Ecological Desktop Study

Prospecting Right application for the prospecting of Chrome ore and Platinum Group Metals (PGM), combined with a Waste License application near Madibeng on the Remaining Extent of Portion 1, Portion 2, Portion 3 (portion of portion 1) of the farm Lekker Sukkel Landgoed 454, the farm Zandfontein 923 and Portion 44 (portion of portion 5), Portion 45 (portion of portion 5), Remaining Extent of Portion 46 (portion of portion 5), Remaining Extent of Portion 226, Portion 343 (portion of portion 41), Portion 369, Portion 370, Portion 371 and Portion 372 of the farm Zandfontein 447, Registration Division: JQ, North West Province.

Reference No.: NW 30/5/1/1/2/11794 PR Prepared by



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Introduction

Milnex 189 CC was contracted by Thabo-Gaelebale Mineral Resources (Pty) Ltd as the independent environmental consultant to undertake the Ecological Desktop Study for the Environmental Impact Assessment process for the proposed Prospecting Right application for the prospecting of Chrome ore and Platinum Group Metals (PGM), combined with a Waste License application near Madibeng on the Remaining Extent of Portion 1, Portion 2, Portion 3 (portion of portion 1) of the farm Lekker Sukkel Landgoed 454, the farm Zandfontein 923 and Portion 44 (portion of portion 5), Portion 45 (portion of portion 5), Remaining Extent of Portion 46 (portion of portion 5), Remaining Extent of Portion 226, Portion 343 (portion of portion 41), Portion 369, Portion 370, Portion 371 and Portion 372 of the farm Zandfontein 447, Registration Division: JQ, North West Province. The farm is situated approximately 8km South of the town Madibeng. Milnex 189 CC is a specialist environmental consultancy with extensive experience in the mining industry which provides a holistic environmental management service, including environmental assessment and planning to ensure compliance with relevant environmental legislation. Milnex 189 CC benefits from the pooled resources, diverse skills and experience in the environmental and mining field held by its team that has been actively involved in undertaking environmental studies for a wide variety of mining related projects throughout South Africa. The Milnex 189 CC team has considerable experience in environmental impact assessment and environmental management, especially in the mining industry.

The EAP, Danie Labuschagne, which conducted the desktop study has experience in consulting in the environmental field. His key focuses are on environmental assessment, advice and management and ensuring compliance to legislation and guidelines, GIS and Water Use Licenses. He is currently involved in undertaking EIAs for several projects across the country. He's key qualifications include:

- Masters Degree in Environmental Management and Geography, North West University, SA.
- Honors in Environmental Management (Hons.Env.Man) (Cum Laude), North West University (NWU), SA.
- B. Sc in Geology and Geography, North West University (NWU), SA.
- Implementing Environmental Management Systems (ISO 14001) course from the CEM (Centre for Environmental Management).
- Environmental Law for Environmental Managers course from the CEM (Centre for Environmental Management).
- Environmental Management Systems ISO 14001 Audit: A Lead Auditor Course based on ISO 19011 and ISO 17021(SAATCA Registered) course at the CEM (Centre for Environmental Management).

It should just be noted that Danie Labuschagne *is not* a qualified Ecologist.

The Ecological habitat status of the proposed mining right area, was determined by means of a site visit and a desktop study. In this document a brief description of the ecology, as stated by Mucina and Rutherford (2006), will be given. This information will be supported with a map and site specific photographs.

It should be noted that the status of these vegetation may have changed as the data used from Mucina and Rutherford (2006) is 10 years old.

Vegetation Map

The exact coordinates of the proposed prospecting right area are plotted to determine the vegetation unit(s), in which the proposed mining activities will take place. The data used, is that provided by Mucina and Rutherford (2006). A vegetation unit is defined by Mucina and Rutherford (2006) as a complex of plant communities ecologically and historically occupying habitat complexes at the landscape scale. According to Mucina and Rutherford (2006) their 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 in floristic composition.

