Environmental Impact Assessment - for the Proposed Elandsfontein Coal Mining Project

Mpumalanga Province, South Africa

Biodiversity Assessment

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CLIENT

Prepared by:

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Report Name	**Environmental Impact Assessment - for the Proposed Elandsfontein Coal Mining Project**
Submitted to	EIMS ENVIRONMENTAL IMPACT MANAGEMENT SERVICES
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 Writer / 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.

EXECUTIVE SUMMARY

GNR 326	Appendix 6 (n): Specialist Opinion

It is the opinion of the specialists that no fatal flaws were identified for the project. The Elandsfontein project, may be favourably considered should the infrastructure be moved to outside of the wetland habitat. Underground mining is the preference for the project, but open cast mining that adheres to the recommendations and mitigation measures prescribed herein is permissible.

The Elandsfontein Colliery comprises of two mining rights (MR63 and MR314). The applicant plans to combine these two MRAs into one single MRA with associated consolidated Environmental Management Programme (EMPR). In addition, the applicant plans to expand current mining areas and include new open cast and underground mining areas as well as proposed surface infrastructure, stockpiles and the related activities.

The purpose of the specialist study is to provide relevant input into the authorisation process and to provide a report for the proposed activities associated with mining and ancillary activities proposed to take place on site.

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1 Introduction

The Elandsfontein Colliery comprises of two mining rights (MR63 and MR314). The applicant plans to combine these two MRAs into one single MRA with associated consolidated Environmental Management Programme (EMPR). In addition, the applicant plans to expand current mining areas and include new open cast and underground mining areas.

The purpose of the specialist study is to provide relevant input into the authorisation process and to provide a report for the proposed activities associated with mining and ancillary activities proposed to take place on site.

The purpose of the specialist study is to provide relevant input into the EIA process and to provide a report for the proposed activities associated with open cast and underground mining. This report, after taking into consideration the findings and recommendations provided by the specialist herein, should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Study Protocols

The wetland assessment has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation”

According to the National Web based Environmental Screening Tool the animal themed biodiversity is Low sensitivity, with the plant species theme sensitivity Medium for most of the project area. The overall terrestrial biodiversity theme for the area is classified as very high sensitivity (Figure 1-1

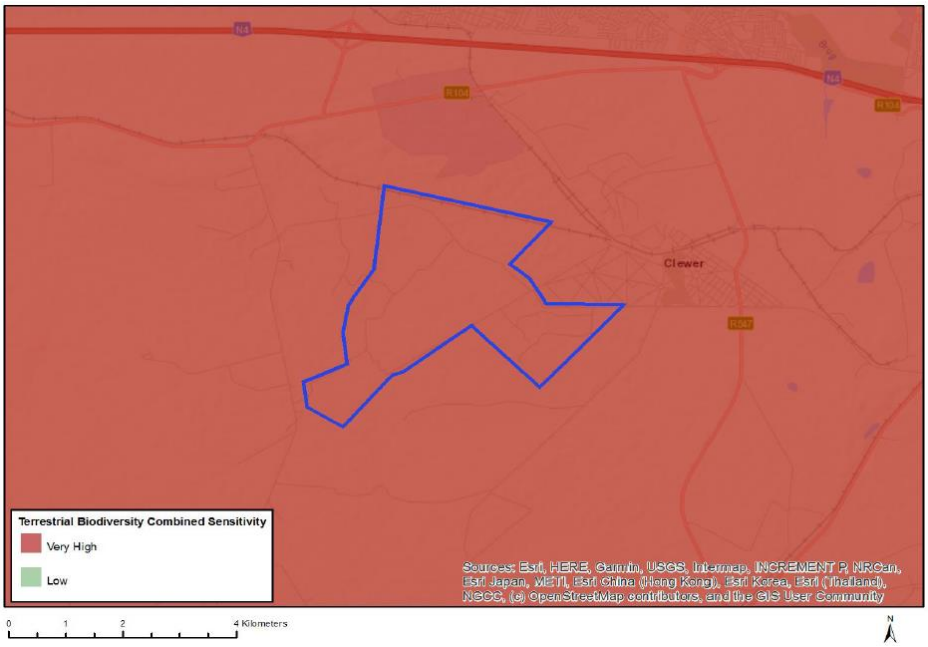

Figure 1-1 Map of relative biodiversity theme sensitivity

2 Document Structure

The table below provides the NEMA (2014) Requirements for Ecological Assessments, and also the relevant sections in the reports where these requirements are addressed

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
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 7 & 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 9
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;	Section 8.2.2
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 7
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;	Section 8.3
Appendix 6(1)(g):	An identification of any areas to be avoided, including buffers;	Section 8.3 & 10
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;	Section 8.3
Appendix 6(1)(i):	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 12
Appendix 6(1)(j):	A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 11
Appendix 6(1)(k):	Any mitigation measures for inclusion in the empr;	Section 10
Appendix 6(1)(l):	Any conditions for inclusion in the environmental authorisation;	Section 11
Appendix 6(1)(m):	Any monitoring requirements for inclusion in the empr or environmental authorisation;	Section 9 & 10
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;	Section 11
Appendix 6(1)(o):	A description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A
Appendix 6(1)(p):	A summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
Appendix 6(1)(q):	Any other information requested by the competent authority.	N/A

3 Specialist Details

3.1 Report Writer and Fieldwork

Martinus Erasmus

Martinus Erasmus Cand. Sci Nat registered in ecological science and 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.

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.

3.2 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.

4 Terms of Reference

The Terms of Reference (ToR) included the following:

- 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; and
- Impact assessment, mitigation and rehabilitation measures to prevent or reduce the possible impacts as per the study.

5 Project Description

5.1 Project area

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 dominant land uses surrounding the project area includes watercourses, cultivation, urban sprawls and mining. A locality map of the project area is shown in Figure 5-1.

5.2 Background

Elandsfontein Colliery is an existing mine with opencast and underground sections. Elandsfontein Colliery holds two mining rights, namely MP 314 MR (~593 ha) and MP 63 MR (~237 ha). It produces coal for the local and the export market, at a rate of ~500 000 tons/annum. Coal has been produced historically from the No. 1 Seam (underground bord and pillar operation) and an opencast operation on the No. 4 Seam and on the No. 2 Seam.

The roll over strip mining method is utilised to extract coal from the shallower No.2 coal seam. The existing opencast operations have an approximate extent of 257 ha (some of this area has already been mined and other areas are currently being mined in accordance with the previous approved mine plan) while the applicant wishes to authorise an additional 69.47 ha of opencast mining. Deeper coal will be extracted by underground bord and pillar mining using decline shafts to access the No. 1 coal seam. The historical underground footprint covers an approximate area of 182 ha, while Elandsfontein Colliery wishes to authorise an additional 485 ha of underground mining and 249 ha of opencast mining. Associated infrastructure consists of a discard dump, coal RoM stockpiles, overburden stockpiles, pollution control dams (PCD) and slurry dam.

Elandsfontein Colliery is planning to add additional opencast and underground mining areas within the existing mining right areas to extend the life-of-mine (LoM). As such a MPRDA S102 amendment process is being undertaken by the mine, supported by the integrated EIA/WML and WULA applications. The EIA process will result in a consolidation of the numerous authorisation processes that have been undertaken to date to produce a single overarching EMPr for holistic management of the Colliery going forward. Elandsfontein Colliery will be applying for the relevant approvals to cover their extended LoM which will include future opencast and underground mining operations and associated infrastructure. Various amendments to the existing EA/EMP as well as IWUL will also be applied for to align the specific conditions with the current status of the mine as well as to provide more clarity on certain conditions.

The following rights, authorisations and approvals are currently in place and have been considered in the compilation of the report:

- Mining Right 63 MR renewal, granted to Elandsfontein Colliery (Pty) Ltd, in terms of Section 24 (3) of the MPRDA on 6 August 2019 which covers the following portions of

the farm Elandsfontein 309 JS: Portion of the RE of Portion 6, Portion of the RE of Portion 8 and RE of Portion 1.

- Mining Right 314 MR renewal, granted to Elandsfontein Colliery (Pty) Ltd, in terms of Section 24 (3) of the MPRDA on 6 August 2019 which covering the following portions of the farm Elandsfontein 309 JS: RE of Portion 7, Portion of the RE of Portion 8, Portion 44 and Portion 14;
- An amended EMPr dated August 2017;
- Approved IWUL, File No. 16/2/7/B100/C11 granted on 20 October 2015 for various S21 (g), (c) and (i) which covers Portions 1, 7, 8 and 14 of Elandsfontein 309 JS (amended 23 July 2019).

The existing approved surface infrastructure at Elandsfontein Colliery consists of the following:

- Opencast pit;
- Underground mining areas;
- Stockpiles;
- Offices;
- Beneficiation Plant area (crushing and screening);
- Contractors yard;
- Weighbridge;
- Access and haul roads;
- Security point and fencing;
- Pumps and sumps;
- Clean water trenches;
- Dirty water trenches;
- 3 PCD's; and
- Storm water control trenches.

5.3 Description of Activities to Be Undertaken

This section describes the current authorization process activities as provided. The proposed project includes inter alia the following application processes with associated activities:

- New Integrated Environmental Authorisation (Scoping and Environmental Impact Report (S&EIR)) for:
    - New opencast and underground mining areas;
    - New PCDs and stormwater management infrastructure;

  - New residue deposits and/or residue stockpiles (requiring Waste Management Licence); and
  - Various activities including the primary processing of a mineral resource related to the extended LoM.

- Renewal of Integrated Water Use Licence (IWUL) and application for new water uses for:
  - Residue stockpiles/deposits;
  - Dewatering of pits and underground areas;
  - New PCD's and stormwater management infrastructure; and
  - GN704 exemptions.
- MPRDA Section 102 Amendment:
  - Revised Mine Works Programme;
  - Revised Social and Labour Plan;
  - Revised Regulation 2.2 Plan; and
  - Revised consolidated EMPr.

The proposed mining can be seen in Figure 5-2 whereas the proposed surface infrastructure, stockpiles and the related activities can be seen in Figure 5-3.

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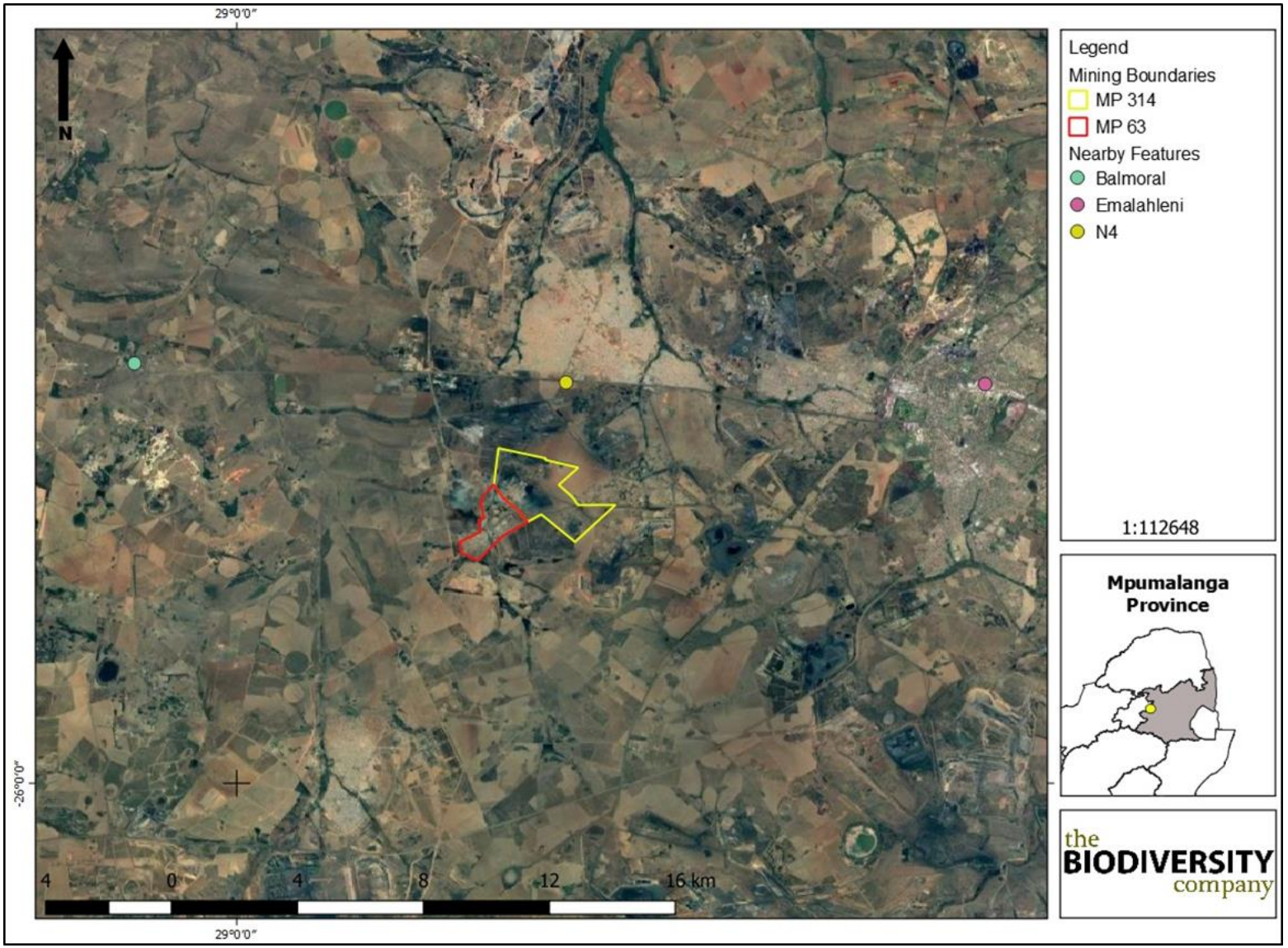

Figure 5-1 Locality of the project area

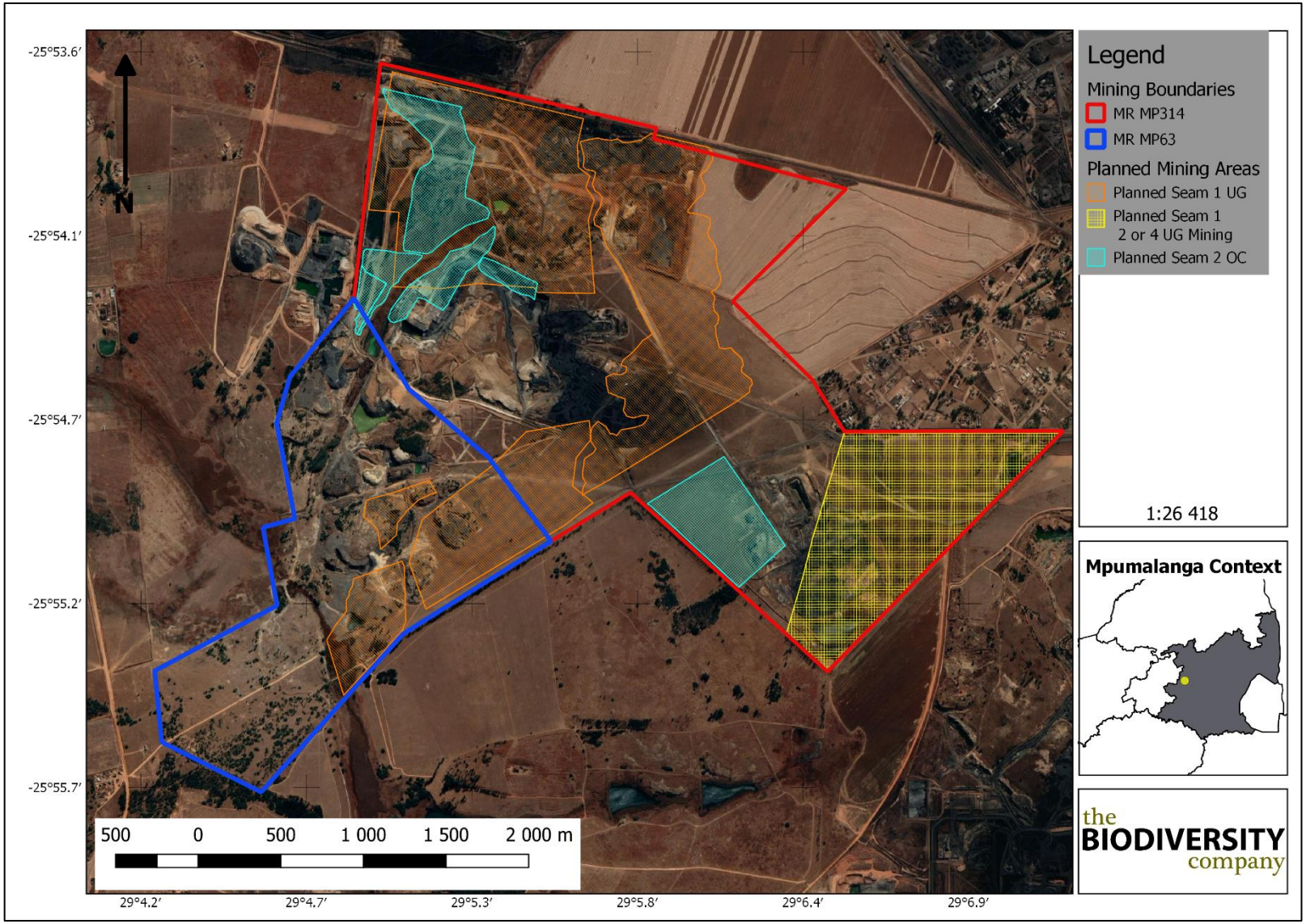

Figure 5-2 The extent of proposed open cast and underground mining areas

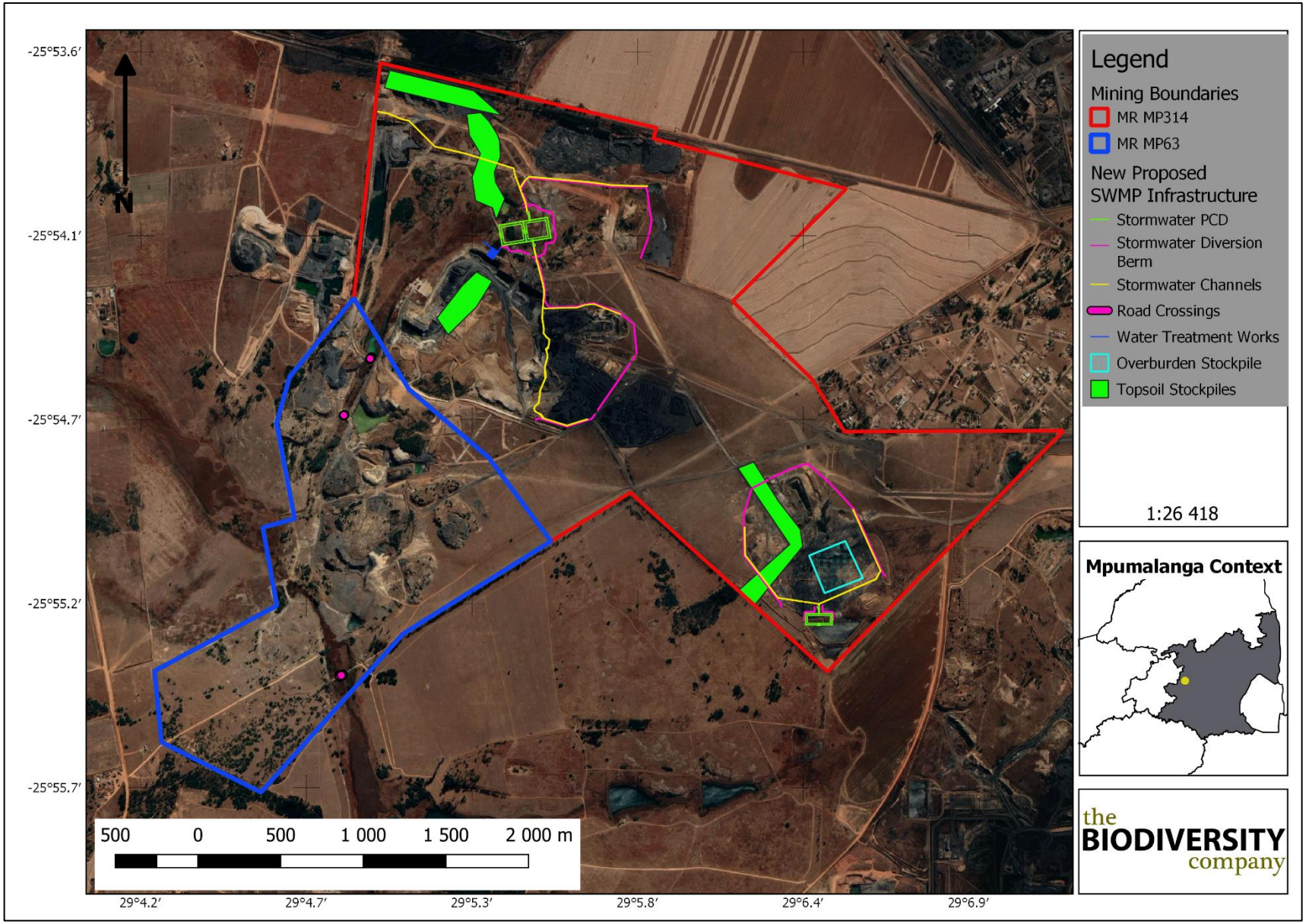

Figure 5-3 Layout map indicating new stormwater management infrastructure

6 Legislative and Policy Framework

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 6-1).

Table 6-1 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 Methodologies

7.1 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);
- Vegetation Map of South Africa, Lesotho and Swaziland (Mucina *et al.,* 2007);
- Mpumalanga Biodiversity Sector Plan (MBSP) Terrestrial Assessment 2014 (MTPA, 2014);
- MBSP Landcover 2010 (MTPA, 2010);
- Department of Environmental Affairs (DEA) National Landcover 2015 (DEA, 2015); and
- Mining and Biodiversity Guideline (SANBI & SAMBF 2012).

Brief descriptions of the standardised methodologies applied in each of the specialist disciplines are provided below. More detailed descriptions of survey methodologies are available upon request.

