SCOPING REPORT FOR THE TERRESTRIAL ECOLOGY FOR THE ELANDSFONTEIN COLLIERY

Emalahleni, Mpumalanga

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CLIENT

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1 Introduction

The Biodiversity Company (TBC) was appointed to conduct a biodiversity scoping assessment comprising baseline information and also a high-level impact identification and assessment for the Environmental Impact Assessment (EIA) for Elandsfontein Colliery. The applicant plans to consolidate two mining right areas into a single mining right.

2 Document Structure

This report comprises of the scoping phase only and the full EIA will be compiled in accordance with the EIA Regulations, 2014 (Government Notice (GN) R982). A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 1 below.

Table 1: Report Structure

ENVIRONMENTAL REGULATION	DESCRIPTION	SECTION IN REPORT
NEMA EIA Regulations 2014 (as amended)		
Appendix 6 (1)(a):	Details of – (I) The specialist who prepared the report; and (II) The expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 3 To be supplied in full EIA
Appendix 6 (1)(b):	A declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix a
Appendix 6 (1)(c):	An indication of the scope of, and the purpose for which, the report was prepared;	Section 4
Appendix 6 (1)(cA):	An indication of the quality and age of base data used for the specialist report;	Section 8
Appendix 6 (1)(cB):	A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 10
Appendix 6 (1)(d):	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	To be included in full EIA
Appendix 6 (1)(e):	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 8 Full methodology to be included in full EIA
Appendix 6(1)(f):	Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	To be included in full EIA
Appendix 6(1)(g):	An identification of any areas to be avoided, including buffers;	To be included in full EIA
Appendix 6(1)(h):	A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	To be included in full EIA
Appendix 6(1)(i):	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 7
Appendix 6(1)(j):	A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	To be included in full EIA
Appendix 6(1)(k):	Any mitigation measures for inclusion in the empr;	To be included in full EIA
Appendix 6(1)(l):	Any conditions for inclusion in the environmental authorisation;	To be included in full EIA

Appendix 6(1)(m):	Any monitoring requirements for inclusion in the empr or environmental authorisation;	To be included in full EIA
Appendix 6(1)(n):	A reasoned opinion- (i) whether the proposed activity, activities or portions thereof should be authorised; (ia) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the empr, and where applicable, the closure plan;	To be included in full EIA
Appendix 6(1)(o):	A description of any consultation process that was undertaken during the course of preparing the specialist report;	To be included in full EIA
Appendix 6(1)(p):	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	To be included in full EIA
Appendix 6(1)(q):	Any other information requested by the competent authority.	To be included in full EIA.

3 Specialist Details

REPORT NAME	SCOPING REPORT FOR THE TERRESTRIAL ECOLOGY FOR THE ELANDSFONTEIN
SUBMITTED TO	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
THE CLIENT	geo
REPORT WRITER	**Lindi Steyn** Lindi Steyn has a PhD in Biodiversity and Conservation from the University of Johannesburg. She specialises in avifauna and has worked in this specialisation since 2013.
REPORT WRITER	**Martinus Erasmus** Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015.
REPORT REVIEWER	**Andrew Husted** Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 12 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.

DECLARATION	The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.

4 Terms of Reference

The Terms of Reference (ToR) included the following:

- Desktop description of the baseline receiving environment specific to the field of expertise (general surrounding area as well as site specific environment);
- Identification and description of any sensitive receptors in terms of relevant specialist disciplines (biodiversity) that occur in the study area, and the manner in which these sensitive receptors may be affected by the activity;
- Identify 'significant' ecological, botanical and faunal features within the proposed development areas;
- Identification of conservation significant habitats around the project area which might be impacted by the proposed development;
- Screening to identify any critical issues (potential fatal flaws) that may result in project delays or rejection of the application;
- Provide a map to identify sensitive receptors in the project area, based on available maps and database information;
- Suggest possible impacts, mitigation and rehabilitation measures to prevent or reduce the possible impacts as per the desktop study.

5 Project Description

The Elandsfontein Colliery is located in the Witbank Coal Field on the farm Elandsfontein 309 JS. The property is approximately 16 km west of the town of Witbank in the Mpumalanga Province, South Africa. The centre point of the site is 25°53'05.01"S and 29°05'36.57"E. The Elandsfontein Colliery comprises 2 distinct mining rights (MR314 and MR63). The applicant plans to consolidate the two mining right areas into a single mining right with associated consolidated EMPR. In addition, the applicant wishes to expand their existing mining operations to include additional mineral resource areas (i.e.: new open cast & underground areas within the consolidated mining right boundary) (GSW, 2019). The area surrounding the project area consists predominantly of mining activities, secondary roads and agricultural areas.

The various land-use activities within, and adjacent to, the project area have impacted upon the associated ecosystems according to available desktop information. A locality map of the project area is shown in Figure 1.

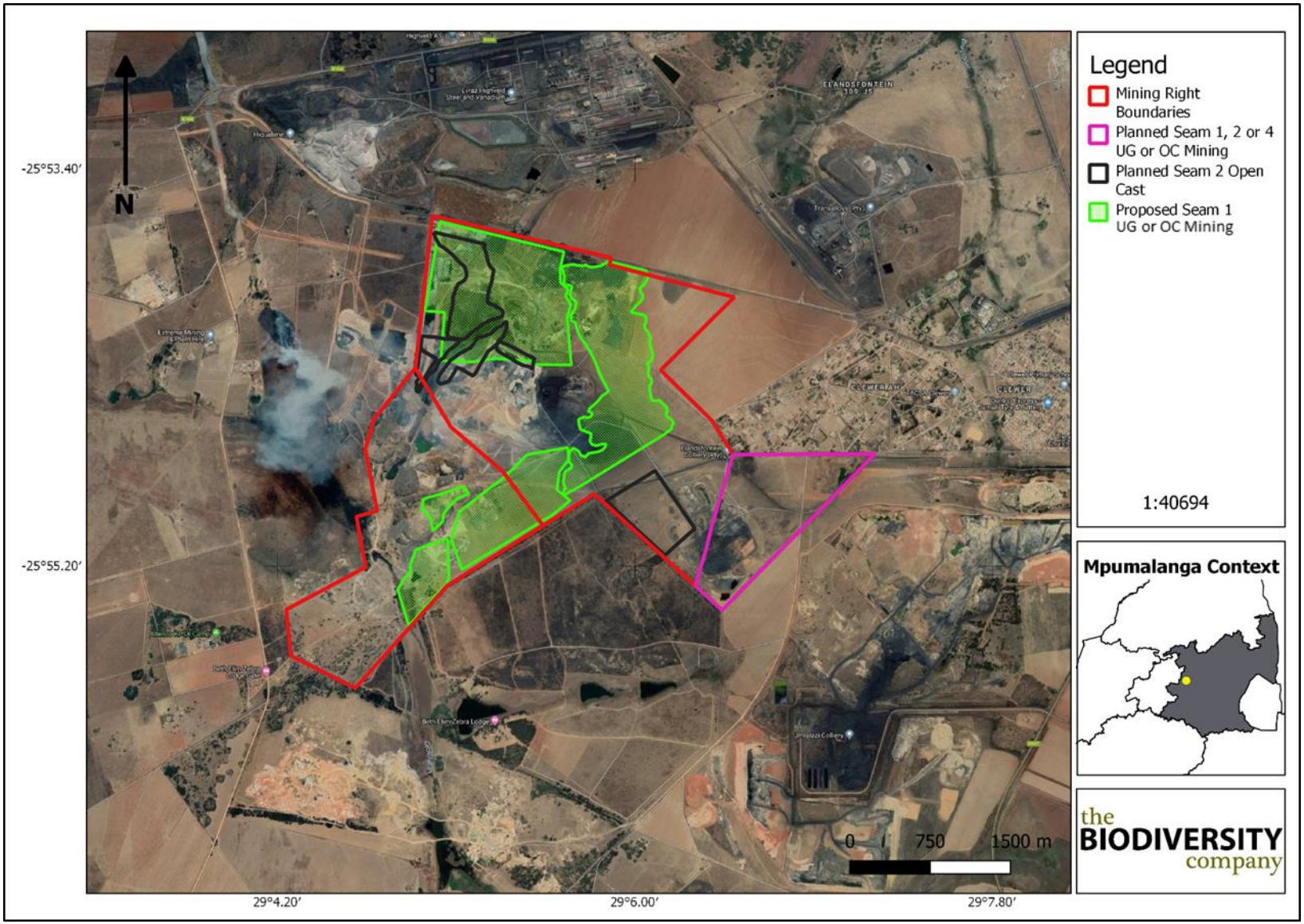

Figure 1: The proposed Elandsfontein project area

6 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 2).

Table 2: A list of key legislative requirements relevant to biodiversity and conservation in Mpumalanga

INTERNATIONAL	Convention on Biological Diversity (CBD, 1993)
	The United Nations Framework Convention on Climate Change (UNFCC,1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
NATIONAL	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Environmental Management Air Quality Act (No. 39 of 2004)
	National Protected Areas Expansion Strategy (NPAES)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Water Act, 1998 (Act 36 of 1998)
	National Freshwater Ecosystem Priority Areas (NFEPA's)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
	National Heritage Resources Act, 1999 (Act 25 of 1999)
	Municipal Systems Act (Act No. 32 of 2000)
	Alien and Invasive Species Regulations, 2014
	South Africa's National Biodiversity Strategy and Action Plan (NBSAP)
	Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)
	Sustainable Utilisation of Agricultural Resources (Draft Legislation).
	White Paper on Biodiversity
PROVINCIAL	Mpumalanga Parks Board Act 6 of 1995
	Mpumalanga Conservation Act, 1998 (Act 10 of 1998)
	Mpumalanga Tourism and Parks Agency Act, No 5 of 2005
	Mpumalanga Conservation Plan (C-plan 2)
	Mpumalanga Biodiversity Sector Plan

7 Limitations

The following limitations should be noted for the study:

- This assessment represents the Scoping Phase of the project only. After further field surveys a final biodiversity and impact assessment report will be submitted;
- The sensitivity map is based on desktop data alone; and
- A field survey still needs to be conducted to advise on the viability of the alternatives.

8 Methodologies

8.1 Geographic Information Systems (GIS) Mapping

Existing data layers were incorporated into GIS software to establish how the proposed project might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment (NBA) (Skowno *et al*., 2019) and
- Mpumalanga Biodiversity Sector Plan (2014).

8.2 Botanical Assessment

The botanical study encompassed a desktop assessment of all the vegetation units and habitat types within the project area. The focus was on an ecological assessment of habitat types as well as identification of any Red Data species within the known distribution of the project area. The South African National Biodiversity Institute (SANBI) provides an electronic database system, namely the Botanical Database of Southern Africa (BODATSA), to access distribution records on southern African plants. This is a new database which replaces the old Plants of Southern Africa (POSA) database. The POSA database provided distribution data of flora at the quarter degree square (QDS) resolution.

The Red List of South African Plants website (SANBI, 2017) was utilized to provide the most current account of the national status of flora.

Additional information regarding ecosystems, vegetation types, and species of conservation concern (SCC) included the following sources:

- The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2012); and
- Red List of South African Plants (Raimondo *et al.,* 2009; SANBI, 2016).

8.3 Faunal Assessment (Mammals & Avifauna)

The faunal desktop assessment included the following:

- Compilation of expected species lists;
- Identification of any Red Data or species of conservation concern (SCC) potentially occurring in the area; and
- Emphasis was placed on the probability of occurrence of species of provincial, national and international conservation importance.

Mammal distribution data were obtained from the following information sources:

- The Mammals of the Southern African Subregion (Skinner & Chimimba, 2005);
- Bats of Southern and Central Africa (Monadjem *et al.,* 2010);
- The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (www.ewt.org.za) (EWT, 2016); and
- Animal Demography Unit (ADU) - MammalMap Category (MammalMap, 2019) (mammalmap.adu.org.za).

8.4 Herpetology (Reptiles & Amphibians)

A herpetofauna assessment of the possible species in the area was done and attention was paid to the SCCs, sources used included the IUCN (2017) and ADU (2019).

Herpetofauna distributional data was obtained from the following information sources:

- South African Reptile Conservation Assessment (SARCA) (sarca.adu.org);
- A Guide to the Reptiles of Southern Africa (Alexander & Marais, 2007);
- Field guide to Snakes and other Reptiles of Southern Africa (Branch, 1998);
- Atlas and Red list of Reptiles of South Africa, Lesotho and Swaziland (Bates *et al.,* 2014);
- A Complete Guide to the Frogs of Southern Africa (du Preez & Carruthers, 2009);
- Animal Demography Unit (ADU) - FrogMAP (frogmap.adu.org.za);
- Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Mintner *et al.,* 2004); and
- Ensuring a future for South Africa's frogs (Measey, 2011).

9 Receiving Environment

9.1 Desktop Spatial Assessment

The following features describes the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI. The desktop analysis and their relevance to this project are listed in Table 3.

