SOIL, LAND USE, AND LAND CAPABILITY VERIFICATION ASSESSMENT: FOR THE PROPOSED DEVELOPMENT THE PROPOSED 132 KV YARD, WITH 2 X 400/132 KV 500 MVA TRANSFORMERS AT MAJUBA SUBSTATION, WITHIN THE DR PIXLEY KA ISAKA SEME LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.

REF: AGR_MAJUBA_24

FINAL DRAFT

20 JUNE 2024

PREPARED FOR

ESKOM SOC LIMITED

PREPARED BY

NSOVO ENVIRONMENTAL CONSULTING

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DOCUMENT CONTROL

Report Name	Soil, Land Use, And Land Capability Verification Assessment: For the Proposed Development The Proposed 132 Kv Yard, With 2 X 400/132 Kv 500 Mva Transformers At Majuba Substation, Within The Dr Pixley Ka Isaka Seme Local Municipality, Mpumalanga Province.
Reference	AGR_MAJUBA_24
Version	Final Draft
Submitted to	ESKOM SOC LIMITED
Author	Tshiamo Setsipane, (Pr. Nat. Sci 114882)
Draft Date Produced	20 June 2024

EXECUTIVE SUMMARY

Nsovo Environmental Consulting was appointed by Eskom SOC Holdings to conduct the soil, land use, and land capability verification assessment as part of the Environmental Impact Assessment (EIA) process for the proposed 132 kV yard, with 2 x 400/132 kV 500 MVA transformers at Majuba Substation. This will ensure that a total of 950 MW unfirm and 475 MW firm capacity will be available. The proposed project is located within the Majuba Power Station and 16 km southwest of the town Amersfoort, within the Dr Pixley Ka Isaka Seme Local Municipality, Mpumalanga Province.

IPP developers have applied to connect 940MW of renewable generation to Majuba MTS at 132kV. Currently, Majuba has 2x 400/88kV 160 MVA transformers. Therefore, a 132kV yard will have to be established to accommodate the evacuated power. Install 2 x 400/132kV 500 MVA transformers with 4 x complete 132kV feeder bays. This will add an additional 1000MW transformation capacity & facilitate the integration of 132kV IPPs. The high-level scope of work is as follows:

132kV Yard:

- Establish new 2 x 400/132 kV 500 MVA transformers
- 132kV yard includes 4 feeder bays and 2 spare bays
- Cater for FCLRs in series with transformers & between transformer pairs (1 x FCLR / busbar)

400kV Yard:

- Extend the 400kV yard
- Equip 2 x 400 kV transformer bays
- Install a 400kV bus section to reduce outages and to switch between busbars during construction
- Deviate the 400kV Alpha line to accommodate the new transformer bays.
- Relocate the Microwave tower to accommodate the new transformer bays.

The study area is characterised by a subtropical highland or temperate climate, associated with dry winters and warm summers with 70% or more of the average annual rainfall received in the warmest 6 months of the year. The mean annual precipitation is between 601 – 800 mm; this rainfall range for the application area is deemed adequate for most cultivated crops with a moderately high yield potential. These conditions have a moderate to high yield potential for a wide range of adapted crops supporting rain-fed agriculture. This results in a wide range of suitable crops for cultivation.

Based on the observations during the site assessment, the dominant soils occurring within the study area are of the Witbank formation. The majority of the soils occurring within the study area do not meet the conditions for agricultural suitability to a certain extent, and these conditions include:

1. Adequate depth (greater than 60 cm) to accommodate root development for the majority of cultivated crops;
2. Good structure, as in water-stable aggregates, which allows for root penetration and water retention;
3. Sufficient distribution of high-quality and potential soils within the study area to constitute a viable economic management unit; and
4. Good climatic conditions, such as sufficient rainfall and sunlight, increase crop variety.

Tables A and B depict the summary findings of the soils identified within the study area and their respective land capability and agricultural potential status.

Table A: Summary findings within the study area.

Study Area				
Soil Forms	**Area (Ha)**	**Percentage (%)**	**Land Capability Class – According to (Smith, 2006)**	**Agricultural Potential**
Witbank	2.33	100	Wilderness (Class VIII)	Very Low
Total Enclosed	**2.33**	**100**		

Table B: Land capability (DAFF, 2017) associated with the soils occurring within the study area.

Soil Form	Land Capability Groups	DAFF (2017) Classification
Witbank	Wilderness (Class VIII)	1. Low – Very Low

The development footprint areas are located in an industrialised area wherein electricity generation occurs. No active agricultural practice is taking place in the study area's immediate vicinity. The area is characterised by previously excavated and backfilled areas mixed with firm material. Therefore, the cumulative loss from a soil and land capability point of view is anticipated to be negligible. Agricultural activities outside the power station boundary will continue unhindered.

The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being of high sensitivity in terms of agricultural potential. Based on the outcomes of the field assessment, this was found to have a less significant impact as presented on the screening tool due to the dominant soil forms that are not high-potential agricultural soils due to anthropogenic impacts. The development's only possible impact was minimal soil and land degradation because of land disturbance during construction and decommissioning. However, integrated mitigation measures must be implemented accordingly to minimise the potential loss of these valuable soils, considering the need for sustainable development and increased electricity generation and transmission capacity.

The specialist believes that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area are made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

DECLARATION OF INDEPENDENCE

- I, Tshiamo Setsipane, in my capacity as a specialist consultant, hereby declare that I:
- Act/acted as an independent specialist to Eskom SOC Limited for this project.
- Do not have any personal, business, or financial interest in the project except for financial remuneration for specialist investigations completed in a professional capacity as specified by the Environmental Impact Assessment Regulations, 2014, as amended.
- Will not be affected by the outcome of the environmental process, of which this report forms part.
- Do not have any influence over the decisions made by the governing authorities.
- Do not object to or endorse the proposed developments but aim to present facts and my best scientific and professional opinion about the impacts of the development.
- Undertake to disclose to the relevant authorities any information that has or may have the potential to influence its decision or the objectivity of any report, plan, or document required in terms of the Environmental Impact Assessment Regulations, 2014, as amended.

TSetsipane

(*Pr. Nat. Sci* 114882)

DOCUMENT GUIDE

This report was compiled according to the following information guidelines for a specialist report in terms of the Environmental Impact Assessment (EIA) Sections 24(5)(a) And (h) and 44 of The National Environmental Management (NEMA), Act 1998, as summarised on the Table below.

Table A: Document guide according to Regulation (No. R. 982) as amended.

Theme-Specific Requirements as per Government Notice No. 320Agricultural Resources Theme – Very High and High Sensitivity Rating as per Screening Tool Output.

No.	NEMA Regs (2014) - Appendix 6	The relevant section in the report
2	**Agricultural Agro-Ecosystem Specialist Assessment**	
2.1	The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professionals (SACNASP).	CV Attached
2.2	The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 1.1
2.3	**The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:**	
2.3.1	The extent of the impact of the proposed development on the agricultural resources and	Section 4
2.3.2	Whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event it does, whether the positive impact of the proposed development on agricultural resources outweighs such a negative impact.	Section 5.4
2.4	**The status quo of the site must be described, including the following aspects, which must be considered as a minimum in the baseline description of the agro-ecosystem:**	
2.4.1	The soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit, and slope;	Section 4
2.4.2	Where applicable, the vegetation composition, available water sources, as agro-climatic information;	
2.4.3	The current productivity of the land-based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units;	Section 5.5
2.4.4	The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure and	Section 1.6
2.4.5	Existing impacts on the site, located on a map (e.g., erosion, alien vegetation, non-agricultural infrastructure, waste, etc.).	Section 4.1
2.5	**Assessment of impacts, including the following aspects which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:**	

2.5.1	Change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units;	Section 5.5
2.5.2	Change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure and	Section 1.6
2.5.3	Any alternative development footprints within the preferred site would be of "medium" or "low" sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification.	Section 5.4
2.6	**The Agricultural Agro-Ecosystem Specialist Assessment findings must be written up in an Agricultural Agro-Ecosystem Specialist Report.**	
2.7	**This report must contain the findings of the agro-ecosystem specialist assessment and the following information, as a minimum:**	
2.7.1	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;	Appendix C
2.7.2	A signed statement of independence by the specialist;	Appendix A
2.7.3	The duration, date, and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.2
2.7.4	A description of the methodology used to undertake the on-site assessment, inclusive of the equipment and models used, as relevant;	Section 2
2.7.5	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;	Figure 2
2.7.6	An indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development;	Sections 5.4 and 5.5
2.7.7	An indication of possible long-term benefits that the project will generate will generate in relation to the benefits of the agricultural activities on the affected land;	Section 5.4
2.7.8	Additional environmental impacts expected from the proposed development based on the current status quo of the land, including erosion, alien vegetation, waste, etc.;	Section 4.1
2.7.9	Information on the current agricultural activities being undertaken on adjacent land parcels;	Section 3.2
2.7.10	An identification of any areas to be avoided, including any buffers;	N/A
2.7.11	A motivation must be provided if there were development footprints identified as per paragraph 2.5.3 above that were identified as having a "medium" or "low" agriculture sensitivity and that were not considered appropriate;	Section 5

2.7.12	Confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities;	Section 5
2.7 .13	A substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development;	Section 5.4
2.7.14	Any conditions to which this statement is subjected;	Section 5.3
2.7.15	Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr); and	Section 5
2.7.16	A description of the assumptions and any uncertainties or gaps in knowledge or data.	Section 1.6
2.8	**The Agricultural Agro-Ecosystem Specialist Assessment findings must be incorporated into the Basic Assessment Report or Environmental Impact Assessment Report, including the mitigation and monitoring measures identified, which are to be contained in the EMPr.**	
2.9	**A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.**	

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1. INTRODUCTION

Nsovo Environmental Consulting was appointed by Eskom SOC Holdings to conduct the soil, land use, and land capability verification assessment as part of the Environmental Impact Assessment (EIA) process for the proposed 132 kV yard, with 2 x 400/132 kV 500 MVA transformers at Majuba Substation. This will ensure that 950 MW unfirm and 475 MW firm capacity will be available. The proposed project is located within the Majuba Power Station and 16 km southwest of Amersfoort, within the Dr Pixley Ka Isaka Seme Local Municipality, Mpumalanga Province. The locality of the study area is illustrated in Figure 1 below.

