



TERRESTRIAL ECOLOGY ASSESSMENT REPORT FOR THE PROPOSED KALGOLD EXPANSION PROJECT

Ratlou Local Municipality, North West

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CLIENT



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1 Introduction

The Biodiversity Company was commissioned to compile a terrestrial ecology assessment for the Kalgold Expansion project. The existing Harmony Kalgold operation wishes to expand its current production rate of 130000 tons per month to 300000 tons per month. A pre-feasibility study has been undertaken and the findings of the pre-feasibility study have concluded that the following new activities and expansions must be provided for:

- New Processing Plant;
- New Powerline;
- New Explosives Magazine;
- Increasing the Pit Footprint;
- Pumping tailings material into the recommissioned Tailings Storage Facility (TSF);
- Expansion of the Spanover Waste Rock Dump (WRD);
- A Series of new Roads;
- A Series of new Pipelines;
- New Trackless Mobile Machine (TMM) Workshop; and
- New Run of Mine (ROM) Pad.

Kalgold mine is an open pit mining operation located some 60 km South-West of Mahikeng in the North West Province. The mine is owned and operated by Harmony Gold, who acquired the mine in 1999. The mine is located in the Kraaipan Greenstone Belt, which is part of the large Amalia-Kraaipan Greenstone terrain. The largest ore body is found in the D-Zone, which was mined out by a single pit operation along a strike length of 1 300 m and to a depth of approximately 290 m below surface. Mining at Kalgold Mine continued at the A-Zone, Windmill and Watertank Open Pits, which are all relatively new opencast operations.

This assessment was conducted per the amendments to the Environmental Impact Assessment Regulations, 2014 (GNR 326, 7 April 2017) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). The approach has taken cognisance of the recently published Government Notices (GN) 320 (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" (Reporting Criteria). The National Web-based Environmental Screening Tool has characterised the terrestrial sensitivity of the project area as "Very High".

The purpose of the specialist studies is to provide relevant input into the environmental authorisation process. 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 project.

1.1 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 desktop sensitive receptors in terms of relevant specialist disciplines (fauna and flora) that occur in the project area, and the manner in which these sensitive receptors may be affected by the project;
- Identify 'significant' desktop ecological, botanical and faunal features within the proposed project areas;
- Identification of conservation significant habitats around the project area which might be impacted;
- 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;
- Impact assessment, mitigation and rehabilitation measures to prevent or reduce the possible impacts as per the study.

1.2 Project Description

Kalgold mine is an open pit mining operation located some 60 km from Mahikeng in the North West Province. The project area is divided by the N18 national highway and falls in the Ratlou Local Municipality within the Ngaka Modiri Molema District Municipality. The area surrounding the project area consists predominantly of mining activities, secondary roads and agricultural fields. The project layout is shown in Figure 1-1, while the location of the project area is shown in Figure 1-2.

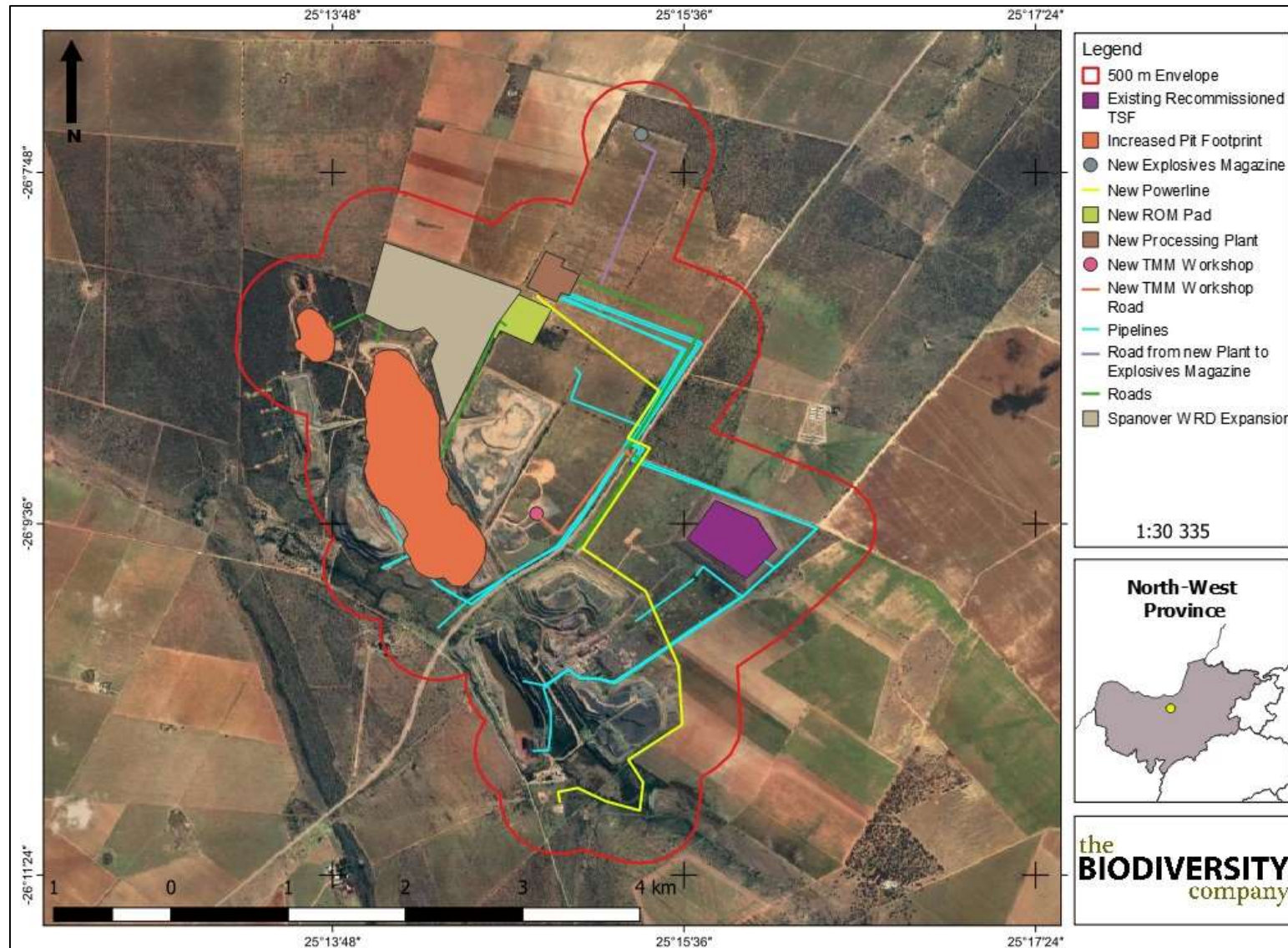


Figure 1-1 Project infrastructure layout

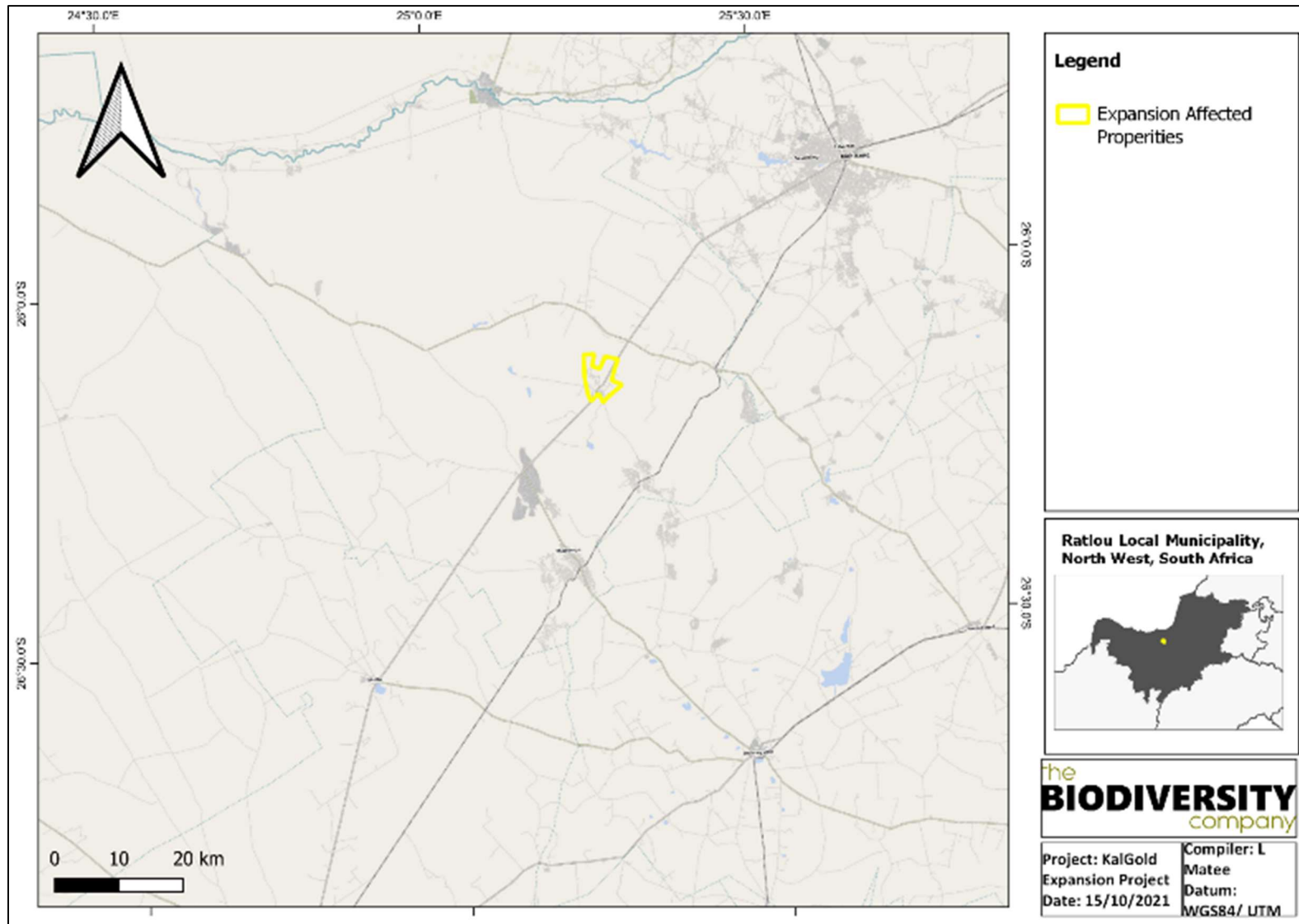


Figure 1-2 Locality of the project area






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 (Table 2-1).

Table 2-1 Report Structure

Environmental Regulation	Description	Section in Report
NEMA EIA Regulations 2014 (as amended)		
	Details of –	
Appendix 6 (1)(a):	(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 1.1
Appendix 6 (1)(cA):	An indication of the quality and age of base data used for the specialist report;	Section 6
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 5
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 5
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
Appendix 6(1)(g):	An identification of any areas to be avoided, including buffers;	Section 8
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 & 9
Appendix 6(1)(i):	A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5.4
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 7
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;	N/A
Appendix 6(1)(m):	Any monitoring requirements for inclusion in the EMPr or environmental authorisation;	N/A
Appendix 6(1)(n):	A reasoned opinion- (i) whether the proposed activity, activities or portions thereof should be authorised; (ii) regarding the acceptability of the proposed activity or activities; and (iii) 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

Report Name	TERRESTRIAL ECOLOGY ASSESSMENT REPORT FOR THE PROPOSED KALGOLD EXPANSION PROJECT COLLIERY	
Submitted to		
Report Writer	<p>Lindi Steyn</p> 	<p>Dr Lindi Steyn has completed her PhD in Biodiversity and Conservation from the University of Johannesburg. Lindi is a terrestrial ecologist with a special interest in ornithology. She has completed numerous studies ranging from Basic Assessments to Environmental Impact Assessments following IFC standards.</p>
Report Writer	<p>Martinus Erasmus</p> 	<p>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. Martinus is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.</p>
Report Writer	<p>Lusanda Matee</p> 	<p>Lusanda Matee is a registered scientist (119257/2018) in the fields of Biological Science (Cand Nat.) and Ecological Science (Cand Nat.). He is a specialist terrestrial ecologist and botanist who conducts floral surveys faunal surveys which include mammals, birds, amphibians, and reptiles. He has 4 years of experience in environmental consulting. He received a Bachelor of Science, Honours, and MSc in Biological Sciences from the University of KwaZulu-Natal.</p>
Report Writer / Reviewer	<p>Andrew Husted</p> 	<p>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.</p>
Declaration	<p>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.</p>	

4 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, is not exhaustive and other legislation, policies and guidelines may apply in addition to those listed below (Table 4-1).