Table 3: Desktop spatial features examined.

Desktop Information Considered	Relevant/Not relevant	Section
Conservation Plan	The project overlaps with CBA: Irreplaceable, CBA: Optimal, Moderately Modified Old Lands; and Heavily Modified Areas (HMA).	4.1
Rocky Ridges	Irrelevant: Mpumalanga does not have regulation regarding rocky ridges	-
Ecosystem Threat Status	The project area is situated within an ecosystem that are listed as VU	4.2.1
Ecosystem Protection Level	The terrestrial ecosystems associated with the development are rated as *not protected* for the entire project area.	4.2.2

Protected Areas	Irrelevant John Cairns Private Nature Reserve is 6.5km from the project area	-
NFEPA Rivers and Wetlands	The project area does overlap with a true FEPA wetland.	Refer to wetland report
Mpumalanga Protected Area Expansion Strategy	The project area impacts on an area identified as part of the protected area expansion strategy.	4.3
Mining and Biodiversity Guidelines	Majority of the project area fall in areas classified as "highest biodiversity importance" and "moderate biodiversity importance".	4.4
Important Bird and Biodiversity Areas	The project area is approximately 45km away from the Loskop Dam Nature Reserve IBA	-

9.2 Project Area in Relation to the Mpumalanga Biodiversity Sector Plan

The key output of this systematic biodiversity plan is a map of biodiversity priority areas (MTPA, 2014). The MBSP CBA map delineates Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA), Protected Areas (PA), and areas that have been irreversibly modified from their natural state (MTPA, 2014). The MBSP uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

- CBA;
- ESA;
- ONA;
- PA; and
- Moderately or Heavily Modified Areas (MMA's or HMA's).

CBAs are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species (MTPA, 2014). Thus, 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 (SANBI-BGIS, 2017).

CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species (MTPA, 2014).

The Mpumalanga Biodiversity Sector Plan (MBSP) specifies two different CBA areas, **Irreplaceable CBA's and Optimal CBA's**. Irreplaceable CBA's include: (1) areas required to meet targets and with irreplaceability biodiversity values of more than 80%; (2) critical linkages or pinch-points in the landscape that must remain natural; or (3) critically Endangered ecosystems (MTPA, 2014).

ESAs are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (SANBI-BGIS, 2017).

ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (SANBI-BGIS, 2017).

Moderately or Heavily Modified Areas (sometimes called 'transformed' areas) are areas that have been heavily modified by human activity so that they are by-and-large no longer natural, and do not contribute to biodiversity targets (MTPA, 2014). Some of these areas may still provide limited biodiversity and ecological infrastructural functions but, their biodiversity value has been significantly, and in many cases irreversibly, compromised.

Figure 2 shows the project area superimposed on the MBSP Terrestrial CBA map. Based on this, the proposed development areas will potentially overlap with:

- CBA: Irreplaceable;
- CBA: Optimal;
- Moderately Modified Old Lands; and
- Heavily Modified Areas (HMA).

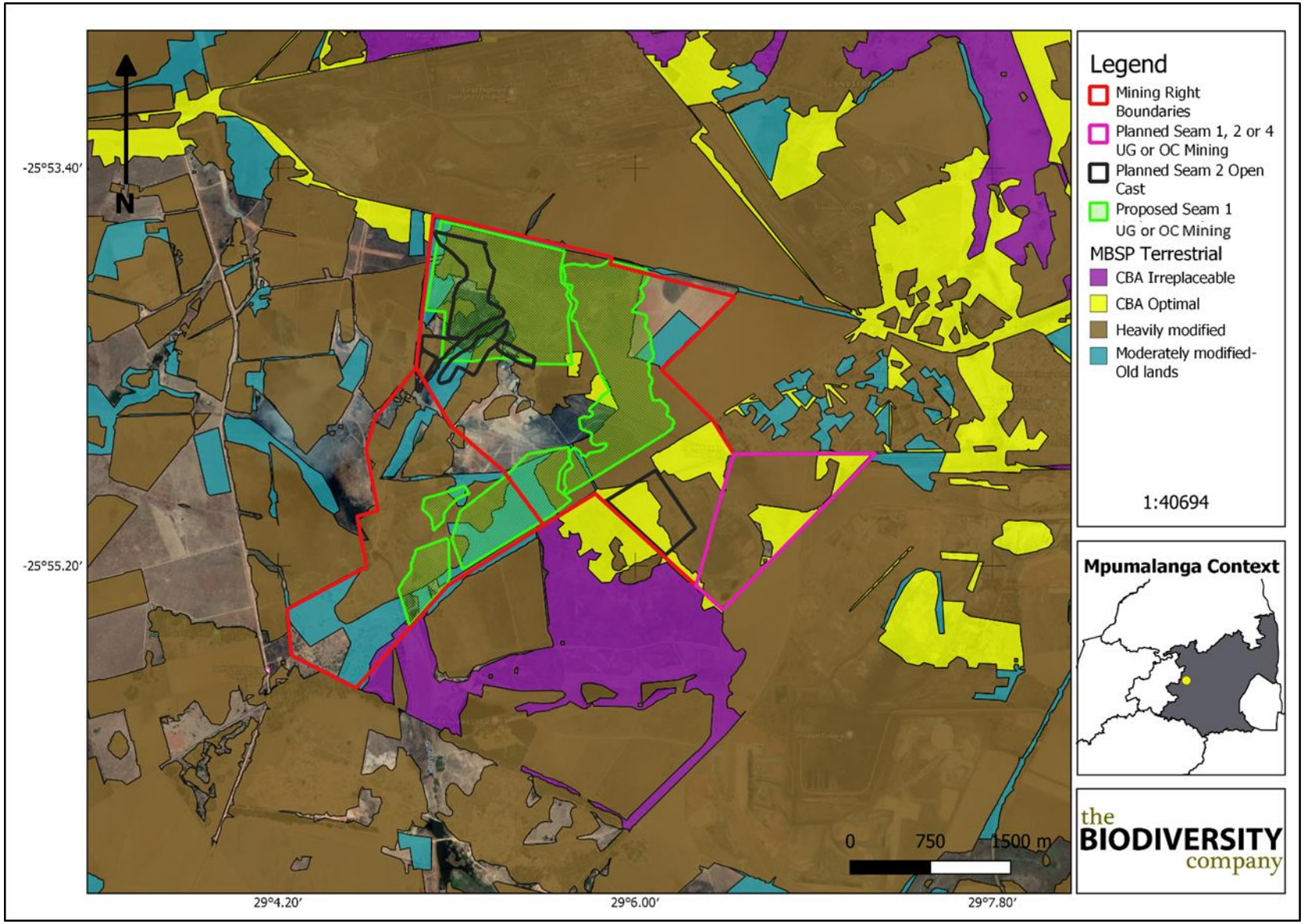

Figure 2: Elandsfontein project area superimposed on the MSBP (MTPA, 2014)

9.3 Project Area in Relation to the NBA

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period (Skowno *et al*., 2019).

The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors (Skowno *et al*., 2019).

The two headline indicators assessed in the NBA are *ecosystem threat status* and *ecosystem protection level* (Skowno *et al*., 2019).

9.3.1 Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends (Skowno *et al*., 2019).

Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition (Skowno *et al*., 2019).

The project area was superimposed on the terrestrial ecosystem threat status (Figure 3). As seen in this figure, the project area is situated within an ecosystem that are listed as VU (Figure 3).

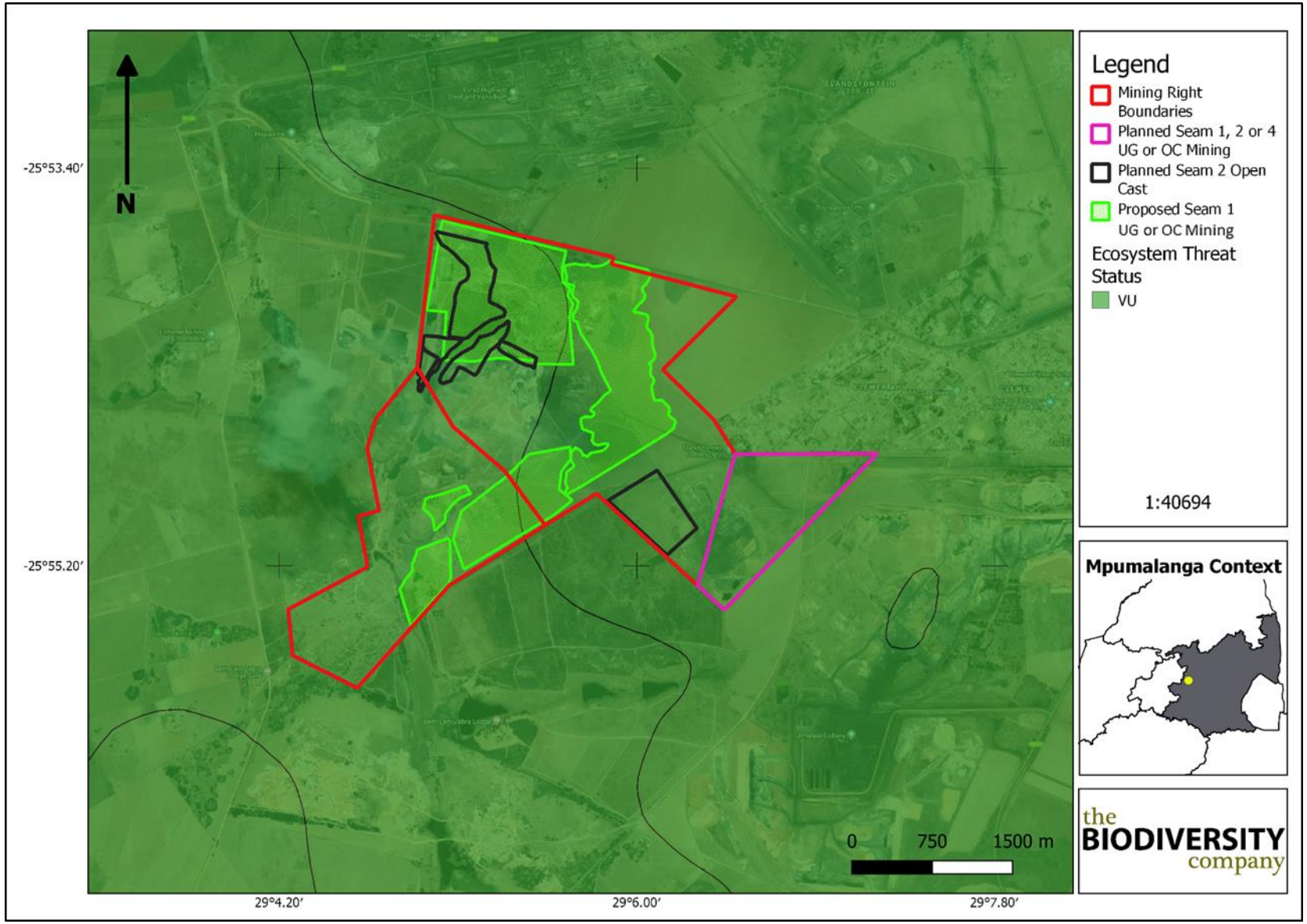

Figure 3: Elandsfontein project area showing the regional ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018)

9.3.2 Ecosystem Protection Level

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected, poorly protected, moderately protected or well protected, based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act (Skowno *et al*., 2019).

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (*Figure 4*). Based on Figure 4 the terrestrial ecosystems associated with the development are rated as *not protected* for the entire project area. This means that these ecosystems are considered not to be adequately protected in areas such as national parks or other formally protected areas. The spatial data is based on regional data and might vary on a local scale due to transformation caused by mining and agriculture; this will be confirmed during the site visit.