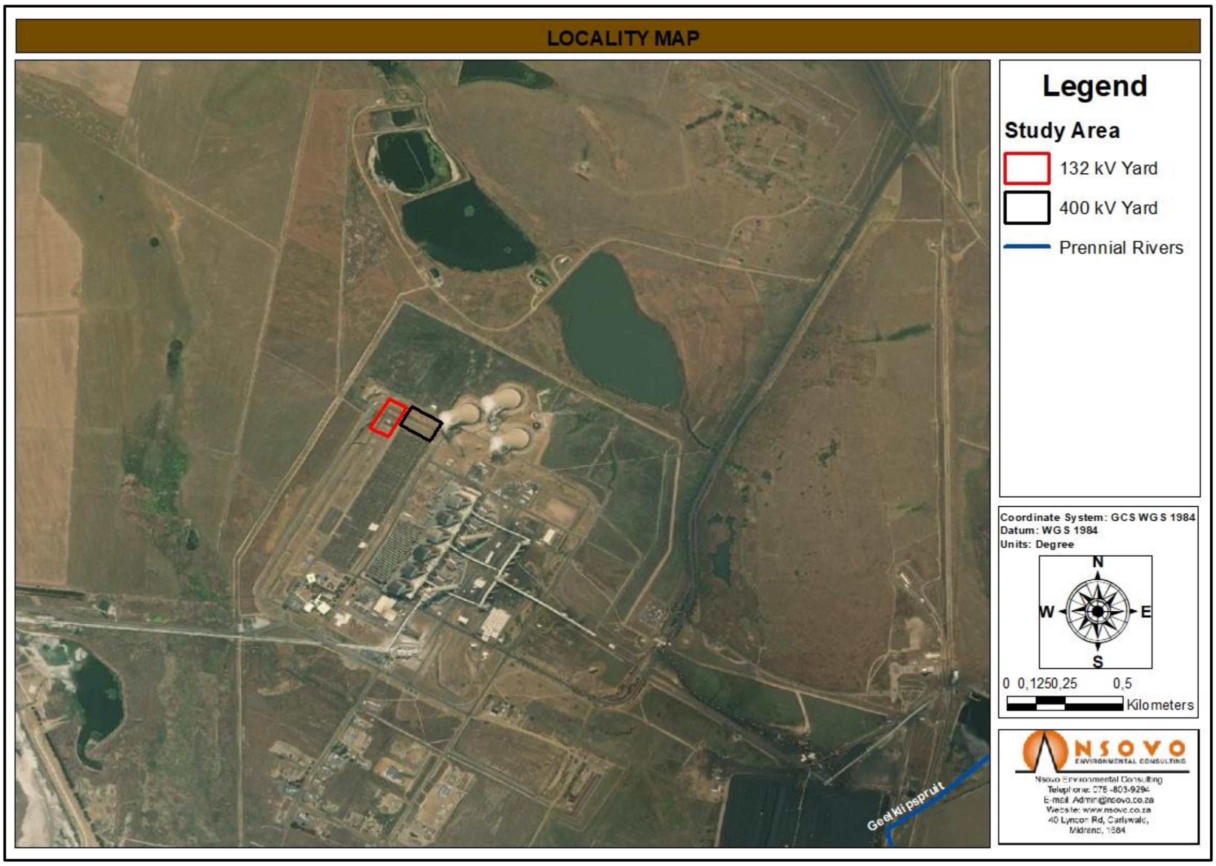

Figure 1: Locality of the study area in relation to the surrounding areas.

1.1 PROJECT DESCRIPTION

IPP developers have applied to connect 940MW of renewable generation to Majuba MTS at 132kV. Currently, Majuba has 2x 400/88kV 160 MVA transformers. Therefore, a 132kV yard will have to be established to accommodate the evacuated power. Install 2 x 400/132kV 500 MVA transformers with 4 x complete 132kV feeder bays. This will add an additional 1000MW transformation capacity & facilitate the integration of 132kV IPPs. The high-level scope of work is as follows:

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- Install a 400kV bus section to reduce outages and to switch between busbars during construction
- Deviate the 400kV Alpha line to accommodate the new transformer bays.
- Relocate the Microwave tower to accommodate the new transformer bays.

The proposed development triggers the NEMA EIA listed activities; as such, Eskom must undertake the Environmental Impact Assessment (EIA) process to obtain an environmental authorisation before the construction of the above-mentioned activities in accordance with the EIA Regulations, 2014 (promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), as amended.

1.2 AIMS AND OBJECTIVES OF THE STUDY

The objective of the Soil, Land Use, and Land Capability is to fulfill and align the proposed project with the requirements of the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) of South Africa. This act aims to promote the conservation of soil, water sources, vegetation and the control of weeds and invader plants by managing natural agricultural resources. Thus, the proposed study aims to determine the possible impacts of the proposed development on the soil, land use, land capability, and agricultural potential and identify areas of high sensitivity within the study area. This will be achieved by considering parameters such as soil quality, drainage, topography, climate, and water availability and providing sound input to ensure that land is used sustainably and responsibly.

1.3 SUITABILITY OF SOILS FOR AGRICULTURAL CULTIVATION

Assessing soil suitability for agricultural cultivation rests primarily on identifying soils suited to crop production. For soils to be classified as being suitable for crop cultivation, they must have the following properties:

- Adequate depth (greater than 60 cm) to accommodate root development of cultivated crops;
- Good structure, as in water-stable aggregates, which allows for root penetration and water retention;
- Sufficient clay and organic matter to provide nutrients for growing crops;
- Sufficient distribution of high-quality and potential soils within the study area to constitute a viable economic management unit;
- Adequate clay content and deep enough water table to allow for water storage; and

- Good climatic conditions, such as sufficient rainfall and sunlight, increase crop choice variety.

1.4 Applicable Legislation

The most recent South African Environmental Legislation that needs to be considered for any new or expanding development with reference to assessment and management of soil and land use includes:

- The National Environmental Management Act. 1998 (Act 107 of 1998) requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided, be minimised and remedied.
- The Conservation of Agricultural Resources (Act 43 of 1983) states that the degradation of the agricultural potential of soil is illegal. Therefore, requires the protection of land against soil erosion and the prevention of water logging and salinization of soils employing suitable soil conservation works to be constructed and maintained. The utilisation of marshes, water sponges, and watercourses is also addressed.

1.5 Terms of Reference

The terms of reference for this study are to fulfil the requirements of the Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998). The site includes land classified by the national web-based environmental screening tool on 29 May 2024 as having **high sensitivity** for impacts on agricultural resources. However, based on the outcomes of the site sensitivity verification (See Sections 4 and 5), the sensitivity for impacts on agricultural resources was deemed to be of a **low sensitivity**. Therefore, a compliance statement report must be submitted. The terms of reference for such an assessment, as stipulated in the protocol, are listed in the **Document Guide** with the section number of this report, which fulfils each stipulation given.

1.6 Assumptions, Assumptions uncertainties, limitations, and gaps

The following assumptions, uncertainties, limitations, and gaps were applicable for the soil, land use, and land capability assessment:

- It is assumed that the infrastructure components will remain as indicated on the layout and that the activities for the construction and operation of the infrastructure are limited to that typical for a project of this nature;
- The soil survey was confined to the study area outline with consideration of various land uses outside the study area;

- Soil profiles were observed using a 1.5m hand-held soil auger; thus, a description of the soil characteristics deeper than 1.5m cannot be given; and
- It can be challenging to classify soils as one specific form due to the infinite variations that exist in the soil continuum. Therefore, the classifications presented in this report are based on the "best fit" to South Africa's soil classification system.

2. METHODOLOGY

The assessment of the study area's agricultural potential was based on a combination of desktop studies to amass general information and site visits for status quo assessment, soil classification, and characterization, and the validation of generated information from the desktop studies.

2.1 DESKTOP STUDY AND LITERATURE REVIEW

Literature review and background study were carried out before beginning the field assessment to gather the study area's predetermined soil, land use, and land capability data. The data was sourced from the Soil and Terrain(SOTER) database and the Natural Agricultural Atlas of South Africa Version 3:
(https://ndagis.nda.agric.za/portal/apps/webappviewer/index.html?id=8b72eb2a25c04660a1ab2b562f6ec0bf)

2.2 SITE SURVEY AND SITE SENSITIVITY VERIFICATION

A desktop assessment was followed by a field investigation to validate the predetermined soil results obtained at the desktop level. The field survey was conducted over 1 day in May 2024, wherein soil auger tests were conducted, and soils were classified into soil forms according to the Soil Classification System: A Natural and Anthropogenic System for South Africa Soil Classification System (2018). It must be noted that the season has no bearing on the soil's morphological properties over a short-term and long-term period.

2.3 LAND CAPABILITY CLASSIFICATION

A land capability class is an interpretive grouping of land units with similar potential and containing limitations or hazards for long-term intensive use of land for rainfed farming determined by the interaction of climate, soil, and terrain. It is a more general term than land suitability and is more conservation oriented (See Table 1 below). It involves consideration of:

- Varying limitations to land use pertaining to rainfed cultivation and soil properties; and
- The risks of land damage from erosion and other causes.

Eight land capability classes were employed, with potential decreases, limitations, and hazards increasing from class 1 to class 8. Classes 1 to 4 are considered arable, whereas Class 5 is considered wet-based soils or watercourses, and Classes 6 to 8 are classified as grazing, forestry, or wildlife. This system is based on the Land Capability Classification system of the United States Department of Agriculture (USDA) Soil Conservation Service by Klingelbiel and Montgomery (1961) as well as by Smith (2006).

Table 1: Soil Capability Classification (after Smith (2006).

Land Capability Group	**Land Capability Class**	**Intensity of Land Use**									
		wildlife	**Forestry**	**Light grazing**	**Moderate grazing**	**Intensive grazing**	**Light cultivation**	**Moderate cultivation**	**Intensive cultivation**	**Very intensive cultivation**	**Limitations**
Arable	I										There are no or few limitations. Very high arable potential. Very low erosion hazard
	II										Slight limitations. High arable potential. Low erosion hazard
	III										Moderate limitations. Some erosion hazards
	IV										Severe limitations. Low arable potential. High erosion hazard.
Grazing	V										Water course and land with wetness limitations
	VI										Limitations preclude cultivation. Suitable for perennial vegetation
	VII										Very severe limitations. Suitable only for natural vegetation
Wildlife	VIII										Extremely severe limitations. Not suitable for grazing or afforestation.

The updated and refined land capability ratings and database for the whole of South Africa were released by the Department of Agriculture, Forestry and Fisheries (DAFF) in 2017 now Department of Agriculture, Land Reform and Rural Development (DALRRD). These land capability ratings were derived through a spatial evaluation modelling approach and a raster spatial data layer comprising fifteen (15) land capability evaluation values 9 (see Table 2 below). The new land capability describes the categories as 1 being the lowest and 15 being the highest. Values of below 8 are generally not suitable for the production of cultivated crops. (DAFF, 2017). Soil agricultural potential is impacted by several factors (see Table 3 below). The soil agricultural potential was evaluated based on the factors mentioned and described in Table 3 by assigning qualitative criteria ratings such as high, moderate, or marginal to low to the updated land capability ratings.

Table 2: National Land Capability Values (DAFF, 2017).

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

Table 3: Soil Agricultural Potential Criteria

Criteria	Description
Rock Complex	If a soil type has prevalent rocks in the upper sections of the soil, it is a limitingfactor to the soil's agricultural potential.
Flooding Risk	The risk of flooding is determined by the closeness of the soil to water sources.
Erosion Risk	The soil erosion risk is determined by combining the wind and watererosion potentials.
Slope	The slope of the site could limit its agricultural use.
Texture	The texture of the soil can limit its use by being too sandy or too clayey.
Depth	The effective depth of soil is critical for the rooting zone for crops.

Criteria	Description
Drainage	The capability of soil to drain water is important as most grain crops do nottolerate submergence in water.
Mechanical Limitations	Mechanical limitations are any factors that could prevent the soil from beingtilled or ploughed.
pH	The pH of the soil is important when considering soil nutrients and fertility.
Soil Capability	This section highlights the soil type's capability to sustain agriculture.
Climate Class	The climate class highlights the prevalent climatic conditions that couldinfluence the agricultural use of a site.
Land Capability / Agricultural Potential	The land capability or agricultural potential rating for a site combines the soil capability and the climate class to arrive at the potential of the site to support agriculture.

2.4 DFFE Screening Tool

The Agricultural Agro-Ecosystem Assessment protocol provides the criteria for assessing and reporting impacts on agricultural resources for activities requiring Environmental Authorisation (EA). The assessment requirements of this protocol are associated with a level of environmental sensitivity determined by the national web-based environmental screening tool, which, for agricultural resources, is based on the most recent land capability evaluation values provided by the Department of Forestry, Fisheries, and the Environment (DFFE). The national web-based environmental screening tool can be accessed at: https://screening.environment.gov.za/screeningtool.

