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APPENDIX 13
SOIL, LAND USE, LAND CAPABILITY AND UTILISATION (AGRICULTURAL) IMPACT ASSESSMENT

COMPLIANCE STATEMENT FOR PROPOSED PROSPECTING RIGHT APPLICATION AT ZANDSPRUIT FARM, SITUATED NEAR UTRECHT IN KWAZULU-NATAL.

PREPARED FOR

LICEBO ENVIRONMENTAL AND MINING (PTY) LTD

MAY 2024

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BACKGROUND TO THE STUDY

Digital Soils Africa (Pty) LTD (DSA) were tasked by Licebo Environmental and Mining (Pty) Ltd (who has been appointed by Lwabantu Ltd) 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.

Lwabantu is applying for a proposed prospecting rights (PR) application at the Magisterial District of Utrecht in the eMadlangeni local municipality within the Amajuba District Municipality (ADM). Lwabantu lodged application for prosecting right on the online South African Mineral Resources Administration System (SAMRAD) governed by DMRE.

The activities to be undertaken include:

- The drilling of prospecting boreholes
- Construction of water collection sumps
- The use of existing roads to access the farm portions, and
- Rehabilitation of the disturbed drilling areas.

Lwabantu intends to undertake prospecting activities for beryllium ore, brytes, calcite, coal, cobalt, copper ore, dalusite, feldspar, fluorspar, glass sand, gold ore, graphite, heavy minerals, oshate ore, kaolin clay, lead, lithium ore, manganese ore, mica, mineral pigment, nickel ore, rare earths, rutile (heavy mineral), salt, strontium, talc, tin (titanium), tin ore, tungsten ore, uranium ore, vanadium ore and zinc ore.

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.

SITE LOCATION

The study area includes a group of farms, such as Tusschembij, Gumtreespruit, Stuurmanskraal, Ferreirashop, Vergenoegd, Twijfelfontein, Tijgerfontein, Weltevreden and Zandspruit and is located approximately 45 km east of the town Newcastle in KwaZulu – Natal Province, South Africa. (Figure 1). The proposed study area, which is now called Zandspruit, is situated within the town of Utrecht, located in the KwaZulu – Natal Province, South Africa.

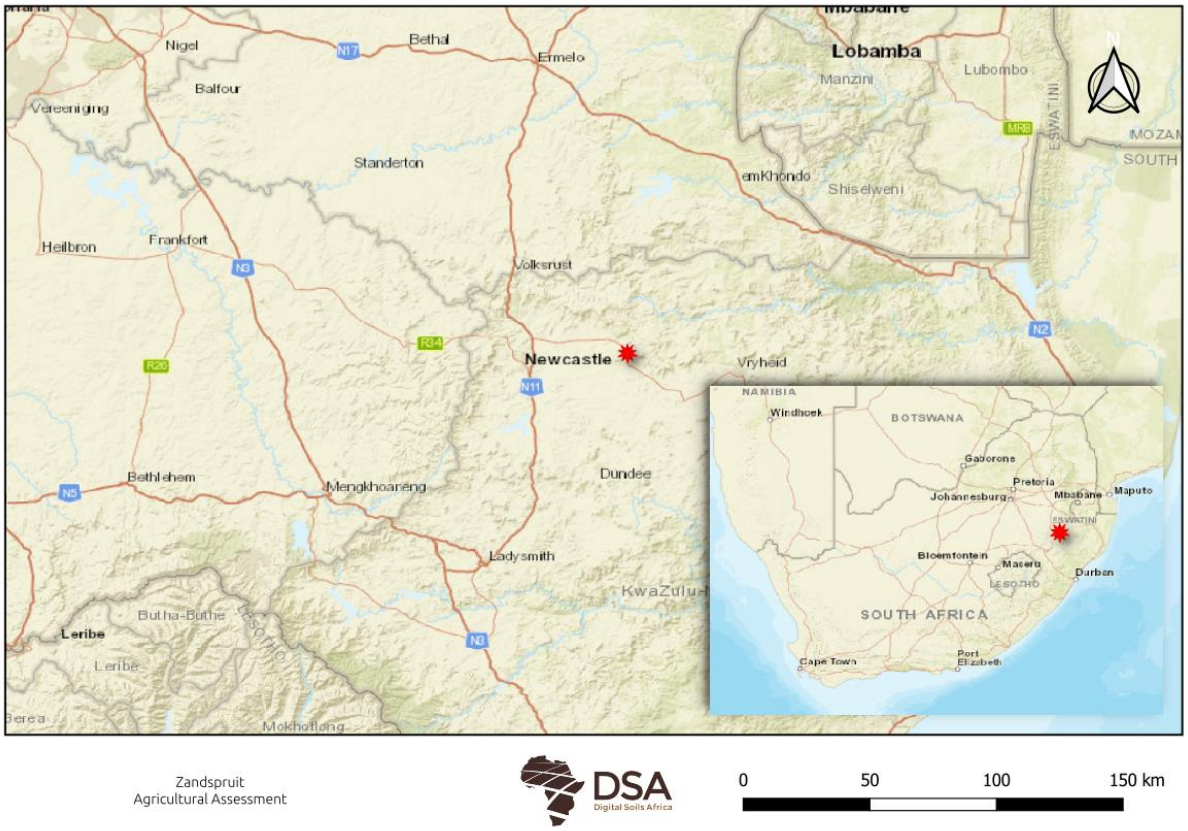


FIGURE 1: LOCATION OF THE STUDY AREA IN THE KWAZULU-NATAL PROVINCE.

The layout of the project's study area, which includes the mentioned farms, is presented in **Error! Reference source not found.**. The proposed prospecting right study area covers the extent of approximately 14 000 ha.

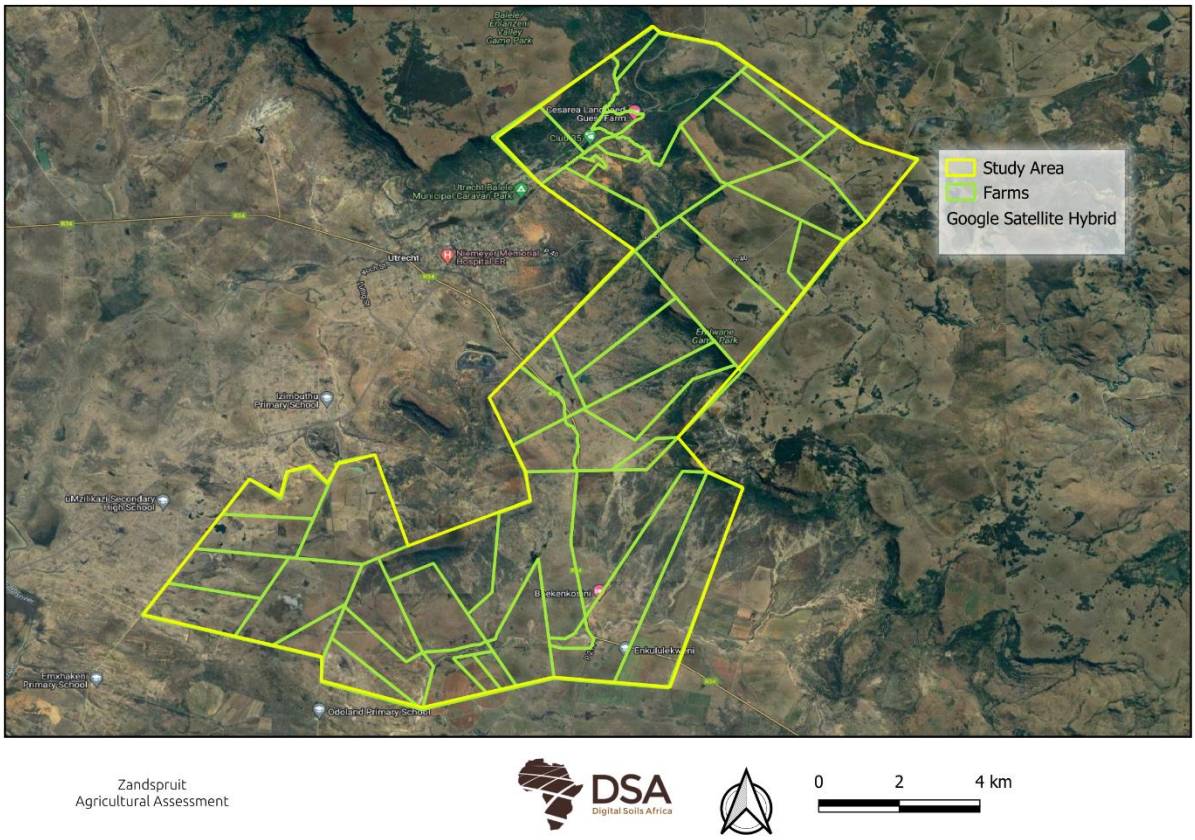


FIGURE 2: THE PROPOSED LAYOUT OF THE STUDY AREA.

