape along the N14 (Figure 1). The development proposal entails the clearance of approximately 19.8ha of indigenous vegetation on Erf 1181, Kakamas and establishing agricultural fields thereon. The agricultural fields will be used for:

I. Providing accredited and non-accredited training (practical and theory), specializing in Viticulture.
II. conducting research and development work for the South African raisin industry
III. Demonstrating technology and innovative ideas commercially.

The infrastructure to be established on the proposed site includes *inter alia*,

- Irrigation pipelines and pump station,
- Water storage dam,
- Guardroom with toilet,
- Road for accessing different parts of the proposed site
- Pack sheds and other buildings in which the processing of the agricultural produce will take place,
- Drying beds for placing harvested grapes on until raisins result
- Administrative office(s), etc

The development proposal will be supplied with potable water, electricity, wastewater disposal, green waste disposal and refuse disposal by the Kai ! Garib Local Municipality.

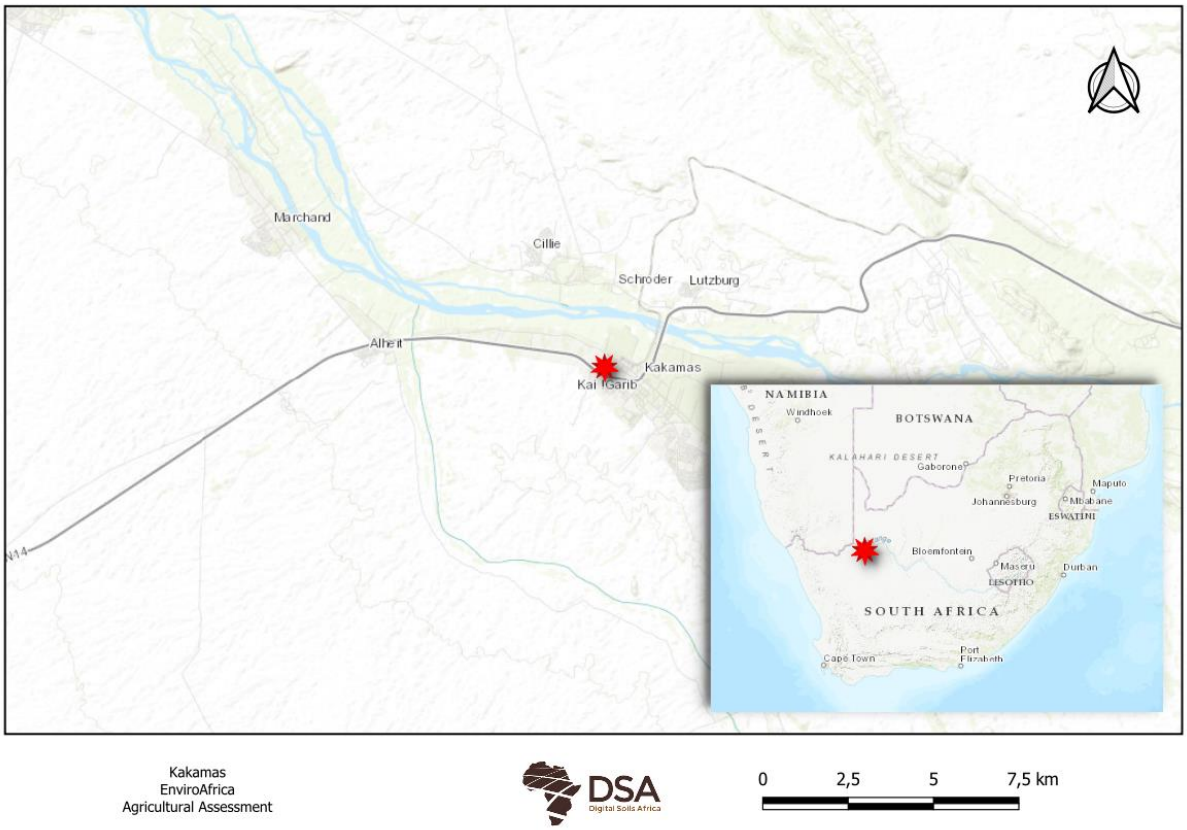

FIGURE 1: LOCATION OF THE STUDY AREA IN THE NORTHERN CAPE.

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 medium sensitivity (Figure 2). The land capability (DAFF, 2017) classifies the soils as having medium to low agricultural sensitivity, majority of the study area is classified as low sensitivity with a few pixels being of medium sensitivity (Figure 4). There are no cultivated crops within the study area (Figure 4).

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low
Medium	Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate

FIGURE 2: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL.