The primary purpose of the Agricultural Agro-Ecosystem Assessment is to determine the site's sensitivity to the proposed land use change (the transition from potential agricultural land to the proposed development is sufficiently considered). The information in this report aims to enable the Competent Authority (CA) to draw sound conclusions and recommendations on the proposed project and its potential impacts, with a specific focus on food security.

Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration, identified by the screening tool, must be confirmed by undertaking a site sensitivity verification:

- An environmental assessment practitioner or a specialist will undertake the site sensitivity verification.
- The site sensitivity verification must be undertaken through the use of:
  - A desktop analysis using satellite imagery;
  - A preliminary on-site inspection; and
  - Any other available and relevant information.

- The outcome of the site sensitivity verification must be recorded in the form of a report that:
  - Confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status, etc.;
  - Contains motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and
  - Is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.

The report is thus compiled to meet the minimum report content requirements for impacts on agricultural resources by the proposed development. The Screening tool sensitivity for the study area is presented in Figure 2 below:

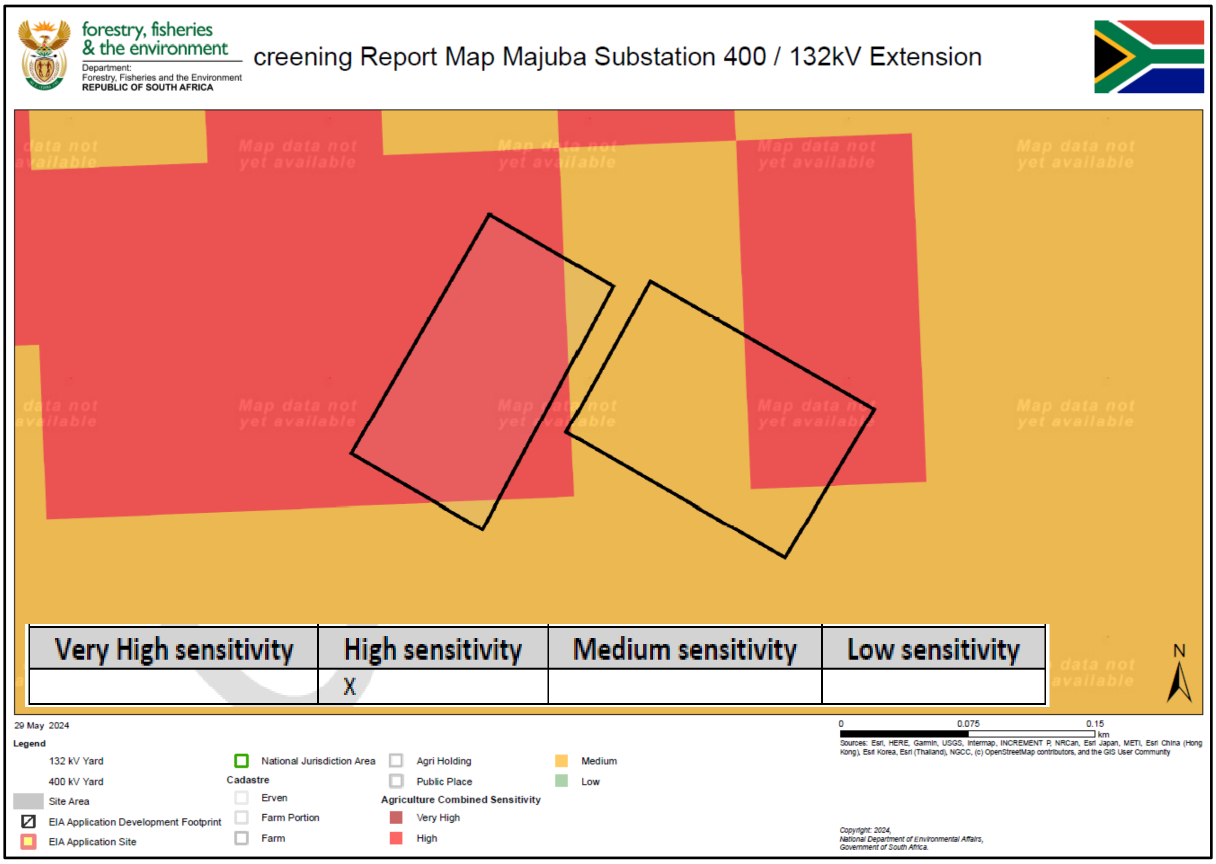

Figure 2: Screening tool sensitivity for the study area.

3. DESKTOP RESULTS AND DISCUSSIONS

As part of the desktop site assessment, background information related to the study area and literature reviews were gathered from various databases, including AGIS (Agricultural Geo-referenced Information System) and

SOTER (Soil and Terrain). In addition, the Department of Agriculture, Forestry & Fisheries provided the Natural Agricultural Resources Atlas of South Africa (NAR Atlas Manual, 2018). Even though desktop results are not field verified, the data presented may contain inaccuracies. Nevertheless, the data provide valuable information regarding the soils within the study area.

3.1 CLIMATIC DATA

The entire study area is characterised by a subtropical highland climate or temperate climate, associated with dry winters and warm summers with 70% or more of the average annual rainfall received in the warmest 6 months of the year. The mean annual precipitation is between 601 – 800 mm; this rainfall range for the application area is deemed adequate for most cultivated crops with a moderately high yield potential. These conditions have a moderate to high yield potential for a wide range of adapted crops supporting rain-fed agriculture. This results in a wide range of suitable crops for cultivation. Figure 3 shows the mean annual rainfall associated with the study area.

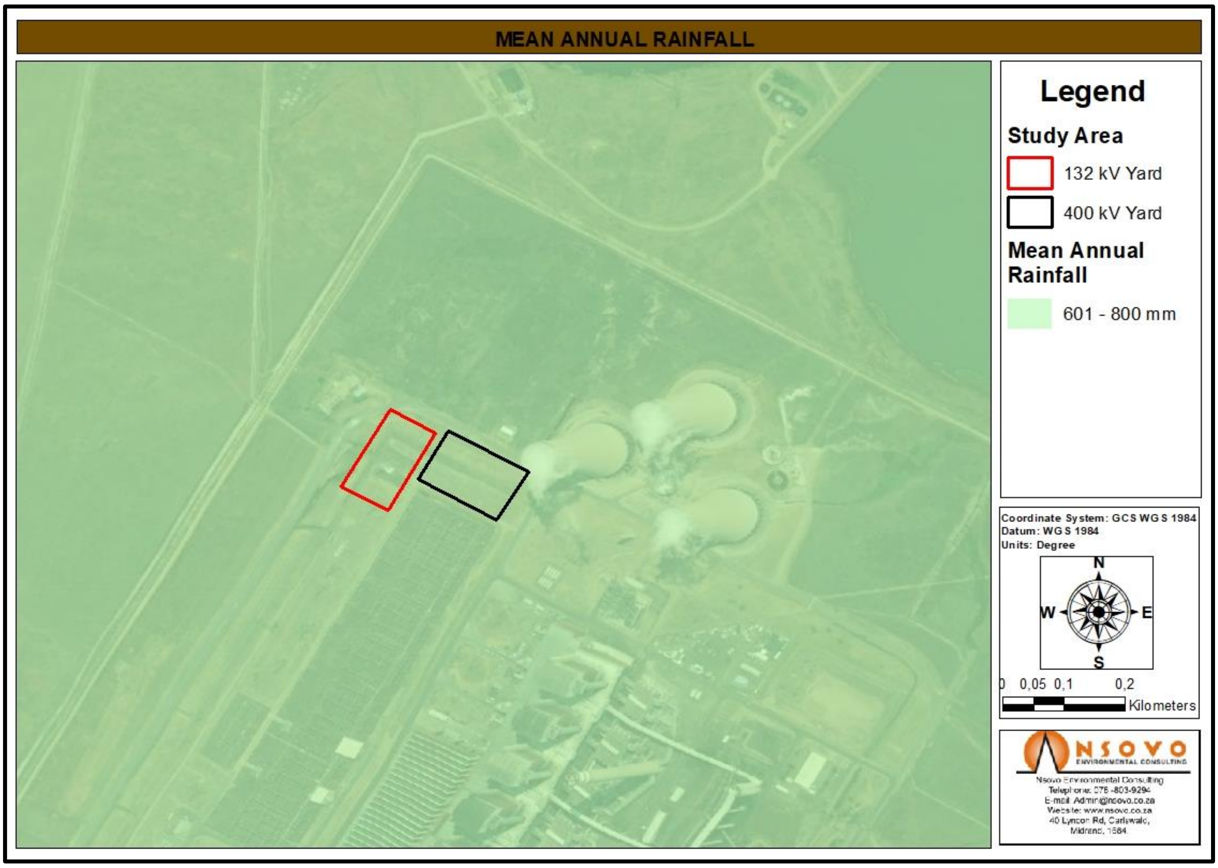

Figure 3: Mean Annual Rainfall associated with the study area.

3.2 GEOLOGY

The entire study area is underlain by shale sedimentary rock. Shale is a fine-grained, clastic sedimentary rock formed from mud that is a mix of flakes of clay minerals and tiny fragments of other minerals, especially quartz and calcite. Figure 4, below, depicts the geology associated with the study area.

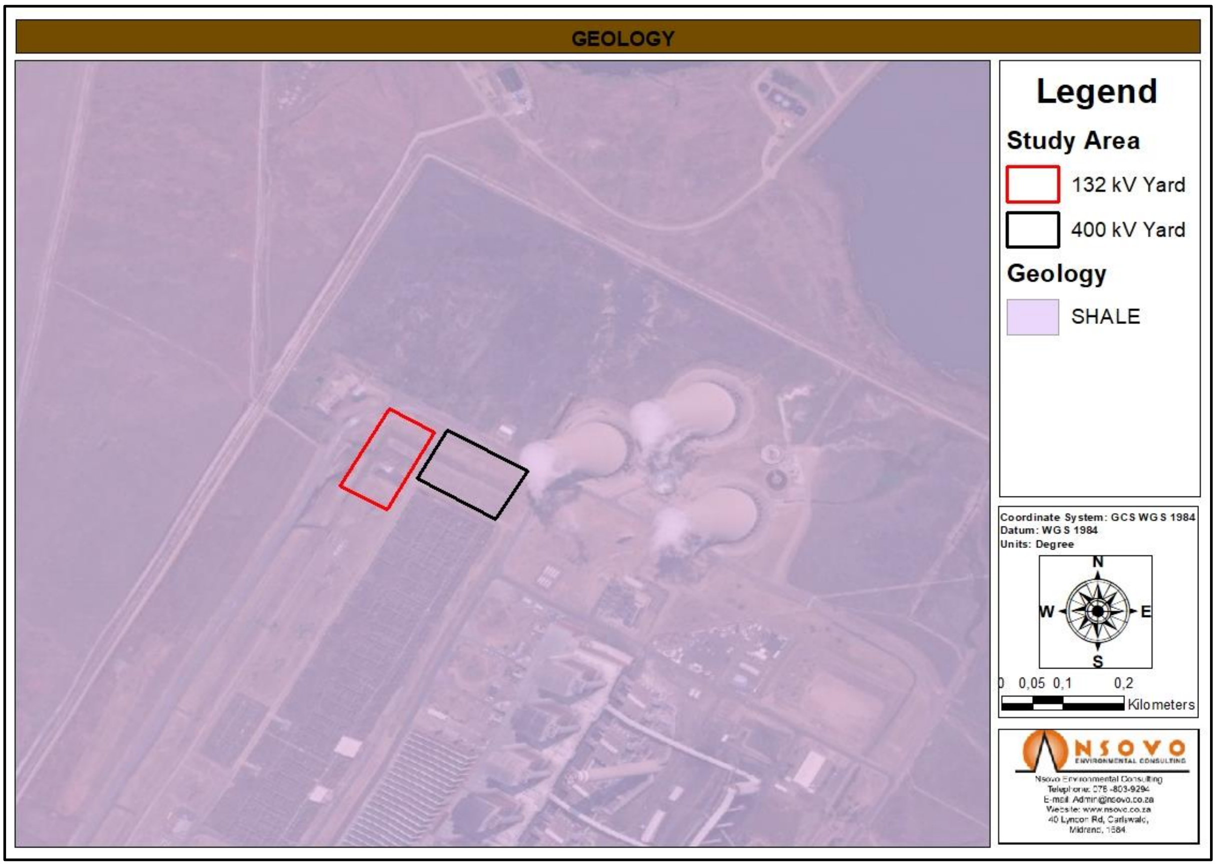

Figure 4: Geological formations associated with the study area.