Table 4-1 A list of key legislative requirements relevant to biodiversity and conservation in North West

INTERNATIONAL	Convention on Biological Diversity (CBD, 1993)
	The United Nations Framework Convention on Climate Change (UNFCCC, 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 No.59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989)
	National Environmental Management Air Quality Act (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 No. 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 No. 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 No. 43 of 1983)
Sustainable Utilisation of Agricultural Resources (Draft Legislation).	
White Paper on Biodiversity	
PROVINCIAL	North-West Biodiversity Sector Plan of 2015 (READ, 2015).
	The North West Biodiversity Management Amendment Bill, 2017

5 Methods

5.1 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

5.1.1 Ecologically Important Landscape Features

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

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on the best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
 - Ecosystem Threat Status – an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
 - Ecosystem Protection Level – an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.
- Protected areas:
 - South Africa Protected Areas Database (SAPAD) (DEA, 2020) – The South African Protected Areas Database (SAPAD) contains spatial data for the conservation of South Africa. It includes spatial and attributes information for both formally protected areas and areas that have less formal protection. SAPAD is updated continuously and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
 - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are, therefore, of high importance for biodiversity, climate resilience and freshwater protection.

- The North West - Department of Agriculture, Conservation, Environment and Rural Development (NWREAD) developed the North West Biodiversity Sector Plan (NW BSP) in 2015. In essence, the NW BSP is a map guiding areas of conservation concern for the North West Province. Two maps have been developed, namely one for terrestrial biodiversity, and the other for freshwater/aquatic biodiversity. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by NWREAD. The NW BSP maps the terrestrial ecosystems of the North West into the following categories:
 - Critical Biodiversity Areas (CBAs) – areas of high biodiversity value, needed to meet biodiversity targets. These areas should be maintained in the natural or near-natural state;
 - Ecological Support Areas (ESAs) – these areas support CBAs, but are not essential for meeting conservation targets;
 - Other Natural Areas – these areas have natural characteristics but have not been earmarked as priority areas for conservation but perform a range of biological as well as ecological functions; and
 - Heavily Modified Areas – Areas that have been impacted and have had a significant or complete loss of natural habitat and ecological function.
- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al.*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of the river and inland wetland ecosystem types as well as pressures on these systems.

5.1.2 Desktop Flora Assessment

The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford, 2006) was used to identify the vegetation type that would have occurred under natural or pre-anthropogenically altered conditions. Furthermore, the Plants of Southern Africa (POSA) database was accessed to compile a list of expected flora species within the proposed development area and surrounding landscape. The Red List of South African Plants (Raimondo *et al.*, 2009; SANBI, 2020) was utilized to provide the most current national conservation status of flora species.

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.

5.1.3 Desktop Faunal Assessment

The faunal desktop assessment comprised of the following:

- Compilation of expected species lists;
- Identification of any Red Data or 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).

While the Avifauna distribution and other pertinent data was obtained from:

- Southern African Bird Atlas Project 2 (SABAP2, 2019);
- Birdlife South Africa (2015);
- Birdlife. (2017). Important Bird Areas Factsheets;
- Checklist of the Birds of the World (Del Hoyo *et al.*, 1996);

- Book of birds of South Africa, Lesotho and Swaziland (Taylor *et al.*, 2015); and
- Roberts – Birds of Southern Africa (Hockey *et al.*, 2005).

A herpetofauna desktop assessment of the possible species in the area was undertaken 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).

5.2 Biodiversity Field Assessment

A single field survey was undertaken in September (Spring) 2021, which is a dry-season survey, to determine the presence of SCC. Effort was made to cover all the different habitat types within the limits of time and access, focus being placed on areas where proposed infrastructure was going to be placed (Figure 1-1).

5.2.1 Flora Survey

The 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 to perform a vegetation and ecological assessment. Emphasis was placed on sensitive habitats, especially those overlapping with the proposed opencast areas.

Homogenous vegetation units were subjectively identified using satellite 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 project 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.

5.2.2 Fauna Survey

The faunal assessment within this report pertains to herpetofauna (amphibians and reptiles) avifauna and mammals. The field survey component of the assessment utilised a variety of sampling techniques including, but not limited to, the following:

- Visual and auditory searches - This typically comprised of meandering and using binoculars to view species from a distance without them being disturbed as well as listening to species calls;
- 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 based on GIS mapping and Google Earth imagery and then the final selection was confirmed through ground-truthing during the surveys.

The herpetofauna field assessment was conducted in each habitat or vegetation type within the project area, as identified from the desktop assessment, 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 which activities occur on surfaces or for species that are difficult to detect by hand-searches or trap sampling. Active hand-searches - are used for species that shelter in or under particular micro-habitats (typically rocks, exfoliating rock outcrops, fallen trees, leaf litter, bark etc.).

5.3 Terrestrial Site Ecological Importance

The different habitat types within the project area were delineated and identified based on observations during the field assessment, and available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of species of conservation concern and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts) as follows.

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor as follows. The criteria for the CI and FI ratings are provided in Table 5-1 and Table 5-2, respectively.

Table 5-1 Summary of Conservation Importance (CI) criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Extremely Rare or CR species that have a global extent of occurrence (EOO) of < 10 km ² . Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of an EN ecosystem type.

	Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km ² . IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining. Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	Confirmed or highly likely occurrence of populations of Near Threatened (NT) species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 5-2 Summary of Functional Integrity (FI) criteria

Functional Integrity	Fulfilling Criteria
Very High	Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types. High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches. No or minimal current negative ecological impacts, with no signs of major past disturbance.
High	Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types. Good habitat connectivity, with potentially functional ecological corridors and a regularly used road network between intact habitat patches. Only minor current negative ecological impacts, with no signs of major past disturbance and good rehabilitation potential.
Medium	Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types. Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches. Mostly minor current negative ecological impacts, with some major impacts and a few signs of minor past disturbance. Moderate rehabilitation potential.
Low	Small (> 1 ha but < 5 ha) area. Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential. Several minor and major current negative ecological impacts.
Very Low	Very small (< 1 ha) area. No habitat connectivity except for flying species or flora with wind-dispersed seeds. Several major current negative ecological impacts.

BI can be derived from a simple matrix of CI and FI as provided in Table 5-3.

Table 5-3 Matrix used to derive Biodiversity Importance (BI) from Functional Integrity (FI) and Conservation Importance (CI)

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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor, as summarised in Table 5-4.

Table 5-4 Summary of Resource Resilience (RR) criteria

Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of: (i) remaining at a site even when a disturbance or impact is occurring, or (ii) returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to: (i) remain at a site even when a disturbance or impact is occurring, or (ii) return to a site once the disturbance or impact has been removed.

Subsequent to the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 5-5.

Table 5-5 Matrix used to derive Site Ecological Importance from Receptor Resilience (RR) and Biodiversity Importance (BI)

Site Ecological Importance		Biodiversity Importance (BI)				
		Very high	High	Medium	Low	Very low
Receptor Resilience (RR)	Very Low	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the project is provided in Table 5-6.

Table 5-6 Guidelines for interpreting Site Ecological Importance in the context of the development activities

Site Ecological Importance	Interpretation in relation to development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e., last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

5.4 Limitations

The following assumptions and limitations are applicable for this assessment:

- The assessment area was based on the area provided by the client and any alterations to the area and/or missing GIS information pertaining to the assessment area would have affected the area surveyed;
- Only a single season survey will be conducted for the respective studies, this would constitute a dry season survey with its limitations;
- Flora identification is limited due to the lack of aboveground plant parts used to determine species, especially in regard to bulbous plants, the vegetation was dry and most plants had already lost the green flush;
- It must be noted that during the survey, only a fraction of the expected geophytes were visible due to their variable emergence patterns;
- This is especially true for cold-blooded animals, such as reptiles and amphibians, which are less active during these times;
- The ridge being actively mined could not be surveyed due to safety risks;
- Whilst every effort is made to cover as much of the site as possible, representative sampling is completed and by its nature, it is possible that some plant and animal species that are present on site were not recorded during the field investigations; and
- The GPS used in the assessment has an accuracy of 5 m and consequently any spatial features may be offset by 5 m.

6 Receiving Environment

6.1 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 (SANBI, 2018);
- North-West Biodiversity Sector Plan of 2015 (READ, 2015); and
- Mining and Biodiversity Guideline (SANBI & SAMBF 2012).

6.1.1 Desktop Spatial Assessment

The following features describe 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 6-1.

Table 6-1 Desktop spatial features examined

Desktop Information Considered	Relevant/Not relevant	Section
Conservation Plan	The project area falls across both a CBA2 and an ESA1 classified areas ¹	6.1.2
Ecosystem Threat Status	The project area is situated within an ecosystem that are listed as LC	6.1.3.1
Ecosystem Protection Level	The terrestrial ecosystems associated with the project area is rated as <i>not protected</i>	6.1.3.2
Protected Areas (SAPAD & SACAD)	Irrelevant; The nearest SAPAD is 52 km from the project area (Baberspan Ramsar site)	-
National Protected Area Strategy	The project area is 7 km from the Molopo NPAES ¹	6.1.4
NFEPA Rivers and Wetlands	The project area does overlap with a true FEPA river	6.1.5
NBA Wetlands	A “not protected” wetland and river as well as an unclassified wetland can be found in the project area. These wetlands are CR and unclassified respectively while the river has an ecosystem threat status of EN.	6.1.6
Strategic Water Source Areas	The project area is 2.2 km from a SWSA.	-
Mining and Biodiversity Guidelines	The project area falls in areas classified as “highest biodiversity importance”, “high biodiversity importance” and “moderate biodiversity importance”.	6.1.7
Important Bird and Biodiversity Areas	Irrelevant: The project area is approximately 46 km away from the Baberspan and Leeupan IBA	-

6.1.2 North West Biodiversity Sector Plan

The North-West Department of Rural, Environment, and Agricultural Development (READ), as custodian of the environment in the North West, is the primary implementing agent of the Biodiversity Sector Plan. The spatial component of the Biodiversity Sector Plan is based on systematic biodiversity planning undertaken by READ. The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), with accompanying land use planning and decision-making guidelines (READ, 2015).

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 as well as the delivery of ecosystem services. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met (READ, 2015).

ESAs are terrestrial and aquatic areas that are not essential for meeting biodiversity representation targets (thresholds), but which play an important role in supporting the ecological functioning of critical biodiversity areas and/or in delivering ecosystem services that support socio-economic development, such as water provision, flood mitigation or carbon sequestration.

¹ According to the DEA screening tool, this feature has contributed to the Very High sensitivity description for the project area

The degree or extent of restriction on land use and resource use in these areas may be lower than that recommended for CBAs (READ, 2015).

The project area falls across both a CBA2 and an ESA1 classified area (Figure 6-1). The Power line, water pipeline, roads and return water corridor falls across the ESA1 areas. The status of these classifications will be confirmed during the field assessment.

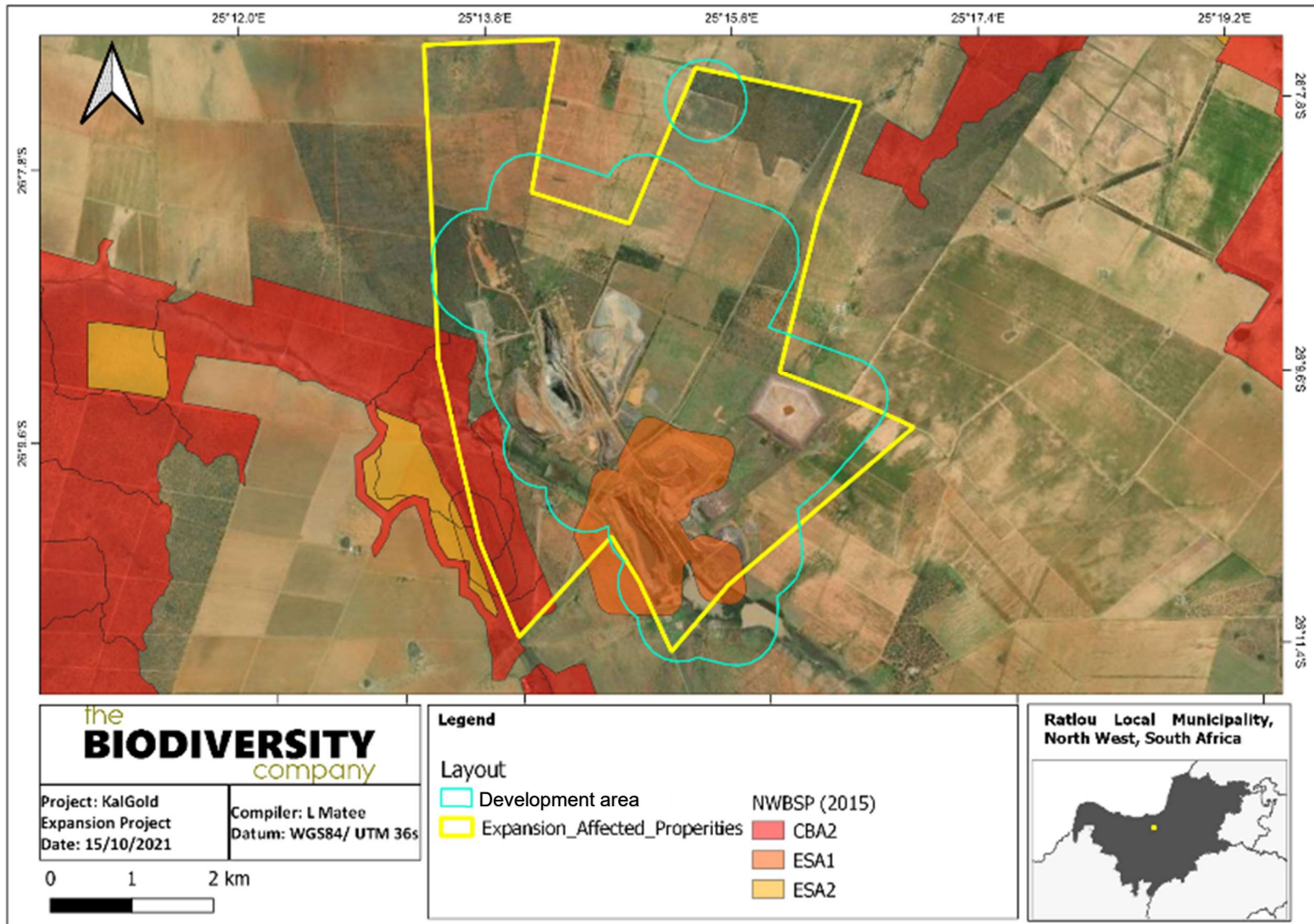


Figure 6-1 Kalgold project area (including the infrastructure portions) superimposed on the North West C-Plan (CBA) map (READ, 2015)

6.1.3 The National Biodiversity Assessment

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).

