Agricultural Agro-Ecosystems Assessment Report

Prepared for

Seriti Power (Pty) Ltd

Document Detail

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EAP:	Niara Environmental Consultants (Pty) Ltd		

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- all the particulars furnished by me in this form are true and correct; and
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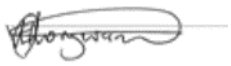
Signature of the Specialist:	
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Date:	07 July 2024

Specialist Checklist

EIA REGULATIONS 2017 GNR 327, 325 and 324 Appendix 6 **CONTENT OF THE SPECIALIST REPORTS**	**In accordance with the EIA Regulations**	**Cross reference in this Report**
(a) details of— the specialist who prepared the report; and the expertise of that specialist to compile a specialist report including a curriculum vitae;	✓	Section **Error! Reference source not found.**
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	✓	Page 3
(c) an indication of the scope of, and the purpose for which, the report was prepared	✓	Section **Error! Reference source not found.**
(cA) an indication of the quality and age of Base Data used for the specialist report	✓	Section **Error! Reference source not found.**
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and the levels of acceptable change	✓	Section **Error! Reference source not found.**
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	✓	Section **Error! Reference source not found.**
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	✓	Section **Error! Reference source not found.**
(f) Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	✓	Section **Error! Reference source not found.**
(g) an identification of any areas to be avoided, including buffers;	✓	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	✓	N/A
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;	✓	Section **Error! Reference source not found.**
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities	✓	Section **Error! Reference source not found.**
(k) any mitigation measures for inclusion in the EMPr	✓	Section **Error! Reference source not found.**

EIA REGULATIONS 2017 GNR 327, 325 and 324 Appendix 6 **CONTENT OF THE SPECIALIST REPORTS**	**In accordance with the EIA Regulations**	**Cross reference in this Report**
(l) any conditions for inclusion in the environmental authorisation;	✓	Section **Error! Reference source not found.**
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	✓	Section **Error! Reference source not found.**
(n) a reasoned opinion— i. whether the proposed activity, activities or portions thereof should be authorised; and (iA) regarding the acceptability of the proposed activity or activities; and ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	✓	Section **Error! Reference source not found.**
(o) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	✓	N/A
(p) any other information requested by the competent authority	✓	N/A

Executive Summary

Introduction

Seriti Power (Pty) Ltd ("Seriti Power") is the holder of a Mining Right for coal in respect of its Klipspruit Colliery ("KPS") operation issued under the Department of Mineral Resources and Energy ("DMRE") (Ref No. MP 30/5/1/2/2/125 MR). KPS intends on applying for an EA and an Integrated Water Use License ("IWUL") for proposed change in mining method to KPSX and KPSS. The application process to be followed in terms of NEMA, for the additional activities proposed across KPSX and KPSS, is a Basic Assessment ("BA") process as contemplated under Chapter 4 of GNR 326. As such Seriti Power appointed Niara as an Independent Environmental Assessment Practitioner (EAP) to ensure compliance by undertaking the required environmental regulatory process. This report presents the findings of a specialist Wetland Baseline and Impact Assessment Study that forms part of the Environmental Impact Assessment (EIA) and Integrated Water Use License Application (IWULA) Process. The objective of this assessment is to discusses the soil types, land capability, present land use, and rehabilitation considerations within the proposed underground mining area. Furthermore, this assessment will assess the impacts of the proposed underground mining on the integrity of the surrounding soils.

Methodology

A site visit was undertaken on the 22nd of February 2024 to determine the types of soils present, their depths, their land capability/ potential, soil stripping ratios, the current land use, identification, and assessment of potential impacts on soils resulting from the proposed project and mitigation measures to minimise impacts associated with the proposed project. Soils were investigated by augering to a maximum depth of 1.2m or to the depth of refusal. Soil survey positions were recorded as waypoints using a handheld Global Positioning System (GPS). At each observation point, the South African Taxonomic Soil Classification System, was used to describe and classify the soils.

Key Findings and Recommendations

The following key findings were made:

- According to 'The vegetation of South Africa, Lesotho and Swaziland', the Klipspruit Colliery Mining Rights Area falls within the Eastern Highveld Grassland and the Rand Highveld Grassland vegetation types;
- The majority of the Klipspruit Colliery Mining Rights Area falls within the quaternary catchment B20G, with wetlands associated with the Saalboomspruit, a tributary of the Wilge River. The south-western portion of the site falls within the B11F catchment, which is bisected by the Olifants River, and a small portion at the north-east of the site occurs within the catchment B11G. Both quaternary catchments are regarded as Largely Modified, according to the Department of Water and Sanitation (DWS);

- The study area comprises of Land type Ba and Bb indicates land in which red and/or yellow brown apedal soils that are dystrophic and/or mesotrophic, dominate over red and/or yellow-brown eutrophic soils. Soils observed during the survey include Witbank, Hutton, Clovelly, and Longlands.
- The dominant land capability classes in the project area were medium, high, and very-high (06 – 15), and soil types ranged from moderately suitable such as Hutton and Clovelly to less suitable for crop production such as Longlands and Fernwood soils.
- The project site is dominated by the presence of high potential agricultural soils such as Hutton, Clovelly, Pinedene and Oakleaf soils, which represent 60% of the totalarea. Forty percent of the project area consists of wetland soils. The Hutton, Avalon, Pinedene, Oakleaf and Clovelly soil types present within the project site can all be stripped and stockpiled together because the inherent soil properties are similar. The soil types are dominated by deep well drained red and yellow soils;
- However the Avalon and Longlands soils do contain a soft plinthic layer in the subsoil. This soft plinthic layer should not be stripped with the brown Avalon and grey Longlands subsoil, because this layer hardens to a rock like consistency when exposed to air. Fernwood wetland soils should be stripped, if allowed and agreed upon by the authority, and stockpiled separately from all other soils.
- Arable Class II and the remaining 2% Arable Classes III and IV.The project area is located within existing commercial farm land and the land use is dominated by 57% grazing and 42% arable crop.

Underground mining has commenced within the Pit BD boundary and the mining method being utilised is bord and pillar mining. The inclusion of the bord and pillar mining method was to ensure optimal extraction of areas that are not profitable by OC method due to high strip ratio. An adit has been developed from the pit BD highwall which provides access to the UG workings, as such all the required infrastructure is already in place except for additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. The strategic positions in which the additional ventilation shafts and rescue boreholes will be located have not been specified.

No construction is expected to take place onsite, as such potential impacts to the agroecosystems are expected to occur during the operational and decommissioning stages of the mine. Some of the identified risks to the agro-ecosystem include:

- Soil Compaction and Erosion;
- Hydrocarbon Pollution;
- Decommissioning of Infrastructure and Rehabilitation of Impacted Areas
- Subsidence

The highest risk to the integrity of agroecosystems onsite during and post mining is the potential for subsidence as underground workings are expected to be located approximately 25m below the ground surface with a mining height cut-off at 1.5m.

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List of Abbreviations and Acronyms

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)
CEC	Cation Exchange Capacity
DAFF	Department of Agriculture, Forestry and Fisheries
DALRRD	Department of Agriculture, Land Reform and Rural Development
DMRE	Department of Mineral Resources and Energy
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
GN	Government Notice
ha	Hectares
IFC	International Finance Corporation
km	Kilometers
KPS	Klipspruit Colliery
KPSS	Klipspruit South
KPSX	Weltevreden and Grootpan referred to as Klipspruit Extension
LoM	Life of Mine
LSU	Large stock unit
MR	Mining Right
MPRDA	Mineral and Petroleum Resources Development Act (Act No. 28 of 2002)
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NDM	Nkangala District Municipality
NWA	National Water Act, 1998 (Act No. 36 of 1998)
RoM	Run of Mine
SACNASP	South African Council for Natural Scientific Professions
WMA	Water Management Area
WUL	Water Use License

1 Introduction

Seriti Power (Pty) Ltd ("Seriti Power") is the holder of a Mining Right for coal in respect of its Klipspruit Colliery ("KPS") operation issued under the Department of Mineral Resources and Energy ("DMRE") (Ref No. MP 30/5/1/2/2/125 MR).

KPS consists of three mining areas under a single Mining Right. These areas are referred to as:

- KPS Main Pit which includes the Main Pit, Smaldeel and Bankfontein Pits;
- "KPSX" or Klipspruit Extension Weltevreden including Pit BD, Pit H, Pit G and Pit S; and
- "KPSS" or Klipspruit South which includes the KPSS East of the Thungela conveyor and the KPSS West of the Thungela conveyor.

KPS Main Pit holds an Environmental Management Programme Report ("EMPr"), converted in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) ("MPRDA") and approved on 14 September 2010 and the EMPr for KPSS and KPSX (Pit BD) which was approved on 17 August 2017. KPS was further awarded an Environmental Authorisation ("EA") for the Opencast ("OC") mining of Pit H in October 2022. In August 2023, an EA was granted for the OC mining of Pit G & S.

In October 2022, KPS was granted a Section 102 ("S102") amendment approval as contemplated under the MPRDA to convert the mining method for KPSX and KPSS from opencast ("OC") to underground ("UG") bord and pillar mining. A subsequent amendment application for the EA was submitted to the DMRE on the 18th August 2023 as provided for under Regulation 29 of the NEMA Environmental Impact Assessment ("EIA") Regulations ("GNR 326"), for the conversion of the mining method from OC to UG of the area within KPSX named Pit BD. The approval of this EA is still pending.

KPS intends to apply for a change in mining method to the remainder of the KPSX and KPSS reserves from OC to UG (including all future mining areas of KPSX that fall outside of the Pit BD and inclusive of Pit H). This project has been termed and will for the purposes of this application be referred to as, the "Nwabu Project".

KPS intends on applying for an EA and an Integrated Water Use License ("IWUL") for proposed change in mining method to KPSX and KPSS. The application process to be followed in terms of NEMA, for the additional activities proposed across KPSX and KPSS, is a Basic Assessment ("BA") process as contemplated under Chapter 4 of GNR 326. Seriti Power is also required to apply for a Water Use Licence for the proposed amendments, in terms of Section 21 of the National Water Act, 1998 (Act No. 36 of 1998).

Niara Environmental Consultants (Pty) Ltd (Niara) has been appointed as an Independent Environmental Assessment Practitioner (EAP) to ensure compliance by undertaking the required environmental regulatory process. This report presents the findings of a specialist Agricultural Agro-Ecosystems Assessment that that forms part of the Basic Assessment (BA) and Integrated Water Use License Application (IWULA) Process. The objective of the assessment is to ensure that the sensitivity of the site to the proposed infrastructure amendments is considered, and the information provided in this report enables the competent authority to come to a sound conclusion on the impact of the proposed project on the agricultural potential of the site.

2 Project Description

Seriti Power (Pty) Ltd ("Seriti Power") is the holder of a Mining Right for coal in respect of its Klipspruit Colliery ("KPS") operation issued under the Department of Mineral Resources and Energy ("DMRE") (Ref No. MP 30/5/1/2/2/125 MR).

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2.1 Mining

KPSX was approved in 2011 with the mining of the full extent of Pit BD via the OC method. Pit H was further approved in 2023 for mining via OC method. When Seriti Power took over the operation of KPS in 2021 from South32 SA Coal Holdings, Seriti Power undertook an evaluation of all the assets obtained. The evaluation's focus was on the viability of the mine, including product market evaluations, operational optimisation and cost optimisation. This resulted in Seriti Power's change in mining strategy for the whole of KPS's remaining reserves from OC to UG. UG mining was the initial strategy for KPSS mining in 2006 but was later changed to OC in 2017 due to the economic value at the time.

2.1.1 KPSX Proposed Mining

The KPSX mining of Pit BD was amended from OC to UG in October 2022 through a S102 amendment process as contemplated under the MPRDA. The EA amendment is still outstanding. The S102 approved amendment covers the full extent of the unmined UG reserves within the KPSX (including Pit H) and KPSS mining areas as indicated in Error! Reference source not found. above. The mineable coal seams within the KPSX area are the following and the focus of the UG mining will be on the main seams as illustrated in **Figure 2-1** and **Figure 2-2**:

- 5 seam ("S5")
- 4 upper A seam ("S4A")
- 4 upper seam ("S4U")
- 4 lower seam ("S4L")
- 2A seam ("S2A")
- 2 seam ("S2")
- 1 seam ("S1")

