

PROPOSED VLAKFONTEIN COAL MINE PROJECT

BCR Coal (Pty) Ltd

Phase 1: Desktop Assessment Terrestrial Biodiversity (Vegetation and Plant Species)

Date: July 2022

Report drafted on behalf of:

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Expertise of author:

- Working in the field of ecology, and in specific vegetation related assessments, since 2007;
- Is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions in the field of ecology (Reg. No. 400019/11); and
- Has been working with plants indigenous to South Africa since 1997.

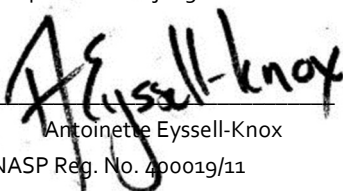
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Based on information provided to Dimela Eco Consulting by the client, and in addition to information obtained during the course of this study, Dimela Eco Consulting present the results and conclusion within the associated document to the best of the authors professional judgement and in accordance with best practise.



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2022.08.04
Date

EXECUTIVE SUMMARY

BCR Coal (Pty) Ltd (the applicant) is proposing an open pit mining operation, hereafter referred to as the BCR Coal Vlakfontein Mine, within the Msukaligwa Municipality, Mpumalanga. Dimela Eco Consulting was appointed by Environmental Management Assistance (Pty) Ltd to conduct the required desktop vegetation assessment informing the required Scoping Report.

The following information pertaining to the site is relevant as detailed by the National Web based Environmental Screening Tool downloaded on the 10/06/2022:

- The site is classified as 'high terrestrial biodiversity sensitivity':
The site intersects Critical Biodiversity Areas, threatened ecosystems, Protected Areas Expansion Strategy areas, Strategic Water Source Areas, as well as Freshwater Ecosystems Priority Areas Sub catchments.
- The site is also classified as "medium for sensitive plant species", indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists nine (9) species that has a possibility of occurring on the site.

As per the Protocol for the Specialist Assessment and Minimum Report Content Requirement for Environmental Impacts on Terrestrial Biodiversity, a terrestrial vegetation assessment, as well as a terrestrial plant species habitat assessment, as published in the Government Gazette No 43855 on 30 October 2020 in terms of sections 24(5)(a) and 25 (5)(h) of NEMA, should be undertaken.

This report is submitted to inform the required Scoping phase and should be considered as a desktop assessment pertaining to vegetation, as well as a high-level sensitivity analysis.

The proposed site is situated on Portion (Ptn.) 2, Ptn 11 and Ptn 21 of farm Vlakfontein 108 IT, Ptn 1, 7, 14, and 12 of farm Welgelegen 107 107 IT, Msukaligwa Municipality, Mpumalanga.

This terrestrial vegetation desktop assessment, highlighting preliminary sensitivities, including the following:

- Research and report on background information to the site relating to, amongst others, conservation plans and threatened ecosystems;
- Short list plant species of conservation concern with a possibility of occurring on or around the site and for which suitable habitat is likely present;
- Submit a desktop report, highlighting preliminary sensitivities; and
- Include in the above a plan of study for the EIA-phase.

Standardised definitions, as recommended by Lexicon for Biodiversity Planning in South Africa by the South African National Biodiversity Institute (SANBI) were used to describe the likely state of vegetation and ecological condition.

The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were cultivated or modified. Such areas are preliminary classified as low sensitivity from a vegetation perspective. However, these areas are likely of biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes.

Some secondary grasslands of medium sensitivity may be present in historically cultivated lands. However, large portions of seemingly intact natural Eastern Highveld Grassland are seemingly present within the site, as well as moist grasslands. Remaining patches of this grassland unit is of high conservation value and sensitivity as it is poorly protected and within a vulnerable ecosystem. It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the Critical Biodiversity Area: Irreplaceable category of the Mpumalanga Biodiversity Sector Plan, in which mining is not an acceptable land use.

Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of high terrestrial biodiversity (vegetation) sensitivity.

The site is classified as medium sensitivity for sensitive plant species, indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists nine (9) species that has a possibility of occurring on the site. The remaining Eastern Highveld Grassland, including the moist grasslands, are highly likely to include sensitive and unique habitats, including suitable habitat for several plant species of conservation concern. Until such time as habitat is verified or species recorded on the site, the desktop results agree with the screening tool sensitivity rating of medium for plant species.

Although some impacts could be mitigated, the destruction of good condition grassland vegetation can not be mitigated as grassland vegetation is difficult, if not impossible, to rehabilitate. As most of the site likely includes good condition grassland, the proposed mining is not supported by the Mpumalanga Biodiversity Sector Plan and could potentially result in a fatal flaw. This will be further supported if plant species of conservation concern are recorded on the site.

The good condition grassland that could be directly impacted is estimated as about 300ha, including the moist grasslands. About 169023780ha of Eastern Highveld Grassland remain in a natural to semi-natural state nationally. The estimated natural grassland on the site thus amounts to about 0.0002% of the remaining extent of the Eastern Highveld Grassland ecosystem. Although the potential natural grassland

on the site is small, it could contribute to the conservation of the Vulnerable ecosystem as well as reach the conservation target of the Mpumalanga Parks and Tourism Agency for a Critical Biodiversity Area: Irreplaceable. The area should ideally be conserved.

For ease of reference, the following table summaries results of the assessment as per the main requirements of the Protocols for Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial (Vegetation) Biodiversity as published on 20 March 2020.

Summary of the main terrestrial (vegetation) biodiversity findings

Biodiversity (vegetation) aspect	Result
Protected Areas	The Chrissiesmeer Protected Environment is situated about 1.5km north-east of the site. The site is within 5km of the Chrissiesmeer Pans Systems. However, the site falls outside of the 1km Ecological Support Area (ESA) buffer of this protected environment.
Conservation Plan Category: CBA: Irreplaceable	<p>Reason for the CBA The CBA around the site was classified based on the potential habitat for plant species of conservation concern and the potential presence of primary vegetation</p> <p>Can the CBA be maintained? No. The development will fragment the CBA and the proposed footprint will destroy an estimated 300ha of CBA directly. Edge effects and downstream impacts will increase the area affected.</p> <p>Mining is destructive and although an effort to limit edge effects must be made to maintain remaining extent of the CBA, the CBA within the proposed mining infrastructure footprint will be destroyed.</p> <p>Impact on species composition and structure of vegetation The proposed mining footprint and operational activities will destroy species composition and structure and lead to degradation of surrounding vegetation due to edge effects. Edge effects include the prevention of grazing and fire which is important to maintain good condition grassland.</p>
Listed ecosystems	<p>According to the 2011 Listed Ecosystems, the site falls within the Vulnerable Eastern Highveld Grasslands.</p> <p>Impact on ecosystem threat status The proposed development will result in the removal of indigenous vegetation within an ecosystem listed as Vulnerable. The good condition grassland within the secondary Project Area of Influence (PAOI) is estimated at about 300ha, including the moist grasslands. However, this excludes areas beyond the secondary PAOI that may be degraded by edge effects.</p> <p>About 169023780ha of Eastern Highveld Grassland remain in a natural to semi-natural state. The estimated natural grassland on the site thus amounts to about 0.00017% of</p>

Biodiversity (vegetation) aspect	Result
	the remaining extent of the Eastern Highveld Grassland ecosystem. Although the potential natural grassland on the site is small, it could contribute to the conservation of the Vulnerable ecosystem as well as reach the conservation target of the MPTA for a CBA: Irreplaceable. The area should ideally be conserved.
Strategic Water Source Areas (SWSA) and hydrological issues	<p>Impact(s) on the terrestrial habitat of a SWSA</p> <p>The site is not situated within a SWSA -the project site is about 13km north-west of the closest Upper Vaal surface water area. However, clearing of vegetation can have an impact on water infiltration and flow dynamics to the moist grassland and downstream watercourses.</p> <p>The hydrology of the area seems interconnected and important in terms of regulating different moisture regimes in different areas on and downstream of the site. Erosion and pollution caused by clearing of vegetation for the mine, could impact on the downstream water quality</p>
National Freshwater Ecosystem Priority Area (NFEPA)	See wetland assessment
Indigenous forest:	Not applicable
Preliminary no go areas	<ul style="list-style-type: none"> • Moist grasslands • Remaining natural grassland
Plant species of conservation concern	<p>Sixteen (16) species of conservation concern could be present in the area that the site is situated in with historical records confirming the presence of several such species close to the site.</p> <p>Suitable habitat is present on the site for most of the listed species. Suitable habitat is within drainage lines and associated moist grasslands, as well as remaining natural grasslands on the site.</p>
Main impacts expected:	<ul style="list-style-type: none"> • Destruction of natural vegetation • Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland and watercourses • Removal / Destruction of protected plants and plants of conservation concern or suitable habitat thereof • Potential increase in invasive vegetation • Compaction and destruction of soils • Edge effects degrading remaining grassland vegetation on and around the site
Cumulative impacts:	<ul style="list-style-type: none"> • Decrease in the extent of CBA: Irreplaceable and Eastern Highveld Grassland available for conservation
Residual impacts:	<ul style="list-style-type: none"> • Natural processes such as fire will likely be prevented around mine; • Trampling and edge effects; • Impacts to the watercourse and pollution; • Exclusion of grazing animals.

Biodiversity (vegetation) aspect	Result
	<ul style="list-style-type: none">• Increase in alien and invasive plant species on and around the site.• Species removed and relocated could die due to transplantation shock or damage during replanting.• Change in ecological processes.• Unforeseen impacts.

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1. INTRODUCTION

BCR Coal (Pty) Ltd (the applicant) is proposing an open pit mining operation, hereafter referred to as the BCR Coal Vlakfontein Mine, within the Msukaligwa Municipality, Mpumalanga. Dimela Eco Consulting was appointed by Environmental Management Assistance (Pty) Ltd to inform the required Scoping Report of the desktop vegetation assessment for the proposed mining operation.

The following information pertaining to the site is relevant as detailed by the National Web based Environmental Screening Tool downloaded on the 10/06/2022:

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This report is submitted to inform the required Scoping phase and should be considered as a desktop assessment pertaining to vegetation, as well as a high-level sensitivity analysis.

1.1 Locality and background

The proposed BCR Coal Vlakfontein Mine site is situated on Portion (Ptn.) 2, Ptn 11 and Ptn 21 of farm Vlakfontein 108 IT, Ptn 1, 7, 14, and 12 of farm Welgelegen 107 107 IT, Msukaligwa Municipality, Mpumalanga (Figure 1). The site is situated about 15km north-east of the town of Ermelo and about 18km south-west of the town of Chrissiesmeer. Much of the site is to the west of the N17 road connecting the two towns, while a small portion of the site is situated east of the N17. The site falls within the quarter degree square 2630AC.

The surface sub-outcrop of the coal seams is planned to be mined using an advancing open pit mining method which allows for concurrent filling of the pit. The pit will be used to develop portals which will allow the remainder of the ore to be exploited using underground mining methods. The open pit planned applies a conventional opencast truck and shovel mining philosophy including the following steps:

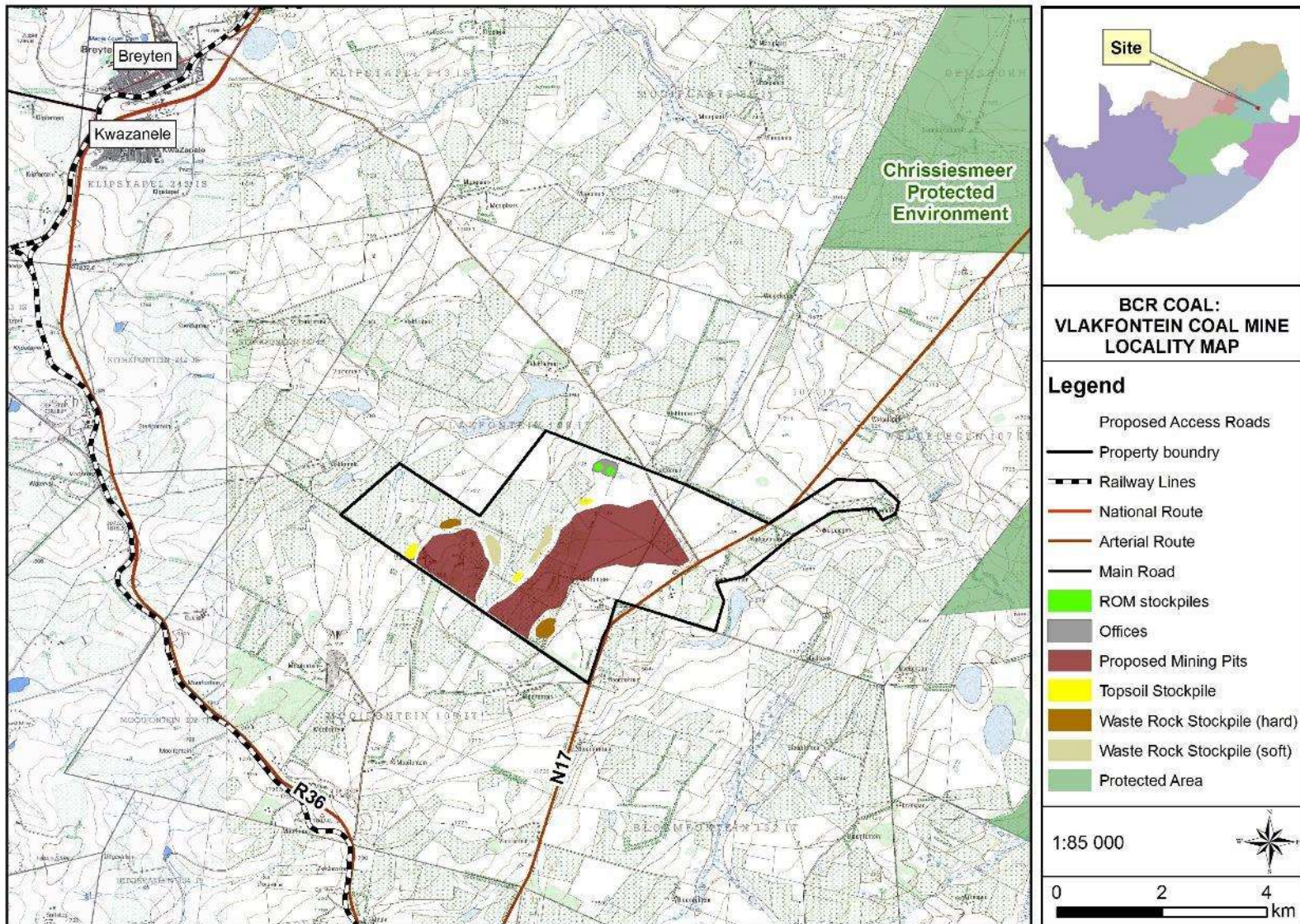


Figure 1: Locality map.

- Removal of topsoil and storing it at a designated position;
- Removal of the overburden;
- Drilling and blasting will be required to break the hard overburden;
- The waste will be dumped in the pit behind the advancing face where possible with the remainder placed at the designated waste rock stockpile, separate from the topsoil;
- Drilling and blasting of the coal seams;
- Loading and hauling of the ore for stockpiling at the Run-of-Mine (ROM) pad and for transport to the preferred Washing Plant.