6.1.3.1 Ecosystem Threat Status

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

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

The project area was superimposed on the terrestrial ecosystem threat status (Figure 6-2). As seen in this figure, the project area is situated within an ecosystem that are listed as LC (Figure 6-2). The status refers to the regional status of the ecosystem and might not represent the infield conditions.

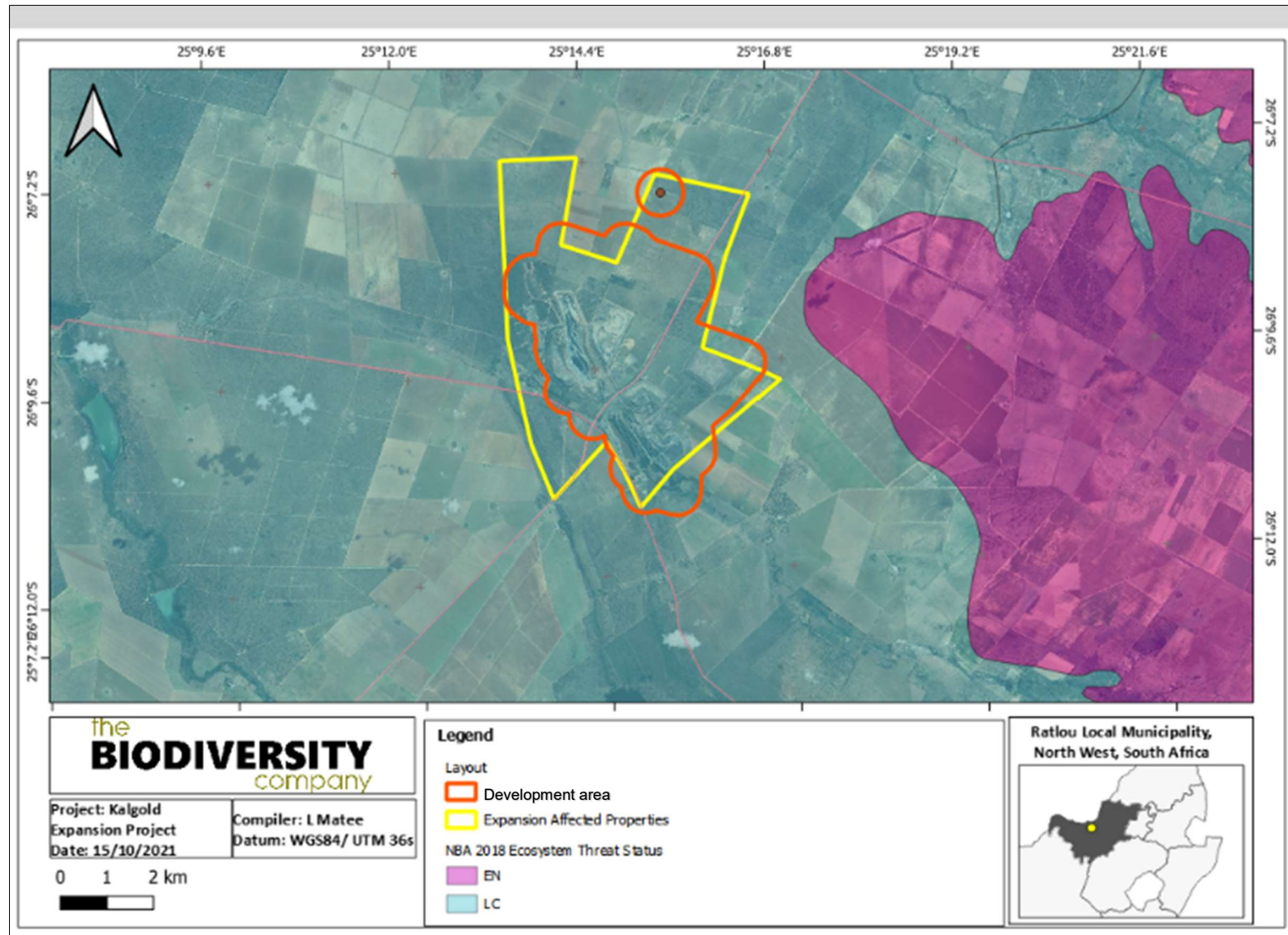


Figure 6-2 The project area showing the regional ecosystem threat status of the associated terrestrial ecosystems (NBA, 2018)

6.1.3.2 Ecosystem Protection Level

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

The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (Figure 6-3). Based on Figure 6-3 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. The status refers to the regional status of the ecosystem and might not represent the infield conditions.

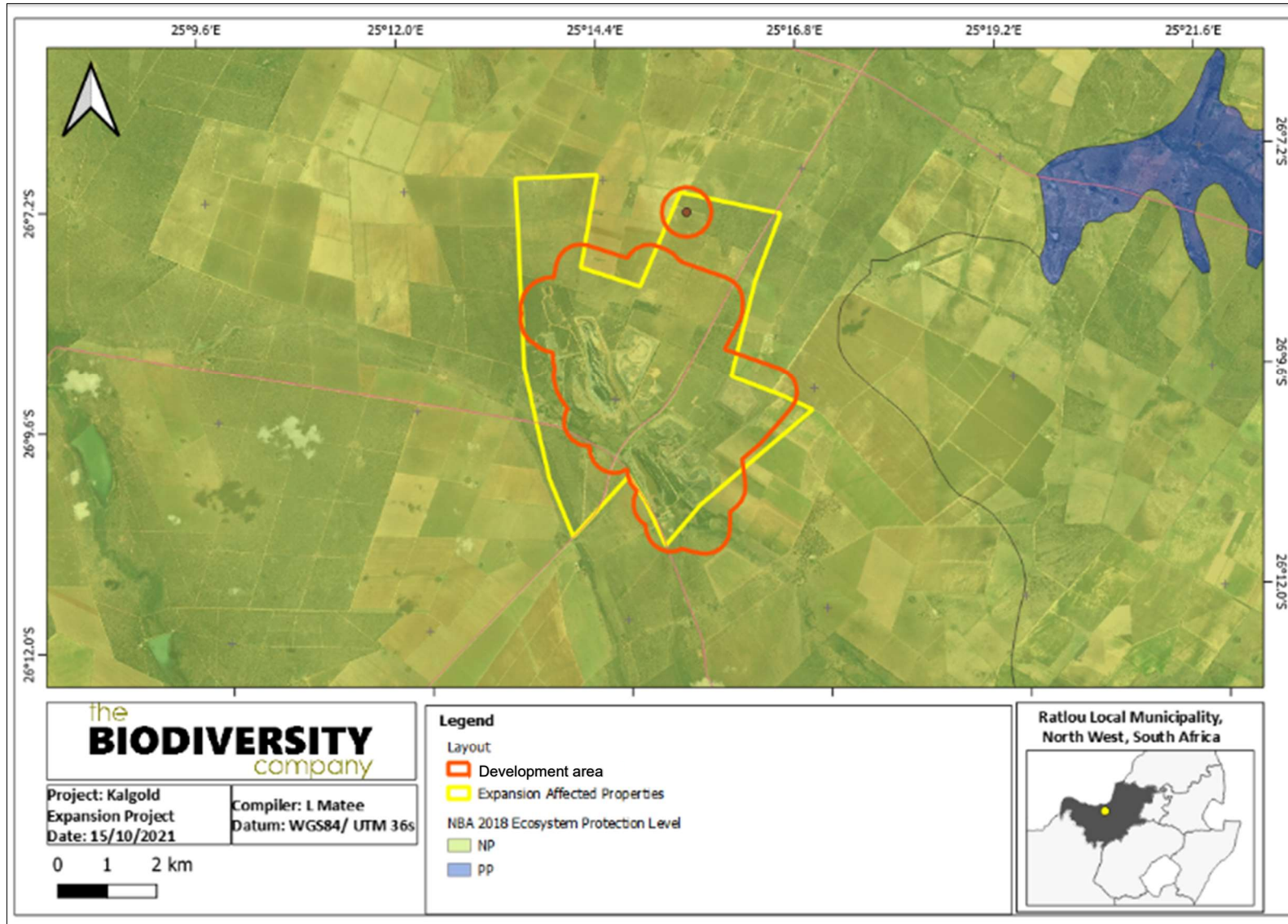


Figure 6-3 The project area showing the regional level of protection of terrestrial ecosystems (NBA, 2018)

6.1.4 National Protected Area Expansion Strategy

National Protected Area Expansion Strategy 2010 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for finescale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010). The project area is 7 km from the Molopo NPAES (Figure 6-4).

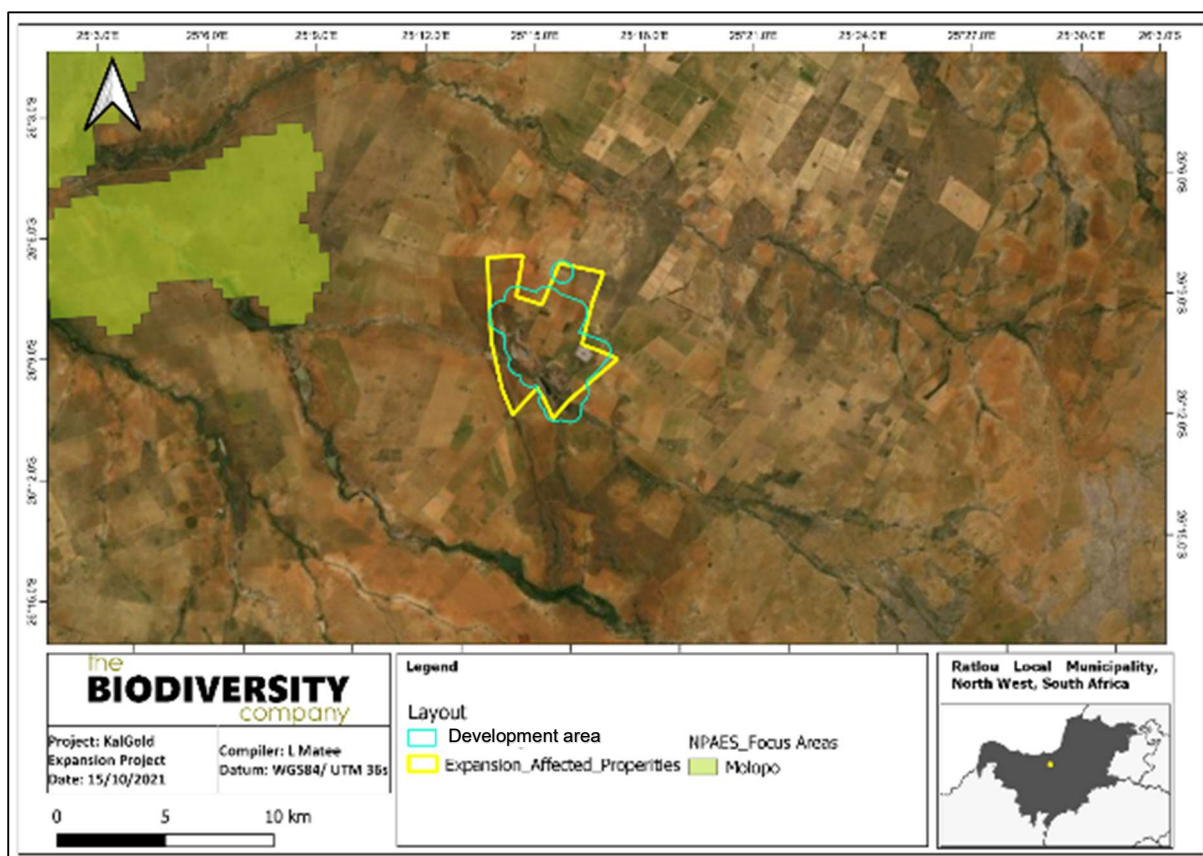


Figure 6-4 The project area in relation to the National Protected Areas Strategy Molopo Area

6.1.5 National Freshwater Ecosystem Priority Areas

The NFEPA spatial data has been incorporated in the above mentioned SAIIE spatial data set. However, to ensure that this data sets are considered we included it as the Freshwater Ecosystem Priority Areas (FEPAs) (Driver *et al.*, 2011) are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act (NEM:BA) biodiversity goals (Nel *et al.*, 2011). The project area overlaps with a non-FEPA wetland (Figure 6-5), and an upstream management area river.