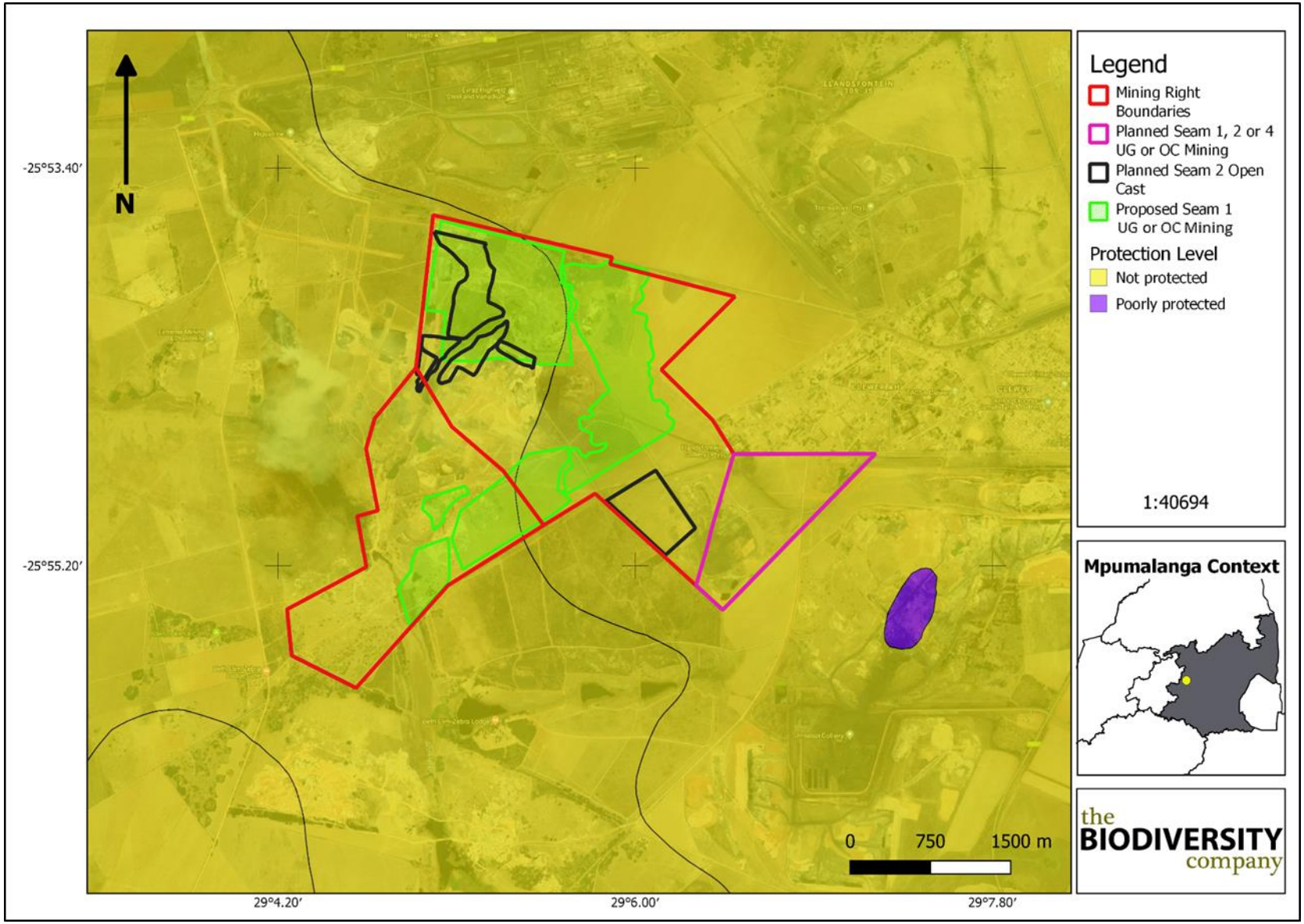

Figure 4: Elandsfontein project area showing the regional level of protection of terrestrial ecosystems (NBA, 2018)

9.4 Mpumalanga Protected Areas Expansion Strategy

The Mpumalanga Protected Area Expansion Strategy (MPAES, 2013), commissioned by the MTPA, serves to function as a provincial framework for an integrated, co-ordinated and uniform approach in the expansion and consolidation of the Provincial PAs, in line with the requirements of the NPAES.

The priority areas for PA Expansion within Mpumalanga were spatially established based on the premise that the primary goal of these areas is to protect biodiversity targets. Several biodiversity data sources were used for the assessment, namely the: Threatened Ecosystems, MBCP Terrestrial Assessment, MBCP Aquatic Assessment, MBCP Irreplaceability, C-plan Irreplaceability, and the National Spatial Biodiversity Assessment Priority areas. A combination of all these were used, together with the spatial priorities established within the NPAES, to establish the spatial priority areas that will guide the MPAES over the next 20 years.

Figure 5 shows the project area superimposed on the MPAES (2013) spatial data. As can be seen in this figure, the project area impacts on an area identified as part of the protected area expansion strategy.

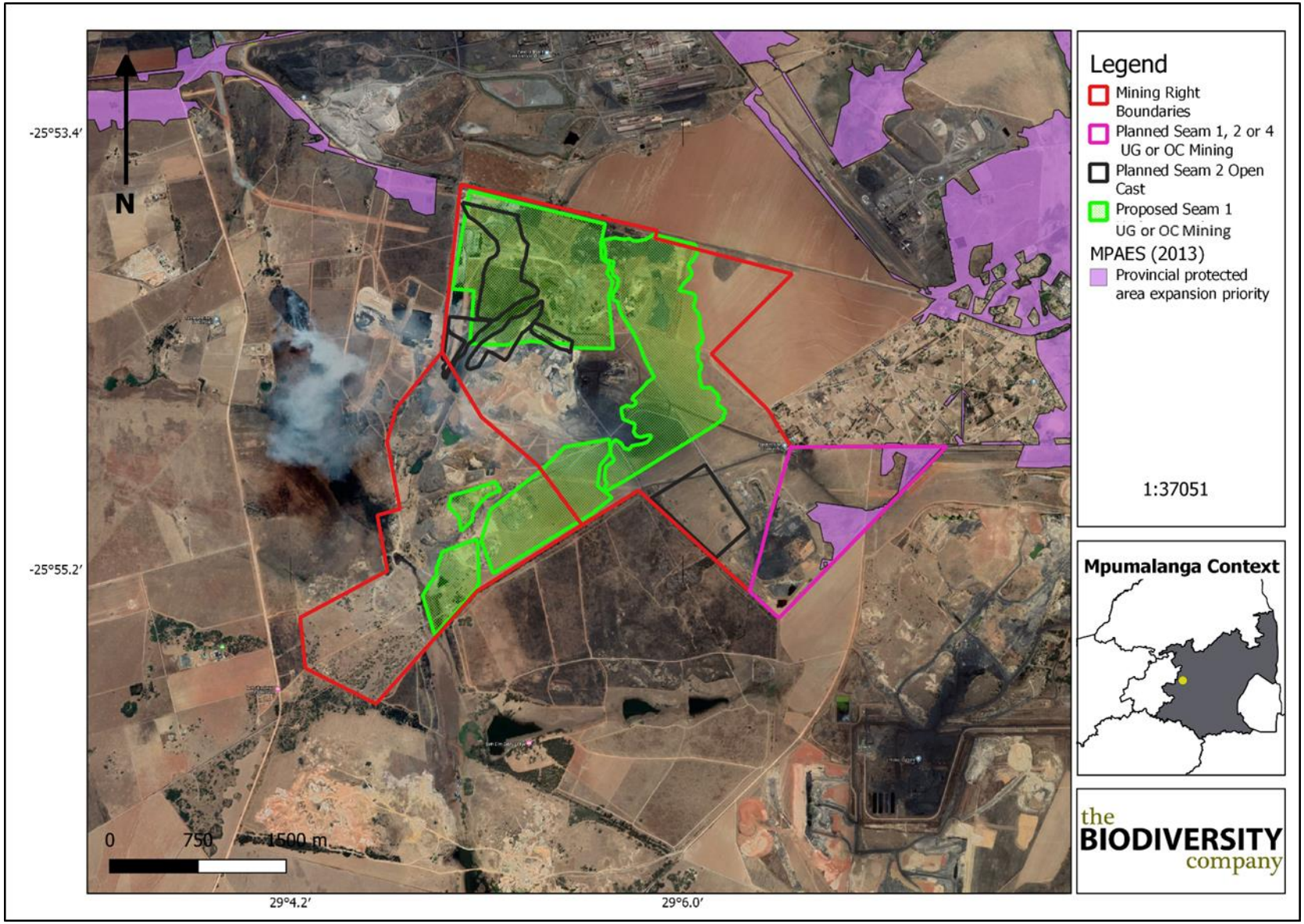

Figure 5: The project area in relation the MPAES (MPAES, 2013)

9.5 Mining and Biodiversity Guidelines

The Mining and Biodiversity Guidelines (2013) was developed by the Department of Mineral Resources, the Chamber of Mines, the South African National Biodiversity Institute and the South African Mining and Biodiversity Forum, with the intention to find a balance between economic growth and environmental sustainability. The Guideline is envisioned as a tool to "foster a strong relationship between biodiversity and mining which will eventually translate into best practice within the mining sector. In identifying biodiversity priority areas which have different levels of risk against mining, the Guideline categorises biodiversity priority areas into four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining in these areas:

A) Legally protected areas, where mining is prohibited;

B) Areas of highest biodiversity importance, which are at the highest risk for mining;

C) Areas of high biodiversity importance, which are at a high risk for mining; and

Areas of moderate biodiversity importance, which are at a moderate risk for mining. Table 4 shows the four different categories and the implications for mining within each of these categories.

The Guideline provides a tool to facilitate the sustainable development of South Africa's mineral resources in a way that enables regulators, industry and practitioners to minimise the impact of mining on the country's biodiversity and ecosystem services. It provides the mining sector with a practical, user- friendly manual for integrating biodiversity considerations into the planning processes and managing biodiversity during the operational phases of a mine, from exploration through to closure. The Guideline provides explicit direction in terms of where mining-related impacts are legally prohibited, where biodiversity priority areas may present high risks for mining projects, and where biodiversity may limit the potential for mining.

Overall, proponents of a mining activity in biodiversity priority areas should demonstrate that:

- There is significant cause to undertake mining – by commenting on whether the biodiversity priority area coincides with mineral or petroleum reserves that are strategically in the national interest to exploit. Reference should also be made to whether alternative deposits or reserves exist that could be exploited in areas that are not biodiversity priority areas or are less environmentally sensitive areas;
- Through the process of a rigorous EIA and associated specialist biodiversity studies the impacts of the proposed mining are properly assessed following good practice. It is critical that sufficient time and resources are budgeted to do so early in the planning and impact assessment process, including appointing appropriate team of people with the relevant skills and knowledge as required by legislation;
- Cumulative impacts have been considered;
- The mitigation hierarchy has been systematically applied and alternatives have been rigorously considered;

- The issues related to biodiversity priority areas have been incorporated into a robust EMP as the main tool for describing how the mining or prospecting operation's environmental impacts are to be mitigated and managed; and
- Good practice environmental management is followed, monitoring and compliance enforcement is ensured.

Table 4: The mining and biodiversity guidelines categories

Category	Biodiversity priority areas	Risk for mining	Implications for mining
A. Legally protected	• Protected areas (including National Parks, Nature Reserves, World Heritage Sites, Protected Environments, Nature Reserves) Areas declared under Section 49 of the Mineral and Petroleum Resources Development Act (No. 28 of 2002)	**Mining prohibited**	Mining projects cannot commence as mining is legally prohibited. Although mining is prohibited in Protected Areas, it may be allowed in Protected Environments if both the Minister of Mineral Resources and Minister of Environmental Affairs approve it. In cases where mining activities were conducted lawfully in protected areas before Section 48 of the Protected Areas Act (No. 57 of 2003) came into effect, the Minister of Environmental Affairs may, after consulting with the Minister of Mineral Resources, allow such mining activities to continue, subject to prescribed conditions that reduce environmental impacts.
B. Highest biodiversity importance	• 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	**Highest risk for mining**	Environmental screening, environmental impact assessment (EIA) and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, and to provide site-specific basis on which to apply the mitigation hierarchy to inform regulatory decision-making for mining, water use licenses, and environmental authorisations. If they are confirmed, the likelihood of a fatal flaw for new mining projects is very high because of the significance of the biodiversity features in these areas and the associated ecosystem services. These areas are viewed as necessary to ensure protection of biodiversity, environmental sustainability, and human well-being. An EIA should include the strategic assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. This assessment should fully consider the environmental sensitivity of the area, the overall environmental and socio-economic costs and benefits of mining, as well as the potential strategic importance of the minerals to the country. Authorisations may well not be granted. If granted, the authorisation may set limits on allowed activities and impacts and may specify biodiversity offsets that would be written into license agreements and/or authorisations.

C. High biodiversity importance	• 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	**High risk for mining**	These areas are important for conserving biodiversity, for supporting or buffering other biodiversity priority areas, and for maintaining important ecosystem services for particular communities or the country as a whole. An EIA should include an assessment of optimum, sustainable land use for a particular area and will determine the significance of the impact on biodiversity. Mining options may be limited in these areas, and limitations for mining projects are possible. Authorisations may set limits and specify biodiversity offsets that would be written into license agreements and/or authorisations.
D. Moderate biodiversity importance	• Ecological support areas • Vulnerable ecosystems • Focus areas for protected area expansion (land-based and offshore protection)	**Moderate risk for mining**	These areas are of moderate biodiversity value. EIAs and their associated specialist studies should focus on confirming the presence and significance of these biodiversity features, identifying features (e.g. threatened species) not included in the existing datasets, and on providing site-specific information to guide the application of the mitigation hierarchy. Authorisations may set limits and specify biodiversity offsets that would be written into license agreements and/or authorisations.

Majority of the project area fall in areas classified as “highest biodiversity importance” with their associated highest risks for mining. Small portions mainly in the central part of the project area is classified as “moderate biodiversity importance” with its associated moderate risk for mining (Figure 6).