7.2 Botanical Assessment

The botanical study encompassed an 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. Relevant field guides and texts consulted for identification purposes in the field during the surveys included the following:

- Field Guide to the Wild Flowers of the Highveld (Van Wyk & Malan, 1997);
- A field guide to Wild flowers (Pooley, 1998);
- Guide to Grasses of Southern Africa (Van Oudtshoorn, 1999);
- Orchids of South Africa (Johnson & Bytebier, 2015);
- Guide to the Aloes of South Africa (Van Wyk & Smith, 2014);
- Mesembs of the World (Smith *et al.,* 1998);
- Medicinal Plants of South Africa (Van Wyk *et al.,* 2013);

- Freshwater Life: A field guide to the plants and animals of southern Africa (Griffiths & Day, 2016); and
- Identification guide to southern African grasses. An identification manual with keys, descriptions and distributions (Fish *et al.,* 2015).

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).

The field work methodology included the following survey techniques:

- Timed meanders;
- Sensitivity analysis based on structural and species diversity; and
- Identification of floral red-data species.

7.2.1 Floristic Analysis

The wet season fieldwork and sample sites were 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 was therefore 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 was placed on sensitive habitats, especially those overlapping with proposed infrastructure development areas.

Homogenous vegetation units were subjectively identified using satelite imagery and existing land cover maps. The floristic diversity and search for flora SCC were conducted through timed meanders within representative habitat units delineated during the scoping fieldwork. Emphasis was 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 were identified according to Raimondo *et al.* (2009) and targeted as part of the timed meanders.

At each sample site notes were 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 were made while navigating through the project area. Effort was made to cover all the different habitat types within the limits of time and access. The geographic location of sample sites and site coverage are shown under the Results section.

7.3 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).

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

- Camera trapping;
- Visual observations;
- Small mammal trapping;
- Identification of tracks and signs; and
- Utilization of local knowledge.

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

7.4 Herpetology (Reptiles & Amphibians)

A herpetofauna desktop 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).

A herpetofauna field assessment were 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 comprised the following techniques:

- Hand searching is used for reptile species that shelter in or under particular habitats. Visual searches, typically undertaken for species with activities that occur on surfaces or for species that are difficult to detect by hand-searches or trap sampling.

8 Receiving Environment

8.1 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 8-1.

Table 8-1 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). **The Environmental Screening Tool identified CBAs as features for the area**	8.1
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	8.1.2.1
Ecosystem Protection Level	The terrestrial ecosystems associated with the development are rated as *not protected* for the entire project area.	8.1.2.2
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.	8.1.3
Mining and Biodiversity Guidelines	Majority of the project area fall in areas classified as "highest biodiversity importance" and "moderate biodiversity importance".	8.1.4
Important Bird and Biodiversity Areas	The project area is approximately 45km away from the Loskop Dam Nature Reserve IBA	-

8.1.1 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 8-1 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).

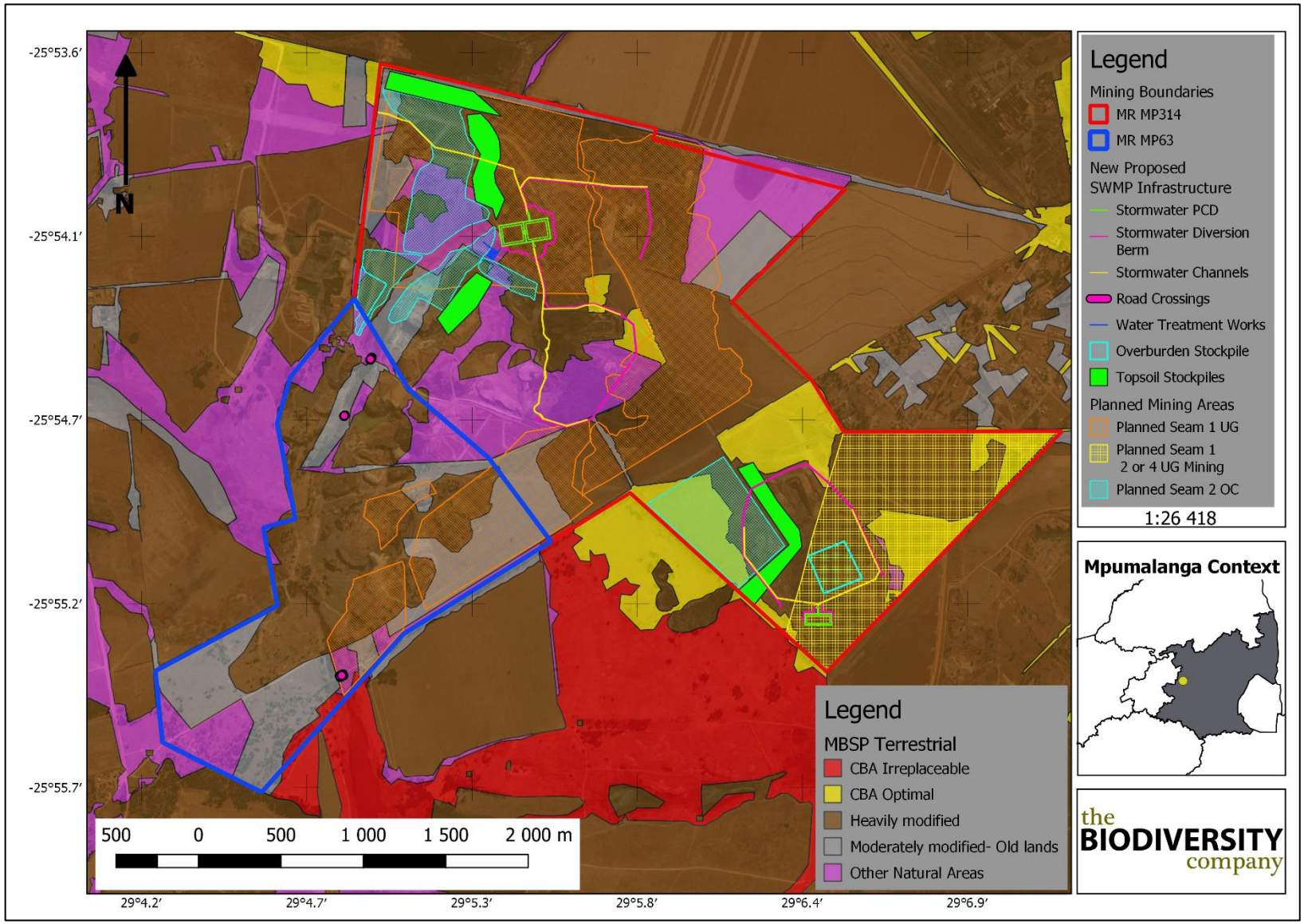

Figure 8-1 Elandsfontein project area superimposed on the MSBP (MTPA, 2014)

8.1.2 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).

8.1.2.1 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 8-2). As seen in this figure, the project area is situated within an ecosystem that are listed as VU (Figure 8-2).

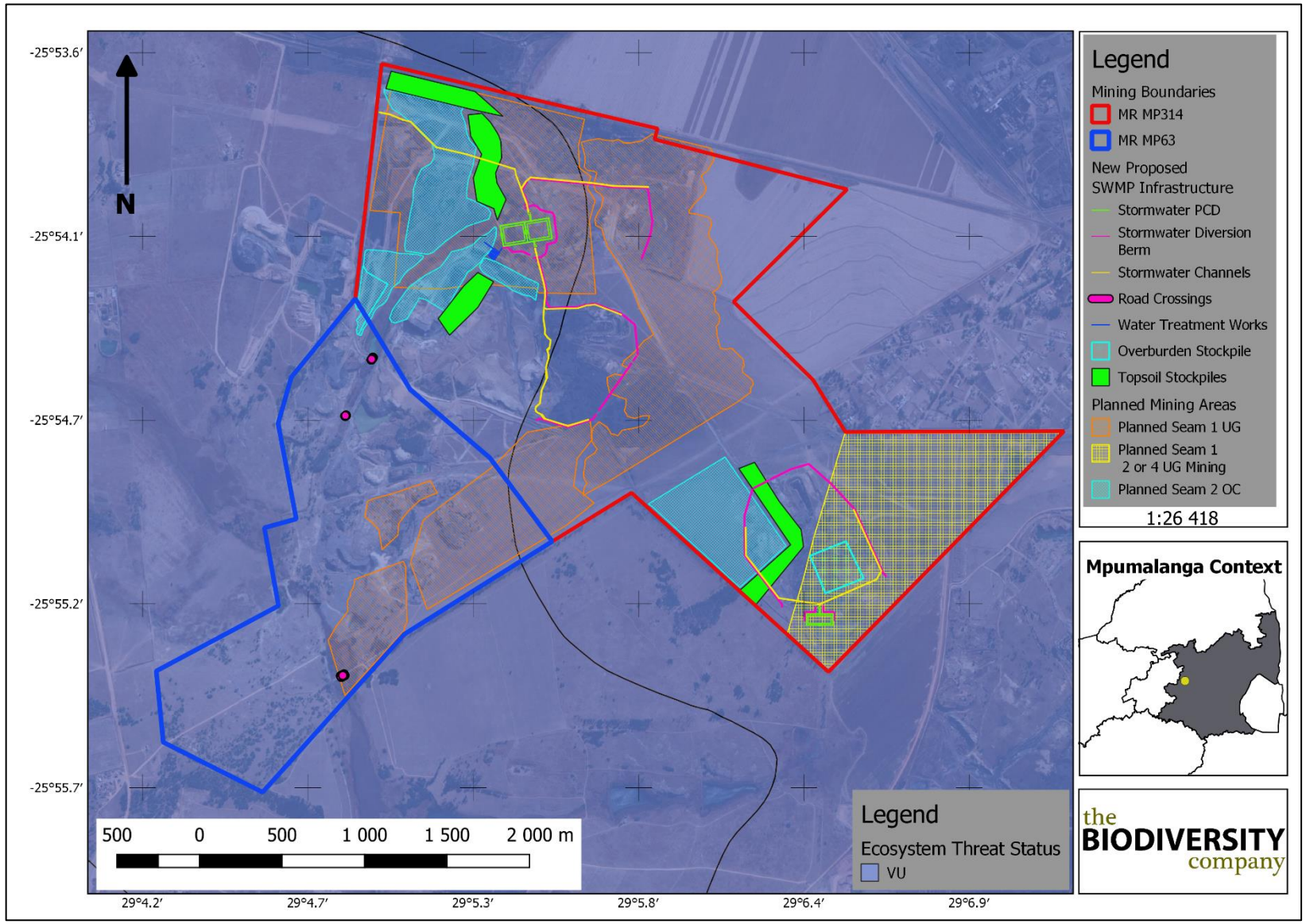

Figure 8-2 Elandsfontein project area showing the regional ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018)

8.1.2.2 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 8-3). Based on Figure 8-3 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.

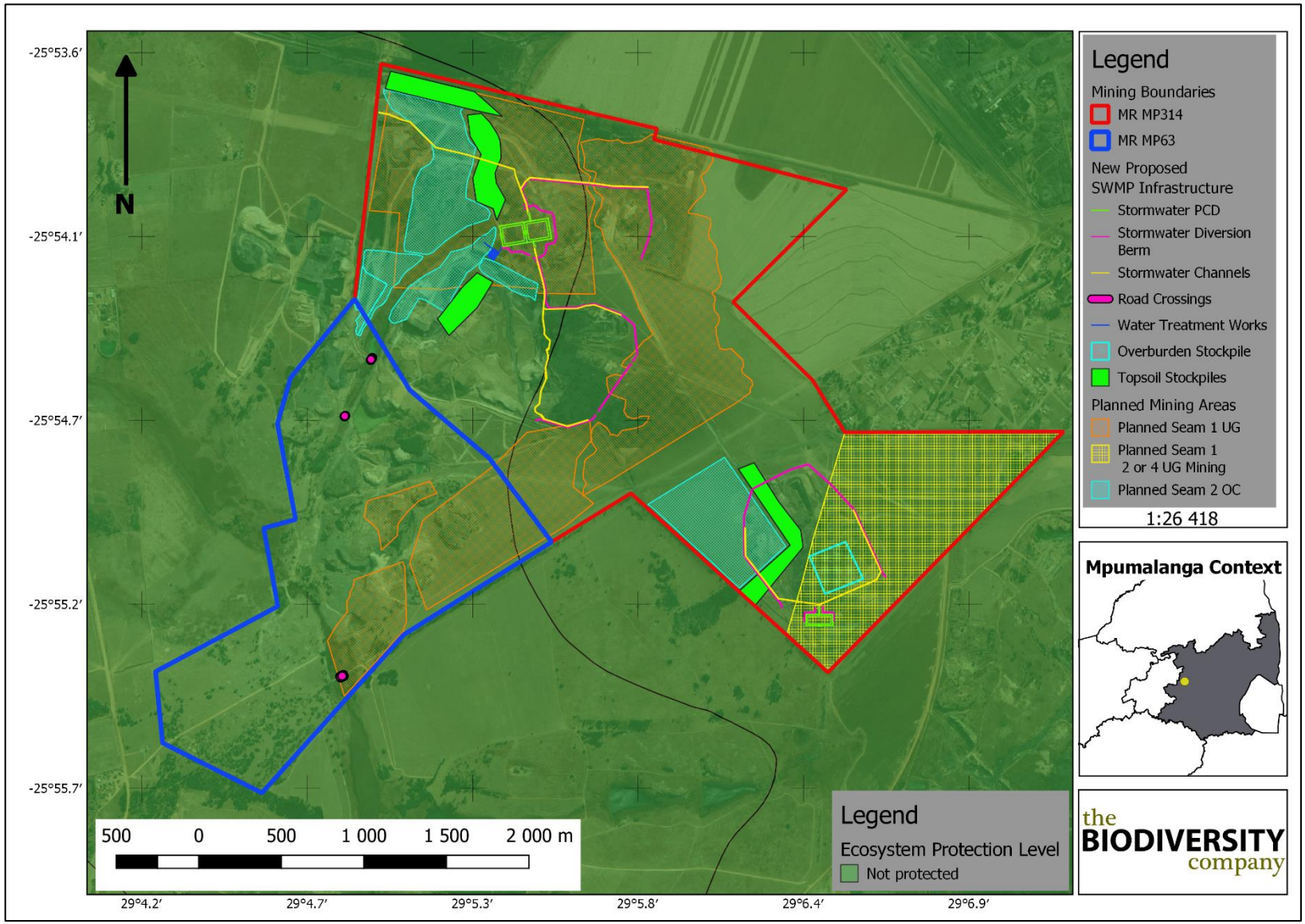

Figure 8-3 Elandsfontein project area showing the regional level of protection of terrestrial ecosystems (NBA, 2018)

8.1.3 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 8-4 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.

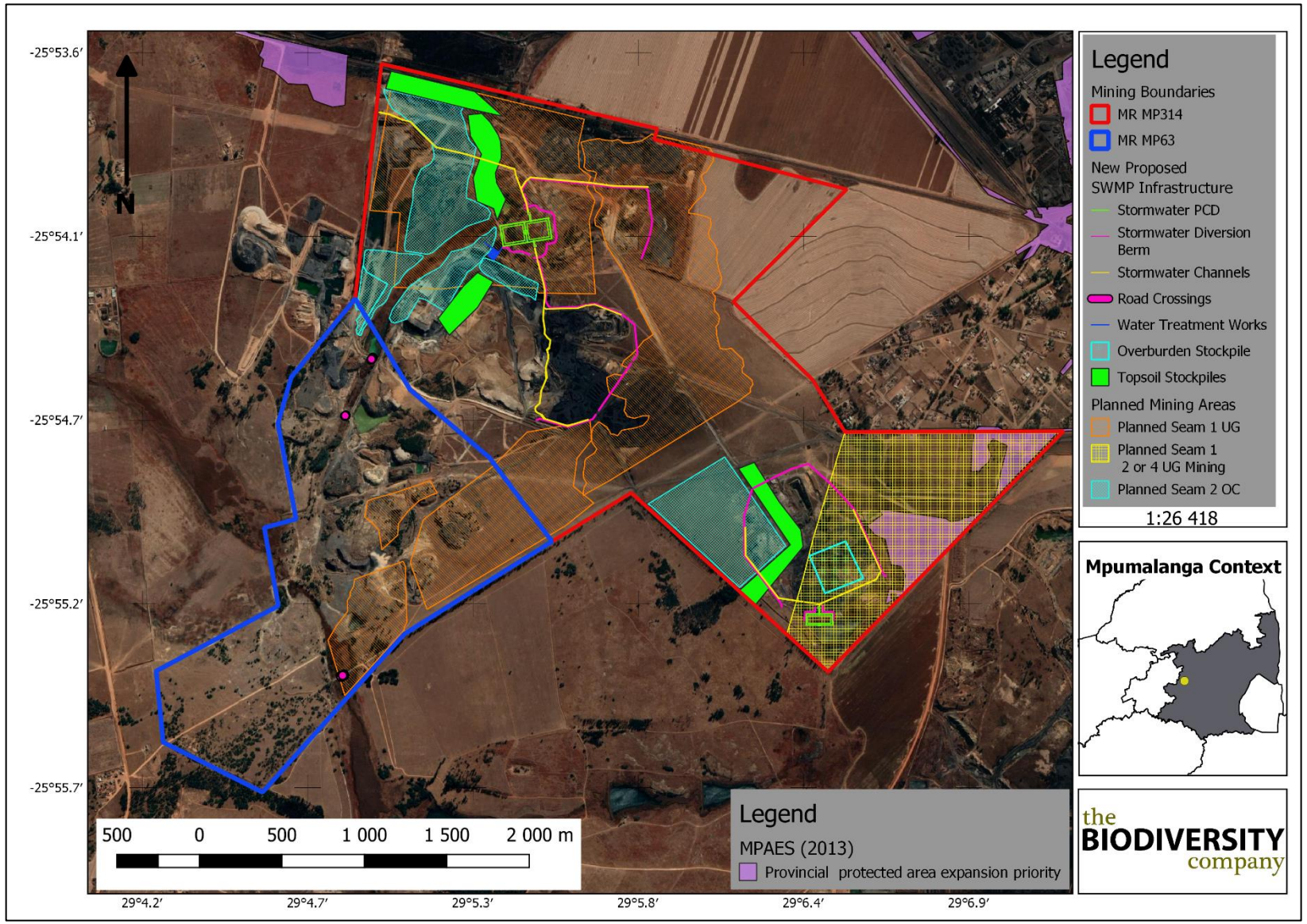

Figure 8-4 The project area in relation the MPAES (MPAES, 2013)

8.1.4 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 8-2 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 8-2 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.

8.2 Results and discussion

8.2.1 Desktop Assessment

8.2.1.1 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.

8.2.1.1.1 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 8-5).

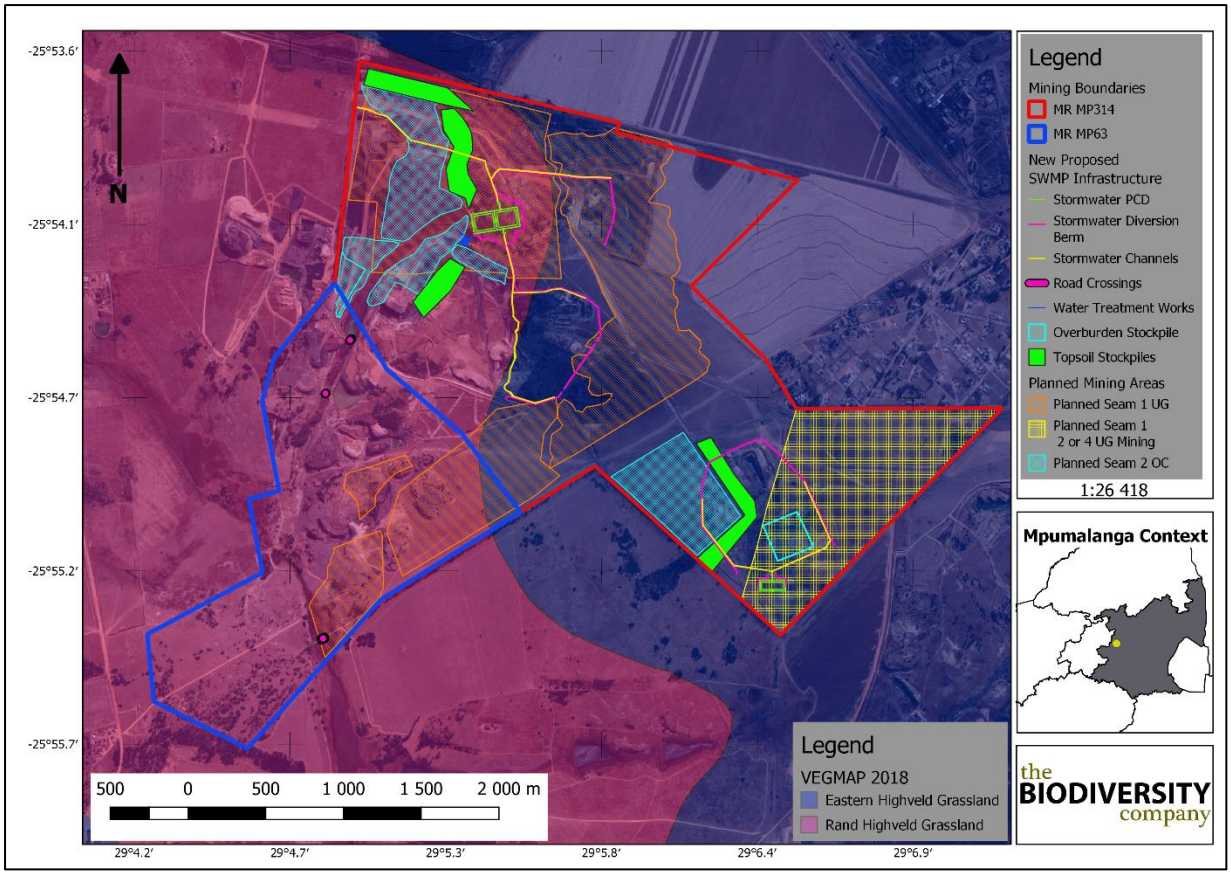

Figure 8-5 The project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)Eastern Highveld Grassland

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.

8.2.1.1.2 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.

8.2.1.1.3 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 8-6).

Of these 311 plant species (Appendix B), one (1) species are listed as being Species of Conservation Concern (SCC) (Table 8-3*)*.