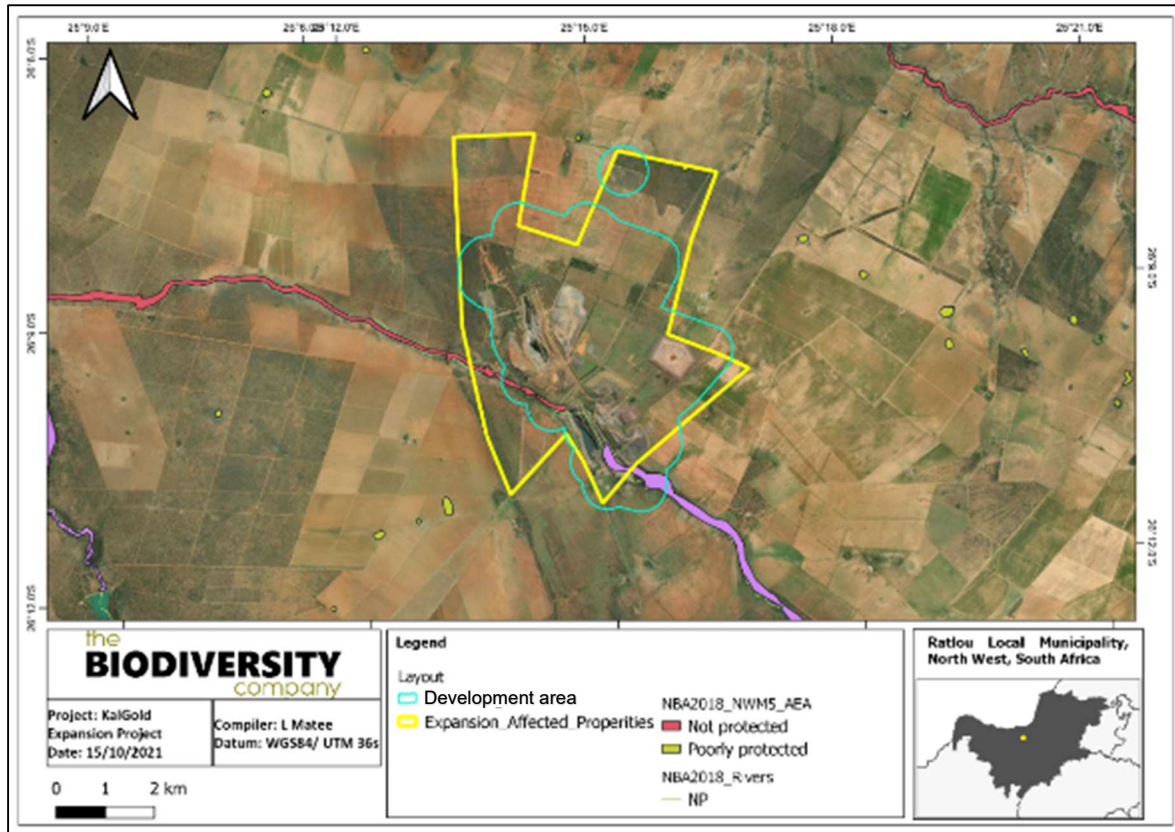


Figure 6-6 The project area in relation to the protection status of the wetlands and rivers (NBA, 2018)

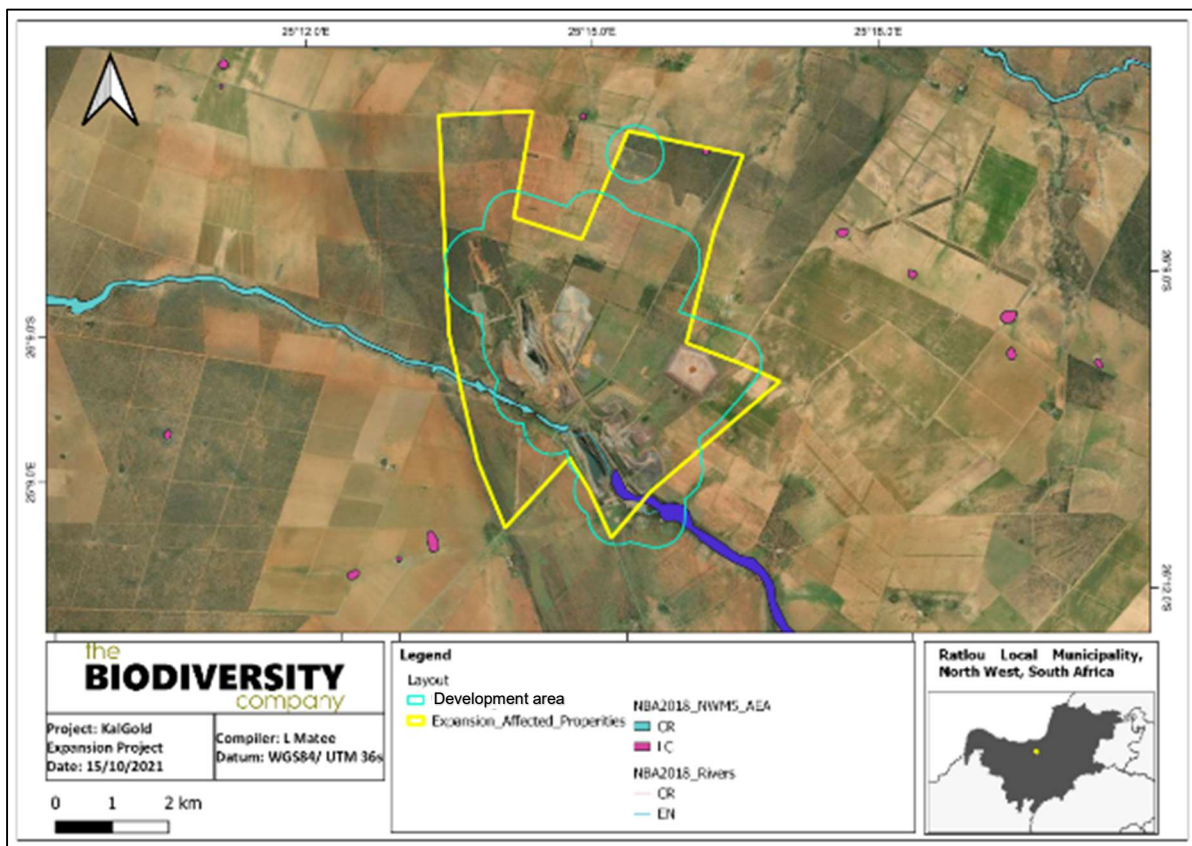


Figure 6-7 The project area in relation to the threat status of the wetland (NBA, 2018)

6.1.7 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 6-2 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 6-2 The mining and biodiversity guidelines categories

Category	Biodiversity priority areas	Risk for mining	Implications for mining
A. Legally protected	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p>
B. Highest biodiversity importance	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p> <p>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.</p>
C. High biodiversity importance	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p> <p>Mining options may be limited in these areas, and limitations for mining projects are possible.</p> <p>Authorisations may set limits and specify biodiversity offsets that would be written into license agreements and/or authorisations.</p>

<p>D. Moderate biodiversity importance</p>	<ul style="list-style-type: none"> • Ecological support areas • Vulnerable ecosystems • Focus areas for protected area expansion (land-based and offshore protection) 	<p>Moderate risk for mining</p>	<p>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.</p>
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The project area overlap with areas classified as “highest biodiversity importance”, “high biodiversity importance” and “moderate biodiversity importance” with their associated highest, high and moderate risks for mining (Figure 6-8).

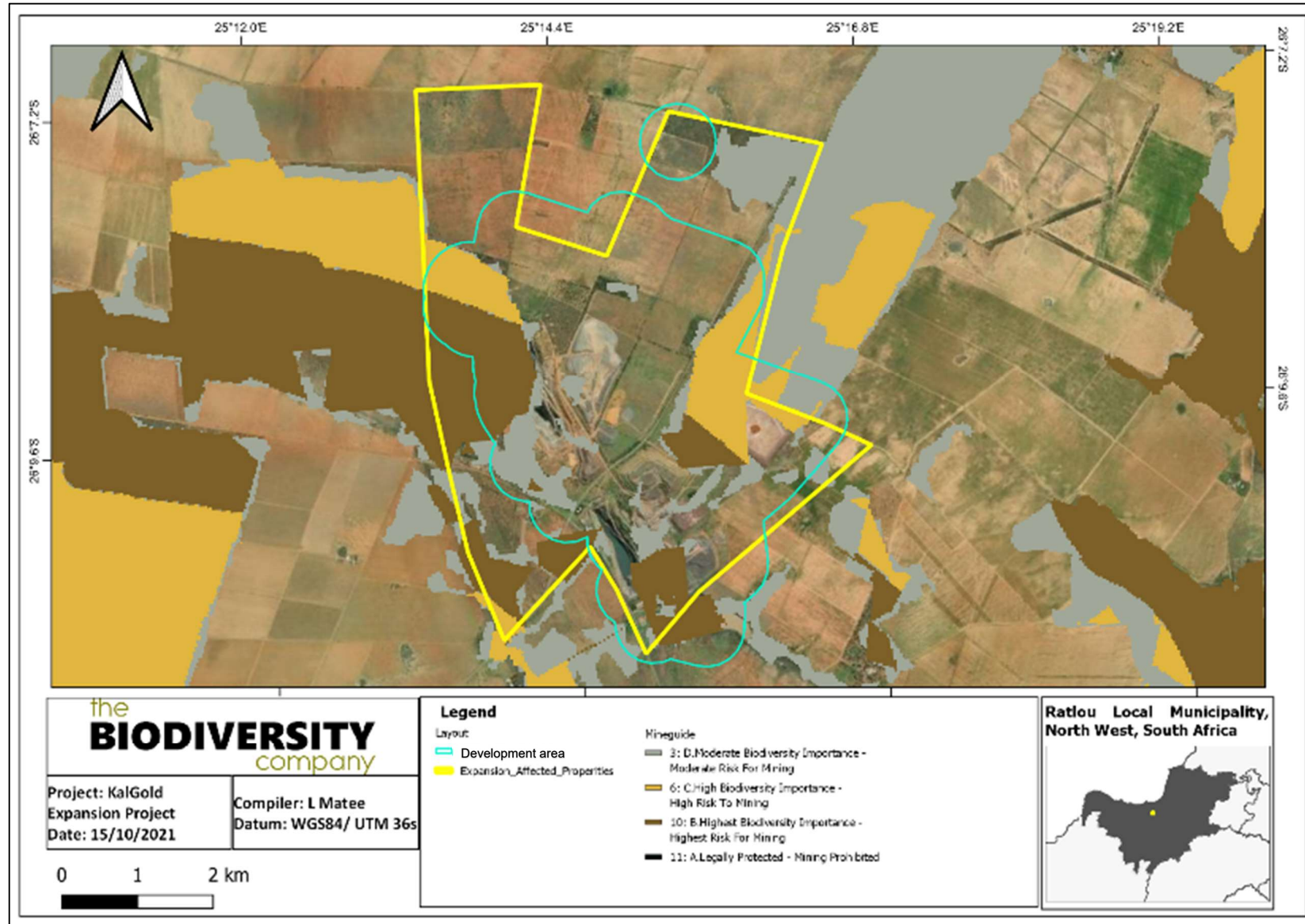


Figure 6-8 The project area superimposed on the Mining and Biodiversity Guideline spatial dataset (2013)

6.2 Desktop Assessment

6.2.1 Vegetation Assessment

The project area is situated within the Savanna biome. The savanna vegetation of South Africa represents the southern-most extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

- a) Seasonal precipitation; and
- b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by a herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layer, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved (macrophyllous) savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include *Vachellia*, *Senegalia* and *Albizia*), and a generally dense herbaceous layer.