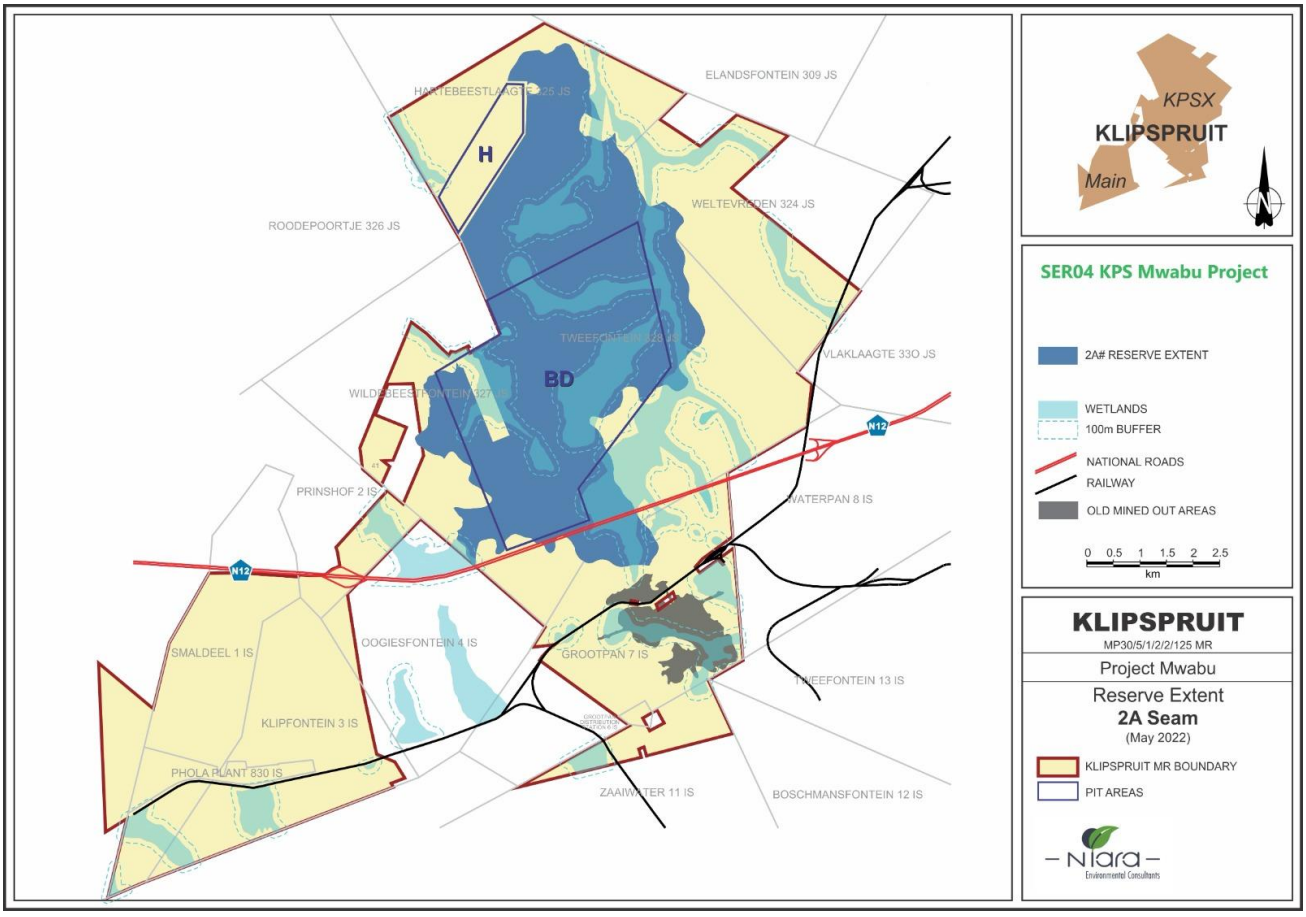

Figure 2-1: Proposed S2A mining

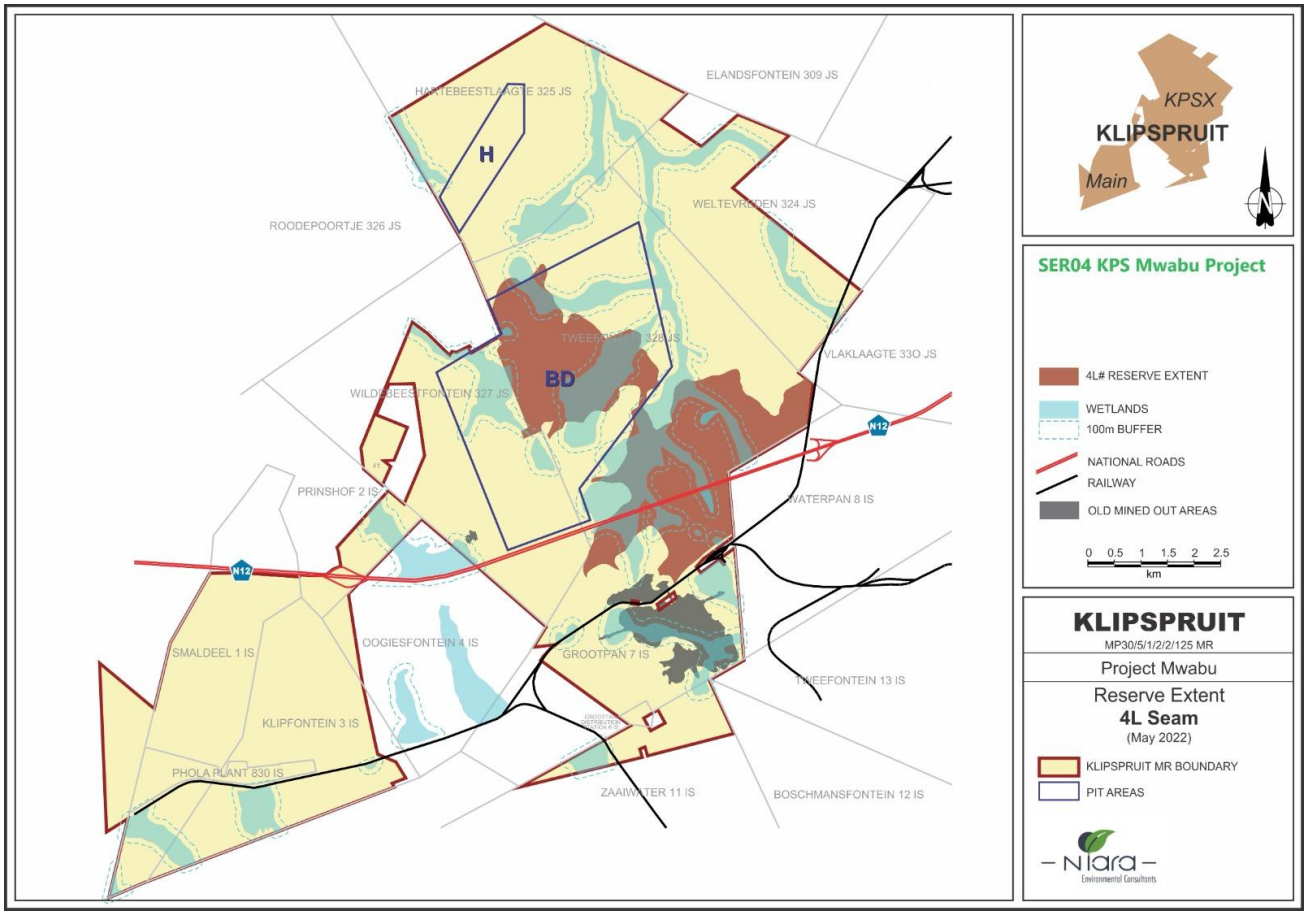

Figure 2-2: Proposed S4L Mining

The mineable coal seams at KPSS will include S5, S4U, S2 and S1.

UG mining has commenced within the Pit BD boundary and the mining method being utilised is bord and pillar mining. The inclusion of the bord and pillar mining method was to ensure optimal extraction of areas that are not profitable by OC method due to high strip ratio (Seriti Power, 2022). An adit has been developed from the pit BD highwall which provides access to the UG workings. The mining will advance towards the North, East, West and Southern directions from the Pit BD boxcut area. The proposed UG mining for both KPSS and KPSX is depicted in Figure 2-3 below. The proposed UG mining will extend mining to 2042. The UG workings designs are based on the following principles for both KPSS and KPSX (Seriti Power, 2022):

- UG workings are expected to be located approximately 25m below the ground surface with a mining height cut-off at 1.5m.
- A safety factor of not less than 1.3 will be applied on all workings with a pillar survival estimated at >99% for >500 years.
- No superimposition of the pillar between S4L and S2A and superimposition of the pillar between S2A and S1 as recommended by the geotechnical study.

UG mining using bord and pillar method will be conducted using a Continuous Miner ("CM") with parallel roadways in the direction of the advance. Perpendicular roads called splits will be developed at predetermined intervals to parallel roads. This road interlinks are the ones that create the pillars. The following activities form part of the board and pillar mining method (Seriti Power, 2022):

- Coal cutting and loading: The CM uses the rotating drum to cutting head, equipped with cutting picks to cut the coal face. The loading mechanism collects the broken coal and delivers it onto the gathering arm, which loads the coal on the CM's chain conveyor. The CM's conveyor transports the broken coal from the front to the rear of the CM. The CM's chain conveyor's capability of horizontal and vertical movements allows for coal loading into the shuttle car.
- Coal hauling and tipping: The loaded shuttle car is used to haul the coal to the section feeder breaker that crushes the coal and feeds it into the conveyor belt system.
- Roof support: A roof bolt machine installs the roof bolts once the CM has finished the development face and roof support is installed on a systematic basis. Roof bolts enhance the stability of the overlying roof. The spacing between roof bolts and the length of the roof bolts is determined during geotechnical studies.
- Coal transportation: The coal is transported using a conveyor belt system from the mining sections to the coal stockpile, linked with the overland conveyor on surface via the UG adit.

The strategy for the mining of the KPSS UG reserve will follow the same methodology as the one depicted above for KPSX and the UG resource will be accessed by using an adit which will be developed on the KPSS OC highwall.

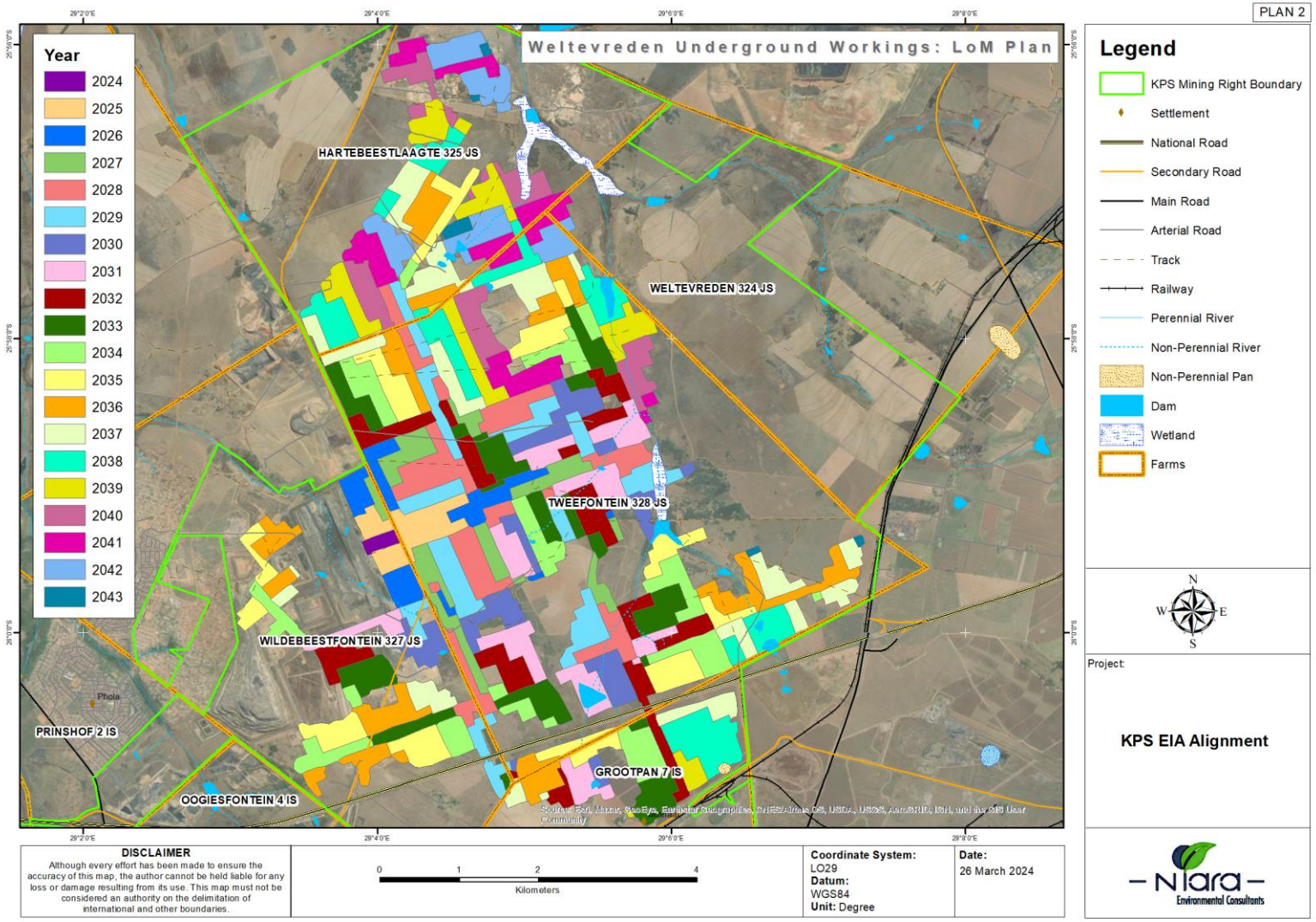

Figure 2-3: Life of Mine plan for the proposed KPSX UG mining

2.1.2 Processing

Once the coal is mined from the UG workings, it will be transported via a network of conveyors to the Phola Processing Plant ("PCPP") which is located adjacent to the KPS operation. The coal is beneficiated here resulting in various grades of quality produced. Following beneficiation at the PCPP, the coal will be transported via rail to the Richards Bay Coal Terminal for export, with a small component being retained for domestic use. Coal discard will be stored at the existing discard dump at the KPS and will be used as additional backfill material in the mining voids as part of the rehabilitation of the KPS.

2.1.3 Waste Management

All waste generated on site will be managed accordingly as per KPS' existing waste management procedures.

2.1.4 Summary of the Infrastructure Requirements

An adit has already been developed to support the UG mining at KPSX together with the supporting UG conveyors. An adit with the supporting UG conveyors will be constructed to support the UG mining at KPSS. This will be constructed on the existing KPSS OC highwall. Further, additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. To manage additional dewatering activities from the UG workings, pipelines will be constructed which will link up with existing pipelines on surface and discharge in existing pollution control dams ("PCDs"). Should there be a need in future, a storage dam might also be constructed underground. Potable water supply to the UG workings will be delivered by pipelines which will link up with the existing potable water supply from the eMalahleni Water Treatment Plant. All other existing infrastructure will be utilised to support the proposed UG mining development including PCDs, power supply, haul roads, workshops, pipelines and water supply. The layout for the infrastructure at KPSX is depicted in **Figure 2-4**.

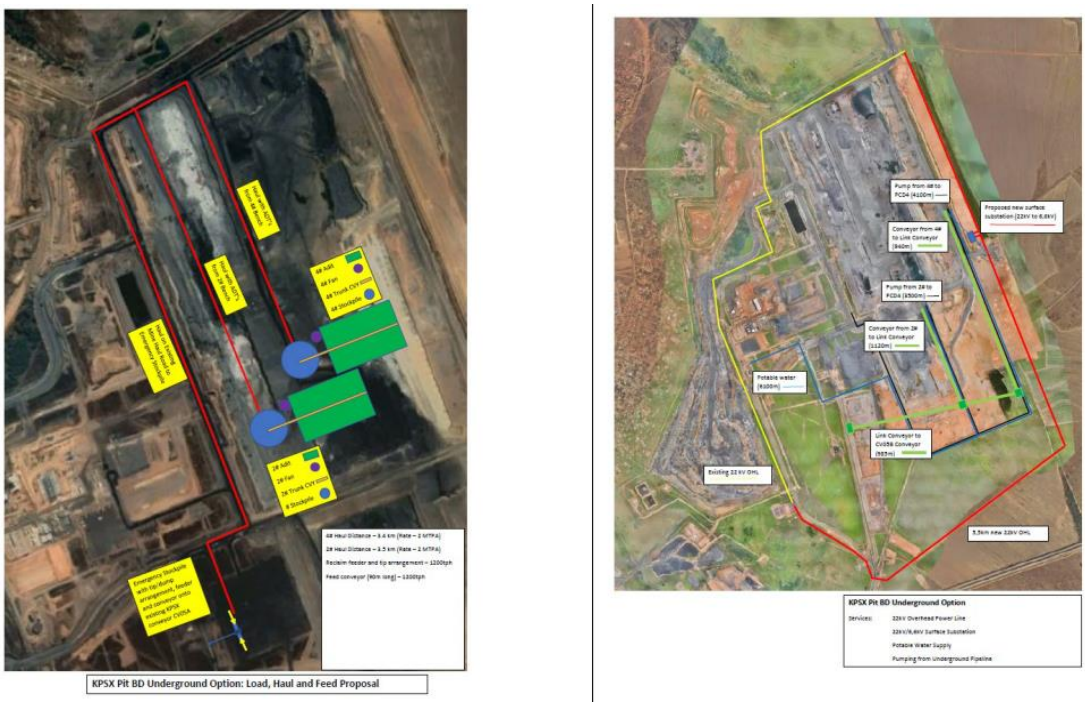

Figure 2-4: Layout for KPSX UG haul roads, pipelines, conveyor, load-haul and feed infrastructure

3 Purpose and Objectives

The overarching purpose of the Agricultural Agro-Ecosystem Assessment that will be included in the Basic Assessment report as well as the Water Use License (WUL) Application, is to ensure that the sensitivity of the site is sufficiently considered against the proposed underground mining activities. Also, that the information provided in this report will enable the competent authority to come to a sound conclusion on the impact of the proposed project on the food production potential of the site. To meet this objective, this report must meet the following objectives:

- confirm or dispute the current land use and the environmental sensitivity as was indicated by the National Environmental Screening Tool.
- It must contain proof of the current land use and environmental sensitivity pertaining to the study field.
- All data and conclusions are submitted together with the Basic Assessment Report and Water Use License (WUL) for the proposed underground mining activities.

According to GN320, the agricultural compliance statement that is submitted must meet the following requirements:

- It must identify the extent of the impact of the proposed development on the agricultural resources;
- It has to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.

4 Legislative Framework

This section provides an overview of legislation pertaining to the undertaking of an impact assessment specific to the soils at the wetland mitigation and offset areas and surroundings.

4.1 Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)

Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that –

- Prevent pollution and ecological degradation.
- Promote conservation.
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

4.2 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)

The Conservation of Agricultural Resources Act 43 of 1983 states that the degradation of the agricultural potential of soil is illegal. The Act 43 of 1983 requires that protection of land against soil erosion and the prevention of water logging and salinization of soils means of suitable soil conservation works to be constructed and maintained;

4.3 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

The National Environmental Management Act 107 of 1998 (NEMA) requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided be minimised and remedied.

4.4 National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)

The NEM: WA defines “contaminated” in relation to land as:

“The presence in or under any land, site, buildings or structures of a substance or micro-organism above the concentration that is normally present in or under that land, which substance or micro-organism directly or indirectly affects or may affect the quality of soil or the environment adversely.”

The Contaminated Land Provisions contained in Part 8 of Chapter 4 of the NEM: WA came into effect on 2 May 2014; however, the provisions apply even if the contamination occurred before the commencement of the NEM: WA. Section 40 (1) of NEM: WA provides that no person may transfer contaminated land without informing the person to whom that land is to be transferred that the land is contaminated.

The NEM: WA identifies the status and risk of contaminated sites and provides a legal mechanism for implementation of remediation activities. Remediation interventions are generally associated with high costs necessitating a holistic, risk-based approach founded on international best practice to address remediation, irrespective of the sector of occurrence. The National Framework for the Management of Contaminated Land provides National Norms and Standards for the practical implementation of remediation activities in compliance with NEM: WA.

5 Terms of Reference

The terms of reference for this study are to fulfil the requirements of the *Protocol for the specialist assessment and reporting of environmental impacts on agricultural resources,* gazetted on 20 March 2020 in Government Notice 320 (GN320). In terms of the protocol, the level of agricultural assessment required for this site which is rated using the national web-based environmental screening tool is an Agricultural Agro-Ecosystem Specialist Assessment due to very-high sensitivity for impacts on agricultural resources. The minimum report content requirements are as follows:

- The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professionals (SACNASP).
- The assessment must be undertaken on the preferred site and within the proposed development footprint.

- The assessment must be undertaken based on a site inspection as well as an investigation of the production figures, where the land under cultivation or has been within the past 5 years and must identify:
    - The extent of the impact of the proposed development on the agricultural resources; and
    - Whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.
- 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:
    - The soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope.
    - Where applicable, the vegetation composition, available water sources as well as agro-climatic information.
    - The current productivity of the land-based on production figures for all agricultural activities undertaken on land for the past 5 years, expressed as an annual figure and broken down into production units.
    - The current employment figures (both permanent and casual) for the land for the past 3 years, as expressed as an annual figure.
    - Existing impacts on site, located on a map (e.g., erosion, alien vegetation, non-agricultural infrastructure, waste, etc).
- Assessment of impacts includes the following aspect which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:
    - Change in productivity for all agricultural activities based on the figures of the past 5 years.
    - Change in employment figures (both permanent and casual) for the past 5 years.
    - 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.