3.4 SOIL PH

The soil pH associated with the soils occurring within the entire study area is between 5.5 and 6.4, which is acidic to slightly acidic. The low pH can be attributed to other factors such as the parent material, loss of organic matter, removal of soil minerals when crops are harvested, erosion of the surface layer, and effects of nitrogen and sulphur fertilisers. The low soil pH can be considered not ideal for the majority of cultivated crops. However, the pH can be corrected using lime and wood ash. Figure 5, below, depicts the soil pH associated with soils occurring within the study area.

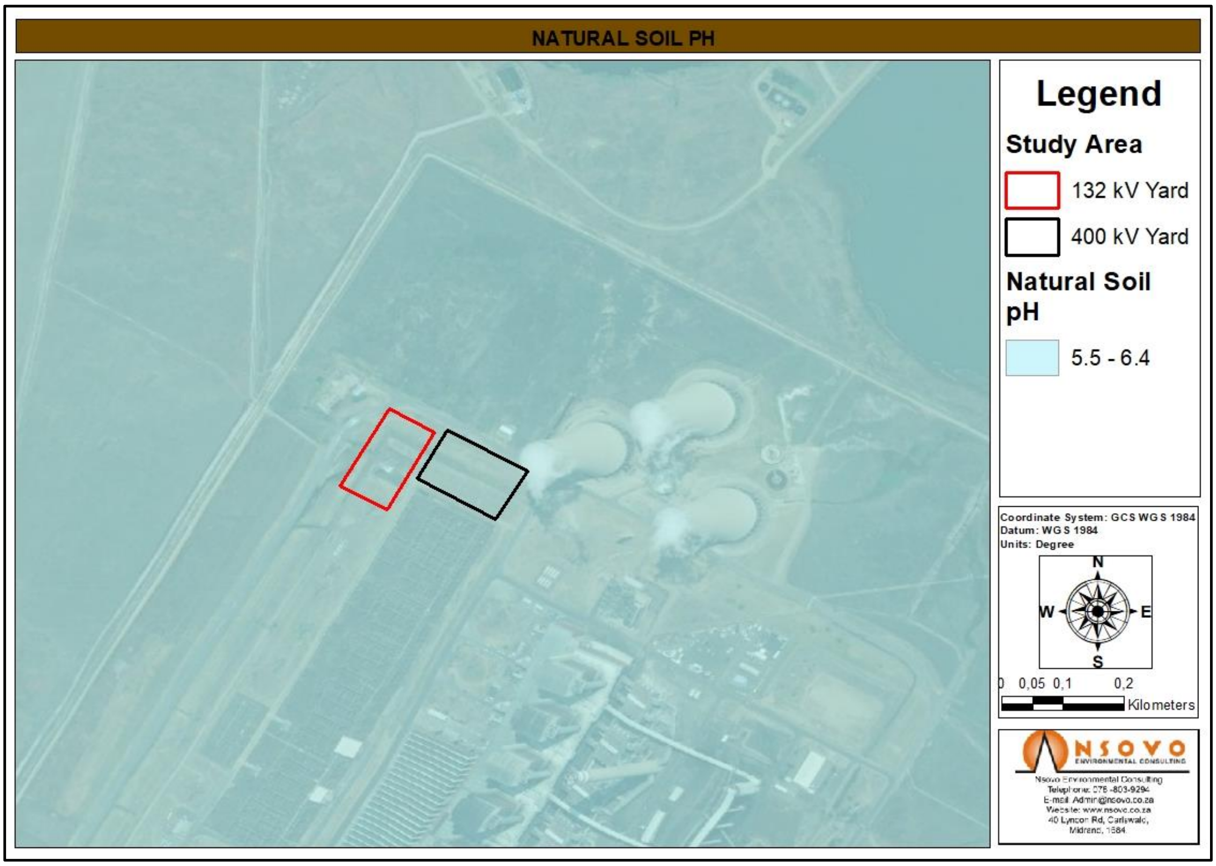

Figure 5: Soil pH associated with the project area.

3.5 Soil and Terrain (SOTER) Dominant Soils

The entire study area is characterised by an increase in clay content with depth below the eluvial horizon. In arid regions, the surface horizon may contain very little organic matter, with the subsurface albic eluviation horizon characterised by a sandy or loamy texture and a weak structure of low stability. Land use on such soils is generally less intensive than on most soils under the same climatic conditions. These soils are best left for grazing due to their poor drainage during the wet season and toxic levels of aluminium in the root zone due to low pH levels. Figure 6 below illustrates the SOTER Dominant soils associated with the study area.

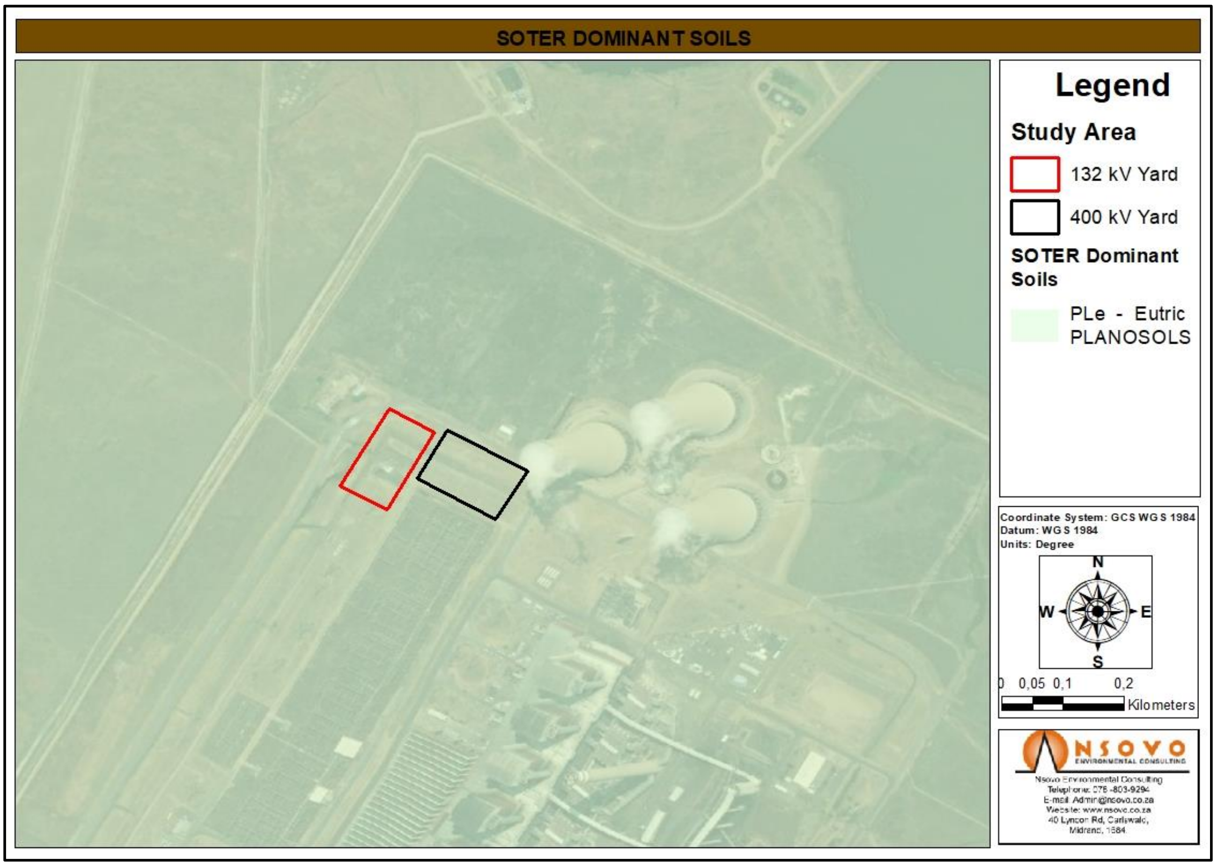

Figure 6: SOTER dominant soils associated with the study area.

3.6 Landtype Classes

The entire study area is characterised by the Ca2 landtype. The Ca landtype is characterised by Plinthic landscapes with commonly occurring upland duplex and margalitic soils. These soils are thus not easily prone to leaching and erosion thus indicating the soils' ability to retain nutrients. Figure 7 below depicts the landtypes classes associated with the study area.

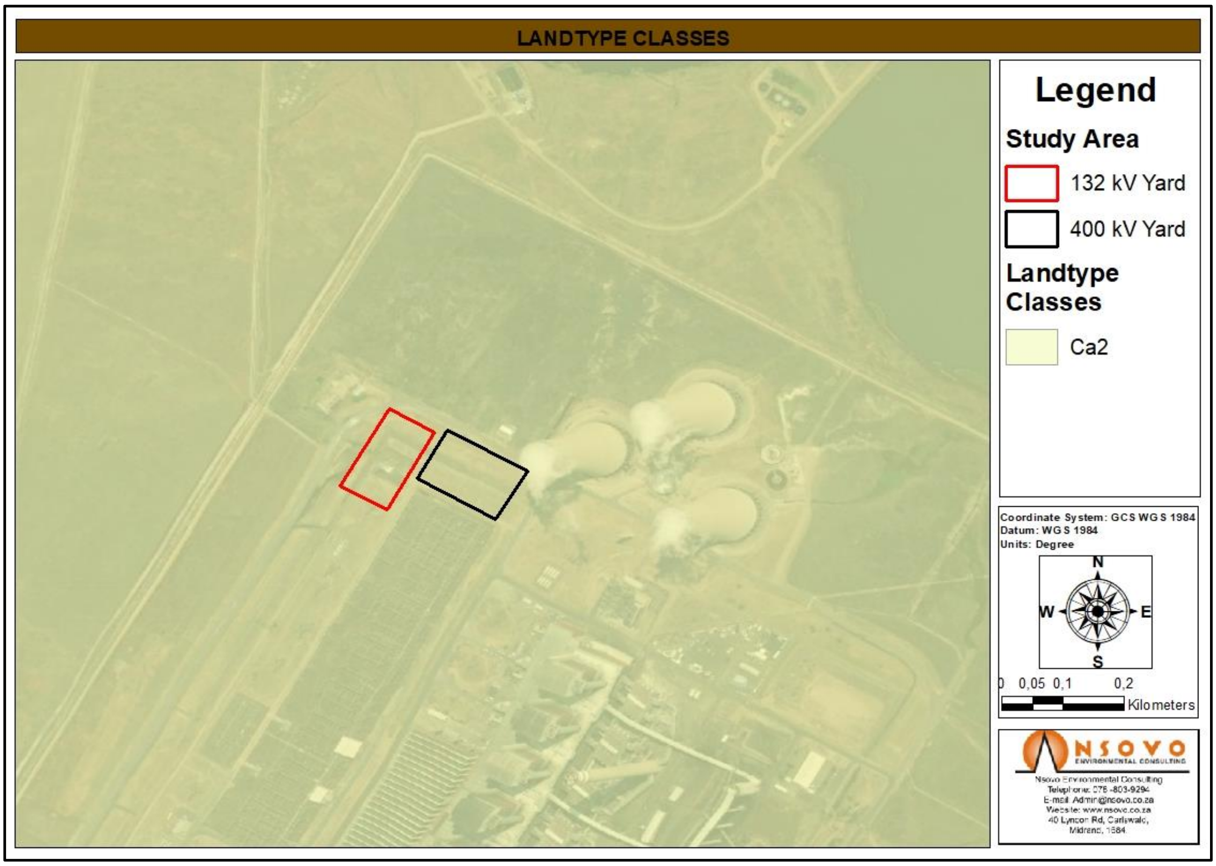

Figure 7: Desktop land capability associated with the study area.