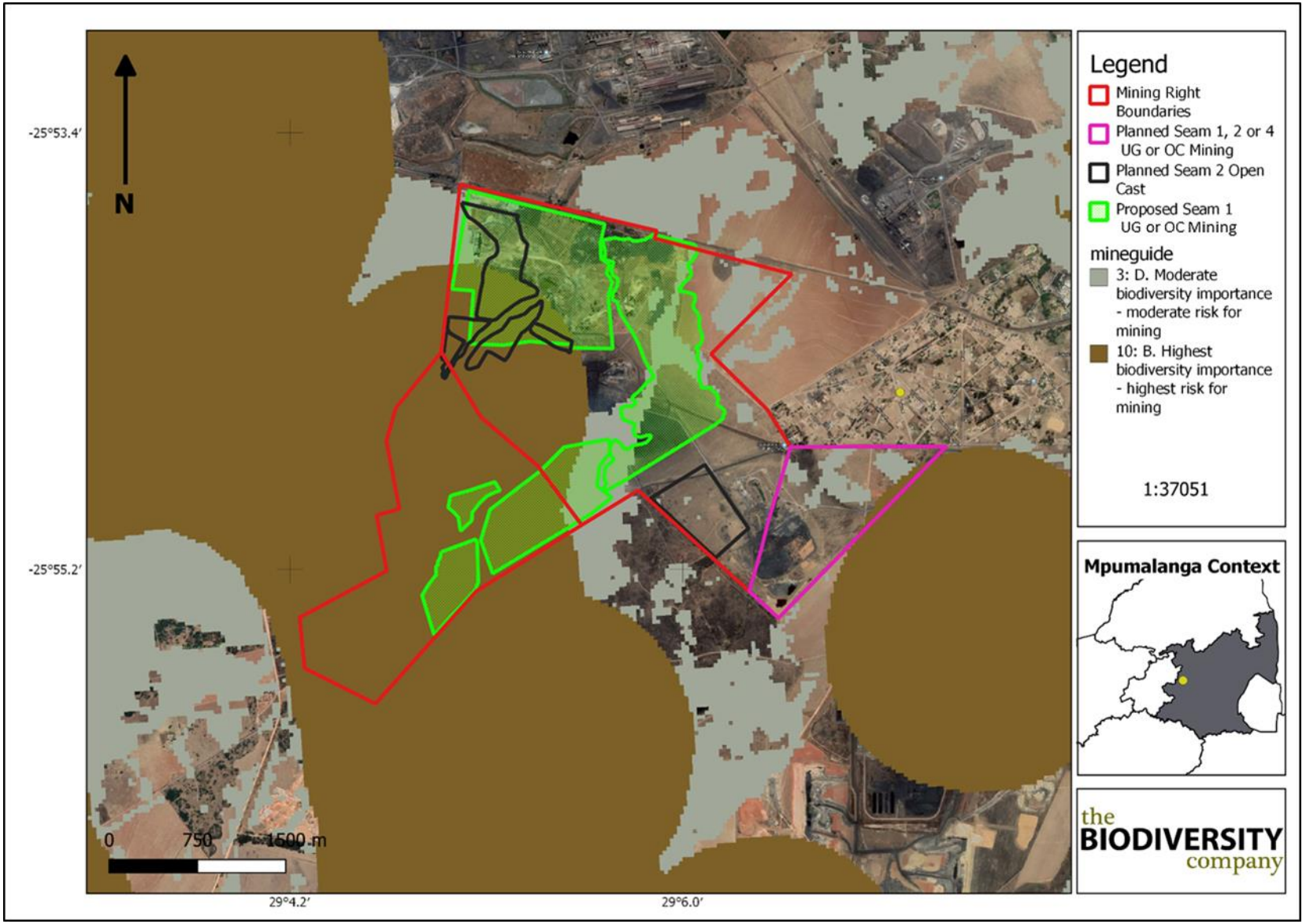

Figure 6: The project area superimposed on the Mining and Biodiversity Guideline spatial dataset (2013)

9.6 Desktop Assessment

9.6.1 Vegetation Assessment

The project area is situated within the grassland biome. This biome is centrally located in southern Africa, and adjoins all except the desert, fynbos and succulent Karoo biomes (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the grassland biome include:

a) Seasonal precipitation; and
b) The minimum temperatures in winter (Mucina & Rutherford, 2006).

The grassland biome is found chiefly on the high central plateau of South Africa, and the inland areas of KwaZulu-Natal and the Eastern Cape. The topography is mainly flat and rolling but includes the escarpment itself. Altitude varies from near sea level to 2 850 m above sea level.

Grasslands are dominated by a single layer of grasses. The amount of cover depends on rainfall and the degree of grazing. The grassland biome experiences summer rainfall and dry winters with frost (and fire), which are unfavourable for tree growth. Thus, trees are typically absent, except in a few localized habitats. Geophytes (bulbs) are often abundant. Frosts, fire and grazing maintain the grass dominance and prevent the establishment of trees.

9.6.1.1 Vegetation Types

The grassland biome comprises many different vegetation types. The project area is situated within two vegetation types; namely the Eastern Highveld Grassland and Rand Highveld Grassland vegetation type according to Mucina & Rutherford (2006) (Figure 7).

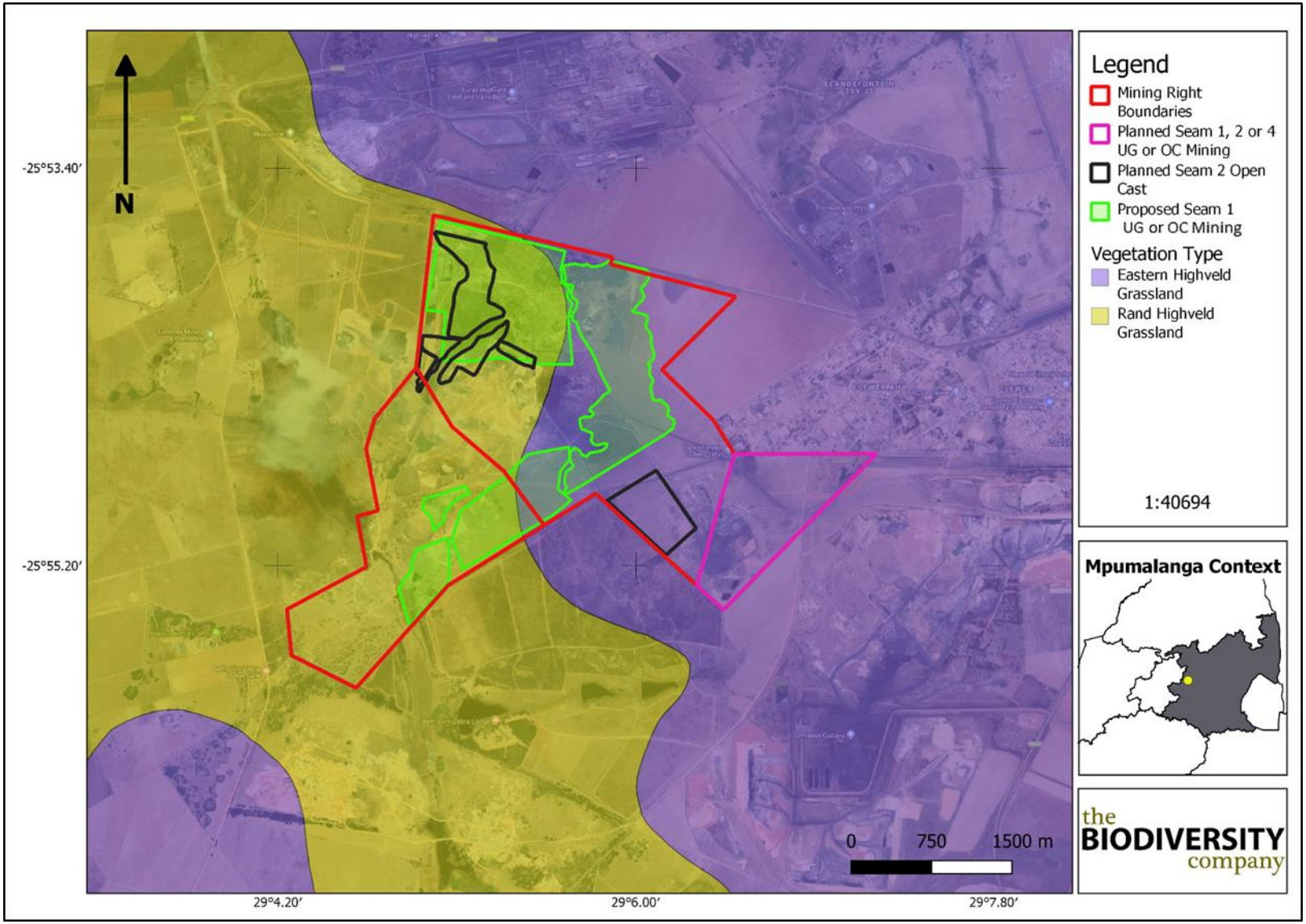

Figure 7: The project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)

9.6.1.1.1 Eastern Highveld Grassland

This vegetation type occurs on slightly to moderately undulating planes, including some low hills and pan depressions. The vegetation is a short dense grass land 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. Some 44% transformed primarily by cultivation, plantations, mines, urbanisation and by building of dams. No serious alien invasions are reported (Mucina & Rutherford, 2006).

Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the **Eastern Highveld Grassland** vegetation type:

Graminoids: *Aristida aequiglumis, A. congesta, A. junciformis subsp. Galpinii, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, D. tricholaenoides, Elionurus muticus, Eragrostis chloromelas, E. curvula, E plana, E racemosa E sclerantha Heteropogon contortus, Loudetia simplex, Microchloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, S. pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, T. rehmanni, Alloteropsis semialata subsp. eckloniana, Andropogon appendiculatus, A schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Eragrostis capensis, E. gummiflua, E. patentissima, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides;*

Herbs: *Berkheya setifera, Haplocarpha scaposa, Justicia anagalloides, Acalypha angusta, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvalensis subsp. setilobus, Helichrysum aureonitens, H caespititium, H. callicomum, H. oreophilum, H. caespititium, H. oreophilum, H rugulosum, ipomoea crassipes, Pentanisia prunelloides subsp. latifolia, Selago densiflora, Senecio coronatus, Vernonia oligocephala, Wahlenbergia undulata;*

Geophytic herbs: *Gladiolus crassifolius, Haemanthus humilis subsp. hirsutus, Hypoxis rigidula var. pilosissima, Ledebouria ovatifolia;*

Succulent herb: *Aloe ecklonis*; and

Low shrubs: *Anthospermum rigidum subsp. pumilum, Stoebe plumosa.*

Conservation Status

According to Mucina and Rutherford (2006), this vegetation type is classified as Endangered. The national target for conservation protection for both these vegetation types is 24%, but only a few patches are statutorily conserved in Nooitgedacht Dam and Jericho Dam Nature Reserves and in private reserves (Holkranse, Kransbank, Morgenstond).

Some 44% of this vegetation type has already been transformed primarily by cultivation, plantations, mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact, indicated by land-cover data. No serious alien invasions are reported, but *Acacia mearnsii* can become dominant in disturbed sites.

9.6.1.1.2 Rand Highveld Grassland

This vegetation type occurs on highly variable landscapes with extensive sloping plains and a series of ridges slightly elevated over undulating surrounding plains. The vegetation is species-rich, wiry, sour grassland alternating with low, sour shrubland on rocky outcrops and steeper slopes. This vegetation type can be found in Gauteng, North-West, Free State and Mpumalanga Provinces, between rocky ridges from Pretoria to Witbank, extending onto ridges in the Stoffberg and Roossenekal regions as well as west of Krugersdorp centred in the vicinity of Derby and Potchefstroom, extending southwards and north-eastwards from there (Mucina & Rutherford, 2006).

Important Plant Taxa

Important plant taxa are those species that have a high abundance, a frequent occurrence or are prominent in the landscape within a particular vegetation type (Mucina & Rutherford, 2006).

The following species are important in the **Rand Highveld Grassland** vegetation type:

Graminoids: *Ctenium concinnum, Cynodon dactylon, Digitaria monodactyla , Diheteropogon amplectens , Eragrostis chloromelas , Heteropogon contortus , Loudetia simplex , Monocymbium ceresiiforme , Panicum natalense , Schizachyrium sanguineum , Setaria sphacelata , Themeda triandra , Trachypogon spicatus , Tristachya biseriata , T. rehmannii , Andropogon schirensis, Aristida aequiglumis, A. congesta, A. junciformis subsp. galpinii, Bewsia biflora, Brachiaria nigropedata, B. serrata, Bulbostylis burchellii, Cymbopogon caesius, Digitaria tricholaenoides, Elionurus muticus, Eragrostis capensis, E. curvula, E. gummiflua, E. plana, E. racemosa, Hyparrhenia hirta, Melinis nerviglumis, M. repens subsp. repens, Microchloa caffra, Setaria nigrirostris, Sporobolus pectinatus, Trichoneura grandiglumis, Urelytrum agropyroides.*

Herbs: *Acanthospermum australe , Justicia anagalloides , Pollichia campestris, Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Helichrysum caespititium, H. nudifolium var. nudifolium, H. rugulosum, Ipomoea crassipes, Kohautia amatymbica, Lactuca inermis, Macledium zeyheri subsp. argyrophyllum, Nidorella hottentotica, Oldenlandia herbacea, Rotheca hirsuta, Selago densiflora, Senecio coronatus, Sonchus dregeanus, Vernonia oligocephala, Xerophyta retinervis* .