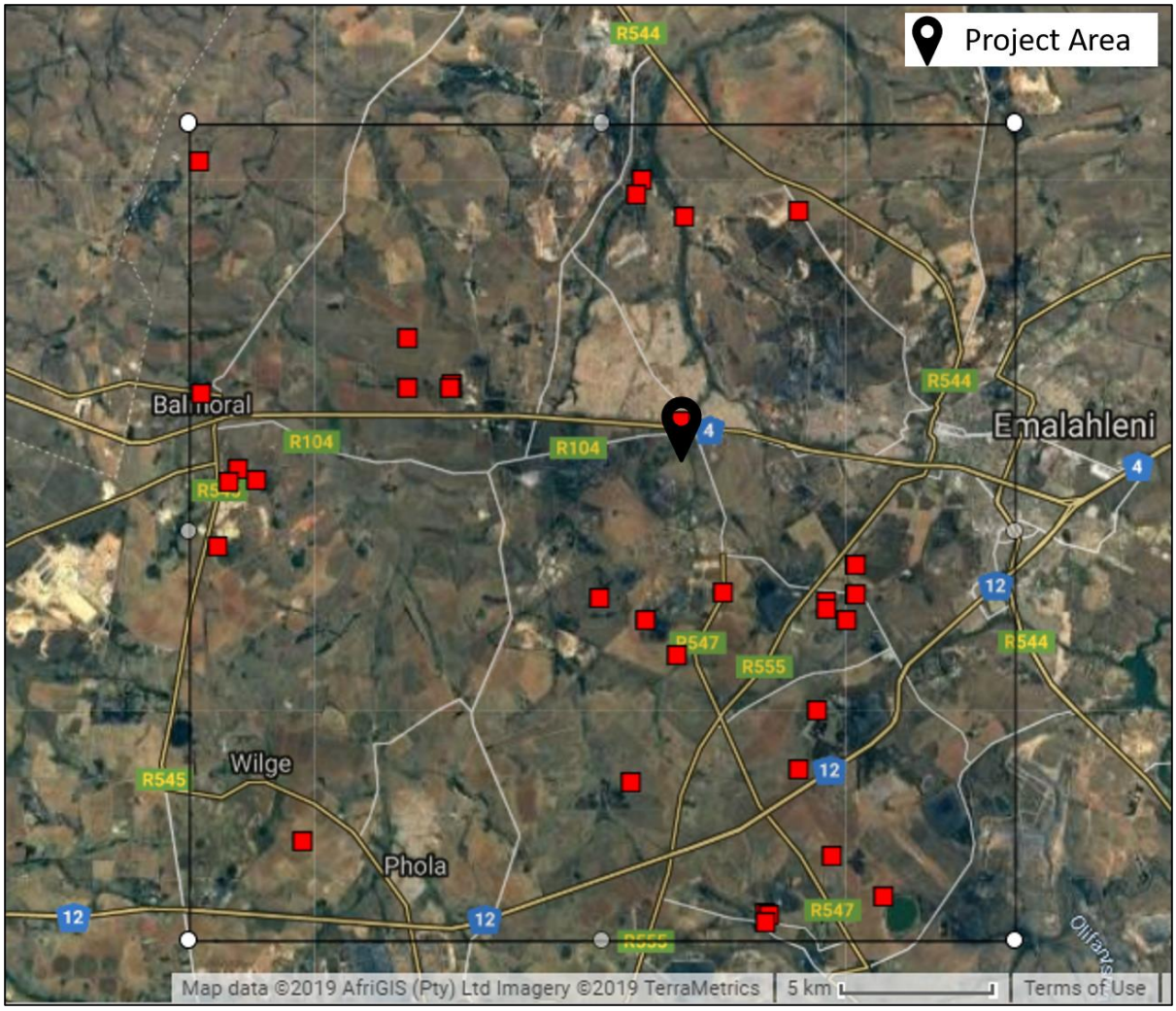

Figure 8-6 showing the grid drawn in order to compile an expected plant species list (BODATSA-POSA, 2019)

Table 8-3 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.

8.2.1.2 Faunal Assessment

8.2.1.2.1 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 C.

Of the potential bird species, nine (9) species are listed as SCC either on a regional or global scale (Table 8-4).

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 8-4).

Table 8-4 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 cannot 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.

8.2.1.2.2 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 (Appendix D).

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 8-5).

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 8-5).

Table 8-5 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.

8.2.1.2.3 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 (Appendix E). 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 (Appendix F). One amphibian SCCs should be present

in the project area (Table 8-6) according to the above-mentioned sources but *in situ* confirmation is required.

Table 8-6 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.

8.2.2 Field Survey

The field survey for the Elandsfontein project (flora and fauna (mammals, avifauna, amphibians and reptiles)) was conducted on the 5th of March 2020 and 18th of March 2020 by terrestrial ecologists. During the surveys the floral and faunal communities in the project area were assessed. The project area was ground-truthed on foot, which included spot checks in pre-selected areas to validate desktop data. Photographs were recorded during the site visits and some are provided under the Results section in this report. All site photographs are available on request.

8.2.2.1 Flora Assessment

8.2.2.1.1 Floristic Analysis

A total of 66 plant species were recorded during fieldwork (

Table 8-7), some plant species observed within the project area can be seen in Figure 8-7. Meanders were limited to the habitats that appeared to have the highest potential to contain SCC (desktop habitat assessment and the judgement of the ecologists). In addition to the targeted timed meander searches, random meanders were conducted across the project area and spot observations of plant species not recorded during the targeted timed meanders were recorded *ad hoc*.

Table 8-7 Trees, shrubs and weeds recorded in the project area

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
Acacia mearnsii	Black Wattle			NEMBA Category 2
Aristida congesta subsp. barbicollis	Spreading Three Awn	LC	Not Endemic	
Aristida congesta subsp. congesta	Tassel Three-awned Grass	LC	Not Endemic	
Aristida junciformis	Gongoni Three-awn	LC	Not Endemic	
Berkheya echinacea	Iphungula (z)	LC	Not Endemic	
Bidens pilosa	Blackjack			Naturalised; Invasive
Campuloclinium macrocephalum	Pom Pom Weed			NEMBA Category 1b.
Chamaecrista comosa	Trailing Dwarf Cassia	LC	Not Endemic	
Cirsium vulgare	Spear Thistle			NEMBA Category 1b.
Conyza bonariensis	Hairy Fleabane			Not indigenous; Naturalised
Cortaderia selloana	Pampas grass			NEMBA Category 1b.
Cucumis zeyheri	Wild Cucumber	LC	Not Endemic	
Cynodon dactylon	Couch Grass, Quick Grass	LC	Not Endemic	
Datura ferox	Large Thorn Apple			NEMBA Category 1b.
Datura stramonium	Common Thorn Apple			NEMBA Category 1b.
Dicoma anomala	Aambeibos	LC	Not Endemic	
Digitaria eriantha	Finger Grass	LC	Not Endemic	
Eleusine coracana	Finger millet			Naturalised; Invasive
Eragrostis chloromelas	Blue Love Grass	LC	Not Endemic	
Eragrostis curvula	Weeping Love Grass	LC	Not Endemic	
Eragrostis plana	Taaipol-Eragrostis	LC	Not Endemic	
Eucalyptus camaldulensis	Red River Gum			NEMBA Category 1b
Felicia mossamedensis	Yellow Felicia	LC	Not Endemic	
Felicia muricata	Wild Aster	LC	Not Endemic	
Gomphocarpus fruticosus subsp. fruticosus	Cotton Milkweed	LC	Not Endemic	
Gomphrena celosioides	Bachelor's button			Naturalised; Invasive
Helichrysum nudifolium var. nudifolium	Wild Tea	LC	Not Endemic	
Helichrysum rugulosum	Marotole (SS)	LC	Not Endemic	
Heliophila rigidiuscula	Blue Cress, Grassland	LC	Not Endemic	
Hyparrhenia hirta	Common Thatching Grass	LC	Not Endemic	
Hypoxis rigidula var. rigidula	Silver-leaved Star-flower	LC	Not Endemic	
Ledebouria ovatifolia	Flat-Leaved African hyacinth	LC	Endemic	
Lopholaena coriifolia	Leather-leaved Fluff-bush	LC	Not Endemic	

Melia azedarach	"Syringa", Persian Lilac			NEMBA Category 1b.
Melinis nerviglumis	Bristle-Leaved Red-Top Grass	LC	Indigenous, Not Endemic	
Melinis repens	Natal Red Top	LC	Not Endemic	
Morus alba	Common Mulberry		Not Endemic	NEMBA Category 3
Panicum maximum	Guinea Grass	LC	Indigenous, Not Endemic	
Paspalum dilatatum	Dallis Grass			Naturalised; Invasive
Paspalum notatum	Bahia grass	LC	Not Endemic	
Paspalum urvillei	Vasey Grass			Naturalised; Invasive
Pennisetum clandestinum	Kikuyu Grass			NEMBA Category 1b in protected areas and wetlands.
Phragmites australis	Common Reed	LC	Not Endemic	
Phytolacca octandra	Forest Inkberry			
Pogonarthria squarrosa	Herringbone Grass	LC	Not Endemic	
Populus alba	White popular			NEMBA Category 2
Richardia brasiliensis	Mexican clover			Naturalised; Invasive
Schinus terebinthifolius	Brazilian Pepper Tree			Not Indigenous
Schkuhria pinnata	Dwarf Marigold			Naturalized exotic weed
Searsia lancea	Karee	LC	Not Endemic	
Selago densiflora		LC	Not Endemic	
Senecio inornatus	Tall marsh senecio	LC	Not Endemic	
Sida cordifolia	Flannel Weed	LC	Not Endemic	
Solanum mauritianum	Bugweed			NEMBA Category 1b.
*Solanum sisymbriifolium**	Sticky nightshade			NEMBA Category 1b
Sporobolus africanus	Ratstail Dropseed	LC	Not Endemic	
Stoebe plumosa	Bankrupt bush	LC	Not Endemic	
Tagetes minuta	Khaki Bush			Naturalised; Invasive
Tamarix ramosissima	Pink Tamarisk			NEMBA Category 1b
Tipuana tipu	Tipu Tree			Category 3 NEMBA
Trichoneura grandiglumis	Rolling Grass	LC	Not Endemic	
Trichoneura grandiglumis	Rolling Grass	LC	Not Endemic	
Typha capensis	Bulrush, Common Cattail	LC	Not Endemic	
Urochloa mosambicensis	Bushveld Signal Grass	LC	Not Endemic	
Vachellia sieberiana	Paper-bark Thorn	LC	Not Endemic	
Verbena bonariensis	Wild Verbena			NEMBA Category 1b.

Figure 8-7 Photographs of some plants observed; A) Gomphocarpus fruticosus subsp. Fruticosus, B) Felicia mossamedensis, C) Berkheya echinacea D) Solanum mauritianum, E) Cortaderia selloana and F)

8.2.2.1.2 Alien and Invasive Plants

Declared weeds and invader plant species have the tendency to dominate or replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of these systems. Therefore, it is important that these plants are controlled and eradicated by means of an eradication and monitoring programme. Some invader plants may also degrade ecosystems through superior competitive capabilities to exclude native plant species.

The National Environmental Management: Biodiversity Act (NEMBA) is the most recent legislation pertaining to alien invasive plant species. In August 2014, the list of Alien Invasive Species was published in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (Government Gazette No 78 of 2014). The Alien and Invasive Species Regulations were published in the Government Gazette No. 37886, 1 August 2014, and was

amended in February 2018 in the Government Gazette No. 41445. The legislation calls for the removal and / or control of alien invasive plant species (Category 1 species). In addition, unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse.

Below is a brief explanation of the three categories in terms of the National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA):

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing
- Take steps to manage the listed invasive species in compliance with:
    - Section 75 of the Act;
    - The relevant invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the Act.

Thirteen (13) alien and/or invasive plants were recorded during the field survey within the project area. It is recommended that an Alien Plant Species Management Plan be implemented.

8.2.2.2 Faunal Assessment

The faunal assessment was completed based on the desktop review and intensive biodiversity surveys which were conducted across the project area.

8.2.2.2.1 Avifauna

A total of thirty six (36) bird species were recorded in the project area during the March 2020 surveys based on either direct observations, or the presence of visual tracks & signs (Figure 8-8 and Table 8-8).

Table 8-8 Avifaunal species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC
Ardea intermedia	Egret, Yellow-billed (Intermediate)	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Bradypterus baboecala	Rush-warbler, Little	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Buteo buteo	Buzzard, Common (Steppe)	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Cisticola aridulus	Cisticola, Desert	Unlisted	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Hirundo rustica	Swallow, Barn	Unlisted	LC
Lonchura cucullata	Mannikin, Bronze	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC

Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC

Figure 8-8 Some of the avifaunal species recorded on site: A) Tree-banded Plover (Charadrius tricollaris), B) Southern Red Bishop (Euplectes orix), C) Black-headed Heron (Ardea melanocephala), D) Purple Heron (Ardea purpurea), E) Red-Knobbed Coot (Fulica cristata) and F) Black-throated Canary (Crithagra atrogularis)

8.2.2.2.2 Mammals

Four mammal species were recorded in the project area during the March 2020 surveys based on either direct observation, camera trap photographs or the presence of visual tracks & signs (Table 8-9 and Figure 8-9). None of the species recorded were SCCs.

Table 8-9 Mammal species recorded in the Elandsfontein project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Atilax paludinosus	Water Mongoose	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC

Figure 8-9 Some of the mammal species recorded in the project area: A, B and F) Water mongoose (Atilax paludinosus), C) Yellow mongoose (Cynictis penicillata), D) Slender mongoose (Herpestes sanguineus),and E) Small-spotted Genet (Genetta genetta)

8.2.2.2.3 Herpetofauna

One (1) reptile species were recorded in the project area during the March 2020 surveys (Table 8-10 and Figure 8-10). The low density recorded in the area is based on the disturbed nature of the habitat. The species recorded is not a SCC.

Table 8-10 A list of herpetofauna recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Trachylepis punctatissima	Speckled Rock Skink	LC	LC

Figure 8-10 The reptile species recorded in the project area: Speckled Rock Skink (Trachylepis punctatissima)

8.2.2.3 Habitat Assessment

The main habitat types identified across the project area were initially delineated largely based on aerial imagery. These main habitat types were refined based on the field coverage and data collected during the survey. Each of the habitats identified are discussed in the sub-sections below.

Fragmented Grassland

The condition of these grassland's ranges from heavily disturbed (largely due to overgrazing) to semi-natural grassland. This habitat type is regarded as largely semi-natural but disturbed grassland. The difference between this habitat and the modified grassland is the extent of the disturbance in the modified grassland being more. This habitat is regarded as having a poor/low sensitivity.

Modified Grassland

The condition of the modified grassland ranges from heavily disturbed (largely due to previous and current mining activities) to moderately disturbed grassland. These areas are considered to have a low-medium sensitivity due to the fact that these areas may be used as a movement

corridor and in many cases form a barrier between the fragmented grassland and the current mining activities. This habitat is regarded as having a poor/low sensitivity.

Transformed

This habitat units represents the current coal mining portions (predominantly open cast) which are present across the study area. Due to the extremely altered nature of this habitat, it is regarded as having a very low/least concern sensitivity. This habitat type represents all areas of mining and the existing infrastructure and includes houses, parking, camps, roads etc.

Wetlands

This habitat unit represents the watercourse and wetland areas with the grasslands that it is connected to. The wetlands habitats are according to the Wetland Assessment TBC (2020). This habitat type is regarded as intact and therefore natural, but slightly disturbed due to grazing by livestock and the surrounding mining. Despite this and due to its limited distribution in the landscape, this habitat is regarded as having a high sensitivity.

Collectively

Collectively, the fragmented and modified grasslands can be seen as degraded grassland, CBA Optimal as identified in Figure 8-1 does no longer exist as CBA as this area has been degraded.

The degraded grassland as a whole is connected to the wetland habitat, and not only acts as a buffer for the wetlands but also as a movement corridor.

The wetland habitat includes a watercourse with the connected wetland areas and associated grasslands that it is connected to. Even though somewhat degraded, the ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of this system is the most important aspect to consider for the proposed development, even more so due to the high sensitivity of the area according to the various ecological datasets. This habitat needs to be protected and improved due to the role of this habitat as a water resource.

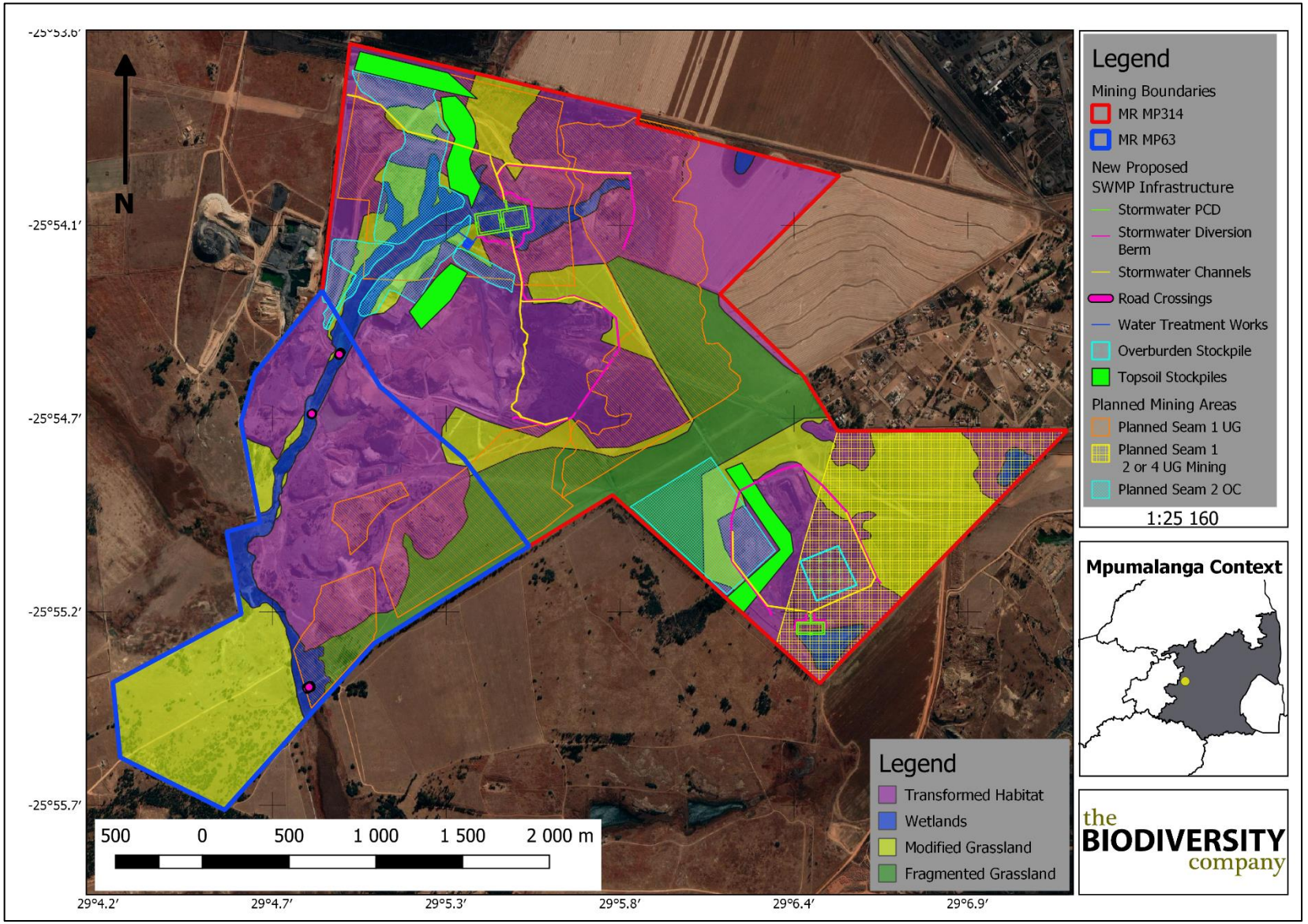

Figure 8-11 Habitats identified on site

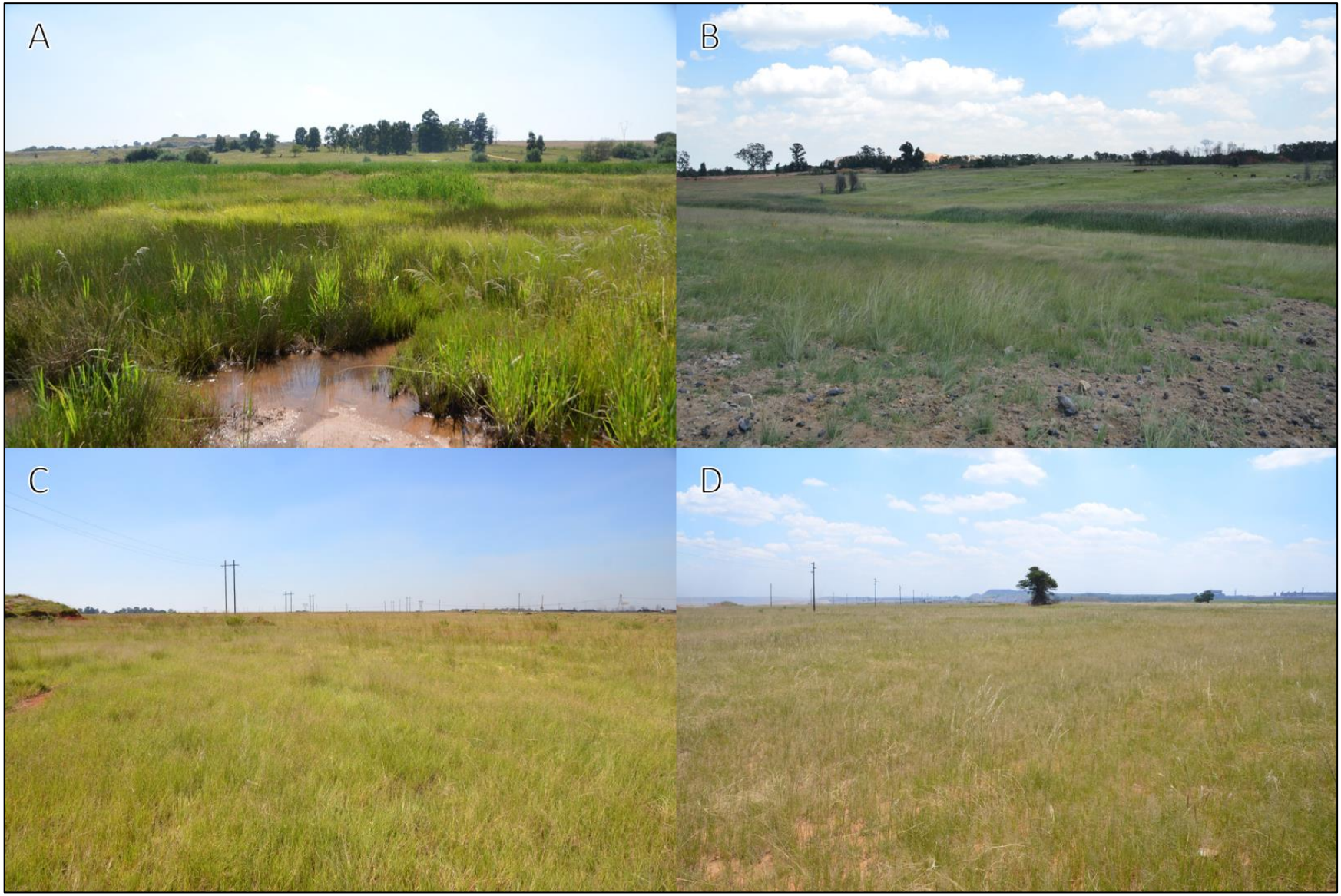

Figure 8-12 Photographs of the main habitats identified; A & B)Wetlands, C and D)Fragmented Grassland