3.7 DESKTOP LAND CAPABILITY

The entire study area is characterised by is non-arable, grazing, woodland, or wildlife capability (Class VII). Figure 8 below shows the desktop land capability associated with the study area.

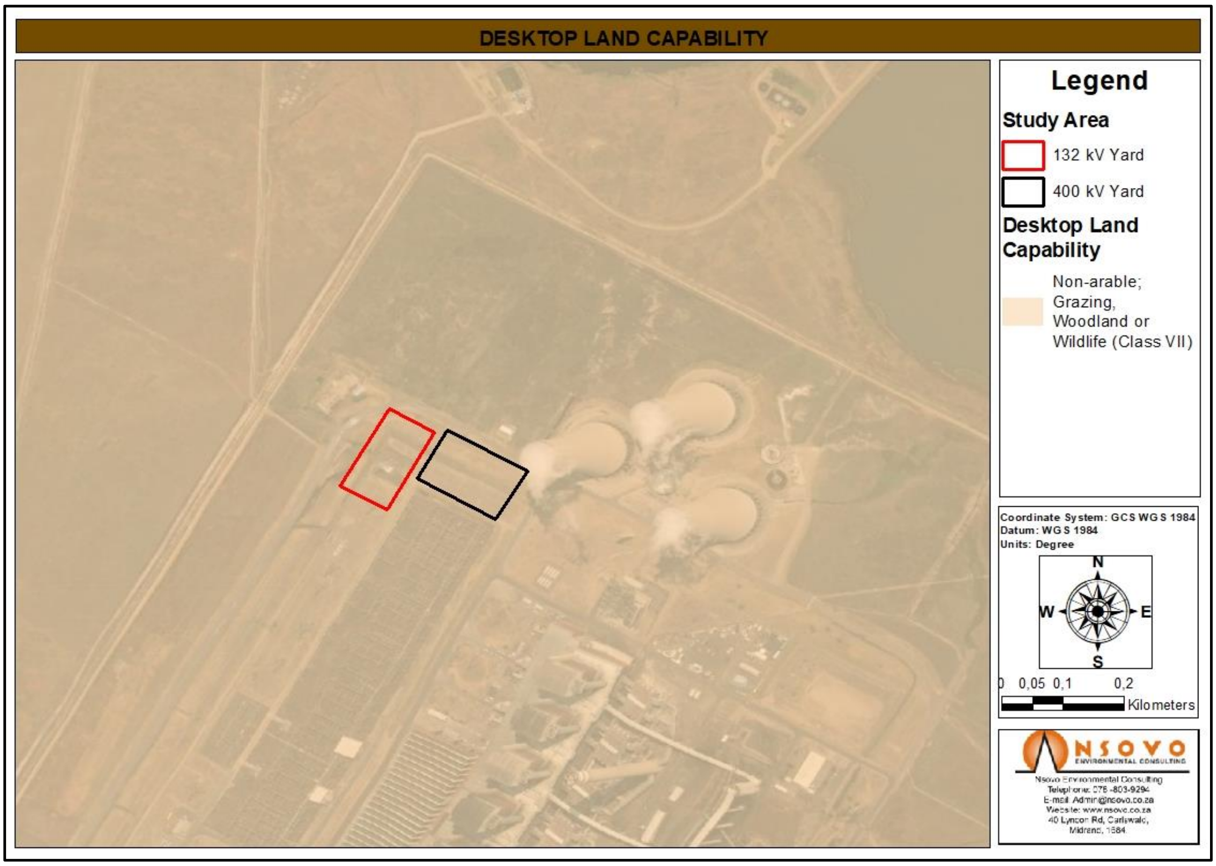

Figure 8: Desktop land capability associated with the study area.

3.8 SOIL POTENTIAL

The entire study area is characterised by soils unsuitable for arable agriculture and largely suitable for forestry or grazing where climate permits. Figure 9 below depicts the soil potential associated with the study area.

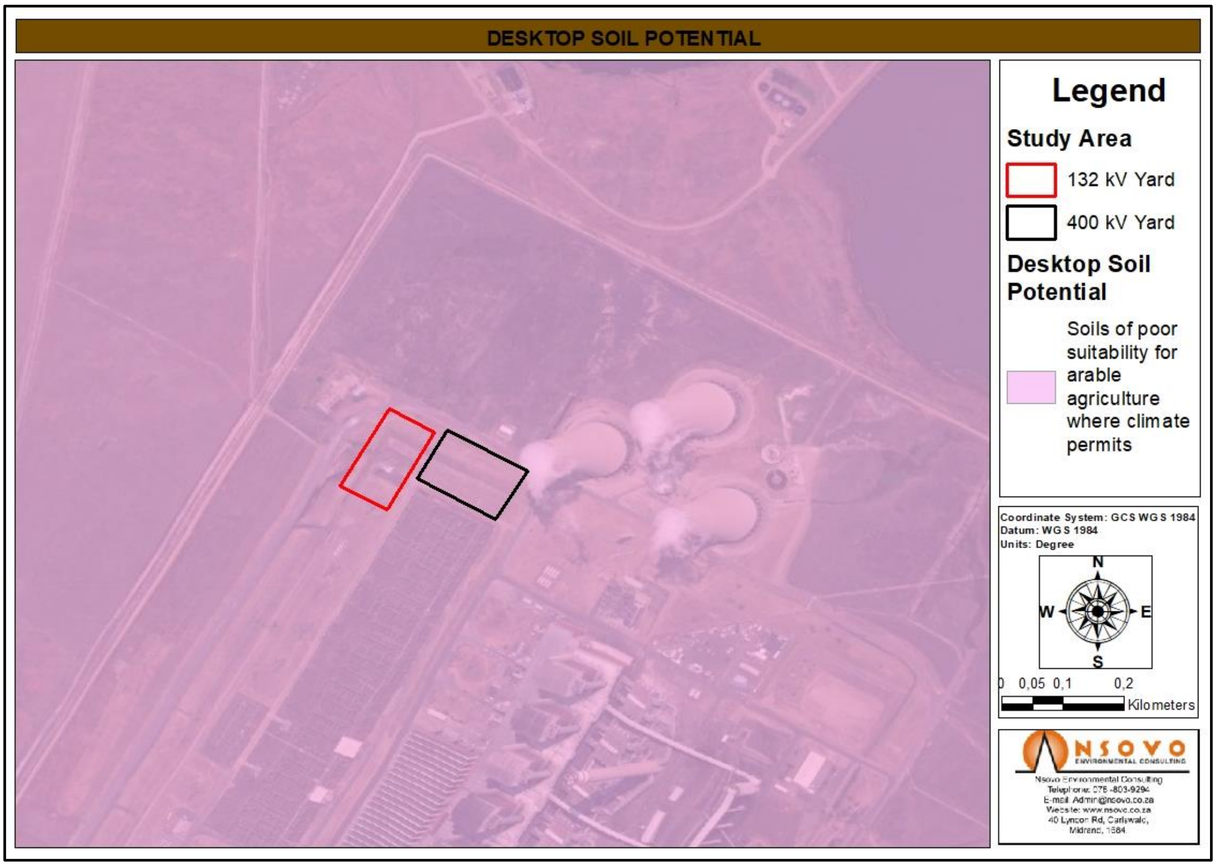

Figure 9: Soil potential associated with the study area.

4. FIELD VERIFIED RESULTS AND DISCUSSIONS

4.1 Land Uses within the Study Area

The proposed development is located within the coal-fired Majuba Power Station. Other land uses in the vicinity include agricultural cultivation and the distribution of electricity through the transmission towers. No active agricultural practices were observed within the study area. Minimal signs of soil degradation were observed in undisturbed areas due to these areas being vegetated, therefore limiting the potential impacts of soil erosion. Figure 10 depicts the different land uses identified within the study area.

Figure 10: Land uses associated with the study area.

4.2 Soil Forms in the Study Area

The section below focuses on the identified soil forms within the study area and is described below. Figure 12 presents the spatial distribution of the identified soil forms within each study area. Table 4 presents a summary table depicting the coverage area of each specified soil form.

4.2.2 Witbank

These soils are usually disturbed by anthropogenic influences such as intentional transportation and severe physical disturbance for urban development (industrial use in this case). The area where the proposed development is to take place was previously excavated and backfilled with soil mixed with firmer material. The diagnostic horizons are no longer arranged in any discernible order or recognisable horizonation as expected in natural soil, sometimes rendering them unsuitable for any cultivation. Figure 11 depicts the areas of disturbance as a result of human intervention.

Figure 11: View of the identified disturbed Witbank soil formation.

Table 4: Soil forms in hectares (ha) occurring within the study area.

Study Area				
Soil Forms	**Area (Ha)**	**Percentage (%)**	**Land Capability Class – According to (Smith, 2006)**	**Agricultural Potential**
Witbank	2.34	100	Wilderness (Class VIII)	Very Low
Total Enclosed	**2.34**	**100**		

Table 5: Land capability (DAFF, 2017) associated with the soils occurring within the study area.

Soil Form	Land Capability Groups	DAFF (2017) Classification
Witbank	Wilderness/Industrial	1. Very Low