6.2.1.1 Vegetation Types

The savanna biome comprises many different vegetation types. The project area is situated within one vegetation type; namely the Mafikeng Bushveld vegetation type according to SANBI (2018) (Figure 6-9).

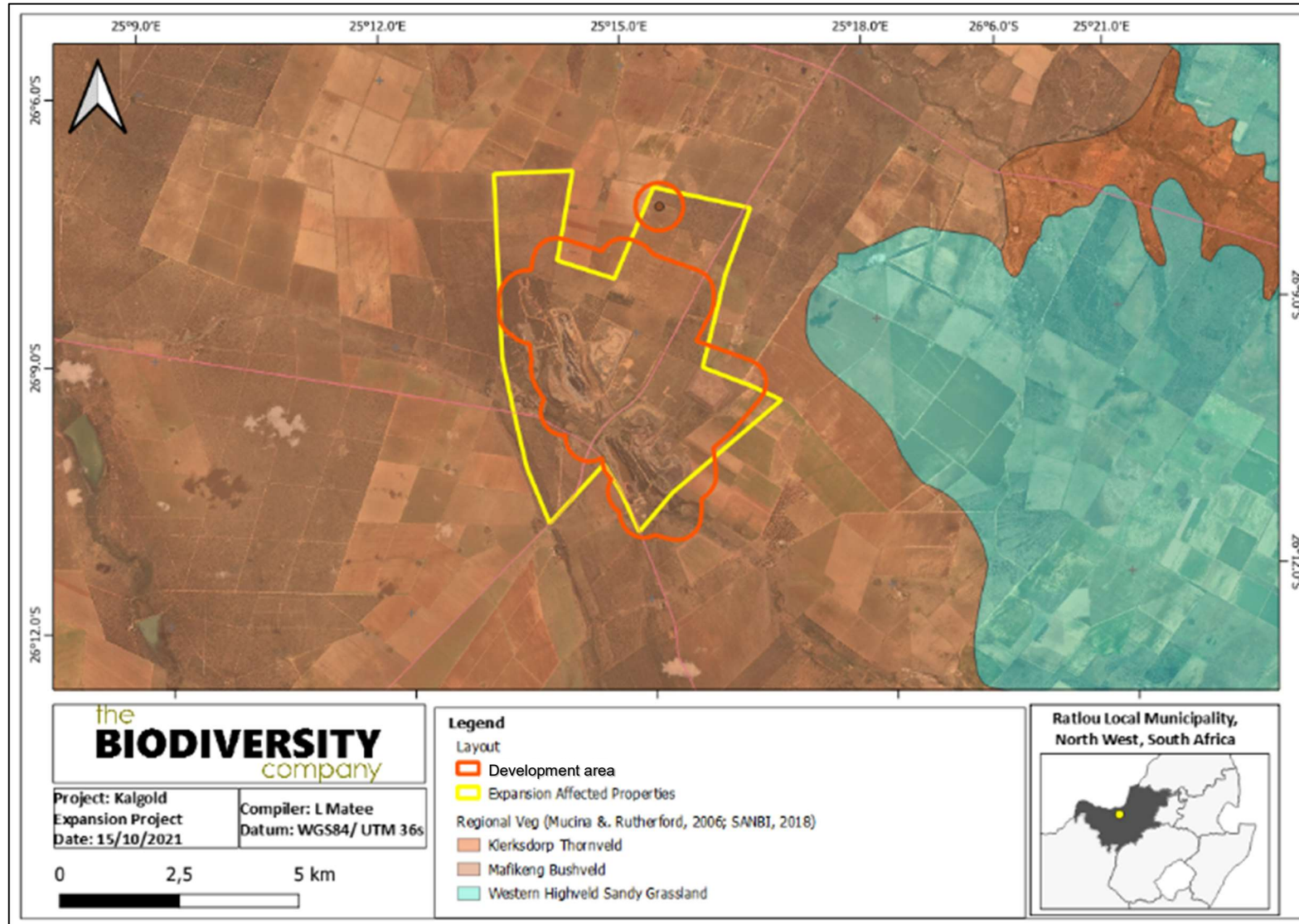


Figure 6-9 The project area showing the vegetation type based on the Vegetation Map of South Africa, Lesotho & Swaziland (BGIS, 2018)

6.2.1.1.1 Mafikeng Bushveld

Mafikeng Bushveld is found in the North West Province, in Aeolian Kalahari sand of Tertiary to Recent age on flat sandy plains. This vegetation type has well developed tree and shrub layers, dense stands of *Terminalia sericea*, *Vachellia luederitzii* and *V. erioloba* in certain areas. The grass layer is also well developed in this vegetation type (Mucina & Rutherford 2006).

Important Plant Taxa

Tall Tree: *Vachellia erioloba*

Small Trees: *Vachellia karroo*, *Senegalia mellifera* subsp. *detinens*, *Terminalia sericea*, *Ziziphus mucronata*.

Tall Shrubs: *Dichrostachys cinerea*, *Grewia flava*, *Searsia tenuinervis*, *Diospyros austro-africana*, *Ehretia rigida* subsp. *rigida*, *Rhigozum obovatum*, *Tarchonanthus camphoratus*.

Low Shrubs: *Vachellia hebeclada* subsp. *hebeclada*, *Grewia retinervis*, *Aptosimum procumbens*, *Felicia muricata*, *Gnidia polycephala*, *Helichrysum zeyheri*, *Hoffmannseggia burchellii*, *Lantana rugosa*, *Talinum arnotii*.

Geoxylic Suffrutex: *Elephantorrhiza elephantina*.

Succulent Shrub: *Lycium cinereum*.

Woody Climber: *Asparagus africanus*.

Graminoids: *Antheophora pubescens*, *Cymbopogon pospischilii*, *Digitaria eriantha* subsp. *eriantha*, *Eragrostis lehmanniana*, *E. pallens*, *Schmidtia pappophoroides*, *Stipagrostis uniplumis*, *Aristida congesta*, *A. meridionalis*, *A. mollissima* subsp. *argentea*, *A. stipitata* subsp. *stipitata*, *Brachiaria nigropedata*, *B. serrata*, *Cynodon dactylon*, *Digitaria argyrograpta*, *Eragrostis superba*, *E. trichophora*, *Melinis repens*, *Tragus racemosus*, *Urochloa panicoides*.

Herbs: *Barleria macrostegia*, *Erlangea misera*, *Harpagophytum procumbens* subsp. *procumbens*, *Hermannia tomentosa*, *Hermbstaedtia odorata*, *Indigofera daleoides*, *Limeum fenestratum*, *Nidorella resedifolia*, *Oxygonum dregeanum* subsp. *canescens* var. *canescens*, *Senna italica* subsp. *arachoides*.

Geophytic Herb: *Ledebouria marginata*.

Biogeographically Important Taxa

Small Tree: *Vachellia luederitzii* var. *luederitzii*.

Graminoid: *Panicum kalahareense*.

Conservation Status of Vegetation Type

The Mafikeng Bushveld vegetation type is listed as Vulnerable (Mucina & Rutherford, 2006; SANBI, 2019). The conservation target for the vegetation type is at 16%. No section of this vegetation type is conserved in statutory conservation areas, but a very small area is conserved in the Mmabatho Recreation Area.

6.2.1.2 Plant Species of Conservation Concern

Based on the Plants of Southern Africa (BODATSA-POSA, 2019) database, 285 plant species have the potential to occur in the project area and its surroundings (Figure 6-10 and Table 6-3).

Of these 285 plant species (Appendix B), two (2) species are listed as being Species of Conservation Concern (SCC) (Table 6-3).

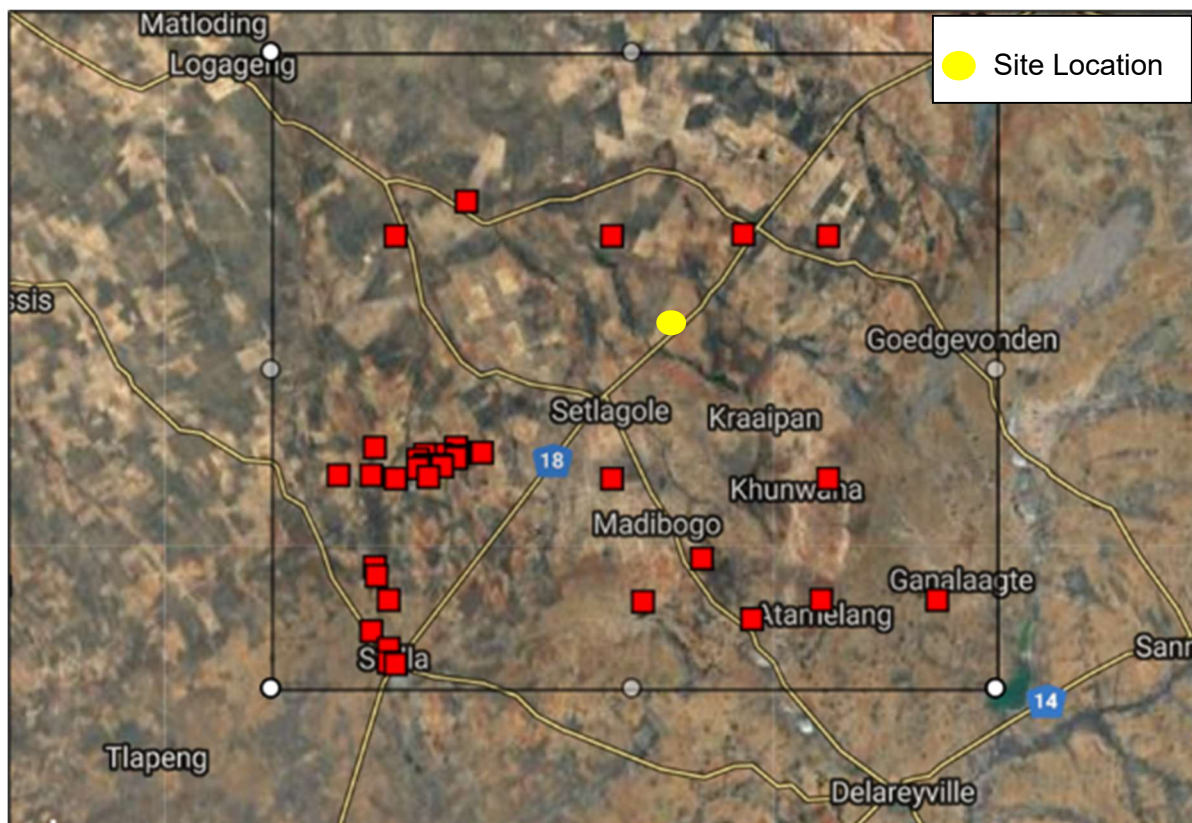


Figure 6-10 Map showing the grid drawn in order to compile an expected plant species list (BODATSA-POSA, 2019)

Table 6-3 Plant Species of Conservation Concern with the potential to occur in the project area

Family	Taxon	Author	IUCN	Ecology
Asphodelaceae	<i>Aloe braamvanwykii</i>	Gideon F.Sm. & Figueiredo	EN	Indigenous; Endemic
Apocynaceae	<i>Brachystelma canum</i>	R.A.Dyer	CR	Indigenous; Endemic

Aloe braamvanwykii is listed as EN according to the Red List of South African Plants (SANBI, 2017). This species is endemic to South Africa and more specifically the North West. It is found in thornveld and deep sandy soils. Based on rates of habitat loss, it is estimated that the aloes population has declined by at least 50% within the past 30 years (one generation of this slow-growing, long-lived species).

Brachystelma canum is CR according to the Red List of South African Plants (SANBI, 2017). This species is endemic to South Africa where it occurs in the North West in the Mafikeng vegetation type. This species is only known from the type collection, dating from 1956. Several attempts to relocate this species at the type locality and surrounding areas have been futile (Hahn, 2013). It is possibly extinct due to habitat loss.

6.2.2 Faunal Assessment

6.2.2.1 Avifauna

Based on the South African Bird Atlas Project, Version 2 (SABAP2) database, 309 bird species have the potential to occur in the vicinity of the project area (pentads 2605_2505; 2605_2510; 2605_2515; 2610_2505; 2610_2510; 2610_2515; 2615_2505; 2615_2510; 2615_2515). The full list of potential bird species is provided in Appendix C.

Of the potential bird species, nineteen (19) species (6.14%) are listed as SCC either on a regional (17) or global scale (11) (Table 6-4). The SCC include the following:

- One (1) species that is listed as Critically Endangered (CR) on a regional scale;
 - Four (4) species that are listed as Endangered (EN) on a regional basis;
 - Four (4) species that are listed as Vulnerable (VU) on a regional basis; and
 - Eight (8) species that are listed as Near Threatened (NT) on a regional basis.