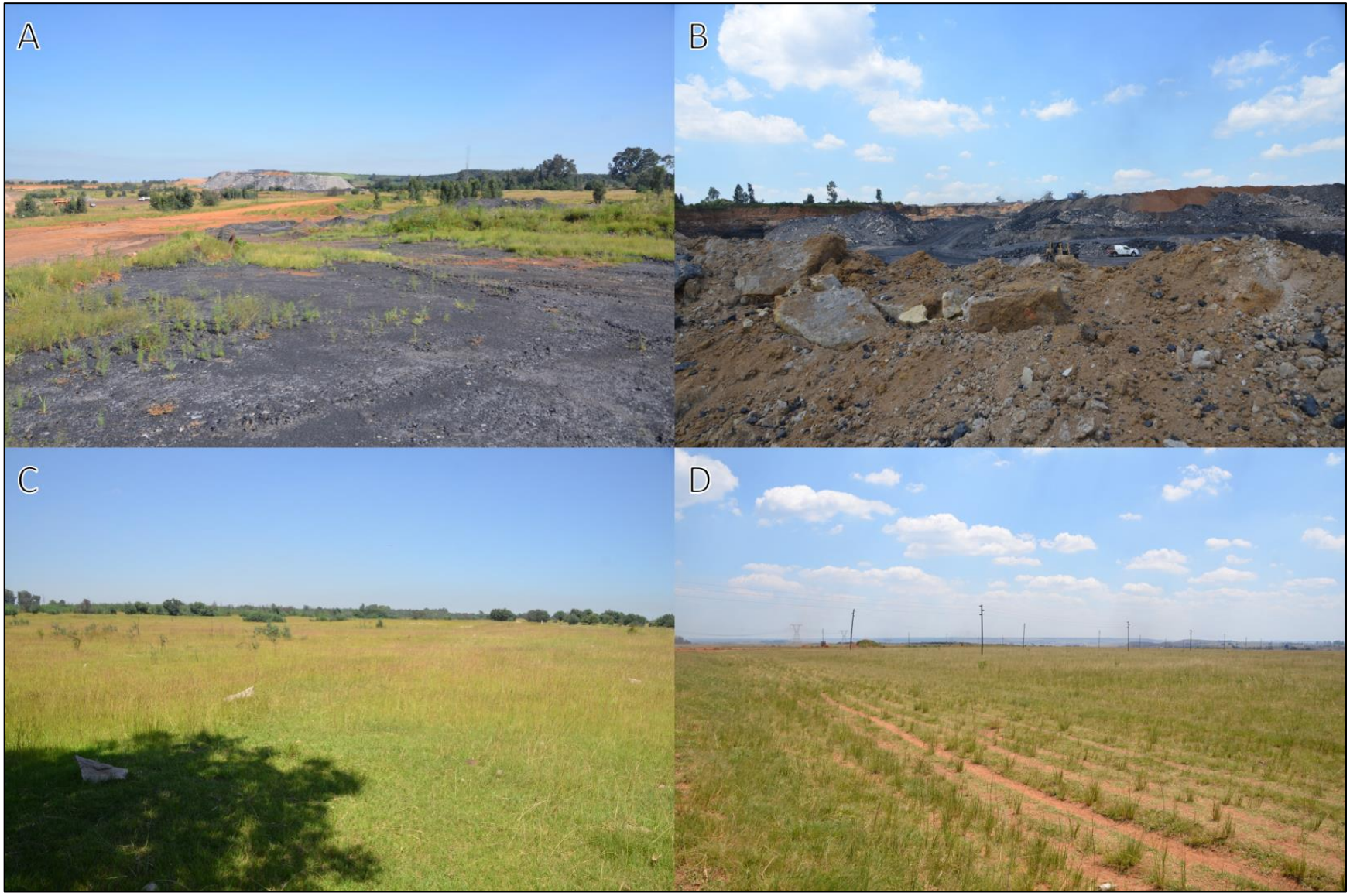

Figure 8-13 Photographs of the main habitats identified; A& B)Transformed, C and D)Modified Grassland

8.3 Sensitivity

8.3.1 Methodology

As part of the EIMS environmental mapping methodology, specialists are required to identify all features in terms of the specific field of expertise within the study area. This methodology includes the compilation of detailed shapefiles with specific attributes. Three main components form part of this methodology, namely;

- Feature layer;
- Overall sensitivity layer; and
- Legislative constraint layer.

All identified features will be rated according to the sensitivity of the feature as well as threats posed by proposed activities. These sensitivity rankings are described and illustrated in Table 8-11.

Table 8-11 Sensitivities relevant to the EIMS methodology

	Sensitivities				
	Least Concern	Low	Medium	High	No-Go
Broad Class Description	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 the project or infrastructure placement.	The proposed development will have not had a significant effect on the inherent feature status and sensitivity.	The proposed development will negatively influence the current status of the feature.	The proposed development will negatively significantly influence the current status of the feature.	The proposed development cannot legally or practically take place.
Scoring	0	1	2	3	+99

8.3.2 Feature Layer

Various features make part of the terrestrial habitats/sensitivity, however due to the degraded state of these features do not have any buffer zones, however the wetland features identified as well as two sets of buffers calculated by means of the DWS buffer tool (for infrastructure and mining activities respectively) from the Wetland Assessment TBC (2020) we incorporated into the terrestrial sensitivity map.

8.3.3 Overall sensitivity

The Wetland habitats were classed according to the Wetland Assessment TBC (2020), which include the high and very high sensitivity. The grasslands were rated as low/poor (0) because of the degraded nature of these areas collectively. The major driving forces of the disturbed and degraded state of these areas are anthropogenic, such as clearing of vegetation, presence of a large amount of alien and invasive plant species, mining impacts and livestock. The least concern sensitivities are those areas which were deemed by the specialists to not have any features that are considered significant ecologically important or sensitive.

The sensitivities within the project area can be seen in Figure 8-14 and in Figure 8-15 with planned mining superimposed.

8.3.4 Legislative Constraints

All areas within the identified wetlands' 500 m regulated area are subject to the National Water Act (NWA) Section 21 (C) and (I), as illustrated in Figure 8-16 as per the accompanying wetland assessment completed for this project.

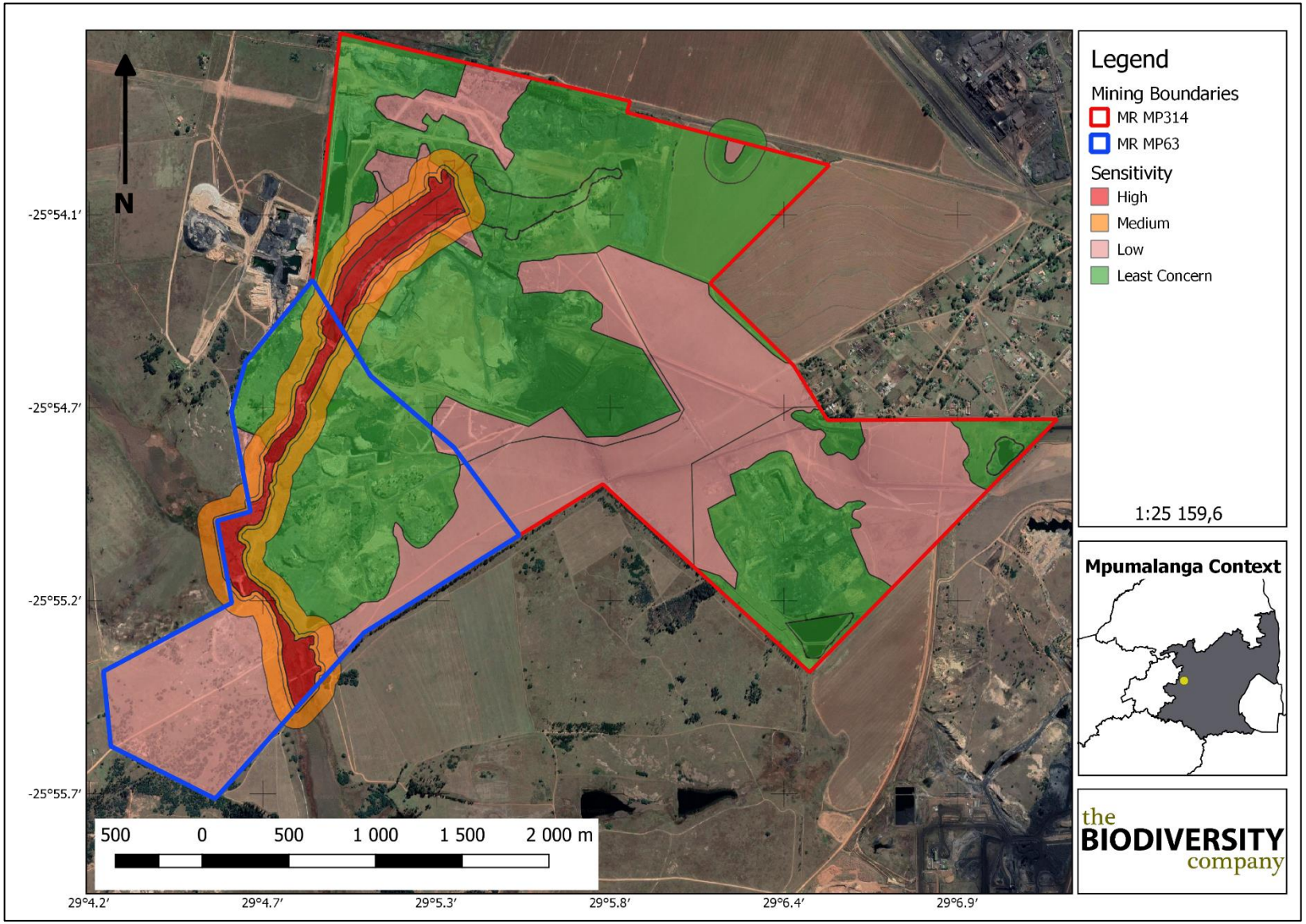

Figure 8-14 The sensitivities of the project area

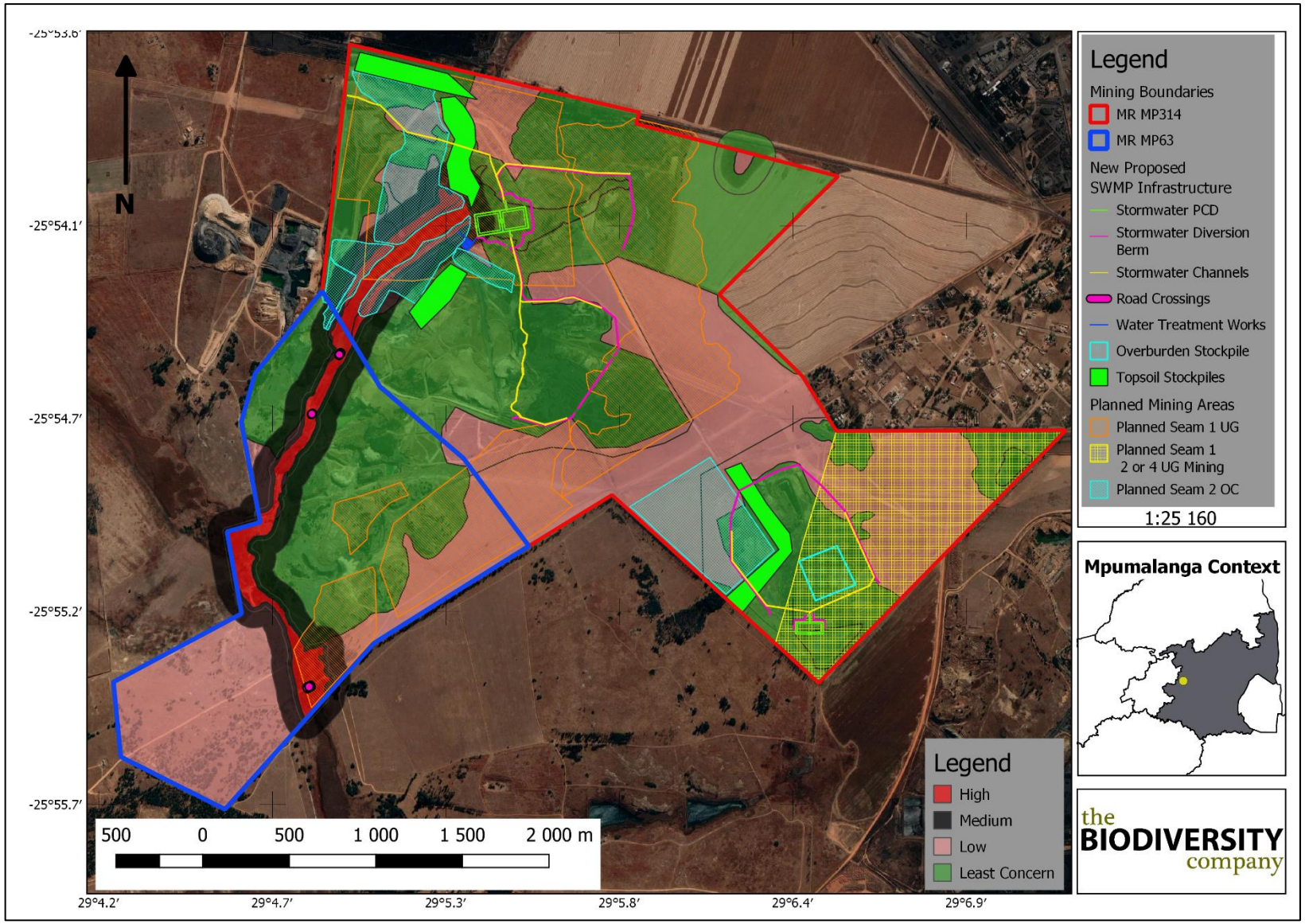

Figure 8-15 The sensitivities of the project area with the planned mining superimposed

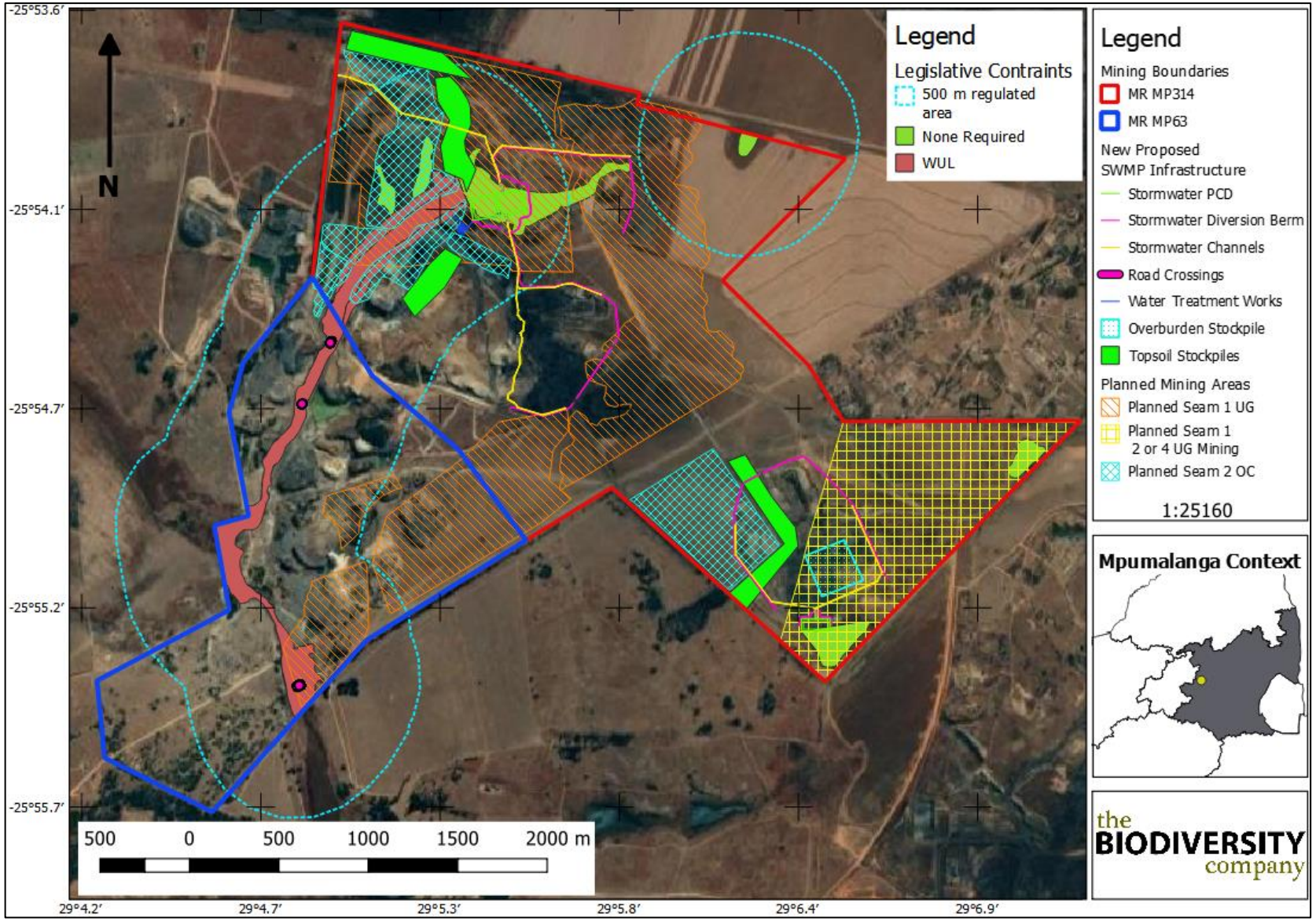
-25°53.6′
-25°54.1′
-25°54.7′
-25°55.2′
-25°55.7′
29°4.2′
29°4.7′
29°5.3′
29°5.8′
29°6.4′
29°6.9′
N
500 0 500 1000 1500 2000 m
Legend
Legislative Contraints
500 m regulated area
None Required
WUL
Legend
Mining Boundaries
MR MP314
MR MP63
New Proposed SWMP Infrastructure
Stormwater PCD
Stormwater Diversion Berm
Stormwater Channels
Road Crossings
Water Treatment Works
Overburden Stockpile
Topsoil Stockpiles
Planned Mining Areas
Planned Seam 1 UG
Planned Seam 1 2 or 4 UG Mining
Planned Seam 2 OC
1:25160
Mpumalanga Context
the BIODIVERSITY company

Figure 8-16 Legislative constraints relevant to identified features from the Wetland Assessment TBC (2020)(

9 Impact Assessment

9.1 Impact Assessment Methodology

An impact assessment methodology was provided by EIMS to determine the environmental risk associated with various aspects related to the proposed activities (open cast and underground mining with ancillary infrastructure). This impact assessment takes the following components into consideration;

- The nature of the associated impact (positive or negative);
- The extent of the proposed activities;
- The duration of the proposed activities;
- The magnitude of the effects caused by the proposed activities;
- The reversibility of associated impacts; and
- The probability of relevant aspects affecting sensitive receptors.

Each one of the above-mentioned components are given a rating, which cumulatively provides the specialist with a pre-mitigation environmental risk rating. These components are then scored again taking into consideration mitigating factors. The cumulative impact and irreplaceable loss to sensitive receptors are then scored to ultimately indicate a “Priority Factor” score.

9.2 Current Impacts

The current impacts observed during surveys are listed below. Photographic evidence of a selection of these impacts is shown in Figure 9-1.

- Fences;
- Overgrazing and trampling of natural vegetation and wetlands by livestock;
- Farm roads and highways (and associated traffic and wildlife road mortalities);
- Erosion;
- Feral animals such as dogs and cats;
- Alien and/or Invasive Plants (AIP);
- Servitudes and infrastructure (powerlines)
- Water contamination and water trenches;
- Mining; and
- Vegetation removal.

Figure 9-1 Some of the identified impacts within the project area: A) Livestock, B) Alien invasive plant species, C) Erosion, D) Mining, E) Vegetation removal and trenches and F) Powerlines

9.3 Anticipated Impacts

The proposed mining as well as the surface infrastructure can be seen overlaid with the overall sensitivity (Figure 8-15). It is evident from the figure that the following may have a negative effect on more sensitive biodiversity features, most impacts involves the wetland and its associated buffer area:

- Planned Seam 2 OC (Affects the wetland, high sensitivity and affects the wetland buffer, medium sensitivity);
- Planned Seam 1 UG (Affects the wetland, high sensitivity and affects the wetland buffer, medium sensitivity);
- A portion of the stormwater PCD (Affects the wetland buffer, medium sensitivity);

- Water Treatment Works (Affects the wetland buffer, medium sensitivity); and
- A portion of the topsoil stockpile (Affects the wetland buffer, medium sensitivity).

In the impacts are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity (Table 9-1).The anticipated impacts are summarised for both the proposed mining as well as the proposed surface infrastructure, stockpiles and their respective associated activities.