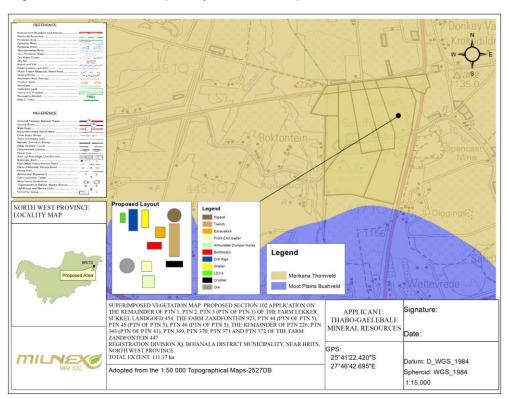


Figure 1: Vegetation Unit Map

The result obtained by plotting the coordinates are as follow:

The proposed area falls within vegetation unit SVcb 6, which is known as the Marikana Thornveld. The Marikana Thornveld is part of the Central Bushveld Bioregion, which is a sub-bioregion for the Savanna Biome.

According to Mucina and Rutherford (2006:461), the Marikana Thornveld vegetation covers the North West and Gauteng Province: Occurs on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. This Thornveld is situated on an altitude of about 1050-1450m.

The vegetation & landscape features include open *Acacia karroo* woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are more dense along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire.

Some other important Taxa found on in the area:

Tall Tree: Acacia burkei.

Small Trees: Acacia caffra (d), A. gerrardii (d), A. karroo (d), Combretum molle (d), Rhus Iancea (d), Ziziphus mucronata (d), Acacia nilotica, A. tortilis subsp. heteracantha, Celtis africana, Dombeya rotundifolia, Pappea capensis, Peltophorum africanum, Terminalia sericea.
Tall Shrubs: Euclea crispa subsp. crispa (d), Olea europaea subsp. africana (d), Rhus pyroides var. pyroides (d), Diospyros lycioides subsp. guerkei, Ehretia rigida subsp. rigida, Euclea undulata, Grewia flava, Pavetta gardeniifolia.
Low Shrubs: Asparagus cooperi (d), Rhynchosia nitens (d), Indigofera zeyheri, Justicia flava.
Woody Climbers: Clematis brachiata (d), Helinus integrifolius.
Herbaceous Climbers: Pentarrhinum insipidum (d), Cyphostemma cirrhosum. Graminoids: Elionurus muticus (d), Eragrostis lehmanniana (d), Setaria sphacelata (d), Themeda triandra (d), Aristida scabrivalvis subsp. scabrivalvis, Fingerhuthia africana, Heteropogon

Herbs: Hermannia depressa (d), Ipomoea obscura (d), Barleria macrostegia, Dianthus mooiensis subsp. mooiensis, Ipomoea oblongata, Vernonia oligocephala.

contortus, Hyperthelia dissoluta, Melinis nerviglumis, Pogonarthria squarrosa.

Geophytic Herbs: Ledebouria revoluta, Ornithogalum tenuifolium, Sansevieria aethiopica.

Mucina and Rutherford (2006:462) also states that the conservation of this thornveld type, is endangered with a target of 19%. Only 1% is statutorily conserved in, for example, Magaliesberg Nature Area. More conserved in addition in other reserves, mainly in De Onderstepoort Nature Reserve. Considerably impacted, with 48% transformed, mainly cultivated and urban or built-up areas. Most agricultural development of this unit is in the western regions towards Rustenburg, while in the east (near Pretoria) industrial development is a greater threat of land transformation. Erosion is very low to moderate. Alien invasive plants occur localised in high densities, especially along the drainage lines.

Protected Areas

According to the data for protected areas the proposed portions falls within Marikana Thornveld Threatened Ecosystem.

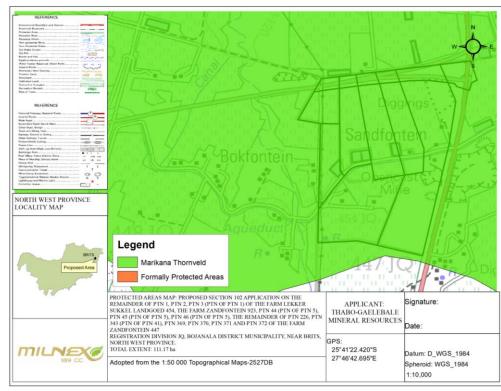


Figure 2: Protected Areas Map

Critical Biodiversity Area

The Department of Rural, Environmental and Agriculture Development (READ) defines Critical Biodiversity Areas and Ecological Support Areas as follows:

Critical Biodiversity Areas (CBAs) are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. In other words, if these areas are not maintained in a natural or near-natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses.

Ecological Support Areas (ESAs) are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which nevertheless play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration. The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs.