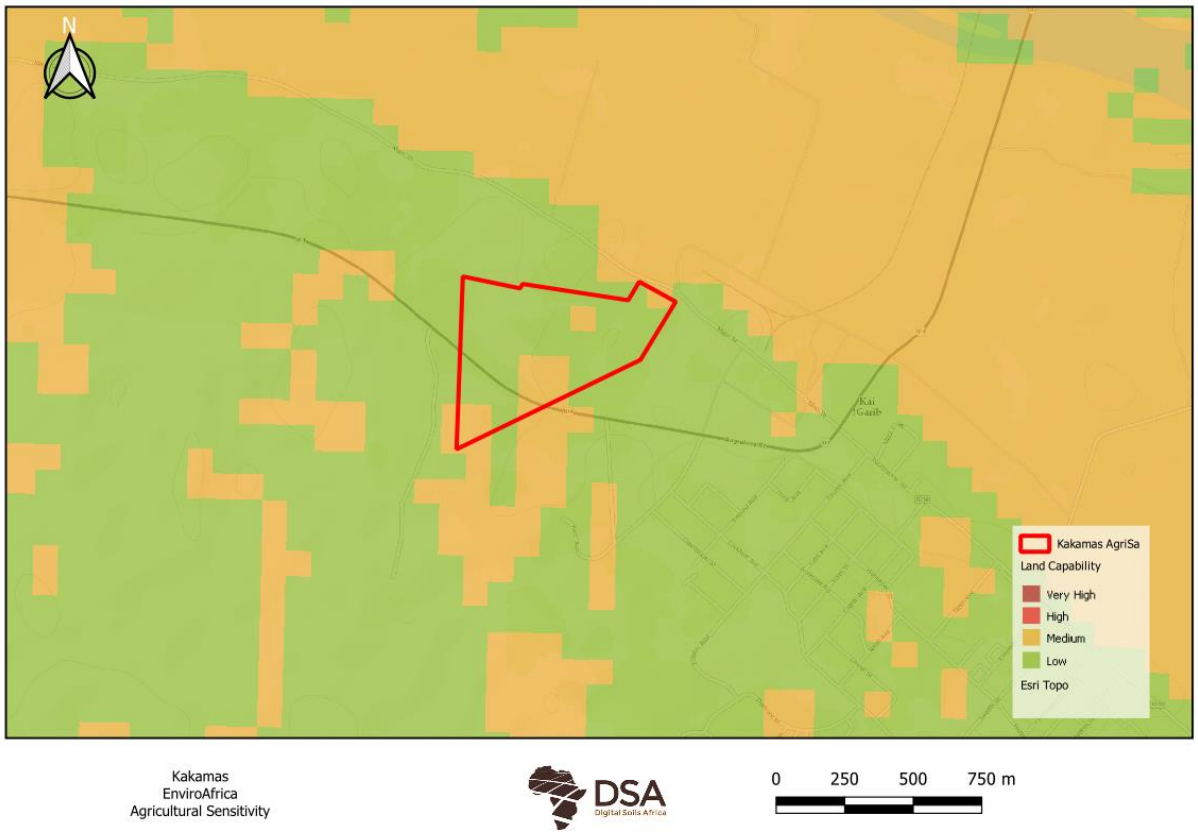

FIGURE 3: THE LAND CAPABILITY OF THE STUDY AS USED IN THE SCREENING TOOL.

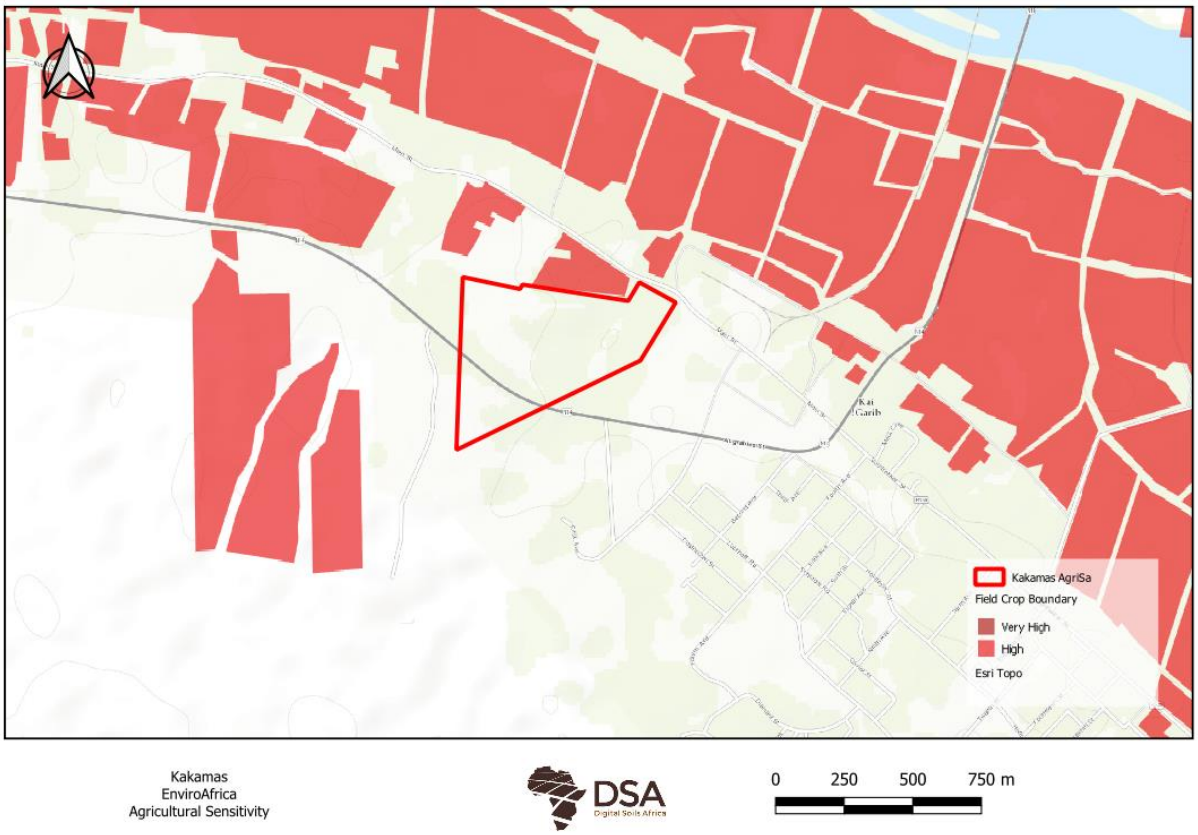

FIGURE 4: THE FIELD CROP BOUNDARIES AS USED IN THE SCREENING TOOL.

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 5).