The open pit mining philosophy is based on a contractor-operated operation. A production shift cycle operating 9 hours a day, 6 days a week will be adopted. The open pit layout and the life of mine schedule is presented in below:

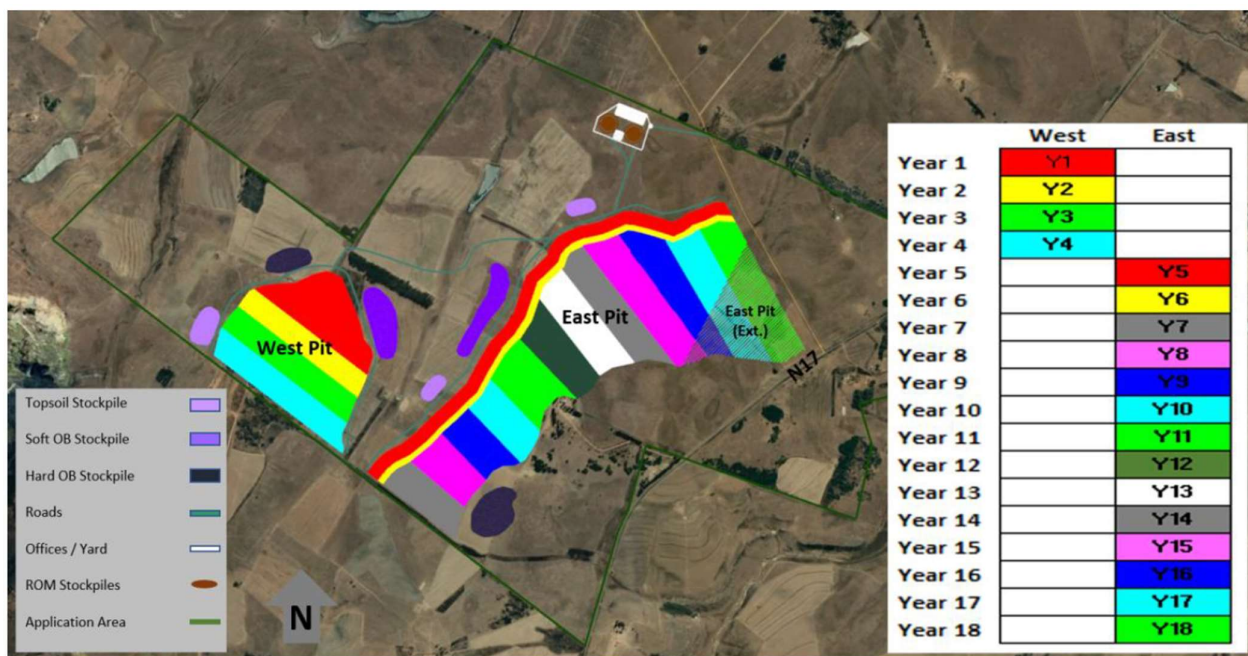


Figure 2: Open pit layout and the life of mine schedule

The project footprint will require the support facilities and infrastructure to operate. The infrastructure requirements are:

- Access & Haul roads (with necessary security) including the upgrading of the access point to mining area;
- Contractor’s Yard with septic/chemical abluion facilities;
- Offices;
- Weighbridge, workshop and stores (with septic/chemical abluion facilities);
- Diesel facilities and a hardstand;
- Power and Water;
- Stockpiles (topsoil, overburden (waste), subsoil/softs, ROM);
- Crushing and screening facility;

- Surface water management measures (stormwater diversion berms and trenches; pollution control dams etc);
- Medical station; and
- Diesel Generator

1.2 Terms of reference-Scoping Phase:

The Scoping Phase of the authorisation process entailed a terrestrial vegetation desktop assessment, highlighting preliminary sensitivities, including the following:

- Research and report on background information to the site relating to, amongst others, conservation plans and threatened ecosystems;
- Short list plant species of conservation concern with a possibility of occurring on or around the site and for which suitable habitat is likely present;
- Submit a desktop report, highlighting preliminary sensitivities; and
- Include in the above a plan of study for the EIA-phase.

1.3 Assumptions and Limitations

The following limitations is applicable to this report:

- No site visit was undertaken. This report was based on available spatial data and literature pertaining to the area that the site is situated in.
- The results of this report rely on the accuracy of available literature, data from provincial and national data bases and spatial data.

2. METHODOLOGY

The methodology used is shortly summarised below.

2.1 Literature- and data review

Data and literature consulted:

- The Mpumalanga Biodiversity Sector Plan (MBSP)
- Information on plant species recorded for the Quarter Degree Square (QDS) that the site is situated in was extracted from the Botanical Database of Southern Africa hosted by SANBI on the new Plants of Southern Africa website (<https://posa.sanbi.org>).
- Additional info was sourced from the Mpumalanga Tourism and Parks Agency (M. Lötter email communication, 7 July 2022)
- A short list of plant species of conservation concern was derived from the above and the Threatened Species Programme, Red List of South African Plants (Red List of South African plants version 2020(<http://redlist.sanbi.org/>)) and species listed within the national Screening Tool Report for the site, dated 10/06/2022.
- Threatened Ecosystem data was extracted from the 2018 Nasional Spatial Biodiversity Assessment (NSBA) (Skowno *et al*, 2019), as well as the gazetted 2011 Listed ecosystems (Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011))

- Historical aerial imagery downloaded from Chief Directorate: National Geospatial Information Geospatial Portal (<http://www.cdngiportal.co.za/cdngiportal>).
- Citizen Science Website: iNaturalist.org

2.2 Project Area of Influence

The Project Area of Influence (PAOI) is defined as per the Species Environmental Assessment Guideline (SANBI, 2020) and was based on the development footprint and the potential extent of the impacts (e.g., edge effects) of the project activities (Figure 3).

- The mining footprint and infrastructure were regarded as the primary PAOI.
- A buffer of 50m around the mine was assessed as the secondary PAOI, where edge effects are likely to take place (e.g. an area where dust, rainwater runoff and mining activities can be expected to negatively impact on the natural vegetation). The specialist chose the 50m distance as an estimate of the extent of possible edge effects.
- The mining rights area, as well as downstream habitats were considered as the tertiary PAOI. The extent of potential impacts downstream will depend on the activity and waterflow at the time of the impact, and the area indicated in Figure 3 is only illustrative of the possible impact area.

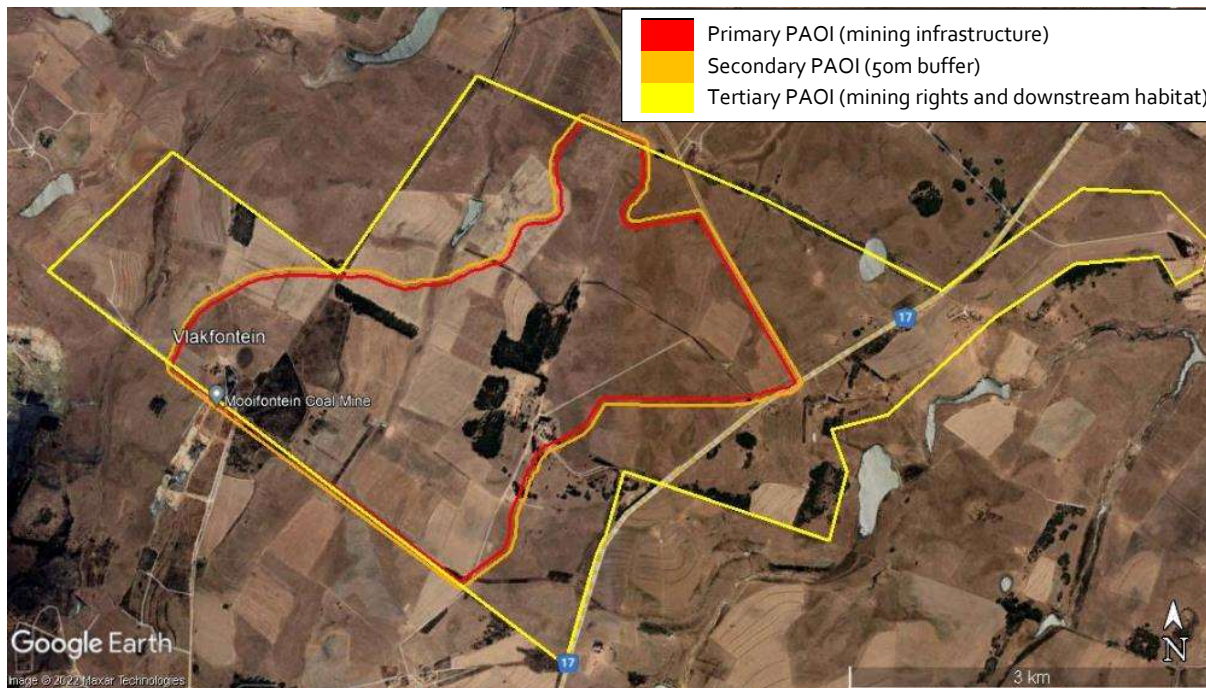


Figure 3: Project area of influence

2.3 Field survey

No site visit was undertaken. A site visit will be undertaken as part of Phase 2 of the authorisation.

2.4 Mapping

Mapping was done by inspection of available Google-Earth Imagery. Delineations are therefore approximate and preliminary, and due to the intricate mosaics and often gradual mergers of vegetation associations, generalisations had to be made. Mapped associations thus show where a certain vegetation unit is likely predominant, but smaller inclusions of another vegetation association is likely present.

2.5 Vegetation / Ecological Condition

Standardised definitions, as recommended by Lexicon for Biodiversity Planning in South Africa by the South African National Biodiversity Institute (SANBI) were used to describe the *likely* state of vegetation and ecological condition (SANBI, 2016). The preliminary condition of the vegetation followed the following definitions:

Natural or near natural:	An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem (good ecological condition). Usually of high sensitivity to development.
Semi-natural or moderately modified	An ecological condition class in which ecological function is maintained even though composition and structure have been compromised (Fair ecological condition). Usually of medium sensitivity to development
Severely or irreversibly modified	An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem (Poor ecological condition). Usually of a low sensitivity to development.
Good ecological condition:	An ecological condition class in which composition, structure and function are still intact or largely intact. Can apply to a site or an ecosystem. (Natural or near natural). Usually of high sensitivity to development.
Fair ecological condition	An ecological condition class in which ecological function is maintained even though composition and structure have been compromised (Moderately modified, semi-natural). Usually of medium sensitivity to development.
Poor ecological condition	An ecological condition class in which ecological function has been compromised in addition to structure and composition. Can apply to a site or an ecosystem (Severely or irreversibly modified). Usually of a low sensitivity to development.

2.6 Site Ecological Importance (sensitivity)

The Site Ecological Importance (SEI) in terms of vegetation should be discussed and mapped as per the requirements of the Species Environmental Assessment Guideline (SANBI, 2020). The assessment criteria and matrices are detailed in Table 1, Table 2, and Table 3. This SEI assessment will be completed once the on-site vegetation assessment and likelihood of plant species of conservation concern were undertaken.

SEI is considered to be a function of the Biodiversity Importance (BI) of the receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site¹³) and its 679 resilience to impacts (Receptor Resilience) as follows:

$$SEI = BI + RR$$

BI in turn is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows:

$$BI = CI + FI$$

Conservation Importance (CI) is evaluated in accordance with recognised established internationally acceptable principles and criteria for the determination of biodiversity-related value, including the IUCN Red List of Species, Red List of Ecosystems and Key Biodiversity Areas (KBA; IUCN (2016)).

Table 1: Criteria for assessing CI, FI and RR

Classification	Conservation Importance	Functional Integrity	Receptor Resilience
Very high	<ul style="list-style-type: none"> Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global Extent of Occurrence of < 10 km² Any area of natural habitat of a CR ecosystem type or large area (> 0.1 % of the total ecosystem type extent) of natural habitat of an EN ecosystem type 	<ul style="list-style-type: none"> Very large (>100 ha) intact area for any conservation status of ecosystem type or >5 ha for CR ecosystem types High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing) 	<ul style="list-style-type: none"> Habitat can recover rapidly (<5 years for >70% of the original species composition and functionality). Species very highly likely to remain at a site during impact. Species very highly likely to return once the impact ceases.
High	<ul style="list-style-type: none"> Confirmed or highly likely CR, EN, VU species. IUCN threatened species must be listed under any criterion other than A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (>0.01% but < 0.1 % of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1 %) of natural habitat of VU ecosystem type. Presence of Rare species. 	<ul style="list-style-type: none"> Large (>20 ha but <100 ha) intact area for any conservation status of ecosystem type or >10 ha for EN ecosystem types. Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential 	<ul style="list-style-type: none"> Habitat can recover relatively quickly (5-10 years for >70% of the original species composition and functionality). Species highly likely to remain at a site during impact. Species highly likely to return to site once impact ceases.
Medium	<ul style="list-style-type: none"> Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under A criterion only and which have more than 10 	<ul style="list-style-type: none"> Medium (>5 ha but <20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types Only narrow corridors of good habitat connectivity 	<ul style="list-style-type: none"> Recovers slowly (>10 years for >70 % of the original species composition and functionality) Species moderately likely to remain at site during impact.

Classification	Conservation Importance	Functional Integrity	Receptor Resilience
	locations or more than 10 000 mature individuals. <ul style="list-style-type: none"> Any area of natural habitat of threatened ecosystem type with status of VU Presence of range-restricted species More than 50 % of receptor contains natural habitat with potential to support SCC 	or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches <ul style="list-style-type: none"> Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance; moderate rehabilitation potential 	<ul style="list-style-type: none"> Species moderately likely to return to site once impact ceases.
Low	<ul style="list-style-type: none"> No confirmed or highly likely SCC. No confirmed or highly likely range-restricted species. Less than 50 % contains natural habitat with limited potential to support SCC. 	<ul style="list-style-type: none"> Small (1 – 5ha) area. Almost no connectivity but migration still possible across transformed / degraded habitat; very busy surrounds. Low rehabilitation potential. Several minor and major ecological impacts. 	<ul style="list-style-type: none"> Unlikely to recover fully (<50% restored) after >15 years. Species have low likelihood of remaining at site during the impact. Species have low likelihood of returning to site once impact ceases.
Very low	<ul style="list-style-type: none"> No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining. 	<ul style="list-style-type: none"> Very small (<1 ha) area. No connectivity except for flying species. Several major current ecological impacts. 	<ul style="list-style-type: none"> Unable to recover from major impacts. Species unlikely to remain at site during the impact. Species unlikely to return once impact ceases.