According to the data for Critical Biodiversity Areas, the proposed area falls within CBA type 2 and ESA type 2. According to the North West Biodiversity Sector Plan (2015) the land management objectives for above mentioned are as follows:

Critical Biodiversity Areas 2 (CBA2)

Maintain in a natural or near-natural state that maximises the retention of biodiversity pattern and ecological process:

- Ecosystems and species fully or largely intact and undisturbed.
- Areas with intermediate irreplaceability or some flexibility in terms of meeting biodiversity targets. There are options for loss of some components of biodiversity in these landscapes without compromising the ability to achieve biodiversity targets, although loss of these sites would require alternative sites to be added to the portfolio of CBAs.
- These are biodiversity features that are approaching but have not passed their limits of acceptable change.

Ecological Support Area 2 (ESA2)

Maintain as much ecological functionality as possible (generally these areas have been substantially modified):

- Maintain current land use or restore area to a natural state.
- Ecosystem NOT in a natural or near-natural state, and has been previously developed (e.g. ploughed).
- Ecosystems significantly disturbed but still able to maintain some ecological functionality.

- Individual species or other biodiversity indicators are severely disturbed or reduced and these are areas that have low irreplaceability with respect to biodiversity pattern targets only.
- These are areas with low irreplaceability with respect to biodiversity pattern targets only. These areas are required to maintain ecological processes especially landscape connectivity.

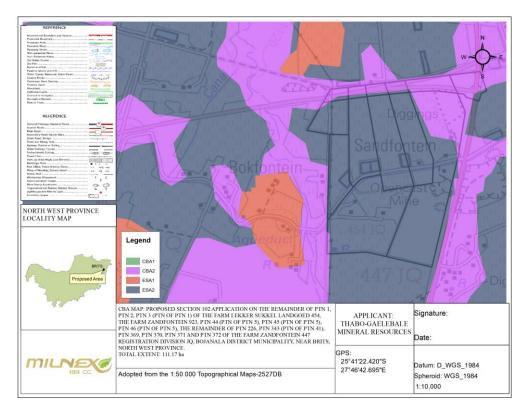


Figure 3: Critical Biodiversity Areas Map.

According to a matrix of recommended land use zones and associated activities in relation to the CBA map categories) prospecting is not permitted and actively discouraged in CBA 1 areas. In CBA 2, ESA 1 and ESA 2 areas prospecting is restricted to compulsory, site specific conditions & controls when unavoidable, not usually permitted.

NO	LAND USE ZONE	ASSOCIATED LAND USE ACTIVITIES	PA/CA	CBA1	CBA2	ESA1	ESA2	ONA
15	Quarrying and	Prospecting and Underground Mining	Ν	Ν	R	R	R	R
	Mining	Quarrying and open-cast mining (includes surface mining, dumping & dredging).	N	Ν	N	Ν	N	R
		Hydraulic Fracturing (fracking)	N	Ν	Ν	R	R	R

Notes:

- 1. Guidelines apply only to natural or near-natural land with natural vegetation cover within each category (on site).
- 2. Y = YES, permitted and actively encouraged activity;
- 3. N = NO, not permitted, actively discouraged activity; and,
- 4. R = RESTRICTED to compulsory, site-specific conditions & controls when unavoidable, not usually permitted.

(North West Biodiversity Sector Plan, 2015:57)

Sensitive area for Mine

According to the Mining of Biodiversity Guidelines, biodiversity priority areas sensitive to the impacts of mining are categorized into four categories (please see the table below).

Category	Description	
А	Legally protected	
В	Highest biodiversity importance	
С	High biodiversity importance	
D	Moderate biodiversity importance	

The purpose is to identify and categorize biodiversity priority areas sensitive to the impacts of mining in order to support mainstreaming of biodiversity issues in decision making in the mining sector.

According to the mine guide map, a certain area of the proposed area falls within category B and C. The biodiversity priority areas are as follows:

Highest biodiversity importance (B)

These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. The Biodiversity priority areas is as follows:

- Critically endangered and endangered ecosystems
- Critical Biodiversity Areas (or equivalent areas) from provincial spatial biodiversity plans
- River and wetland Freshwater Ecosystem Priority Areas (FEPAs), and a 1km buffer around these FEPAs
- Ramsar Sites

High biodiversity importance (C)

These areas are important for conserving biodiversity, for supporting or buffering other biodiversity priority areas, for maintaining important ecosystem services for particular communities or the country as a whole. The Biodiversity priority areas is as follows:

- Protected area buffers (including buffers around National Parks, World Heritage Sites* and Nature Reserves)
- Transfrontier Conservation Areas (remaining areas outside of formally proclaimed protected areas)
- Other identified priorities from provincial spatial biodiversity plans
- High water yield areas

- Coastal Protection Zone
- Estuarine functional zone

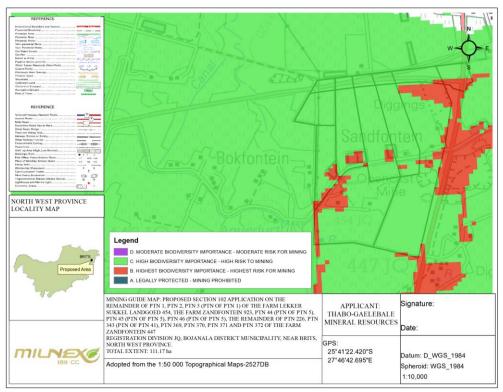


Figure 4: Sensitive area for mine

Wetland Areas

Wetland is defined as land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil (from the South African National Water Act; Act No. 36 of 1998).

The maps below depict all wetland areas on the proposed area, which include a Unchannelled valleybottom wetland, Valleyhead seep and a Flat wetland. The wetland vegetation type falls within the Central Bushveld Group 2.

According to the 2013 SANBI Biodiversity Series 22 a;

<u>Unchannelled valley-bottom wetland</u> is a valley-bottom wetland without a river channel running through it. They are characterised by their location on valley floors, an absence of distinct channel banks, and the prevalence of diffuse flows.

<u>Valleyhead seep</u> is a gently-sloping, typically concave wetland area located on a valley floor at the head of a drainage line, with water inputs mainly from subsurface flow (although there is usually also a convergence of diffuse overland water flow in these areas during and after rainfall events). Horizontal, unidirectional (down-slope) movement of water in the form of interflow and diffuse surface flow dominates

within a valleyhead seep, while water exits at the downstream end as concentrated surface flow where the valleyhead seep becomes a channel.

<u>Flat wetland</u> is a level or near-level wetland area that is not fed by water from a river channel, and which is typically situated on a plain or a bench. Closed elevation contours are not evident around the edge of a wetland flat. Wetland flats are characterised by the dominance of vertical water movements associated with precipitation, groundwater inflow, infiltration and evapotranspiration. Horizontal water movements within these wetlands, if present, are multi-directional, due to the lack of any significant change in gradient within the wetland.

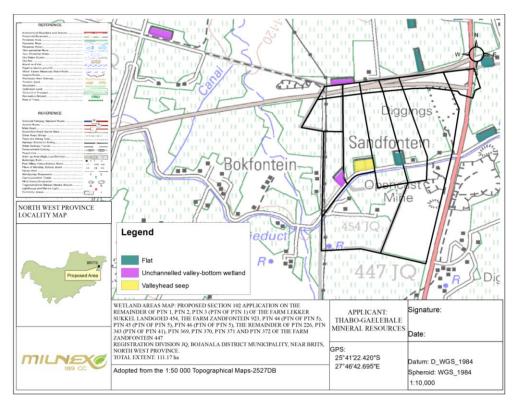


Figure 5: Wetland types present on site

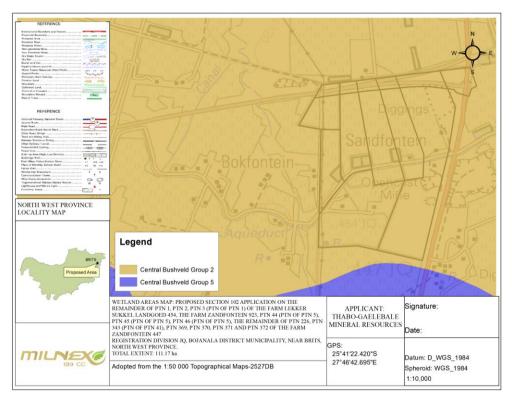


Figure 6: Wetland vegetation type

Recommendations

- Protected trees and plants shall not be removed or damaged without prior approval and permits or licenses from the relevant authority.
- Vegetation clearance, if any, should be kept to the minimum required for the operation.
- No activities may occur within wetlands.

The EAP herewith confirms the correctness of the information provided in this report.

Signature of the EAP: Danie Labuschagne Date: 28/03/2018