Geophytic Herbs: *Boophone disticha, Cheilanthes hirta, Haemanthus humilis subsp. humilis, Hypoxis rigidula var. pilosissima, Ledebouria ovatifolia, Oxalis corniculate.*

Succulent Herb: *Aloe greatheadii var. davyana.*

Low Shrubs: *Anthospermum rigidum subsp. pumilum, Indigofera comosa, Rhus magalismontana, Stoebe plumosa. Succulent Shrub: Lopholaena coriifolia*.

Geoxylic Suffrutex: *Elephantorrhiza elephantina*.

Conservation Status of the Vegetation Type

According to Mucina and Rutherford (2006), this vegetation type is classified as Endangered. The national target for conservation protection for both these vegetation types is 24%, but only a few patches are protected in statutory reserves (Kwaggavoetpad, Van Riebeeck Park,

Bronkhorstspruit, Boskop Dam Nature Reserves) and in private conservation areas (e.g. Doornkop, Zemvelo, Rhenosterpoort and Mpopomeni).

Almost half of this vegetation type has been transformed mostly by cultivation, plantations, urbanisation or dam-building. Cultivation may also have had an impact on an additional portion of the surface area of the unit where old lands are currently classified as grasslands in land-cover classifications and poor land management has led to degradation of significant portions of the remainder of this unit.

9.6.1.2 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 311 plant species have the potential to occur in the project area and its surroundings (*Figure 8*).

Of these 311 plant species, one (1) species are listed as being Species of Conservation Concern (SCC) (*Table 5)*.

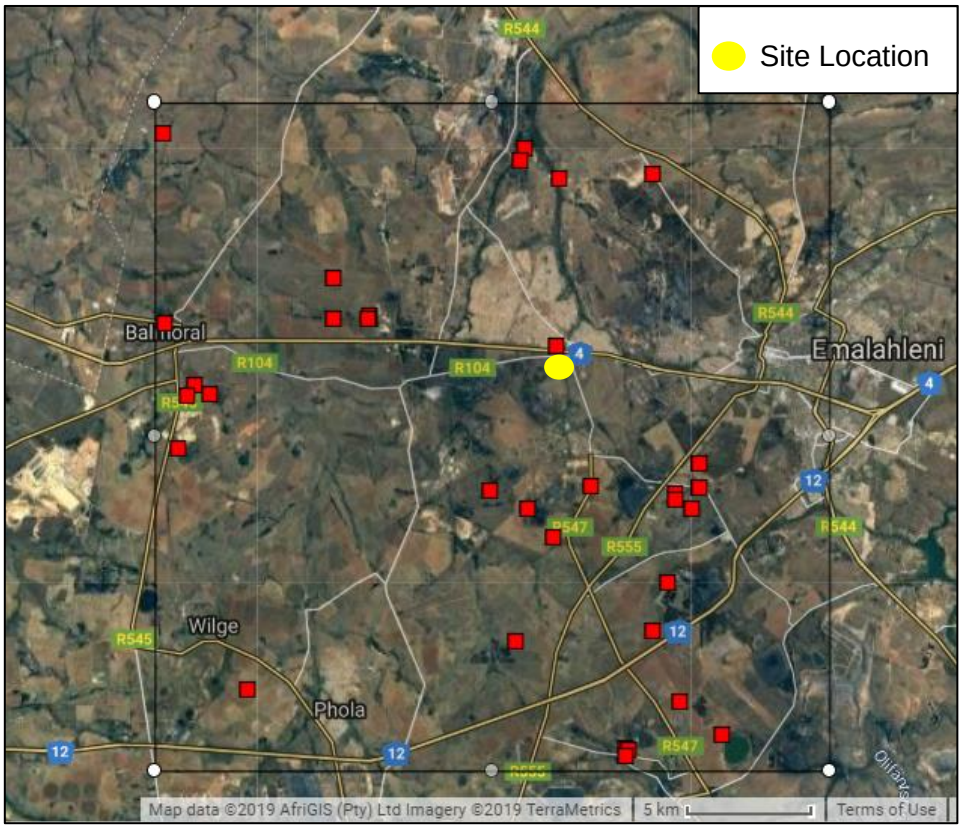

Figure 8: Map showing the grid drawn in order to compile an expected plant species list (BODATSA-POSA, 2019)

Table 5: Plant Species of Conservation Concern with the potential to occur in the project area

Family	Taxon	Author	IUCN	Ecology
Iridaceae	*Gladiolus paludosus*	Baker	VU	Indigenous

Gladiolus paludosus is categorised as VU according to the Red List of South African Plants (SANBI, 2017). It occurs in wetlands and marshes in high altitude grasslands, where its threatened by habitat loss and degradation.

9.6.2 Faunal Assessment

9.6.2.1 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 235 bird species have the potential to occur in the vicinity of the project area. The full list of potential bird species is provided in Appendix B.

Of the potential bird species, nine (9) species are listed as SCC either on a regional or global scale (*Table 6*).

The SCC include the following:

- Two (2) species that are listed as EN on a regional basis;
- Two (2) species that are listed as VU on a regional basis; and
- Four (4) species that are listed as NT on a regional basis.

On a global scale, four (4) species are listed as VU and three (3) species as NT (*Table 6*).

Table 6: List of bird species of regional or global conservation importance that are expected to occur in close vicinity to the project area.

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Anthropoides paradiseus	Crane, Blue	NT	VU	Low
Circus ranivorus	Marsh-harrier, African	EN	LC	Moderate
Geronticus calvus	Ibis, Southern Bald	VU	VU	Moderate
Mirafra cheniana	Lark, Melodious	LC	NT	Low
Oxyura maccoa	Duck, Maccoa	NT	NT	Low
Phoenicopterus minor	Flamingo, Lesser	NT	NT	Low
Phoenicopterus ruber	Flamingo, Greater	NT	LC	Low
Polemaetus bellicosus	Eagle, Martial	EN	VU	Low
Sagittarius serpentarius	Secretarybird	VU	VU	Moderate

Anthropoides paradiseus (Blue Crane) is listed as NT on a regional scale and as VU on a global scale. This species has declined, largely owing to direct poisoning, power-line collisions and loss of its grassland breeding habitat owing to afforestation, mining, agriculture and development (IUCN, 2017). This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short. Due to the lack of suitable habitat in the project area the likelihood of occurrence is rated as low.

Circus ranivorus (African Marsh Harrier) is listed as EN in South Africa (ESKOM, 2014). This species has an extremely large distributional range in sub-equatorial Africa. South African populations of this species are declining due to the degradation of wetland habitats, loss of habitat through over-grazing and human disturbance and possibly, poisoning owing to over-use of pesticides (IUCN, 2017). This species breeds in wetlands and forages primarily over reeds and lake margins. There are some wetlands and marsh areas at the project area,

however many of them are disturbed and thus the occurrence of *C. ranivorus* in the project area is therefore considered to be moderate.

Geronticus calvus (Southern Bald Ibis) is listed as VU on a regional basis and prefers high rainfall (>700 mm p.a.), sour and alpine grasslands, with an absence of trees and a short, dense grass sward and also occurs in lightly wooded and relatively arid country. It forages on recently burned ground, also using unburnt natural grassland, cultivated pastures, reaped maize fields and ploughed areas. It has a varied diet, mainly consisting of insects and other terrestrial invertebrates (IUCN, 2017). It has high nesting success on safe, undisturbed cliffs. The likelihood of the species foraging within the project area is good and therefor the likelihood of occurrence is rated as moderate.

Mirafra cheniana (Melodious Lark) is seen as NT n a global scale. This species is a non endemic species that can be found in the central South African regions. It is threatened by habitat loss and change (IUCN, 2017). Suitable habitat can not be found in the project area.

Oxyura maccoa (Maccoa Duck) has a large northern and southern range, South Africa is part of its southern distribution. During the species' breeding season, it inhabits small temporary and permanent inland freshwater lakes, preferring those that are shallow and nutrient-rich with extensive emergent vegetation such as reeds (*Phragmites spp*.) and cattails (*Typha spp*.) on which it relies for nesting (IUCN, 2017). The likelihood of occurrence of this species in the project area was rated as low, as the water sources are too disturbed to be seen as suitable habitat for this species.

Phoeniconaias minor (Lesser Flamingo) is listed as NT on a global and regional scale whereas *Phoenicopterus roseus* (Greater Flamingo) is listed as NT on a regional scale only. Both species have similar habitat requirements and the species breed on large undisturbed alkaline and saline lakes, salt pans or coastal lagoons, usually far out from the shore after seasonal rains have provided the flooding necessary to isolate remote breeding sites from terrestrial predators and the soft muddy material for nest building (IUCN, 2017). The disturbed nature of the waterbodies decreases the likelihood of occurrence.

Polemaetus bellicosus (Martial Eagle) is listed as EN on a regional scale and VU on a global scale. This species has an extensive range across much of sub-Saharan Africa, but populations are declining due to deliberate and incidental poisoning, habitat loss, reduction in available prey, pollution and collisions with power lines (IUCN, 2017). It inhabits open woodland, wooded savanna, bushy grassland, thorn-bush and, in southern Africa, more open country and even sub-desert (IUCN, 2017). No roosting or foraging habitat is present for this species and as such the likelihood of occurrence is rated as low.

Sagittarius serpentarius (Secretarybird) occurs in sub-Saharan Africa and inhabits grasslands, open plains, and lightly wooded savanna. It is also found in agricultural areas and sub-desert (IUCN, 2017). The likelihood of occurrence is rated as moderate due to the agricultural fields and some grassland areas that can be found in and adjacent to the project area.

9.6.2.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 87 mammal species that could be expected to occur within the project area. Of these species, 7 are medium to large conservation dependant species, such *Ceratotherium simum* (Southern White Rhinoceros) and *Tragelaphus oryx* (Common Eland) that, in South Africa, are generally restricted to protected

areas such as game reserves. These species are not expected to occur in the project area and are removed from the expected SCC list. They are however still included in the expected species list.

Of the remaining 80 small to medium sized mammal species, sixteen (16) (20%) are listed as being of conservation concern on a regional or global basis (*Table 7*).

The list of potential species includes:

- Three (3) that are listed as EN on a regional basis;
- Five (5) that are listed as VU on a regional basis; and
- Seven (7) that are listed as NT on a regional scale.

On a global scale, 1 species is listed as EN, 2 are listed as VU and 4 as NT (*Table 7*).

Table 7: List of mammal species of conservation concern that may occur in the project area as well as their global and regional conservation statuses.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Aonyx capensis	Cape Clawless Otter	NT	NT	Low
Atelerix frontalis	South Africa Hedgehog	NT	LC	Moderate
Cloeotis percivali	Short-eared Trident Bat	EN	LC	Low
Crocidura maquassiensis	Makwassie musk shrew	VU	LC	Low
Dasymys incomtus	African Marsh rat	NT	LC	Low
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT	Low
Felis nigripes	Black-footed Cat	VU	VU	Low
Hydrictis maculicollis	Spotted-necked Otter	VU	NT	Low
Leptailurus serval	Serval	NT	LC	High
Mystromys albicaudatus	White-tailed Rat	VU	EN	Low
Ourebia ourebi	Oribi	EN	LC	Low
Panthera pardus	Leopard	VU	VU	Low
Parahyaena brunnea	Brown Hyaena	NT	NT	Low
Pelea capreolus	Grey Rhebok	NT	LC	Low
Poecilogale albinucha	African Striped Weasel	NT	LC	Moderate
Redunca fulvorufula	Mountain Reedbuck	EN	LC	Low

Aonyx capensis (Cape Clawless Otter) is the most widely distributed otter species in Africa (IUCN, 2017). This species is predominantly aquatic, and it is seldom found far from water. The disturbed nature of the water sources in the project area decreases the likelihood of occurrence.

Atelerix frontalis (South African Hedgehog) has a tolerance of a degree of habitat modification and occurs in a wide variety of semi-arid and sub-temperate habitats (IUCN, 2017). Based on the Red List of Mammals of South Africa, Lesotho and Swaziland (2016), *A. frontalis* populations are decreasing due to the threats of electrocution, veld fires, road collisions, predation from domestic pets and illegal harvesting. Although the species is cryptic and

therefore not often seen, there is suitable habitat in the project area although somewhat disturbed and therefore the likelihood of occurrence is rated as moderate.