ENVIRONMENTAL SCREENING TOOL

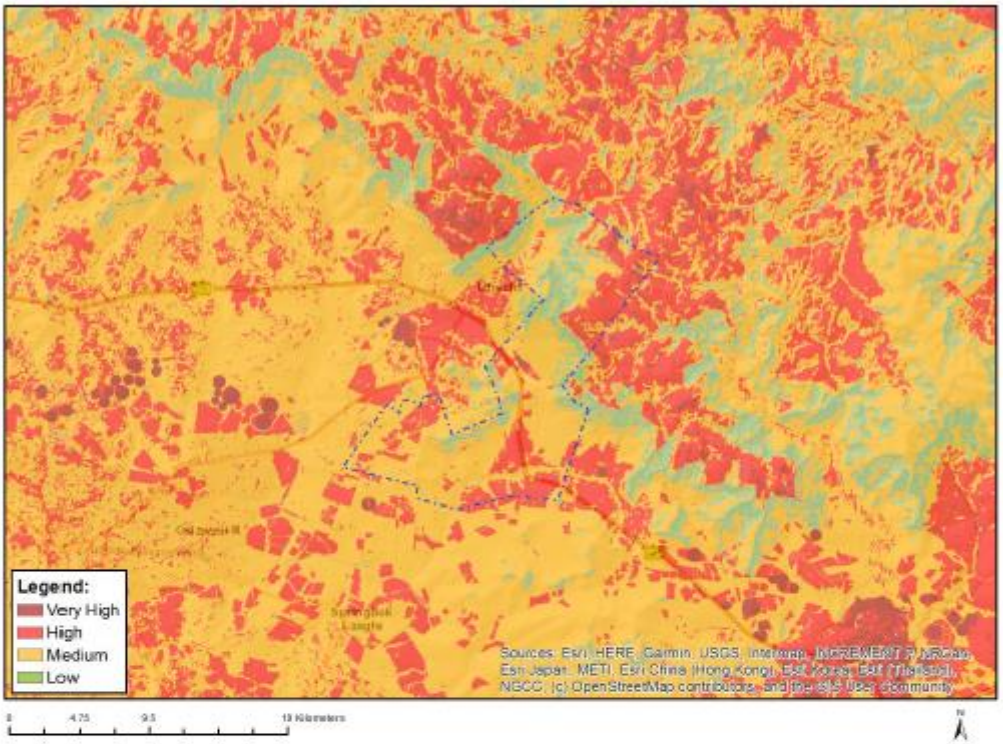
Agricultural sensitivity, as reported in the screening tool, is based upon the land use (SANLC, 2014) and land capability (Department of Agriculture, Forestry and Fisheries, 2017, also referred to as DAFF, 2017).

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 predominantly natural grassland, with rainfed/dryland cultivated areas and pivot-irrigated cultivated areas (Figure 4). There are field crop boundaries located within the study area as seen in Figure 4. The land capability (DAFF, 2017) classifies the soils as having a land capability of predominantly moderate sensitivity (Figure 5).



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;09. Moderate-High/10. Moderate-High
High	Small Holdings;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Old Fields;Land capability;06. Low-Moderate/07. Low-Moderate/08. Moderate
High	Old Fields;Land capability;09. Moderate-High/10. Moderate-High
High	Annual Crop Cultivation / Planted Pastures Rotation;Land capability;01. Very low/02. Very low/03. Low-Very low/04. Low-Very low/05. Low

FIGURE 3: RESULTS FROM THE ENVIRONMENTAL SCREENING TOOL.

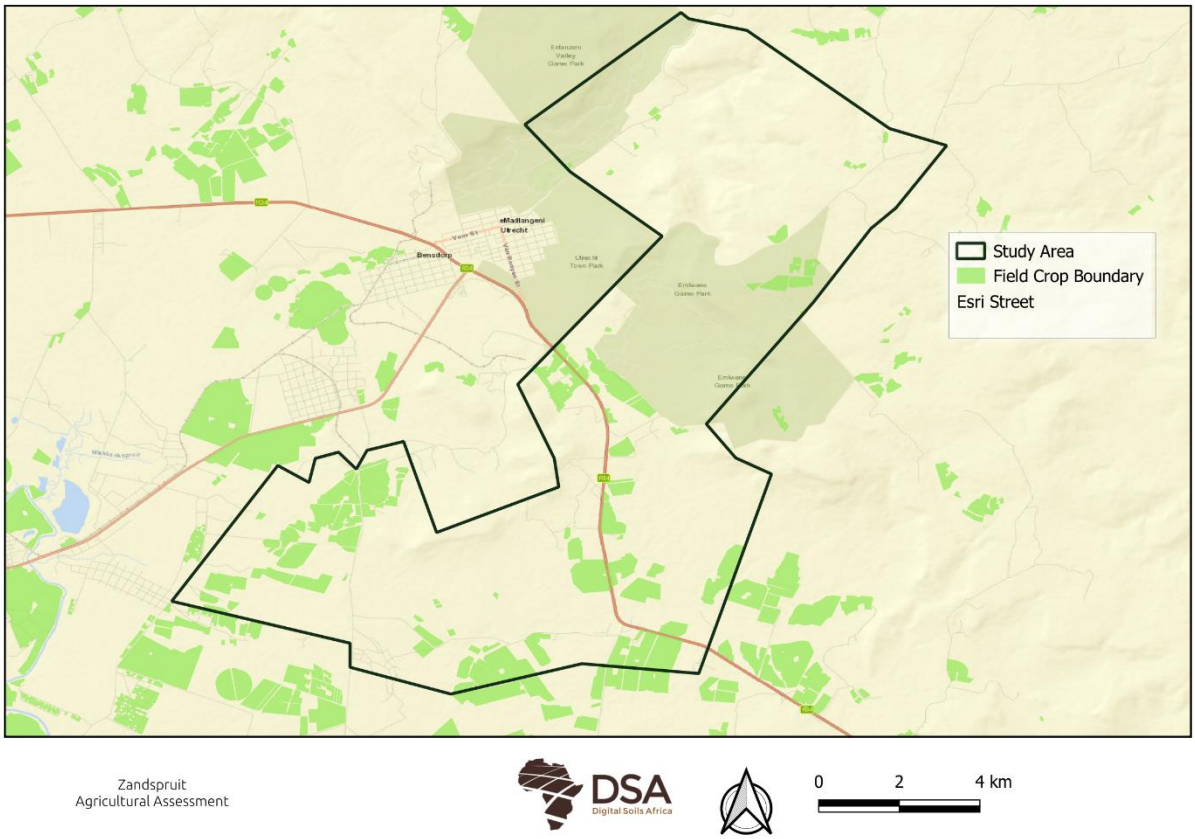


FIGURE 4: THE FIELD CROP BOUNDARIES AS USED IN THE SCREENING TOOL.

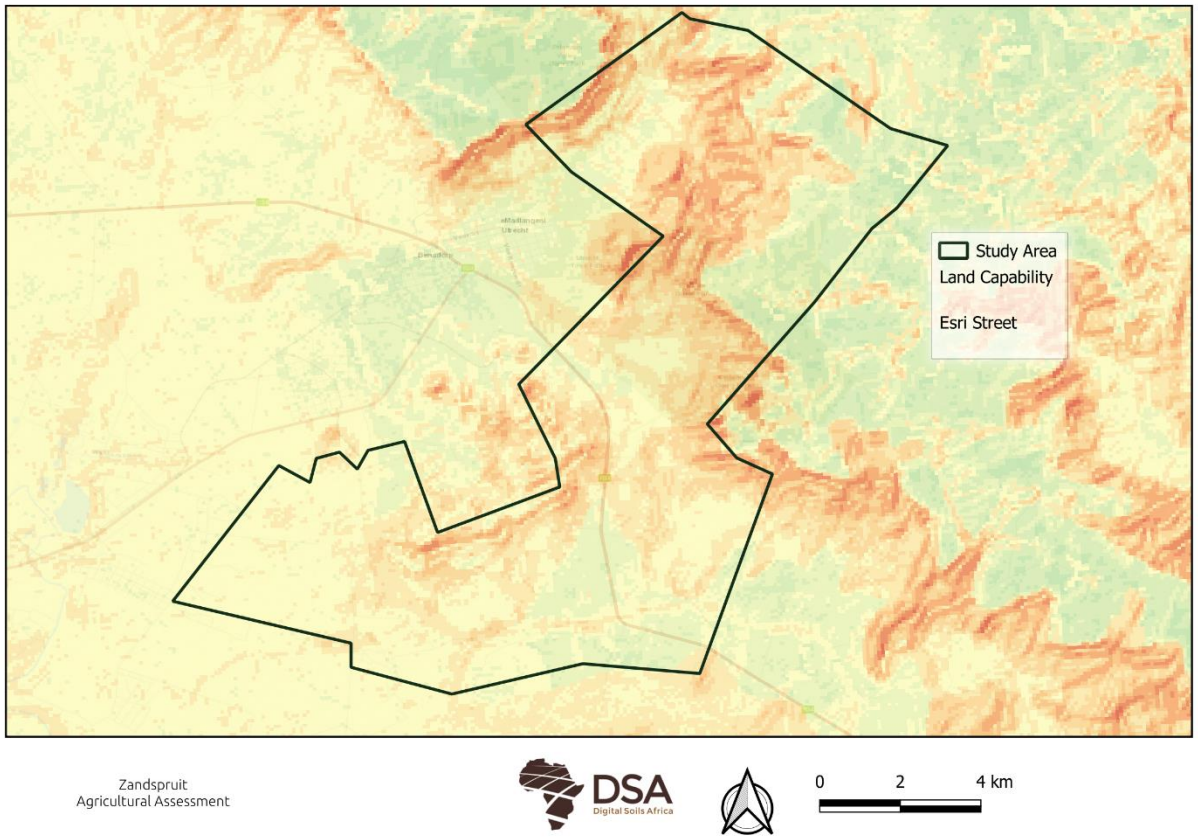


FIGURE 5:THE LAND CAPABILITY OF THE STUDY AS USED IN THE SCREENING TOOL.

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).