6 Data Gaps and Limitations of the Specialist Study

The following are the recognised limitations and assumptions of the Specialist study that were made during the assessment and reporting phase:

- The information provided in this report is based on information gathered from the site visit undertaken on 25th of February 2024 and information reviewed from previous studies.
- The methodologies and procedures applied during sampling and report writing are followed in the soil science community. Therefore, it is the opinion of the professional specialist that this assessment was carried out with sufficient sampling and in sufficient detail to enable the Proponent, the EAP and the Regulating Authorities to make an informed decision regarding the proposed activity.

7 Methodology

This study was conducted in three phases and the findings presented hereunder represent the soils and agricultural potential properties that were investigated at the time of site visit. The following activities have been undertaken for this study:

Phase 1: Desktop investigation and field preparation

- Historic climatic conditions.
- The terrain features.
- The base soils information from the land type database (Land Type Survey Staff, 1972 – 2006).
- The geology for the mining site.

Phase 2: Soil survey and Analysis

- Field investigation.
- Site conclusions.

Phase 3: Soil impact assessment, recommendations, and management requirements

7.1 Desktop Study and Literature Review

The desktop study for the proposed development included a review of the historical data, aerial imagery, a review of scoping report and land type data. Land Type data was used to obtain generalised soil patterns and terrain types for the project site. Land Type data exists in the form of published 1:250 000 scale maps. These maps indicate delineated areas of similar terrain types, pedosystems (uniform terrain and soil pattern) and climate (Land Type Survey Staff, 1989). The land type and historical data were then used to plan the field survey. A review of all available data and information was undertaken to determine the status quo of the soil environments on the site and the immediate surrounding areas. The Department of Agriculture, Land Reform and Rural Development (DALRRD) requires that the agricultural potential of the soils in South Africa is considered for any areas that are going to be impacted by new developments.

Niara conducted a literature review of the existing baseline data related to the soil and wetland assessments, and conceptual designs. The following sources of information were reviewed and utilised for the compilation of this report:

- Digby Wells. January 2015. Environmental Impact Assessment for KPSX: Weltevreden, Soil Survey Report. BHP2690. Billiton Energy Coal South Africa (Pty) Limited (BECSA);
- Digby Wells. July 2018. Environmental Impact Assessment and Environmental Management Programme Alignment for Klipspruit Colliery near Ogies, Mpumalanga, Soil and Land Capability Assessment Report. SOU4087. South32 SA Coal Holdings (Pty) Ltd (South32);
- Digby Wells. March 2020. Environmental Impact Assessment and Environmental Management Programme for Listed Activities Associated with the South32 Klipspruit Colliery Alignment Project, Mpumalanga Province, EIA and EMP Report. SOU4087. South32 SA Coal Holdings (Pty) Ltd (South32).

- Niara Environmental Consultants (Pty) Ltd. April 2021.Screening Report for an Environmental Authorization as Required by the 2014 EIA Regulations – Proposed Site Environmental Sensitivity, KPS EA Alignment. South32 SA Coal Holdings (Pty) Ltd.
- Niara Environmental Consultants (Pty) Ltd. July 2021. Environmental Authorisation for the Klipspruit Colliery Dragline Relocation Project near Ogies town, Mpumalanga Province: Agricultural Agro-Ecosystems Specialist Assessment. Seriti Power (Pty) Ltd

7.2 Field Survey and Soil Classification

The field assessment and soil sampling were undertaken on the 25th of February 2024. An assessment of the soils present on site was conducted as per the standard soil survey techniques and procedure (Dent and Young, 1981) and the site was traversed on foot. A hand-held soil auger was used to determine the soil form and depth, as illustrated in Figure 7-1.

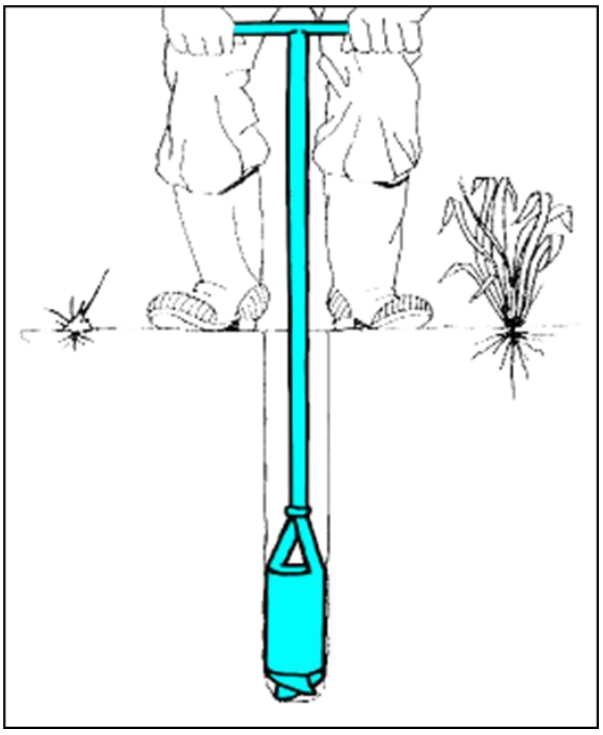

Figure 7-1: An example of a hand-held auger

Soils were investigated using a bucket auger to a maximum depth of 1.2m or to the depth of refusal. The soil forms (types of soil) found was described using the South African Soil Classification System (Soil Classification Working Group, 2018). Distinct soil and landscape features were recorded at each observation point. These included characteristics such as depth, soil colour, signs of erosion, stoniness, and drainage class.

7.3 Land Suitability

Soils were classified for land suitability based mainly on soil form, depth, and drainage. Depending on which of these were limiting, the soils would fall under one of the following suitability classes, namely very well suited (**S1**), well-suited (**S2**), moderately suited (**S3**), poorly suited (**S4**) and not suited (**N**) for the specified use (FAO, 1976).

- Class **S1** – Highly Suitable: Land having no significant limitations to sustained application of a given use, or minor limitations that will significantly reduce productivity or benefits and will not raise inputs above an acceptable level.
- Class **S2** – Moderately Suitable: Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on Class S1 land.
- Class **S3** – Marginally Suitable: Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.
- Class **N** – Not Suitable: Land having limitations which appear so severe as to preclude any possibilities of successful sustained use of the land in the given manner.

The second category, the subclass, is a grouping of capability units having similar kinds of limitations and hazards. Four general kinds of limitations or hazards are recognized: (1) Erosion hazard (e), (2) wetness (w), (3) rooting zone limitations (s), and (4) climate (c).

7.4 Land capability

Land capability was determined by assessing a combination of soil, terrain, and climate features. Land capability is defined by the most sustainable land use under rain-fed conditions. The land was rated into fifteen (15) land capability evaluation values (Table 7-1) and these values rage from 1 – 15 in order of increasing agricultural potential based on limiting factors that include erosion hazard, excess, soil root zone and climatic limitations (Davidson, 1992) and is based on a spatial evaluation modelling approach and a raster spatial data layer (DAFF, 2017). The land capability of the wetland mitigation and offset strategy project was compared to the National Land Capability which was refined between 2014 and 2016.

Table 7-1: Land Capability Classes (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

Land Capability Evaluation Value	Land Capability Description
7	
8	Moderate
9	Moderate to High
10	
11	High
12	High to Very High
13	
14	Very High
15	

7.5 Land Use/Cover

The current land use was identified using imagery during the desktop assessment and verified through on-site visual inspection. The land use was classified as built-up areas, waterbodies, wetlands, grassland, mines, and quarries, and cultivated areas.

7.6 Irrigation Potential

For sustainable irrigation of the land, the soils need to have specific properties to prevent water logging and salinisation. These properties include depth of the soil, texture, structure, chemical properties and as well as water infiltration of the soil. Soil depth provides the volume of soil material for root development, water storage and nutrient uptake. Effective soil depth can be considered as the depth freely permeable to plant roots and water. The derived Irrigation Potential Classes used in terms of soil depth are:

- **Class 1** – 900 to 1500 mm
- **Class 2** – 600 to 900 mm
- **Class 3** – 300 to 600 mm
- **Class 4** – 150 to 300 mm
- **Class 5** – 0 to 150 mm

The irrigation classes are defined as follows:

- **Class 1** – Highly suitable for irrigation with few or no limitations or preconditions. Topography is flat, soils are well drained, of moderate permeability and are deep, medium textured with good available water holding capacity.
- **Class 2** – Suitable for irrigation with slight limitations such as undulating topography, moderately well drained soils, moderately slow or moderately rapid permeability or moderate depth of soil.
- **Class 3** – Low suitability with moderately severe limitations such as significantly rolling topography, imperfect, or somewhat excessively drained soils, slow or rapid permeability, or shallow soils.
- **Class 4** – Not suitable for irrigation under most conditions with severe limitations.

- **Class 5** – Soils with severe limitations, not recommended at all, such as soils in natural waterways, soils in the river floodplain, soils presently eroded or soils showing the presence of any permanent or potential water table.

8 Sensitivity Analysis of the Site According to the Environmental Screening Tool

The result of the screening of the proposed site showed that the area has very-high combined agricultural sensitivity as illustrated in **Error! Reference source not found.**. However, the area has been impacted by mining activities (opencast) and has resulted in the loss of natural topography and drainage patterns, loss of natural soil form and horizon sequences that cannot be reconstructed similarly loss of original fertility and exposure of soils to compaction, erosion, pollution, and chemical alteration of nutrients. Sensitivity features include:

- High – Land capability 06 to 10 (Low – High).
- High – Old fields, annual crop cultivation/ Planted pastures rotation.
- Medium – Land Capability 06 to 08 (Low – Moderate).
- Very High – Land capability 11 to 15 (High – Very High).
- Very High – Pivot irrigation, Land capability 06 to 10 (Low – High).

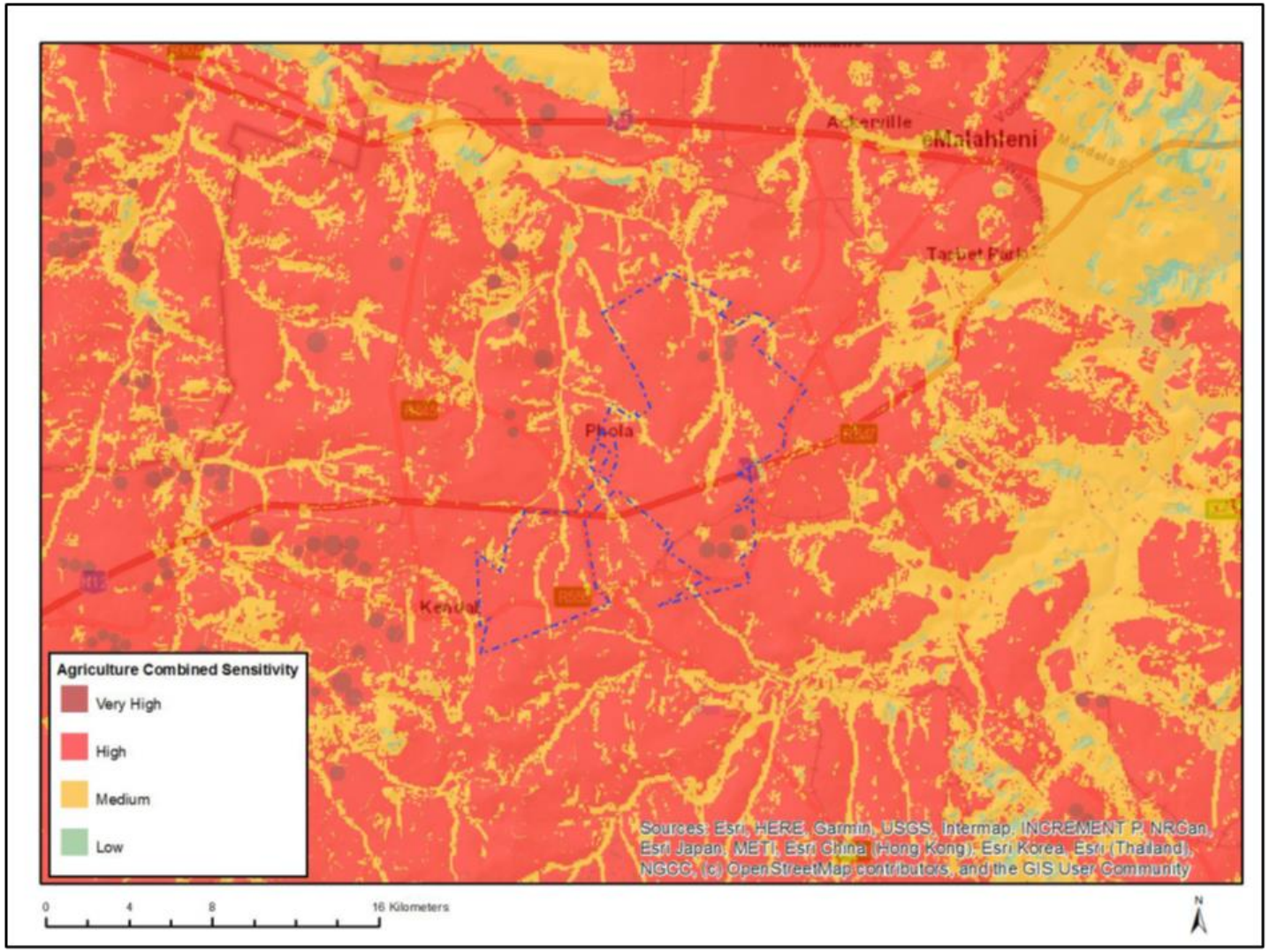

Figure 8-1: Agricultural Combined Sensitivity of the Proposed KPS Project (Source: Environmental Screening Tool)

9 Impact Assessment Methodology

The impact significance rating process serves two purposes: firstly, it helps to highlight the critical impacts requiring consideration in the management and approval process; secondly, it shows the primary impact characteristics, as defined above, used to evaluate impact significance. Five factors need to be considered when assessing the significance of community health impacts, namely:

- Relationship of the impact to **temporal** scales (duration) - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Relationship of the impact to **spatial** scales - the spatial scale defines the physical extent of the impact.
- The severity of the impact - the **severity/beneficial** scale is used to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.
- The severity of impacts can be evaluated with and without mitigation to demonstrate how serious the impact is when it is not allayed. The word 'mitigation' means not just 'compensation' but includes concepts of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
- The **likelihood** of the impact occurring - the likelihood of impacts taking place because of Project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g., loss of vegetation), but other impacts are not as likely to occur (e.g., vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.

Each criterion is ranked with scores assigned as presented in **Error! Reference source not found.** to determine the overall **significance** of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the consequence and likelihood are then read off the matrix presented in **Error! Reference source not found.** to determine the overall significance of the impact. The overall significance is either negative or positive.

The ***environmental significance*** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.

9.1 Prioritisation of Impacts

Negative impacts that are ranked as being of **"VERY HIGH" and "HIGH**" significance will need to be investigated further to determine how the impact can be minimised or what alternative activities or mitigation measures can be implemented. These impacts may also assist decision makers i.e., numerous HIGH negative impacts may bring about a negative decision.

For impacts identified as having a negative impact of **"MODERATE"** significance, it is standard practice to investigate alternate activities and/or mitigation measures. The most effective and practical mitigations measures will then be proposed.

For impacts ranked as **"LOW"** significance, no investigations or alternatives will be considered. Possible management measures should be investigated to ensure that the impacts remain of low significance.

Table 9-1: Ranking of Evaluation Criteria

EFFECT	**Temporal Scale (Duration)**			**Score**
	Short term	Less than 5 years		1
	Medium term	Between 5-20 years		2
	Long term	Between 20 and 40 years (a generation) and from a human perspective also permanent		3
	Permanent	Over 40 years and resulting in a permanent and lasting change that will always be there		4
	Spatial Scale			
	Localised	At localised scale and a few hectares in extent		1
	Study Area	The proposed site and its immediate environs		2
	Regional	District and Provincial level		3
	National	Country		3
	International	Internationally		4
	Severity	**Severity**	**Benefit**	
	Slight	Slight impacts on the affected system(s) or party(ies)	Slightly beneficial to the affected system(s) and party(ies)	1
	Moderate	Moderate impacts on the affected system(s) or party(ies)	Moderately beneficial to the affected system(s) and party(ies)	2
	Severe/ Beneficial	Severe impacts on the affected system(s) or party(ies)	A substantial benefit to the affected system(s) and party(ies)	4
	Very Severe/ Beneficial	Very severe change to the affected system(s) or party(ies)	A very substantial benefit to the affected system(s) and party(ies)	8
LIKELIHOOD	**Likelihood**			
	Unlikely	The likelihood of these impacts occurring is slight		1
	May Occur	The likelihood of these impacts occurring is possible		2
	Probable	The likelihood of these impacts occurring is probable		3
	Definite	The likelihood is that this impact will definitely occur		4

* In certain cases, it may not be possible to determine the severity of an impact thus it may be determined: Do not know/ cannot know.