On a global scale, one (1) species is listed as CR, two (2) species are listed as EN, two (2) species are listed as VU and six (6) species as NT (Table 6-4).

Table 6-4 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)	
<i>Ardeotis kori</i>	Bustard, Kori	NT	NT	High
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC	NT	Moderate
<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC	Low
<i>Ciconia nigra</i>	Stork, Black	VU	LC	Moderate
<i>Circus macrourus</i>	Harrier, Pallid	NT	NT	Moderate
<i>Coracias garrulus</i>	Roller, European	NT	LC	Moderate
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC	High
<i>Falco chicquera</i>	Falcon, Red-necked	Unlisted	NT	High
<i>Gyps africanus</i>	Vulture, White-backed	CR	CR	Moderate
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN	Low
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC	High
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	NT	High
<i>Pelecanus rufescens</i>	Pelican, Pink-backed	VU	LC	Moderate
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT	Low
<i>Phoenicopterus ruber</i>	Flamingo, Greater	NT	LC	Low
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	VU	High
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC	Moderate
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU	High

<i>Torgos tracheliotus</i>	Vulture, Lappet-faced	EN	EN	Moderate
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Ardeotis kori (Kori Bustard) is listed as NT both on a regional and global scale. It occurs in flat, arid, mostly open country such as grassland, karoo, bushveld, thornveld, scrubland and savanna but also including modified habitats such as wheat fields and firebreaks. Collisions with high voltage power lines are a major threat to this species in the Karoo of South Africa (IUCN, 2007). The project area has suitable habitat for this species and as such the likelihood of occurrence was rated as high.

Calidris ferruginea (Curlew Sandpiper) is migratory species which breeds on slightly elevated areas in the lowlands of the high Arctic and may be seen in parts of South Africa during winter. During winter, the species occurs at the coast, but also inland on the muddy edges of marshes, large rivers and lakes (both saline and freshwater), irrigated land, flooded areas, dams and saltpans (IUCN, 2017). Due to the presence of some of these habitat types within the project area the likelihood of occurrence of this species was rated as moderate.

Ciconia abdimii (Abdim's Stork) is listed as NT on a local scale and the species is known to be found in open grassland and savanna woodland often near water but also in semi-arid areas, gathering beside pools and water-holes. They tend to roost in trees or cliffs (IUCN, 2017). The existence of wet areas creates the potential for this species to occur in the project area but due to the degraded state of the environment the likelihood of occurrence was rated as low.

Ciconia nigra (Black Stork) is native to South Africa, and inhabits old, undisturbed, open forests. They are known to forage in shallow streams, pools, marshes, swampy patches, damp meadows, flood-plains, pools in dry riverbeds and occasionally grasslands, especially where there are stands of reeds or long grass (IUCN, 2017). It is unlikely that this species would breed in the project area due to the lack of forested areas, however some suitable foraging habitat remains in the form of the open grasslands and wetland areas, and as such the likelihood of occurrence is rated as moderate.

Circus macrourus (Pallid Harrier) is listed as NT on a regional and global scale, and overwinters in semi-desert, scrub, savanna and wetlands. The species is migratory, with most birds wintering in sub-Saharan Africa or south-east Asia (IUCN, 2017). The species is most likely only to use the project area as a migratory route or a temporary overwintering location from August to March, the likelihood of occurrence is moderate.

Coracias garrulous (European Roller) is a winter migrant from most of South-central Europe and Asia occurring throughout sub-Saharan Africa (IUCN, 2017). The European Roller has a preference for bushy plains and dry savannah areas (IUCN, 2017). There is a moderate chance of this species occurring in the project area as they prefer to forage in open/disturbed agricultural areas which can be found adjacent to the project area.

Falco biarmicus (Lanner Falcon) is native to South Africa and inhabits a wide variety of habitats, from lowland deserts to forested mountains (IUCN, 2017). They may occur in groups up to 20 individuals but have also been observed solitary. Their diet is mainly composed of small birds such as pigeons and francolins. The likelihood of incidental records of this species in the project area is rated as high due to the presence of many bird species on which Lanner Falcons may predate.

Falco chicquera (Red-necked Falcon) is classed as NT on a global scale. This species was recently split from its Indian counterpart *Falco chicquera chicquera*. The African species is mostly found in semi-desert and savanna areas with some trees for perching. The number of this species is declining due to ongoing habitat degradation. The likelihood of occurrence in the project area is rated as high due to the availability of suitable habitat.

Gyps africanus (White-backed Vulture) has a large range and only occurs throughout sub-Saharan Africa. Primarily a lowland species of open wooded savanna, particularly areas of *Acacia* (*Vachellia*). It requires tall trees for nesting. According to the IUCN (2017) this species faces similar threats to other African vultures, being susceptible to habitat conversion to agro-pastoral systems, loss of wild ungulates leading to a reduced availability of carrion, hunting for trade, persecution, and poisoning. The likelihood of suitably large trees for nesting for this species is moderate at the project site and as such the likelihood of occurrence for the species is moderate.

Gyps coprotheres (Cape Vulture) is listed as EN on both a regional and global scale. Cape Vultures are long-lived carrion-feeders specialising on large carcasses, they fly long distances over open country, although they are usually found near steep terrain, where they breed and roost on cliffs (IUCN, 2017). Individuals may be seen foraging within the project area but are unlikely to be resident. Likelihood of occurrence is rated as low.

Mycteria ibis (Yellow-billed Stork) is listed as EN on a regional scale and LC on a global scale. This species is migratory and has a large distributional range which includes much of sub-Saharan Africa. It is typically associated with freshwater ecosystems, especially wetlands and the margins of lakes and dams (IUCN, 2017). The presence of some water bodies within the project area creates a high possibility that this species may occur there.

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 high due to the river system that runs through the property and suitable associated vegetation.

Pelecanus rufescens (Pink-backed Pelican) is listed as VU on a regional scale. The species occur in freshwater lakes, swamps, rivers and seasonal ponds, sometimes they occur along the coast. As there is a river system and a number of wetlands within the project area the likelihood of occurrence is rated as high, but due to the area's disturbed nature the likelihood is decreased to moderate.

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). Due to the absence of its preferred habitat within the project area, combined with the disturbed nature of the area, the likelihood of occurrence is low.

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). With the presence of grassland areas and some trees the likelihood of occurrence in the project area is rated as high.

Rostratula benghalensis (Greater Painted-snipe) shows a preference for recently flooded areas in shallow lowland freshwater temporary or permanent wetland, it has a wide range of these freshwater habitats which they occur in, in this case, sewage pools, reservoirs, mudflats overgrown with marsh grass which may possibly exist within the project area, thus the likelihood of occurrence is moderate.

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 high due to the grasslands and wetland areas present in the project area, as well as the agricultural areas present in which this species may forage.

Torgos tracheliotus (Lappet-faced Vulture) is listed as EN, both on a regional and global level. Only a small, very rapidly declining population remains, owing primarily to poisoning and persecution, as well as ecosystem alterations (IUCN, 2017). The species inhabits dry savanna, arid plains, deserts and open mountain. It ranges widely when foraging and is mainly a scavenger, feeding predominantly on any large carcasses or their remains. This rare species is unlikely to be resident within the project area due to unsuitable nesting sites but may scavenge on any dead carcasses in the area, and therefore the likelihood of occurrence is rated as moderate.

6.2.2.2 Mammals

The IUCN Red List Spatial Data (IUCN, 2017) lists 67 mammal species that could be expected to occur within the project area. Of these species, 8 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 59 small to medium sized mammal species, ten (10) (17%) are listed as being of conservation concern on a regional or global basis. The list of potential species includes:

- Four (4) that are listed as VU on a regional basis; and
- Six (6) that are listed as NT on a regional scale.

On a global scale, 1 species is listed as EN, 3 species are listed as VU and 2 species as NT (Table 6-5).

Table 6-5 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)	
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT	Moderate
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC	High
<i>Crocuta crocuta</i>	Spotted Hyaena	NT	LC	Low
<i>Felis nigripes</i>	Black-footed Cat	VU	VU	Moderate
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN	Moderate
<i>Panthera pardus</i>	Leopard	VU	VU	Low
<i>Parahyaena brunnea</i>	Brown Hyena	NT	NT	High
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC	High
<i>Rhinolophus denti</i>	Dent's Horseshoe Bat	NT	LC	Low
<i>Smutsia temminckii</i>	Temminck's Ground Pangolin	VU	VU	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. Based on the absence of a perennial river within the project area but the presence of a nearby wetland area and seasonal stream, the likelihood of occurrence of this species occurring in the project area is considered to be moderate.

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 and therefore the likelihood of occurrence is rated as high.

Crocuta Crocuta (Spotted Hyaena) is classified as NT on a national scale. This species mainly occurs in protected areas but in Limpopo and the North-west Provinces they can still be found outside of protected areas. This species is predominantly found in savanna habitats, where they can occur in close association with humans. The likelihood of occurrence in this project area is low due to the lack of suitable prey species and human-induced impacts.

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 optimal for the species and the likelihood of occurrence is rated as moderate.

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, where 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. Although the vegetation type is suitable, the moderate

levels of human disturbance mean that the likelihood of occurrence of this species in the project area is rated as moderate.

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 which is in such close proximity to an urban area, and where they are likely to be persecuted, is regarded as low.

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. Prey species are most likely absent for the project area and as such the likelihood of occurrence 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 high.

Rhinolophus denti (Dent's Horseshoe Bat) is listed as NT regionally and is typically associated with savanna habitats. Populations are largely dependent on caves, abandoned mines and similar habitats for roosting (IUCN, 2007). Due to the lack of such habitat at the project site, the likelihood of occurrence is low.

Smutsia temminckii (Temminck's Ground Pangolin) is a predominantly solitary, terrestrial species that inhabits mainly savanna woodland in low-lying regions with moderate to dense scrub where average annual rainfall is between 250 mm and 1,400 mm (IUCN, 2017). The species is eaten as bushmeat to various extents across its range (e.g. South Africa, Zimbabwe, Namibia, Mozambique, Tanzania). Of greater threat is overexploitation for body parts and scales which have superstitious value and are used for medicinal purposes (IUCN, 2017). The likelihood of occurrence of this species in the project area is low due to disturbances which would typically force sensitive species such as this to move to other areas.

6.2.2.3 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) 20 reptile species have the potential to occur in the project area (Appendix E). None 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) 16 amphibian species have the potential to occur in the project area (Appendix F). No amphibian SCCs are expected to occur in the project area.

7 Field Survey

The project area was ground-truthed on foot which included spot checks in pre-selected sensitive areas to validate or refute desktop data. All site photographs are available on request.

7.1 Habitat Assessment

Vegetation associated with the Kalgold Mining Right Area (MRA) and the proposed mine development areas and related infrastructure footprint comprises three broad habitat units, namely the Transformed habitat unit, the Mafikeng Bushveld habitat unit, Wetland habitat unit (includes riparian zones), (Figure 7-1)(Figure 7-2).

Transformed Habitat

The Transformed habitat unit which is the largest of the three units represents areas where vegetation cover has been significantly impacted by current and historical mining and agricultural activities as well as through infrastructure associated with the mining activities. This habitat unit has no conservation value and from ecological perspective is regarded as having low conservation value.

Mafikeng Bushveld

The Mafikeng Bushveld habitat unit includes tracts of bushveld habitat containing a high abundance of indigenous species. The intact Mafikeng Bushveld was found to be in a semi-natural state, but slightly disturbed due to historic grazing by livestock, edge effects from the mining presence and recently being impacted by prospecting activities. The dominant plant species present were Camel Thorn, Sickle Bush interspersed with *Eragrostis sp.* The current ecological condition of this habitat in regard to the main driving forces, are intact; which is evident in the observed balance between trees, grasses and herbaceous plant, lack of Alien Invasive Plants (AIP) and the amount of protected tree species recorded. One floral species, which is protected under the National Forests Act (Act 84 of 1998), *Vachellia (Acacia) erioloba* (Camel Thorn) was recorded in abundance throughout this habitat unit. In terms of this act, protected tree species may not be cut, disturbed, damaged or destroyed and their products may not be possessed, collected, removed, transported, exported, donated, purchased or sold - except under licence granted by the Department of Water Affairs (DWA). Applications for such activities should be made to the responsible official in each province. Previous studies done by TBC also recorded the Sheppard's trees (*Boscia albitrunca*) within the Mafikeng Bushveld Habitat Unit, this tree is also protected under the NFA thus the same applies. The vegetation structure within the Mafikeng Bushveld habitat is considered to be relatively intact, with few areas of bush encroachment, typical of overgrazing, noted as well as edge effects from mining. However, due to its habitat value for faunal species as it hosts a number of mammal species including the NT brown hyena (*Parahyaena brunnea*), the habitat is considered to be of high ecological importance and sensitivity.