Table 9-1 Anticipated impacts for the proposed activities on terrestrial biodiversity

Main Impact	**Project activities that can cause loss of habitat (especially with regard to the construction):**	**Secondary impacts anticipated**
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation Access roads and servitudes Soil dust precipitation Water leakages Dumping of waste products Random events such as fire (cooking fires or cigarettes)	Displacement/loss of flora & fauna (including possible SCC) Increased potential for soil erosion Habitat fragmentation Increased potential for establishment of alien & invasive vegetation
Main Impact	**Project activities that can cause the spread and/or establishment of alien and/or invasive species**	**Secondary impacts anticipated**
2. Spread and/or establishment of alien and/or invasive species	Vegetation removal Vehicles potentially spreading seed Unsanitary conditions surrounding infrastructure promoting the establishment of alien and/or invasive rodents Creation of infrastructure suitable for breeding activities of alien and/or invasive birds	Habitat loss for native flora & fauna (including potential SCC) Spreading of potentially dangerous diseases due to invasive and pest species Alteration of fauna assemblages due to habitat modification
Main Impact	**Project activities that can cause the Direct mortality of fauna**	**Secondary impacts anticipated**
3. Direct mortality of fauna	Project activities that can cause direct mortality of fauna Clearing of vegetation Roadkill due to vehicle collision Pollution of water resources due to dust effects, chemical spills, acid mine drainage etc. Intentional killing of fauna for food (hunting) Bird collisions with powerlines	Loss of ecosystem services Increase in rodent populations and associated disease risk
Main Impact	**Project activities that can cause reduced dispersal/migration of fauna**	**Secondary impacts anticipated**
4.Reduced dispersal/migration of fauna	Loss of landscape used as corridor Compacted roads Removal of vegetation Light, noise and dust disturbance Powerlines	Loss of ecosystem services Reduced plant seed dispersal
Main Impact	**Project activities that can cause pollution in water courses and the surrounding environment**	**Secondary impacts anticipated**
5. Environmental pollution due to water/ mine drainage runoff	Chemical (organic/inorganic) spills Erosion AMD	Faunal mortality (direct and indirectly) Groundwater pollution Loss of ecosystem services
Main Impact	**Project activities that can cause disruption/alteration of ecological life cycles due to sensory disturbance and dust.**	**Secondary impacts anticipated**
6.Disruption/alteration of ecological life cycles (breeding, migration, feeding) due to noise, dust and light pollution.	Operation of machinery (Large earth moving machinery, generators) Vehicles Exposed mine dumps Outside lighting	Loss of ecosystem services

Main Impact	Project activities that can cause staff to interact directly with potentially dangerous fauna	Secondary impacts anticipated
8. Staff and others interacting directly with fauna (potentially dangerous) or poaching of animals	All unregulated/supervised activities outdoors	Harm to fauna and/or staff

9.4 Unplanned Events

The planned activities will have known impacts as discussed above; however, unplanned events may occur on any project and may have potential impacts which will need mitigation and management.

Underground mining can have significant impacts on sub-surface water and water flow, and therefore still poses possibly severe threats to wetlands and river systems above ground, as well as to floral species. However, it is assumed that the safety factor for the underground mining method will be considered and adhered to.

The following is an excerpt from Bloggert *et al*. (2002), regarding the effects of subsidence due to underground mining:

"Subsidence and hydrology impacts occur at every underground mining operation bringing about changes to surface landforms, ground water and surface water. Subsidence is an inevitable consequence of underground mining – it may be small and localized or extend over large areas, it may be immediate or delayed for many years. Underground mining causes impacts to hydrologic features like lakes, streams, wetlands, and underground aquifers.

Methods used to predict subsidence and hydrologic impacts are not reliable when applied to the more complex geologic and hydrologic conditions. Once mining begins, it is very difficult to mitigate the effects on the environment. There is little evidence in the scientific literature demonstrating effective mitigation of subsidence or hydrologic impacts at hard-rock metal mines. Consequently, the environmental impacts from mining may worsen over time as the ground continues to settle and aquifers are de-watered or degraded.

This report also concludes that because subsidence and hydrology impacts cannot be avoided as a consequence of underground mining, such activities should be considered inappropriate in National Parks, Wilderness Areas, and adjoining localities that might affect those areas.

In some cases, subsidence and hydrologic impacts continue to affect the surface environment more than 100 years after mining occurred. These cases illustrate the wide variability of conditions at hard-rock mines and emphasize the basic fact that opening a void underground to conduct mining operations inevitably results in some impacts to surface and hydrologic features."

Table 9-2 is a summary of the findings of an unplanned event assessment from a terrestrial ecology perspective. Note, not all potential unplanned events may be captured herein, and this must therefore be managed throughout all phases according to recorded events.

Table 9-2 Summary of unplanned events for terrestrial biodiversity

Unplanned Event	Potential Impact	Mitigation
Hydrocarbon spills into the surrounding environment	Contamination of habitat as well as water resources associated with spillage.	A spill response kit must be available at all times. The incident must be reported on and if necessary, a

		biodiversity specialist must investigate the extent of the impact and provide rehabilitation recommendations.
Fire	Uncontrolled/unmanaged fire that spreads to the surrounding natural grassland and wetlands	Appropriate/Adequate fire management plan need to be implemented.
Acid Mine Drainage	Severe water quality and in turn habitat degradation	Water treatment, post closure water monitoring and water level management.
PCD Failing or PCD Pipeline burst	Contamination of habitat as well as water resources.	Monitoring of PCD structure and follow legislative guidelines. Regular monitoring for leaks, cracks and faults in the pipeline

9.5 No-Go Option (Activity Alternative A2)

It is the specialist's opinion that in the event that none of the proposed activities be considered, that sensitive receptors will remain in degraded conditions unless significant anthropogenic interventions, such as rehabilitation, takes place. The current ecological state of the area holistically, is in a degraded state, which will degrade even further taking into consideration the proposed mining activities.

The most natural areas, i.e. the delineated wetland systems and the fragmented grassland could improve naturally over time, especially with the reduction of cattle, and will improve significantly with rehabilitation. To summarise, the no-go option will result in zero additional impacts and could result in the improvement of the area as a whole, especially the wetland systems which, in an environmental aspect, will be the suitable option.

9.6 Planning Phase Impacts (Activity Alternative A1)

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:

9.6.1 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.

9.6.1.1 Mitigation Measures

Please see section 10.

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 to the proposed areas as much as possible;
- If vehicles are to be used, make use of existing roads.

9.7 Construction Phase

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

9.7.1 Open Cast Mining (Seam 2)

9.7.1.1 Destruction, further loss and fragmentation of the vegetation community and the associated habitat;

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. Planned seam 2 OC is placed within the wetlands footprint as well as within its buffer zones TBC (2020), resulting in the loss of wetland habitat as well.

Activities that will contribute to this impact:

- Driving/ moving outside of designated areas;
- Stock piling/placing overburden materials in sensitive areas;
- Physical removal of vegetation;
- Soil dust precipitation as a result of amongst others the discard dumps, overburden, trucks and exposed soils;
- Dumping of waste products; and
- Random events such as fire (cooking fires or cigarettes).

9.7.1.1.1 Mitigation Measures

Please see section 10. Specific mitigations were included for the infrastructure to be placed in the least concern sensitivity areas.

9.7.1.1.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Further loss of EN vegetation type as well as a water resource; and
- Loss of habitat and a movement corridor for species including migratory species.

9.7.1.1.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.7.1.1.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.1.2 Introduction of alien species, especially plants

The spread of alien invasive species will result in the loss of habitat and the amount of 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 species;
- Disturbance of soil; and
- Construction of infrastructure suitable for breeding activities of alien and/or invasive species, especially birds.

9.7.1.2.1 Mitigation Measures

Please see section 10.

9.7.1.2.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of habitat for indigenous species and proliferation of alien invasive plants; and
- Spread of disease to surrounding areas.

9.7.1.2.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.7.1.2.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.1.3 Erosion due to storm water runoff and wind

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;
- Overgrazing of vegetation by livestock;
- Water runoff from large dumps;
- Wind around mine dumps; and
- Compacting of roads.

9.7.1.3.1 Mitigation Measures

Please see section 10.

9.7.1.3.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.7.1.3.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of and degradation of wetland habitat.

9.7.1.3.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.1.4 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).
- Disease caused by increased dust levels.
- Bird collisions with electrical lines.

9.7.1.4.1 Mitigation Measures

Please see section 10.

9.7.1.4.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of habitat for indigenous species.

9.7.1.4.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of faunal SCCs.

9.7.1.4.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.2 Underground Mining (Seam 1)

The extent, duration and location of construction activities regarding this alternativities, i.e. underground mining is expected to have, a lower magnitude of impacts not only due the fact that mining has already been undertaken to some extent in this area and some services are already available, but also due the nature of the mining method having less direct aboveground impacts. Also, much of the area above ground is already has been transformed and degraded. Additionally, various roads already are in existence which can be used during the proposed activities. Therefore, besides subsidence, there are limited potential impacts on terrestrial biodiversity which may result from the underground mining operations. The only considered construction phase impact was the possible impact of noise and/or vibrations resulting from underground blasting activities.

9.7.2.1 Destruction, further loss and fragmentation of the vegetation community

Planned seam 1 UG is placed under the wetlands as well as within its buffer zones TBC (2020).

9.7.2.1.1 Mitigation Measures

Please see section 10.

9.7.2.1.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change

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

9.7.2.1.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss of wetland habitat.

9.7.2.1.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.2.2 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;
- Disturbance of soil; and
- Construction of infrastructure suitable for breeding activities of alien and/or invasive birds.

9.7.2.2.1 Mitigation Measures

Please see section 10.

9.7.2.2.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change

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

9.7.2.2.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss of wetland habitat;

9.7.2.2.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.2.3 Erosion due to storm water runoff and wind

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;
- Overgrazing of vegetation by livestock;
- Water runoff from large dumps;
- Wind around mine dumps; and
- Compacting of roads.

9.7.2.3.1 Mitigation Measures

Please see section 10.

9.7.2.3.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.7.2.3.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss of and degradation of wetland habitat.

9.7.2.3.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.2.4 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.
- Vibration - temporary effects of underground blasting (noise, vibrations) on terrestrial fauna.
- 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).
- Disease caused by increased dust levels.
- Bird collisions with electrical lines.

9.7.2.4.1 Mitigation Measures

Please see section 10.

9.7.2.4.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change

- Loss of habitat for indigenous species.

9.7.2.4.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss of faunal SCCs.

9.7.2.4.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.7.3 Surface infrastructure, stockpiles and their respective associated activities.

9.7.3.1 Destruction, further loss and fragmentation of the vegetation community

The vegetation communities are classed as EN, through site clearing, more of the vegetation communities will be lost. Unmitigated, this will also lead to habitat fragmentation and the establishment of alien invasive species as well as soil erosion. Some of the infrastructure is placed within the wetlands footprint as well as within its buffer zones TBC (2020), resulting in the loss of wetland habitat as well.

9.7.3.1.1 Mitigation Measures

Please see section 10.

9.7.3.1.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Further loss of EN vegetation type as well as portions of a water resource; and

9.7.3.1.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.7.3.1.4 Impacts on Alternatives Considered

No alternatives were considered.

9.7.3.2 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.

9.7.3.2.1 Mitigation Measures

Please see section 10

9.7.3.2.2 Cumulative Impacts

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

9.7.3.2.3 Irreplaceable Loss of Resources

- Further loss of EN vegetation type as well as portions of a water resource; and

9.7.3.2.4 Impacts on Alternatives Considered

No alternatives were considered.

9.7.3.3 Erosion due to storm water runoff and wind

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 hardened surfaces;
- Vehicles driving outside demarcated areas;
- Footpaths outside demarcated areas;
- Clearing of vegetation; and
- Water runoff from areas with bare soil.

9.7.3.3.1 Mitigation Measures

Please see section 10

9.7.3.3.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.7.3.3.3 Irreplaceable Loss of Resources

- Further loss of EN vegetation type as well as portions of a water resource

9.7.3.3.4 Impacts on Alternatives Considered

No alternatives were considered.

9.7.3.4 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 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. Mitigation Measures

Please see section 12.

9.7.3.4.1 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of habitat for indigenous species.

9.7.3.4.2 Irreplaceable Loss of Resources

- Loss of potential faunal SCCs.

9.7.3.4.3 Impacts on Alternatives Considered

No alternatives were considered.

9.7.3.5 Environmental pollution due to water/ mine drainage runoff potential leaks, discharges, pollutant, and storage leaching into the surrounding environment

Hydrocarbons leaching into the surrounding area will result in the loss of usable water resources. This will also result in the contamination of the topsoil and reduce the likelihood of successful rehabilitation of an area.

9.7.3.5.1 Mitigation Measures

Please see section 12.

9.7.3.5.2 Cumulative Impacts

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

9.7.3.5.3 Irreplaceable Loss of Resources

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

9.7.3.5.4 Impacts on Alternatives Considered

No alternatives were considered.

9.8 Operational Phase

This section pertains to Activity Alternative A1.

The following potential impacts were considered on biodiversity (including fauna and flora).

9.8.1 Open Cast Mining (Seam 2)

9.8.1.1 Continued fragmentation, 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.

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

9.8.1.1.1 Mitigation Measures

Please see section 10.

9.8.1.1.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of habitat for indigenous species

9.8.1.1.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.8.1.1.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.1.2 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 displacement;
- 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.

9.8.1.2.1 Mitigation Measures

Please see section 10

9.8.1.2.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.1.2.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of habitat and food sources for Fauna SCCs.

9.8.1.2.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.1.3 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:

- Acid mine drainage;
- Leaking equipment;

9.8.1.3.1 Mitigation Measures

Please see section 10

9.8.1.3.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.1.3.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Degradation of the wetland habitat and loss of usable water resources for fauna species resulting in loss of SCC and other species.

9.8.1.3.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.1.4 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.

9.8.1.4.1 Mitigation Measures

Please see section 10.

9.8.1.4.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of suitable habitat.

9.8.1.4.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.
- Loss of faunal SCCs.

9.8.1.4.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.2 Underground Mining (Seam 1)

The following impacts is for the operational phase of the underground mining process. The only main impact considered for this phase was attributed to the chance of subsistence occurring;

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

Subsidence will likely change the morphology of the catchment, which will include drainage of the catchment. These changes (including drainage) will result in a loss of surface water, which some faunal species may be dependent on. The loss of water will also amount to changes to the habitat structure for the catchment, will have an effect on the overall faunal community structure.

9.8.2.1.1 Mitigation Measures

Please see section 10;

- 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.

9.8.2.1.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.2.1.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.8.2.1.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.2.2 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.

9.8.2.2.1 Mitigation Measures

Please see section 10.

- 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.

9.8.2.2.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.2.2.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.8.2.2.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.2.3 Subsidence; physical alteration of surface-level environment leading to negative impacts on habitats (especially wetlands) 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.

9.8.2.3.1 Mitigation Measures

Please see section 10.

- 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.

9.8.2.3.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.2.3.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.8.2.3.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.8.3 Surface infrastructure, stockpiles and their respective associated activities.

9.8.3.1 Continued fragmentation, 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.

- Dust;
- Soil dust precipitation;
- Water leakages; and
- Dumping of waste products.

9.8.3.1.1 Mitigation Measures

Please see section 10.

9.8.3.1.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of habitat for indigenous species

9.8.3.1.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.

9.8.3.1.4 Impacts on Alternatives Considered

No alternatives were considered.

9.8.3.2 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 displacement;
- 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.

9.8.3.2.1 Mitigation Measures

Please see section 10

9.8.3.2.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.3.2.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of habitat and food sources for Fauna SCCs.

9.8.3.2.4 Impacts on Alternatives Considered

No alternatives were considered.

9.8.3.3 Potential leaks, discharges, pollutant from mining activities leaching into the surrounding environment, especially relating to the PCD's and stormwater management infrastructure.

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:

- Acid mine drainage;
- PCD and WTW structural integrity as well as overflow;
- Defective storm water channels and berms
- Leaking equipment;

9.8.3.3.1 Mitigation Measures

Please see section 10

9.8.3.3.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.8.3.3.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Degradation of the wetland habitat and loss of usable water resources for fauna species resulting in loss of SCC and other species.

9.8.3.3.4 Impacts on Alternatives Considered

No alternatives were considered.

9.8.3.4 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.

9.8.3.4.1 Mitigation Measures

Please see section 10.

9.8.3.4.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of suitable habitat.

9.8.3.4.3 Irreplaceable Loss of Resources

The operational phase of the relevant activities could result in a loss of natural resources. It is however worth noting that the relevant resources have limited value.

- Loss of wetland habitat.
- Loss of faunal SCCs.

9.8.3.4.4 Impacts on Alternatives Considered

No alternatives were considered.

9.9 Decommissioning and Rehab/Closure Phase

This section pertains to Activity Alternative A1.

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

9.9.1 Open Cast Mining (Seam 2)

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

9.9.1.1 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, even to the surrounding areas outside of the project arae. 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.

9.9.1.1.1 Mitigation Measures

Please see section 10.

9.9.1.1.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.9.1.1.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss and degradation of habitat and food sources for Fauna SCCs.

9.9.1.1.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.9.1.2 Continued displacement and fragmentation of the faunal community (including potential threatened or protected species) due to ongoing habitat degradation/loss (infringement, 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).

9.9.1.2.1 Mitigation Measures

Please see section 10.

9.9.1.2.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of suitable habitat.

9.9.1.2.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss of faunal SCCs.

9.9.1.2.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.9.2 Underground Mining (Seam 1)

The following impacts were considered for the decommissioning and rehabilitation phase of the underground operation. Due to the likelihood that the surface infrastructure will most likely occur within transformed areas, the decommission thereof should have similar impacts as section 10.7.1 above

9.9.2.1 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.

9.9.2.1.1 Mitigation Measures

Please see section 10.

- 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.

9.9.2.1.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.9.2.1.3 Irreplaceable Loss of Resources

- Loss of wetlands.

9.9.2.1.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.9.2.2 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.

9.9.2.2.1 Mitigation Measures

Please see section 10;

- 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.

9.9.2.2.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.9.2.2.3 Irreplaceable Loss of Resources

- Loss of wetlands.

9.9.2.2.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.9.2.3 Subsidence; physical alteration of surface-level environment leading to negative impacts on habitats (especially wetlands) 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.

9.9.2.3.1 Mitigation Measures

Please see section 10;

- 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.

9.9.2.3.2 Cumulative Impacts

Medium rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Deaths of smaller faunal species.

9.9.2.3.3 Irreplaceable Loss of Resources

- Loss of wetlands.

9.9.2.3.4 Impacts on Alternatives Considered

No alternatives were considered. However, UG mining is considered to have a less significant impact than OC.

9.9.3 Surface infrastructure, stockpiles and their respective associated activities.

9.9.3.1 Continued encroachment of an indigenous and EN 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, even to the surrounding areas outside of the project arae. 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.

9.9.3.1.1 Mitigation Measures

Please see section 10.

9.9.3.1.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change.

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

9.9.3.1.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss and degradation of habitat and food sources for Fauna SCCs.

9.9.3.1.4 Impacts on Alternatives Considered

No alternatives were considered.

9.9.3.2 Continued displacement and fragmentation of the faunal community (including potential threatened or protected species) due to ongoing habitat degradation/loss (infringement, 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).

9.9.3.2.1 Mitigation Measures

Please see section 10.

9.9.3.2.2 Cumulative Impacts

Low rating, it is probable that the impact will result in spatial and temporal cumulative change.

- Loss of suitable habitat.

9.9.3.2.3 Irreplaceable Loss of Resources

The construction phase of the relevant activities is unlikely to result in a loss of natural resources.

- Loss of potential faunal SCCs.

9.9.3.2.4 Impacts on Alternatives Considered

No alternatives were considered.

9.10 Monitoring mitigations

Post-Closure Monitoring and Maintenance:

- Monitoring is an essential tool in ensuring that time, money and effort that was put into the rehabilitation isn't wasted, the following is a list of monitoring protocols that would need to be put in place for the post-closure phases;
- Monthly monitoring on the emergence of the species and the effectivity of the alien management plan, and action taken where needed in regard to alien invasive plant species;
- The rehabilitated area must be assessed by the appropriate specialist, once a year for compaction, fertility, and erosion;
- Monitor the surface and groundwater levels at locations and frequencies prescribed by the respective specialist studies; and
- If erosion occurs, corrective actions (erosion berms) must be taken to minimize any further erosion from taking place.

10 Specialist Management Plan

Table 10-1 presents the recommended mitigation measures and the respective timeframes, targets and performance indicators for the terrestrial study. The mitigations within this section has been taken into consideration during the impact assessment in cases where the post-mitigation environmental risk is lower than that of the pre-mitigation environmental risk.

Table 10-1 Mitigation measures including requirements for timeframes, roles and responsibilities for terrestrial biodiversity

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Reduce the amount of unnecessary people and restrict vehicle access as much as possible on the property by making use of spatial data.	Planning	Project manager, Environmental Officer	Number of contractors within the area	Ongoing
All High and Medium sensitivity areas must be avoided and declared "No-go" areas. The areas to be developed/mined must be specifically demarcated to prevent movement into sensitive surrounding environments. The opencast areas mining infrastructure outlines as well as the surface infrastructure must be realigned to be outside of the wetland and wetland buffer zone habitat.	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further. Clearing of vegetation should be minimized and avoided where possible.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation (High sensitivity areas)	Ongoing
Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.	Construction/Operational Phase	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All livestock (including cattle, pigs, goats, domestic dogs and cats) must be kept out of the project area at all times.	Life of operation	Project manager, Environmental Officer	Areas of indigenous vegetation (High sensitivity areas)	Ongoing
All laydown, chemical toilets etc. should be restricted to least concern sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction/closure phase has been concluded. Buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated project areas.	Construction/Operational Phase	Environmental Officer & Design Engineer	Laydown areas and material storage & placement.	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Assess the state of rehabilitation and encroachment of alien vegetation	Quarterly for up to two years after the closure
All structure footprints to be rehabilitated and landscaped after prospecting is complete. Rehabilitation of the disturbed areas existing in the project area must be made a priority. Topsoil must also be utilised, and any disturbed area must be re-vegetated with plant and grass species which are endemic to this vegetation type.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Footprint rehabilitation	Quarterly monitoring

Progressive rehabilitation and mining 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.	Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Footprint rehabilitation	During Phase
A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. No servicing of equipment on site unless necessary. All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them leaking and entering the environment.	Life of operation	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing
Keep the surface & sub-surface water as well as storm water away that may run off from the dumps from the low laying areas, such as wetlands as well as the surrounding areas, from leaving the project area in an uncontrolled manner.	Life of operation	Project manager, Environmental Officer & Design Engineer	Water Pathways	During rain events.
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.	Life of operation	Environmental Officer & Contractor	Leaks and spills	Ongoing
Storm Water run-off & Discharge Water Quality.	Life of operation	Environmental Officer & Design Engineer	Water Quality	Monthly
It should be made an offence for any staff to /take bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.	Life of operation	Project manager, Environmental Officer	Any instances	Ongoing
Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be utilised during decommissioning phases and re-vegetation. All removed soil and material must not be stockpiled within the wetland/watercourse and buffer. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.	Construction/Operational Phase	Project manager, Environmental Officer	Topsoil removal and storage	Ongoing
Appropriate speed humps, enforcing of speed limits with the associated stormwater on access roads managed to avoid erosion and sedimentation. Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface (with “dirty water”) and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds.	Life of operation	Project manager, Environmental Officer	Speed limit of vehicles	Ongoing

A fire management plan needs to be complied and implemented to restrict the impact fire might have on the rehabilitated areas.	Life of operation	Environmental Officer & Contractor	Fire Management	During Phase
Aquatic monitoring must be done, this includes ground water and surface water to ensure that that acid mine drainage is detected and managed. A management plan must be compiled for acid mine drainage.	Life of operation	Project manager, Environmental Officer	Water Quality	Ongoing on a monthly basis
Monitor the surface water level in relation to potential subsidence.	Life of operation	Environmental Officer & Contractor	Subsidence	A monthly basis for 5 years after closure of mine

Management outcome: Fauna

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
The areas to be developed must be specifically demarcated to prevent movement of workers into, especially medium and highly sensitive areas and the surrounding environments, i.e. the wetlands; • Signs must be put up to enforce this	Construction/Operational Phase	Project manager, Environmental Officer	Infringement into these areas	Ongoing
Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals	Construction/Operational Phase	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed • Signs must be put up to enforce this;	Life of operation	Environmental Officer	Evidence of trapping etc	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
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, especially on transmission lines close to the wetlands.	Life of operation	Environmental Officer	Presence and condition of flappers and insulation on towers.	Monthly
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas such as the wetland. Fluorescent and mercury vapor lighting should be avoided and sodium vapor (yellow) lights should be used wherever possible.	Construction/Operational Phase	Project manager, Environmental Officer & Design Engineer	Light pollution and period of light.	Ongoing
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. Speed limits must still be enforced to ensure that road killings and erosion is limited.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. • Driving on access roads close to sensitive areas (wetlands) at night should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period;	Life of operation	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day in the case.	Ongoing

Management outcome: Alien species				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Compilation of and implementation of an alien vegetation management plan.	Life of operation	Project manager, Environmental Officer & Contractor	Assess presence and encroachment of alien vegetation	Quarterly monitoring
The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas	Construction/Operational Phase	Project manager, Environmental Officer & Contractor	Footprint Area	Life of operation
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. • Refuse bins will be emptied and secured; • Temporary storage of domestic waste shall be in covered waste skips; and • Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer & Health and Safety Officer	Presence of waste	Life of operation
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	Life of operation	Environmental Officer & Health and Safety Officer	Evidence or presence of pests	Ongoing

Management outcome: Dust				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Dust-reducing mitigation measures must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated.	Life of operation	Contractor	Dustfall	As per the air quality report and the dust monitoring program.