Cloeotis percivali (Short-eared Trident Bat) occurs in savanna areas where there is sufficient cover in the form of caves and mine tunnels for day roosting (IUCN, 2017). It feeds exclusively on moths and appears to be very sensitive to disturbance. Suitable habitat cannot be found around the project area and therefore the likelihood of finding this species is rated as low.

Crocidura maquassiensis (Maquassie Musk Shrew) is listed as VU on a regional basis and is known to be found in rocky, mountain habitats. It may tolerate a wider range of habitats and individuals have been collected in Kwa-Zulu Natal from a garden, and in mixed bracken and grassland alongside a river at 1,500 m (IUCN, 2017). There is a lack of suitable habitat for this species in the project area and therefore the likelihood of occurrence is rated as low.

Dasymys incomtus (African Marsh Rat) is listed as NT on a regional scale and LC on a global scale. This species has a wide distributional range that includes Central Africa, East Africa and parts of Southern Africa. This species has been recorded from a wide variety of habitats, including forest and savanna habitats, wetlands and grasslands (IUCN, 2017). Even though there are wetland areas in the project area they are too disturbed to support this species.

Eidolon helvum (African Straw-coloured Fruit Bat) is listed as LC on a regional scale and NT on a global scale. This species has been recorded from a very wide range of habitats across the lowland rainforest and savanna zones of Africa (IUCN, 2017). Although considered to be widespread and abundant across its range, certain populations are decreasing due to severe deforestation, hunting for food and medicinal use (IUCN, 2017). This species is known to form large roosts and colonies numbering in the thousands to even millions of individuals (IUCN, 2017). No colonies of this species are known to occur in the project area or in the immediate vicinity, therefore it's likelihood of occurrence is rated as low.

Felis nigripes (Black-footed Cat) is endemic to the arid regions of southern Africa. This species is naturally rare, has cryptic colouring is small in size and is nocturnal. These factors have contributed to a lack of information on this species. Given that the highest densities of this species have been recorded in the more arid Karoo region of South Africa, the habitat in the project area can be considered to be sub-optimal for the species and the likelihood of occurrence is rated as low.

Hydrictis maculicollis (Spotted-necked Otter) inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes (IUCN, 2017). Suitable habitat may be available in the wetland areas however due to their disturbed nature the likelihood of occurrence is low.

Leptailurus serval (Serval) occurs widely through sub-Saharan Africa and is commonly recorded from most major national parks and reserves (IUCN, 2017). The Serval's status outside reserves is not certain, but they are inconspicuous and may be common in suitable habitat as they are tolerant of farming practices provided there is cover and food available. In sub-Saharan Africa, they are found in habitat with well-watered savanna long-grass environments and are particularly associated with reedbeds and other riparian vegetation types. This species is known to be very adaptable to disturbances associated with mining and as such the likelihood of occurrence is rated as high.

Mystromys albicaudatus (White-tailed Rat) is listed as VU on a regional basis and EN on a global scale. It is relatively widespread across South Africa and Lesotho; the species is known to occur in shrubland and grassland areas. A major requirement of the species is black loam soils with good vegetation cover. The likelihood of occurrence in the project area are rated as low.

Ourebia ourebi (Oribi) has a patchy distribution throughout Africa and is known to occur in South Africa. Populations are becoming more fragmented as it is gradually eliminated from moderately to densely settled areas (IUCN, 2017). The likelihood of occurrence is rated as low due to the relatively small size of the patches of natural vegetation that remain within the project area.

Panthera pardus (Leopard) has a wide distributional range across Africa and Asia, but populations have become reduced and isolated, and they are now extirpated from large portions of their historic range (IUCN, 2017). Impacts that have contributed to the decline in populations of this species include continued persecution by farmers, habitat fragmentation, increased illegal wildlife trade, excessive harvesting for ceremonial use of skins, prey base declines and poorly managed trophy hunting (IUCN, 2017). Although known to occur and persist outside of formally protected areas, the densities in these areas are considered to be low. The likelihood of occurrence in the project area is regarded as low because of the lack of suitable prey species.

Parahyaena brunnea (Brown Hyaena) is endemic to southern Africa. This species occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Given its known ability to persist outside of formally protected areas the likelihood of occurrence of this species in the project area is moderate to good. Due to the absence of larger herbivore prey species in the area the likelihood of occurrence of the brown hyaena is rated as low.

Pelea capreolus (Grey Rhebok) is endemic to a small region in southern Africa, inhabiting montane and plateau grasslands of South Africa, Swaziland, and Lesotho. In South Africa, their distribution is irregular and patchy, and they no longer occur north of the Orange River in the Northern Cape, or in parts of the North-West Province (IUCN, 2017). Grey Rhebok can be found in suitable habitat which has rocky hills, grassy mountain slopes, and montane and plateau grasslands in southern Africa. They are predominantly browsers, and largely water independent, obtaining most of their water requirements from their food. Based on the lack of their favoured habitat within the project area, the likelihood of occurrence of this species is rated as low.

Poecilogale albinucha (African Striped Weasel) is usually associated with savanna habitats, although it probably has a wider habitat tolerance (IUCN, 2017). Due to its secretive nature, it is often overlooked in many areas where it does occur. There is sufficient habitat for this species in the project area and the likelihood of occurrence of this species is therefore considered to be moderate.

Redunca fulvorufula (Mountain Reedbuck) is listed as EN both regionally and globally. The South African population has undergone a decline of 61-73% in the last three generations (15 years) (IUCN, 2017). Mountain Reedbuck live on ridges and hillsides in broken rocky country and high-altitude grasslands (often with some tree or bush cover). Rocky areas are absent from the project area and as such the likelihood of occurrence is rated as low.

9.6.2.3 Herpetofauna (Reptiles & Amphibians)

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the ReptileMap database provided by the Animal Demography Unit (ADU, 2019) 73 reptile species have the potential to occur in the project area. One of the expected species are SCCs (IUCN, 2017).

Based on the IUCN Red List Spatial Data (IUCN, 2017) and the AmphibianMap database provided by the Animal Demography Unit (ADU, 2019) 26 amphibian species have the potential to occur in the project area. One amphibian SCCs should be present in the project area (Table 8) according to the above-mentioned sources but *in situ* confirmation is required.

Table 8: List of amphibian species of conservation concern that may occur in the project area as well as their global and regional conservation statuses (IUCN, 2017; SANBI, 2016).

Species	Common Name	Conservation Status		Likelihood of Occurrence
		Regional (SANBI, 2016)	IUCN (2017)	
Reptiles				
Crocodylus niloticus	Nile Crocodile	VU	LC	Low
Amphibians				
Pyxicephalus adspersus	Giant Bullfrog	NT	LC	Low

Crocodylus niloticus (Nile Crocodile) is listed as VU on a regional basis. The Nile crocodile is quite widespread throughout sub-Saharan Africa, in different types of aquatic environments such as lakes, rivers, and marshlands. No suitable perennial rivers are found in the project area as such the likelihood of occurrence is rated as low.

The *Pyxicephalus adspersus* (Giant Bull Frog) is a species of conservation concern that will possibly occur in the project area. The Giant Bull Frog is listed as NT on a regional scale. It is a species of drier savannahs. It is fossorial for most of the year, remaining buried in cocoons. They emerge at the start of the rains, and breed in shallow, temporary waters in pools, pans and ditches (IUCN, 2017). The likelihood of occurrence is rated as low as the area surrounding the wetlands are too disturbed to function as habitat for this species.

10 Sensitivity

10.1 Methodology

EIMS has developed a comprehensive sensitivity mapping methodology for use by all specialists in order to standardise the scoring system which allows for a comparative assessment of all impacts. The methodology utilises a revised scoring table as well as including a base score for the entire prospecting area in question. This deviated from the past approach where features were scored based on their inherent sensitivity.

The updated methodology has shifted the focus from: (1) Scoring inherent environmental sensitivity towards (2) Scoring the proposed project impact on landscape features. The new scoring methodology (Figure 9) shifted focus to identifying sensitive/non-sensitive areas in terms of the development activity, rather than the original method which focused purely on the sensitivity of the landscape/environment.

The new scoring methodology has made provision for specialists to score areas/features that would be suitable or preferred for development. It should be noted that features/areas should

be scored in terms of the proposed project context and not purely on “perceived sensitivity of landscape features”. Thus, the specialist should continually be asking themselves the question “how will this feature be affected by the proposed development”. In cases where the development is anticipated to create a high negative impact, the high or very high scoring should be applied. High and very high scores must be justified. The final shape files must include a column indicating why each feature was assigned a certain score/sensitivity. In addition, a separate column must be provided indicating the numerical score in Figure 9.

To ensure that accurate site selection decisions will take place, the specialist must score sensitivity relative to the site in question. Ideally the specialist should only use very high sensitivity in rare cases, where such a score can be justified. Please note that legal licencing requirements or permit requirements should not be factored into the sensitivity score, this should be represented by a separate shapefile indicating additional legal requirements.

Sensitivity Rating	Description	Weighting	Preference
Least Concern	The inherent feature status and sensitivity is already degraded. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for mining or infrastructure placement.	-1	Preferrable
Low/Poor	The proposed development will have not have a significant effect on the inherent feature status and sensitivity.	0	Negotiabl
High	The proposed development will negatively influence the current status of the feature.	+1	Restricted
Very High	The proposed development will negatively significantly influence the current status of the feature.	+2	

Figure 9: The sensitivity matrix utilised for the sensitivity mapping process (as provided by EIMS)

Areas that were classified as having a *Least Concerned* sensitivity area those areas that have been modified as per google earth. The *Low* sensitivities are those areas which were deemed by the specialists to not have any spatial or desktop features that are considered ecologically important or sensitive (Figure 10). The areas assigned a *High* sensitivity are the region in which the CBA freshwater areas are located, while the *Very High* sensitivity was assigned to the CBA terrestrial areas.

It is important to note that these maps do not replace any local, provincial or government legislation relating to these areas or the land use capabilities or sensitivities of these environments. The maps are also not final as it is based on desktop data alone and will be adapted once the area has been ground truthed.

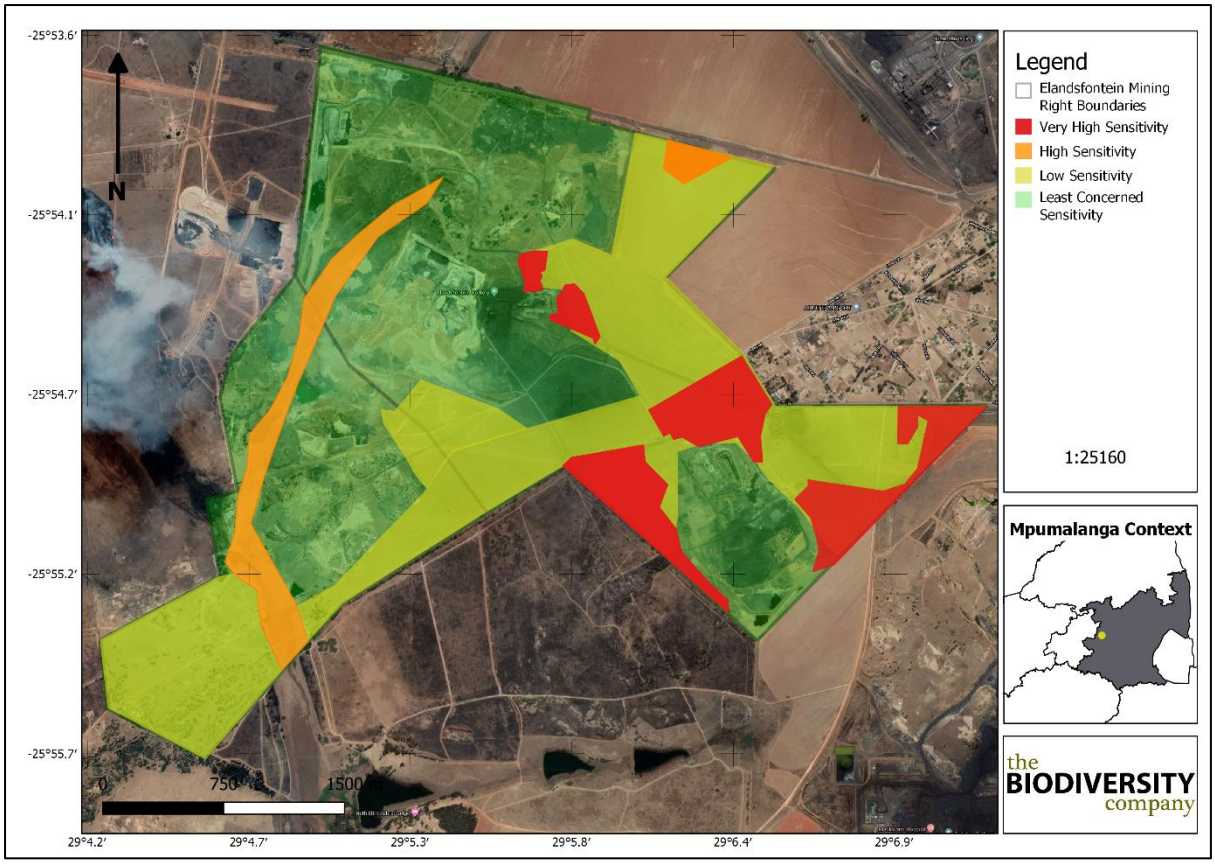

Figure 10: The desktop sensitivities of the project area

11 Impact Assessment

The impact assessment is based on the desktop assessment only, an infield survey must be conducted to confirm the desktop information.