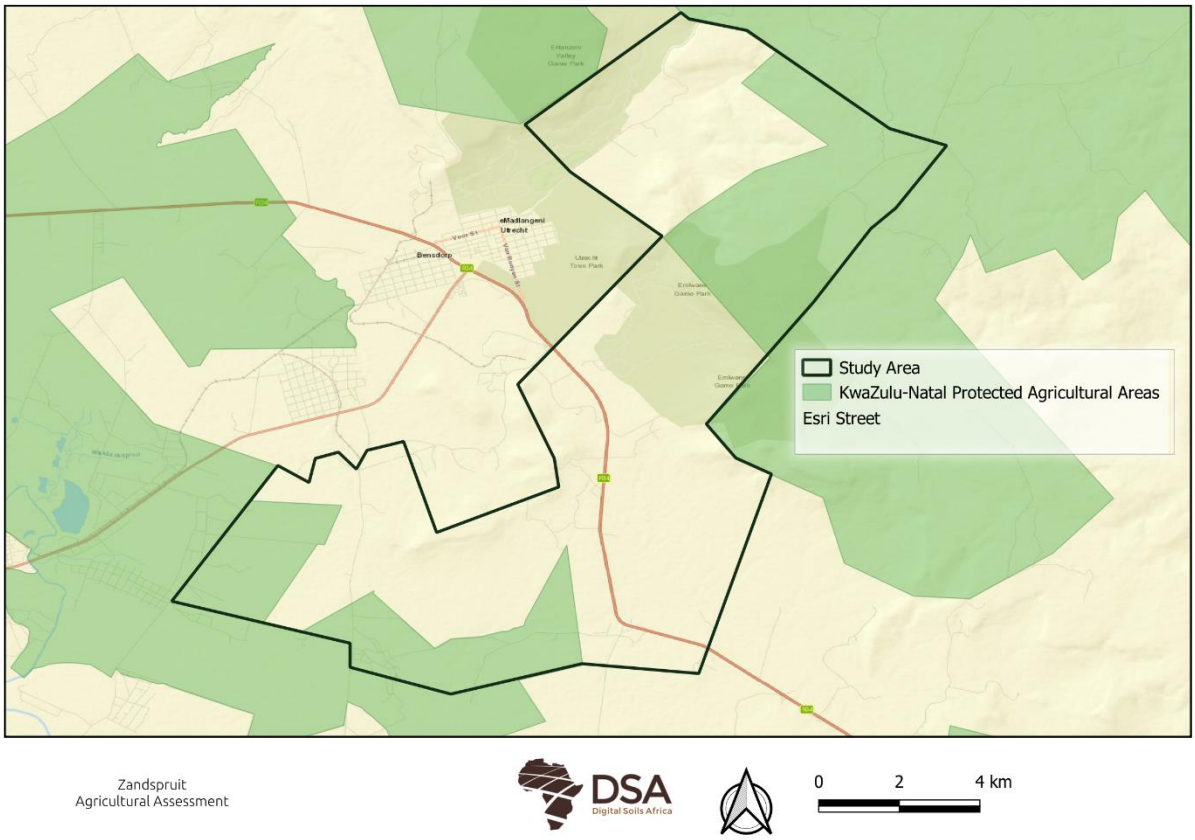


FIGURE 6: THE PROTECTED AGRICULTURAL AREAS FOR THE STUDY AREA.

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 (pgError! Bookmark not defined.).

RESULTS

CLIMATE CAPABILITY

The climate is considered a warm and temperate climate. The Köppen-Geiger climate classification is Cwb. The average annual temperature is 16 °C. During the year, there is high rainfall, with an annual precipitation of about 895 mm. The project site has a Dry-Subhumid or Humid climate (Figure 7). Therefore, cultivation of dry land crops will be possible.

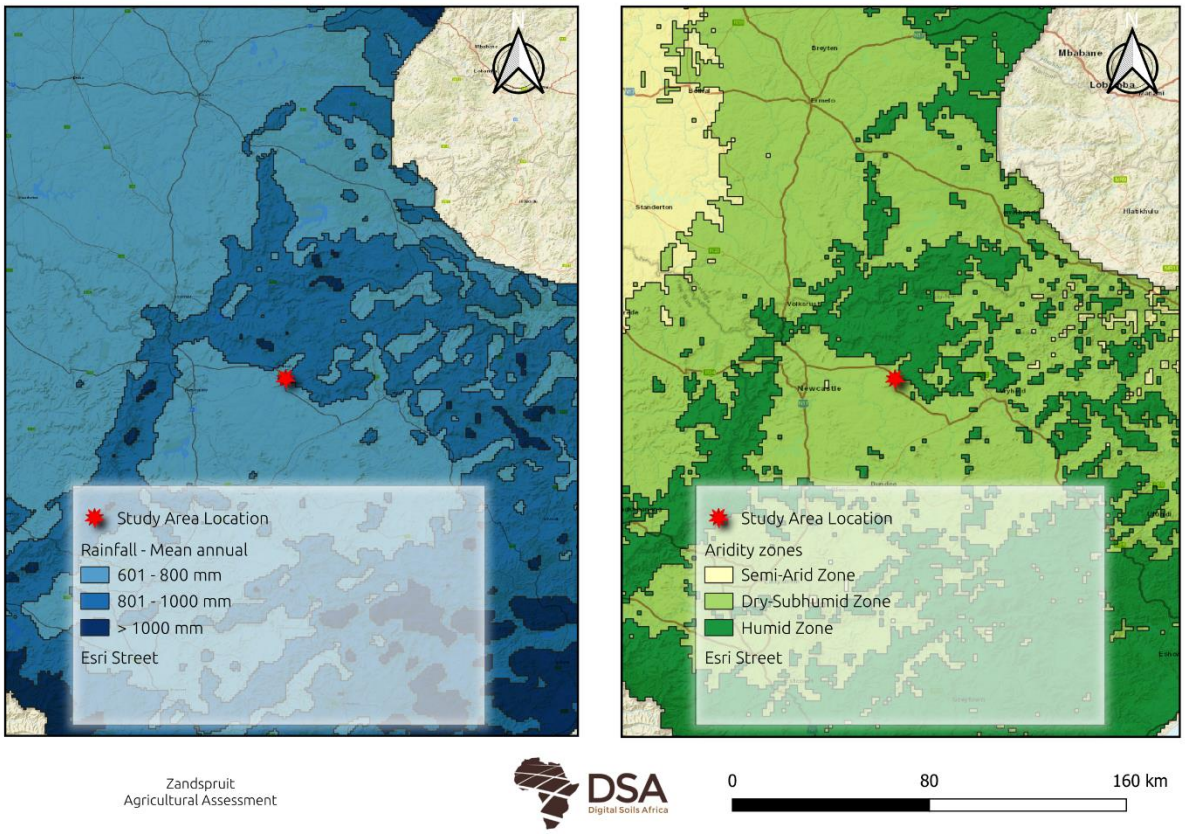


FIGURE 7: CLIMATE OF THE SITE AND THE SURROUNDING AREA (SCHULZE, 2007).

TABLE 1: CLIMATIC PROPERTIES OF NEWCASTLE, KWAZULU-NATAL PROVINCE (CLIMATE-DATA.ORG).

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature	19.9 °C	19.8 °C	18.6 °C	15.9 °C	13.1 °C	10.3 °C	10.1 °C	13 °C	16 °C	17.5 °C	18.6 °C	19.7 °C
Min. Temperature	14.9 °C	14.9 °C	13.4 °C	10.4 °C	6.7 °C	3.7 °C	3.1 °C	5.6 °C	8.6 °C	11 °C	12.6 °C	14.3 °C
Max. Temperature	25.5 °C	25.5 °C	24.4 °C	22 °C	20.2 °C	17.9 °C	17.9 °C	21 °C	24 °C	24.8 °C	25.2 °C	25.8 °C
Rainfall (mm)	146	105	104	44	19	11	14	25	42	99	123	163
Humidity	72%	71%	69%	66%	57%	53%	49%	45%	46%	58%	64%	69%
Rainy days	13	10	9	6	3	2	2	3	5	10	12	14
avg. Sun hours	8.3	8.6	8.2	8.1	8.6	8.4	8.5	8.9	8.8	8.6	8.7	9.1

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, has a value of 6 (Figure 8Figure 8). This is considered a moderate to high climate capability.