Table 2: Matrix for determining BI

Biodiversity Importance (BI)		Conservation Importance (CI)				
		Very High	High	Medium	Low	Very Low
Functional Integrity (FI)	Very High	Very High	High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 3: Matrix for determining SEI

Site Ecological Importance (SEI) (Mitigation)		Biodiversity Importance (BI)				
		Very High	High	Medium	Low	Very Low
Receptor Resilience (RR)	Very Low	Very High (Avoid)	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)
	Low	Very High (Avoid)	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Very Low (Minimise)
	Medium	Very High (Avoid)	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)
	High	High (Avoid & Minimise)	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)	Very Low (Minimise)
	Very High	Medium (Minimise & Restore)	Low (Minimise & Restore)	Very Low (Minimise)	Very Low (Minimise)	Very Low (Minimise)

The interpretation of the SEI ranks is described in Table 4 below. This table is a supplemented version of that which appears in the Species Environmental Assessment Guideline (SANBI, 2020). The SEI rating will be utilised to generate the vegetation sensitivity map.

Table 4: Guidelines for interpreting Site Ecological Importance (SEI) in the context of the proposed development activities.

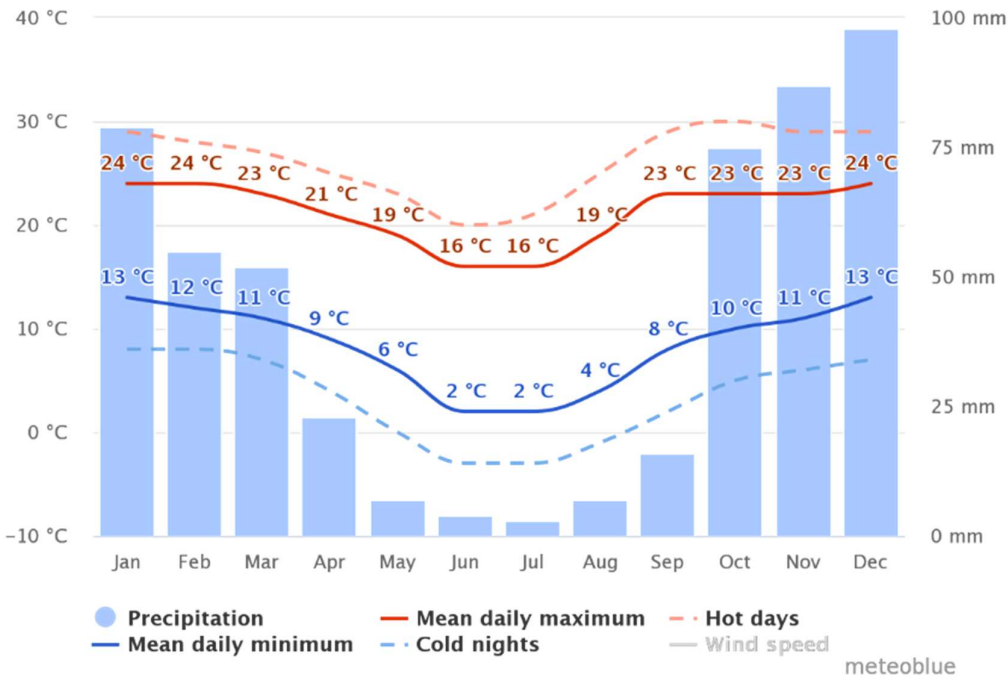
SEI	Interpretation in relation to proposed development activities (SANBI, 2020), with mitigation added by the specialist
Very High	Avoidance mitigation - No destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages. Destructive impacts for species/ecosystems where persistence target remains. <ul style="list-style-type: none"> Development within these areas is not supported. Impacts are difficult to mitigate, if at all Such features usually protected by legislation or guiding policies
High	Avoidance mitigation wherever possible. Minimization mitigation – Changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities. <ul style="list-style-type: none"> Development within these areas is undesirable and impacts are difficult to mitigate, if at all. Impacts must be avoided or managed by an ecological management plan
Medium	Minimization & restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities <ul style="list-style-type: none"> Development within these areas could proceed, limiting impact to sensitive vegetation, provided that appropriate mitigation measures are taken. High impact developments should be considered with caution, if at all. Development must be restricted in footprint and impacts managed and mitigated by an approved management plan. Edge effects to higher sensitivity classes in its proximity must be mitigated / prevented.
Low	Minimization & restoration mitigation - Development activities of medium to high impact acceptable followed by appropriate restoration activities

SEI	Interpretation in relation to proposed development activities (SANBI, 2020), with mitigation added by the specialist
	<ul style="list-style-type: none"> • <i>Developable areas that are connected to sensitive features.</i> • <i>Edge effects must be prevented.</i>
Very Low	<p>Minimization mitigation - Development activities of medium to high impact acceptable and restoration activities may not be required</p> <ul style="list-style-type: none"> • <i>Most types of development can proceed within these areas with little to no impact on conservation worthy vegetation.</i> • <i>Edge effects to other proximate sensitivity classes must be mitigated / prevented.</i>

3. BACKGROUND TO THE STUDY SITE

3.1 Climate

The project falls within the summer rainfall area, with warm summers and cool, dry winters. Mean Annual precipitation (MAP) is between 650-900mm, and frost occurs in winter (Mucina and Rutherford, 2006). The graph below shows the annual average temperatures and precipitation for the Ermelo area. Most rain falls during December and January, which are also the warmest months.



Graph 1: Average temperature and precipitation for the area (meteoblue.com)

3.2 Topography and Hydrology

The proposed mining project site is relatively flat, comprising of an undulating landscape. The site slopes gently north and north-eastwards. Two north flowing streams forms the lowest points in the landscape (Figure 4). These streams drain towards the Vaal River to the northeast of the site. The highest point on site is just west of the N17 road at about 1766m.

3.4 Geology and soils

The site is underlain by arenite (Figure 5). The site is dominated by red to yellow sandy soils of the Ba and Bb land types, found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup) (Mucina and Rutherford, 2006). The site falls on the Bb21 land type. Bb land types comprise apedal (= structureless) soils and include plinthic catena: soils contain a greyish subsoil layer (plinthic) where iron and manganese accumulate in the form of mottles, due to a seasonally fluctuating water table.

3.4 Overview of the regional vegetation types

The study site is situated within the Grassland Biome of South Africa. This biome is dominated by grasslands wherein high summer rainfall, combined with dry winters, night frost and marked diurnal temperature variations are unfavourable to tree growth. Most plant species in grasslands are non-grassy herbs (forbs), most of which are perennial plants with large underground storage structures. Furthermore, many Rare and Threatened plant species in the summer rainfall regions of South Africa are restricted to high-rainfall grasslands, making the Grassland Biome in most urgent need of conservation.

The Grassland Biome comprises several vegetation types (Mucina & Rutherford, 2006). This site is situated within the historical extent of the Eastern Highveld Grassland (Figure 6). The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra*, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Searsia magalismontanum*).

Eastern Highveld Grassland is a poorly conserved vegetation unit with much of its area transformed by cultivation, plantations, urbanisation, and mining. Where disturbances occur, the invasive exotic tree *Acacia mearnsii* (black wattle) can become dominant and displace the natural vegetation. The remaining portions of the Eastern Highveld Grassland are therefore of high conservation value and sensitivity and are thus classified as an Endangered vegetation type (Mucina & Rutherford, 2006). The study site must be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction.

3.5 Listed Ecosystems

The National Environmental Management: Biodiversity Act (Act 10 of 2004) provides for listing threatened or protected ecosystems in one of four categories: critically endangered (CR), endangered (EN), Vulnerable (VU) or Protected (Section 52(1)(a) of the National Environmental Management: Biodiversity Act (Government Gazette 34809, Government Notice 1002, 9 December 2011). Ecosystem status is based on the percentage of original area remaining untransformed (by croplands, mining, urban development & roads) in relation to the biodiversity target and a threshold for ecosystem functioning. Biodiversity target refers to the percentage of the original areas required to capture 75% of the species occurring in each vegetation type. The targets are aimed only at species conservation, and ecological processes are not considered.

According to the 2011 Listed Ecosystems, Eastern Highveld Grassland is a Vulnerable ecosystem, based on irreversible loss of natural habitat (Government Gazette 34809, Government Notice 1002, and 9 December 2011). The most northern extent of the mining rights boundary falls within the Endangered Chrissiesmeer Panveld (Figure 7). Although the National List of Threatened Terrestrial Ecosystems published in terms of the Biodiversity Act in 2011 remains in legal force, the data contained in the recent National Biodiversity Assessment (NBA) 2018 represents an update of the assessment of threat status for terrestrial ecosystems, but the National List of Threatened Terrestrial Ecosystems has not yet been revised and therefore the gazetted 2011 Listed Ecosystems is still in force. The updated threatened ecosystems as per the recent NBA (2018) places the site and surrounds within the Vulnerable Eastern Highveld Grassland (Figure 8).