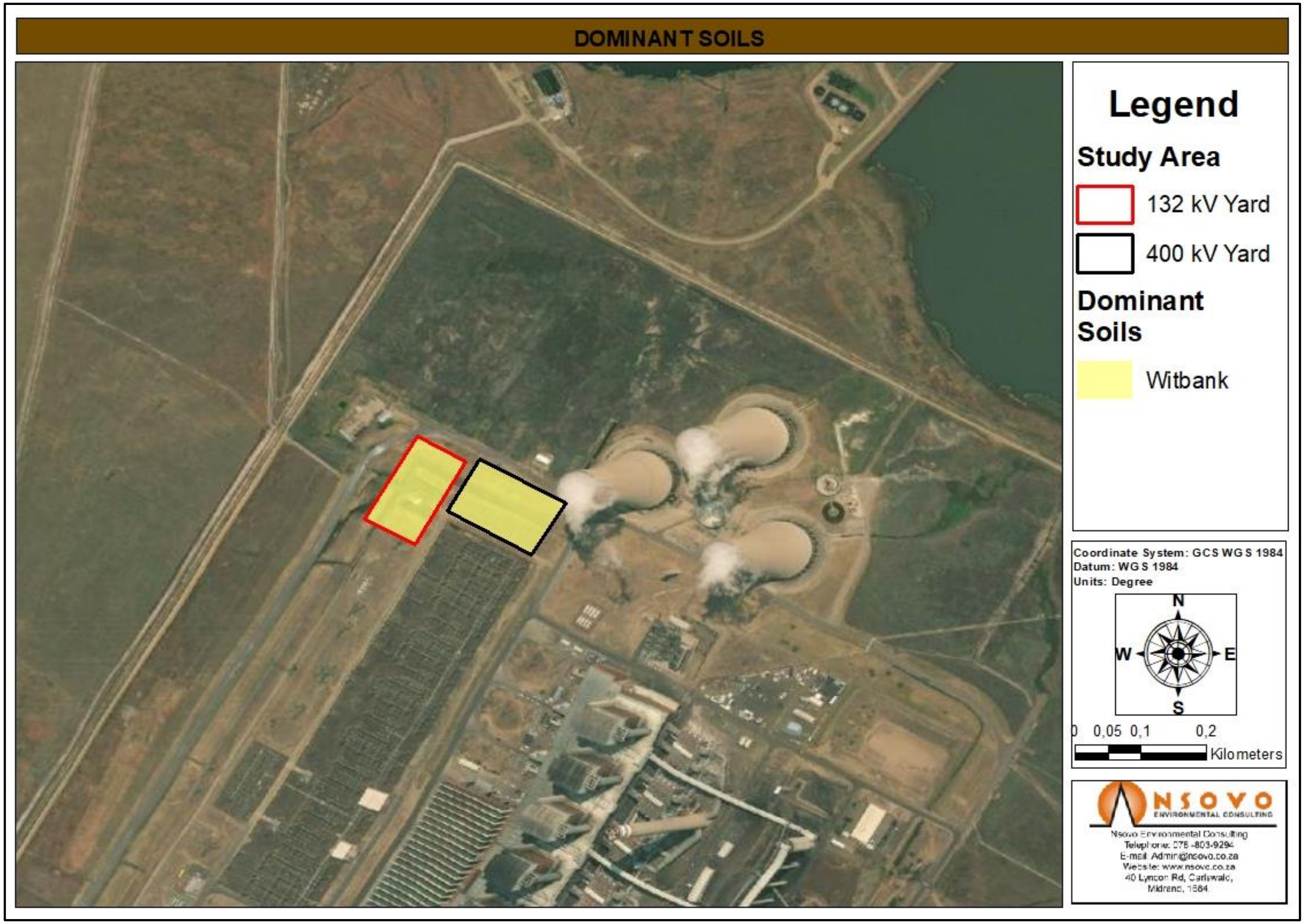

Figure 12: Dominant soils form within the study area.

4.2 LAND CAPABILITY AND AGRICULTURAL POTENTIAL

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 soil physical properties with which the agricultural potential for this assessment, agricultural sensitivity, was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. Figures 13 and 14 below depict the land capabilities, while Figure 15 depicts the agricultural potential.

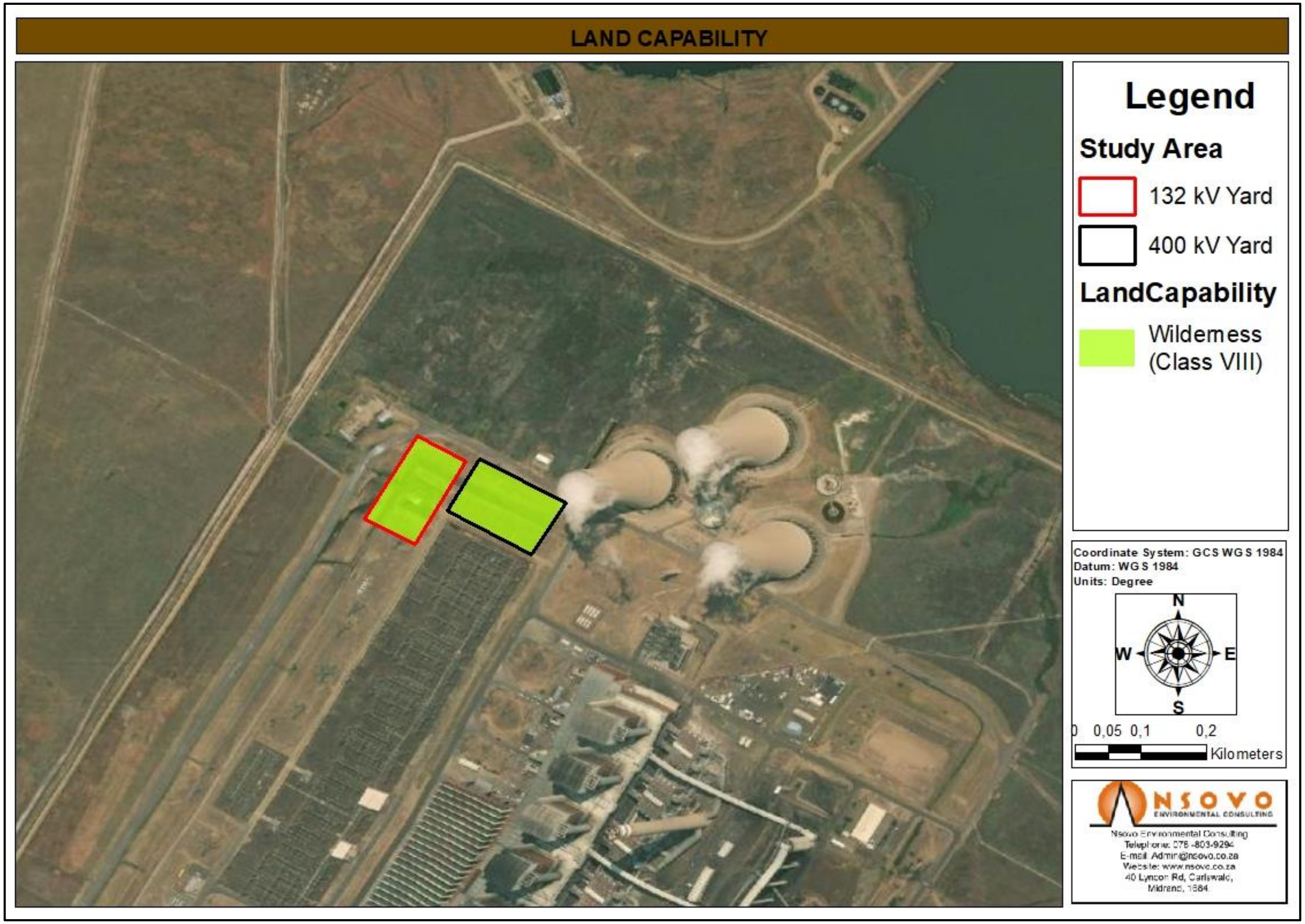

Figure 13: Map depicting land capability of soils within the Study Area.

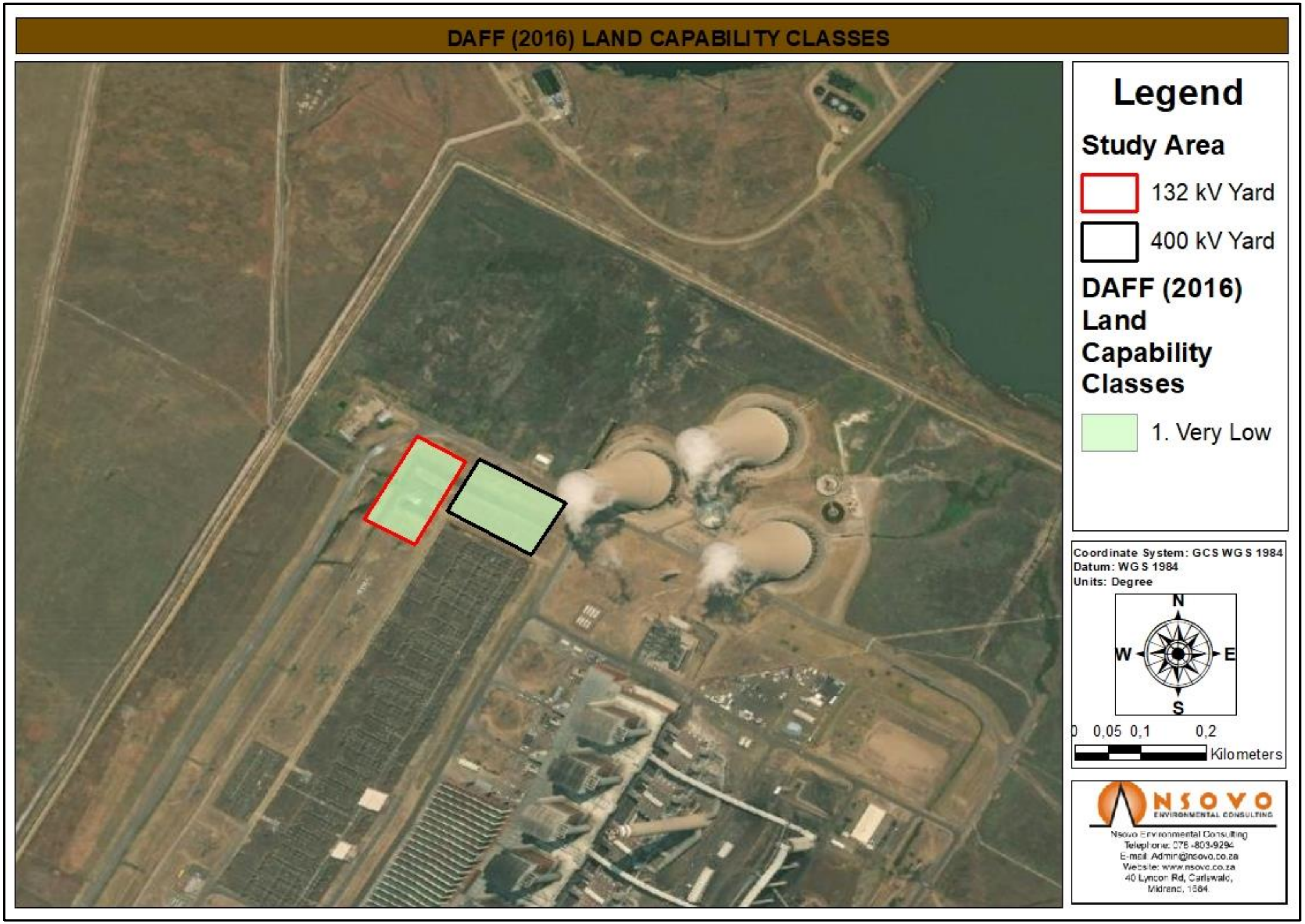

Figure 14: Land capability (DFFE, 2016) of the soil forms associated with the study area.