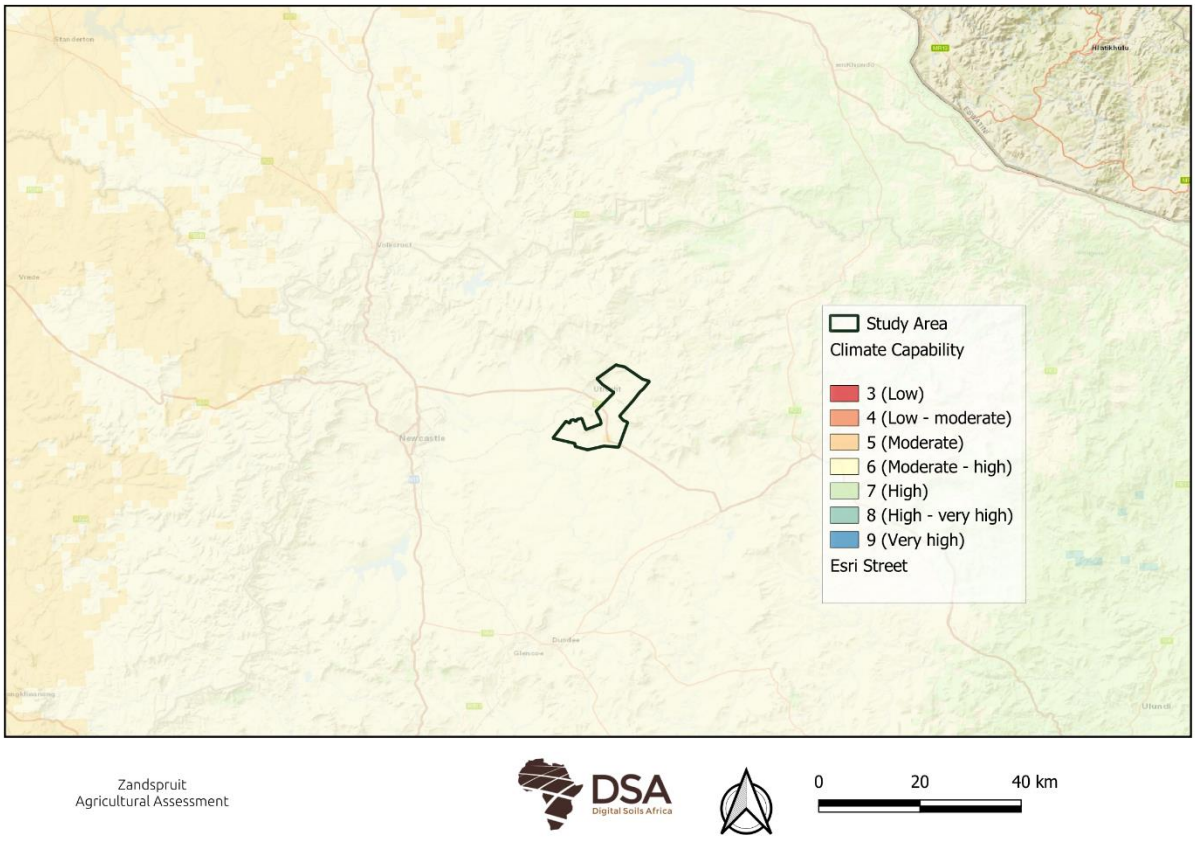


FIGURE 8: THE CLIMATE CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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 project area consisted of 10 land types presented in Figure 9 (Land Type Survey Staff, 1972 – 2002). The broad land types found in the study area are Ac, Ba, Bb, Ca, Db, Dc, Ea and Fb. The Ac broad land type is dominated by freely drained, red and yellow, dystrophic or mesotrophic, apedal soils that comprise more than 40% of the land type (where red and yellow soils each are present in more than 10% of the area). The Ba broad land type is characterized as red and yellow, dystrophic/mesotrophic, apedal soils with plinthic subsoils (where the plinthic subsoils comprise >10% of the land type, while red soils comprise >33% of the land type). The Bb broad land type is characterized by red and yellow, dystrophic or mesotrophic, apedal topsoils with plinthic subsoils, where plinthic soils comprise >10% of land type and red soils comprise <33% of land type. The Ca broad land type is characterised as a land type that qualifies as Ba-Bd broad land types, but >10% of this land type is occupied by upland duplex/margalitic soils. The Db broad land type is characterised as duplex soils (sandy topsoil overlying more clayey subsoil) that comprise <50% of the land type and <50% of duplex soils have non-red B horizons. The Dc broad land type is also characterised as duplex soils that dominate the land type (>50%), with >10% occupies by black or red clays. The Ea broad land type is characterized by black or red clays that comprise >50% of the land type. The Fb broad land types are dominated by shallow soils (Mispah & Glenrosa soil forms), with little or some lime in the landscape.

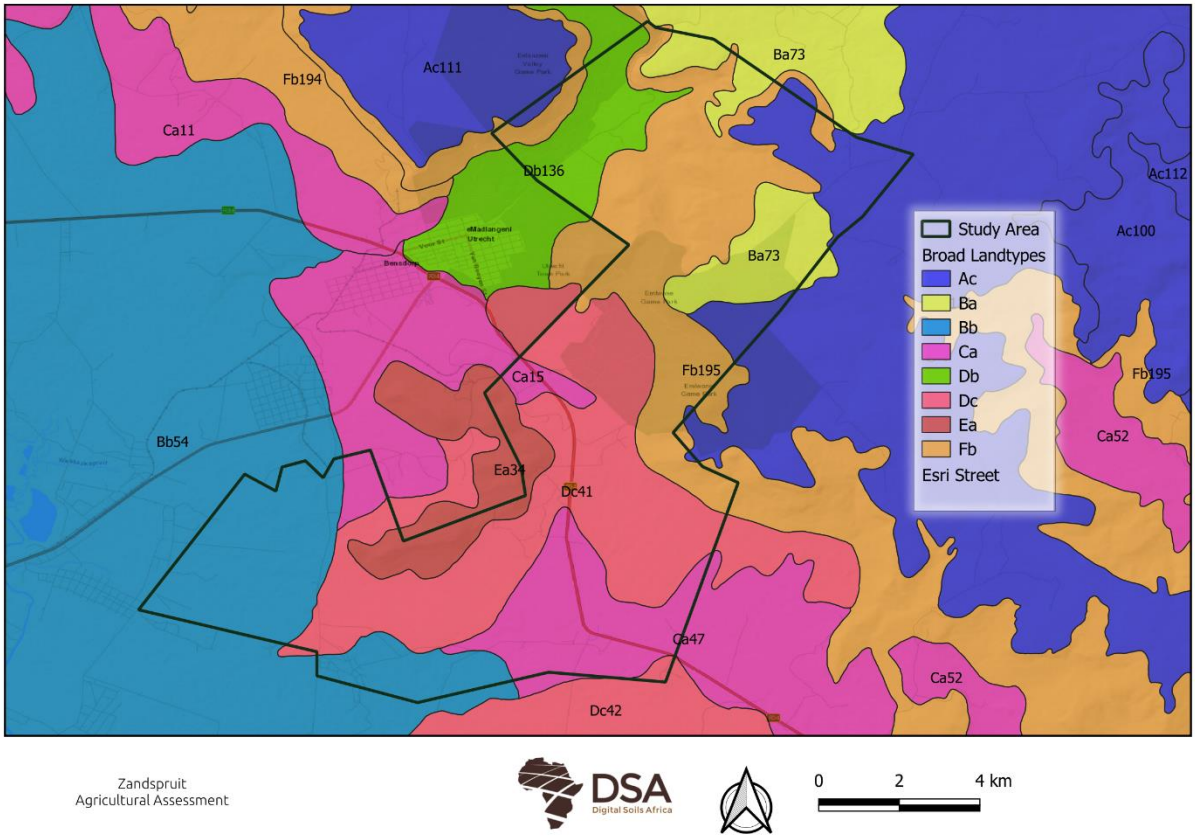


FIGURE 9: LANDTYPES FOUND IN THE STUDY AREA AND THE SURROUNDING AREA (LAND TYPE SURVEY STAFF, 1972 – 2002).

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 range from 3 (Low) to 7 (High) (Figure 10). The northern part of the study area has a soil capability between 3 (Low) to 7 (High), with the majority of this part being Low. The central part of the project area has a soil capability of 3 (Low) and 5 (Moderate), with majority of this part being Low. The southern part of the study area has a soil capability between 3 (Low) to 6 (Moderate - high), with the majority of this part being Low to Moderate (4).

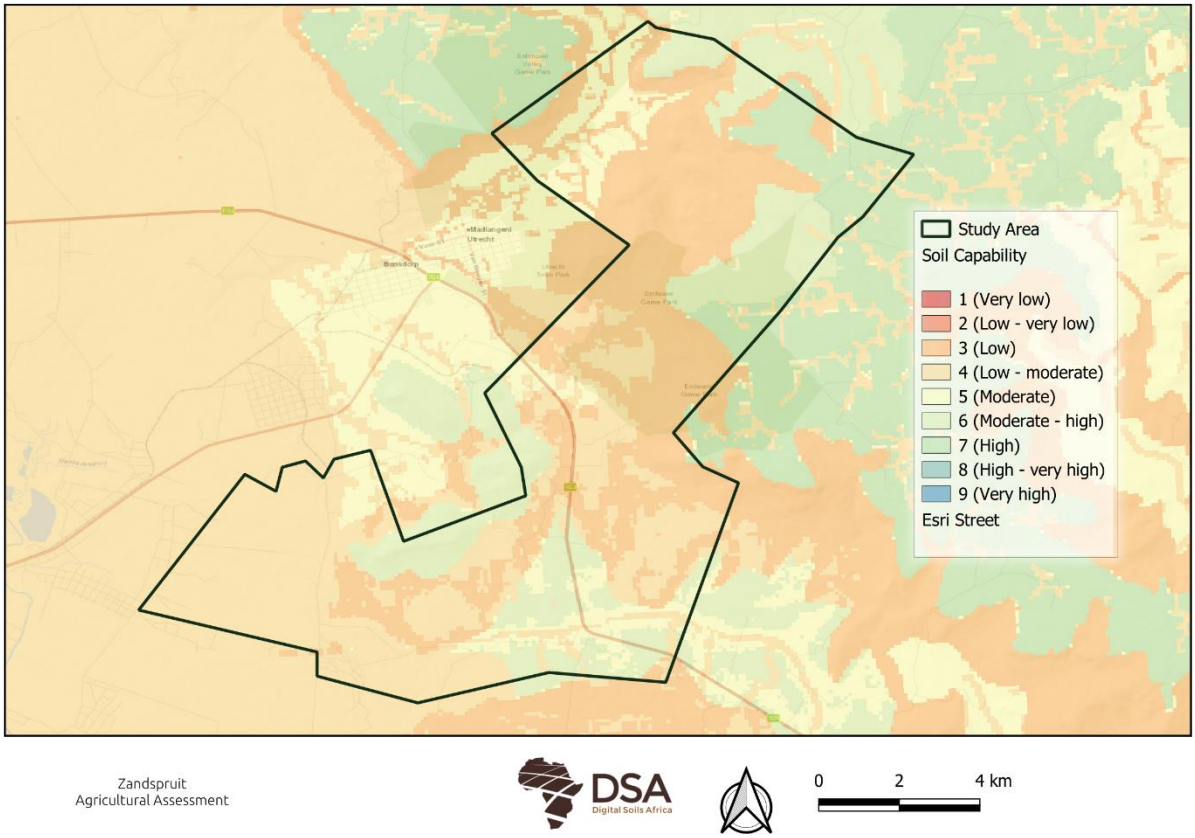


Figure 10: The Soil capability of the site and surrounding area (DAFF, 2017).