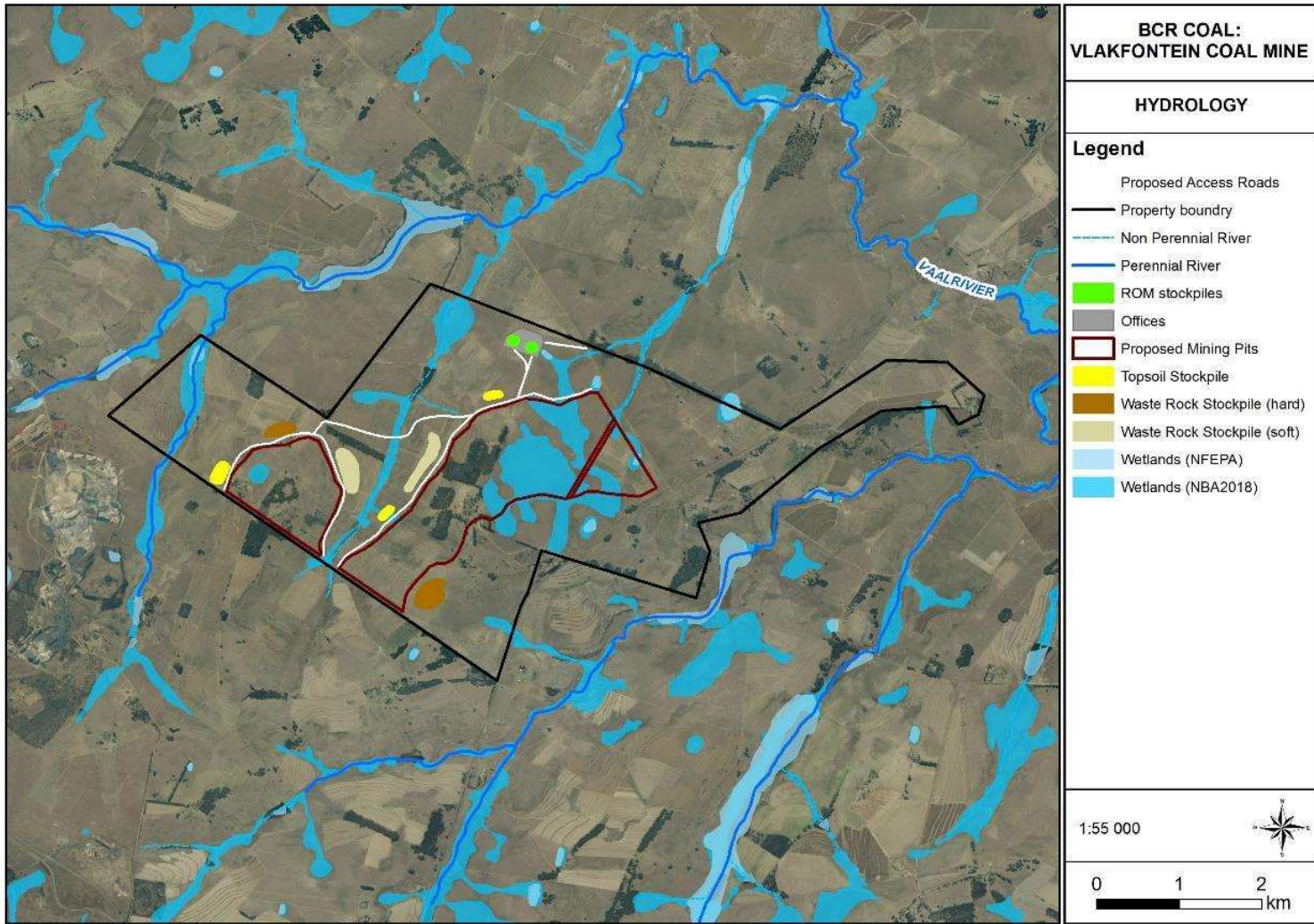


Figure 4: Hydrology of the area that the site is situated in

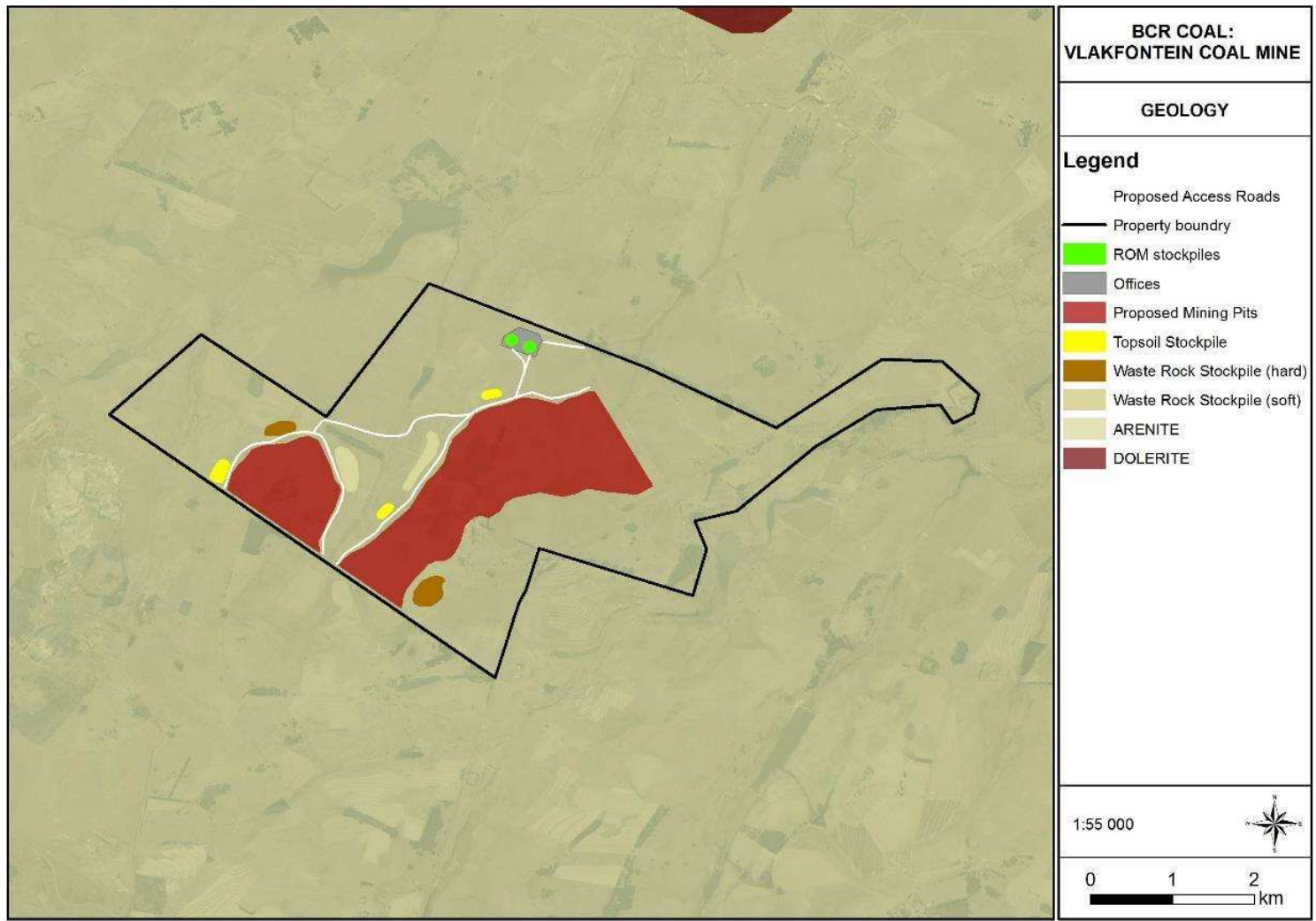


Figure 5: Geology map

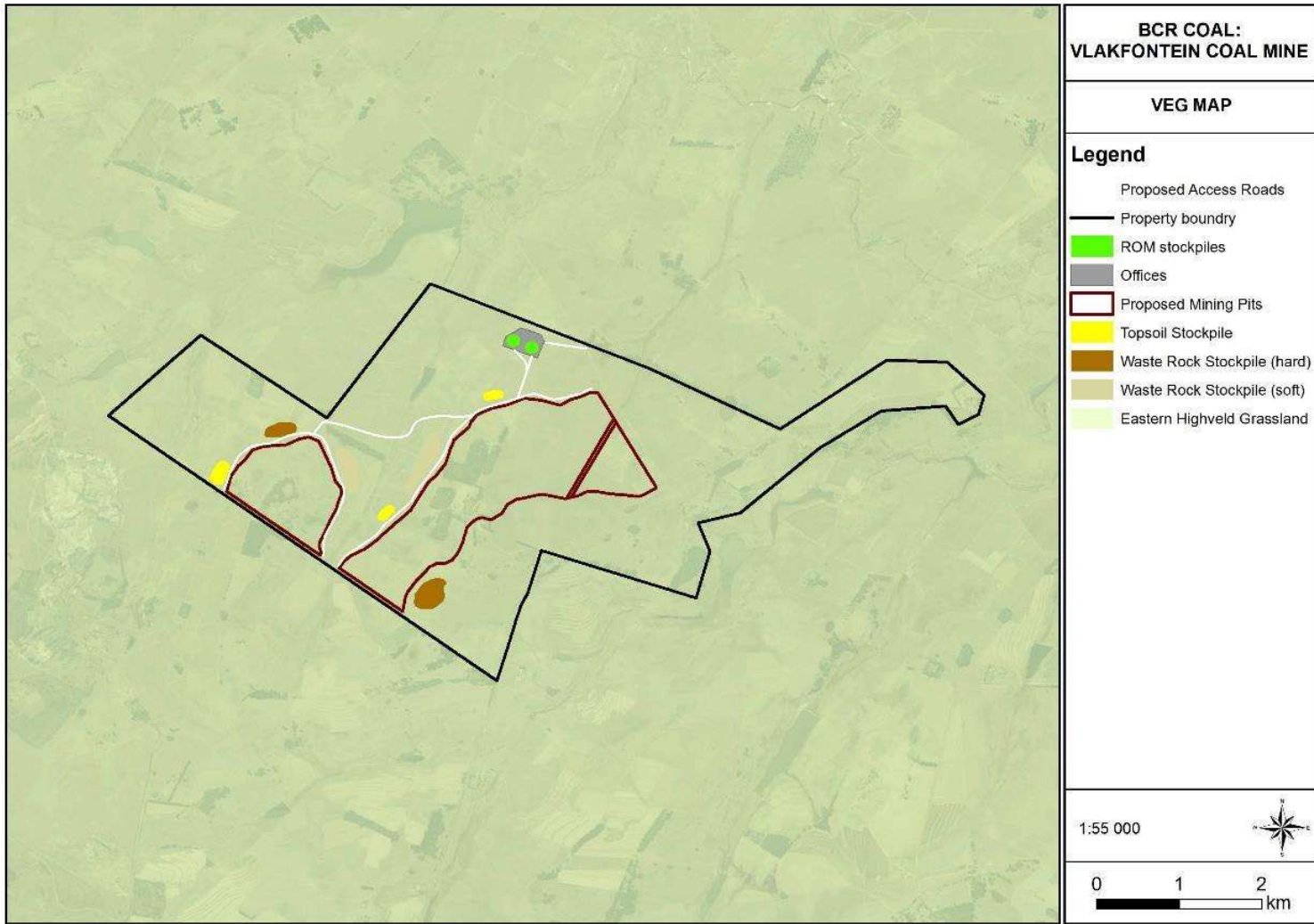


Figure 6: Regional vegetation map

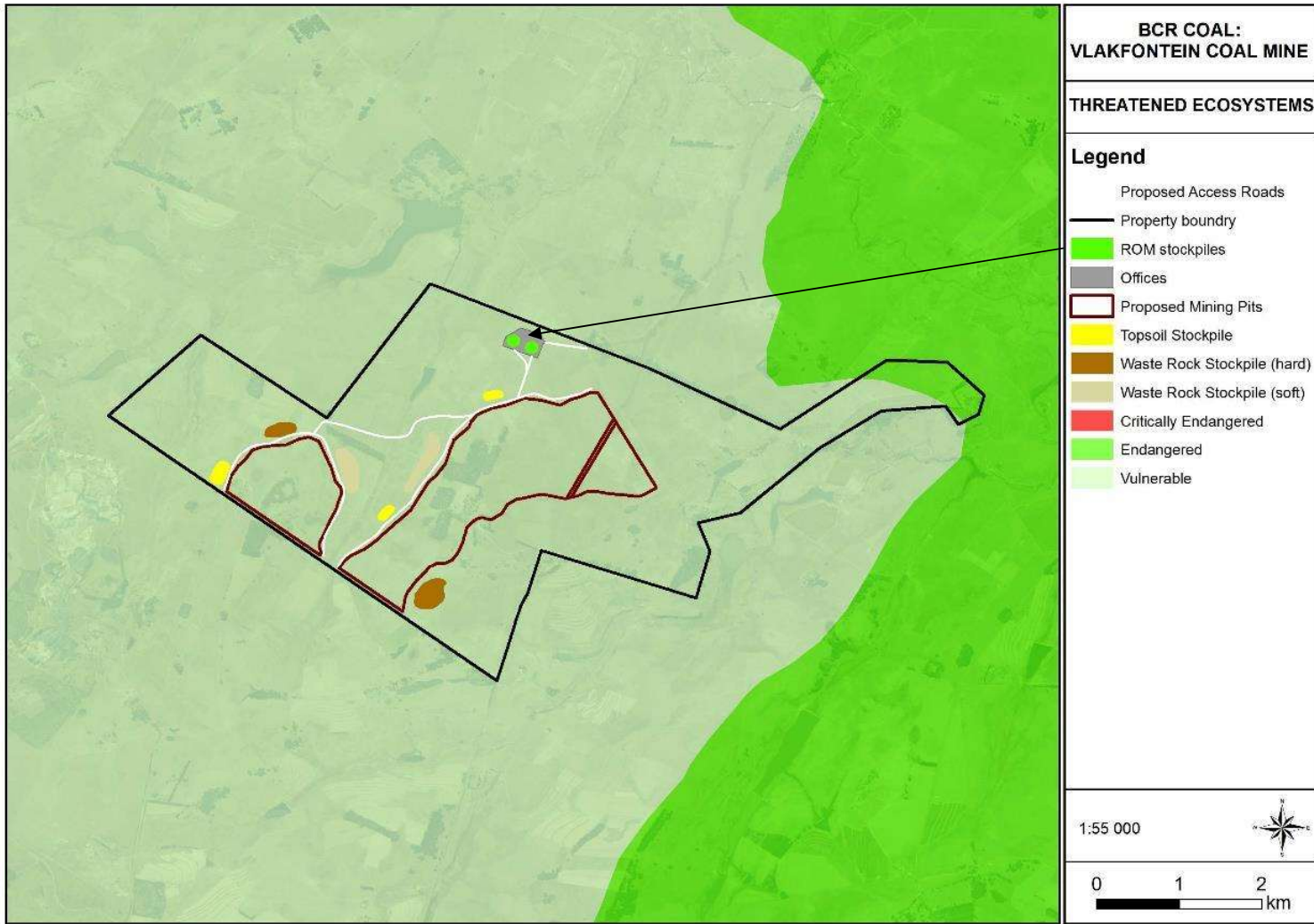


Figure 7: The site falls within the Vulnerable Eastern Highveld Grassland ecosystem, with the most northern extent of the mining rights boundary within the Endangered Chrissiesmeer Panveld (Government Gazette 34809, Government Notice 1002, and 9 December 2011)

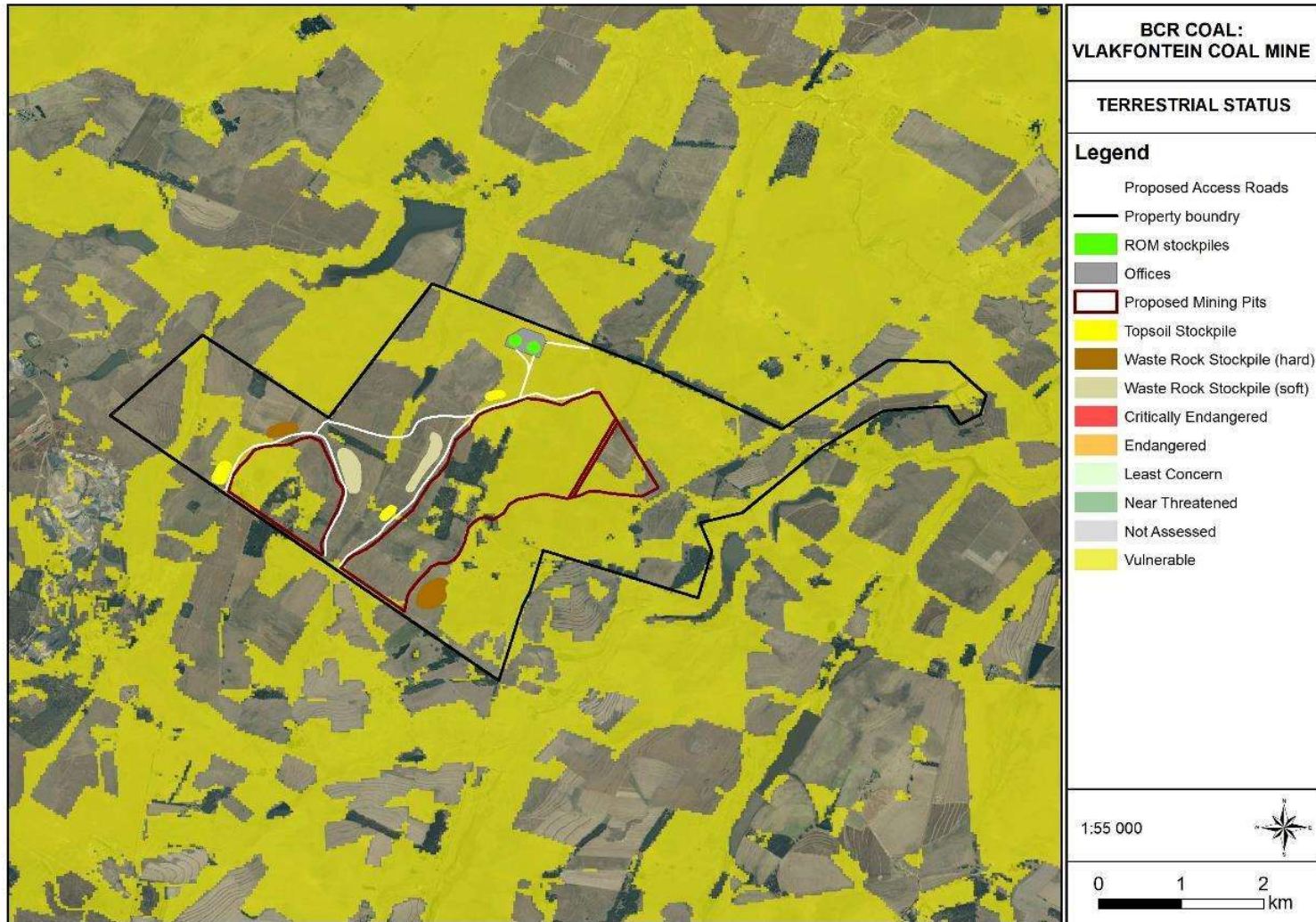


Figure 8: Terrestrial ecosystem status as per the recent National Biodiversity Assessment (Skowno *et al*, 2019)

3.6 Protected Areas

The site is not within a protected area; however, the Chrissiesmeer Protected Environment is situated about 1.5km north-east of the site (Figure 1: Locality map). Chrissiesmeer was proclaimed as a Protected Environment in terms of section 28(1)(a)(i) and (b) of the National Environmental Management: Protected Areas Act 57 of 2003, on 22 January 2014 (Provincial Gazettes (Mpumalanga), No. 2251 of 22 January 2014). The site is within 5km of the Chrissiesmeer Pans Systems but outside of the 1km ESA buffer of this protected environment (Figure 9).

3.7 Mpumalanga Biodiversity Sector Plan

The Mpumalanga Biodiversity Sector Plan (MBSP) delineates the following categories: Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and Modified Area (areas that have been irreversibly modified from their natural state). The map is a fine-scale map (1:10 000 - 1:25 000) that aims to guide sustainable development by providing a map of biodiversity priority areas that can be used by planners and decision-makers in a range of sectors.

The conservation categories present on the site are geographically represented in Figure 9. Table 5 describes the conservation categories that are present on and around the site and tabulates the MBSP management goals for these categories.