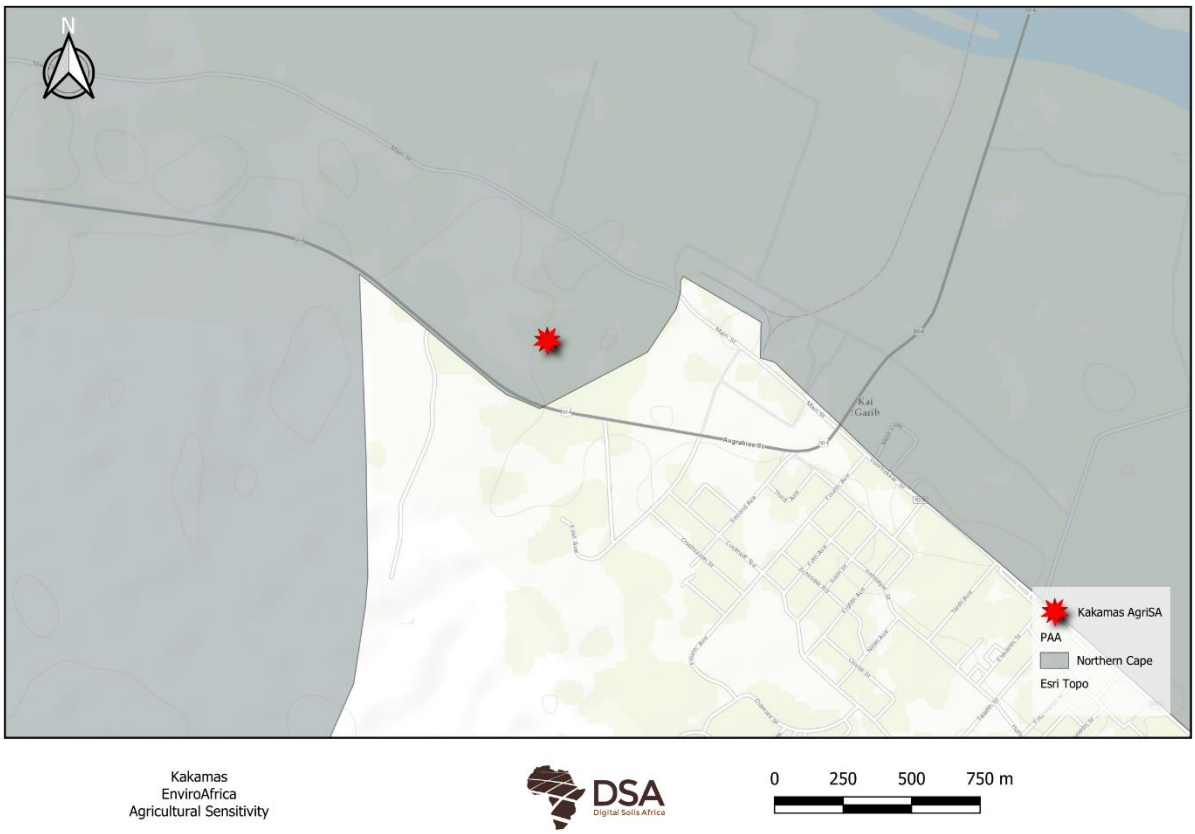

FIGURE 5: THE PROTECTED AGRICULTURAL AREAS FOR THE STUDY AREA.

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. (pg25)
- 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(pg24);
- indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site (pg24).
- 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 (pg24);

- 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 (pg24);
- any conditions to which the statement is subjected (pg24);
- 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 (pg10).

ASSUMPTIONS, UNCERTAINTIES OR GAPS

- Desktop data assumed to be correct.

RESULTS

CLIMATE CAPABILITY

The climate of Kakamas is characterized by arid and dry conditions typical of a desert region. Throughout the year, Kakamas experiences an almost complete absence of precipitation. According to the Köppen-Geiger classification, the prevailing climate in this region is categorized as BWh. In Kakamas, the average annual temperature is 21.6 °C. Each year, there is an approximate 148 mm of precipitation that occurs. The site has Arid climate zone (Figure 6).

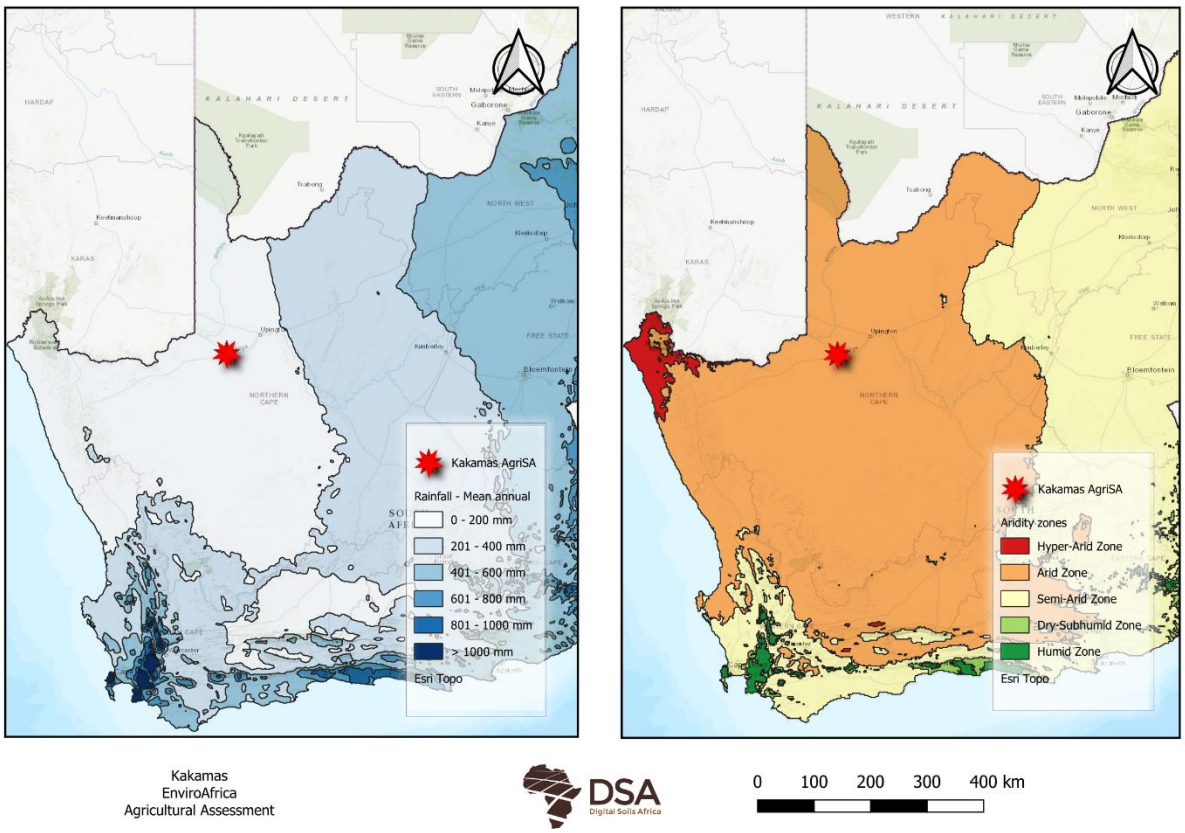

FIGURE 6: CLIMATE OF THE SITE AND THE SURROUNDING AREA (SCHULZE, 2007).