Table 9-2: Matrix used to Determine the Overall Significance of the Impact Based on the Likelihood and Effect of the Impact

Likelihood		Effect													
		3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	2	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	3	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	4	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Table 9-3: Description of Environmental Significance Ratings and Associated Range of Scores

Significance Rating	Description	Positive	Negative
Low	An acceptable impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in either positive or negative medium to short term effects on the social and/or natural environment.	4-7	4-7
Moderate	An important impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.	8-11	8-11
High	A serious impact, if not mitigated, may prevent the implementation of the Project (if it is a negative impact). These impacts would be considered by society as constituting a major and usually a long-term change to the (natural &/or social) environment and result in severe effects or beneficial effects.	12-15	12-15
Very High	A very serious impact which, if negative, may be sufficient by itself to prevent implementation of the Project. The impact may result in permanent change. Very often these impacts cannot be mitigated and usually result in very severe effects, or very beneficial effects.	16-20	16-20

10 Description of the Baseline – Agro-Ecosystem

This section provides a description of the receiving environment and existing conditions on and in the vicinity of the proposed project components.

10.1 Climate

The study area is situated in the Olifants Water Management Area 4 (WMA 4) within the B20G quaternary catchment, and small portions of B11F and B20F. The topography of the project area and surrounds is undulating with numerous ridges and valleys. The study area is situated in the Highveld Region of the Mpumalanga Province at an approximate elevation of 1596 meters above mean sea level (mamsl).

The region is characterised by warm to hot summers and cool to cold winters. Showers and thunderstorms occur during the summer months (October – Mar) and the winter months are normally arid and cold (June – August). The annual rainfall ranges from 2 to 100mm as illustrated in Figure 10-1. The seasonality of the rainfall, showing the highest rainfall during October, November, December, and January. The maximum average temperature in summer is 27°C and in winter is 18°C. The minimum average temperatures 14°C in summer to just below 2°C in winter, as illustrated in Figure 10-2. According to the Mpumalanga Biodiversity Sector Plan Handbook (Lötter et al., 2014), there has already been notable shifts in climate in terms of increased average temperatures in Mpumalanga. Heat waves are becoming more frequent while cold days, nights and frost are becoming less frequent.

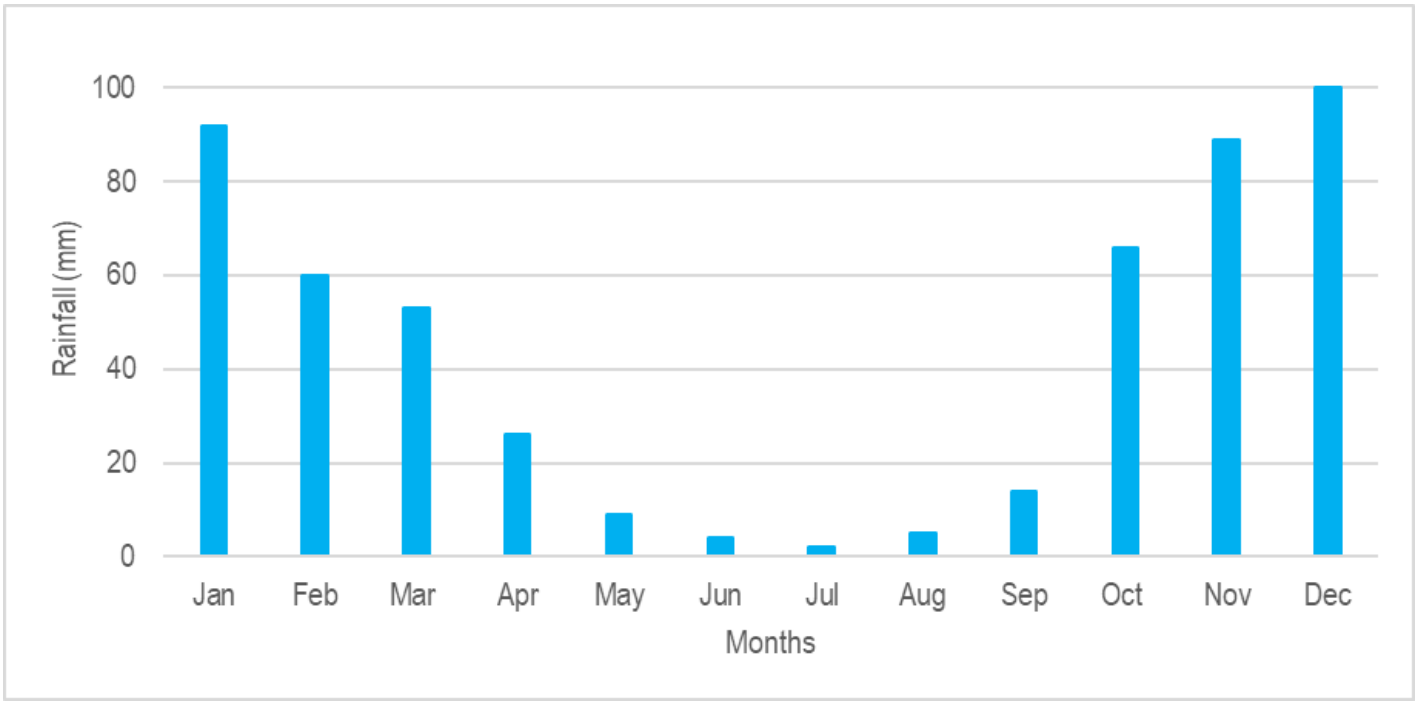

Figure 10-1: Average monthly rainfall for Ogies

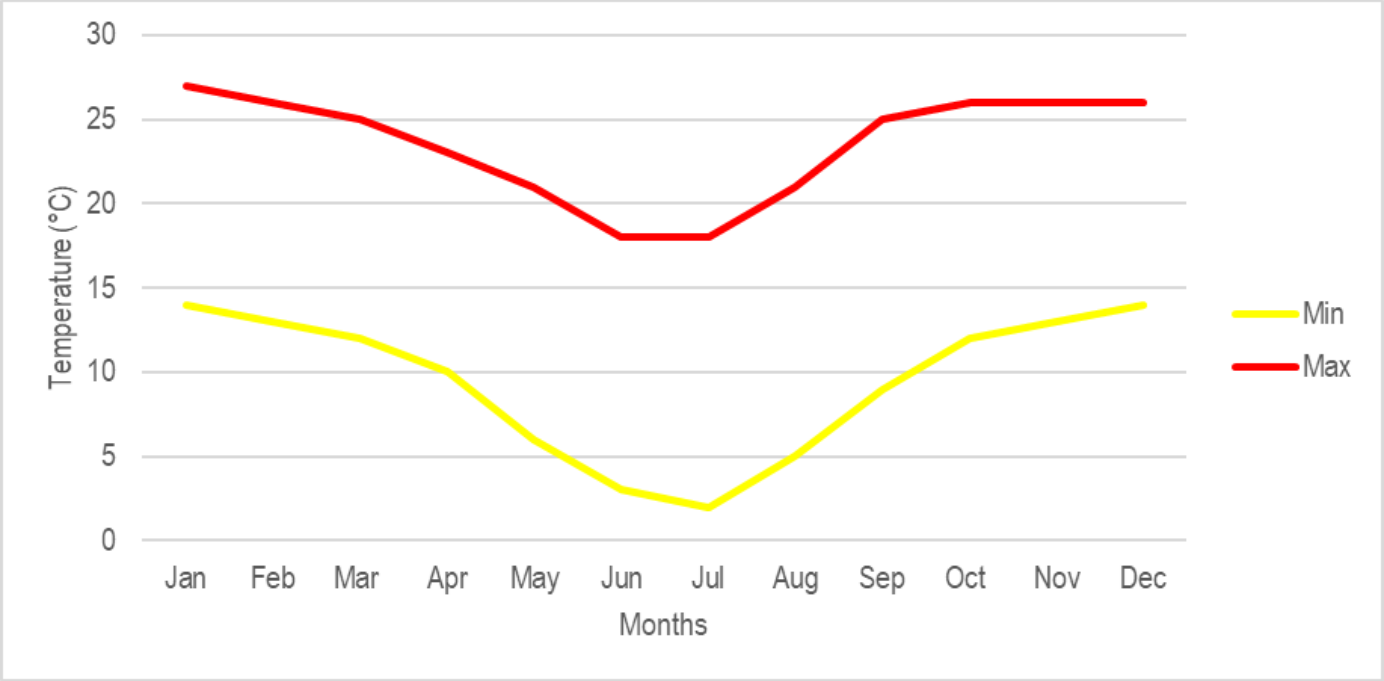

Figure 10-2: Average temperature for Ogies

10.2 Quaternary Catchment

The water resources of South Africa have been divided into Quaternary Catchments, which are regarded as the principal water management units in the country (DWAF 2011). A Quaternary Catchment is a fourth order catchment in a hierarchical classification system in which the primary catchment is the major unit. The majority of the study area falls within the quaternary catchment B20G, with wetlands associated with the Saalboomspruit, a tributary of the Wilge River. The south-western portion of the site falls within the B11F catchment, which is bisected by the Olifants River, and a small portion at the north-east of the site occurs within the catchment B11G. The quaternary catchments are regarded as Largely Modified, according to the Department of Water and Sanitation (DWS).

The water systems associated with the study area are all linked to the Olifants River and fall within the greater Olifants River catchment. The Quaternary catchments are represented in Figure 10-3. Owing to the cumulative impacts on the Olifants River, as well as its link to important habitats in the Kruger National Park (KNP), the DWS has recently placed significant emphasis on the importance of conservation of watercourses associated with this catchment.

The pan / depression wetlands on site fall within the Eastern Temperate Freshwater Wetlands vegetation type, according to Mucina and Rutherford, 2006. This vegetation type is regarded as one of the most important habitats in Mpumalanga (Fourie *et al.* 2014).

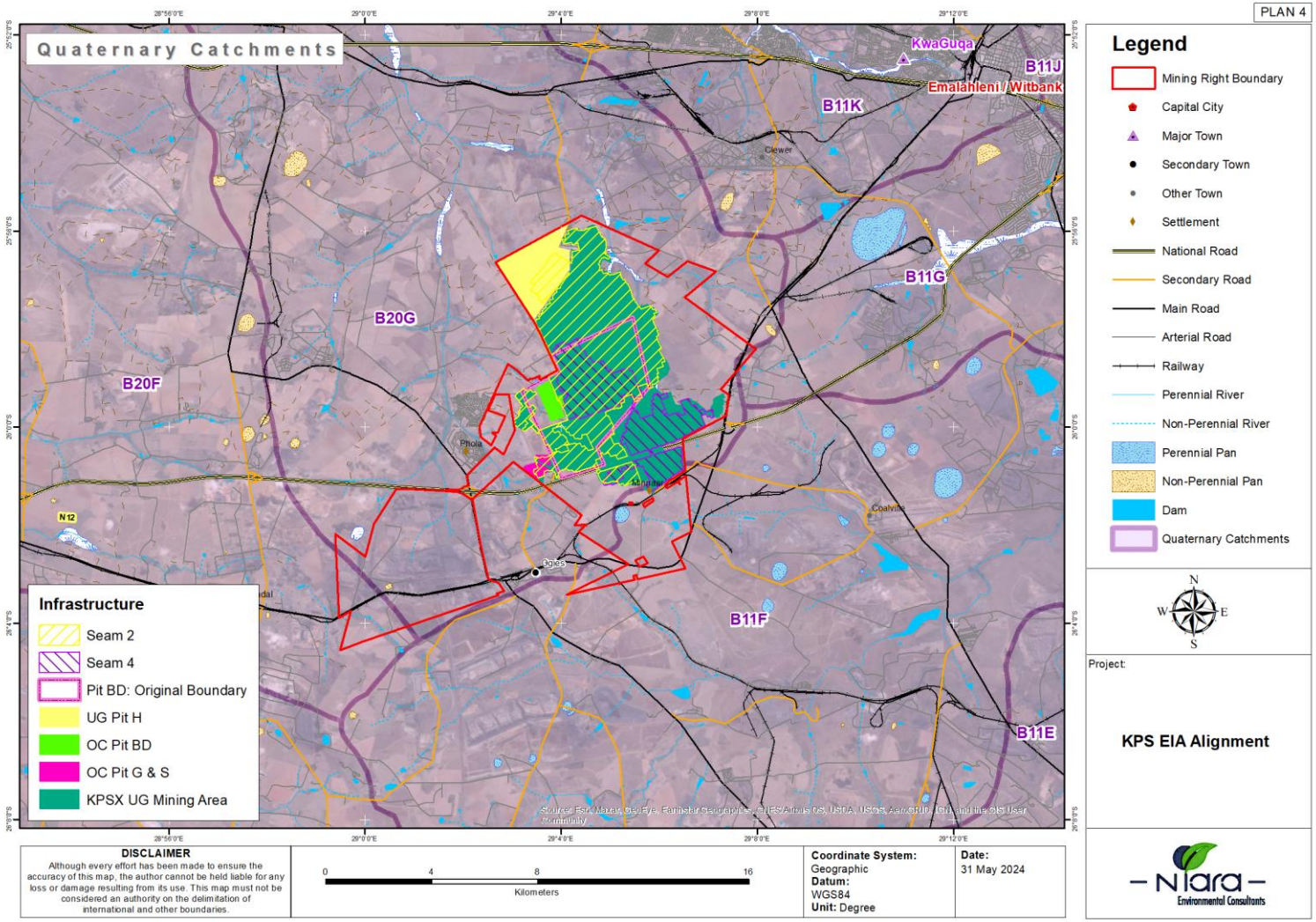

Figure 10-3: Quaternary Catchments

10.3 Geology

Klipspruit reserve falls within the Springs-Witbank coalfield. The lithological profile is comprised of soft overburden, hard overburden, No. 5 coal seam, Inter burden, No. 4U coal seam, Interburden, No. 4L coal seam, Interburden, No. 3 coal seam; Inter burden, No.2 coal seam, Inter burden and No.1 coal seam. The main coal seams present are the No.4 and No. 2 coal seams with an average parting thickness of 12m. The interburden mainly consists of fine-grained sandstone and sandy mudstone as indicated in Figure 10-4. The west-east profile shows that the topography is fairly flat over the area. The south-north profile indicates that the topography slopes downwards from the south towards the north of the strip mine section. The west east striking Ogies Dyke is situated to the north of the R555 between the proposed strip mine and the underground mine workings. Excess base material is present in the stratigraphical units. The total sulphur percentage of all of the lithologies is moderate (0.001% - 0.846%).

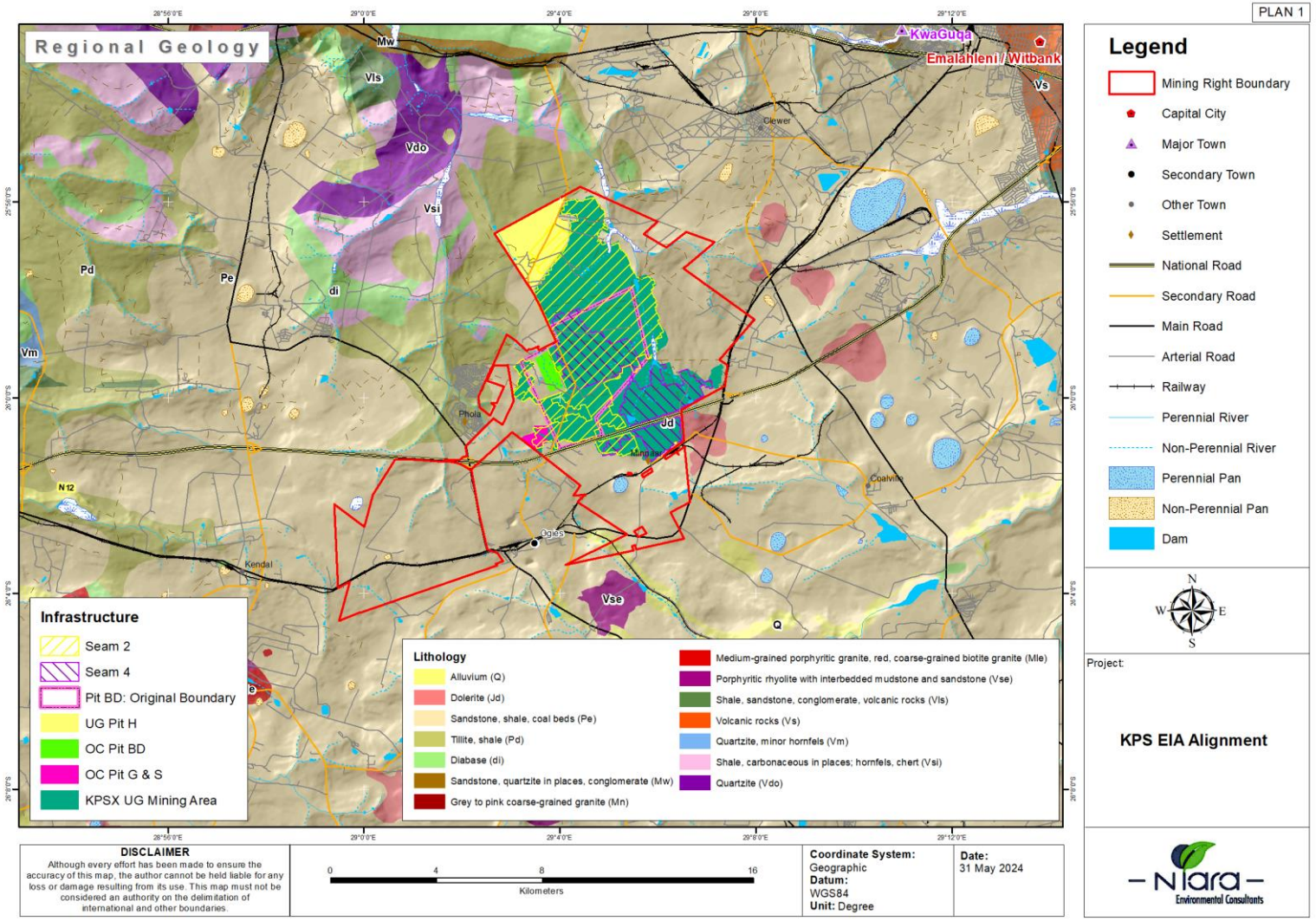

Figure 10-4: Regional Geology

10.4 Vegetation

According to 'The vegetation of South Africa, Lesotho and Swaziland', the KPS and KPSX falls within the Eastern Highveld Grassland and the Rand Highveld Grassland vegetation types (Mucina and Rutherford, 2006) (please see Figure 10-5 below). Both these vegetation types are considered to be nationally endangered with none conserved and some altered, primarily by cultivation.