Wetlands (and riparian zones)

Various wetlands associated with non-perennial drainage lines traverse the subject property within the southwest and southeast of the project area. The riparian habitat unit or riparian zone represents areas associated with the Marokwa River as well as dammed up sections of the river. Tree species are dispersed into clusters with the dominant species including *Searsia*

Lancea, *Senegalia mellifera* and *Ziziphus mucronata*. Although the stream and associated dams are in relatively modified poor condition with the presence of invasive species, bank erosion, pollution and overgrazing/trampling adjacent to the stream, the riparian vegetation serves an important ecological function with high conservation value. Riparian areas have high conservation value and can be considered most important part of a watershed for a wide range of values and resources. They provide important habitat for a large volume of wildlife and often forage for domestic animals. The vegetation they contain are an important part of the water balance for the hydrological cycle through evapotranspiration. Numerous individuals of *Vachellia erioloba* (Camel Thorn) was recorded in abundance throughout this habitat unit. The wetlands (and riparian zone) habitat unit is considered to be of very high ecological sensitivity due to the contribution of the various wetland (and riparian) features to faunal migratory connectivity, ecoservices provision and the unique habitat provided for faunal and floral species. The wetland habitats have been provided by the wetland specialist, and the accompanying wetland report must be consulted for the relevance and sensitivity of these systems which have been included within this report. The riparian habitats have been provided by the aquatics specialist, and the accompanying freshwater report must be consulted for the relevance and sensitivity of these systems which have been included within this report.

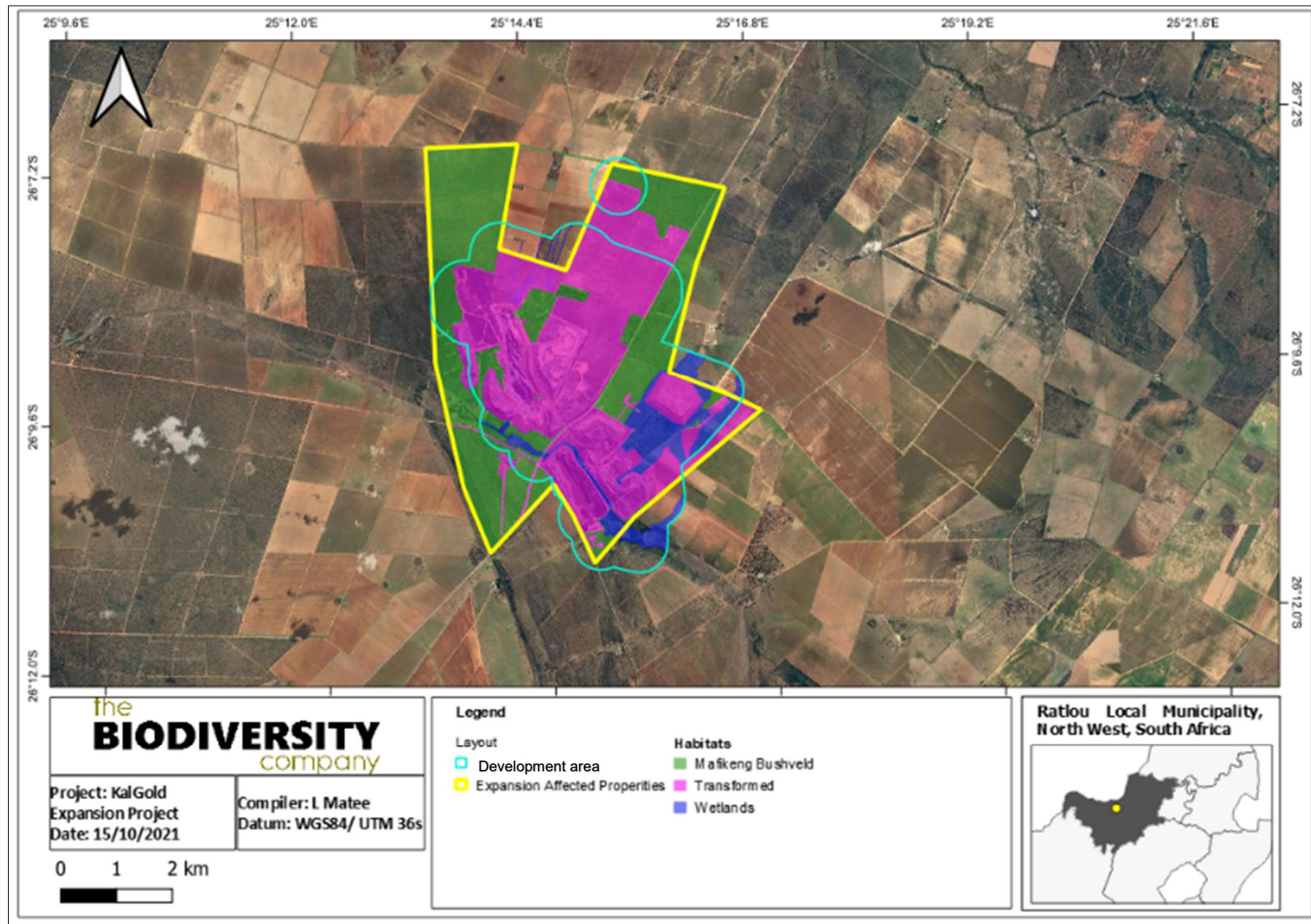


Figure 7-1 Habitats identified within the project area.

7.2 Vegetation Assessment

The vegetation assessment was conducted throughout the extent of the project area. A total of 59 tree, shrub, graminoid and herbaceous plant species were recorded (Table 7-1 and Figure 7-3). Plants listed as Category 1 alien or invasive species under the National Environmental Management: Biodiversity Act (NEMBA) appear in green text. Plants listed in Category 2 or as 'not indigenous' or 'naturalised', appear in blue text. One nationally protected plant was recorded, *Vachellia erioloba* (Camel Thorn), which is a protected tree in terms of the National Forests Act (Act No. 84 of 1998), was recorded in abundance throughout the project area.

Table 7-1 Trees, shrubs and weeds recorded on the project area

Scientific Name	Common Name	Threat Status (SANBI, 2017)	SA Endemic	Alien Category
<i>Acacia mearnsii</i>	Black Wattle			NEMBA Category 2
<i>Aloe cf grandidentata</i>	Kleinbontaalwyn	LC	Not Endemic	
<i>Ammocharis coranica</i>	Ground Lily	LC	Not Endemic	
<i>Argemone ochroleuca</i>	White-Flowered Poppy		Not Indigenous; Naturalised; Invasive	NEMBA Category 1b
<i>Aristida adscensionis</i>	Annual Three Awn	LC	Not Endemic	
<i>Aristida congesta subsp. Congesta</i>	Cat's-tail Three-awned Grass	LC	Not Endemic	
<i>Asparagus laricinus</i>	Langbeenkatdoring	LC	Not Endemic	
<i>Bulbine abyssinica</i>	Bushy Bulbine	LC	Not Endemic	
<i>Cadaba aphylla</i>	Leafless Worm Bush	LC	Not Endemic	
<i>Cenchrus ciliaris</i>	Buffelgrass	LC	Not Endemic	
<i>Cirsium vulgare</i>	Spear Thistle, Scotch Thistle		Indigenous, Not Endemic	NEMBA Category 1b.
<i>Commelina africana</i>	Common Yellow Commelina	LC	Not Endemic	
<i>Cynodon dactylon</i>	Couch Grass, Quick Grass	LC	Not Endemic	
<i>Datura ferox</i>	Large Thorn Apple		Not Indigenous; Naturalised; Invasive	NEMBA Category 1b.
<i>Dicerocaryum senecioides</i>	Elandsdoring	LC	Not Endemic	
<i>Dichrostachys cinerea subsp. africana</i>	Small-leaved Sickle Bush	LC	Not Endemic	
<i>Digitaria eriantha</i>	Woolly Finger Grass	LC	Not Endemic	
<i>Ehretia rigida</i>	Puzzle Bush	LC	Endemic	
<i>Elephantorrhiza elephantina</i>	Elephant's root	LC	Indigenous, Not Endemic	
<i>Eragrostis chloromelas</i>	Blue Love Grass	LC	Not Endemic	
<i>Eragrostis curvula</i>	Weeping Love Grass	LC	Not Endemic	
<i>Eragrostis pallens</i>	Gembokgras	LC	Not Endemic	
<i>Eragrostis rigidior</i>	Curly Leaved Love Grass	LC	Not Endemic	
<i>Felicia clavipilosa subsp. clavipilosa</i>		LC	Not Endemic	
<i>Flaveria bidentis</i>	Smelter's bush		Not Indigenous; Naturalised; Invasive	NEMBA Category 1b
<i>Gomphocarpus physocarpus</i>	Balloon milkweed	LC	Indigenous, Not Endemic	

<i>Gomphocarpus fruticosus</i>	Narrow-leaved cotton bush	LC	Not Endemic	
<i>Grewia flava</i>	Velvet Raisin	LC	Not Endemic	
<i>Gymnosporia buxifolia</i>	Common Spike-thorn	LC	Not Endemic	
<i>Hyparrhenia hirta</i>	Thatch Grass	LC	Not Endemic	
<i>Lantana mearnsii</i>		LC	Not Endemic	
<i>Ledebouria luteola</i>	Highveld African Hyacinth	LC	Not Endemic	
<i>Melia azedarach</i>	"Syringa", Persian Lilac		Not Endemic	NEMBA Category 1b
<i>Melinis repens</i>	Natal Red Top	LC	Not Endemic	
<i>Melinis repens</i>	Natal grass	LC	Not Endemic	
<i>Nicotiana glauca</i>	Wild Tobacco			NEMBA Category 1b
<i>Opuntia ficus-indica</i>	Mission Prickly Pear, Sweet Prickly Pear		Not Endemic	NEMBA Category 1b
<i>Opuntia stricta</i>	Australian pest pear			NEMBA Category 1b
<i>Panicum maximum</i>	Guinea Grass	LC	Not Endemic	
<i>Phragmites australis</i>	Common Reed	LC	Not Endemic	
<i>Schkuhria pinnata</i>	Dwarf Marigold		Not Endemic	Naturalized exotic weed
<i>Searsia lancea</i>	Karee	LC	Not Endemic	
<i>Searsia pyroides</i>	Common Currant	LC	Not Endemic	
<i>Senegalia mellifera</i>	Black Thorn	LC	Not Endemic	
<i>Sida cordifolia</i>	Flannel Weed	LC	Not Endemic	
<i>Solanum campylacanthum</i>	Bitter Apple	LC	Not Endemic	
<i>Stipagrostis uniplumis</i>	Bushman Grass	LC	Not Endemic	
<i>Tagetes minuta</i>	Khaki Bush			Naturalized exotic weed
<i>Tarchonanthus camphoratus</i>	Camphor Bush	LC	Not Endemic	
<i>Themeda triandra</i>	Red Grass	LC	Not Endemic	
<i>Vachellia erioloba</i>	Camel Thorn	LC-Nationally Protected	Not Endemic	
<i>Vachellia hebeclada</i>	Candle-pod Thorn	LC	Not Endemic	
<i>Vachellia karroo</i>	Sweet Thorn	LC	Not Endemic	
<i>Verbena bonariensis</i>	Wild Verbena, Tall Verbena, Purple Top		Not Indigenous; Naturalised; Invasive	NEMBA Category 1b.
<i>Verbena brasiliensis</i>	Brazilian Verbena, Gin Case		Not Indigenous; Naturalised; Invasive	
<i>Xanthium spinosum</i>	Spiny cocklebur		Not Indigenous; Naturalised; Invasive	NEMBA Category 1b
<i>Xanthium strumarium</i>	Cockle Bur		Not Indigenous; Naturalised; Invasive	NEMBA Category 1b
<i>Zea mays</i>	Corn or maize		Not Indigenous; Naturalized exotic	Naturalized exotic
<i>Ziziphus mucronata</i>	Buffalo thorn	LC	Not Endemic	