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 °C	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 °C	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 °C	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
Precipitation / 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 (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 according to the Department of Agriculture, Forestry and Fisheries, 2017, is a value of 3 (Figure 7). This is considered a low climate capability.

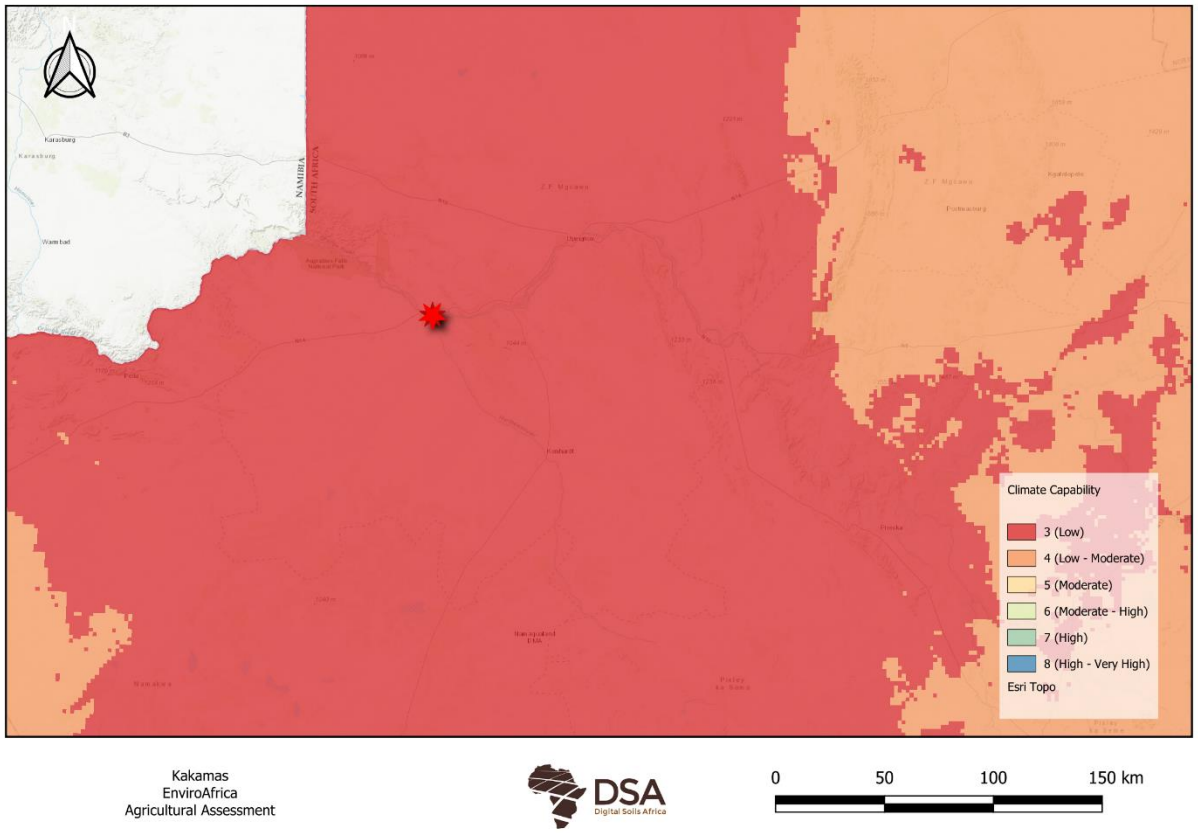

FIGURE 7: THE CLIMATE CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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 study area is entirely comprised of the Ag land type (Land Type Survey Staff, 1972 – 2002) (Figure 8). Ag land types are characterized by Freely drained, shallow (<300 mm deep), red, eutrophic, apedal soils comprise >40% of the land type (yellow soils comprise <10%).