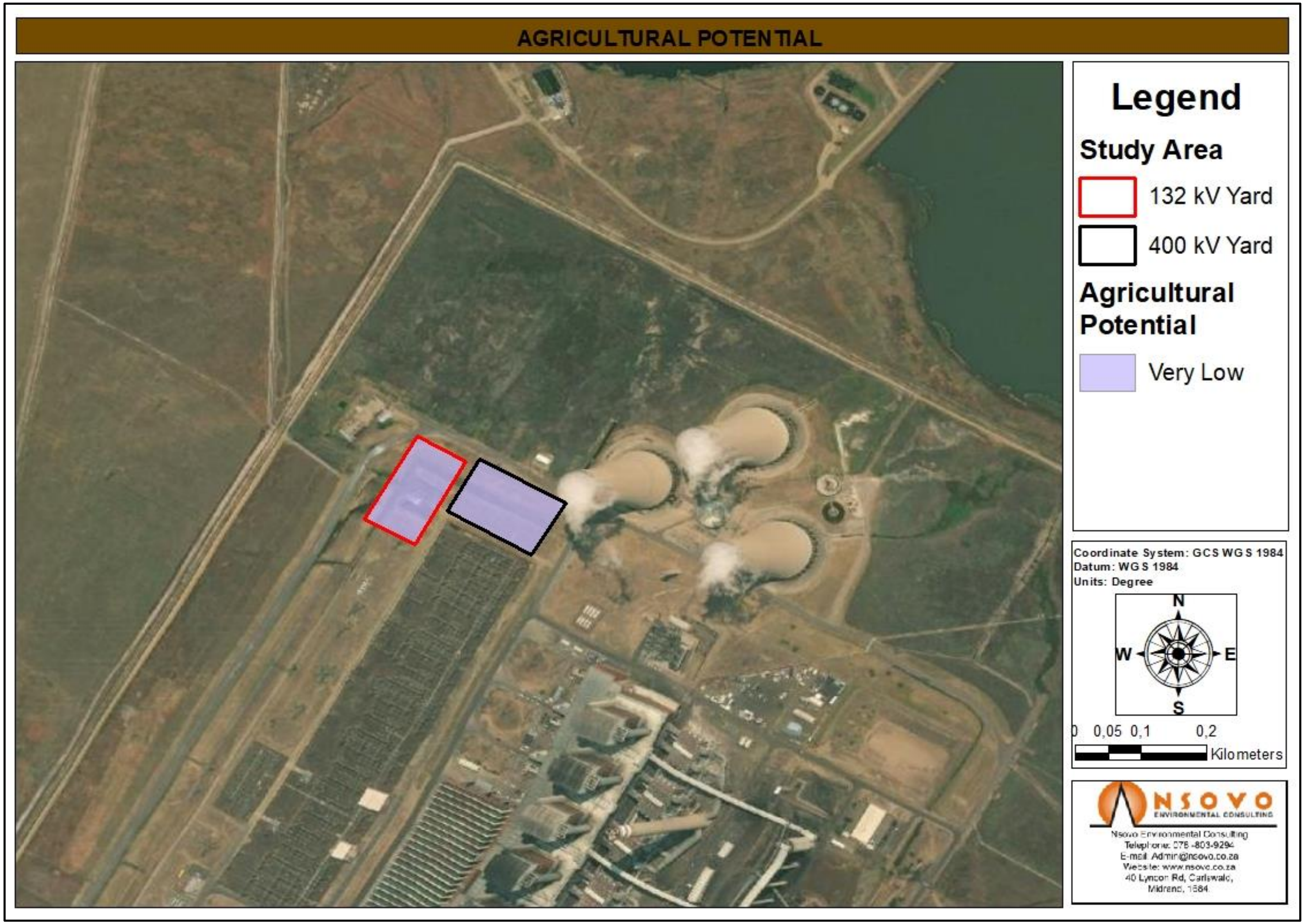

Figure 15: Agricultural potential for soils associated with the soils occurring within the study area.

5. IMPACT ASSESSMENT

5.1 ASSESSMENT METHODOLOGY

According to the NEMA regulations (2014), all the impact assessments should provide quantified scores that show the expected impact and those that will likely result from proposed activities. Significance scoring both assesses and predicts the environmental impacts through the evaluation of the following factors;

- Probability of the impact,
- Duration of the impact,
- Extent of the impact, and
- Magnitude of the impact.

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise due to the Proposed Development implementation and place the consequences of the Proposed Development before the competent authority.

For each main project phase, the existing and potential future impacts and benefits (associated only with the Proposed Development) were described using the criteria listed in Appendix B. This was done in accordance with the EIA Regulations, promulgated in terms of Section 24 of the NEMA and the criteria drawn from the Integrated Environmental Management (IEM) Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the Department of Environmental Affairs (April 1998).

The assignment of significance ratings has been undertaken based on the specialist team's experience and research. Subsequently, mitigation measures have been identified and considered for each impact. The assessment is repeated to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented). Each of the above impact factors has been used to assess each potential impact using ranking scales as detailed in Appendix B.

The significance of the impacts that may occur due to the proposed activities and a description of the mitigation required to limit the identified adverse impacts on the identified soils on site are presented in Section 5.2 below.

5.2 Impact Assessment Per Project Phase

5.2.1 Construction Phase

During the construction phase of the proposed development, the soils are anticipated to be exposed to erosion, dust emission, potential soil contamination, and loss of land capability impacts. The main envisaged activities include the following:

- Earthworks (where necessary) will include vegetation clearing from the surface and stripping topsoil (soil excavation) for foundation preparation where the proposed infrastructure is to be placed. These activities are the most disruptive to natural soil horizon distribution and will impact on the current soil hydrological properties and functionality of soil if not mitigated properly;
- Frequent movement of heavy machinery increasing the likelihood of soil contamination from petroleum, oil, and grease substances;
- Other activities in this phase that will impact on soil are the handling and storage of building materials and different kinds of waste. This will potentially result in soil pollution when not managed properly.

The disturbance of original soil profiles and horizon sequences during earthworks is considered to be a measurable erosion deterioration.

Soil chemical pollution due to potential oil and fuel spillages from vehicles, is considered to be a moderate deterioration of the soil resource.

Soil compaction will be a measurable deterioration caused by heavy vehicles commuting on the existing roads and any newly widened access road to increase access to the substations.

5.2.2 Operational Phase

The operational phase includes the completion and operation of the proposed development, and the perceived impacts include possible runoff, which can result in erosion, constant disturbances of soils by maintenance vehicles and machinery, which can increase the risk of soil compaction, and poor waste management, which can result in waste materials being improperly stored, which can increase the risk of soil compaction.

The main envisaged operational activities that will impact soil, land use, and land capability include the following:

- General activities including transport on access roads will result in soil compaction or generation of runoff, respectively.

- Waste generation (non-mineral waste) and accidental spills and leaks may result in soil chemical pollution if not managed.

The disturbance of original soil profiles and horizon sequences of these profiles is considered a measurable deterioration, leading to soil erosion.

Soil chemical pollution, caused by pollutants leaching into subsurface soil horizons where waste is stored or from leaking maintenance vehicles, is considered to be a moderate deterioration of the soil resource.

Soil compaction will be a measurable deterioration that will occur due to the movement of vehicles on the soil surfaces (including access roads).

5.2.3 Closure and Decommissioning Phase

Decommissioning can be considered the reverse of the construction phase, with the demolition and removal of the infrastructure and activities very similar to those described in the construction phase.

The main envisaged decommissioning activities that will impact on soil, land use, and land capability include the following:

- Transporting materials away from the site will compact the soil of the existing roads, and fuel and oil spills from vehicles may result in soil chemical pollution.
- Earthworks will include redistribution of inert waste materials to fill the ponds and ditches and add topsoil to the soil surface. These activities will not further impact land use and capability but may increase soil compaction.
- Other activities in this phase that will impact soil are handling and storing materials and different kinds of waste generated and accidental spills and leaks with decommissioning activities. When not managed properly, these activities can potentially result in soil pollution.

5.3 Impact Summary Tables

Tables 7 to 10 below present the impact summary tables for the loss of land capability, soil erosion, soil compaction, and soil contamination associated with the powerlines. Tables 11 to 14 show the summary tables for the proposed substation.

Table 6: Rating of impacts for the loss of land capability and associated mitigation measures for the Majuba Substation extension.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Construction Phase:							
Clearing vegetation and levelling soils where necessary, such as removing topsoil material to create the foundation for the construction of the power plant, and temporary laydown areas potentially encroaching cultivated areas.							
	WOM	Neg	1	2	6	3	27
	WM	Neg	1	1	4	2	12
Mitigation Measures							
To minimise edge effects, the project operations must be kept within the demarcated footprint areas as far as practically possible.							
Avoid permanently impacting topsoil and subsoil but salvage the maximum depth of these when clearing areas for infrastructure.							
Use geotextiles and contours to control soil erosion and revegetate exposed soil surfaces where possible.							
Construction vehicle movement should be limited to within the project perimeter fence to avoid unnecessary compaction and erosion of adjacent soils.							
Always strip a suitable time before commencing construction activities to avoid soil loss and contamination.							
The proposed development within the study area should aim to minimise the impact on soils used for cultivation as far as practically possible.							
Operational and Maintenance Phase							
Operation and maintenance of the Majuba Substation: Constant traffic and frequent soil disturbances result in land capability loss.							
	No Corrective Measures	Neg	1	4	4	2	18

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Corrective Measures		Neg	1	4	2	2	10
Mitigation Measures							
Maintenance vehicles should be checked for hydrocarbon leakages before commencement of maintenance activities.							
Disturbed areas adjacent to the footprint should be revegetated with indigenous grass mix to limit potential soil erosion.							
Use geotextiles and contours to prevent soil erosion and revegetate exposed soil surfaces where possible.							
Decommissioning Phase							
Potential future decommissioning activities will likely involve dismantling and removal of the power plant and other on-site buildings, equipment, and facilities, including possible excavation and removal of concrete pads; transferring of waste materials to disposal, recycling, and/or treatment facilities, as applicable (where re-use is not possible)							
No Corrective Measures		Neg	2	2	4	3	24
Corrective Measures		Neg	1	1	4	3	18
Mitigation Measures							
The study area should be revegetated with indigenous vegetation to help with erosion and dust control as required or returned to agricultural use.							
Establish natural drainage patterns as pre-construction through recontouring and revegetation.							
Dismantled equipment should be recycled, and an approved service provider should appropriately landfill non-recyclable material.							
Any portions of the site with compacted soil should be decompacted and any excavations backfilled with soil to restore the site for future use.							

Table 7: Rating of impacts on soil erosion and associated mitigation measures for the Majuba Substation.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Construction Phase:							
Potential frequent movement of earth-moving machinery within loose and exposed soils, leading to excessive erosion. Site clearing, removal of vegetation, and associated disturbances to soils, leading to increased runoff, erosion and possible sedimentation of downstream watercourses.							
	WOM	Neg	2	2	6	5	50
	WM	Neg	2	1	4	4	28
Mitigation Measures							
The project operations should be kept within the demarcated footprint areas as far as possible to minimise edge effects.							
Unnecessary trafficking and movement over the areas targeted for construction must be avoided, especially heavy machinery							
No site-clearing activities should take place during periods of heavy rainfall.							
Loosening of the soil through ripping and discing before the stripping process is recommended to break up crusting.							
Compacted soils should be ripped at least 20cm to alleviate.							
Access roads should be aligned to the existing road as far as practically possible to avoid further agricultural impact and unnecessary soil disturbance.							
Operational and Maintenance Phase							
Operation and maintenance of the Majuba Substation; constant traffic and frequent disturbances of soils resulting in soil compaction.							
	No Corrective Measures	Neg	2	4	6	3	36

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Corrective Measures		Neg	1	4	4	3	27
Mitigation Measures							
Loosening of the soil through ripping and discing prior to the stripping process is recommended to break up crusting.							
Unnecessary trafficking and movement over the areas targeted for maintenance must be minimised as far as practically possible, especially for heavy machinery.							
Disturbed areas adjacent to the footprint area should be revegetated with indigenous grass mix to limit potential soil compaction.							
Access roads should be inspected and maintained as necessary.							
Decommissioning Phase							
Potential future decommissioning activities will likely involve dismantling and removal of the power plant and other on-site buildings, equipment, and facilities. During this period, there will be heavy vehicular traffic and thus increasing the likelihood of soil erosion.							
No Corrective Measures		Neg	2	2	6	3	30
Corrective Measures		Neg	1	1	4	3	18
Mitigation Measures							
The study area should be revegetated with indigenous vegetation to help with soil compaction, runoff, erosion and dust control as required or returned to agricultural use.							
Establish natural drainage patterns as pre-construction through recontouring, revegetation, and ripping soils to alleviate soil compaction.							
Dismantled equipment should be recycled, and an approved service provider should appropriately landfill non-recyclable material.							
Any portions of the site with compacted soil should be de-compacted and any excavations backfilled with soils to restore the site for future use.							