11.1 Impact Assessment Methodology

The methodology used in determining the significance of potential environmental impacts relating to the Elandsfontein project was supplied by EIMS. The details of this methodology can be made available on request.

11.2 Planning Phase Impacts

The planning phase activities are considered a low risk as they typically involve desktop assessments and initial site inspections. This would include compiling of mine and waste management plans, obtaining of necessary permits, environmental and social impact assessments, characterisation of baseline site conditions, design of mine layouts and facilities and consultation with various contractors involved with a diversity of proposed project related activities going forward. Only one minor impact was assessed regarding the planning phase:

11.2.1 Temporary disturbance of wildlife due to increased human presence and possible use of machinery and/or vehicles.

As more vehicles will be driving in the area to survey various components of the project, the wildlife will be disturbed. The possible use of heavy machinery can also lead to the trampling of both vegetation and faunal species.

11.2.1.1 Mitigation Measures

The following mitigation measures were considered for the planning phase:

- Reduce the amount of people allowed on the property by making use of spatial data;
- Restrict vehicle access as much as possible; and
- Ensure someone is walking ahead of heavy machinery to chase up any faunal species.

11.3 Construction Phase

General impacts were considered for the new infrastructure as the layout still needs to be finalised and will thus only be considered in the final report.

11.3.1 Destruction, further loss and fragmentation of the vegetation community

The vegetation communities are classed as EN, though site clearing more of the vegetation communities will be lost. This will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion. Activities that will contribute to this impact:

- Driving/ moving outside of designated areas;
- Storing building materials in sensitive areas;
- Physical removal of vegetation;
- Soil dust precipitation;
- Water leakages;
- Dumping of waste products; and
- Random events such as fire (cooking fires or cigarettes).

11.3.1.1 Mitigation Measures

- The areas to be developed must be specifically demarcated to prevent movement of workers into sensitive surrounding environments.
- Areas of indigenous vegetation, even secondary communities outside of the direct mining footprint, should under no circumstances be fragmented or disturbed further or used as an area for the dumping of waste.
- Appropriate speed humps and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist.

- Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.

11.3.1.2 Cumulative Impacts

- Further loss of EN vegetation type; and
- Loss of habitat for species including migratory species.

11.3.1.3 Irreplaceable Loss of Resources

- Loss of CBA: Irreplaceable and CBA: optimal habitat; and
- Loss of SCC plant species.

11.3.1.4 Impacts on Alternatives Considered

No alternatives assessed as project infrastructure layout has not been finalised, this will be included in the final EIA report.

11.3.2 Introduction of alien species, especially plants

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. It can also contribute to the spreading of potentially dangerous diseases due to invasive and pest species. Overall the fauna assemblage will be changed. Activities that will contribute to this impact:

- Vegetation removal;
- Vehicles potentially spreading seed;
- Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive; and
- Construction of infrastructure suitable for breeding activities of alien and/or invasive birds.

11.3.2.1 Mitigation Measures

- The footprint area of the construction should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;
- An extensive alien plant management plan be compiled to remove all alien vegetation from within the project area; The use of herbicide needs to be monitored and only be used by a qualified person;
- Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site; and
- A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the likely presence of SCCs.

11.3.2.2 Cumulative Impacts

- Loss of habitat for indigenous species; and
- Spread of disease to surrounding areas.

11.3.2.3 Irreplaceable Loss of Resources

- Loss of CBA: Irreplaceable and CBA: optimal habitat;
- Loss of SCC plant species.

11.3.2.4 Impacts on Alternatives Considered

No alternatives assessed as project infrastructure layout has not been finalised, this will be included in the final EIA report.

11.3.3 Erosion due to storm water runoff

Erosion will lead to the loss of vegetation, the removal/ relocation of the topsoil and the destruction of habitat. Activities that will contribute to this impact:

- Storm water runoff from roads, and other paved areas;
- Vehicles driving outside demarcated areas;
- Footpaths outside demarcated areas;
- Clearing of vegetation; and
- Compacting of roads.

11.3.3.1 Mitigation Measures

- The areas to be developed must be specifically demarcated to prevent movement of workers into sensitive surrounding environments;
- Appropriate speed humps and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist;
- Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events;
- A storm water management plan must be compiled and implemented.

11.3.3.2 Cumulative Impacts

- Removal of topsoil; and
- Loss of habitat for indigenous species.

11.3.3.3 Irreplaceable Loss of Resources

- Loss of CBA area; and
- Loss of SCC plant species.

11.3.3.4 Impacts on Alternatives Considered

No alternatives assessed as project infrastructure layout has not been finalised, this will be included in the final EIA report.

11.3.4 Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, vibration and poaching).

Faunal community will be influenced in a number of ways, including the loss of their habitat, disturbances that will either make them move out of the area if possible or have to adapt and possible deaths due to physical harm or indirect harm from pollution. Activities that will contribute to this impact:

- Clearing of vegetation;
- Roadkill due to vehicle collision;
- Pollution of water resources due to dust effects and run-off;
- Intentional killing of fauna for food (hunting) or otherwise (killing of snakes); and
- Bird collisions with electrical lines.

11.3.4.1 Mitigation Measures

- The areas to be developed must be specifically demarcated to prevent movement of workers into sensitive surrounding environments;
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife;
- No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals;
- All laydown, storage and temporary infrastructure areas must be within the existing disturbed areas, and not within the adjacent grassland areas;
- During the construction phase, noise must be kept to an absolute minimum during the evenings and at night to minimise all possible disturbances to amphibian species and nocturnal mammals;
- Outside lighting should be designed to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas such as the wetland. Fluorescent and mercury vapour lighting should be avoided and sodium vapour (yellow) lights should be used wherever possible;

- No trapping, killing or poisoning of any wildlife is to be allowed;
- The intentional killing of any animals including snakes, insects, lizards, birds or other animals should be strictly prohibited;
- Based on the expected avifaunal species, bird strikes, and electrocutions will be a highly likely, bird flappers must be placed on the transmission line and the towers must be insulated to prevent electrocutions; and
- If any indigenous faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action.

11.3.4.2 Cumulative Impacts

- Loss of habitat for indigenous species.

11.3.4.3 Irreplaceable Loss of Resources

- Loss of faunal SCCs.

11.3.4.4 Impacts on Alternatives Considered

No alternatives assessed as project infrastructure layout has not been finalised, this will be included in the final EIA report.

11.4 Operational Phase

The following potential impacts were considered on biodiversity (including fauna and flora) based on the opencast and underground operations:

11.4.1 Opencast

The following impacts associated with the operational phase of the opencast section of the mining operation is for partially pre-existing pits.

11.4.1.1 Continued removal and fragmentation of EN vegetation communities, CBA: Irreplaceable and CBA: Optimal habitats and a Highest biodiversity importance area due to the creation of new open cast pits

The vegetation communities are classed as EN, CBA and “Highest importance area” though site clearing more of the vegetation communities will be lost. This will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion. Activities that will contribute to this impact:

- Physical removal of vegetation;
- Soil dust precipitation;
- Water leakages; and
- Dumping of waste products.

11.4.1.1.1 Mitigation Measures

- The areas to be mined must be specifically demarcated to prevent movement of workers into sensitive surrounding environments.
- Areas of indigenous vegetation, even secondary communities outside of the direct mining footprint, should under no circumstances be fragmented or disturbed further or used as an area for the dumping of waste.
- All removed soil and material must not be stockpiled within the watercourse and buffer. stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.
- Encouraged indigenous vegetation growth within the disturbed area to assist in erosion control.
- Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.

11.4.1.1.2 Cumulative Impacts

- Loss of habitat for indigenous species

11.4.1.1.3 Irreplaceable Loss of Resources

- Loss of SCC species.

11.4.1.1.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.4.1.2 Vegetation loss due to erosion and encroachment by alien invasive plant species

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. It can also contribute to the spreading of potentially dangerous diseases due to invasive and pest species. Overall the fauna assemblage will be changed. Erosion will also disrupt the vegetation in the surrounding areas and result in habitat loss. Activities that will contribute to this impact:

- Vegetation removal;
- Vehicles potentially spreading seed;
- Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive;
- Construction of infrastructure suitable for breeding activities of alien and/or invasive birds;
- Storm water runoff from roads, and other paved areas;

- Vehicles driving outside demarcated areas;
- Footpaths outside demarcated areas;
- Compacting of roads.

11.4.1.2.1 Mitigation Measures

- The footprint area of the opencast should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;
- An extensive alien plant management plan be compiled to remove all alien vegetation from within the project area; The use of herbicide needs to be monitored and only be used by a qualified person;
- Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site;
- Appropriate speed humps and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist;
- Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events; and
- A storm water management plan must be compiled and implemented.

11.4.1.2.2 Cumulative Impacts

- Loss of habitat; and
- Loss of indigenous flora species due to competition.

11.4.1.2.3 Irreplaceable Loss of Resources

- Loss of flora SCCs; and
- Loss of habitat and food sources for Fauna SCCs.

11.4.1.2.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.4.1.3 Potential leaks, discharges, pollutant from mining activities leaching into the surrounding environment

Acid mine draining leaching into the surrounding area will result in the loss of usable water resources, the loss of fauna and flora species.

Activities that will contribute to this impact:

- Loss of vegetation.

11.4.1.3.1 Mitigation Measures

- Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the surrounding environment; and
- The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly.

11.4.1.3.2 Cumulative Impacts

- Loss of usable water resources for fauna species; and
- Poisoning of species.

11.4.1.3.3 Irreplaceable Loss of Resources

- Loss of usable water resources for fauna species resulting in loss of SCC and other species.

11.4.1.3.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.4.1.4 Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).

Faunal community will be influenced in a number of ways, including the loss of their habitat, disturbances that will either make them move out of the area if possible or have to adapt and possible deaths due to physical harm or indirect harm from pollution.

Activities that will contribute to this impact:

- Clearing of vegetation;
- Roadkill due to vehicle collision;
- Pollution of water resources due to dust effects and run-off;
- Intentional killing of fauna for food (hunting) or otherwise (killing of snakes); and
- Bird collisions with electrical lines.

11.4.1.4.1 Mitigation Measures

- The areas to be developed must be specifically demarcated to prevent movement of workers into sensitive surrounding environments;
- All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife;

- No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals;
- All laydown, storage and temporary infrastructure areas must be within the existing disturbed areas, and not within the adjacent grassland areas;
- Outside lighting should be designed to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas such as the wetland. Fluorescent and mercury vapour lighting should be avoided and sodium vapour (yellow) lights should be used wherever possible;
- No trapping, killing or poisoning of any wildlife is to be allowed;
- The intentional killing of any animals including snakes, insects, lizards, birds or other animals should be strictly prohibited;
- Based on the expected avifaunal species, bird strikes, and electrocutions will be a highly likely, bird flappers must be placed on the transmission line and the towers must be insulated to prevent electrocutions; and
- If any indigenous faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action.

11.4.1.4.2 Cumulative Impacts

- Loss of suitable habitat.

11.4.1.4.3 Irreplaceable Loss of Resources

- Loss of faunal SCCs.

11.4.1.4.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.4.2 Underground

The following impacts is for the operational phase of the underground mining process;

11.4.2.1 Subsidence - negative impacts on availability of surface water for fauna. Catchment morphology and resultant modification to surface water baseflow and riverine habitat.

As subsidence will lower the surface area the likelihood that water will drain away faster exist resulting in a loss of surface water for faunal species. With the loss of the water the habitats will also change.

11.4.2.1.1 Mitigation Measures

- Follow the subsidence reports guidelines (Geomech Consulting (Pty) Ltd Report No. GEOM13-2019-003) on which areas can be undermined without a significant subsidence risk; and

- Monitor the surface water level on a monthly basis; ensuring that the water level does not decrease.

11.4.2.1.2 Cumulative Impacts

- Sink holes resulting in a total loss of habitat and becoming a risk for animal deaths.

11.4.2.1.3 Irreplaceable Loss of Resources

- Deaths of faunal species.

11.4.2.1.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.4.2.2 Subsidence - detrimental effects to habitat composition (including wetlands) and floral distribution due to changing groundwater dynamics.