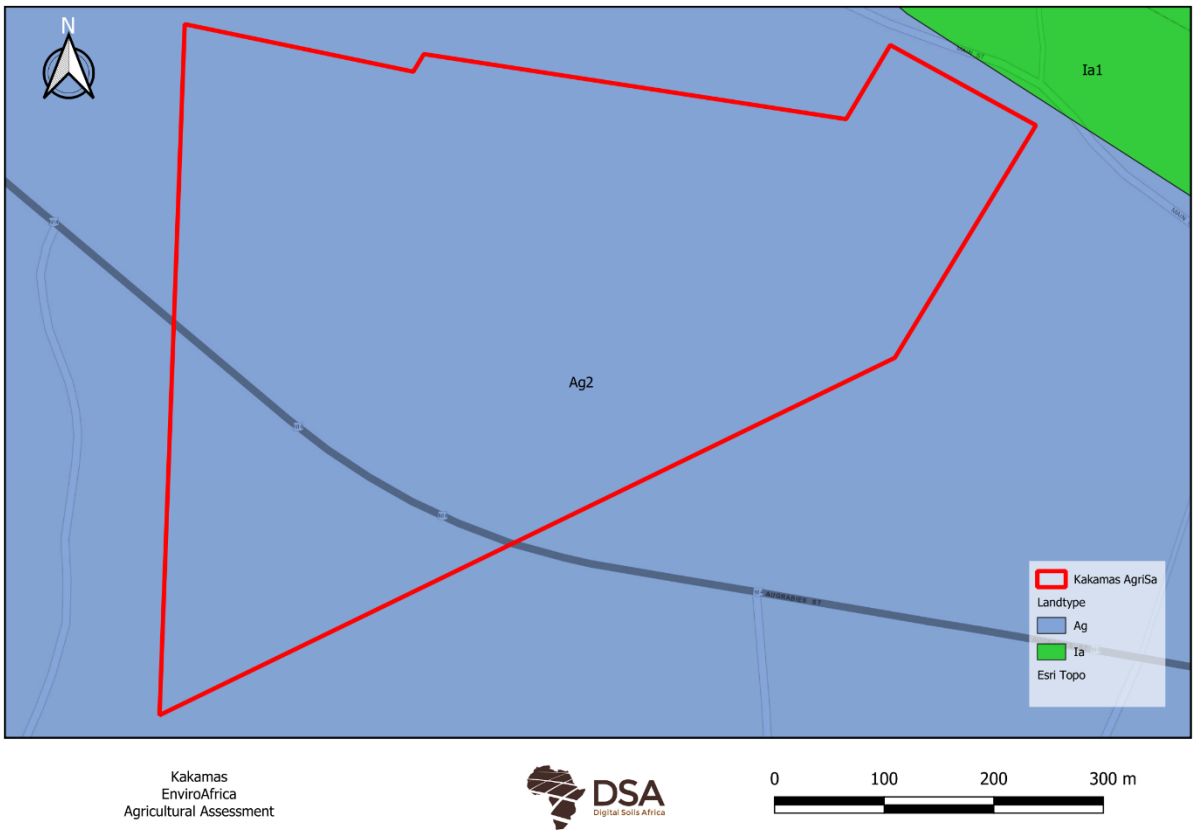

FIGURE 8: LANDTYPES FOUND IN THE STUDY AREA AND THE SURROUNDING AREA (LAND TYPE SURVEY STAFF, 1972 – 2002).

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 has values of 2, 3 and 5, according to the DAFF (2017), (Figure 9).The majority of the study area has a soil capability of 3 which is low, while 3 pixels of value 2 (Very Low – Low) to the west and roughly 8 pixels of value 5 (Moderate) to the south of the study area. This is considered a low soil capability.

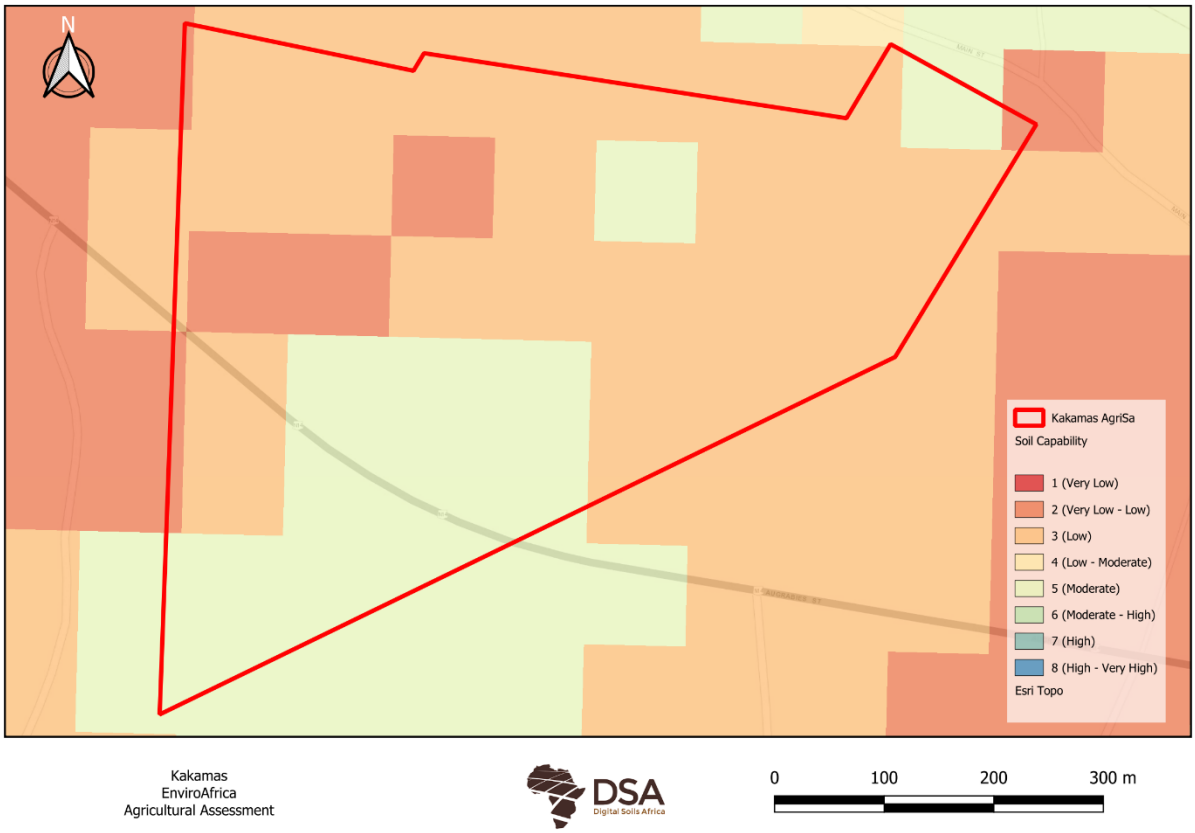

FIGURE 9: THE SOIL CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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 according to the DAFF (2017), is a value of 5 (Moderate) to 7 (High) (Figure 10). High terrain capability towards the east of the site and 5 (Moderate) and 6 (Moderate – High) to the western part of the study area. This is considered a moderate - high terrain capability.