LAND TYPE DISAGGREGATION

For soil mapping of the project site, the soils were grouped into classes with relatively similar soil characteristics. The general approach used was Land Type disaggregation to predict the soil form, or soil association, on the representative Topographic Morphological Unit (TMU). This was used in conjunction with terrain analysis, and satellite imagery. A raster with the Terrain Units of the site (van den Berg, 2021) was overlaid with Land Type. Each Land Type was divided into a TMU, and a soil type, or soil association, was ascribed to the TMU based on the disaggregation of the land type inventory.

The soil distribution, average depth, and average clay contents within the land type is presented in Table 2.

TABLE 2: THE SELECTED SOIL PROPERTIES WITHIN LAND TYPES OF THE PROJECT AREA (LAND TYPE SURVEY STAFF, 1972 – 2002)

Land type	Average depth (mm)	Average clay (%)
Ac111	797.9	39.4
Ba73	816.1	32.3

Bb54	672.7	14.7
Ca15	707.7	22.5
Ca47	695.1	27.8
Db136	494.5	22.8
Dc41	467.8	20.6
Dc42	399.4	24.2
Ea34	649.2	48.1
Fb195	272.3	19.5

LAND TYPE AC111 DISAGGREGATION

The land type occupies 29 320 ha and is situated in the northern part of the study area; however, this land type only occupies approximately 900 ha of the entire study area. The land type is dominantly on the TMU 3 (75%), with a portion on the TMU 1 and 5 position. There are slopes of 2-15% for all TMU positions. The soil distribution on the TMU 1 and 3 are dominated by apedal soil types. Deep, red apedal soils (Hutton and Griffin soil forms) dominate the land type representing more than 60% of the TMU 1 and 3 positions, all of which are classified as having a very high agricultural potential. Soils with a high degree of saturation (Katspruit and Dundee soil forms) dominate the TMU 5 positions (> 60% of this position) and considered wetland soils.

LAND TYPE BA73 DISAGGREGATION

The land type occupies 5 070 ha and is situated in the western part of the study area; however, this land type only occupies approximately 1 070 ha of the entire study area. The land type is dominantly on the TMU 3 (88%), with a portion on the TMU 1 (2%) and TMU 2 (2%) position. The slopes of TMU 1 are 2-8%, for TMU 2 it is >100% and for TMU 3 and 5 it is 5-20%. The soil distribution of TMU 1 and 2 is dominated (> 50%) by shallow, rocky soils (Mispah and Glenrosa soil forms), while TMU 3 are dominated by apedal, deep soil types (Hutton and Clovelly soil forms). TMU 3 have a very high agricultural potential, while TMU 1 has a very low agricultural potential due to the shallow depth, limiting root penetration.

LAND TYPE BB54 DISAGGREGATION

The land type occupies 91 909 ha and is situated in the western part of the study area; however, this land type only occupies approximately 2 060 ha of the entire study area. The land type is dominantly on the TMU 3 (50%), with a portion on the TMU 1 (35%) and TMU 5 (15%) position. There are slopes of 1-6% for all TMUs. The soil distribution of TMU 1 and 3 are

dominated (>50%) by sandy topsoils overlying plinthic subsoils (Avalon, Glencoe and Longlands soil forms) and these soils have moderate to high agriculture potential. These soils can cause root penetration issues but can also increase water-holding capacity. Soils with a high degree of saturation (Katspruit and Rensburg) dominate the TMU 5 positions (> 50% of this position) and considered wetland soils.

LAND TYPE CA15 DISAGGREGATION

The land type occupies 2 500 ha and comprises the largest part of the study area; this land type occupies approximately 325 ha of the entire study area. The land type is dominantly on the TMU 3 (80%), with a portion (20%) on the TMU 5 position. There are slopes of 2-12% for all TMU positions. The soil distribution on the TMU 3 is dominated (>50%) by deep, sandy soils (Hutton soil form) or sandy topsoil overlying plinthic subsoils (Longslands and Avalon soil forms). The deep, sandy soils have a very high agriculture potential, while the plinthic soils have a moderate potential, due to the high water-holding capacity and root penetration resistance. Soils with a high degree of saturation (Katspruit and streambeds) dominate the TMU 5 positions (> 50% of this position) and considered wetland soils.

LAND TYPE CA47 DISAGGREGATION

The land type occupies 3 310 ha and comprises the largest part of the study area; this land type occupies approximately 1 380 ha of the entire study area. The land type is dominantly on the TMU 3 (53%) and TMU 4 (35%) position. There are slopes of 2-8% for all TMU positions. The soil distribution on the TMU 3 is dominated (>50%) by deep, sandy soils (Hutton soil form) or sandy topsoil overlying plinthic subsoils (Longlands and Avalon soil forms). The soil distribution on the TMU 4 is dominated (>40%) by pedocutanic subsoils (Bonheim, Valsrivier) that are strong, unstable clays that have a low agricultural potential. Soils with a high degree of saturation (Katspruit and streambeds) dominate the TMU 5 positions (> 50% of this position) and considered wetland soils.

LAND TYPE DB136 DISAGGREGATION

The land type occupies 2 190 ha and is situated in the eastern part of the project area. This land type occupies approximately 800 ha of the project area. The land type is dominantly on the TMU 3 (80%) and TMU 5 (20%) position. There are slopes of 4-20% for the TMU 3 and TMU 5 positions. The soil distribution of the TMU 3 is dominated (>50%) by highly structured, clay soils (Valsrivier, Swartland and Sterkspruit soil forms). There are some smaller areas indicating either deep, apedal soils (Hutton soil form) or shallow, rocky soils (Mispah and Glenrosa soil forms). The TMU 5 is considered a wetland soil and dominated by highly saturated, clay soils

(Katspruit and streambeds). The TMU 3 is considered to have a low agriculture potential, due to the erodibility and clay soils making root penetration difficult.

LAND TYPE DC41 DISAGGREGATION

The land type occupies 4 310 ha and is situated in the eastern and southern part of the study area. This land type occupies approximately 3 560 ha of the project area. The land type is dominantly on the TMU 3 (50%) and TMU 5 (50%) position. There are slopes of 4-15% for the TMU 3 and TMU 5 positions. The soil distribution of the TMU 3 is dominated (>60%) by highly structured, clay soils (Sterkspruit, Valsrivier and Swartland soil forms), with small areas indicating shallow, rocky soils (Mispah and Glenrosa soil forms). The TMU 5 is considered a wetland soil and dominated by highly saturated soils (Rensburg and streambeds). The TMU 3 is considered to have a low agriculture potential, due to the erodibility and high clay soils making root penetration difficult.

LAND TYPE DC42 DISAGGREGATION

The land type occupies 29 320 ha and is situated in the eastern and southern part of the study area. This land type occupies approximately 30 ha of the project area. The land type is dominantly on the TMU 1 (15%) and TMU 3 (75%) position. There are slopes of 2-6% for the TMU 3 and TMU 5 positions. The soil distribution of the TMU 1 is dominated (>40%) by shallow, rocky soils (Mispah and Glenrosa soil forms). The soil distribution of TMU 3 is dominated (> 40%) by highly structured, clay soils (Sterkspruit, Valsrivier and Swartland soil forms). The TMU 5 is considered a wetland soil and dominated by highly saturated soils (Rensburg, Willowbrook and Katspruit).

LAND TYPE EA34 DISAGGREGATION

The land type occupies 28 529 ha and is situated in the southern part of the study area. This land type occupies approximately 620 ha of the project area. The land type is dominantly on the TMU 1 (30%) and TMU 3 (63%) position. There are slopes of 2-4% for the TMU 1 and slopes of 6-15% for the TMU 5 positions. The soil distribution of the TMU 1 and TMU 3 is dominated (>60%) by strong, red structured, stable clay soils (Shortlands soil form). These soils have a moderate agriculture potential, due to the clays making root penetration difficult, however, the stability of the soil makes it less susceptible to erosion.

LAND TYPE FB195 DISAGGREGATION

The land type occupies 19 760 ha and is situated in the northern and eastern part of the study area. This land type occupies approximately 2 950 ha of the project area. The land type is

dominantly on the TMU 2 (20%) and TMU 3 (70%) position. There are slopes of >100% for TMU 2, while TMU 3 has slopes of 12-90%. The soil distribution of the TMU 2 is dominated (100%) by shallow, rocky soils (Mispah and Glenrosa soil forms), while the TMU 3 is also dominated (<60%) by shallow, rocky soils (Mispah and Glenrosa soil forms), having low agriculture potential.

SOIL MAP

The soil classification map is seen in Figure 11: Soil classification map of the project area.Figure 11. The shallow, rocky soils were predominantly consisting of the Mispah and Glenrosa soil forms, while the deep, apedal soils consisted of the red, yellow and bleached soil forms, such as Hutton, Clovelly, and Griffin. The unstable, structured, clay soils consisted of predominantly strong structured soil forms, such as Bonheim, Sterkspruit, Valsrivier and Swartland that consisted of prismacutanic or pedocutanic subsoils which are prone to erosion. The stable, structured clay soils were predominantly of the Shortlands soil form that consisted of red structured subsoils and are very resistant to erosion. Plinthic soils were considered as soils that were dominated by plinthic horizons, such as Avalon, Longlands, Westleigh and Glencoe soil forms. There was also the category of “Combination of deep, Apedal and Plinthic Soils”, which were used as it grouped areas where the deep, apedal soils and the plinthic soils were both dominant at the land type. Wetland soils were considered as predominantly Arcadia and/or Rensburg, Katspruit soil forms, as well as streambeds.