As subsidence will lower the surface area the likelihood that water will drain away faster exist resulting in a loss of surface water for flora species. With the loss of the water the habitats will also change.

11.4.2.2.1 Mitigation Measures

- Follow the subsidence reports guidelines (Geomech Consulting (Pty) Ltd Report No. GEOM13-2019-003) on which areas can be undermined without a significant subsidence risk; and
- Monitor the surface water level on a monthly basis; ensuring that the water level does not decrease.

11.4.2.2.2 Cumulative Impacts

- Sink holes resulting in a total loss of habitat and becoming a risk for animal deaths.

11.4.2.2.3 Irreplaceable Loss of Resources

- Loss of flora species.

11.4.2.2.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.4.2.3 Subsidence - physical alteration of surface-level environment leading to negative impacts on habitats (including CBAs) and associated fauna.

Through the change of the surface level the overall layout of the habitat will be altered and depending on the level of subsidence smaller faunal species such as amphibians might be trapped in the subsidence area restricting their access to necessary resources.

11.4.2.3.1 Mitigation Measures

- Follow the subsidence reports guidelines (Geomech Consulting (Pty) Ltd Report No. GEOM13-2019-003) on which areas can be undermined without a significant subsidence risk; and
- Monitor the subsidence level on a monthly basis.

11.4.2.3.2 Cumulative Impacts

- Deaths of smaller faunal species.

11.4.2.3.3 Irreplaceable Loss of Resources

- Loss of faunal SCC species.

11.4.2.3.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.5 Decommissioning and Rehab/Closure Phase

The decommissioning will involve the removal of the surface infrastructure and the backfilling of the opencast pits. Followed by the rehabilitation of the area.

11.5.1 Opencast

The following impacts were considered for the decommissioning and rehab phase of the opencast area:

11.5.1.1 Continued encroachment of an indigenous and VU vegetation community by alien invasive plant species as well as erosion due to disturbed soils

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall the fauna assemblage will be changed. Erosion will also disrupt the vegetation in the surrounding areas and result in habitat loss. Activities that will contribute to this impact:

- Vehicles potentially spreading seed;
- Unsanitary conditions during infrastructure removal promoting the establishment of alien and/or invasive;
- Storm water runoff from roads, and other paved areas;
- Vehicles driving outside demarcated areas; and
- Footpaths outside demarcated areas.

11.5.1.1.1 Mitigation Measures

- The footprint area of the opencast should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;

- An extensive alien plant management plan be compiled to remove all alien vegetation from within the project area; The use of herbicide needs to be monitored and only be used by a qualified person;
- Appropriate speed humps and mitre drains must be constructed along the access roads (every three metres of elevation) in order to slow the flow of water run-off from the road surface, if this does not already exist;
- Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited;
- Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events;
- A storm water management plan must be compiled and implemented;
- Topsoil must be returned to the areas to ensure successful rehabilitation;
- Disturbed areas must be revegetated with indigenous grass species found in this vegetation type; and
- A fire management plan needs to be complied and implemented to restrict the impact fire might have on the rehabilitated area.

11.5.1.1.2 Cumulative Impacts

- Loss of habitat; and
- Loss of indigenous flora species due to competition.

11.5.1.1.3 Irreplaceable Loss of Resources

- Loss of flora SCCs; and
- Loss of habitat and food sources for Fauna SCCs.

11.5.1.1.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.5.1.2 Continued displacement and fragmentation of the faunal community (including threatened or protected species) due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).

During the decommissioning phase infrastructure will now be broken down, removed and disturbed. All these activities will have an impact on species that got adapted to these infrastructures in the project area, long term this will be beneficial but as the infrastructure are being removed this will disrupt the ecosystem. Activities that will contribute to this impact:

- Roadkill due to vehicle collision;
- Pollution of water resources due to dust effects and run-off; and

- Intentional killing of fauna for food (hunting) or otherwise (killing of snakes).

11.5.1.2.1 Mitigation Measures

- The areas to be decommissioned must be specifically demarcated to prevent movement of workers into sensitive surrounding environments;
- Speed limits must still be enforced to ensure that road killings and erosion is limited;
- No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals;
- The intentional killing of any animals including snakes, insects, lizards, birds or other animals should be strictly prohibited;
- If any indigenous faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action; and
- Sewage system must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.

11.5.1.2.2 Cumulative Impacts

- Loss of suitable habitat.

11.5.1.2.3 Irreplaceable Loss of Resources

- Loss of faunal SCCs.

11.5.1.2.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.5.2 Underground

The following impacts were considered for the decommissioning and rehabilitation phase of the underground operation:

11.5.2.1 Subsidence - negative impacts on availability of surface water for fauna

As subsidence will lower the surface area the likelihood that water will drain away faster exist resulting in a loss of surface water for faunal species. With the loss of the water the habitats will also change.

11.5.2.1.1 Mitigation Measures

- Follow the subsidence reports guidelines (Geomech Consulting (Pty) Ltd Report No. GEOM13-2019-003) on which areas can be undermined without a significant subsidence risk; and
- Monitor the surface water level on a monthly basis for 5 years after closure of mine; ensuring that the water level does not decrease, should subsidence take place an

action plan needs to be in place to ensure minimal deaths of faunal and flora SCC species.

11.5.2.1.2 Cumulative Impacts

- Sink holes resulting in a total loss of habitat and becoming a risk for animal deaths.

11.5.2.1.3 Irreplaceable Loss of Resources

- Deaths of faunal species.

11.5.2.1.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.5.2.2 Subsidence - detrimental effects to habitat composition and floral distribution due to changing groundwater dynamics

As subsidence will lower the surface area the likelihood that water will drain away faster exist resulting in a loss of surface water for flora species. With the loss of the water the habitats will also change.

11.5.2.2.1 Mitigation Measures

- Follow the subsidence reports guidelines (Geomech Consulting (Pty) Ltd Report No. GEOM13-2019-003) on which areas can be undermined without a significant subsidence risk; and
- Monitor the surface water level on a monthly basis for 5 years after closure of mine; ensuring that the water level does not decrease, should subsidence take place an action plan needs to be in place to ensure minimal deaths of faunal and flora SCC species.

11.5.2.2.2 Cumulative Impacts

- Sink holes resulting in a total loss of habitat and becoming a risk for animal deaths.

11.5.2.2.3 Irreplaceable Loss of Resources

- Loss of flora species

11.5.2.2.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

11.5.2.3 Subsidence - physical alteration of surface-level environment leading to negative impacts on habitats (including CBAs) and associated fauna.

Through the change of the surface level the overall layout of the habitat will be altered, and depending on the level of subsidence smaller faunal species such as amphibians might be trapped in the subsidence area restricting their access to necessary resources.

11.5.2.3.1 Mitigation Measures

- Follow the subsidence reports guidelines (Geomech Consulting (Pty) Ltd Report No. GEOM13-2019-003) on which areas can be undermined without a significant subsidence risk; and
- Monitor the surface water level on a monthly basis for 5 years after closure of mine; ensuring that the water level does not decrease, should subsidence take place an action plan needs to be in place to ensure minimal deaths of faunal and flora SCC species.

11.5.2.3.2 Cumulative Impacts

- Deaths of smaller faunal species.

11.5.2.3.3 Irreplaceable Loss of Resources

- Loss of faunal SCC species.

11.5.2.3.4 Impacts on Alternatives Considered

No alternatives assessed as project layout has not been finalised, this will be included in the final EIA report.

12 Conclusion

Based on the desktop ecological review the habitat has been altered however some natural does still exist. A number of species of conservation concern (SCCs) are expected to occur in the area, this increases the importance of the area as a habitat.

The following further conclusions were reached based on the results of this desktop assessment:

- Based on the Terrestrial CBA map, the project overlaps with CBA: Irreplaceable, CBA: Optimal, Moderately Modified Old Lands; and Heavily Modified Areas (HMA);
- The proposed project was superimposed on the terrestrial ecosystem threat status spatial data. According to this, the project area falls across one ecosystem, which is listed as VU;
- The prospecting area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development. Based on this the terrestrial ecosystems associated with the proposed prospecting area is rated as *poorly protected*;
- The prospecting area is situated across two vegetation types; Eastern Highveld Grassland and Rand Highveld Grassland vegetation type both of with are classed as EN;
- Based on the Plants of Southern Africa database, 311 plant species are expected in the project area, one (1) species are listed as being SCC;
- Based on the South African Bird Atlas Project, Version 2 (SABAP2) database 235 bird species are expected to occur in the vicinity of the prospecting area of which nine (9) species are listed as SCC either on a regional scale or international scale;
- Eighty mammal species are expected of which 16 are SCCs, while 73 reptile species are expected and 1 is a SCC and 26 amphibians are expected and 1 is a SCC; and
- Majority of the impacts had a moderate rating prior to mitigations, which were then decreased once mitigations are implemented, except for the removal of habitat due to the open cast mining and the loss of water resources for faunal species which are rated as high pre-mitigation and moderate post mitigation.

13 Terms of Reference for Final Study

13.1.1 Floristic Analysis

The fieldwork and sample sites will be placed within targeted areas (i.e. target sites) perceived as ecologically sensitive based on the preliminary interpretation of satellite imagery (Google Corporation) and GIS analysis (which included the latest applicable biodiversity datasets) available prior to the fieldwork. The focus of the fieldwork will therefore be to maximise coverage and navigate to each target site in the field in order to perform a rapid vegetation and ecological assessment at each sample site. Emphasis will be placed on sensitive habitats, especially those overlapping with proposed infrastructure development areas.

Homogenous vegetation units will be subjectively identified using satelite imagery and existing land cover maps. The floristic diversity and search for flora SCC will be conducted through timed meanders within representative habitat units delineated. Emphasis will be placed mostly on sensitive habitats overlapping with the proposed infrastructure areas.

The timed random meander method is a highly efficient method for conducting floristic analysis, specifically in detecting flora SCC and maximising floristic coverage. In addition, the method is time and cost effective and highly suited for compiling flora species lists and therefore gives a rapid indication of flora diversity. The timed meander search was performed based on the original technique described by Goff *et al.* (1982). Suitable habitat for SCC will be identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes will be made regarding current impacts (e.g. livestock grazing, erosion etc.), subjective recording of dominant vegetation species and any sensitive features (e.g. wetlands, outcrops etc.). In addition, opportunistic observations will be made while navigating through the project area. Effort will be made to cover all the different habitat types within the limits of time and access.

13.1.2 Faunal Assessment (Mammals & Avifauna)

The field survey component of the study utilised a variety of sampling techniques including, but not limited to, the following:

- Camera trapping (*Figure 11*);
- Visual observations;
- Small mammal trapping;
- Identification of tracks and signs; and
- Utilization of local knowledge.

Site selection for trapping will focus on the representative habitats within the project area. Sites will be selected on the basis of GIS mapping and Google Earth imagery and then final selection will be confirmed through ground truthing during the surveys. Habitat types that will be sampled include pristine, disturbed and semi-disturbed zones, drainage lines, wetlands and rocky ridges.

Figure 11: A) Hand Searches, B) Active Searching, C & D) Camera Traps and E) Photography for Avifauna Assessments

13.1.3 Herpetology (Reptiles & Amphibians)

A herpetofauna assessment of the project area will be conducted, including in-depth, site-specific research and focused searching. Ideally, surveys for herpetofauna will be conducted at those times when the target species or communities are known to be active because these periods of activity are more likely to lead to capture success (for most species). In South Africa this is during the summer months and ideally after or during periods when rainfall is most likely or has recently occurred.

Surveys will be conducted in each habitat or vegetation type within the project area, as identified from the desktop study, with a focus on those areas which will be most impacted by the proposed development (i.e. the infrastructure development and waste dumping areas).

The herpetological field survey will comprise of the following techniques:

- Diurnal hand searches - are used for reptile species that shelter in or under particular microhabitats (typically rocks, exfoliating rock outcrops, fallen timber, leaf litter, bark etc.);
- Visual searches - typically undertaken for species whose behaviour involves surface activity or for species that are difficult to detect by hand-searches or pitfall trapping. may include walking transects or using binoculars to view species from a distance without them being disturbed;
- Amphibians – many of the survey techniques listed above will be able to detect species of amphibians. Over and above these techniques, vocalisation sampling techniques are often the best to detect the presence of amphibians as each species has a distinct call; and
- Opportunistic sampling - Reptiles, especially snakes, are incredibly illusive and difficult to observe. Consequently, all possible opportunities to observe reptiles are taken, in order to augment the standard sampling procedures described above. This will include

talking to local people and staff at the site and reviewing photographs of reptiles and amphibians that the other biodiversity specialists may come across while on site.

14 References

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15 Appendices

Appendix A: Specialist declarations

DECLARATION

I, Martinus Erasmus, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

November 2019

DECLARATION

I, Lindi Steyn, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Lindi Steyn

Terrestrial Ecologist

The Biodiversity Company

November 2019