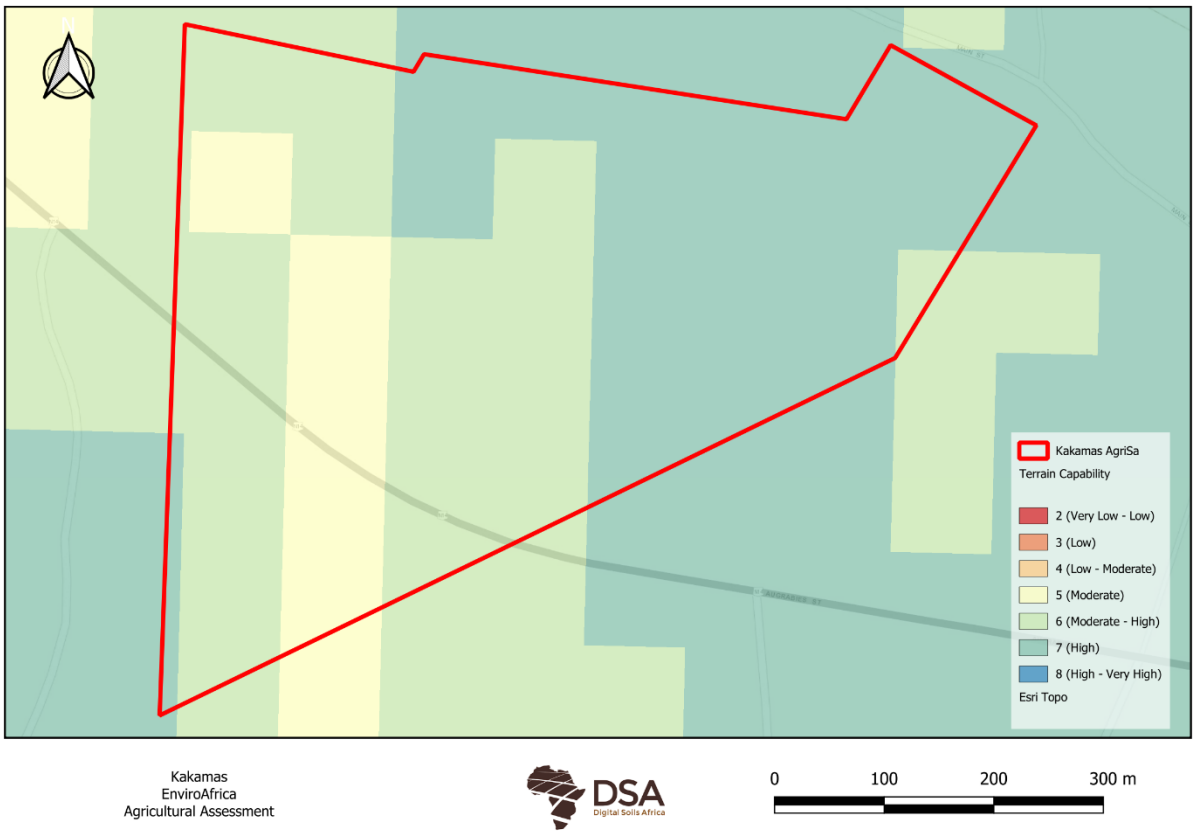

FIGURE 10: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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	
5	Low	
6-7	Low to Moderate	
8	Moderate	Arable
9-10	Moderate to High	
11	High	
12-13	High to Very High	
14-15	Very High	

The Land capability value is 4 (Very low – low) to 6 (Low - Moderate), which is generally considered not arable (Figure 11).

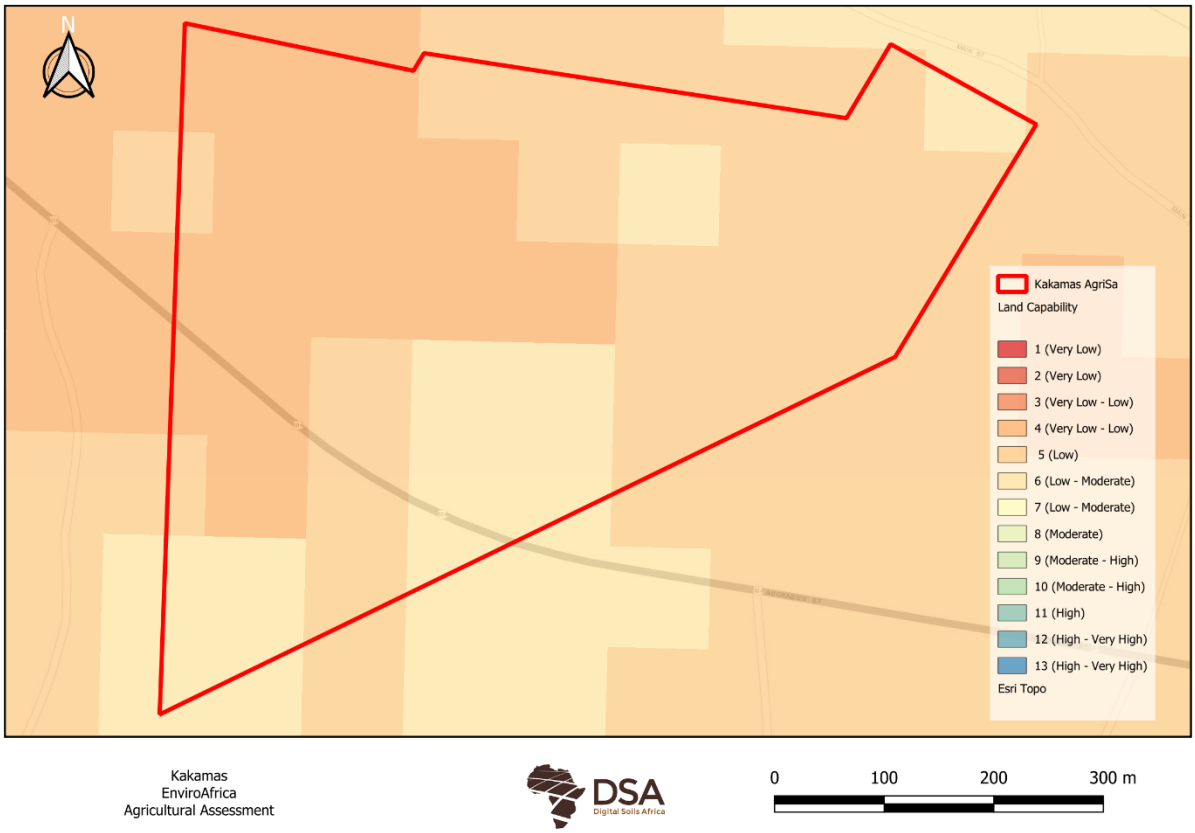

FIGURE 11: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017).

GRAZING CAPACITY

The unit used in the grazing capacity is hectares per large stock unit (ha/LSU). The site has a Very low grazing capacity of 36 ha/LSU (Figure 12). 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).