Table 5: MBSP categories on the site and planned infrastructure in each category

Conservation category	Management goals	Relevant section of the project (Figure 9)
<p>Critical Biodiversity Areas (CBAs): Irreplaceable These area the most important biodiversity areas in the Province, outside of the protected area network. They represent the last remaining options for securing critical biodiversity and ecosystems and for achieving biodiversity targets. If these areas suffer any further loss of habitat or ecological function, it is likely that the biodiversity targets will not be met, and the status of species and ecosystems will decline.</p>	Maintaining the natural vegetation cover of CBAs in a healthy ecological state	<ul style="list-style-type: none"> • Proposed mining pits • Mining offices • ROM stockpiles • Topsoil stockpiles • Access roads
<p>Heavily modified: Transformed areas, where biodiversity and ecological function have been lost to the point that they are not worth considering for conservation</p>	Manage the land use in a biodiversity friendly manner aiming to maximise ecological functionality	<ul style="list-style-type: none"> • Waste rock stockpiles • Topsoil stockpile • Access roads
<p>Moderately modified / old lands: Areas which were modified within the last 80 years but now abandoned, including old mines and old cultivated fields</p>	Stabilise and manage to restore ecological functionality, particularly soil carbons and water related functionality	<ul style="list-style-type: none"> • Proposed mining pits • Waste rock stockpiles • Topsoil stockpile • Access roads

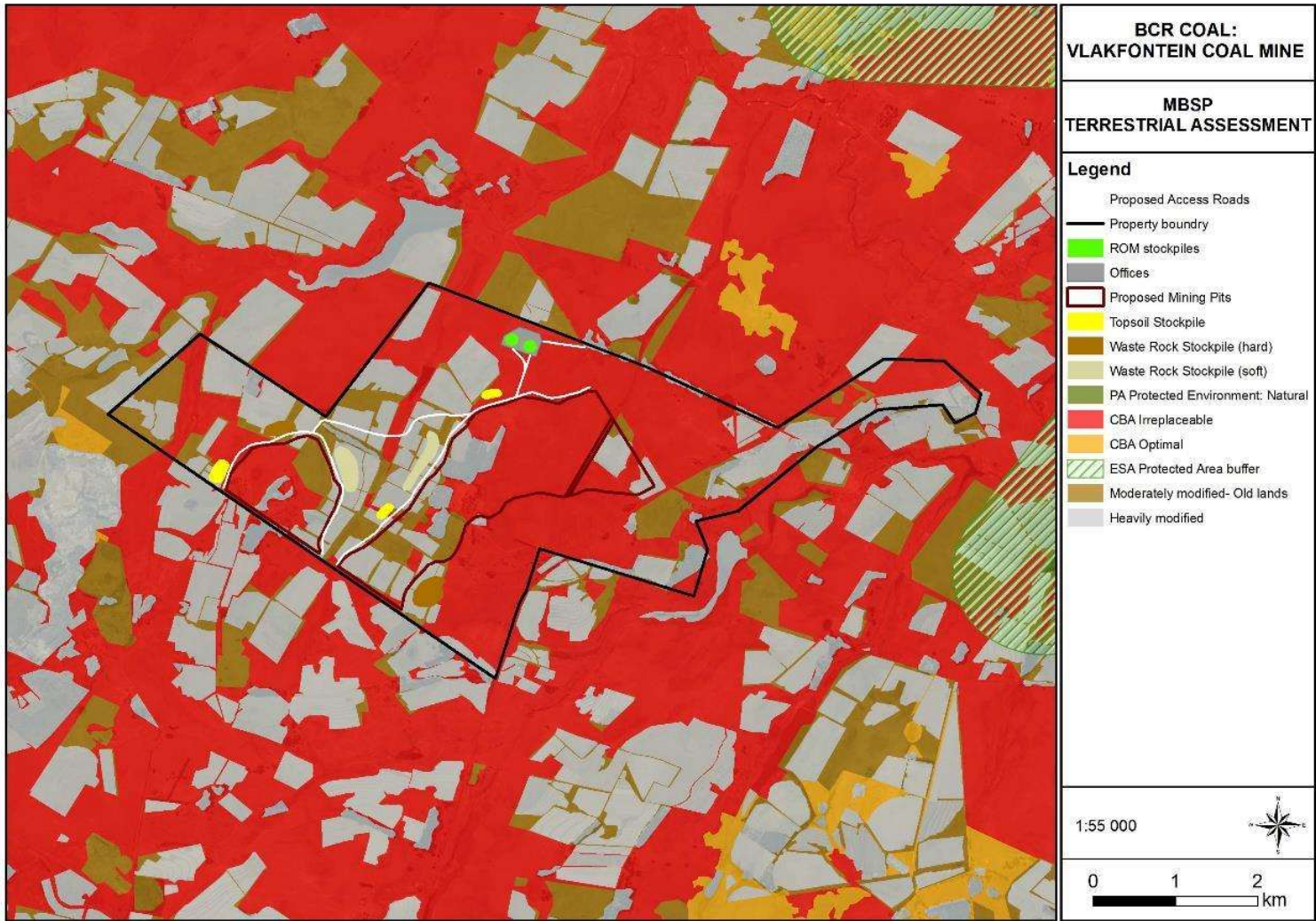


Figure 9: Mpumalanga Biodiversity Sector Plan Map

3.9 Ecological drivers and processes on the site

Frost, fire, and grazing maintain the herbaceous grass and forb layer and prevent the establishment of thickets or encroachment by trees into grasslands (Tainton, 1999). Fire is a natural disturbance caused by lightning, and regular burning is therefore essential for maintaining the structure and biodiversity of grasslands. Grassland plants are adapted to survive fires. If fire is prevented or frost becomes limited due to climate change factors, the vegetation structure degrades, and alien species could eventually dominate the natural vegetation. This will also lead to a decrease in species diversity as species adapted to fire and grazing will eventually decrease or die-off. Mismanagement of grasslands often leads to encroachment by non-herbaceous or 'woody' species

3.10 Strategic Water Source Areas (SWSA)

Strategic Water Source Areas (SWSAs) are landscapes where a relatively large volume of runoff produces water for the majority of South Africa. Strategic water source areas can be regarded as natural 'water factories', supporting growth and development needs that are often a far distance away. Deterioration of water quality and quantity in these areas can have a disproportionately large negative effect on the functioning of downstream ecosystems and the overall sustainability of growth and development in the regions they support (Nel *et al.*, 2013). According to Le Maitre *et al.* (2018), the project site is about 13km north-west of the closest Upper Vaal surface water area.

4. PRELIMINARY RESULTS

4.1 Land use disturbances

An historical aerial image of the year 1968 indicated that the vegetation within the proposed infrastructure footprint was largely cultivated and several stands of trees, likely exotic, can be seen (Figure 10).



Figure 10: Aerial imagery dated 1968 (Chief Directorate National Geospatial Information Geospatial Portal)

Subsequent Google Earth Satellite imagery indicated the ongoing cultivation within the mining rights area (Figure 11). Some tree stands, likely the exotic *Eucalyptus*- or *Acacia* species can be seen. It seems the landowners are in the process of removing much of the exotic trees. The imagery also indicated the Mooifontein coal mine activities to the south-west of the site.

Several moist areas can be noted, and areas not cultivated over the years are likely too wet for ploughing. Remaining grasslands on the site are probably used for grazing cattle. Google Earth Satellite imagery taken from the N17 westward over the site, shows the remaining grassland on the site (Photo plate 1). The grasslands probably range from secondary to primary grasslands. The grassland and moist grasslands on the site are suitable habitat to several plant species of conservation concern.

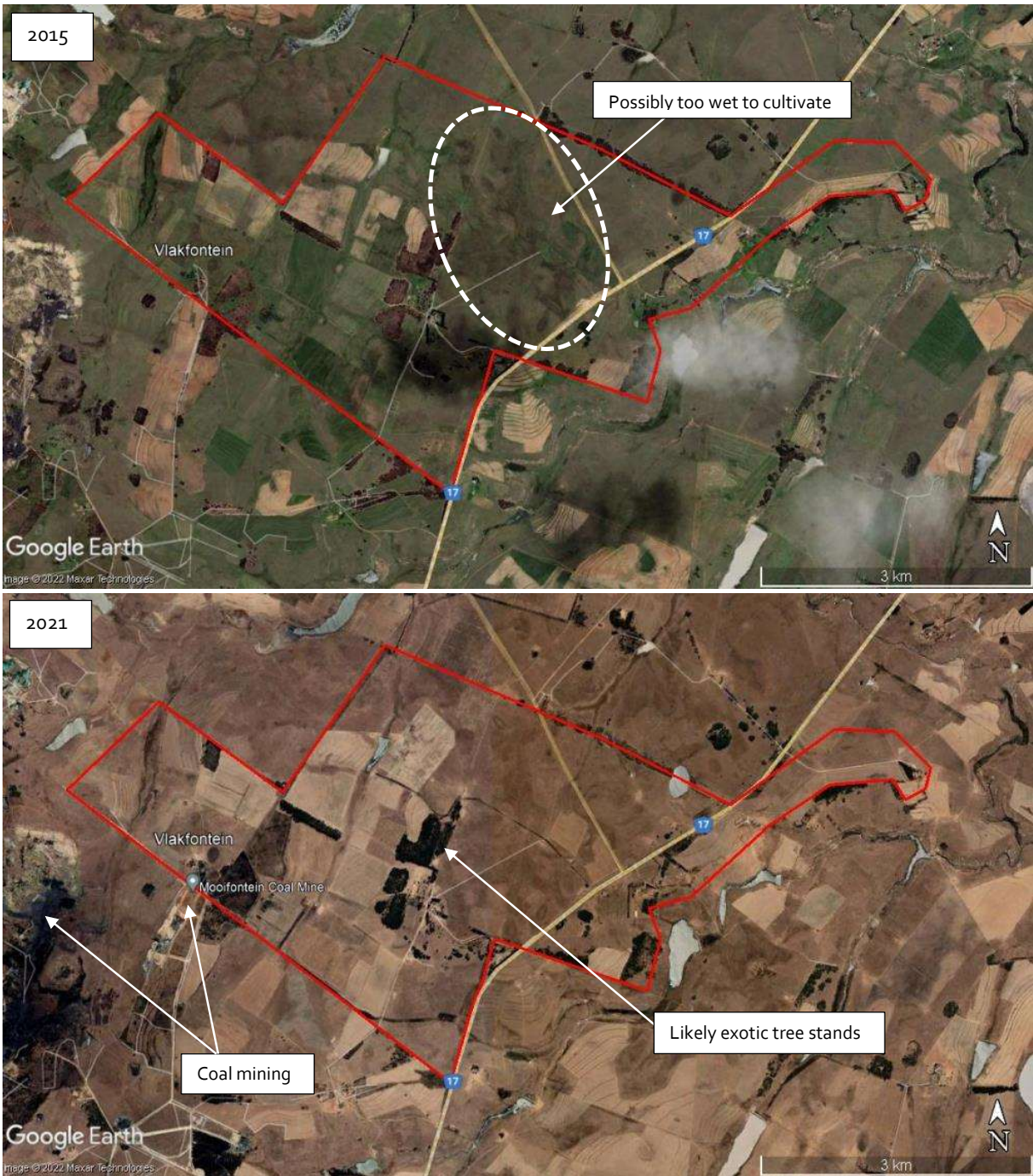


Figure 11: Google Earth satellite imagery dated 2015 (top) and 2021 (below)

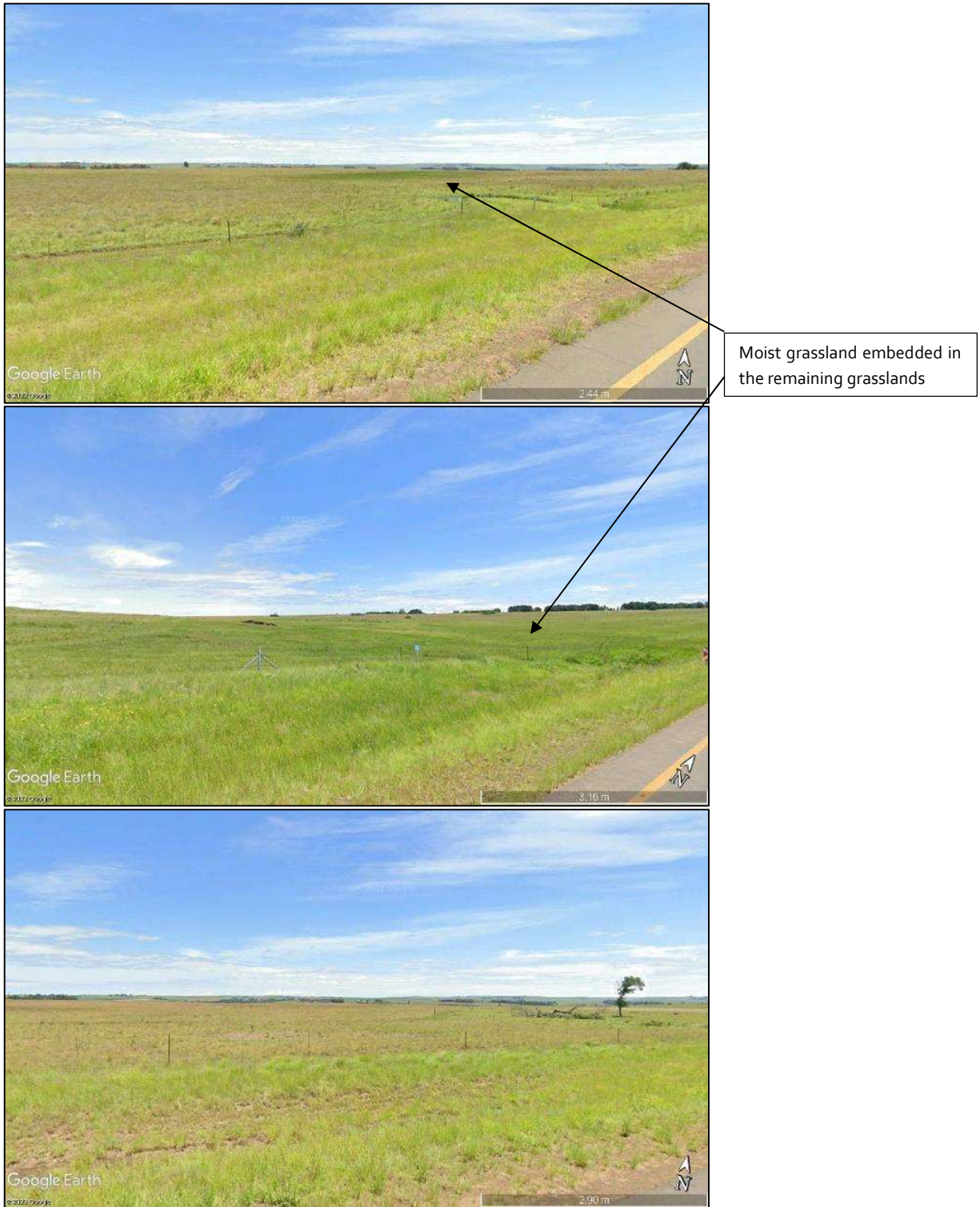


Photo plate 1: A collage of Google Earth Street View images taken from the N17 west and north-westward over the site (images dated January 2022). The images indicate a range of grassland vegetation on the site, including moist grasslands, secondary grasslands, and good condition primary grassland.

4.2 Broad vegetation groups likely present

The assessment of literature, aerial and satellite imagery and available spatial data indicate that at least four (4) broad vegetation communities are likely present on the site:

1. Natural to near-natural Eastern Highveld Grassland
2. Secondary grassland
3. Moist grassland along drainage lines and in wetlands
4. Modified vegetation (farm buildings, cultivated land and alien invasive tree stands)

The potential broad vegetation groups are discussed below and geographically represented in Figure 12. The preliminary site sensitivity is represented in Figure 13.

4.2.1 Modified land

Modified land comprises areas where the natural vegetation was destroyed or degraded beyond a threshold of recovery. Modified vegetation can be described as land where the loss of composition, structure and ecological function of the vegetation was extensive, and the land is in a poor ecological condition (SANBI, 2016).