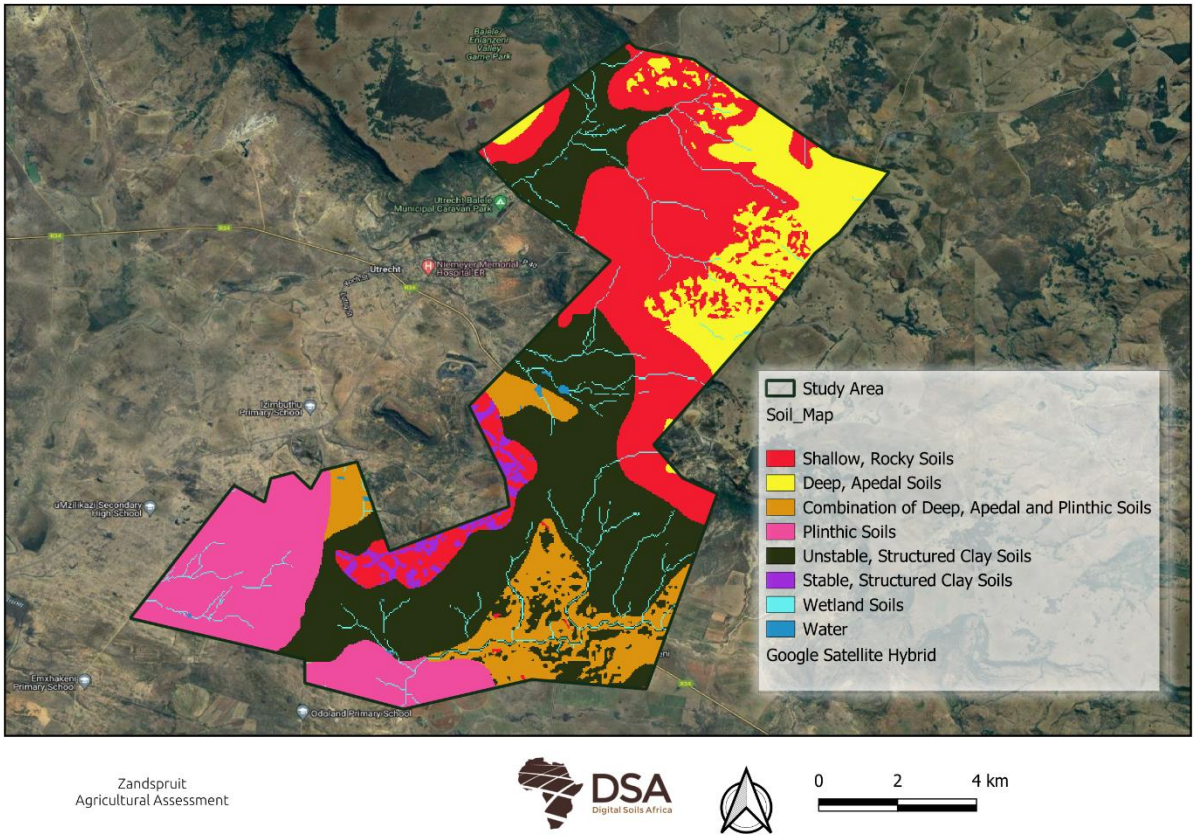


FIGURE 11: SOIL CLASSIFICATION MAP OF THE PROJECT AREA.

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 study area, according to the DAFF (2017), has a range from 3 (Low) to 7 (High) (Figure 12). The northern part of the study area has a terrain capability between 3 (Low) to 7 (High), with the majority of this part being Low (3). The central part of the study area has a terrain capability of 3 (Low) and 7 (High), with majority of this part being Moderate to High (6). The southern part of the project area has a terrain capability dominated by either Moderate to High (6) or High (7) areas.

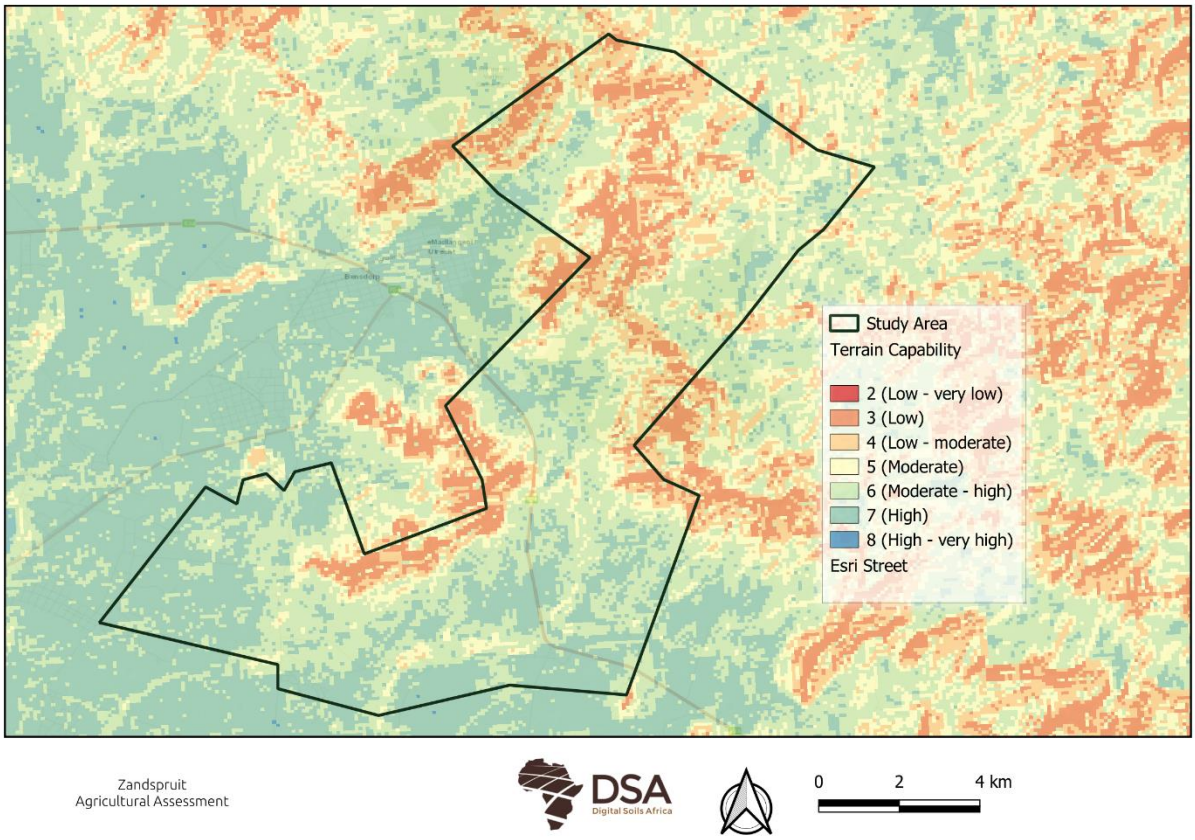


FIGURE 12: THE TERRAIN CAPABILITY OF THE SITE AND SURROUNDING AREA (DAFF, 2017).

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) (Table 3). 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 3: 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 values of the project area are between 2 (Very Low) and 10 (Moderate to High) (Figure 13Figure 13). Overall, the entire study area has regions where the land capability is not arable (Land Capability between 1 and 7), and regions where the land capability is arable (Land Capability between 8 and 15). The southern part of the study area has the highest land capabilities (Moderate to High), while the central part has the lowest land capabilities (Very Low and Low).

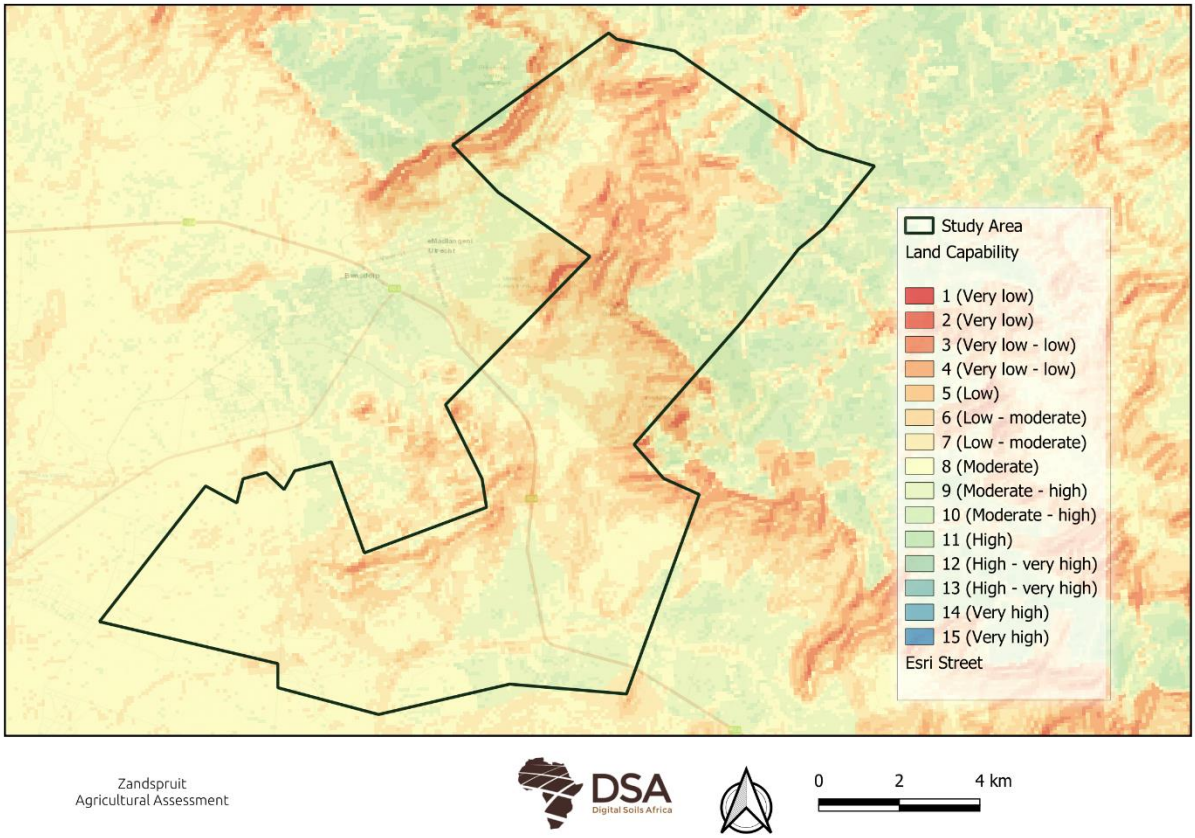


FIGURE 13: LAND CAPABILITY CLASS MAP OF THE STUDY AREA (DAFF, 2017).