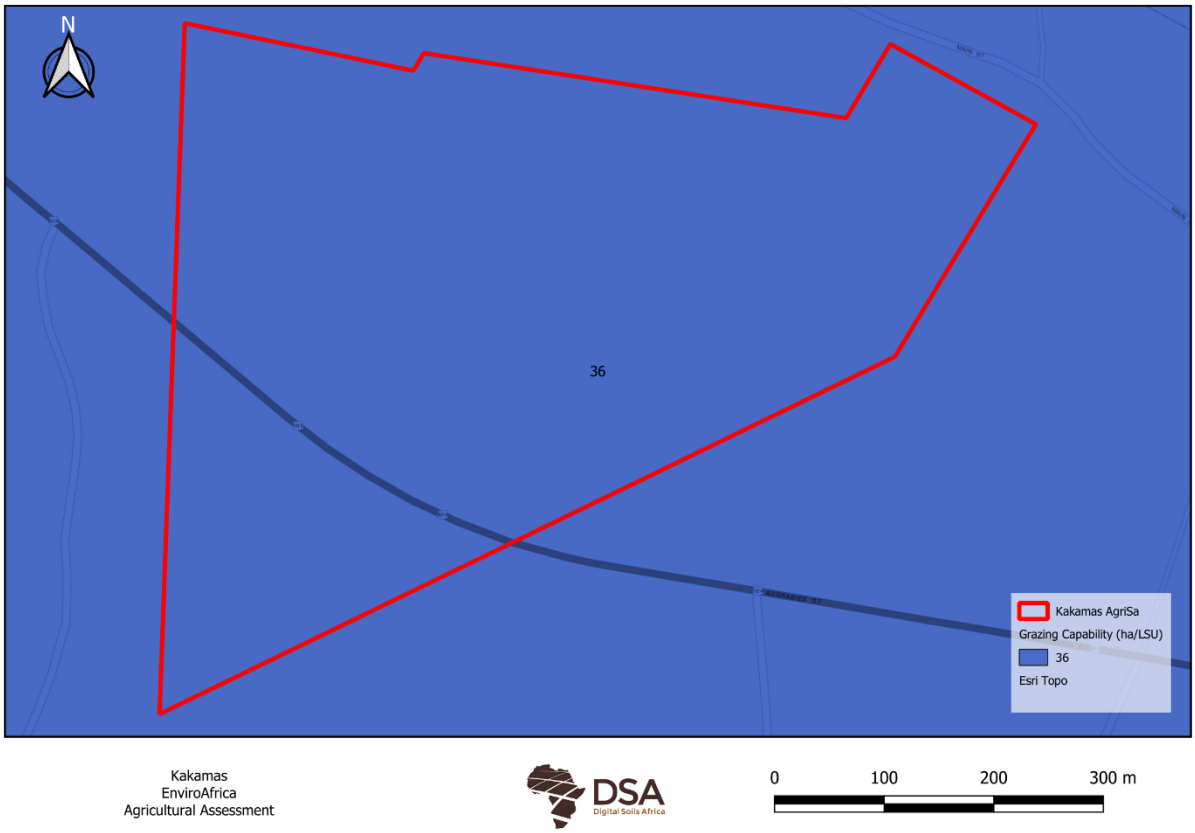

FIGURE 12: GRAZING CAPACITY FOR THE SITE AND THE SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2016).

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 area as predominantly low shrubland (Nama Karoo) (11), and sparsely wooded grassland (Figure 13) with the class names listed in Table 3 below.

TABLE 3: LEGEND TO FIGURE 13

No.	Class Name	Class Definition
4	Contiguous & Dense Planted Forest	Dense to contiguous cover, planted tree forests, consisting primarily of exotic timber species, with canopy cover exceeding 35%, and canopy heights exceeding 2.5 metres. Typically represented by mature commercial plantation tree stands. This class also includes smaller woodlots and windbreaks, where they have been identified by the same spectral-based image modelling procedures used to detect the plantation forests.
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.
12	Sparsely Wooded Grassland	Natural woody vegetation, with a woody canopy cover ranging between only 5 - 10%, and canopy heights exceeding 2.5 metres, in a grass-dominated environment. Typically represented by very sparse woodland or lightly wooded grassland communities. This class has been included as it is part of the new gazetted land-cover classification standards, but is challenging to map with 20m resolution imagery, since the associated woody cover component is not a spatially dominant component. Whilst the class has been generated with all possible due care and attention, it must be used and with caution, and should be interpreted as a sub-component of the grassland areas, especially in drier more arid areas.
13	Natural Grassland	Natural and/or semi-natural indigenous grasslands, typically devoid of any significant tree or bush cover, and where the grassland component is typically dominant over any adjacent bare ground exposure. Typically representative of low, grass-dominated vegetation communities in the Grassland and Savanna Biomes.
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.
67	Roads & Rail (Major Linear)	Built-up features represented by primary road and rail networks that are image-detectable (i.e. networks are non-contiguous), as well as smaller airfields and airstrips. Note that road and rail networks have not been mapped as contiguous networks, but are only represented in the NLC dataset where the linear feature is image detectable, which is dependent on object size, shape, orientation, material and surrounding landscape characteristics. This class is therefore not a definitive representation of road and rail networks. It has been included as a requirement to match, as far as possible, the gazetted land-cover standard.