On site, the cultivated areas, areas that comprise infrastructure and alien invasive tree stands will likely support no or little indigenous species diversity and range from moderately to severely modified from the reference state of Eastern Highveld Grassland. No plant species of conservation concern are expected to occur in the modified land and the vegetation is considered as low sensitivity to the proposed mining.

Note that some modified areas might be fallow and comprise secondary grasslands. This must be verified during the vegetation assessment.

4.2.2 Secondary grassland

Secondary grasslands develop where the original, undisturbed grassland vegetation was removed (e.g. cultivation). After such disturbances cease, pioneer grassland species, as well as weedy pioneer plants, colonise the fallow lands leading to a pioneer grassland state with a much lower initial species diversity as opposed to the primary (climax) state prior to any disturbances. In the absence of further disturbances, the grassland could reach a secondary grassland state (more diverse and ecologically stable than pioneer grassland, yet much lower in species diversity than primary grassland) and theoretically the primary state over time. However, primary grasslands are species rich ecosystems, which once disturbed, are difficult, if not impossible to restore.

Secondary grassland comprises an ecological condition class in which ecological function is maintained even though composition and structure have been compromised. The secondary grasslands are therefore not expected to support plant species of conservation concern and are preliminary classified as being of medium to low sensitivity to the proposed mining.

Some portions of the site were cultivated for a short period and then left fallow, subsequently being colonised by grassland species. Also, areas where alien invasive tree species were removed seemingly

comprise secondary grasslands. These areas must be assessed during the vegetation assessment to determine the state thereof, as well as potential to support plant species of conservation concern.

4.2.3 Eastern Highveld Grassland

According to aerial imagery and spatial data such as the Mpumalanga Biodiversity Sector Plan, about half of the proposed site comprised grassland vegetation which was not previously disturbed. These areas are likely used for grazing and may include secondary grasslands.

The remaining grassland is likely representative of the Eastern Highveld Grassland and in a good condition. Vegetation composition, structure and function are still intact or largely intact. Such grassland has a high possibility to support several plant species of conservation concern and are considered as highly sensitive to the proposed mining. The vegetation assessment must be undertaken during the growing season and verify the state of the grassland, as well as potential to support plant species of conservation concern.

4.2.4 Moist grassland

Moist grasslands in this report refer to grassland vegetation that will likely support plant species with an affinity to grow in permanent, temporary, or seasonally saturated conditions. Note that the moist grasslands are an indication of where wetlands could occur, based on aerial imagery and the likely presence of plant species that are adapted to growing in inundated soils, or species that prefers moist soils, but are not necessarily wetlands. The wetland report must be consulted for the definitive wetland boundaries and recommended buffer zones.

The moist grasslands were not historically cultivated and are expected to be in a good natural condition, likely representative of the Eastern Highveld Grassland. Vegetation composition, structure and function are still intact or largely intact and the moist grassland has a high possibility to support several plant species of conservation concern. Moist grasslands, if confirmed to be wetlands, are also protected by the National Water Act 36 of 1998 and are considered as highly sensitive to the proposed mining.

The vegetation assessment must be undertaken during the growing season and verify the state of the grassland, as well as potential to support plant species of conservation concern.

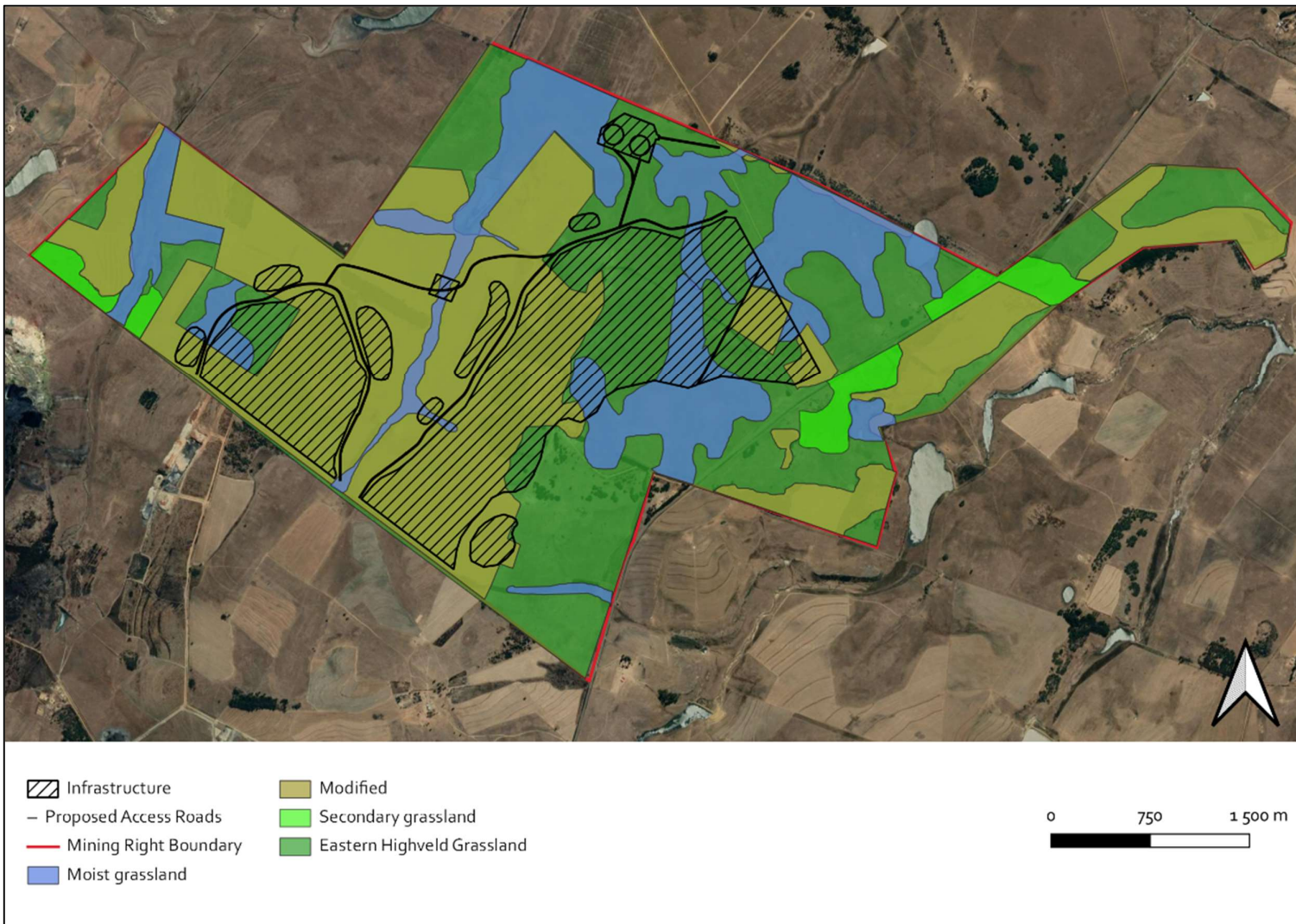


Figure 12: Preliminary, desktop level vegetation map

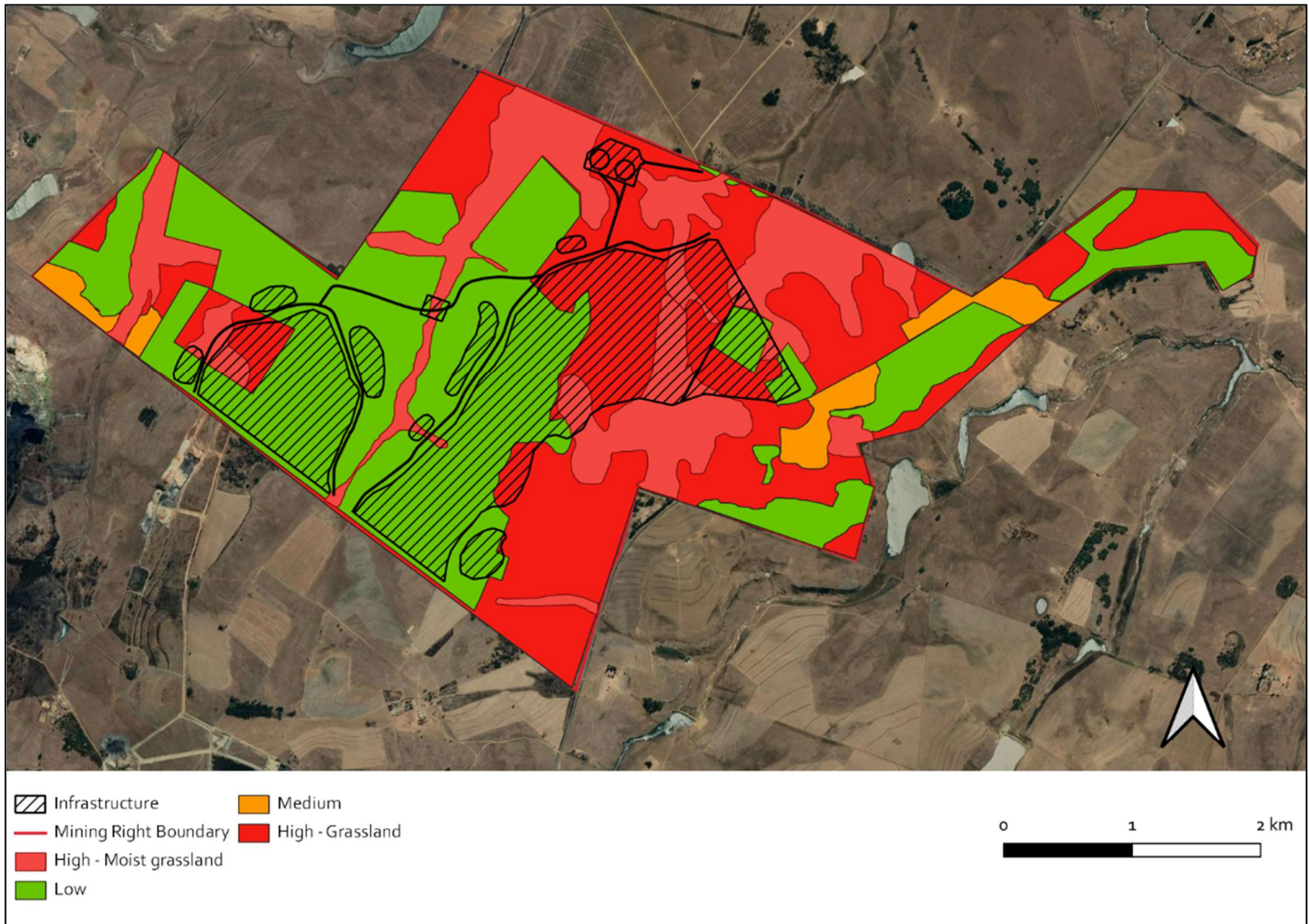


Figure 13: Preliminary, desktop level sensitivity map

4.4 Summary of Plants of Conservation Importance

4.4.1 Threatened or Protected Plant Species (TOPS)

Chapter 4, Part 2 of the National Environmental Management: Biodiversity Act (NEM:BA Act No. 10 of 2004), (NEMBA) provides for listing of plant and animal species as threatened or protected. If a species is listed as threatened, it must be further classified as Critically Endangered, Endangered or Vulnerable. These species are commonly referred to as TOPS listed. The Act defines these classes as follows:

- Critically endangered species: any indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
- Endangered species: any indigenous species facing a high risk of extinction in the wild in the near future, although it is not a critically endangered species.
- Vulnerable species: any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future; although it is not a critically endangered species or an endangered species.
- Protected species: any species which is of such high conservation value or national importance that it requires national protection. Species listed in this category will include, among others, species listed in terms of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

Certain activities, known as 'Restricted Activities', are regulated on listed species using permits by a special set of regulations published under the Act. Restricted activities regulated under the act are keeping, moving, having in possession, importing and exporting, and selling. The first list of threatened and protected species published under NEM:BA was published in the government gazette on the 23rd of February 2007, with the most recent amended draft list and regulations published in March 2015 (Government Gazette No. 38600 of 31 March 2015)

The site offers suitable habitat for some TOP species, and the presence or likely presence of such species should be assessed during the growing season.

4.4.2 Plant Species of Conservation Concern (PSCC)

Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened, Extinct in the wild, Data deficient, Near-threatened, Critically rare, Rare and Declining (Figure 14). Chapter 4, Part 2 of NEMA Biodiversity Act, 2004 (Act No. 10, 2004) provides for listing of species that are threatened or in need of protection to ensure their survival in the wild, while regulating the activities, including trade, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival.

A list of plants of conservation concern was compiled using information from the South African National Biodiversity Institute's (SANBI) checklist (SANBI, 2009), Raimondo *et al*, (2009), information

received from the Mpumalanga Tourism and Parks Agency (MTPA) for the site, the national web-based screening tool report.

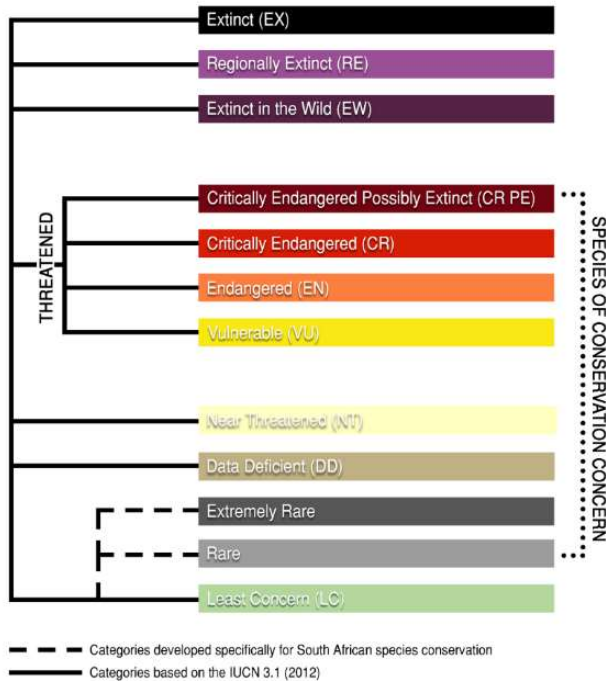


Figure 14: Categories of species of conservation concern (SCC) modified from the IUCN's extinction risk categories (reproduced in part from IUCN, 2012).

4.4.2.1 Plant species of conservation concern desktop statement

A list of sixteen (16) species of conservation concern was compiled using the data listed above. Of these species, two (2) are classified as Near Threatened, eight (8) as Vulnerable and one (1) as Endangered. Five (5) species were historically classified as Declining, however, the species have been reassessed to Least Concern or are currently listed as Data Deficient. The numbers of these plants are still decreasing and therefore it is listed here as best practise.

Suitable habitat is present on the site for most of the listed species. Suitable habitat is within drainage lines and associated moist grasslands, as well as remaining natural grasslands on the site. Suitable habitat on the site must be assessed within the growing season for the plant species shortlisted. Data for plant species of conservation concern is confidential and the public can contact the relevant Environmental Assessment Practitioner for further information. Data for sensitive species is available from SANBI and may not be published.