The conservation status of the Eastern Highveld Grassland vegetation type is very poor with large parts that are either currently cultivated or previously ploughed, and the remaining untransformed vegetation occurs as patchy remnants that are heavily overgrazed.

Eastern Highveld Grassland occurs in the Mpumalanga and Gauteng provinces. The eastern Highveld Grassland occurs in the plains between Belfast in the east and the eastern side of Johannesburg in the west and extends southwards to Bethal, Ermelo and West of Piet Retief. The Eastern Highveld Grassland altitude ranges from 1520m to 1780m above mean sea level but also declines as low as 1300m (Mucina and Rutherford, 2006).

This vegetation type is characterized by short dense grassland, dominated by the usual highveld grass composition (Aristida, Digitaria, Eragrostis, Themeda, etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (Acacia caffra, Celtis africana, Parinari capensis, etc.).

Approximately 44% of the Eastern Highveld Grassland has already been transformed by cultivation, urban sprawl, mining, plantations and dams. This vegetation type has been afforded the status of endangered with a conservation target of 24%.

Rand Highveld Grassland occurs in Gauteng, North-West, Free State and Mpumalanga Provinces. In areas between rocky ridges from Pretoria to Witbank, extending onto ridges of the Stoffberg and Roosenekal regions as well as west of Krugersdorp cantered in the vicinity of Derby and Potchefstroom, extending southwards and northeastwards form there. Altitude ranges from 1 300m to 1 635m, but reaches 1 760m in places (Mucina & Rutherford, 2006). Rand Highveld Grassland is considered endangered. It is poorly conserved (only 1%). Small patches are protected in statutory reserves (Kwaggavoetpad, Van Riebeeck Park, Bronkhorstspruit, and Boskop Dam Nature Reserve) and in private conservation areas (e.g. Doornkop, Zemvelo, Rhenosterpoort and Mpopomeni). Almost half has been transformed mostly by cultivation, plantations, urbanisation or dam building. Cultivation may also have had an impact on an additional portion of surface area of the unit where old lands are currently classified as grasslands in land cover classifications and poor land management has led to degradation of significant portions of the remainder of this unit. Scattered aliens (most prominently Acacia mearnsii) occur in about 7% of this unit. Only about 7% has been subjected to moderate to high erosion levels (Mucina & Rutherford, 2006).

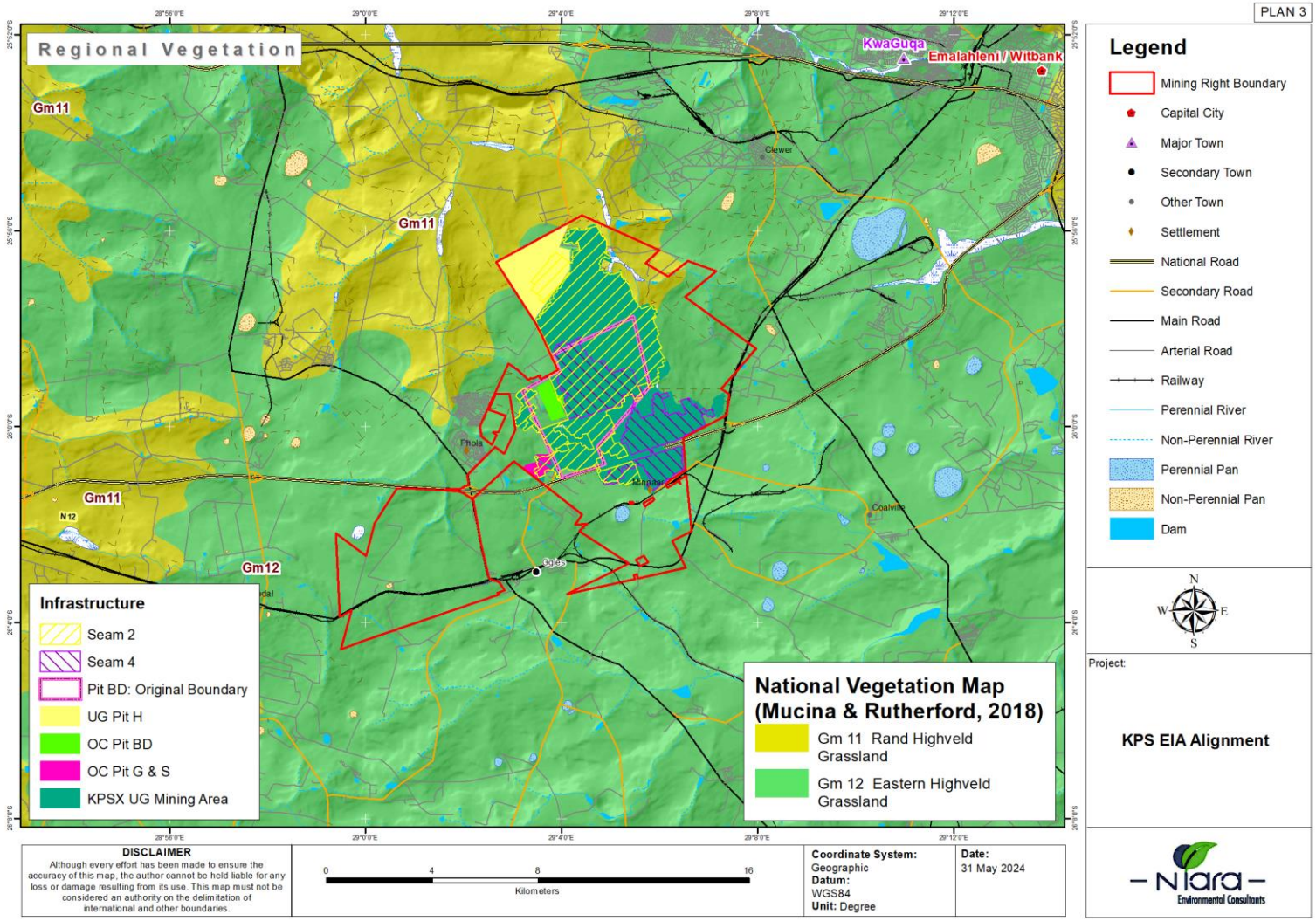

Figure 10-5: Regional Vegetation

11 Results and Discussion

Information related to the soils associated with the project area is discussed in this section.

11.1 Land Types and Soil Forms in the area

A land type survey on a scale of 1:250 000 was conducted in the early 1970s to compile inventories of the natural resources of South Africa in terms of soil, terrain, and climate. The land type indicates the dominant soil forms and their occurrence in terms of percentages. The land types that were found to be occupying the KPS and KPSX area are the Ba 4, Ba 5 and Bb 13 land types of the 2528 and 2628 Pretoria and East Rand Land Type maps (Land Type Survey Staff, 1989) as indicated in Figure 11-1. Land type Ba and Bb indicates land in which red and/or yellow brown apedal soils that are dystrophic and/or mesotrophic, dominate over red and/or yellow-brown eutrophic soils. Soils observed during the survey include Clovelly, Longlands, Hutton and Witbank soil forms as illustrated in Figure 11-2.

The Clovelly soil form is characterized by an A-horizon yellowish in colour, weak in structure without water stagnation, underlain by yellow-brown, structureless, sandy clay subsoil. The **Longlands soil form** consists of Orthic topsoil on an E horizon, over soft plinthic B subsoil. The E horizon is distinguishable by criteria, namely:

- Grey, pale yellow or white matrix colours;
- Being intermittently saturated with water;
- The depletion of iron oxides, clay, and organic matter;
- Being loose when wet and hardens and becomes brittle when dry.

The **Hutton soil form** consists of an orthic A and red apedal B over unspecified material. The Hutton soils and the Clovelly soils are well drained, usually slightly acidic, , and have a low cation exchange capacity (CEC) due mainly to clay mineral composition (kaolinite, iron oxides) and sometimes low clay content. The **Witbank soil form** (Transported Technosols), which are materials intentionally transported by human intervention and already been impacted by mining activities (open cast areas and stockpiles). The properties of these soil forms are affected strongly by the nature of the material or the human activity that placed it and they are more likely to be contaminated than soils from other groups. The **Fernwood soil form** consists of Orthic A on an E horizon. Soils with an E horizon as representing ‘Permanent or Seasonal Wetness’.

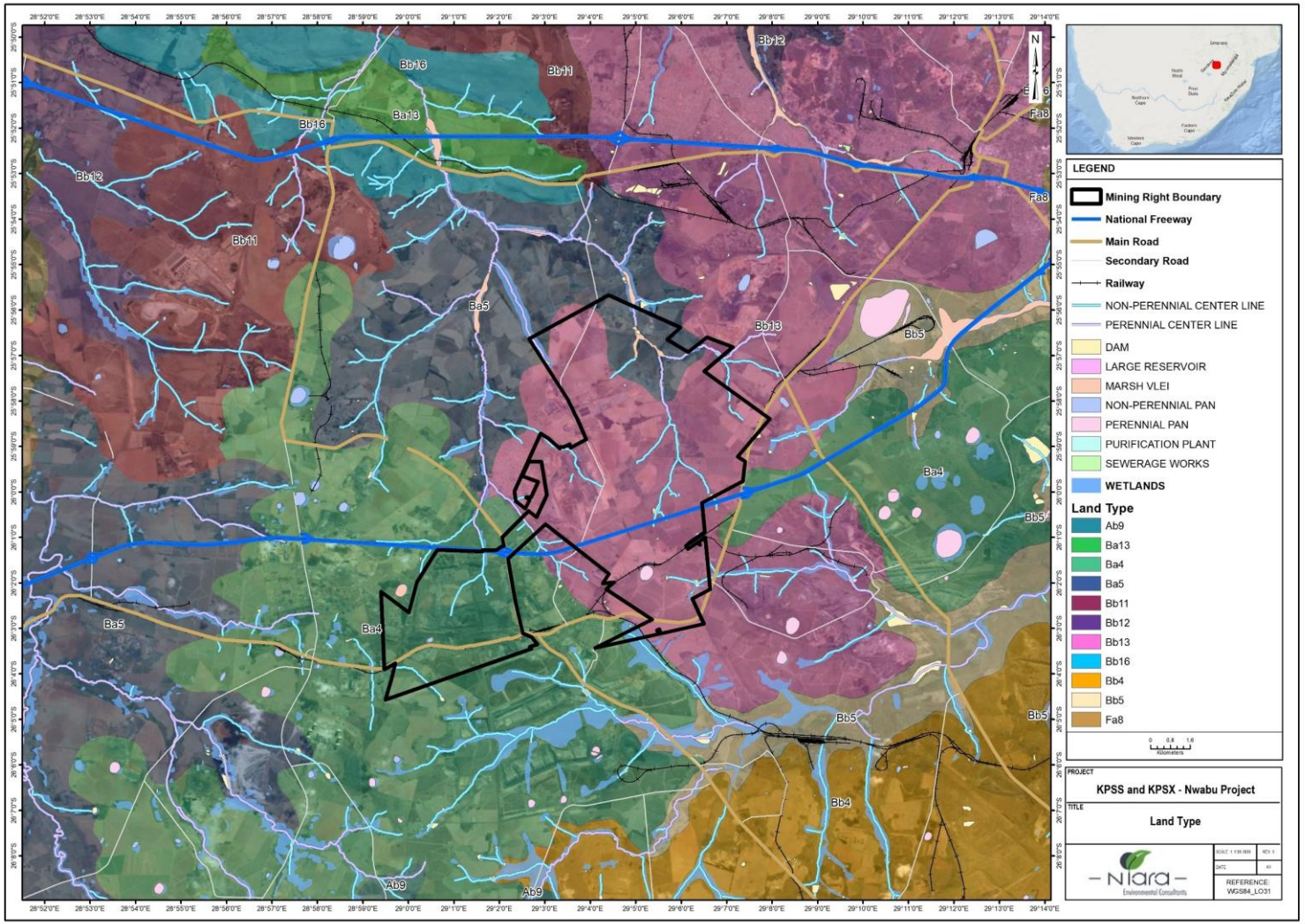

Figure 11-1: Land Types in the Vicinity of the Project Area

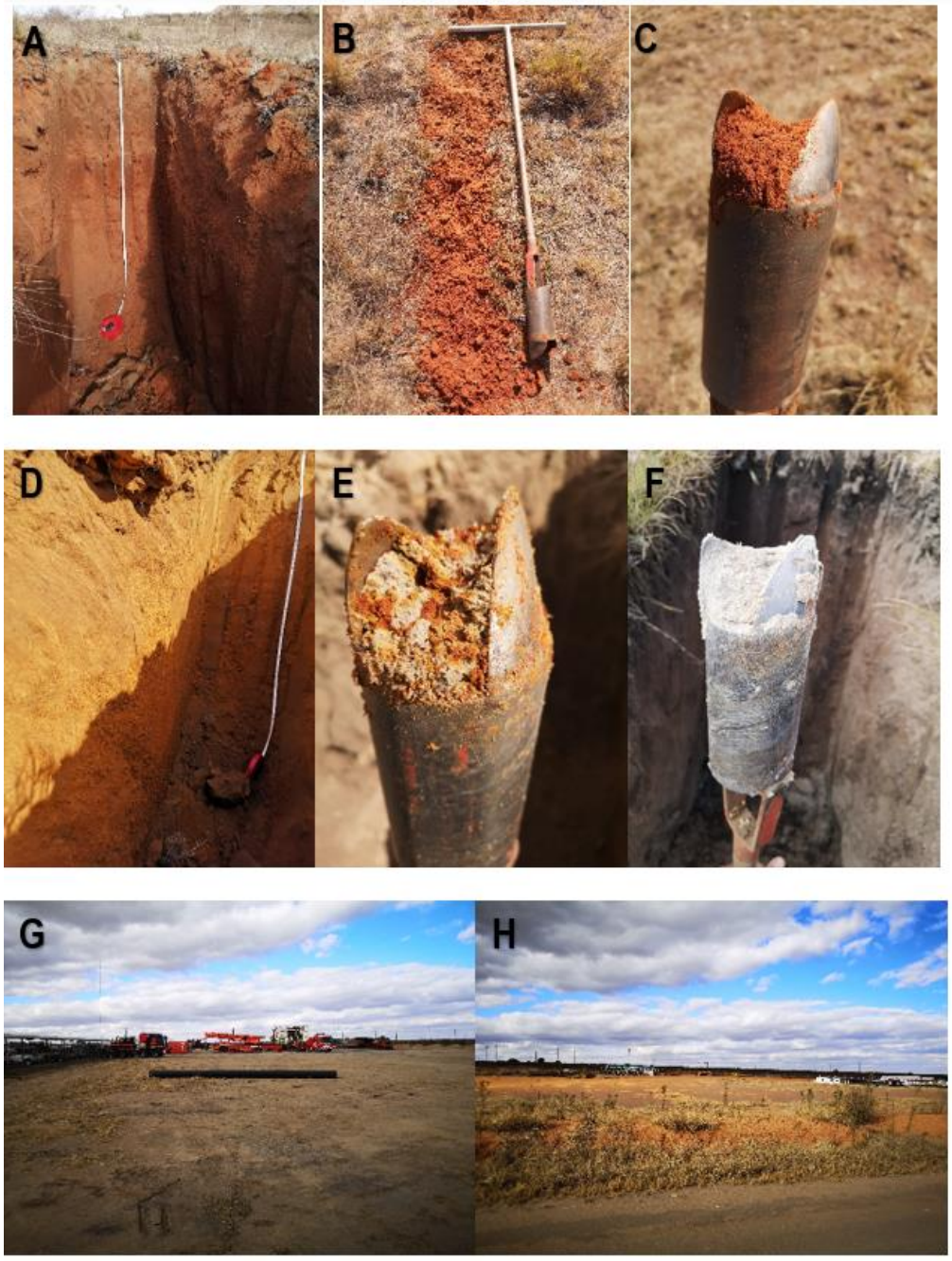

Figure 11-2: Examples of the identified soil forms: A – C) Hutton (Red apedal), D) Clovelly, E) Longlands, F) Albic & G – H) Witbank (Transported Technosols)