GRAZING CAPACITY

The unit used in the grazing capacity is hectares per large stock unit (ha/LSU). The study area has a very high grazing capacity between 2.5 and 5.5 ha/LSU (Figure 14Figure 14). 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).

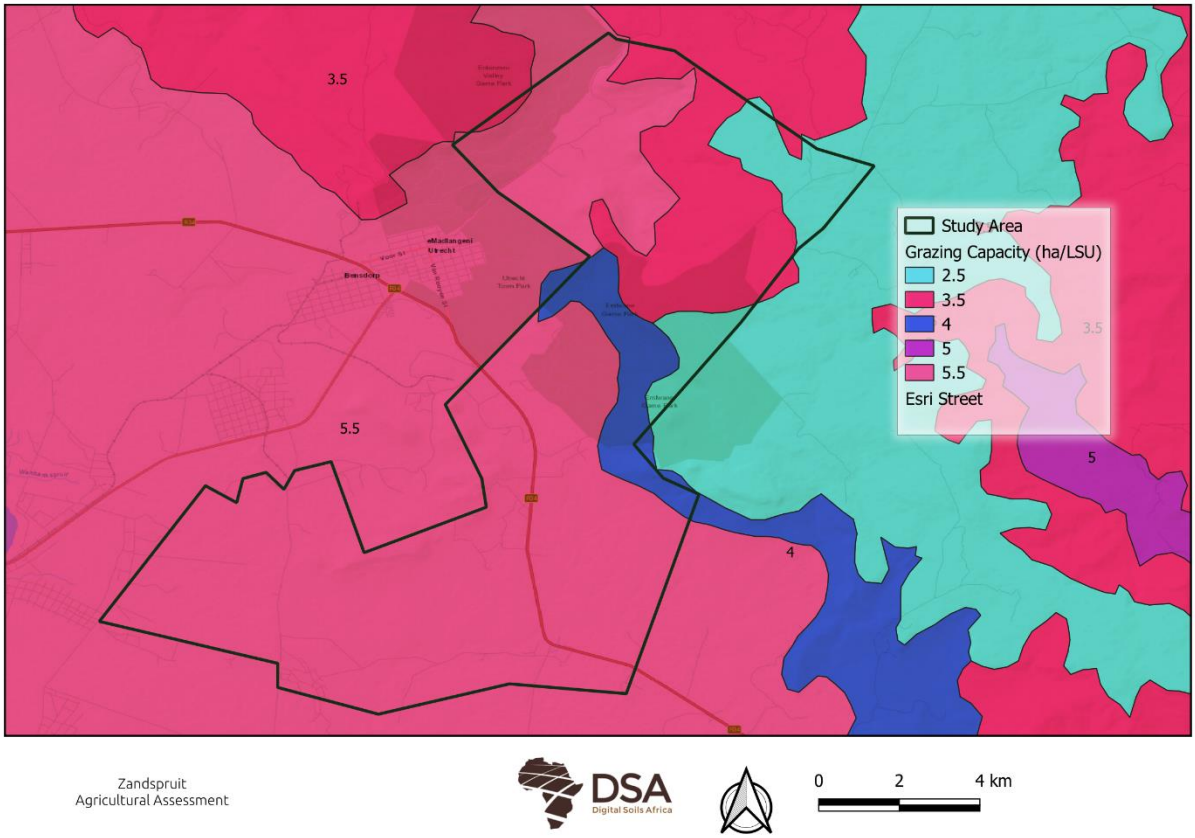


FIGURE 14: GRAZING CAPACITY FOR THE SITE AND THE SURROUNDING AREA (DEPARTMENT OF AGRICULTURE, FORESTRY AND FISHERIES, 2016).

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 areas indicating planted forests (1–7), natural grassland (13), artificial dams (19), herbaceous wetlands (22), eroded and bare areas (27 and 31), pivot irrigated cultivated lands (38), dry-land cultivated lands (40) and old fields (44), residential (49) areas and mining areas (69).

TABLE 4: LEGEND TO FIGURE 15

No.	Class Name	Class Definition
1	Contiguous (indigenous) Forest	Natural tall woody vegetation communities, with 75% or more canopy cover, and canopy heights exceeding 6 metres. Typically representative of tall, indigenous forests.
3	Dense Forest & Woodland	Natural tall woody vegetation communities, with canopy cover ranging between 35 - 75%, and canopy heights exceeding 2.5 metres. Typically represented by dense bush, dense woodland and thicket communities.
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.
7	Temporary Unplanted Forest	Temporarily unplanted stands within commercial forest plantations that have recently been harvested, and/or re-planted but the tree saplings are undetectable on the imagery. Note: to a large degree the extent of these 2018 clear-felled plantation areas has been informed and guided by areas classified as plantations with standing trees in the 2013-14 SANLC dataset, but not having any detectable plantation tree cover in SANLC 2018; as long as no other alternate land-cover or land-use class has replaced the plantation forests.
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.
19	Artificial Dams	Man-constructed artificial inland waterbodies, ranging from small farm dams to large reservoirs, and if image-detectable, large irrigation canals. The spatial extent of classified water is the cumulative extent of all image-detectable water surfaces from all available images used in the production of the NLC dataset; which is comparable to the annual maximum extent. Note that the occurrence of rooted or floating emergent aquatic vegetation that covers the water surface may influence the area of image-detected open water.
23	Herbaceous Wetlands	Natural or semi-natural wetlands covered in permanent or seasonal herbaceous vegetation. The mapped wetland extent represents the surface wetland extent detectable from image detectable surface vegetation characteristics, (which may differ from soil-profile based wetland

		delineations). This wetland class represents wetlands identified in the current national land-cover modelling. The class represents primarily riparian wetland areas, but can also include emergent aquatic vegetation in pans.
27	Eroded Lands	Areas that have been eroded away.
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.
38	Cultivated Commercial Annuals Pivot Irrigated	Active or recently active cultivated lands used for the production of agricultural crops, in this case specifically associated with commercial annual crops, although occasionally (undetected) permanent crops. The plants only remain in the field for one growing seasons and one harvest, and are grown in pivot irrigated fields. Note that with certain crops, for example potatoes, the pivot structures are rotated cyclically through specific field locations; with the result that the depicted pivot locations in the NLC dataset can represent both current, active pivots, as well as image-detectable pivot patterns from recent, but currently in-active or over-planted pivots, that will be re-established as pivots in 2 – 3 years.
40	Cultivated Commercial Annuals Non-Pivot / Non-Irrigated	Active or recently active cultivated lands used for the production of agricultural crops, in this case specifically associated with commercial annual crops, The plants only remain in the field for one growing seasons and one harvest, and are grown non-irrigated, rainfed fields.
44	Fallow Land & Old Fields (Grass)	Long-term, non-active, previously cultivated lands that are now overgrown with grass dominated woody vegetation. Typically the cultivated land unit is no longer image detectable. Historical field boundaries (supplied by SANBI) have been mapped from archival topographical 1:50,000 maps circa 1950's-70's. This class is only represented if it has not been modified to a more recent, alternative land-cover or land-use class.
49	Residential Formal (low veg / grass)	Built-up areas primarily containing formally planned and constructed residential structures and associated utilities. The dominant vegetation (in gardens etc) is grass and/or low shrub based.
63	Urban Recreational Fields	Areas that consists of man-made recreational land.
69	Mines: Extraction Sites: Open Cast & Quarries combined	Non-vegetated, active and/or non-active extraction pits associated with surface-based mining activities, including open-cast mines, quarries, and road-side borrow pits etc. Note that in some cases (especially coal mining) there may be some overlap/mis-representation between mine-extraction pits and mine-tailings, due to the challenge of separating these accurately.