4.4.3 Provincially Protected Plants

The project area could support several plant species that are provincially protected by the Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998) (MNCA). These species may not be removed,

pruned or damaged without a permit from the Mpumalanga Tourism and Parks Agency (MTPA). These species are most likely to occur along drainage lines and within undisturbed grassland. The remaining natural vegetation should be assessed during the growing season to determine which species are present.

4.4.4 National Protected Trees

The National Forest Act, 1998 (Act No. 84 of 1998) enforces the protection of several indigenous trees. The removal, thinning or relocation of protected trees will require a permit from the Department of Forestry, Fisheries and the Environment (DFFE) (Notice of the List of Protected Tree Species under the National Forests Act, 1998 (ACT NO 84 OF 1998), Notice 44204, Government Gazette, 1 March 2021).

The site falls within the grassland biome and are unlikely to support national protected trees. However, the natural vegetation should be assessed for the presence of such species.

5. POTENTIAL IMPACT STATEMENT

Mankind depends on the natural environment for many ecological services provided for by ecosystems, ecological processes, and plant species in general. However, any development activities in natural systems will impact on the surrounding natural environment and usually in a negative way. To limit or negate these impacts, the source, extent, duration and intensity of the possible impacts needs to be identified. Once the significance of the impacts is understood, the development could both adequately plan for and mitigate these impacts to a best practice and acceptable level. However, if the impacts are significant, especially in already threatened ecosystems and vegetation units such as present on the proposed site, and no adequate mitigation measures (including for example alternatives, layout amendments and relocation of infrastructure) could reduce or avert these impacts, then the development should not be allowed to proceed, or an offset must be considered.

Large portions of seemingly intact natural Eastern Highveld Grassland are likely present based on the outcome of the desktop level assessment. Remaining patches of this grassland unit is of high conservation value and sensitivity as it is poorly protected and within a vulnerable ecosystem (Skowno, et al., 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the Critical Biodiversity Area: Irreplaceable category of the Mpumalanga Biodiversity Sector Plan.

Some impacts could be mitigated, however, the destruction of good condition grassland vegetation can not be mitigated as grassland vegetation is difficult, if not impossible, to rehabilitate. In addition, much of the primary PAOI is within a CBA: Irreplaceable conservation category of the MBSP. According to the land use guidelines of the MBSP, any form of mining or prospecting should not be located within

a CBA. Permissible land uses are those that are compatible with maintaining the natural vegetation cover of CBAs in a healthy ecological state, and that do not result in loss or degradation of natural habitat. Land use in Irreplaceable CBAs must be in line with Conservation Management. Such natural areas are required for the province to meet its biodiversity targets. The proposed mining is not supported by the MBSP in CBA: Irreplaceable. The MBSP classifies mining as a non-permissible land use, which could potentially result in a fatal flaw damage to vegetation and plant species of conservation concern that would have a Very High significance rating and that can not be mitigated). This will be further supported if natural grassland vegetation and plant species of conservation concern are recorded on the site.

Table 6 below summarises the potential impacts that the desktop phase identified, as well as the methods that will be used to assess these impacts further during a field survey.

Table 6: Desktop Issues associated with the proposed mine

Preliminary issues/ impact	Nature of impact	Extent of Impact	No-go areas or areas that could constitute a fatal flaw	Proposed plan of study
Destruction of Eastern Highveld Grassland – an endangered vegetation type and listed as a vulnerable ecosystem	Clearing of land for mining and associated infrastructure Mining operation	Local	Impacts in good condition Eastern Highveld Grassland and other sensitive vegetation communities must be limited or avoided where possible	Field survey to assist in delineating good condition Eastern Highveld Grassland and other sensitive vegetation groupings.
Degradation of vegetation around watercourses	Clearing of land for mining and associated infrastructure Mine operation	Local and downstream	Buffer areas as set by wetland specialist Ares where protected and threatened plant species of conservation concern, or suitable habitat are confirmed during the field survey	Field survey to assess watercourse vegetation and to determine areas that provide suitable habitat to SCC
<ul style="list-style-type: none"> • Removal and destruction of habitat for PSCC • Destruction of individuals or populations • Degradation of habitat 	Clearing of land for mining and associated infrastructure Operational activities	Local - regional	Confirmed and suitable habitat for PSCC that must be conserved <i>in situ</i>	Identify suitable habitat for PSCC on the project site Search accessible sample areas for PSCC

Preliminary issues/ impact	Nature of impact	Extent of Impact	No-go areas or areas that could constitute a fatal flaw	Proposed plan of study
Spread of alien invasive plant species	The seed of alien invasive plant species could spread into the disturbed and stockpiled soil. Construction vehicles and equipment can introduce alien invasive plant species	Regional	Drainage lines, moist grasslands and good condition grasslands should be avoided as much as possible to prevent spread of such species into naturally vegetated areas	Record the dominant / common alien invasive plant species within sampled areas during the field survey
Degradation of remaining grasslands	Operational edge effects Exclusion of fire and grazing, as well as changes to hydrology	Local	Impacts in good condition Eastern Highveld Grassland and other sensitive vegetation communities must be limited or avoided where possible	Field survey to assist in delineating good condition Eastern Highveld Grassland and other sensitive vegetation groupings. Recommend mitigation to maintain ecological process on the site
Compaction and destruction of soils	Clearing of land for mining and associated infrastructure Mining operation	Local	Impacts in good condition Eastern Highveld Grassland and other sensitive vegetation communities must be limited or avoided where possible	Recommendations into the reduction of footprint where possible, depending on site results.

6. SUMMARY OF DESKTOP VERIFICATION VS SCREENING TOOL RESULTS

6.1 Biodiversity (vegetation) results

The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were cultivated or modified. Such areas are preliminary classified as low sensitivity from a vegetation perspective. However, these areas are likely of biodiversity importance to the movement of fauna and pollinators and important to maintain function and ecological processes.

Some secondary grasslands of medium sensitivity may be present in historically cultivated lands. However, large portions of seemingly intact natural Eastern Highveld Grassland are seemingly present within the site, as well as moist grasslands. Remaining patches of this grassland unit is of high conservation value and sensitivity as it is poorly protected and within a vulnerable ecosystem (Skowno, *et al.*, 2019). It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the CBA: Irreplaceable category of the MBSP, in which mining is not an acceptable land use.

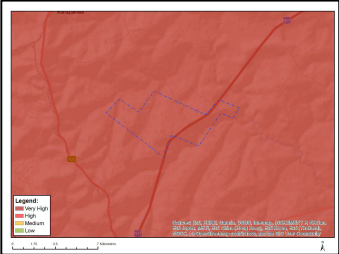
Other than the modified areas, the desktop results are in accordance with the screening tool results that the site comprises mostly of high terrestrial biodiversity (vegetation) sensitivity (Table 7).


6.2 Plant species results

The site is classified as medium sensitivity for sensitive plant species, indicating that the site includes suitable habitat for plant species of conservation concern. The screening tool lists nine (9) species that has a possibility of occurring on the site. These are discussed in section 4.4.

The remaining Eastern Highveld Grassland, including the moist grasslands, are highly likely to include sensitive and unique habitats, and suitable habitat for several plant species of conservation concern are likely to be present. until such time as habitat is verified or species recorded on the site, the desktop results in accordance with the screening tool sensitivity rating for plant species (Table 7).

Table 7: Summary of desktop verification

SCREENING TOOL SENSITIVITY	DESKTOP PRELIMINARY SENSITIVITY	OUTCOME STATEMENT/PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
DESKTOP VEGETATION IMPACT ASSESSMENT			
<p style="text-align: center;">High for entire site</p> 	<p>Low: modified land (About 60% of the primary PAOI)</p> <p>Medium to low: secondary grassland (Outside of the primary PAOI)</p> <p>High: remaining natural grasslands and moist grasslands especially as these correspond with a CBA: Irreplaceable (About 40% of the primary PAOI)</p>	<p><u>Undertake a site survey during the growing season (October earliest):</u></p> <ul style="list-style-type: none"> • Verify the extent of modified land • Verify the presence and extent of secondary grasslands • Verify the state of remaining grassland on the site (e.g. primary vs degraded) • Confirm presence and extent of moist grasslands • Delineate any additional vegetation communities not described in the desktop phase • Map the above and complete a Site Ecological Importance (SEI) assessment • Undertake an impact assessment and recommend mitigation measures or offset 	<p style="text-align: center;">Section 4.2 Figure 14 and Figure 15 Conclusion</p>
DESKTOP PLANT SPECIES IMPACT ASSESSMENT			

SCREENING TOOL SENSITIVITY	DESKTOP PRELIMINARY SENSITIVITY	OUTCOME STATEMENT/PLAN OF STUDY	RELEVANT SECTION MOTIVATING VERIFICATION
<p>Medium for much of the site, low for remainder of site</p> 	<p>Medium areas as indicated by the screening tool correspond with desktop delineated moist grasslands and remaining good condition grassland on the site. These areas are suitable habitat for plant species of conservation concern and therefore the desktop verifies this sensitivity. It is highly likely that the site supports plant species of conservation concern, and should these be recorded, the rating will change to high (about 40% of the primary PAOI)</p> <p>Low sensitivity areas correspond largely to the desktop delineated modified land (cultivated) and are unlikely to support plant species of conservation concern (about 60% of the primary PAOI)</p>	<p><u>Undertake a habitat assessment during the growing season (October earliest):</u></p> <ul style="list-style-type: none"> • Suitable habitat on the site must be delineated and assessed within the growing season for the plant species shortlisted. • Where such species are recorded, map the localities • If species are suspected to be present, but not recorded at the time of the site assessment, recommend a follow-up plant species assessment • Assess suitable habitat for TOP species • List provincially protected plant species • Map the above and complete a Site Ecological Importance (SEI) assessment • Depending on the threat status of species recorded (or habitat for such species) recommend follow-up actions 	<p>Section 4.4.2 Conclusion</p>

7. CONCLUSION and OPINION

The site falls in an area that is listed by the National Screening Tool as being of 'High' terrestrial biodiversity. Furthermore, the Screening Tool lists a 'Medium' sensitivity for plant species, indicating that there is a likelihood of plant species of conservation concern being present.

The desktop assessment of the available information indicated that about half of the vegetation that could be impacted on by the proposed mining were cultivated, modified or could comprise secondary grasslands. However, large portions of seemingly intact natural Eastern Highveld Grassland are likely present. Remaining patches of this grassland unit is of high conservation value and sensitivity. It is therefore imperative that the site vegetation be assessed for the presence of intact (undisturbed or untransformed) Eastern Highveld Grassland, as remaining portions should be conserved to preserve this vegetation type and protect it from extinction. Importantly, the remaining grassland on the site corresponds greatly with the CBA: Irreplaceable category of the MBSP, in which mining is not an acceptable land use.

Although some impacts could be mitigated, however, the destruction of good condition grassland vegetation can not be mitigated as grassland vegetation is difficult, if not impossible, to rehabilitate. In addition, much of the site is within a CBA: Irreplaceable conservation category of the MBSP. The remaining grassland within the primary PAOI corresponds greatly with the Critical Biodiversity Area: Irreplaceable category of the Mpumalanga Biodiversity Sector Plan. According to the land use guidelines of the MBSP, any form of mining or prospecting should not be located within a CBA. Permissible land uses are those that are compatible with maintaining the natural vegetation cover of CBAs in a healthy ecological state, and that do not result in loss or degradation of natural habitat., in which mining is not an acceptable land use. Such natural areas are required for the province to meet its biodiversity targets. The proposed mining is not supported by the MBSP in CBA: Irreplaceable and could potentially result in a "fatal flaw". This will be further supported if natural grassland and plant species of conservation concern are recorded on the site.

The good condition grassland that could be directly impacted on is estimated at about , including the moist grasslands. About 16902378oha of Eastern Highveld Grassland remain in a natural to semi-natural state nationally. The estimated natural grassland on the site thus amounts to about 0.00017% of the remaining extend of the Eastern Highveld Grassland ecosystem. Although the potential natural grassland on the site is small, it could contribute to the conservation of the Vulnerable ecosystem as well as reach the conservation target of the Mpumalanga Parks and Tourism Agency for a Critical Biodiversity Area: Irreplaceable. The area should ideally be conserved.

8. PROTOCOL SUMMARY

For ease of reference, the following table summaries results of the assessment as per the main requirements of the Protocols for Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial (Vegetation) Biodiversity as published on 20 March 2020.

Table 8: Summary of the main terrestrial (vegetation) biodiversity findings

Biodiversity (vegetation) aspect	Result
Protected Areas	The Chrissiesmeer Protected Environment is situated about 1.5km north-east of the site. The site is within 5km of the Chrissiesmeer Pans Systems. However, the site falls outside of the 1km Ecological Support Area (ESA) buffer of this protected environment.
Conservation Plan Category: CBA: Irreplaceable	<p>Reason for the CBA</p> <p>The CBA around the site was classified based on the potential habitat for plant species of conservation concern and the potential presence of primary vegetation</p> <p>Can the CBA be maintained?</p> <p>No. The development will fragment the CBA and the proposed footprint will destroy an estimated 300ha of CBA directly. Edge effects and downstream impacts will increase the area affected.</p> <p>Mining is destructive and although an effort to limit edge effects must be made to maintain remaining extent of the CBA, the CBA within the proposed mining infrastructure footprint will be destroyed.</p> <p>Impact on species composition and structure of vegetation</p> <p>The proposed mining footprint and operational activities will destroy species composition and structure and lead to degradation of surrounding vegetation due to edge effects. Edge effects include the prevention of grazing and fire which is important to maintain good condition grassland.</p>
Listed ecosystems	<p>According to the 2011 Listed Ecosystems, the site falls within the Vulnerable Eastern Highveld Grasslands.</p> <p>Impact on ecosystem threat status</p> <p>The proposed development will result in the removal of indigenous vegetation within an ecosystem listed as Vulnerable. The good condition grassland within the secondary PAOI is estimated at about 400ha, including the moist grasslands. However, this excludes areas beyond the secondary PAOI that may be degraded by edge effects.</p> <p>About 169023780ha of Eastern Highveld Grassland remain in a natural to semi-natural state (Skowno, et al 2019). The estimated natural grassland on the site thus amounts to about 0.00017% of the remaining extend of the Eastern Highveld Grassland ecosystem. Although the potential natural grassland on the site small, it could contribute to the</p>

Biodiversity (vegetation) aspect	Result
	conservation of the Vulnerable ecosystem as well as reach the conservation target of the MPTA for a CBA: Irreplaceable. The area should ideally be conserved.
SWSA and hydrological issues	<p>Impact(s) on the terrestrial habitat of a SWSA</p> <p>The site is not situated within a SWSA -the project site is about 13km north-west of the closest Upper Vaal surface water area. However, clearing of vegetation can have an impact on water infiltration and flow dynamics to the moist grassland and downstream watercourses.</p> <p>The hydrology of the area seems interconnected and important in terms of regulating different moisture regimes in different areas on and downstream of the site. Erosion and pollution caused by clearing of vegetation for the mine, could impact on the downstream water quality</p>
National Freshwater Ecosystems priority Areas (NFEPA)	See wetland assessment
Indigenous forest:	Not applicable
Preliminary no go areas	<ul style="list-style-type: none"> • Moist grasslands • Remaining natural grassland
Plant species of conservation concern	<p>Sixteen (16) species of conservation concern could be present in the area that the site is situated in with historical records confirming the presence of several such species close to the site.</p> <p>Suitable habitat is present on the site for most of the listed species. Suitable habitat is within drainage lines and associated moist grasslands, as well as remaining natural grasslands on the site.</p>
Main impacts expected:	<ul style="list-style-type: none"> • Destruction of natural vegetation • Exposure to erosion and subsequent sedimentation or pollution of proximate moist grassland and watercourses • Removal / Destruction of protected plants and plants of conservation concern or suitable habitat thereof • Potential increase in invasive vegetation • Compaction and destruction of soils • Edge effects degrading remaining grassland vegetation on and around the site
Cumulative impacts:	<ul style="list-style-type: none"> • Decrease in the extent of CBA: Irreplaceable and Eastern Highveld Grassland available for conservation
Residual impacts:	<ul style="list-style-type: none"> • Natural processes such as fire will likely be prevented around mine; • Trampling and edge effects; • Impacts to the watercourse and pollution; • Exclusion of grazing animals. • Increase in alien and invasive plant species on and around the site.