Table 8: Rating of impacts on soil compaction and associated mitigation measures for all project phases for the Majuba Substation.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Construction Phase:							
Site clearing, removal of vegetation, and associated disturbances to soils, leading to, increased runoff, soil compaction in cleared areas.							
WOM		Neg	2	2	6	4	40
WM		Neg	2	1	4	3	21
Mitigation Measures							
The project operations should be kept within the demarcated footprint areas as far as possible to minimise edge effects.							
Unnecessary trafficking and movement over the areas targeted for construction must be avoided, especially heavy machinery							
No site clearing activities should take place during periods of heavy rainfall.							
Loosening of the soil through ripping and discing prior to the stripping process is recommended to break up crusting.							
Compacted soils should be ripped at least 20cm to alleviate.							
Operational and Maintenance Phase							
Operation and maintenance of the Majuba Substation; constant traffic and frequent disturbances of soils resulting in soil compaction.							
No Corrective Measures		Neg	2	4	6	3	36
Corrective Measures		Neg	1	4	4	3	27
Mitigation Measures							

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Loosening of the soil through ripping and discing prior to the stripping process is recommended to break up crusting.							
Unnecessary trafficking and movement over the areas targeted for maintenance must be minimised, especially heavy machinery.							
Disturbed areas adjacent to the footprint area should be revegetated with indigenous grass mix to limit potential soil compaction.							
Access roads should be inspected and maintained as necessary.							
Decommissioning Phase							
Potential future decommissioning activities will likely involve dismantling and removal of the power plant and other on-site buildings, equipment, and facilities. During this period, there will be heavy vehicular traffic and thus increasing the likelihood of soil compaction.							
No Corrective Measures		Neg	2	2	6	3	30
Corrective Measures		Neg	1	1	4	3	18
Mitigation Measures							
The study area should be revegetated with indigenous vegetation to help with soil compaction, runoff, erosion and dust control as required or returned to agricultural use.							
Establish natural drainage patterns as pre-construction through recontouring, revegetation, and ripping soils to alleviate soil compaction.							
Dismantled equipment should be recycled, and non-recyclable material should be appropriately landfilled by an approved service provider.							
Any portions of the site with compacted soil should be de-compacted and any excavations backfilled with soils to restore the site for future use.							

Table 9: Rating of impacts on soil contamination and associated mitigation measures for all project phases for the Majuba Substation.

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Construction Phase:							
Leaching of hydrocarbon chemicals into the soils from maintenance equipment of the hydrogen plant leads to alteration of the soil chemical status as well as contamination of ground water. Potential hazardous and non-hazardous waste disposal, including waste material spills and refuse deposits into the soil.							
	WOM	Neg	2	2	6	4	40
	WM	Neg	2	1	4	4	28
Mitigation Measures							
The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.							
Ensure proper handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets.							
Maintenance of vehicles and equipment should be carried out in designated appropriate facilities fitted with spillage containment, floors, and sumps to capture any fugitive oils and greases.							
Implementing regular site inspections for materials handling and storage.							
Development of detailed procedures for spill containment and soil clean up.							
Operational and Maintenance Phase							
Direct chemical spills on soils within the Majuba Substation from construction vehicles, or other construction equipment used.							
	No Corrective Measures	Neg	2	4	6	4	48

Issue	Corrective measures	Impact rating criteria					Significance
		Nature	Extent	Duration	Magnitude	Probability	
Corrective Measures		Neg	1	4	4	3	27
Mitigation Measures							
Ensure proper handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets.							
Maintenance of vehicles and equipment should be carried out in designated appropriate facilities fitted with spillage containment, floors, and sumps to capture any fugitive oils and greases.							
Implementing regular site inspections for materials handling and storage.							
Development of detailed procedures for spill containment and soil clean up.							
Decommissioning Phase							
Potential decommissioning activities will likely involve dismantling and removing the hydrogen plant and other on-site buildings, equipment, and facilities. During this period, there will be heavy vehicular traffic thus increasing the likelihood of soil contamination.							
No Corrective Measures		Neg	2	2	6	3	30
Corrective Measures		Neg	1	1	4	3	18
Mitigation Measures							
The study area should be revegetated with indigenous vegetation to help with soil compaction, runoff, erosion, and dust control as required or returned to agricultural use.							
Establish natural drainage patterns as pre-construction through recontouring, revegetation, and ripping soils to alleviate soil compaction.							
Dismantled equipment should be recycled, and an approved service provider should appropriately landfill non-recyclable material.							
Any portions of the site with compacted soil should be decompacted, and any excavations should be backfilled with soils to restore the site for future use.							

6 IMPACT STATEMENT AND SCREENING TOOL VERIFICATION

The development footprint areas are located in an industrialised area wherein electricity generation occurs. No active agricultural practice is taking place in the study area's immediate vicinity. The area is characterised by previously excavated and backfilled areas mixed with firm material. Therefore, the cumulative loss from a soil and land capability point of view is anticipated to be negligible. Agricultural activities outside the power station boundary will continue unhindered.

The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being of high sensitivity in terms of agricultural potential. Based on the outcomes of the field assessment, this was found to have a less significant impact as presented on the screening tool due to the dominant soil forms that are not high-potential agricultural soils due to anthropogenic impacts. The development's only possible impact was minimal soil and land degradation because of land disturbance during construction and decommissioning. However, integrated mitigation measures must be implemented accordingly to minimise the potential loss of these valuable soils, considering the need for sustainable development and increased electricity generation and transmission capacity.

The specialist believes that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area are made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

7 CONCLUSION

Nsovo Environmental Consulting was appointed by Eskom SOC Holdings to conduct the soil, land use, and land capability verification assessment as part of the Environmental Impact Assessment (EIA) process for the proposed 132 kV yard, with 2 x 400/132 kV 500 MVA transformers at Majuba substation. This will ensure that a total of 950 MW unfirm, and 475 MW firm capacity will be made available. The proposed project is located within the Majuba Power Station and 16 km southwest of the town Amersfoort, within the Dr Pixley Ka Isaka Seme Local Municipality, Mpumalanga Province.

The entire study area is characterised by a hot semi-arid climate associated with hot, sometimes extremely hot, summers and warm to cool winters, with some to minimal precipitation. This type of climate is most commonly found around the fringes of subtropical deserts. The western portion of the study area linked to site options 1, 2 and 4 is characterised by a mean annual precipitation between 401 – 600 mm, and this precipitation range is deemed moderately adequate to support rainfed agriculture thus, supplementary irrigation may be required to cultivate successfully on these soils. The entire site option 4 is characterised by a mean annual precipitation between 601 – 800 mm; this rainfall range for the application area is deemed adequate for most cultivated crops with a moderately high yield potential. These conditions have a moderate to high yield potential for a wide range of adapted crops supporting rain-fed agriculture. This results in a wide range of suitable crops for cultivation.

These soils occurring within the study area are usually disturbed by anthropogenic influences such as intentional transportation and severe physical disturbance for urban development (industrial use in this case). The area where the proposed development is to take place was previously excavated and backfilled with soil mixed with firmer material. The diagnostic horizons are no longer arranged in any discernible order or recognisable horizonation as expected in natural soil, sometimes rendering them unsuitable for any cultivation.

The development footprint areas are located in an industrialised area wherein electricity generation occurs. No active agricultural practice is taking place in the study area's immediate vicinity. The area is characterised by previously excavated and backfilled areas mixed with firm material. Therefore, the cumulative loss from a soil and land capability point of view is anticipated to be negligible. Agricultural activities outside the power station boundary will continue unhindered.

The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being of high sensitivity in terms of agricultural potential. Based on the outcomes of the field assessment, this was found to have a less significant impact as presented on the screening tool due to the dominant soil forms that are not high-potential agricultural soils due to anthropogenic impacts. The development's only possible impact was minimal soil and land degradation because of land disturbance during construction and decommissioning. However, integrated mitigation measures must be implemented accordingly to minimise the potential loss of these valuable soils, considering the need for sustainable development and increased electricity generation and transmission capacity.

The specialist believes that this study provides the relevant information required for the Environmental Impact Assessment phase of the project to ensure that appropriate consideration of the agricultural resources in the study area are made in support of the principles of Integrated Environmental Management (IEM) and sustainable development.

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APPENDIX A: INDEMNITY

- This report is based on survey and assessment techniques, which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken.
- This report is based on a desktop investigation using available information and data on the site to be affected, in situ fieldwork, surveys, assessments, and the specialist's best scientific and professional knowledge.
- The Precautionary Principle has been applied throughout this investigation.
- The findings, results, observations, conclusions, and recommendations given in this report are based on the specialist's best scientific and professional knowledge and information available at the time of the study.
- Additional information may become known or available later in the process for which no allowance could have been made at the time of this report.
- The specialist reserves the right to modify this report, recommendations, and conclusions at any stage should additional information become available.
- Information and recommendations in this report cannot be applied to any other area without proper investigation.
- This report, in its entirety or any portion thereof, may not be altered in any manner or form or for any purpose without the specific and written consent of the specialist as specified above.
- Acceptance of this report, in any physical or digital form, confirms acknowledgment of these terms and liabilities.

Tshiamo Setsipane

20 June 2024

TSetsipane

(*Pr. Nat. Sci* 114882)

APPENDIX B: CURRICULUM VITAE OF SPECIALISTS

CURRICULUM VITAE OF TSHIAMO SETSIPANE

PROFESSIONAL EXPERIENCE

Soil Science Consultant

- Conducting Soil, Land Use and Land Capability Assessments:
  - Assess existing information for rainfall data and current land uses.
  - Conduct a desktop assessment within the study area using digital satellite imagery and other suitable digital aids.
  - A soil classification survey and agricultural potential will be conducted within the proposed development area.
  - A soil classification survey and agricultural potential will be conducted within the proposed development area.
  - Provide recommended mitigation measures to manage the anticipated impacts and comply with the applicable legislations.
  - Compile a report on the findings of the assessment and presented in an electronic format.
- Conducting Hydropedological Impact Surveys:
  - Identify dominant hillslopes (from crest to stream) of the project area using terrain analysis.
  - Conduct a transect soil survey on each of the identified hillslope.
  - Hydrological behaviour of the identified hillslope described according to the identified hydropedological groups;
  - Graphical representation of the dominant and sub-dominant flow paths at hillslope scale prior to development and post development.
  - The impact of the proposed development on the hydropedological behaviour described in a report format.
  - Quantification of hydropedological fluxes using the Soil and Water Analysis Tool (SWAT+) to determine the losses to the wetland systems though the proposed project
- Conducting Land Contamination Assessments and Soil Monitoring Assessments:
  - Assessments of historic and current storage of hazardous waste and materials on soils.
  - Topsoil stockpile quality assessment for future usage.
  - Monitoring programme to determine the dust suppression impact on soil chemical parameters.

EDUCATION

- M.Sc. (Agric): Soil Science **01/2016– 03/2019**
  - Dissertation: Characterisation of hydropedological processes and properties of a sandstone and a tillite hillslope, Kwa-Zulu Natal, South Africa.
  - Graduated *Cum-Laude*.
- B.Sc. (Agric) Honours: Soil Science **01/2014 – 11/2014**

- Majored in soil fertility, soil physics, soil geography and soil chemistry.
- Research Project: Soil as an indicator of soil water regime.

- B.Sc. (Agric): Soil Science and Agrometeorology **2010 – 11/2013**
  - Majored in soil science and agrometeorology.
  - Minored in agronomy and plant pathology.

PROFESSIONAL MEMBERSHIP AND AFFILIATION

- Professional Natural Scientist with South African Council for Natural Scientific Professions (SACNASP) Registered, 11/2015 – Current
- Member of the Soil Science Society of South Africa (SSSSA)
- Member, South African Soil Surveyors Organization (SASSO)
- Member of the South African Wetland Society (SAWS)