Management outcome: Waste management				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Waste management must be a priority and all waste must be collected and stored effectively.	Life of operation	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area.	Construction/Closure Phase	Environmental Officer & Health and Safety Officer	Presence of Waste	Daily
A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Life of operation	Environmental Officer & Health and Safety Officer	Number of toilets per staff member. Waste levels	Daily

The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility	Life of operation	Environmental Officer & Health and Safety Officer	Availability of bins and the collection of the waste.	Ongoing
Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement with regard to waste management. Under no circumstances may domestic waste be burned on site	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins will be emptied and secured Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days.	Life of operation	Environmental Officer, Contractor & Health and Safety Officer	Management of bins and collection of waste	Ongoing, every 10 days
Sewage system must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area.	Closure Phase/Rehabilitation phase	Environmental Officer, Contractor & Health and Safety Officer	Removal of all sewerage	Till completed

Management outcome: Environmental awareness training

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species, their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr. The avoidance and protection of the wetland areas must be included into a site induction. Contractors and employees must all undergo the induction and made aware of the "no-go" to be avoided.	Life of operation	Health and Safety Officer	Compliance to the training.	Ongoing

Management outcome: Erosion

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Appropriate speed humps, enforcing of speed limits 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; • Reducing the dust generated by the listed activities above, especially the earth moving machinery, through wetting the soil surface (with "dirty water") and putting up signs to enforce speed limit as well as speed bumps built to force slow speeds; • Signs must be put up to enforce this.	Life of operation	Project manager, Environmental Officer	Water Runoff from road surfaces	Ongoing

Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.	Life of operation	Project manager, Environmental Officer	Routes used within the area	Ongoing
Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events.	Life of operation	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively with mining
A storm water management plan must be compiled and implemented.	Life of operation	Project manager, Environmental Officer	Management plan	Before construction phase: Ongoing
A row of indigenous trees may be planted to act as a wind breaker and to reduce the overall levels of dust and erosion. The location of the trees must be determined after dust monitoring has been done.	Life of operation	Project manager, Environmental Officer	Dust reducing mitigation	Before construction phase: Ongoing

11 Conclusion

11.1 Baseline Results

The project area has been altered both currently and historically. Mining has had an extensive impact on both the fauna and the flora in the area with the semi-natural areas still present being impacted on in some way or another. Both the fauna and flora diversity were low, this is most likely as a result of the transformed/degraded nature of the area. No faunal SCCs were recorded on site.

The only remaining natural habitats, i.e. wetland habitats, even though somewhat degraded are the most sensitive habitat within the project area. The ecological integrity, importance and functioning of these areas play a crucial role as a water resource system and an important habitat for various fauna and flora. The preservation of this system is the most important aspect to consider for the proposed project, even more so due to the sensitivity of the area according to the various ecological datasets as well as the Wetland Assessment TBC (2020). This habitat needs to be protected and improved due to the role of this habitat as a water resource within this disturbed local area.

11.2 Impact Assessment

The impacts associated with the proposed underground mining method are considerably less significant when compared to comparable opencast mining methods.

The final significance rating for the open cast has been scored a “Medium negative” prior to mitigation, implementation of mitigations, resulted in a “Low negative”. The significance rating for underground operations was only rated a “High” negative” due to the consideration of possible subsidence during the operational phase, and after the decommissioning and rehabilitation phases, however due to the nature of subsidence it remains a stochastic event. The final significance rating for the surface infrastructure, stockpiles and their respective associated activities. has been scored a “Medium negative” prior to mitigation, implementation of mitigations, resulted in a “Low negative”.

It is recommended that the proposed open cast mining areas (Seam 2) be amended to adhere to the delineated high and medium sensitivity areas and that the underground mining areas (Seam 1) be moved to stay outside of the delineated wetlands to ensure avoidance, if not, a wetland offset process may need to be initiated. It is recommended that the proposed surface infrastructure be amended to adhere to the delineated high and medium sensitivity areas.

Careful consideration must be afforded each of the mitigation measures provided in this report. In the event that environmental authorisation is issued for this project, proven ecological (or environmental) controls and mitigation measures must be entrenched in the management framework.

11.3 Specialist Recommendation

Considering the above-mentioned information, no fatal flaws were identified for the project. It is the opinion of the specialist that the Elandsfontein project, may be favourably considered. All recommendations and mitigation measures prescribed herein must be considered by the issuing authority.

12 Uncertainties and Gaps in Knowledge

The following limitations should be noted for the study:

- As per the scope of work, the fieldwork component of the assessment comprised of one assessment only, which was conducted during the wet season (5th of March 2020 and 18th of March 2020);
- This project has not assessed any temporal trends for the respective seasons; and
- Despite these limitations, a comprehensive desktop assessment was conducted, in conjunction with the detailed results from the surveys, and as such there is a high confidence in the information provided; and
- The GPS used for water resource delineations is accurate to within five meters. Therefore, the wetland delineation plotted digitally may be offset by at least five meters to either side.

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14 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

July 2020

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

July 2020

Appendix B Flora species expected in the project area and surrounds

Family	Taxon	Author	IUCN	Ecology
Fabaceae	*Acacia dealbata*	Link	NE	Not indigenous; Naturalised; Invasive
Lamiaceae	*Acrotome hispida*	Benth.	LC	Indigenous
Pteridaceae	*Actiniopteris radiata*	(J.Koenig ex Sw.) Link	LC	Indigenous
Asteraceae	*Afroaster serrulatus*	(Harv.) J.C.Manning & Goldblatt	LC	Indigenous
Apiaceae	*Afrosciadium magalismontanum*	(Sond.) P.J.D.Winter	LC	Indigenous
Cyperaceae	*Afroscirpoides dioeca*	(Kunth) Garcia-Madr.		Indigenous
Iridaceae	*Afrosolen sandersonii*	(Baker) Goldblatt & J.C.Manning		Indigenous
Hyacinthaceae	*Albuca shawii*	Baker	LC	Indigenous
Hyacinthaceae	*Albuca virens subsp. virens*	(Ker Gawl.) J.C.Manning & Goldblatt	LC	Indigenous
Orobanchaceae	*Alectra sessiliflora*	(Vahl) Kuntze	LC	Indigenous
Apiaceae	*Alepidea setifera*	N.E.Br.	LC	Indigenous
Asphodelaceae	*Aloe ecklonis*	Salm-Dyck	LC	Indigenous
Asphodelaceae	*Aloe jeppeae*	Klopper & Gideon F.Sm.	LC	Indigenous
Apocynaceae	*Asclepias adscendens*	(Schltr.) Schltr.	LC	Indigenous
Apocynaceae	*Asclepias albens*	(E.Mey.) Schltr.	LC	Indigenous
Apocynaceae	*Asclepias brevipes*	(Schltr.) Schltr.	LC	Indigenous; Endemic
Apocynaceae	*Asclepias crispa var. crispa*	P.J.Bergius	LC	Indigenous; Endemic
Apocynaceae	*Asclepias eminens*	(Harv.) Schltr.	LC	Indigenous
Apocynaceae	*Asclepias fallax*	(Schltr.) Schltr.	LC	Indigenous; Endemic
Apocynaceae	*Asclepias gibba var. gibba*	(E.Mey.) Schltr.	LC	Indigenous
Asparagaceae	*Asparagus flavicaulis subsp. flavicaulis*	(Oberm.) Fellingham & N.L.Mey.	LC	Indigenous
Apocynaceae	*Aspidoglossum biflorum*	E.Mey.	LC	Indigenous
Apocynaceae	*Aspidoglossum glabrescens*	(Schltr.) Kupicha	LC	Indigenous; Endemic
Apocynaceae	*Aspidoglossum interruptum*	(E.Mey.) Bullock	LC	Indigenous
Apocynaceae	*Aspidoglossum validum*	Kupicha	DD	Indigenous
Aytoniaceae	*Asterella wilmsii*	(Steph.) S.W.Arnell		Indigenous
Asteraceae	*Berkheya pinnatifida subsp. ingrata*	(Thunb.) Thell.	LC	Indigenous; Endemic
Asteraceae	*Berkheya radula*	(Harv.) De Wild.	LC	Indigenous
Acanthaceae	*Blepharis innocua*	C.B.Clarke	LC	Indigenous; Endemic
Apocynaceae	*Brachystelma rubellum*	(E.Mey.) Peckover	LC	Indigenous
Asphodelaceae	*Bulbine favosa*	(Thunb.) Schult. & Schult.f.	LC	Indigenous
Cyperaceae	*Bulbostylis contexta*	(Nees) M.Bodard	LC	Indigenous
Cyperaceae	*Bulbostylis oritrephes*	(Ridl.) C.B.Clarke	LC	Indigenous
Cyperaceae	*Bulbostylis schlechteri*	C.B.Clarke	LC	Indigenous; Endemic

Cyperaceae	*Bulbostylis scleropus*	C.B.Clarke	LC	Indigenous
Pilotrichaceae	*Callicostella tristis*	(Mull.Hal.) Broth.		Indigenous
Asteraceae	*Callilepis leptophylla*	Harv.	LC	Indigenous
Colchicaceae	*Camptorrhiza strumosa*	(Baker) Oberm.	LC	Indigenous
Cyperaceae	*Carex glomerabilis*	V.I.Krecz.	LC	Indigenous
Poaceae	*Cenchrus ciliaris*	L.	LC	Indigenous
Scrophulariaceae	*Chaenostoma floribundum*	Benth.	LC	Indigenous
Fabaceae	*Chamaecrista comosa var. capricornia*	E.Mey.	LC	Indigenous
Verbenaceae	*Chascanum hederaceum var. hederaceum*	(Sond.) Moldenke	LC	Indigenous
Gentianaceae	*Chironia krebsii*	Griseb.	LC	Indigenous
Gentianaceae	*Chironia purpurascens subsp. humilis*	(E.Mey.) Benth. & Hook.f.	LC	Indigenous
Poaceae	*Chloris gayana*	Kunth	LC	Indigenous
Agavaceae	*Chlorophytum calyptrocarpum*	(Baker) Kativu	LC	Indigenous
Agavaceae	*Chlorophytum fasciculatum*	(Baker) Kativu	LC	Indigenous
Commelinaceae	*Commelina africana var. africana*	L.	LC	Indigenous
Commelinaceae	*Commelina modesta*	Oberm.	LC	Indigenous
Convolvulaceae	*Convolvulus sagittatus*	Thunb.	LC	Indigenous
Apocynaceae	*Cordylogyne globosa*	E.Mey.	LC	Indigenous
Crassulaceae	*Crassula setulosa var. setulosa*	Harv.	NE	Indigenous
Iridaceae	*Crocosmia paniculata*	(Klatt) Goldblatt	LC	Indigenous
Commelinaceae	*Cyanotis speciosa*	(L.f.) Hassk.	LC	Indigenous
Pilotrichaceae	*Cyclodictyon vallis-gratiae*	(Hampe ex Mull.Hal.) Kuntze		Indigenous
Orobanchaceae	*Cycnium tubulosum subsp. tubulosum*	(L.f.) Engl.	LC	Indigenous
Poaceae	*Cynodon dactylon*	(L.) Pers.	LC	Indigenous
Cyperaceae	*Cyperus decurvatus*	(C.B.Clarke) C.Archer & Goetgh.	LC	Indigenous
Cyperaceae	*Cyperus denudatus*	L.f.	LC	Indigenous
Cyperaceae	*Cyperus difformis*	L.	LC	Indigenous
Cyperaceae	*Cyperus margaritaceus var. margaritaceus*	Vahl	LC	Indigenous
Cyperaceae	*Cyperus marginatus*	Thunb.	LC	Indigenous
Cyperaceae	*Cyperus obtusiflorus var. obtusiflorus*	Vahl	LC	Indigenous
Amaryllidaceae	*Cyrtanthus breviflorus*	Harv.	LC	Indigenous
Amaryllidaceae	*Cyrtanthus tuckii var. transvaalensis*	Baker	LC	Indigenous
Caryophyllaceae	*Dianthus mooiensis subsp. mooiensis*	F.N.Williams	NE	Indigenous; Endemic
Pedaliaceae	*Dicerocaryum senecioides*	(Klotzsch) Abels	LC	Indigenous

Asteraceae	*Dicoma macrocephala*	DC.	LC	Indigenous
Iridaceae	*Dierama mossii*	(N.E.Br.) Hilliard	LC	Indigenous
Asteraceae	*Dimorphotheca caulescens*	Harv.	LC	Indigenous
Asteraceae	*Dimorphotheca spectabilis*	Schltr.	LC	Indigenous; Endemic
Dioscoreaceae	*Dioscorea dregeana*	(Kunth) T.Durand & Schinz	LC	Indigenous
Ebenaceae	*Diospyros lycioides subsp. guerkei*	Desf.	LC	Indigenous
Hyacinthaceae	*Dipcadi gracillimum*	Baker	LC	Indigenous
Hyacinthaceae	*Dipcadi marlothii*	Engl.	LC	Indigenous
Hyacinthaceae	*Dipcadi rigidifolium*	Baker	LC	Indigenous
Hyacinthaceae	*Dipcadi viride*	(L.) Moench	LC	Indigenous
Orchidaceae	*Disa rhodantha*	Schltr.	LC	Indigenous
Orchidaceae	*Disa versicolor*	Rchb.f.	LC	Indigenous
Droseraceae	*Drosera madagascariensis*	DC.	LC	Indigenous
Acanthaceae	*Dyschoriste costata*	(Nees) Kuntze	LC	Indigenous; Endemic
Poaceae	*Echinochloa jubata*	Stapf	LC	Indigenous
Cyperaceae	*Eleocharis dregeana*	Steud.	LC	Indigenous
Cyperaceae	*Eleocharis limosa*	(Schrad.) Schult.	LC	Indigenous
Fabaceae	*Elephantorrhiza elephantina*	(Burch.) Skeels	LC	Indigenous
Sapotaceae	*Englerophytum magalismontanum*	(Sond.) T.D.Penn.	LC	Indigenous
Poaceae	*Eragrostis curvula*	(Schrad.) Nees	LC	Indigenous
Poaceae	*Eragrostis inamoena*	K.Schum.	LC	Indigenous
Poaceae	*Eragrostis plana*	Nees	LC	Indigenous
Ericaceae	*Erica drakensbergensis*	Guthrie & Bolus	LC	Indigenous
Fabaceae	*Eriosema burkei var. burkei*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Eriosema cordatum*	E.Mey.	LC	Indigenous
Fabaceae	*Eriosema gunniae*	C.H.Stirt.	LC	Indigenous; Endemic
Fabaceae	*Eriosema psoraleoides*	(Lam.) G.Don	LC	Indigenous
Fabaceae	*Eriosema salignum*	E.Mey.	LC	Indigenous
Ruscaceae	*Eriospermum porphyrovalve*	Baker	LC	Indigenous
Ebenaceae	*Euclea sp.*			
Orchidaceae	*Eulophia hians var. hians*	Spreng.	LC	Indigenous
Orchidaceae	*Eulophia ovalis var. ovalis*	Lindl.	LC	Indigenous
Asteraceae	*Euryops gilfillanii*	Bolus	LC	Indigenous; Endemic
Rubiaceae	*Fadogia homblei*	De Wild.	LC	Indigenous
Convolvulaceae	*Falkia oblonga*	Bernh. ex C.Krauss	LC	Indigenous
Moraceae	*Ficus thonningii*	Blume		Indigenous
Cyperaceae	*Fimbristylis complanata*	(Retz.) Link	LC	Indigenous
Fossombroniaceae	*Fossombronia crispa*	Nees		Indigenous

Fossombroniaceae	*Fossombronia gemmifera*	Perold		Indigenous
Cyperaceae	*Fuirena pubescens var. pubescens*	(Poir.) Kunth	LC	Indigenous
Asteraceae	*Gazania krebsiana subsp. serrulata*	Less.	LC	Indigenous
Asteraceae	*Gazania linearis var. linearis*	(Thunb.) Druce	LC	Indigenous
Asteraceae	*Geigeria aspera var. aspera*	Harv.	LC	Indigenous
Asteraceae	*Gerbera ambigua*	(Cass.) Sch.Bip.	LC	Indigenous
Iridaceae	*Gladiolus antholyzoides*	Baker	LC	Indigenous; Endemic
Iridaceae	*Gladiolus crassifolius*	Baker	LC	Indigenous
Iridaceae	*Gladiolus elliotii*	Baker	LC	Indigenous
Iridaceae	*Gladiolus paludosus*	Baker	VU	Indigenous
Iridaceae	*Gladiolus papilio*	Hook.f.	LC	Indigenous
Iridaceae	*Gladiolus vinosomaculatus*	Kies	LC	Indigenous; Endemic
Iridaceae	*Gladiolus woodii*	Baker	LC	Indigenous
Apocynaceae	*Gomphocarpus glaucophyllus*	Schltr.	LC	Indigenous
Orchidaceae	*Habenaria epipactidea*	Rchb.f.	LC	Indigenous
Orchidaceae	*Habenaria filicornis*	Lindl.	LC	Indigenous
Orchidaceae	*Habenaria nyikana subsp. nyikana*	Rchb.f.	LC	Indigenous
Asteraceae	*Haplocarpha lyrata*	Harv.	LC	Indigenous; Endemic
Asteraceae	*Helichrysum acutatum*	DC.	LC	Indigenous
Asteraceae	*Helichrysum aureonitens*	Sch.Bip.	LC	Indigenous
Asteraceae	*Helichrysum cephaloideum*	DC.	LC	Indigenous
Asteraceae	*Helichrysum nudifolium var. nudifolium*	(L.) Less.	LC	Indigenous
Asteraceae	*Helichrysum subglomeratum*	Less.	LC	Indigenous
Rhamnaceae	*Helinus integrifolius*	(Lam.) Kuntze	LC	Indigenous
Brassicaceae	*Heliophila rigidiuscula*	Sond.	LC	Indigenous
Malvaceae	*Hermannia depressa*	N.E.Br.	LC	Indigenous
Malvaceae	*Hermannia geniculata*	Eckl. & Zeyh.	LC	Indigenous
Malvaceae	*Hermannia lancifolia*	Szyszyl.	LC	Indigenous; Endemic
Malvaceae	*Hermannia sp.*			
Malvaceae	*Hermannia transvaalensis*	Schinz	LC	Indigenous; Endemic
Malvaceae	*Hibiscus aethiopicus var. ovatus*	L.	LC	Indigenous
Asteraceae	*Hilliardiella elaeagnoides*	(DC.) Swelank. & J.C.Manning		Indigenous
Asteraceae	*Hilliardiella hirsuta*	(DC.) H.Rob.	LC	Indigenous
Apocynaceae	*Huernia loeseneriana*	Schltr.	LC	Indigenous
Poaceae	*Hyparrhenia hirta*	(L.) Stapf	LC	Indigenous
Hypericaceae	*Hypericum lalandii*	Choisy	LC	Indigenous
Hypoxidaceae	*Hypoxis hemerocallidea*	Fisch., C.A.Mey. & Ave-Lall.	LC	Indigenous
Hypoxidaceae	*Hypoxis rigidula var. rigidula*	Baker	LC	Indigenous
Fabaceae	*Indigofera atrata*	N.E.Br.	LC	Indigenous