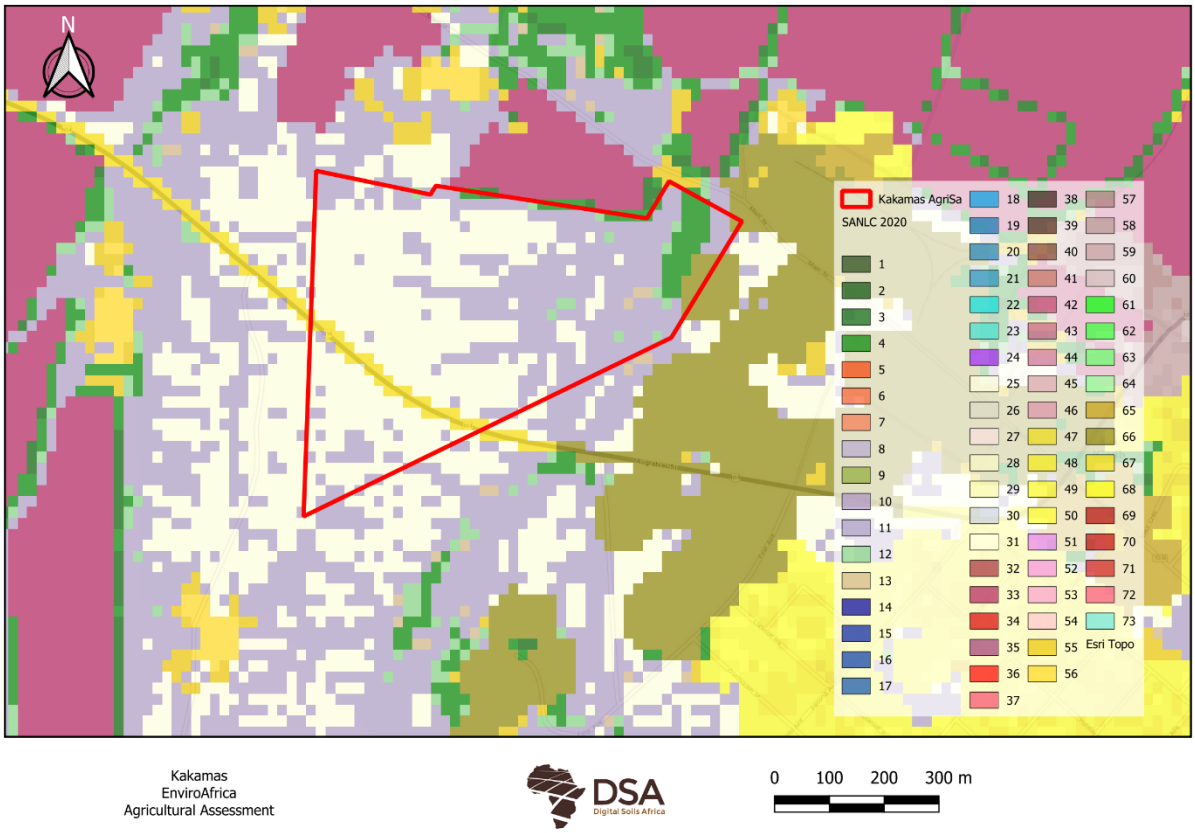

FIGURE 13: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

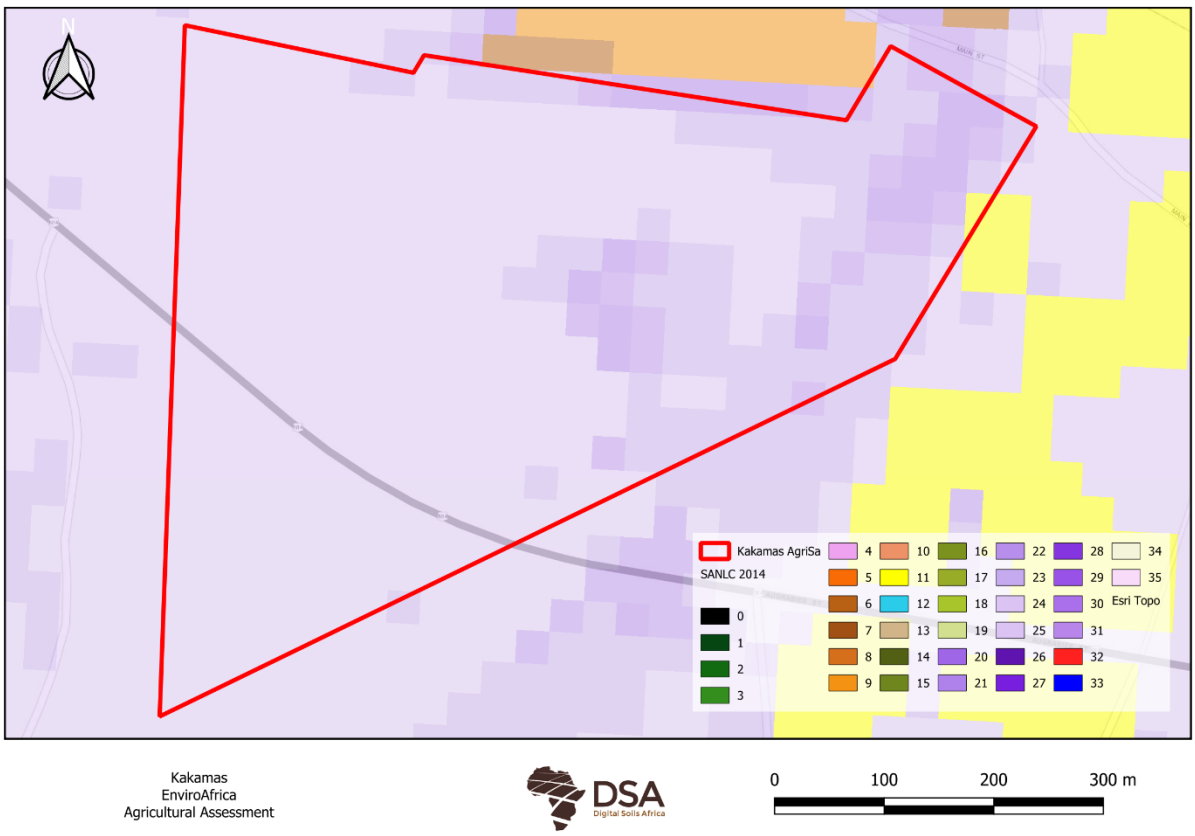

FIGURE 14: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

From Figures 15, Google earth images suggest that the land-use did not change much over the years. No cultivated fields are observed from the satellite images, confirming the SANLC 2020 classification.

FIGURE 15: GOOGLE EARTH IMAGE (2014) OF STUDY SITE IN KAKAMAS.

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 a medium sensitive according to the Agricultural theme.

Findings from the desktop assessment:

- The study area is situated within a Northern Cape Protected Agricultural Area.
- No Field crop boundaries are recorded in SANLC 2014 and 2020, and no cultivation was observed from the Google satellite images.
- The climate capability of the area was classified as Low.
- The Ag land types are characterized by freely drained, shallow, red, eutrophic, apedal soils comprise >40% of the land type. The soil capability was largely low to moderate.
- Area had a moderate terrain capability.
- The overall land capability was concluded as low.
- The grazing capacity of the study area was moderate (36 ha/LSU).

The desktop assessment aligns with the screening tool of medium agricultural sensitivity therefore, the project is not expected to have an adverse impact on food production at the site. For this reason, the specialist recommends that the project 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: 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