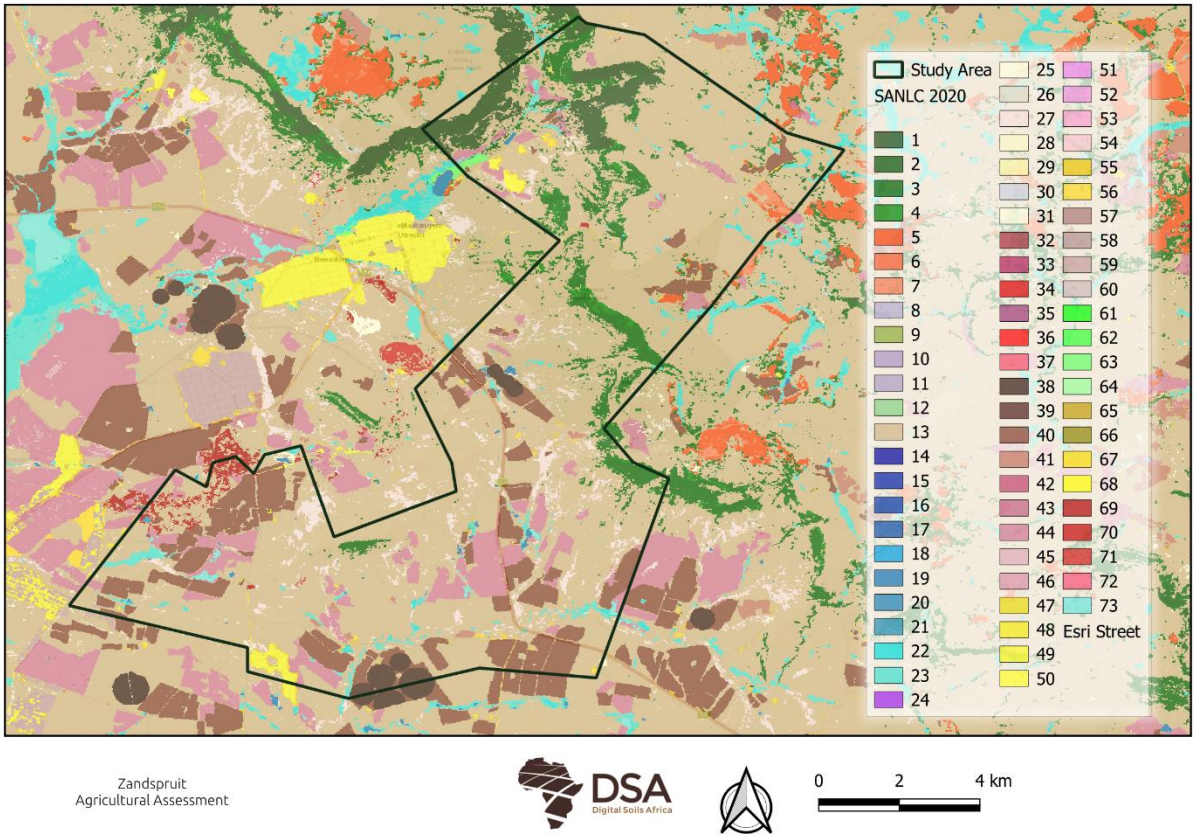


FIGURE 15: SOUTH AFRICAN NATIONAL LAND-COVER 2020 (SANLC 2020).

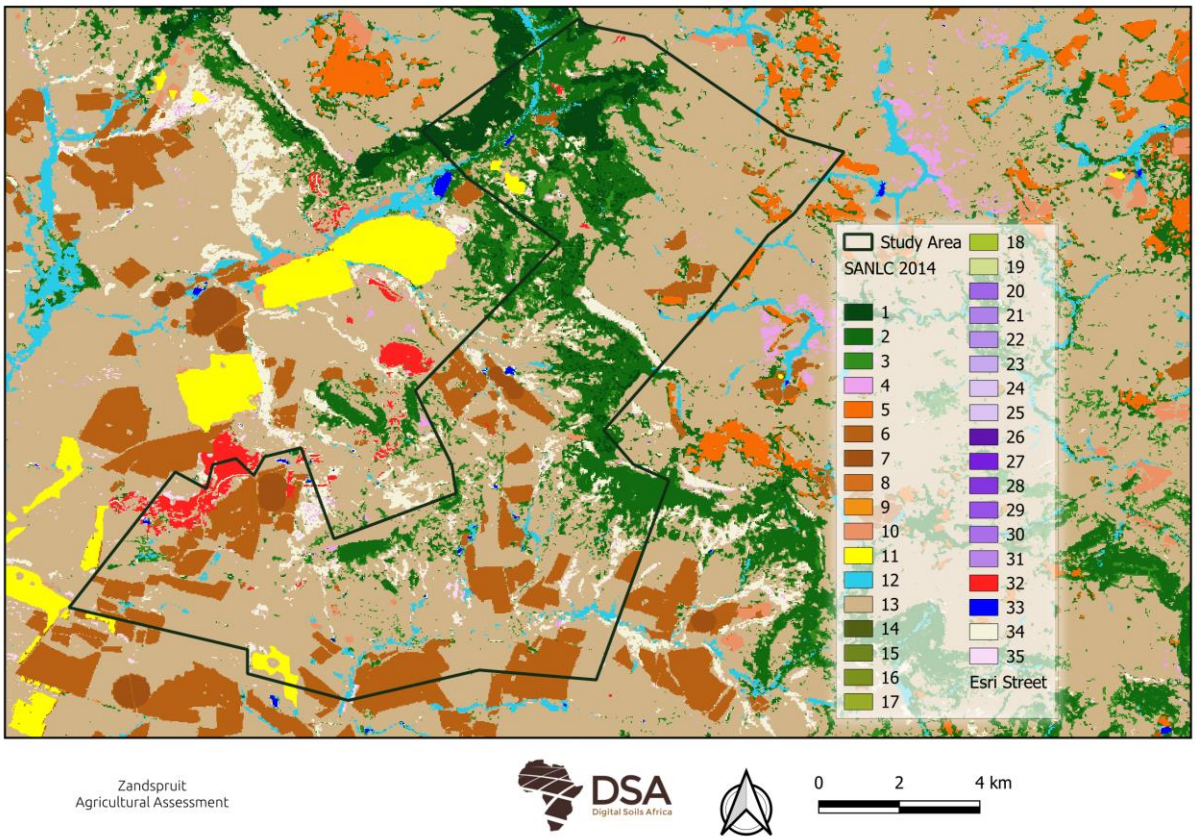


FIGURE 16: SOUTH AFRICAN NATIONAL LAND-COVER 2014 (SANLC 2014).

From Figures 17-19, the land-use of the different parts of the project area did not change from what is mentioned in the "Land use" section of this document. Figure 20 indicates an example of the agriculture activity occurring in the southern part of the study area. Within the blue circle there is indication of dry-land and pivot-irrigated cultivated fields.

FIGURE 17: GOOGLE EARTH IMAGE (2014) OF ZANDSPRUIT STUDY AREA.

FIGURE 18: GOOGLE EARTH IMAGE (2018) OF ZANDSPRUIT STUDY AREA.

FIGURE 19: LATEST GOOGLE EARTH IMAGE (2020) OF ZANDSPRUIT STUDY AREA.

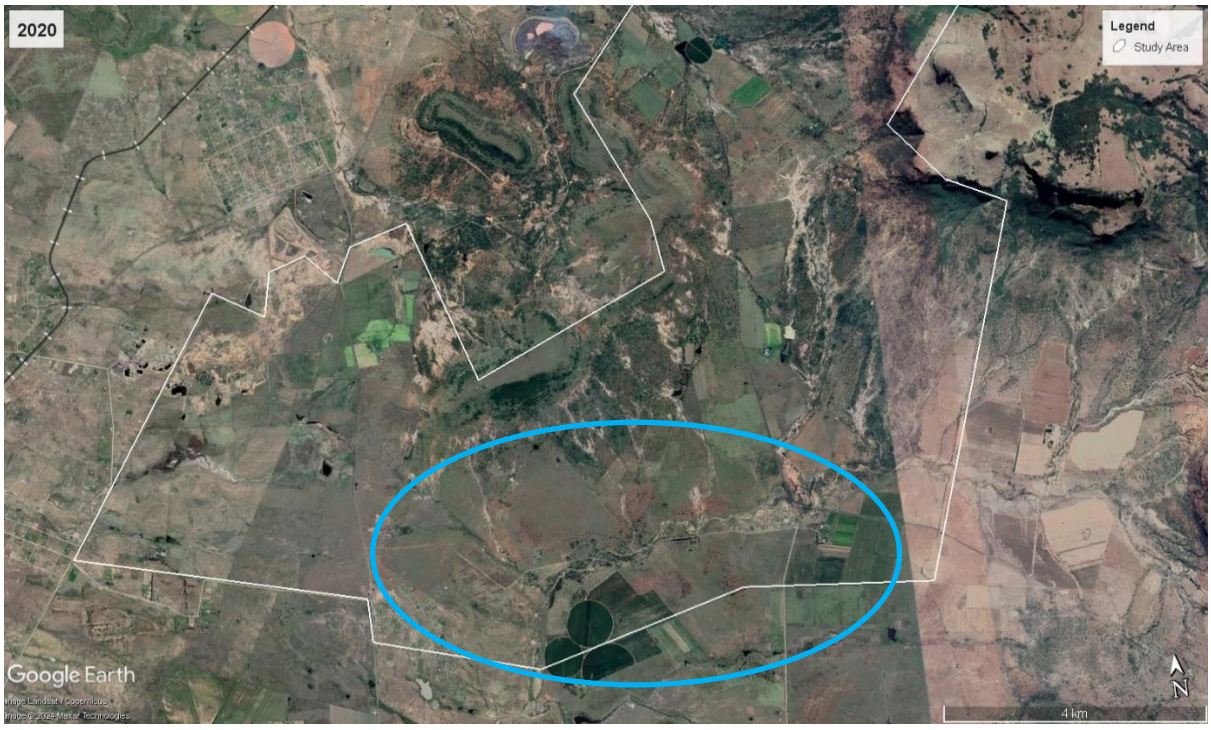


FIGURE 20: GOOGLE EARTH IMAGE INDICATING AGRICULTURE ACITIVITY IN THE WESTERN PART OF THE STUDY AREA.

COMPLIANCE STATEMENT

According to the screening tool, the site is classified as having a very high agricultural sensitivity due to the presence of cultivated areas found within the study area. The study area is situated within the KwaZulu-Natal Protected Agricultural Area, and there were crop field boundaries found within the study area.

The following is a summary of the findings:

Climate Capability:

- The area's climate capability was classified as moderate to high due to high rainfall and a humid environment.

Land Types:

- A total of 10 land types and 8 broad land types were identified in the study area.
- A detailed map indicates the distribution of soils across the study site.

Soil Capability:

- The project area exhibits low to moderate soil capability overall.
- Certain areas within the project site have high soil and terrain capability.

Land Capability:

- Some areas indicate low to moderate land capability.
- Other areas demonstrate a higher, more arable land capability.

Grazing Capacity:

- The study area has a very high grazing capacity between 2.5 and 5.5 ha/LSU.

Therefore, all desktop data aligns with the screening tool, indicating that certain areas of highly sensitive agricultural land are present on-site. If mining is to be established within any areas classified as high or very high sensitivity, a full assessment of those areas would be necessary. Whereas areas classified as Unstable clay soils (Figure 11), should not be cultivated and considered as medium sensitivity.

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