Biodiversity (vegetation) aspect	Result
	<ul style="list-style-type: none">• Species removed and relocated could die due to transplantation shock or damage during replanting.• Change in ecological processes.• Unforeseen impacts.

9. REFERENCES

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10. GLOSSARY

Alien species	Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity
Conservation concern (Plants of..)	Plants of conservation concern are those plants that are important for South Africa's conservation decision making processes and include all plants that are Threatened (see Threatened), Extinct in the wild, Data deficient, Near threatened , Critically rare, Rare and Declining . These plants are nationally protected by the National Environmental Management: Biodiversity Act. Within the context of these reports, plants that are provincially protected are also discussed under this heading.
Conservation status	An indicator of the likelihood of that species remaining <u>extant</u> either in the present day or the near future. Many factors are taken into account when assessing the conservation status of a species: not simply the number remaining, but the overall increase or decrease in the population over time, breeding success rates, known threats, and so on.
Critically Endangered	A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
Data Deficient	There is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. However, "data deficient" is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate.
Declining	A taxon is declining when it does not meet any of the five IUCN criteria and does not qualify for the categories Threatened or Near Threatened, but there are threatening processes causing a continuous decline in the population (Raimondo <i>et al</i> , 2009).
Edge effect	Inappropriate influences from surrounding activities, which physically degrade habitat, endanger resident biota and reduce the functional size of remnant fragments including, for example, the effects of invasive plant and animal species, physical damage and soil compaction caused through trampling and harvesting, abiotic habitat alterations and pollution
Endangered	A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future
Exotic species	Plant taxa in a given area, whose presence there, is due to the intentional or accidental introduction as a result of human activity

Fatal flaw	A major defect or deficiency in a project proposal that should result in environmental authorisation being refused, and from a biodiversity perspective, a residual negative impact that would have a Very High significance rating
Forb	A herbaceous plant other than grasses.
Indigenous	Any species of plant, shrub or tree that occurs naturally in South Africa
Invasive species	Naturalised alien plants that have the ability to reproduce, often in large numbers. Aggressive invaders can spread and invade large areas
Irreversibly modified	An ecological condition class in which the ecosystem has been modified completely, with an almost complete loss of composition and structure. All or most ecosystem function has been destroyed and the changes are irreversible. Can apply to a site or an ecosystem.
Mitigation	The implementation of practical measures to reduce adverse impacts
Moderately modified	An ecological condition class in which ecological function is predominantly unchanged even though composition and structure have been compromised. Equates to a fair ecological condition or semi-natural
Natural	Unmodified. No significant changes in composition, structure or function have taken place. Good ecological condition.
Near Natural	Small changes in composition and structure may have taken place, but ecosystem functions are essentially unchanged. Good ecological condition
Near Threatened	A Taxon is Near Threatened when available evidence indicates that that it nearly meets any of the five IUCN criteria for Vulnerable and is therefore likely to qualify for a threatened category in the near future (Raimondo <i>et al</i> , 2009).
Protected Plant	According to Provincial Nature Conservation Ordinances or Acts, no one is allowed to sell, buy, transport, or remove this plant without a permit from the responsible authority. These plants are protected by provincial legislation.
Red Data	A list of species, fauna and flora that require environmental protection - based on the IUCN definitions. <i>Now termed Plants of Conservation Concern</i>
Semi-natural	Ecological function is predominantly unchanged even though composition and structure have been compromised. Fair ecological condition

Severely modified	An ecological condition class in which loss of composition, structure and ecological function is extensive. The land is in a poor ecological condition.
Species diversity	A measure of the number and relative abundance of species
Species richness	The number of species in an area or habitat
Threatened	Threatened Species are those that are facing a high risk of extinction, indicated by placing in the categories Critically Endangered (CR), Endangered (E) and Vulnerable (VU) (Raimondo <i>et al</i> , 2009)
Transformation	The removal or radical disturbance of natural vegetation, for example by crop agriculture, plantation forestry, mining or urban development. Transformation mostly results in a serious and permanent loss of biodiversity and fragmentation of ecosystems, which in turn lead to the failure of ecological processes. Remnants of biodiversity may survive in transformed landscapes
Vegetation Unit	A complex of plant communities ecologically and historically (both in spatial and temporal terms) occupying habitat complexes at the landscape scale. Mucina and Rutherford (2006) state: "Our vegetation units are the obvious vegetation complexes that share some general ecological properties such as position on major ecological gradients and nutrient levels, and appear similar in vegetation structure and especially floristic composition".
Vulnerable	A taxon is Vulnerable when it is not Critically Endangered or Endangered but meets any of the five IUCN criteria for Vulnerable and are therefore facing a high risk of extinction in the wild in the future (Raimondo <i>et al</i> , 2009)

APPENDIX A: SPECIALIST QUALIFICATIONS

Curriculum Vitae

Antoinette Eyssell-Knox

Personal Information Summary

Name: Antoinette Eyssell-Knox
Highest qualification: MSc Environmental Science (2010), University of Pretoria
Professional membership: SACNASP Pr Sci Nat (400019/11) Ecological Science
Company: Dimela Eco Consulting
Contact details: Antoinette@dimela-eco.co.za
 Tel 083 642 6295

Professional Experience

- Environmental Management:

I have been working in the field of environmental management as a vegetation specialist since the year 2007 (11 years). I have been self-employed since November 2011.

Nov 2011 – current: Dimela Eco Consulting
 Sep 2007 – Nov 2011: Strategic Environmental Focus (SEF)

Main field of work and experience include:

- Vegetation assessments, overviews or scans;
- Strategic ecological assessments;
- Ecological management, rehabilitation- and biodiversity action plans (including alien vegetation management);
- Specialist input: Gauteng and North-West Outlook Reports, ecological conditional requirements for Green Star rating;
- Ground-truthing of vegetation related data;
- Review of ecological reports; and
- Mentoring.

- Environmental Education:

2011 – current: Writer of the ecology feature for the bimonthly Supernova Kids Magazine
 Aug 2003 – Sep 2007: Snr Environmental Education Officer, South African National Biodiversity Institute (SANBI), Pretoria National Botanical Garden

- Horticulture

Jun – Jul 2003: Horticultural Trainer, 7 Shaft Training Centre, Johannesburg
 May 1997 – Mar 2002: Horticulturist, Pretoria National Botanical Garden (then NBI, now SANBI)

Qualifications

- M.Sc Environmental Science, University of Pretoria (2010)
Dissertation: *Land cover change and its effect on future land uses*
- B. Sc (Hons) Horticulture, University of Pretoria (1999-2000)
Dissertation: *Horticultural uses of the indigenous Barleria species*
- B. Sc (Agriculture) Horticulture, University of Pretoria (1993-1996)

Memberships and Affiliations

- SACNASP: Registered as a Professional Natural Scientist in the field of ecology since 2011 (Reg no 400019/11)
- Botsoc: Member of the Botanical Society of Southern Africa since 2013

Course History

- 2018: Asteraceae Identification Course
- 2015: SAGIC Invasive Species Consultant Training
- 2012: Tools for Wetland Assessment (Rhodes University – September 2012)
- 2012: Landscape Functional Assessment, introductory workshop with David Tongway and Prof Klaus Kellner (North West University)
- 2012: Soil Classification and Wetland Delineation (Terra Soil)
- 2007: ISO 14000 Advanced EMS Auditors Course (SGS & University of Pretoria)
- 2007: Introduction into Forestry Stewardship Council (FSC) (University of Pretoria)
- 2006: Permaculture training course (S.E.E.D)
- 2005: Project Management Course (Wildlife and Environment Society of South Africa (WESSA) Umgeni Valley)
- 2004: Grass and plant identification courses

Presentations

- July 2007: Environmental Education in a changing world, World Environmental Education Conference (WEEC), Durban
- Sept2006: Environmental Education, BGCI Conference, Oxford England

Selected Project Experience (2011 onwards)

1. Provincial Environmental Outlook Reports

- 2017-2018: Vegetation input: Gauteng Outlook Report
- in process:* Vegetation input: North-West Outlook Report

2. Open Space Planning

- Nov 2015: The proposed Kaalspruit Open Space Project, Thembisa, Gauteng. Kaalspruit River Rehabilitation Biodiversity Scan: (NuLeaf Planning and Environmental)

2015-2016: City of Johannesburg Open Space Planning – vegetation input for Linbro Park, Bassonia, Kyalami and Ruimsig areas (Iggdrasil)

3. Management- and Rehabilitation Plans

April-May 2012: Vegetation base line study and input into Biodiversity Action Plan for Kumba Iron Ore (Lidwala Consulting Engineers)

Jan 2015: Environmental Management Plan for the Krugersdorp Nature Reserve – vegetation section

Jan 2016: Tharisa Mine Railway Line – Vegetation rehabilitation plan (Limosella Consulting)

Sept 2016: General vegetation rehabilitation plan for the proposed Mezo Kitchens Panel Processing Facility (Shangoni)

Nov 2016: General Ecological Rehabilitation and Monitoring Plan for the N4 additional lane between: R52 Koster offramp & D1325 Marikana Interchange; and The R512 (Brits West Interchange) & K67 (Ga-Rankuwa Interchange) North West and Gauteng Provinces

Nov 2016: Biodiversity Management Plan: Afrisam (Sa) (Pty) Ltd, Dudfield Cement – vegetation input

June 2017: Rehabilitation planning for the Klip- Lower and Upper Rietspruit Water Management Units (Pregio, via Limosella Consulting)

Dec 2017: Eskom underground cable river crossings – vegetation input into rehabilitation plants (Envirolution)

4. Linear Infrastructure

March 2012: Kranspoort road upgrade Protected tree identification (Lidwala Consulting Engineers)

Oct 2012: Eskom: Perseus to Gamma Vegetation assessment (Mokgope Consulting)

March 2013: Diepsloot Eskom line and substation, Johannesburg (Envirolution)

Nov 2013: Masa Ngwedi 750kV and 400kV lines (Limpopo & North-West Provinces) Section D & E Vegetation Input for EMP (Mandara Consulting)

2013-2014 Eskom: Northern Alignments (Perseus in the Northern Cape to Juno in the Western Cape) (Mokgope Consulting)

Feb 2014: Meteor substation, as well as the 88kV line between the Pulsar, Meteor and Sonland substations, Sebokeng, (Nsovo Environmental Consulting)

Dec 2014: Upgrading of Internal Roads in Stinkwater, Hammanskraal (Gauteng) (GladAfrica)

Sept 2015: Railway Siding for GCMC Open Cast Mine, Lephalale (Limpopo)

Feb 2016: N4 - Additional lane between Brits and Rustenburg (Environamic)

Nov 2016: Aggeneis-Paulputs 400kV Powerline and Substations Upgrades

Feb 2017: Proposed Lulamisa to Diepsloot East to Blue Hills to Crowthorne 88kv Power Line / Cable and 2 Substations Gauteng (Envirolution)

May 2017: Proposed 132 kV Powerline Between Fochville Municipal Substation and an Existing Line, Gauteng Province (Envirolution)

5. Solar Developments

January 2012: Schmidtsdrift, Northern Cape Vegetation Assessment for Solar Panels (Nuleaf)

Aug 2015: Proposed Construction of A 75mw Solar Energy Facility Project, Limpopo Tshikovha Environmental and Communication Consulting

6. Mining

- April 2012: Rietfontein Open Cast Vegetation assessment (Cabanga Concepts)
- Jan 2013: Vierfontein Colliery Vegetation assessment and EMP input (Cabanga Concepts)
- Jan 2017: G&W Base and Industrial Minerals Koppies Betonite Mine Vegetation Assessment & Management Input Report (Cabanga Concepts)

7. Other Development

- Dec 2013: Marekele Bush camp – vegetation & fauna assessments (NuLeaf)
- May 2013: Komati Power Station – Coal stockyard (EnviroLution)
- April 2014: Blesboklaagte & Leeupoort Township development (Shangoni)
- May 2014: Goldi Farm Composting Site, Section 24G Fauna and Flora assessment and Summary document (Shangoni)
- Feb 2015: TOPIGS: Proposed Piggery, Mpumalanga (Shangoni)
- May 2015: Kwaggasrant Recycling Facility Upgrade (Shangoni)
- Oct 2016: Proposed piggery on portion 139 of the farm Honingnestkrans 269JR Vegetation and Fauna investigation (Methale Environmental Consulting)
- Oct 2017: Ongoing Clinic Development & Proposed Emergency Medical Services Facility on Prt 79 of the farm De Wagendrift 417 JR Gauteng Province. (Methale Environmental Consultants)

8. Plant relocation and monitoring

- April 2014: Relocation of *C bulbipermum*, overlooked Colliery in Mpumalanga (Cabanga Concepts)
- Feb 2017: Monitoring report for the relocated *Crinum bulbispermum* at Overlooked Colliery
- May 2017: Relocation of protected plant species: Evander Mine
- Feb 2018: Monitor populations of the Critically Endangered *Chlorophytum radula* at the Woodbush Plantation, Limpopo.

9. International:

- Oct 2009: Tatu, Nairobi: Vegetation Assessment (Kenya) (Lokisa Environmental Consulting)
- Sept 2014: Vegetation input to the Regional Environmental and Social Assessment of Coal-based Energy Projects along the South Africa- Botswana Border (World bank Project, Mott MacDonald)

10. Mentorship:

- May 2017: Technical Peer Review of the vegetation section for the Emfuleni Bulk Water Supply Pipelines: Ecological Assessment. GIBB Engineering & Architecture (Pty) Ltd
- Nov 2017: Mentorship and Technical Peer Review of the vegetation section for the Merensky-Kennedy Powerline: vegetation assessment GIBB Engineering & Architecture (Pty) Ltd