11.2 Dominant Soil form in Land Type Bb13 and Land Type Ba5

The proposed underground mine area is located on Land Type Bb13 and Land Type Ba5. The area occupied by the Bb 13 land type is 40 316 ha. The Bb 13 land type is, is dominated by 40 % crest and 45 % midslope positions, the remainder (15 %) is occupied by valley bottom landscape positions see the representative terrain form sketch in Figure 11-3

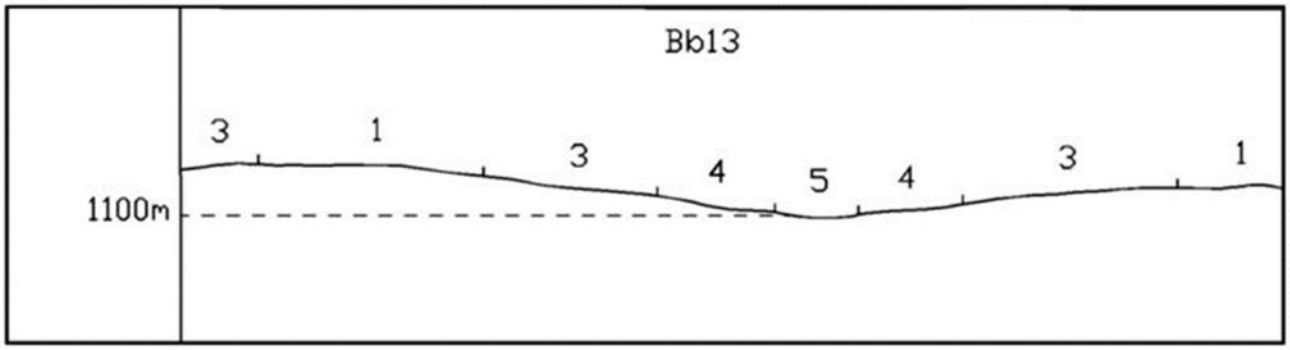

Figure 11-3: Representative terrain form sketch of land type Bb 13

The Bb13 Land type is dominated by deep well drained yellow-brown apedal soils, with about 70% of the land type having these soils; they have an average slope of around 3%. The following list of soil types occurs within the crest (40%) in this land type:

- Clovelly (Cv) – 45%
- Avalon (Av) – 15%
- Other shallow soil types such as the Glencoe (Gc) soil – 40

The following list of soil types occurs within the midslope (45%) in this land type:

- Clovelly (Cv) – 35%
- Avalon (Av) – 35%
- Other shallow soil types such as the Glencoe (Gc) soil – 30%

The land area occupied by the Ba 5 Land Type is 77 663 ha. The Ba 5 Land Type is dominated by 20% crest and 60% mid-slope terrain unit positions in the landscape. Other positions in the landscape are foot-slope and valley bottom positions occupying 15% and 5% of the landscape positions respectively see the representative terrain sketch in Figure 11-4

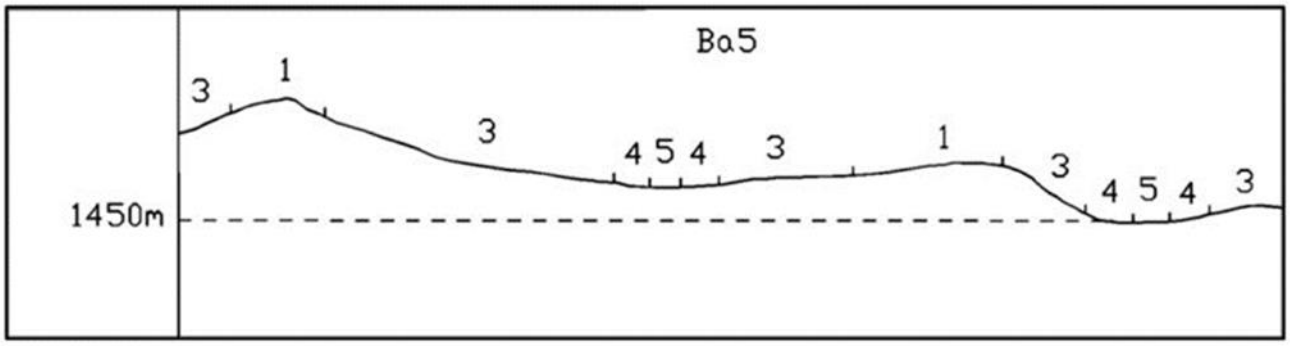

Figure 11-4: Representative terrain form sketch of land type Ba5

The Ba 5 Land type is dominated by deep well drained red/yellow-brown apedal soils, with about 60% of the land type having these soils; the average slope is estimated at 1.5 %. The following list of soil types occur within this land type in the crest (20%) of the landscape:

- Hutton (Hu) – 60%
- Clovelly (Cv) – 10%
- Shallow rocky soil – 30%

The following list of soil types occur within this land type in the midslope (60%) of the landscape:

- Hutton (Hu) – 40%
- Clovelly (Cv) – 10%
- Avalon (Av) – 10%
- Other shallow rocky soil – 40%

11.3 Soil types present within the KPSS and KPSX Underground Mining area;

The major soil types found during field surveys are presented in Figure 11-5 below. The project site is dominated by the presence of high potential agricultural soils such as Hutton, Clovelly, Pinedene and Oakleaf soils which represent 60% of the project site. Furthermore, a high percentage of the project area consists of wetland soils.

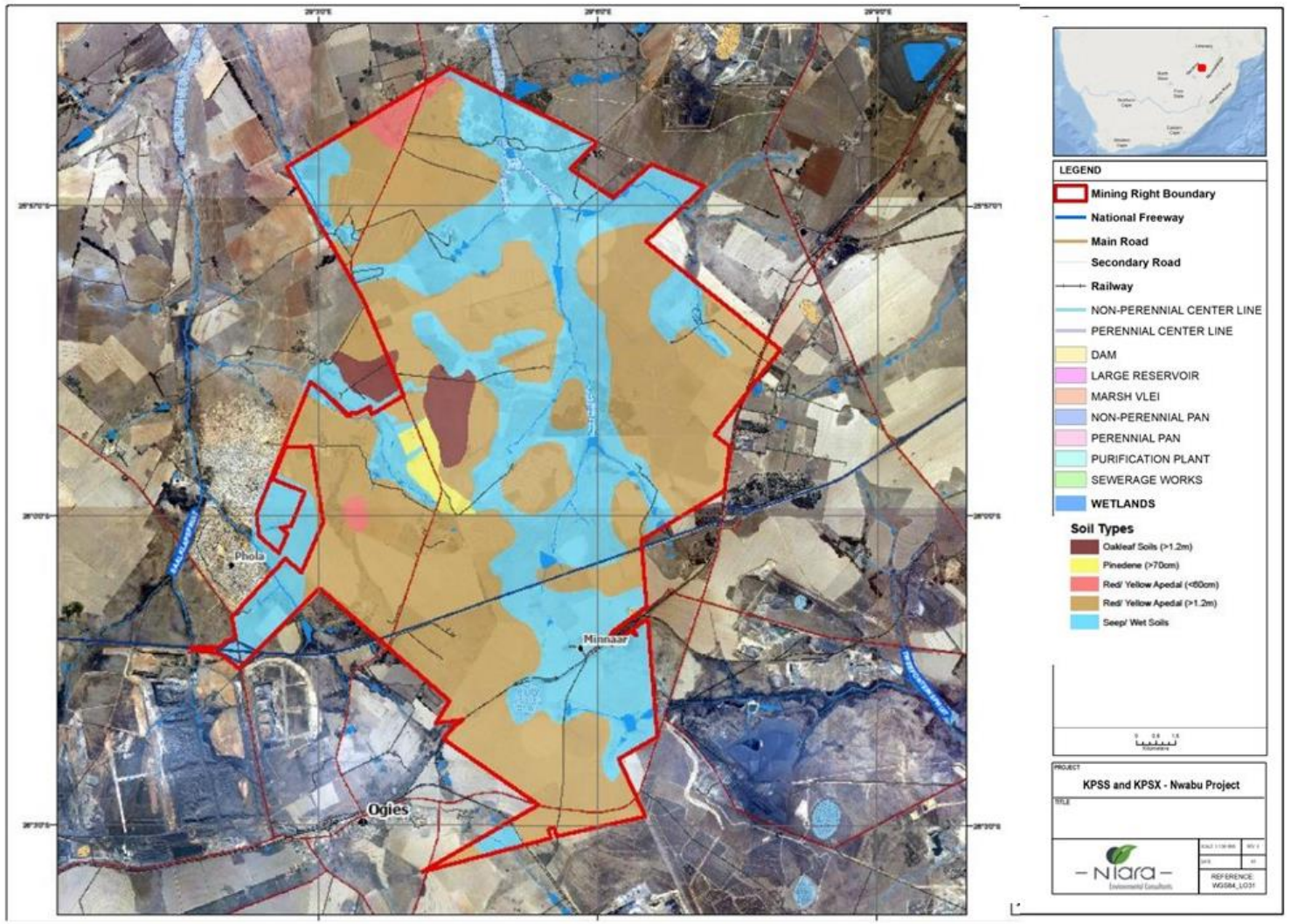

Figure 11-5: Major soil types found during the field survey in the KPS and KPSX underground mining area

11.4 Current Land use, Srrounding and Historical

Results from the field soil survey (soil form and depth) and observations made on site, were used to inform the potential and realistic land uses for the area. The most dominant land uses within the project are mining activities (Coal) as illustrated in. The other land uses surrounding the site are crop production mainly maize and other coal mines. The main impact on land use will be the change to that of mining. The cumulative impact on land use will be converting into open cast mining and infrastructure areas resulting in loss of agricultural land in that area for the mining life and after mining land can be restored. Surrounding land use can be broadly defined as arable land under cultivation on commercial farms (Dryland and Pivot Irrigated).

11.5 Baseline Soil Quality

The fertility status of the KPSS and KPSX Underground mining area is annually adjusted through fertilisation to sustain commercial crop production. Natural soils (uncultivated) within the Ogies region is expected to contain 1 – 5 mg kg-1 P in the topsoil. The high agricultural potential of the soil is proven through farmers records over the past 25 years of maize production. The estimated average yield over the 25-year period is 7 tons maize per ha on the farm. The Hutton soil occupying the higher landscape positions yields 10 tons of maize per ha, proving that the climate, soil and crop combination on this farm is ideal for maize production. Any cultivation of soils needs to take cognisance of the natural acidification process through monitoring and subsequent neutralisation of acidity through liming. No soil samples were recovered for laboratory analysis on this project due to the fact that no new mining infrastructure will be constructed as part of the project. An adit has already been developed to support the UG mining at KPSX together with the supporting UG conveyors. Only additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. As such crop production can continue without disturbance.

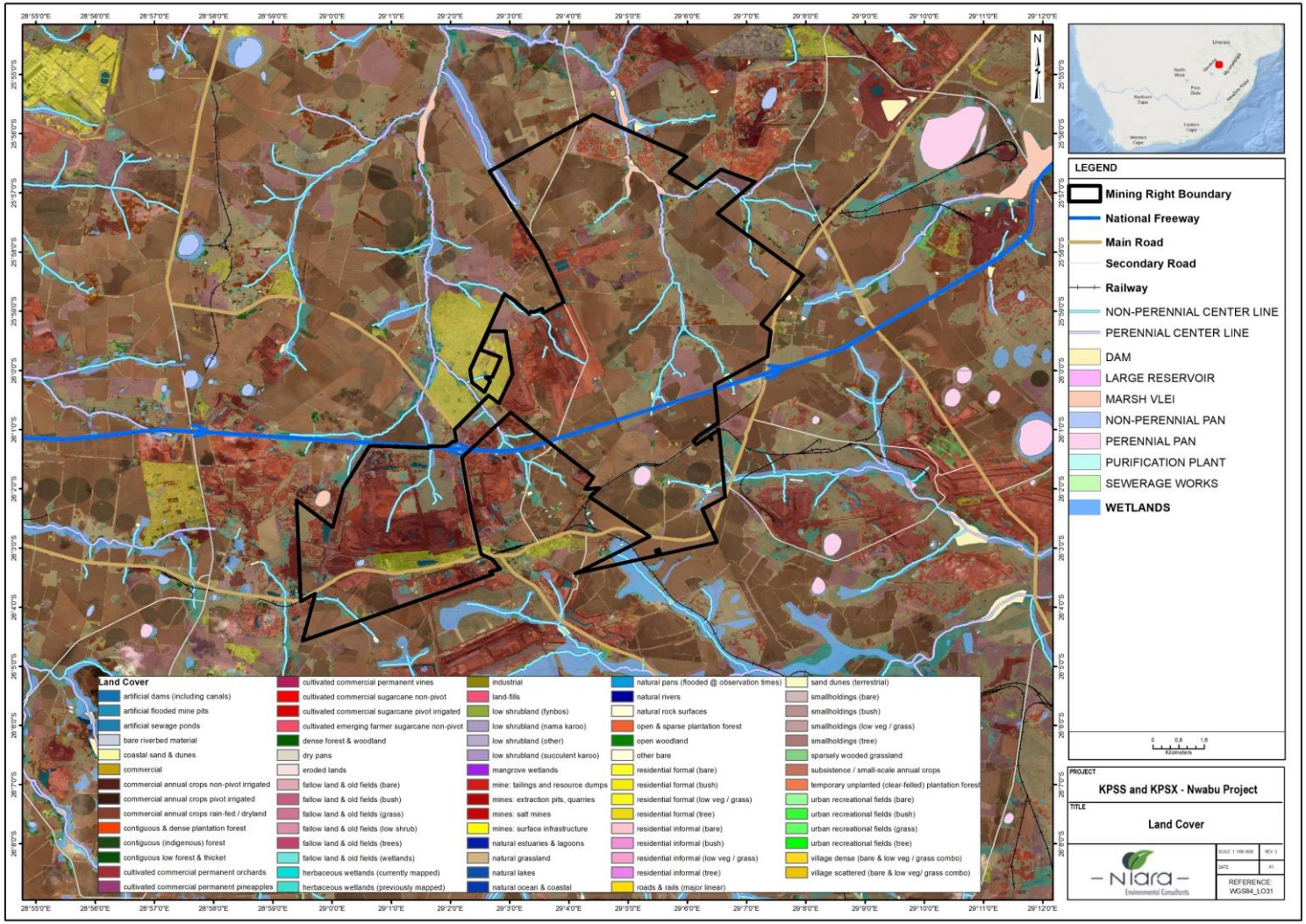

Figure 11-6: Land uses within the site and surrounding

11.6 Land Capability

Land capability is determined by a combination of soil, terrain and climatic features. Land capability classification indicates sustainable long-term use of land under rain-fed conditions while soil properties implicating limitations associated with the various land use classes are also taken into consideration. The following paragraphs contain detailed listed limitations as used in the classification of Arable Class II and Grazing Class V (wetland) land capabilities of the KPS and KPSX underground mining area.

11.6.1.1 Arable, Class II

Land in Class II has some limitations that reduce the choice of plants or require moderate conservation practices. It may be used for cultivated crops, but with less latitude in the choice of crops or management practices than Class I. The limitations are few and the practices are easy to apply

Limitations may include singly or in combination the effects of:

- Gentle slopes;
- Moderate susceptibility to wind and water erosion;
- Less than ideal soil depth;
- Somewhat unfavourable soil structure and workabability;
- Slight to moderate salinity or sodicity easily corrected but likely to recur;
- Occasional damaging flooding;
- Wetness correctable by drainage but existing permanently as a moderate limitation; and
- Slight climatic limitations on soil use and management.

Limitations may cause special soil-conserving cropping systems, soil conservation practices, water-control devices or tillage methods to be required when used for cultivated crops.

11.6.1.2 Grazing Class V

Land in Class V has little or no erosion hazard but have other limitations impractical to remove that limit its use largely to pasture, range, woodland or wildlife food and cover. Limitations restrict the kind of plants that can be grown and prevent normal tillage of cultivated crops. Pastures can be improved and benefits from proper management can be expected. Land is nearly level. Some occurrences are wet or frequently flooded. Other are stony, have climatic limitations, or have some combination of these limitations. Examples of Class V Limitations are:

- Valley bottoms subject to frequent flooding that prevents the normal production of cultivated crops;
- Nearly level land with a growing season that prevents the normal production of cultivated crops;
- Level or nearly level stony or rocky land; and

- Ponded areas where drainage for cultivated crops is not feasible but which are suitable for grasses or trees

Land capability is expected to remain the same as no new mining infrastructure will be constructed as part of the project. An adit has already been developed to support the UG mining at KPSX together with the supporting UG conveyors. Only additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. As such crop production can continue without disturbance.