Fabaceae	*Indigofera egens*	N.E.Br.	LC	Indigenous; Endemic
Fabaceae	*Indigofera mollicoma*	N.E.Br.	LC	Indigenous
Fabaceae	*Indigofera oxalidea*	Welw. ex Baker	LC	Indigenous
Fabaceae	*Indigofera oxytropis*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Indigofera velutina*	E.Mey.	LC	Indigenous
Convolvulaceae	*Ipomoea bathycolpos*	Hallier f.	LC	Indigenous; Endemic
Convolvulaceae	*Ipomoea crassipes var. crassipes*	Hook.	LC	Indigenous
Convolvulaceae	*Ipomoea oenotherae*	(Vatke) Hallier f.		Indigenous
Convolvulaceae	*Ipomoea ommanneyi*	Rendle	LC	Indigenous
Poaceae	*Ischaemum fasciculatum*	Brongn.	LC	Indigenous
Scrophulariaceae	*Jamesbrittenia aurantiaca*	(Burch.) Hilliard	LC	Indigenous
Euphorbiaceae	*Jatropha lagarinthoides*	Sond.	LC	Indigenous; Endemic
Juncaceae	*Juncus dregeanus subsp. dregeanus*	Kunth	LC	Indigenous
Juncaceae	*Juncus exsertus*	Buchenau	LC	Indigenous
Juncaceae	*Juncus oxycarpus*	E.Mey. ex Kunth	LC	Indigenous
Asphodelaceae	*Kniphofia ensifolia subsp. ensifolia*	Baker	LC	Indigenous
Asphodelaceae	*Kniphofia porphyrantha*	Baker	LC	Indigenous
Poaceae	*Koeleria capensis*	(Steud.) Nees	LC	Indigenous
Rubiaceae	*Kohautia amatymbica*	Eckl. & Zeyh.	LC	Indigenous
Cyperaceae	*Kyllinga alba*	Nees	LC	Indigenous
Cyperaceae	*Kyllinga erecta var. erecta*	Schumach.	LC	Indigenous
Asteraceae	*Lactuca inermis*	Forssk.	LC	Indigenous
Thymelaeaceae	*Lasiosiphon capitatus*	(L.f.) Burtt Davy	LC	Indigenous
Thymelaeaceae	*Lasiosiphon kraussianus*	(Meisn.) Meisn.		Indigenous
Thymelaeaceae	*Lasiosiphon microphyllus*	(Meisn.) Meisn.	LC	Indigenous; Endemic
Asteraceae	*Lasiospermum pedunculare*	Lag.	LC	Indigenous; Endemic
Hyacinthaceae	*Ledebouria cooperi*	(Hook.f.) Jessop	LC	Indigenous
Hyacinthaceae	*Ledebouria marginata*	(Baker) Jessop	LC	Indigenous
Poaceae	*Leersia hexandra*	Sw.	LC	Indigenous
Fabaceae	*Leobordea foliosa*	(Bolus) B.-E.van Wyk & Boatwr.	LC	Indigenous
Poaceae	*Leptochloa fusca*	(L.) Kunth	LC	Indigenous
Fabaceae	*Listia solitudinis*	(Dummer) B.-E.van Wyk & Boatwr.	LC	Indigenous; Endemic
Lobeliaceae	*Lobelia erinus*	L.	LC	Indigenous
Lobeliaceae	*Lobelia sonderiana*	(Kuntze) Lammers	LC	Indigenous

Scrophulariaceae	*Manulea parviflora var. parviflora*	Benth.	LC	Indigenous
Scrophulariaceae	*Melanospermum transvaalense*	(Hiern) Hilliard	LC	Indigenous; Endemic
Poaceae	*Melinis nerviglumis*	(Franch.) Zizka	LC	Indigenous
Fabaceae	*Melolobium alpinum*	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	*Melolobium wilmsii*	Harms	LC	Indigenous; Endemic
Convolvulaceae	*Merremia verecunda*	Rendle	LC	Indigenous
Aizoaceae	*Mossia intervallaris*	(L.Bolus) N.E.Br.	LC	Indigenous
Fabaceae	*Neorautanenia ficifolia*	(Benth. ex Harv.) C.A.Sm.	LC	Indigenous
Amaryllidaceae	*Nerine rehmannii*	(Baker) L.Bolus	LC	Indigenous
Lythraceae	*Nesaea sagittifolia var. sagittifolia*	(Sond.) Koehne	LC	Indigenous
Lythraceae	*Nesaea schinzii*	Koehne	LC	Indigenous
Asteraceae	*Nidorella anomala*	Steetz	LC	Indigenous
Asteraceae	*Nidorella hottentotica*	DC.	LC	Indigenous
Menyanthaceae	*Nymphoides thunbergiana*	(Griseb.) Kuntze	LC	Indigenous
Lamiaceae	*Ocimum obovatum subsp. obovatum*	E.Mey. ex Benth.	NE	Indigenous
Apocynaceae	*Orbea miscella*	(N.E.Br.) Meve	LC	Indigenous; Endemic
Hyacinthaceae	*Ornithogalum flexuosum*	(Thunb.) U.Mull.-Doblies & D.Mull.-Doblies	LC	Indigenous
Poaceae	*Oropetium capense*	Stapf	LC	Indigenous
Asteraceae	*Osteospermum striatum*	Burtt Davy	LC	Indigenous; Endemic
Oxalidaceae	*Oxalis latifolia*	Kunth		Not indigenous; Naturalised; Invasive
Oxalidaceae	*Oxalis obliquifolia*	Steud. ex A.Rich.	LC	Indigenous
Polygonaceae	*Oxygonum dregeanum subsp. canescens*	Meisn.	NE	Indigenous; Endemic
Polygonaceae	*Oxygonum dregeanum subsp. canescens*	Meisn.	NE	Indigenous
Anacardiaceae	*Ozoroa paniculosa var. paniculosa*	(Sond.) R.Fern. & A.Fern.	LC	Indigenous
Rubiaceae	*Pachystigma thamnus*	Robyns	LC	Indigenous; Endemic
Poaceae	*Panicum hygrocharis*	Steud.	LC	Indigenous
Fabaceae	*Pearsonia cajanifolia subsp. cajanifolia*	(Harv.) Polhill	LC	Indigenous; Endemic
Geraniaceae	*Pelargonium luridum*	(Andrews) Sweet	LC	Indigenous
Geraniaceae	*Pelargonium pseudofumarioides*	R.Knuth	LC	Indigenous
Rubiaceae	*Pentanisia angustifolia*	(Hochst.) Hochst.	LC	Indigenous
Rubiaceae	*Pentanisia prunelloides subsp. prunelloides*	(Klotzsch ex Eckl. & Zeyh.) Walp.	LC	Indigenous
Apocynaceae	*Pentarrhinum insipidum*	E.Mey.	LC	Indigenous
Apocynaceae	*Periglossum angustifolium*	Decne.	LC	Indigenous
Polygonaceae	*Persicaria decipiens*	(R.Br.) K.L.Wilson	LC	Indigenous

Polygonaceae	*Persicaria lapathifolia*	(L.) Delarbre		Not indigenous; Naturalised; Invasive
Poaceae	*Phalaris arundinacea*	L.	NE	Not indigenous; Naturalised
Poaceae	*Phalaris canariensis*	L.	NE	Not indigenous; Naturalised
Pittosporaceae	*Pittosporum viridiflorum*	Sims	LC	Indigenous
Lamiaceae	*Platostoma rotundifolium*	(Briq.) A.J.Paton	LC	Indigenous
Caryophyllaceae	*Polycarpaea corymbosa var. corymbosa*	(L.) Lam.		Not indigenous; Naturalised
Polygalaceae	*Polygala houtboshiana*	Chodat	LC	Indigenous
Polygalaceae	*Polygala producta*	N.E.Br.	LC	Indigenous
Polygalaceae	*Polygala sp.*			
Polygalaceae	*Polygala spicata*	Chodat	LC	Indigenous
Polygalaceae	*Polygala transvaalensis subsp. transvaalensis*	Chodat	LC	Indigenous
Portulacaceae	*Portulaca hereroensis*	Schinz	LC	Indigenous
Portulacaceae	*Portulaca quadrifida*	L.	LC	Indigenous
Potamogetonaceae	*Potamogeton octandrus*	Poir.	LC	Indigenous
Potamogetonaceae	*Potamogeton pectinatus*	L.	LC	Indigenous
Potamogetonaceae	*Potamogeton trichoides*	Cham. & Schltdl.	LC	Indigenous
Proteaceae	*Protea gaguedi*	J.F.Gmel.	LC	Indigenous
Cyperaceae	*Pycreus macranthus*	(Boeck.) C.B.Clarke	LC	Indigenous
Rubiaceae	*Pygmaeothamnus zeyheri var. rogersii*	(Sond.) Robyns	LC	Indigenous; Endemic
Ranunculaceae	*Ranunculus multifidus*	Forssk.	LC	Indigenous
Apocynaceae	*Raphionacme hirsuta*	(E.Mey.) R.A.Dyer	LC	Indigenous
Orobanchaceae	*Rhamphicarpa brevipedicellata*	O.J.Hansen	LC	Indigenous
Fabaceae	*Rhynchosia monophylla*	Schltr.	LC	Indigenous
Fabaceae	*Rhynchosia nervosa var. nervosa*	Benth. ex Harv.	LC	Indigenous
Fabaceae	*Rhynchosia totta var. totta*	(Thunb.) DC.	LC	Indigenous
Aneuraceae	*Riccardia fastigiata*	(Lehm.) Trevis.		Indigenous
Ricciaceae	*Riccia atropurpurea*	Sim		Indigenous
Ricciaceae	*Riccia natalensis*	Sim		Indigenous; Endemic
Ricciaceae	*Riccia volkii*	S.W.Arnell		Indigenous
Brassicaceae	*Rorippa fluviatilis var. fluviatilis*	(E.Mey. ex Sond.) R.A.Dyer	LC	Indigenous
Lamiaceae	*Rotheca hirsuta*	(Hochst.) R.Fern.	LC	Indigenous
Orchidaceae	*Satyrium hallackii subsp. ocellatum*	Bolus	LC	Indigenous
Orchidaceae	*Satyrium longicauda var. longicauda*	Lindl.	NE	Indigenous
Orchidaceae	*Satyrium parviflorum*	Sw.	LC	Indigenous
Orchidaceae	*Satyrium trinerve*	Lindl.	LC	Indigenous
Asteraceae	*Schistostephium crataegifolium*	(DC.) Fenzl ex Harv.	LC	Indigenous

Hyacinthaceae	*Schizocarphus nervosus*	(Burch.) Van der Merwe	LC	Indigenous
Orchidaceae	*Schizochilus zeyheri*	Sond.	LC	Indigenous
Cyperaceae	*Schoenoplectus corymbosus*	(Roth ex Roem. & Schult.) J.Raynal	LC	Indigenous
Cyperaceae	*Schoenoplectus decipiens*	(Nees) J.Raynal	LC	Indigenous
Cyperaceae	*Schoenoplectus scirpoides*	(Schrad.) Browning	LC	Indigenous
Cyperaceae	*Scleria catophylla*	C.B.Clarke	LC	Indigenous
Anacardiaceae	*Searsia zeyheri*	(Sond.) Moffett	LC	Indigenous; Endemic
Scrophulariaceae	*Selago sp.*			
Asteraceae	*Senecio coronatus*	(Thunb.) Harv.	LC	Indigenous
Asteraceae	*Senecio glanduloso-pilosus*	Volkens & Muschl.	LC	Indigenous; Endemic
Asteraceae	*Senecio gregatus*	Hilliard	LC	Indigenous
Asteraceae	*Senecio harveianus*	MacOwan	LC	Indigenous
Asteraceae	*Senecio hieracioides*	DC.	LC	Indigenous
Asteraceae	*Senecio inaequidens*	DC.	LC	Indigenous
Asteraceae	*Senecio polyodon var. polyodon*	DC.	LC	Indigenous
Asteraceae	*Senecio sp.*			
Fabaceae	*Senegalia caffra*	(Thunb.) P.J.H.Hurter & Mabb.	LC	Indigenous
Caryophyllaceae	*Silene burchellii subsp. pilosellifolia*	Otth ex DC.		Indigenous
Brassicaceae	*Sisymbrium turczaninowii*	Sond.	LC	Indigenous
Apocynaceae	*Sisyranthus randii*	S.Moore	LC	Indigenous
Fabaceae	*Smithia erubescens*	(E.Mey.) Baker f.	LC	Indigenous
Solanaceae	*Solanum giganteum*	Jacq.	LC	Indigenous
Solanaceae	*Solanum nigrum*	L.		Not indigenous; Naturalised
Solanaceae	*Solanum retroflexum*	Dunal	LC	Indigenous
Solanaceae	*Solanum sisymbriifolium*	Lam.		Not indigenous; Naturalised; Invasive
Asteraceae	*Sonchus dregeanus*	DC.	LC	Indigenous
Orobanchaceae	*Sopubia cana var. cana*	Harv.	LC	Indigenous
Sphagnaceae	*Sphagnum sp.*			
Poaceae	*Sporobolus africanus*	(Poir.) Robyns & Tournay	LC	Indigenous
Poaceae	*Sporobolus albicans*	(Nees ex Trin.) Nees	LC	Indigenous
Poaceae	*Stiburus conrathii*	Hack.	LC	Indigenous
Gesneriaceae	*Streptocarpus dunnii*	Hook.f.	LC	Indigenous
Orobanchaceae	*Striga bilabiata subsp. bilabiata*	(Thunb.) Kuntze	LC	Indigenous
Pallaviciniaceae	*Symphyogyna brasiliensis*	Nees & Mont.		Indigenous
Lamiaceae	*Syncolostemon pretoriae*	(Gurke) D.F.Otieno	LC	Indigenous
Myrtaceae	*Syzygium cordatum*	Hochst. ex C.Krauss		Indigenous
Fabaceae	*Tephrosia capensis var. capensis*	(Jacq.) Pers.	LC	Indigenous

Fabaceae	*Tephrosia semiglabra*	Sond.	LC	Indigenous
Lamiaceae	*Teucrium trifidum*	Retz.	LC	Indigenous
Thelypteridaceae	*Thelypteris confluens*	(Thunb.) C.V.Morton	LC	Indigenous
Santalaceae	*Thesium pallidum*	A.DC.	LC	Indigenous
Santalaceae	*Thesium spartioides*	A.W.Hill	LC	Indigenous
Asteraceae	*Tolpis capensis*	(L.) Sch.Bip.	LC	Indigenous
Asphodelaceae	*Trachyandra asperata var. nataglencoensis*	Kunth	LC	Indigenous
Asphodelaceae	*Trachyandra saltii var. saltii*	(Baker) Oberm.	LC	Indigenous
Alliaceae	*Tulbaghia leucantha*	Baker	LC	Indigenous
Asteraceae	*Ursinia nana subsp. leptophylla*	DC.	LC	Indigenous
Asteraceae	*Ursinia sp.*			
Lentibulariaceae	*Utricularia livida*	E.Mey.	LC	Indigenous
Lentibulariaceae	*Utricularia stellaris*	L.f.	LC	Indigenous
Verbenaceae	*Verbena brasiliensis*	Vell.		Not indigenous; Naturalised; Invasive
Fabaceae	*Vigna vexillata var. vexillata*	(L.) A.Rich.	LC	Indigenous
Campanulaceae	*Wahlenbergia undulata*	(L.f.) A.DC.	LC	Indigenous
Campanulaceae	*Wahlenbergia virgata*	Engl.	LC	Indigenous
Iridaceae	*Watsonia bella*	N.E.Br. ex Goldblatt	LC	Indigenous
Solanaceae	*Withania somnifera*	(L.) Dunal	LC	Indigenous
Asteraceae	*Xanthium strumarium*	L.		Not indigenous; Naturalised; Invasive
Velloziaceae	*Xerophyta retinervis*	Baker	LC	Indigenous
Xyridaceae	*Xyris gerrardii*	N.E.Br.	LC	Indigenous
Scrophulariaceae	*Zaluzianskya spathacea*	(Benth.) Walp.	LC	Indigenous
Rutaceae	*Zanthoxylum thorncroftii*	(I.Verd.) P.G.Waterman	LC	Indigenous; Endemic
Fabaceae	*Zornia linearis*	E.Mey.	LC	Indigenous

Appendix C Avifauna species expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
Accipiter melanoleucus	Sparrowhawk, Black	Unlisted	LC
Acridotheres tristis	Myna, Common	Unlisted	LC
Acrocephalus arundinaceus	Reed-warbler, Great	Unlisted	LC
Acrocephalus baeticatus	Reed-warbler, African	Unlisted	Unlisted
Acrocephalus gracilirostris	Swamp-warbler, Lesser	Unlisted	LC
Acrocephalus palustris	Warbler, Marsh	Unlisted	LC
Actophilornis africanus	Jacana, African	Unlisted	LC
Afrotis afraoides	Korhaan, Northern Black	Unlisted	LC
Alcedo cristata	Kingfisher, Malachite	Unlisted	Unlisted
Alopochen aegyptiacus	Goose, Egyptian	Unlisted	LC
Amadina erythrocephala	Finch, Red-headed	Unlisted	LC
Amandava subflava	Waxbill, Orange-breasted	Unlisted	Unlisted
Amaurornis flavirostris	Crake, Black	Unlisted	LC
Amblyospiza albifrons	Weaver, Thick-billed	Unlisted	LC
Anas capensis	Teal, Cape	Unlisted	LC
Anas erythrorhyncha	Teal, Red-billed	Unlisted	LC
Anas hottentota	Teal, Hottentot	Unlisted	LC
Anas platyrhynchos	Duck, Mallard	Unlisted	LC
Anas smithii	Shoveler, Cape	Unlisted	LC
Anas sparsa	Duck, African Black	Unlisted	LC
Anas undulata	Duck, Yellow-billed	Unlisted	LC
Anhinga rufa	Darter, African	Unlisted	LC
Anthropoides paradiseus	Crane, Blue	NT	VU
Anthus cinnamomeus	Pipit, African	Unlisted	LC
Anthus leucophrys	Pipit, Plain-backed	Unlisted	LC
Anthus similis	Pipit, Long-billed	Unlisted	LC
Anthus vaalensis	Pipit, Buffy	Unlisted	LC
Apalis thoracica	Apalis, Bar-throated	Unlisted	LC
Apus affinis	Swift, Little	Unlisted	LC
Apus apus	Swift, Common	Unlisted	LC
Apus caffer	Swift, White-rumped	Unlisted	LC
Apus horus	Swift, Horus	Unlisted	LC
Aquila wahlbergi	Eagle, Wahlberg's	Unlisted	LC
Ardea cinerea	Heron, Grey	Unlisted	LC
Ardea melanocephala	Heron, Black-headed	Unlisted	LC
Ardea purpurea	Heron, Purple	Unlisted	LC
Asio capensis	Owl, Marsh	Unlisted	LC
Aviceda cuculoides	Hawk, African Cuckoo	Unlisted	LC
Bostrychia hagedash	Ibis, Hadeda	Unlisted	LC
Bradypterus baboecala	Rush-warbler, Little	Unlisted	LC
Bubulcus ibis	Egret, Cattle	Unlisted	LC
Burhinus capensis	Thick-knee, Spotted	Unlisted	LC

Buteo rufofuscus	Buzzard, Jackal	Unlisted	LC
Buteo vulpinus	Buzzard, Common	Unlisted	Unlisted
Calandrella cinerea	Lark, Red-capped	Unlisted	LC
Calidris minuta	Stint, Little	LC	LC
Caprimulgus pectoralis	Nightjar, Fiery-necked	Unlisted	LC
Caprimulgus tristigma	Nightjar, Freckled	Unlisted	LC
Centropus burchellii	Coucal, Burchell's	Unlisted	Unlisted
Cercotrichas leucophrys	Scrub-robin, White-browed	Unlisted	LC
Ceryle rudis	Kingfisher, Pied	Unlisted	LC
Chalcomitra amethystina	Sunbird, Amethyst	Unlisted	LC
Charadrius pecuarius	Plover, Kittlitz's	Unlisted	LC
Charadrius tricollaris	Plover, Three-banded	Unlisted	LC
Chersomanes albofasciata	Lark, Spike-heeled	Unlisted	LC
Chlidonias hybrida	Tern, Whiskered	Unlisted	LC
Chlidonias leucopterus	Tern, White-winged	Unlisted	LC
Chrysococcyx caprius	Cuckoo, Diderick	Unlisted	LC
Ciconia ciconia	Stork, White	Unlisted	LC
Cinnyricinclus leucogaster	Starling, Violet-backed	Unlisted	LC
Cinnyris afer	Sunbird, Greater Double-collared	Unlisted	LC
Cinnyris talatala	Sunbird, White-bellied	Unlisted	LC
Circaetus cinereus	Snake-eagle, Brown	Unlisted	LC
Circaetus pectoralis	Snake-eagle, Black-chested	Unlisted	LC
Circus ranivorus	Marsh-harrier, African	EN	LC
Cisticola aridulus	Cisticola, Desert	Unlisted	LC
Cisticola ayresii	Cisticola, Wing-snapping	Unlisted	LC
Cisticola fulvicapilla	Neddicky, Neddicky	Unlisted	LC
Cisticola juncidis	Cisticola, Zitting	Unlisted	LC
Cisticola lais	Cisticola, Wailing	Unlisted	LC
Cisticola textrix	Cisticola, Cloud	Unlisted	LC
Cisticola tinniens	Cisticola, Levaillant's	Unlisted	LC
Clamator jacobinus	Cuckoo, Jacobin	Unlisted	LC
Colius striatus	Mousebird, Speckled	Unlisted	LC
Columba guinea	Pigeon, Speckled	Unlisted	LC
Columba livia	Dove, Rock	Unlisted	LC
Corvus albus	Crow, Pied	Unlisted	LC
Corvus capensis	Crow, Cape	Unlisted	LC
Cossypha caffra	Robin-chat, Cape	Unlisted	LC
Coturnix coturnix	Quail, Common	Unlisted	LC
Creatophora cinerea	Starling, Wattled	Unlisted	LC
Crithagra atrogularis	Canary, Black-throated	Unlisted	LC
Crithagra flaviventris	Canary, Yellow	Unlisted	LC
Crithagra gularis	Seedeater, Streaky-headed	Unlisted	LC
Crithagra mozambicus	Canary, Yellow-fronted	Unlisted	LC
Cuculus clamosus	Cuckoo, Black	Unlisted	LC
Cuculus solitarius	Cuckoo, Red-chested	Unlisted	LC
Cypsiurus parvus	Palm-swift, African	Unlisted	LC