12 No-Go Option

According to Department of Water of Affairs (DWAF) (2005), the permanent zone of a wetland area could potentially be Rensburg soil forms as defined by the South African Classification System (Soil Classification Working Group, 1991 & 2018). During seasonal and temporary zones of the wetland, the following soils forms are found: Longlands and Avalon (DWAF, 2005). Wetland soils, and permanent wetland areas should not be disturbed by mining activities until a Water Use License is applied for and granted by the Department of Water and Sanitation (previously known as Department of Water Affairs). Wetland soils, and rivers have high sensitivity as protected by legislation and no development can negatively impact such natural resources. Since no new mining infrastructure will be constructed as part of the project. For access, an adit has already been developed to support the UG mining at KPSX together with the supporting UG conveyors. The mined coal will be transported via a network of conveyors to the Phola Processing Plant ("PCPP") which is located adjacent to the KPS operation. Only additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. As such, the proposed KPSX and KPSS underground coal mine is not expected to result in any disturbance of wetlands and wetland soils.

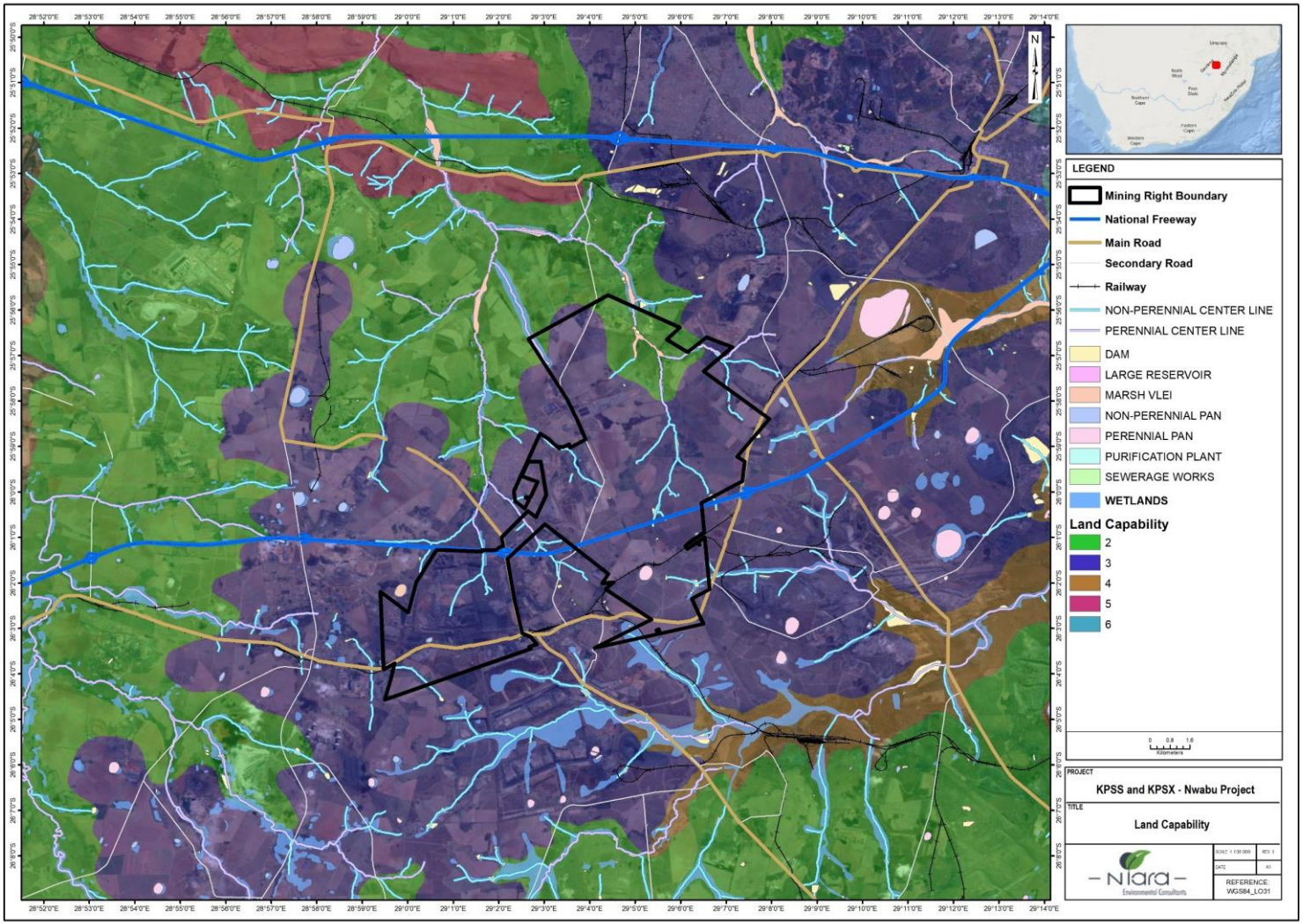

Figure 12-1: The Land Capability within the project area

13 Impact Assessment

As indicated in Section 11 above, all the required infrastructure is already in place except for additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. The strategic positions in which the additional ventilation shafts and rescue boreholes will be located have not been specified. The highest risk to the integrity of agroecosystems onsite during and post mining is the potential for subsidence as underground workings are expected to be located approximately 25m below the ground surface with a mining height cut-off at 1.5m. The risks associated with the Ongoing Operation as well as the Mine Closure and Decommissioning Phase of the proposed underground workings KPSX and KPSS are assessed below:

13.1 Construction Phase

As mentioned in sections above, the expansion of underground workings will mostly be done on already disturbed areas and is not envisaged to result in significant impacts on the soils within the project area. All the required infrastructure is already in place except for additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. The strategic positions in which the additional ventilation shafts and rescue boreholes will be located have not been specified. As such, no impacts are expected during the construction phase of the project.

13.2 Operational Phase

During the operational phase, site clearing is necessary for the preparation of surface for the installation of additional ventilation shafts and rescue boreholes. When soil is removed, the physical properties are changed, and the soils' chemical properties will deteriorate unless effectively managed. When organic matter is removed, either by the clearing of an area for development or by erosion, the soils' fertility is reduced due to no nutrient input to the soils. Vehicles will drive on the soil surface, thereby causing compaction of the soils. This reduces infiltration rates and the ability for plant roots to penetrate the compacted soil. The installation process can result in additional sediment ending up in the water course due to earthworks or trenches used to divert water away from working areas. Sediment can result in silt build-up downstream, increase the turbidity of the water and result in habitat changes. Given the limited nature of the earthworks, sedimentation is not anticipated to occur to a significant degree.

13.2.1 Impact: Soil Compaction and Erosion

Table 13-1: Soil Compaction and Erosion

Soil Compaction and Erosion: Site Clearing and topsoil removal for the installation of additional ventilation shafts and rescue boreholes – localised soil compaction is expected to take place during the installation of the additional ventilation shafts and rescue boreholes due to the usage of heavy machinery. The movement of heavy machinery on the soil surface causes compaction which reduces the vegetation's ability to grow.		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	1	1
Duration *(Short term, Medium term, Long term)*	3	1

Soil Compaction and Erosion: Site Clearing and topsoil removal for the installation of additional ventilation shafts and rescue boreholes – localised soil compaction is expected to take place during the installation of the additional ventilation shafts and rescue boreholes due to the usage of heavy machinery. The movement of heavy machinery on the soil surface causes compaction which reduces the vegetation's ability to grow.		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Magnitude *(Major, Moderate, Minor)*	3	2
Probability *(Definite, Possible, Unlikely)*	4	3
Calculated Significance Rating (Low, Medium, High)	11 (Moderate)	7 (Low)
Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Can impacts be enhanced: (Yes or No)	Yes	

Mitigation measures

- The additional ventilation shafts and rescue boreholes must be located outside of the sensitive environment such as wetlands;
- Existing access routes and disturbed areas should be utilised as far as possible to access planned borehole locations. Where no existing tracks are available, a single access track to each planned borehole location should be used.
- Vegetation clearing should only be undertaken if absolutely necessary and should be limited to the smallest footprint possible
- If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place. This may entail planting vegetation (indigenous) or constructing barriers to prevent further erosion.
- The handling of the stripped topsoil should be minimised to ensure the soil's structure does not deteriorate significantly.
- Ensure proper storm water management designs are in place to prevent soil erosion.
- All earthworks must take place during the dry season.
- Stockpiles must be located away from any waterway or water flow path in the landscape.

13.2.2 Impact: Hydrocarbon Pollution

Table 13-2: Hydrocarbon Pollution

Hydrocarbon Pollution: Pollution of soil resources may occur as a result of the use of heavy machinery during installation of additional ventilation shafts and rescue boreholes – localised hydrocarbon impacts are likely to occur due to spills, leaks and overfills.		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	2	1
Duration *(Short term, Medium term, Long term)*	3	2
Magnitude *(Major, Moderate, Minor)*	4	2
Probability *(Definite, Possible, Unlikely)*	3	2
Calculated Significance Rating (Low, Medium, High)	**Moderate (12)**	**Low (7)**

Impact Status: (positive or negative)	Negative	Negative
Reversibility: (Reversible or Irreversible)	Reversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Can impacts be enhanced: (Yes or No)	Yes	

Mitigation Measures

- Care must be taken in the handling and storage of all drilling fluids, oils, greases and fuel on site, including all drilling vehicle and support vehicle fluids. A spill kit will be available on site in case of accidental spillages.
- All contractors and labour must undergo environmental awareness training, and be encouraged to maintain a "clean" working area, and report any (potential) risks to the environment as a result of the drilling programme;
- No fixing, servicing or cleaning of vehicles/machinery to take place on site. All malfunctioning drilling equipment must be moved designated workshop areas for fixing;
- All vehicles must be regularly inspected for potential hydrocarbon leaks. High-level maintenance must be undertaken on all vehicles and construction/maintenance machinery to prevent hydrocarbon spills.
- No storage of fuel and diesel on site.
- Fuel and oil spills should be remediated using a commercially available emergency clean up kits. For major spills, if soils are contaminated, they must be stripped and disposed of at a licensed waste disposal site.
- Drip trays must be used while vehicles are not in use.
- Accidental spillage of potentially contaminating liquids and solids must be cleaned up immediately by trained staff with the correct equipment and protocols.

13.3 Decommissioning and Rehabilitation Phase

The major impacts to consider in the rehabilitation of the site will be the loss of topsoil as a resource through erosion and compaction. When topsoil is compacted or eroded, the soil profile loses effective rooting depth, water holding capacity and fertility. When the decommissioning and removal of infrastructure takes place, vehicles could drive on the rehabilitated surfaces causing compaction them and this in turn reduces infiltration rates as well as the ability for plant roots to penetrate the compacted soil. During the decommissioning phase, the following activities will take place:

- Demolition of the infrastructure areas.
- Ripping of compacted areas to loosen soil.
- Top soiling of all disturbed areas.
- Vegetation establishment in all disturbed areas.

13.3.1 Decommissioning of Infrastructure and Rehabilitation of Impacted Areas

Table 13-3: Decommissioning of infrastructure and Rehabilitation of Impacted Areas

Decommissioning of infrastructure and Rehabilitation of impacted areas: The major impacts to consider in the rehabilitation of the site will be the loss of topsoil as a resource through erosion and compaction. When topsoil is compacted or eroded, the soil profile loses effective rooting depth, water holding capacity and fertility. When the decommissioning and removal of infrastructure takes place, vehicles could drive on the rehabilitated surfaces causing compaction them and this in turn reduces infiltration rates as well as the ability for plant roots to penetrate the compacted soil.		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	2	1

Duration *(Short term, Medium term, Long term)*	2	2
Magnitude *(Major, Moderate, Minor)*	2	2
Probability *(Definite, Possible, Unlikely)*	3	2
Calculated Significance Rating (Low, Medium, High)	9 (Moderate)	7 (Low)
Impact Status: (positive or negative)	Negative	
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Can impacts be enhanced: (Yes or No)	Yes	

Mitigation measures

- Implement land rehabilitation measures as defined in rehabilitation report.
- Compacted areas are to be ripped to loosen the soil and vegetation cover re-instated.
- Ensure proper storm water management designs are in place to ensure no run-off or pooling occurs.
- Contour slopes to minimise erosion and run-off.
- Plant native vegetation to prevent erosion and encourage self-sustaining development of a productive ecosystem.
- Remove shafts to foundation level. Demolished rubble must be disposed of in accordance with Rehabilitation Plan and approval from the South African authorities.
- Only designated access routes are to be used to reduce any unnecessary compaction.
- The topsoil should be shaped taking the pre-mining landscape into consideration.

The management objectives are to limit the impacts that could occur on the site. Rehabilitated areas must be assessed for compaction, contamination, fertility, and possible erosion, corrected, and protected immediately. The following management actions and targets are provided:

- Compacted areas are to be ripped to loosen the soil and vegetation cover re-instated.
- Ensure proper storm water management designs are in place to ensure no run-off or pooling occurs.
- Contour slopes to minimise erosion and run-off.
- Plant native vegetation to prevent erosion and encourage self-sustaining development of a productive ecosystem.
- Only designated access routes are to be used to reduce any unnecessary compaction.
- The topsoil should be shaped taking the pre-mining landscape into consideration.

13.3.2 Impact: Subsidence

Table 13-4: Subsidence

Subsidence – Subsidence is likely to occur following the extraction of coal due to the shallow depth (25m) within which mining is planned to take place. After coal is extracted from beneath the ground, the land above can sink and fill the hollow mine workings. This can cause uneven surfaces that may impact the manner in which water flows.		
	Impact Rating Without Mitigation	**Impact Rating with Mitigation**
Extent *(Local, Regional, International)*	2	1

Duration *(Short term, Medium term, Long term)*	4	1
Magnitude *(Major, Moderate, Minor)*	4	2
Probability *(Definite, Possible, Unlikely)*	2	1
Calculated Significance Rating (Low, Medium, High)	12 (High)	5 (Low)
Impact Status: (positive or negative)	Negative	
Reversibility: (Reversible or Irreversible)	Irreversible	
Irreplaceable loss of resources: (Yes or No)	Yes	
Can impacts be enhanced: (Yes or No)	Yes	

Mitigation Measures

- All precautionary measures should be taken to ensure no surface subsidence occurs post mining in the project area. As such, it is recommended that a detailed subsidence risk assessment is undertaken to determine the likelihood of subsidence and the likely consequences of such subsidence. The risk assessment should inform the mine plan and design.
- No high extraction mining should take place such that the area is impacted by subsidence post mining;
- However, should subsidence occur, measures must be taken to ensure the continuation of, or if necessary reinstate, the natural hydrology within the landscape.

14 Soil Management Guidelines

The soil management guideline demonstrates how soil should be preserved in a condition as near as possible to its pre-mining condition to allow successful rehabilitation. The plan should be implemented during clearance of the soil in preparation for installation of additional ventilation shafts and rescue boreholes. The management plan provides the following information:

- A topsoil stripping procedure that aims to maximise volumes of soil removed.
- Stockpile maintenance procedure.
- A topsoil application procedure to be used during the rehabilitation.

14.1 Soil Stripping for the Installation of Additional Ventilation Shafts and Rescue Boreholes

Soils should be stripped and replaced in a similar location in the catena to their natural location. Wetland soils should not be stripped and stockpiled at all. This section provides details of the depths of topsoil to be stripped according to soil type and a stripping procedure. Correct stripping of soils will ensure that enough soils are available for rehabilitation and that the soils are of adequate quality to support vegetation growth. The steps that should be taken during soil stripping are as follows:

- If possible, soil material should be stripped when it is in a lightly moist conditions to minimise compaction (i.e., when they are dry).
- Stripping should be supervised to ensure that the various soils are not mixed.
- Topsoil should be stored separately from subsoil because it contains more nutrients and microbes.

- Soil stripping and stockpiling of the soils should be done in a single action to reduce compaction and to increase the viability of the seed bank contained in the stripped soil surface.
- Demarcate boundaries of different soil horizons.
- Define cut-off horizons in simple terms that the stripping operator can understand.

14.2 Stockpiling of Stripped Soils

This section provides topsoil stockpile management measures which aim to conserve topsoil in a condition as close as possible to its original state:

- Separate stockpiles for topsoil and subsoil because topsoil contains more nutrients and microbes.
- Stockpiles should be kept minimal and stockpiles should be revegetated with indigenous grass to minimise loss of soil quality and maintained. Stockpiles should be clearly signposted for easy identification. Locations should be accurately surveyed, and data recorded relating to the soil type and volume.
- Stockpile should be located outside proposed disturbance areas.
- Stockpiles should be in areas away from drainage lines or windy areas to minimise the risk of soil erosion.
- Minimise compaction during stockpile creation and revegetate to avoid erosion losses. A contingency plan for preventing wind erosion and dust from topsoil stockpiles is to apply hydro mulching to create a crust and provide a growing medium for vegetation on the surface of the stockpile.
- No waste material should be placed on the stockpiles.
- Equipment movement on top of the soil stockpiles should be limited to avoid topsoil compaction and subsequent damage to the soils and seedbank.
- Soil erosion should be controlled on stockpiles by having control measures to reduce erosion risk such as erosion control blankets, erosion berms, soil binders, revegetation, contours, diversion banks and spillways.