Delichon urbicum	House-martin, Common	Unlisted	LC
Dendrocygna viduata	Duck, White-faced Whistling	Unlisted	LC
Dendropicos fuscescens	Woodpecker, Cardinal	Unlisted	LC
Dicrurus adsimilis	Drongo, Fork-tailed	Unlisted	LC
Egretta alba	Egret, Great	Unlisted	LC
Egretta garzetta	Egret, Little	Unlisted	LC
Egretta intermedia	Egret, Yellow-billed	Unlisted	LC
Elanus caeruleus	Kite, Black-shouldered	Unlisted	LC
Emberiza tahapisi	Bunting, Cinnamon-breasted	Unlisted	LC
Eremopterix leucotis	Sparrowlark, Chestnut-backed	Unlisted	LC
Estrilda astrild	Waxbill, Common	Unlisted	LC
Euplectes afer	Bishop, Yellow-crowned	Unlisted	LC
Euplectes albonotatus	Widowbird, White-winged	Unlisted	LC
Euplectes ardens	Widowbird, Red-collared	Unlisted	LC
Euplectes axillaris	Widowbird, Fan-tailed	Unlisted	LC
Euplectes orix	Bishop, Southern Red	Unlisted	LC
Euplectes progne	Widowbird, Long-tailed	Unlisted	LC
Falco amurensis	Falcon, Amur	Unlisted	LC
Falco naumanni	Kestrel, Lesser	Unlisted	LC
Falco peregrinus	Falcon, Peregrine	Unlisted	LC
Falco rupicoloides	Kestrel, Greater	Unlisted	LC
Falco rupicolus	Kestrel, Rock	Unlisted	LC
Fulica cristata	Coot, Red-knobbed	Unlisted	LC
Gallinago nigripennis	Snipe, African	Unlisted	LC
Gallinula chloropus	Moorhen, Common	Unlisted	LC
Geronticus calvus	Ibis, Southern Bald	VU	VU
Halcyon senegalensis	Kingfisher, Woodland	Unlisted	LC
Haliaeetus vocifer	Fish-eagle, African	Unlisted	LC
Himantopus himantopus	Stilt, Black-winged	Unlisted	LC
Hirundo abyssinica	Swallow, Lesser Striped	Unlisted	LC
Hirundo albigularis	Swallow, White-throated	Unlisted	LC
Hirundo cucullata	Swallow, Greater Striped	Unlisted	LC
Hirundo fuligula	Martin, Rock	Unlisted	Unlisted
Hirundo rustica	Swallow, Barn	Unlisted	LC
Hirundo semirufa	Swallow, Red-breasted	Unlisted	LC
Hirundo spilodera	Cliff-swallow, South African	Unlisted	LC
Indicator minor	Honeyguide, Lesser	Unlisted	LC
Ixobrychus minutus	Bittern, Little	Unlisted	LC
Jynx ruficollis	Wryneck, Red-throated	Unlisted	LC
Lagonosticta senegala	Firefinch, Red-billed	Unlisted	LC
Lamprotornis nitens	Starling, Cape Glossy	Unlisted	LC
Laniarius ferrugineus	Boubou, Southern	Unlisted	LC
Lanius collaris	Fiscal, Common (Southern)	Unlisted	LC
Lanius collurio	Shrike, Red-backed	Unlisted	LC
Lanius minor	Shrike, Lesser Grey	Unlisted	LC
Larus cirrocephalus	Gull, Grey-headed	Unlisted	LC

Lophaetus occipitalis	Eagle, Long-crested	Unlisted	LC
Lybius torquatus	Barbet, Black-collared	Unlisted	LC
Macronyx capensis	Longclaw, Cape	Unlisted	LC
Megaceryle maximus	Kingfisher, Giant	Unlisted	Unlisted
Melierax gabar	Goshawk, Gabar	Unlisted	LC
Merops apiaster	Bee-eater, European	Unlisted	LC
Merops bullockoides	Bee-eater, White-fronted	Unlisted	LC
Mirafra africana	Lark, Rufous-naped	Unlisted	LC
Mirafra cheniana	Lark, Melodious	LC	NT
Mirafra fasciolata	Lark, Eastern Clapper	Unlisted	LC
Motacilla capensis	Wagtail, Cape	Unlisted	LC
Muscicapa striata	Flycatcher, Spotted	Unlisted	LC
Myrmecocichla formicivora	Chat, Anteating	Unlisted	LC
Netta erythrophthalma	Pochard, Southern	Unlisted	LC
Nilaus afer	Brubru	Unlisted	LC
Numida meleagris	Guineafowl, Helmeted	Unlisted	LC
Oena capensis	Dove, Namaqua	Unlisted	LC
Oenanthe monticola	Wheatear, Mountain	Unlisted	LC
Oenanthe pileata	Wheatear, Capped	Unlisted	LC
Onychognathus morio	Starling, Red-winged	Unlisted	LC
Oriolus larvatus	Oriole, Black-headed	Unlisted	LC
Ortygospiza atricollis	Quailfinch, African	Unlisted	LC
Oxyura maccoa	Duck, Maccoa	NT	NT
Passer diffusus	Sparrow, Southern Grey-headed	Unlisted	LC
Passer domesticus	Sparrow, House	Unlisted	LC
Passer melanurus	Sparrow, Cape	Unlisted	LC
Peliperdix coqui	Francolin, Coqui	Unlisted	LC
Phalacrocorax africanus	Cormorant, Reed	Unlisted	LC
Phalacrocorax carbo	Cormorant, White-breasted	LC	LC
Philomachus pugnax	Ruff	Unlisted	LC
Phoenicopterus minor	Flamingo, Lesser	NT	NT
Phoenicopterus ruber	Flamingo, Greater	NT	LC
Phoeniculus purpureus	Wood-hoopoe, Green	Unlisted	LC
Phylloscopus trochilus	Warbler, Willow	Unlisted	LC
Platalea alba	Spoonbill, African	Unlisted	LC
Plectropterus gambensis	Goose, Spur-winged	Unlisted	LC
Plegadis falcinellus	Ibis, Glossy	Unlisted	LC
Plocepasser mahali	Sparrow-weaver, White-browed	Unlisted	LC
Ploceus capensis	Weaver, Cape	Unlisted	LC
Ploceus cucullatus	Weaver, Village	Unlisted	LC
Ploceus velatus	Masked-weaver, Southern	Unlisted	LC
Podiceps cristatus	Grebe, Great Crested	Unlisted	LC
Pogoniulus chrysoconus	Tinkerbird, Yellow-fronted	Unlisted	LC
Polemaetus bellicosus	Eagle, Martial	EN	VU
Polyboroides typus	Harrier-Hawk, African	Unlisted	LC
Porphyrio madagascariensis	Swamphen, African Purple	Unlisted	Unlisted

Porzana pusilla	Crake, Baillon's	Unlisted	LC
Prinia flavicans	Prinia, Black-chested	Unlisted	LC
Prinia subflava	Prinia, Tawny-flanked	Unlisted	LC
Prodotiscus regulus	Honeybird, Brown-backed	Unlisted	LC
Psophocichla litsipsirupa	Thrush, Groundscraper	Unlisted	Unlisted
Pternistis natalensis	Spurfowl, Natal	Unlisted	LC
Pternistis swainsonii	Spurfowl, Swainson's	Unlisted	LC
Pycnonotus tricolor	Bulbul, Dark-capped	Unlisted	Unlisted
Quelea quelea	Quelea, Red-billed	Unlisted	LC
Rallus caerulescens	Rail, African	Unlisted	LC
Riparia cincta	Martin, Banded	Unlisted	LC
Riparia paludicola	Martin, Brown-throated	Unlisted	LC
Riparia riparia	Martin, Sand	Unlisted	LC
Sagittarius serpentarius	Secretarybird	VU	VU
Sarothrura rufa	Flufftail, Red-chested	Unlisted	LC
Saxicola torquatus	Stonechat, African	Unlisted	LC
Scleroptila levaillantii	Francolin, Red-winged	Unlisted	LC
Scleroptila levaillantoides	Francolin, Orange River	Unlisted	LC
Scopus umbretta	Hamerkop	Unlisted	LC
Serinus canicollis	Canary, Cape	Unlisted	LC
Sigelus silens	Flycatcher, Fiscal	Unlisted	LC
Spermestes cucullatus	Mannikin, Bronze	Unlisted	Unlisted
Sphenoeacus afer	Grassbird, Cape	Unlisted	LC
Spizocorys conirostris	Lark, Pink-billed	Unlisted	LC
Spreo bicolor	Starling, Pied	Unlisted	LC
Streptopelia capicola	Turtle-dove, Cape	Unlisted	LC
Streptopelia semitorquata	Dove, Red-eyed	Unlisted	LC
Streptopelia senegalensis	Dove, Laughing	Unlisted	LC
Struthio camelus	Ostrich, Common	Unlisted	LC
Tachybaptus ruficollis	Grebe, Little	Unlisted	LC
Tachymarptis melba	Swift, Alpine	Unlisted	LC
Tadorna cana	Shelduck, South African	Unlisted	LC
Tchagra senegalus	Tchagra, Black-crowned	Unlisted	LC
Telophorus zeylonus	Bokmakierie, Bokmakierie	Unlisted	LC
Terpsiphone viridis	Paradise-flycatcher, African	Unlisted	LC
Thalassornis leuconotus	Duck, White-backed	Unlisted	LC
Thamnolaea cinnamomeiventris	Cliff-chat, Mocking	Unlisted	LC
Threskiornis aethiopicus	Ibis, African Sacred	Unlisted	LC
Trachyphonus vaillantii	Barbet, Crested	Unlisted	LC
Tringa glareola	Sandpiper, Wood	Unlisted	LC
Tringa nebularia	Greenshank, Common	Unlisted	LC
Turdoides jardineii	Babbler, Arrow-marked	Unlisted	LC
Turdus libonyanus	Thrush, Kurrichane	Unlisted	Unlisted
Turdus olivaceus	Thrush, Olive	Unlisted	LC
Turdus smithi	Thrush, Karoo	Unlisted	LC
Turnix sylvaticus	Buttonquail, Kurrichane	Unlisted	LC

Tyto alba	Owl, Barn	Unlisted	LC
Upupa africana	Hoopoe, African	Unlisted	LC
Uraeginthus angolensis	Waxbill, Blue	Unlisted	LC
Urocolius indicus	Mousebird, Red-faced	Unlisted	LC
Vanellus armatus	Lapwing, Blacksmith	Unlisted	LC
Vanellus coronatus	Lapwing, Crowned	Unlisted	LC
Vanellus senegallus	Lapwing, African Wattled	Unlisted	LC
Vidua macroura	Whydah, Pin-tailed	Unlisted	LC
Zosterops virens	White-eye, Cape	Unlisted	LC

Appendix D Mammals expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	**IUCN (2017)**
Aepyceros melampus	Impala	LC	LC
Aethomys ineptus	Tete Veld Rat	LC	LC
Aethomys namaquensis	Namaqua rock rat	LC	LC
Alcelaphus buselaphus	Hartebeest	LC	LC
Antidorcas marsupialis	Sclater's Shrew	LC	LC
Aonyx capensis	Cape Clawless Otter	NT	NT
Atelerix frontalis	South Africa Hedgehog	NT	LC
Atilax paludinosus	Water Mongoose	LC	LC
Canis mesomelas	Black-backed Jackal	LC	LC
Caracal caracal	Caracal	LC	LC
Ceratotherium simum	White Rhinoceros	NT	NT
Cloeotis percivali	Short-eared Trident Bat	EN	LC
Connochaetes gnou	Black Wildebeest	LC	LC
Connochaetes taurinus	Blue Wildebeest	LC	LC
Crocidura cyanea	Reddish-grey Musk Shrew	LC	LC
Crocidura maquassiensis	Makwassie musk shrew	VU	LC
Crocidura silacea	Lesser Grey-brown Musk Shrew	LC	LC
Cryptomys hottentotus	Common Mole-rat	LC	LC
Cynictis penicillata	Yellow Mongoose	LC	LC
Damaliscus pygargus	Blesbok	LC	LC
Dasymys incomtus	African Marsh rat	NT	LC
Dendromus melanotis	Grey Climbing Mouse	LC	LC
Diceros bicornis	Black Rhinoceros	EN	CR
Eidolon helvum	African Straw-colored Fruit Bat	LC	NT
Elephantulus brachyrhynchus	Short-snouted Sengi	LC	LC
Elephantulus myurus	Eastern Rock Sengi	LC	LC
Epomophorus wahlbergi	Wahlberg's epauletted fruit bat	LC	LC
Eptesicus hottentotus	Long-tailed Serotine Bat	LC	LC
Equus quagga	Plains Zebra	LC	NT
Felis nigripes	Black-footed Cat	VU	VU
Felis silvestris	African Wildcat	LC	LC
Genetta genetta	Small-spotted Genet	LC	LC
Gerbilliscus brantsii	Highveld Gerbil	LC	LC

Gerbilliscus leucogaster	Bushveld Gerbil	LC	LC
Herpestes sanguineus	Slender Mongoose	LC	LC
Hipposideros caffer	Sundevall's Leaf-nosed Bat	LC	LC
Hydrictis maculicollis	Spotted-necked Otter	VU	NT
Hystrix africaeaustralis	Cape Porcupine	LC	LC
Ichneumia albicauda	White-tailed Mongoose	LC	LC
Ictonyx striatus	Striped Polecat	LC	LC
Kerivoula lanosa	Lesser Woolly Bat	LC	LC
Leptailurus serval	Serval	NT	LC
Lepus saxatilis	Scrub Hare	LC	LC
Lepus victoriae	African Savanna Hare	LC	LC
Mastomys coucha	Multimammate Mouse	LC	LC
Mastomys natalensis	Natal Multimammate Mouse	LC	LC
Mellivora capensis	Honey Badger	LC	LC
Mungos mungo	Banded Mongoose	LC	LC
Mus musculus	House Mouse	Unlisted	LC
Myotis welwitschii	Welwitsch's Hairy Bat	LC	LC
Mystromys albicaudatus	White-tailed Rat	VU	EN
Neoromicia capensis	Cape Serotine Bat	LC	LC
Neoromicia zuluensis	Aloe Bat	LC	LC
Nycteris thebaica	Egyptian Slit-faced Bat	LC	LC
Orycteropus afer	Aardvark	LC	LC
Otomys angoniensis	Angoni Vlei Rat	LC	LC
Otomys irroratus	Vlei Rat (Fynbos type)	LC	LC
Ourebia ourebi	Oribi	EN	LC
Panthera pardus	Leopard	VU	VU
Papio ursinus	Chacma Baboon	LC	LC
Parahyaena brunnea	Brown Hyaena	NT	NT
Pedetes capensis	Springhare	LC	LC
Pelea capreolus	Grey Rhebok	NT	LC
Poecilogale albinucha	African Striped Weasel	NT	LC
Procavia capensis	Rock Hyrax	LC	LC
Pronolagus randensis	Jameson's Red Rock Rabbit	LC	LC
Pronolagus saundersiae	Hewitt's Red Rock Rabbit	LC	LC
Proteles cristata	Aardwolf	LC	LC
Raphicerus campestris	Steenbok	LC	LC
Rattus rattus	House Rat	Exotic (Not listed)	LC
Redunca fulvorufula	Mountain Reedbuck	EN	LC
Rhabdomys pumilio	Xeric Four-striped Mouse	LC	LC
Rhinolophus clivosus	Geoffroy's Horseshoe Bat	LC	LC
Rhinolophus darlingi	Darling's Horseshoe Bat	LC	LC
Saccostomus campestris	Pouched Mouse	LC	LC
Sauromys petrophilus	Flat-headed Free-tail Bat	LC	LC
Scotophilus dinganii	Yellow House Bat	LC	LC
Steatomys pratensis	Fat Mouse	LC	LC
Suncus varilla	Lesser Dwarf Shrew	LC	LC

Suricata suricatta	Suricate	LC	LC
Sylvicapra grimmia	Common Duiker	LC	LC
Syncerus caffer	African Buffalo	LC	LC
Tadarida aegyptiaca	Egyptian Free-tailed Bat	LC	LC
Taphozous mauritianus	Mauritian Tomb Bat	LC	LC
Thryonomys swinderianus	Greater Cane Rat	LC	LC
Tragelaphus oryx	Common Eland	LC	LC
Vulpes chama	Cape Fox	LC	LC

Appendix E Reptiles species expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	**IUCN (2017)**
Acanthocercus atricollis	Southern Tree Agama	LC	LC
Acontias gracilicauda	Thin-tailed Legless Skink	LC	LC
Afroedura nivaria	Drankensberg Flat Gecko	LC	LC
Afrotyphlops bibronii	Bibron's Blind Snake	LC	LC
Agama aculeata distanti	Eastern Ground Agama	LC	LC
Agama atra	Southern Rock Agama	LC	LC
Aparallactus capensis	Black-headed Centipede-eater	LC	LC
Atractaspis bibronii	Bibron's Stiletto Snake	LC	Unlisted
Bitis arietans arietans	Puff Adder	LC	Unlisted
Boaedon capensis	Brown House Snake	LC	LC
Causus defilippii	Snouted Night Adder	LC	Unlisted
Causus rhombeatus	Rhombic Night Adder	LC	LC
Chamaeleo dilepis	Common Flap-neck Chameleon	LC	LC
Chondrodactylus turneri	Turner's Gecko	LC	Unlisted
Cordylus vittifer	Common Girdled Lizard	LC	LC
Crocodylus niloticus	Nile Crocodile	VU	LC
Crotaphopeltis hotamboeia	Red-lipped Snake	LC	Unlisted
Dasypeltis scabra	Rhombic Egg-eater	LC	LC
Dendroaspis polylepis	Black Mamba	LC	LC
Dispholidus typus	Boomslang	LC	Unlisted
Duberria lutrix	Common Slug-eater	LC	LC
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	LC	Unlisted
Heliobolus lugubris	Bushveld Lizard	LC	Unlisted
Hemachatus haemachatus	Rinkhals	LC	LC
Hemidactylus mabouia	Common Tropical House Gecko	LC	Unlisted
Homopholis wahlbergii	Wahlberg's Velvet Gecko	LC	LC
Ichnotropis capensis	Ornate Rough-scaled Lizard	LC	Unlisted
Kinixys lobatsiana	Lobatse hinged-back Tortoise	LC	LC
Lamprophis aurora	Aurora House Snake	LC	LC
Leptotyphlops jacobseni	Jacobsen's Thread Snake	LC	LC
Leptotyphlops scutifrons scutifrons	Peters' Thread Snake	LC	Unlisted
Lycodonomorphus inornatus	Olive House Snake	LC	LC
Lycodonomorphus rufulus	Brown Water Snake	LC	Unlisted
Lycophidion capense capense	Cape Wolf Snake	LC	Unlisted
Lycophidion variegatum	Variegated Wolf Snake	LC	Unlisted
Lygodactylus capensis capensis	Common Dwarf Gecko	LC	Unlisted
Lygodactylus nigropunctatus	Cryptic Dwarf Gecko	DD	DD
Lygodactylus ocellatus	Spotted Dwarf Gecko	LC	LC
Mochlus sundevallii	Sundevall's Writhing Skink	LC	LC
Naja mossambica	Mozambique Spitting Cobra	LC	Unlisted
Nucras holubi	Holub's Sandveld Lizard	LC	Unlisted
Pachydactylus affinis	Transvaal Gecko	LC	LC
Pachydactylus capensis	Cape Gecko	LC	Unlisted

Pachydactylus vansoni	VAN Son's Gecko	LC	LC
Panaspis wahlbergi	Wahlberg's Snake-eyed Skink	LC	Unlisted
Pedioplanis lineoocellata lineoocellata	Spotted Sand Lizard	LC	Unlisted
Philothamnus hoplogaster	South Eastern Green Snake	LC	Unlisted
Philothamnus occidentalis	Western Nalal Green Snake	Unlisted	Unlisted
Philothamnus semivariegatus	Spotted Bush Snake	LC	Unlisted
Platysaurus orientalis orientalis	Sekhukhune Flat Lizard	LC	LC
Platysaurus relictus	Soutpansberg Flat Lizard	LC	LC
Prosymna ambigua	Angolan Shovel-snout	Unlisted	LC
Psammophis brevirostris	Short-snouted Grass Snake	LC	Unlisted
Psammophis crucifer	Cross-marked Grass Snake	LC	LC
Psammophis mossambicus	Olive Grass Snake	LC	Unlisted
Psammophis subtaeniatus	Stripe-bellied Sand Snake	LC	LC
Psammophylax rhombeatus	Spotted Grass Snake	LC	Unlisted
Psammophylax tritaeniatus	Striped Grass Snake	LC	LC
Pseudaspis cana	Mole Snake	LC	Unlisted
Pseudocordylus melanotus melanotus	Common Crag Lizard	LC	LC
Python natalensis	Southern African Python	LC	Unlisted
Scelotes mirus	Montane Dwarf Burrowing Skink	LC	LC
Smaug vandami	Van Dam's Dragon Lizard	LC	LC
Stigmochelys pardalis	Leopard Tortoise	LC	LC
Telescopus semiannulatus semiannulatus	Eastern Tiger Snake	LC	Unlisted
Thelotornis capensis	Southern Twig Snake	LC	LC
Trachylepis capensis	Cape Skink	LC	Unlisted
Trachylepis damarana	Damara skink	Unlisted	LC
Trachylepis margaritifera	Rainbow Skink	LC	LC
Trachylepis punctatissima	Speckled Rock Skink	LC	LC
Trachylepis varia	Variable Skink	LC	LC
Varanus albigularis albigularis	Southern Rock Monitor	LC	Unlisted
Varanus niloticus	Water Monitor	LC	Unlisted

Appendix F Amphibians expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	**IUCN (2017)**
Amietia delalandii	Delalande's River Frog	LC	Unlisted
Amietia fuscigula	Common River Frog	LC	LC
Breviceps adspersus	Bushveld Rain Frog	LC	LC
Breviceps mossambicus	Mozambique Rain Frog	LC	LC
Cacosternum boettgeri	Common Caco	LC	LC
Cacosternum nanum nanum	Bronze Caco	LC	LC
Hyperolius marmoratus	Painted Reed Frog	LC	LC
Kassina senegalensis	Bubbling Kassina	LC	LC
Phrynobatrachus natalensis	Snoring Puddle Frog	LC	LC
Phrynomantis bifasciatus	Banded Rubber Frog	LC	LC
Poyntonophrynus fenoulheti	Northern Pygmy Toad	LC	LC
Ptychadena anchietae	Plain Grass Frog	LC	LC
Ptychadena porosissima	Striped Grass Frog	LC	LC
Pyxicephalus adspersus	Giant Bullfrog	NT	LC
Schismaderma carens	African Red Toad	LC	LC
Sclerophrys capensis	Raucous Toad	LC	LC
Sclerophrys garmani	Olive Toad	LC	LC
Sclerophrys gutturalis	Guttural Toad	LC	LC
Sclerophrys pusilla	Flatbacked Toad	LC	LC
Semnodactylus wealii	Rattling Frog	LC	LC
Strongylopus fasciatus	Striped Stream Frog	LC	LC
Strongylopus grayii	Clicking Stream Frog	LC	LC
Tomopterna cryptotis	Tremelo Sand Frog	LC	LC
Tomopterna natalensis	Natal Sand Frog	LC	LC
Tomopterna tandyi	Tandy's Sand Frog	LC	LC
Xenopus laevis	Common Platanna	LC	LC