14.3 Soil Replacement and Amelioration

All soils should be replaced to a similar depth as was encountered prior to the mining operation. However, soils can be replaced to a depth (0.5 m) that will sustain moderate cultivation land capability. It is recommended that the soils should be replaced as follows:

- Soil horizons (topsoil and subsoil) should be replaced in the same sequence in which they were stripped.
- The usable subsoil material should be replaced on the reshaped spoil, followed by the topsoil, and ensure natural revegetation with the indigenous grass species that were originally in the area.
- Soils should be moved when dry to minimise compaction.
- Compaction should be minimised by use of appropriate equipment and replacing soils.
- Minimise compaction during smoothing of replaced soils by using dozers rather than graders.
- Following replacement, all soils should be ripped to full rooting depth using dozer rippers.

14.4 Supervision and Responsibilities

Close supervision and monitoring of the stripping process is required to ensure that soils are stripped correctly. Table 14-1 provides roles and responsibilities of the people that will be responsible for implementing excavations and stockpiling procedures. The responsibilities of the contractor need to be documented in contract documents

Table 14-1: Supervision and Monitoring Program

Aspect	Measures and Actions	Timeframe/Frequency	Responsibility
Soil erosion and sediment control	Clearing activities must be restricted to the intervention areas.	During the installation of the installation of additional ventilation shafts and rescue boreholes	Contractors, Environmental Control Officer and Project Manager
Waste management	Bins must be provided for disposal of waste during construction.	During the installation of the installation of additional ventilation shafts and rescue boreholes	Contractors, Environmental Control Officer and Project Manager
Hazardous materials	Spillage plan must be developed. Refuelling must be done offsite to prevent potential soil pollution from spillage. Spillages must be reported immediately.	During the installation of the installation of additional ventilation shafts and rescue boreholes	Contractors, Maintenance Manager, Environmental Control Officer and Project Manager
Equipment and storage areas	Equipment maintenance must be done offsite. Storage areas must be within the fenced area and located away from all sensitive areas	During the installation of the installation of additional ventilation shafts and rescue boreholes	Contractors, Environmental Control Officer and Project Manager
Stockpile management	Stockpiled soils must not be located far away from replacement areas. Must be protected from potential erosion and limit the height. Must be kept clear of weeds and alien vegetation.	During the installation of the installation of additional ventilation shafts and rescue boreholes	Contractors, Environmental Control Officer and Project Manager
Land Use	Maintain and minimise land use change within the license areas. Evaluation of land use within the mining precinct using satellite imagery	Annually	Environmental Control Officer Mine Environmental Manager
Rehabilitated areas	Maintain the quality and condition of rehabilitated areas. Continuous monitoring of rehabilitated areas for closure compliance	Annually	Environmental Control Officer Mine Environmental Manager

15 Response to concerns raised by Interested & Affected Parties

This section is to be completed in response to issues raised during the Public Participation Process. Thus far, no issues relating to the agricultural agro-ecosystem has been brought to the attention of the specialists. Should any comment be received, it will be addressed in this report.

16 Conclusions

The following conclusions were made:

- According to 'The vegetation of South Africa, Lesotho and Swaziland', the Klipspruit Colliery Mining Rights Area falls within the Eastern Highveld Grassland and the Rand Highveld Grassland vegetation types;
- The majority of the Klipspruit Colliery Mining Rights Area falls within the quaternary catchment B20G, with wetlands associated with the Saalboomspruit, a tributary of the Wilge River. The south-western portion of the site falls within the B11F catchment, which is bisected by the Olifants River, and a small portion at the north-east of the site occurs within the catchment B11G. Both quaternary catchments are regarded as Largely Modified, according to the Department of Water and Sanitation (DWS);
- The study area comprises of Land type Ba and Bb indicates land in which red and/or yellow brown apedal soils that are dystrophic and/or mesotrophic, dominate over red and/or yellow-brown eutrophic soils. Soils observed during the survey include Witbank, Hutton, Clovelly, and Longlands.
- The dominant land capability classes in the project area were medium, high, and very-high (06 – 15), and soil types ranged from moderately suitable such as Hutton and Clovelly to less suitable for crop production such as Longlands and Fernwood soils.
- The project site is dominated by the presence of high potential agricultural soils such as Hutton, Clovelly, Pinedene and Oakleaf soils, which represent 60% of the totalarea. Forty percent of the project area consists of wetland soils. The Hutton, Avalon, Pinedene, Oakleaf and Clovelly soil types present within the project site can all be stripped and stockpiled together because the inherent soil properties are similar. The soil types are dominated by deep well drained red and yellow soils;
- However the Avalon and Longlands soils do contain a soft plinthic layer in the subsoil. This soft plinthic layer should not be stripped with the brown Avalon and grey Longlands subsoil, because this layer hardens to a rock like consistency when exposed to air. Fernwood wetland soils should be stripped, if allowed and agreed upon by the authority, and stockpiled separately from all other soils.
- Arable Class II and the remaining 2% Arable Classes III and IV.The project area is located within existing commercial farm land and the land use is dominated by 57% grazing and 42% arable crop.

Underground mining has commenced within the Pit BD boundary and the mining method being utilised is bord and pillar mining. The inclusion of the bord and pillar mining method was to ensure optimal extraction of areas that are not profitable by OC method due to high strip ratio. An adit has been developed from the pit BD highwall which provides access to the UG workings, as such all the required infrastructure is already in place except for additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. The strategic positions in which the additional ventilation shafts and rescue boreholes will be located have not been specified. Subsidence was identified as the highest risk to the agroecosystem onsite.

17 Acceptability Statement

It is my professional opinion that this application is considered favourably, as all the required infrastructure is already in place except for additional ventilation shafts and rescue boreholes will be constructed in strategic areas as the mining advances for both KPSX and KPSS. No further soil impacts are expected to result from the proposed underground mining activities within the project area.

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Appendix A: Specialist CV

Lindokuhle Vincent Hlongwane

Wetland Specialist
SACNASP Ecological Science (400100/1)

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EDUCATION AND QUALIFICATIONS

- Bsc Hons, University of Witwatersrand, 2006
- Bsc Degree, University of Witwatersrand, 2005

AFFILIATIONS

- South African Council for Natural Scientific Professions
- Network for Industrially Contaminated Land in Africa

YEARS OF EXPERIENCE

- 17 Years

KEY COMPETENCIES

- Baseline Wetland Assessments
- Contaminated Land Management
- Environmental Auditing

COUNTRIES OF WORK EXPERIENCE

- South Africa
- Botswana
- Mali

LANGUAGES

- English
- IsiZulu
- Southern Sotho

BIOGRAPHY

Lindokuhle Hlongwane serves as the Principal Consultant with over 17 years of professional experience as both a Wetland Specialist and a Contaminated Land Specialist. Lindokuhle has worked extensively both locally and internationally. He is a registered Professional Natural Scientist with the South African Council for Natural Scientific Professions (SACNASP) and is also an active member and steering committee fellow of the Network for Industrially Contaminated Land in Africa (NICOLA).

Lindokuhle began his career in wetland assessments during his internship, contributing to the rollout and update of “A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas.” Since then, he has conducted numerous wetland assessments across various sectors, including housing developments, mining, and industrial projects.

In the realm of contaminated land management, Lindokuhle's expertise encompasses baseline contamination assessments, delineation of contamination plumes, development of Conceptual Site Models, setting Remedial Objectives (RO), crafting End State Visions, conducting Remedial Alternatives Analyses (RAA), and overseeing the installation of Remediation Systems such as Multi-Phase Extraction, Soil Vapour Extraction, and Sub-slab Depressurization Systems. He is adept at evaluating the efficacy of remediation systems, ensuring that remedial objectives are met, and driving projects to successful closure.

Lindokuhle is skilled in managing complex projects and navigating interactions with challenging stakeholders. His extensive experience also includes collaborating with landowners and conveyancers to provide critical input for land sale agreements. A self-motivated and trained project manager, Lindokuhle prioritizes budget, schedule, safety, and the quality of the final product. He firmly believes that incident-free operations are achievable when stakeholders unite as One Team to complete projects with zero incidents.

EMPLOYMENT HISTORY

Jul-2013 to Present: Independent Environmental Consultant

Jun-2012 to Jun-2013: Wetland Specialist, Digby Wells Environmental (Pty) Ltd

Jan-2010 to May-2012: Contaminated Land Specialist , Mills And Otten Environmental Consulting (Pty) Ltd

Jan-2007 to Mar-2009: Internship, Wetlands Consulting Services (Pty) Ltd

EXPERIENCE HIGHLIGHTS

The below highlight key recent and relative project experience:

- Rolling out of the Practical Field Procedure for Identification and Delineation of the Wetlands and Riparian Areas (DWAF 2005), DWAF, Trainer
- Crocodile West Ecological Reserve Determination Study, DWAF, Trainee Fluvial Geomorphologist
- Thukela Hydro Electric Power Scheme: Ecological Reserve Determination Study , DWAF, Fluvial Geomorphologist
- Wetland Assessment Study for the Proposed Universal Coal plc: Kangala Coal Mine, Delmas, Mpumalanga Province, South Africa, Kangala Coal Mine, Wetland Specialist
- External Audit in Fulfilment of The Integrated Water Use Licence for Klipspruit Water Treatment Plant- Year 2022, Seriti Klipspruit Colliery, Lead Auditor

Please consult the attached appendix for a comprehensive list detailing the project experiences undertaken.

APPENDIX A: PROJECT EXPERIENCE

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2007-2008	Rolling out of the Practical Field Procedure for Identification and Delineation of the Wetlands and Riparian Areas (DWAF 2005).	Department of Water Affairs and Forestry, South Africa	Trainer
2008-2009	Upgrading the Practical Field Procedure for Identification and Delineation of the Wetlands and Riparian Areas (DWAF 2005).	Department of Water Affairs and Forestry, South Africa	Trainer
2007-2008	Upper Vaal Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Trainee Fluvial Geomorphologist
2007-2008	Inkomati Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Trainee Fluvial Geomorphologist;
2008-2009	Crocodile West Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Fluvial Geomorphologist
2008-2009	Groot Marico Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Fluvial Geomorphologist
2008-2009	Weza River Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Fluvial Geomorphologist
2009-2010	Mzimvubu River Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Fluvial Geomorphologist
2009-2010	Thukela Hydro Electric Power Scheme: Ecological Reserve Determination Study	Department of Water Affairs and Forestry, South Africa	Fluvial Geomorphologist
2015	Wetland Assessment Study for a Pan Associated with an Existing Honingkranz sand Winning Operations, Bronkhorstspruit, Mpumalanga Province, South Africa;	Honningkrantz Sand Winning Operations, South Africa	Wetland Specialist
2013	Wetland Assessment Study for the Proposed Exxaro Coal: Thabametsi Coal Mine, Lephalale, Limpopo Province, South Africa;	Exxaro Coal, South Africa	Wetland Specialist
2013	Wetland Assessment Study for the Existing Rand Gold Resources: Loulo-Gounkoto Gold Mine, Mali	Rand Gold Resources, Mali	Wetland Specialist
2013	Wetland Assessment Study for the Proposed Universal Coal plc: Kangala Coal Mine, Delmas, Mpumalanga Province, South Africa;	: Kangala Coal Mine, South Africa	Wetland Specialist
2013	Wetland Assessment Study for the Proposed Universal Coal plc: Roodekop Coal Mine, Delmas, Mpumalanga Province, South Africa;	Roodekop Coal Mine, South Africa	Wetland Specialist

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2014	Wetland Assessment Study for the Proposed Msobo Coal: Cronsbrey Coal Mine, Chrissesmere, Mpumalanga Province, South Africa;	Xstarta Coal, South Africa	Wetland Specialist
2014	Wetland Assessment Study for the Proposed Anglo Thermal Coal: Dalyshope Coal Mine, Liphalale, Limpopo Province, South Africa;	Anglo Thermal Coal, South Africa	Wetland Specialist
2014	Wetland Assessment Study for the Proposed Msobo Coal: Harwar Coal Mine, Chrissesmere, Mpumalanga Province, South Africa;	Xstarta Coal, South Africa	Wetland Specialist
2014	Wetland Assessment Study for the Proposed Coal Fired Power Station and Associated Infrastructure: IPP Thabametsi Power Station, Liphalale, Limpopo Province, South Africa;	Thabametsi IPP, South Africa	Wetland Specialist
2014	Wetland Assessment Study for the Proposed Anglo Thermal Coal: Dalyshope Coal Mine, Liphalale, Limpopo Province, South Africa;	Anglo Thermal Coal	Wetland Specialist
2014	Wetland Assessment Study for the Proposed Vedanta IPP Project: Vedanta Resources PLC, Liphalale, Limpopo Province, South Africa;	Vedanta Resources PLC	Wetland Specialist
2012	Wetland Assessment Study for the Proposed BHP Billiton: Klipsruit Coal Mine, Oogies, Mpumalanga Province, South Africa;	Klipsruit Coal Mine, South Africa	Wetland Specialist
2012	Wetland Assessment Study for the Proposed Waste Rock Dump associated with the existing Anglo Thermal Coal Greenside Colliery, Witbank, Mpumalanga Province, South Africa;	Anglo Thermal Coal Greenside Colliery, South Africa	Wetland Specialist
2012	Wetland Assessment Study for the Proposed Waste Rock Dump Associated with the Existing Anglo Thermal Coal Kleinkopje Colliery, Witbank, Mpumalanga Province, South Africa;	Anglo Thermal Coal Kleinkopje Colliery	Wetland Specialist
2015	Wetland Assessment Study for the Proposed Waste Rock Dump Associated with the Existing Anglo Thermal Coal Goedehoop Colliery, Witbank, Mpumalanga Province, South Africa;	Anglo Thermal Coal Goedehoop Colliery, South Africa	Wetland Specialist
2014	Wetland Assessment Study to Support the Biodiversity Management Plan at the Existing Anglo Thermal Coal New Vaal Colliery, Vanderbijylpark, Free State Province, South Africa;	Anglo Thermal Coal New Vaal Colliery, South Africa	Wetland Specialist

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2014	Wetland Assessment Study for the Proposed Geluksdal Tailings Storage Facility and Pipeline Infrastructure: Gold One International, Randfontein, Gauteng Province, South Africa;	Gold One International, South Africa	Wetland Specialist
2017	Ecological Assessment of Wetland Areas Associated with the Proposed Olive Street Estate Located on Portions of the Farm Vlakfontein 523 JR, Bronkhorstspruit;	Olive Street Estate, South Africa	Wetland Specialist
2017	Baseline Wetland Assessment Study for the Proposed Schoongezicht Coal Mine Located on Portions of Portion 6 of the Farm Schoongezicht 308 JS Emalahleni, Mpumalanga Province;	Schoongezicht Coal Mine, South Africa	Wetland Specialist
2023	Baseline Wetland Assessment Study for the Water Use Licence Application for Randfontein Estate Limited: Doornkop Mine	Randfontein Estate Limited, South Africa	Wetland Specialist
2016	Baseline Wetland Assessment Study for the Proposed Railway Coal Siding at the Highveld Steel and Vanadium Corporation Plant on the Farm Elandsfontein 309 JS, Clewer, Emalahleni, Mpumalanga Province	Highveld Steel (Pty) Ltd, South Africa	Wetland Specialist
2023	External Audit Report in Fulfilment of The Integrated Water Use License for Klipspruit Extension- Year 2022;	Seriti, Klipspruit Colliery, South Africa	Lead Auditor
2023	External Audit in Fulfilment of The Integrated Water Use License for Klipspruit Main Pit- Year 2022;	Seriti, Klipspruit Colliery, South Africa	Lead Auditor
2023	External Audit in Fulfilment of The Integrated Water Use Licence for Klipspruit South Pit- Year 2022	Seriti, Klipspruit Colliery, South Africa	Lead Auditor
2023	External Audit in Fulfilment of The Integrated Water Use Licence for Klipspruit Water Treatment Plant- Year 2022;	Seriti, Klipspruit Colliery, South Africa	Lead Auditor
2023	Khutala Colliery Regulation 704 Compliance Audit and stormwater management Plan dated October 2023;	Seriti, Khutala Coal Mine, South Africa	Lead Auditor
2023	External Audit Report in Fulfilment of The Integrated Water Use License for Khutala Mine Portion 16 - Year 2022;	Seriti, Khutala Coal Mine, South Africa	Lead Auditor

Duration	Assignment name / brief description of main deliverables/outputs	Name of client and country of assignment	Role on the assignment
2023	External Audit Report in Fulfilment of The Integrated Water Use Licence for Klipspruit South Pit- Year 2022;	Seriti Klipspruit Colliery, South Africa	Lead Auditor