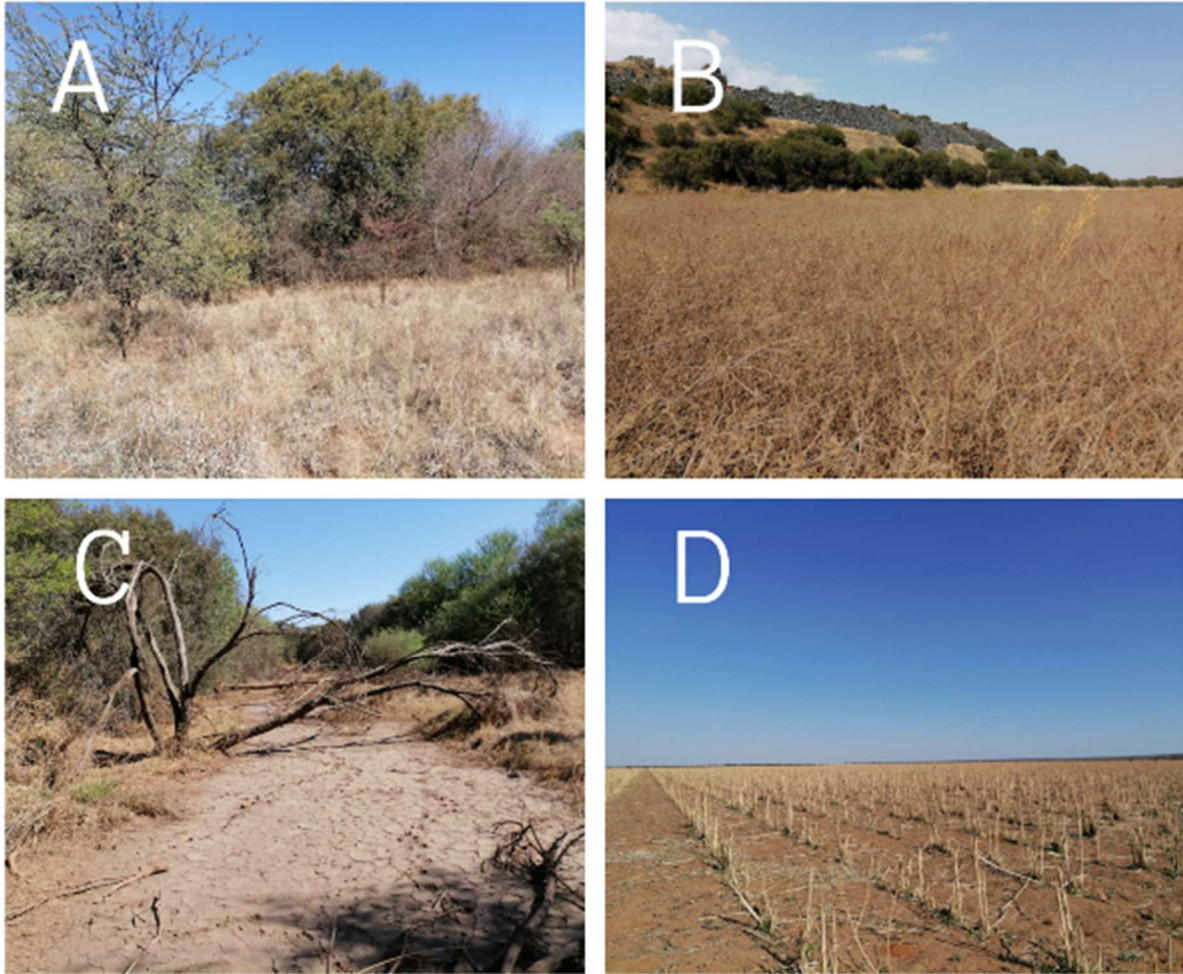


Figure 7-2 Examples of some of the habitats observed within the project area; A) Marikana Bushveld, B) Wetland, C) Riparian, and D) Transformed.

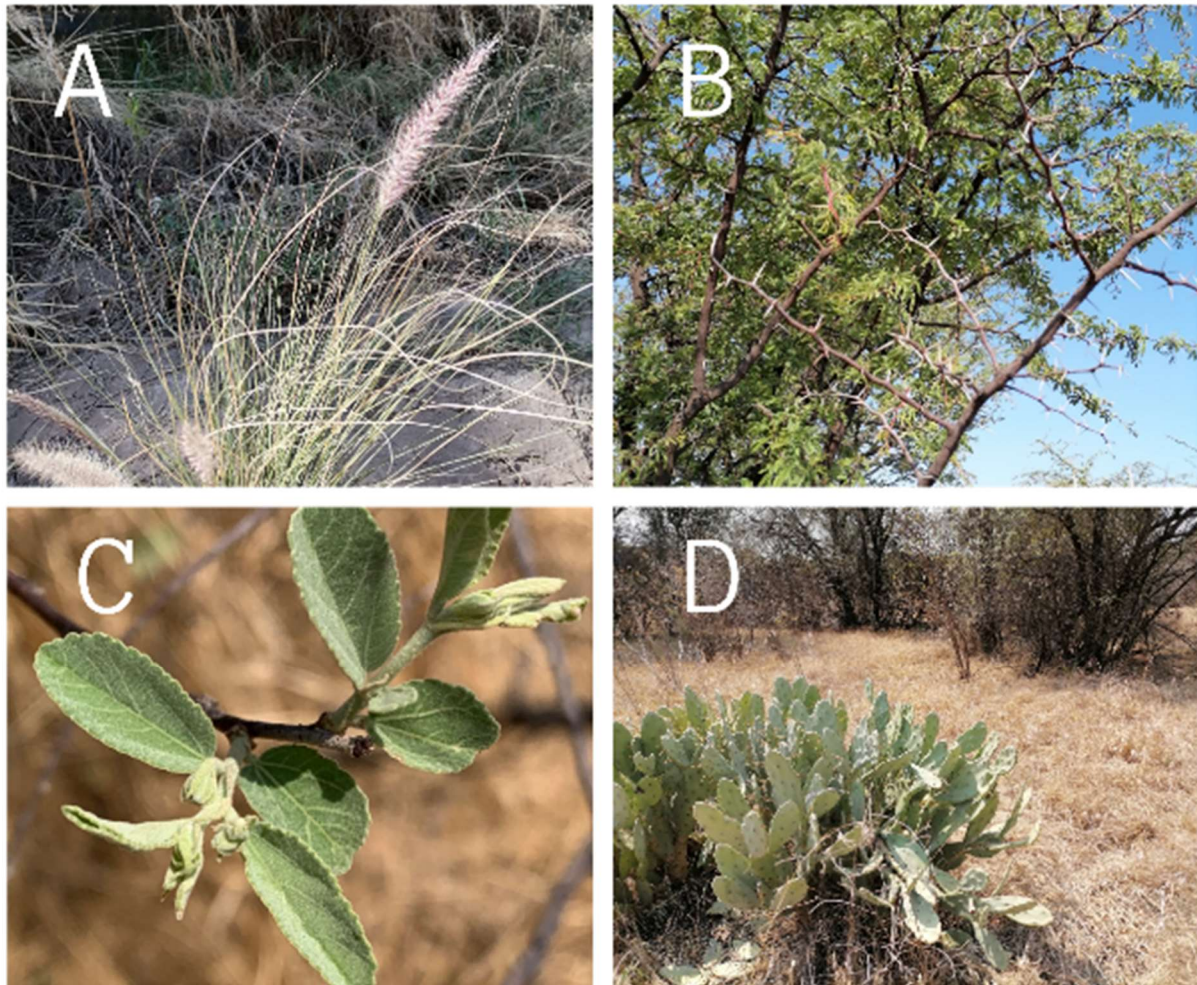


Figure 7-3 Plant species recorded during the survey: A) Buffelgrass (*Cenchrus ciliaris*) B) Camel Thorn (*Vachellia erioloba*), C) Velvet Raisin (*Grewia flava*), and D) Australian pest pear (*Opuntia stricta*).

7.3 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 ecosystems. 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.

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 NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation calls for the removal and / or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, 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 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; and
- 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 (from construction phase in this case) 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.

Eleven (11) Category 1b and one (1) Category 2 invasive species were recorded within the project area and must therefore be removed by implementing an alien invasive plant management programme in compliance of section 75 of the Act as stated above. Plants listed as Category 1 alien or invasive species under the National Environmental Management: Biodiversity Act (NEMBA) appear in green text. Plants listed in Category 2 or as 'not indigenous' or 'naturalised', appear in blue text (Table 7-1).

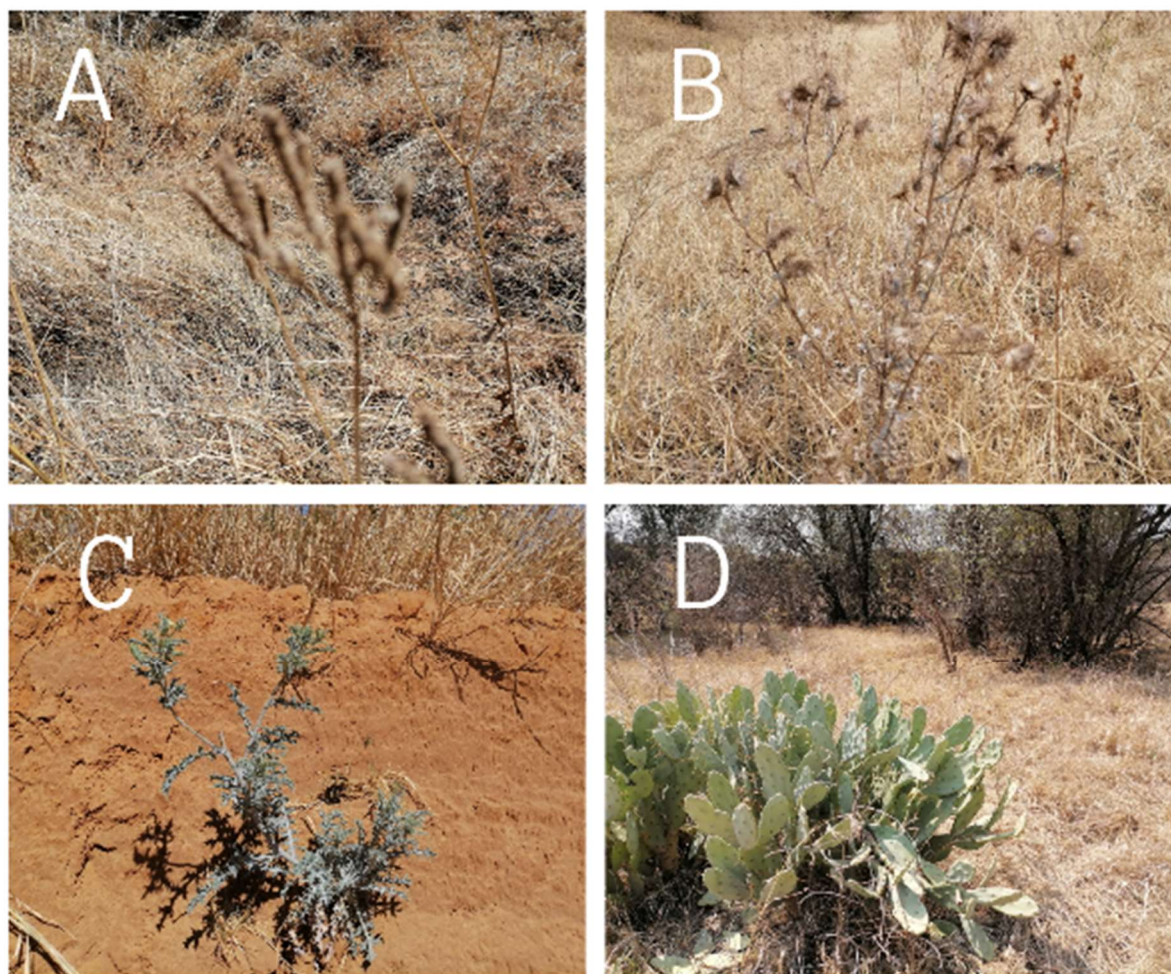


Figure 7-4 Some invasive plant species recorded in the project area: A) *Verbena brasiliensis*, B) *Cirsium vulgare*, C) *Argemone ochroleuca*, and D) *Opuntia stricta*.

7.4 Fauna Assessment

7.4.1 Avifauna

During the survey, 35 bird species were recorded (Table 7-2 and Figure 7-5). Two of the species recorded were SCCs.

Table 7-2 A list of the avifauna species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Ardeotis kori</i>	Bustard, Kori	NT	NT
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Amadina fasciata</i>	Finch, Cut-throat	Unlisted	Unlisted
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC

<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC
<i>Corvinella melanoleuca</i>	Shrike, Magpie	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Corythaixoides concolor</i>	Go-away-bird, Grey	Unlisted	LC
<i>Cossypha humeralis</i>	Robin-chat, White-throated	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC
<i>Gyps africanus</i>	Vulture, White-backed	CR	CR
<i>Laniarius atrococcineus</i>	Shrike, Crimson-breasted	Unlisted	LC
<i>Merops hirundineus</i>	Bee-eater, Swallow-tailed	Unlisted	LC
<i>Mirafra africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC
<i>Onychognathus morio</i>	Starling, Red-winged	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Pycnonotus nigricans</i>	Bulbul, African Red-eyed	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Tockus leucomelas</i>	Hornbill, Southern Yellow-billed	Unlisted	LC
<i>Tockus rufirostris</i>	Hornbill, Southern Red-billed	Unlisted	Unlisted
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	Unlisted	LC
<i>Upupa africana</i>	Hoopoe, African	Unlisted	LC
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC

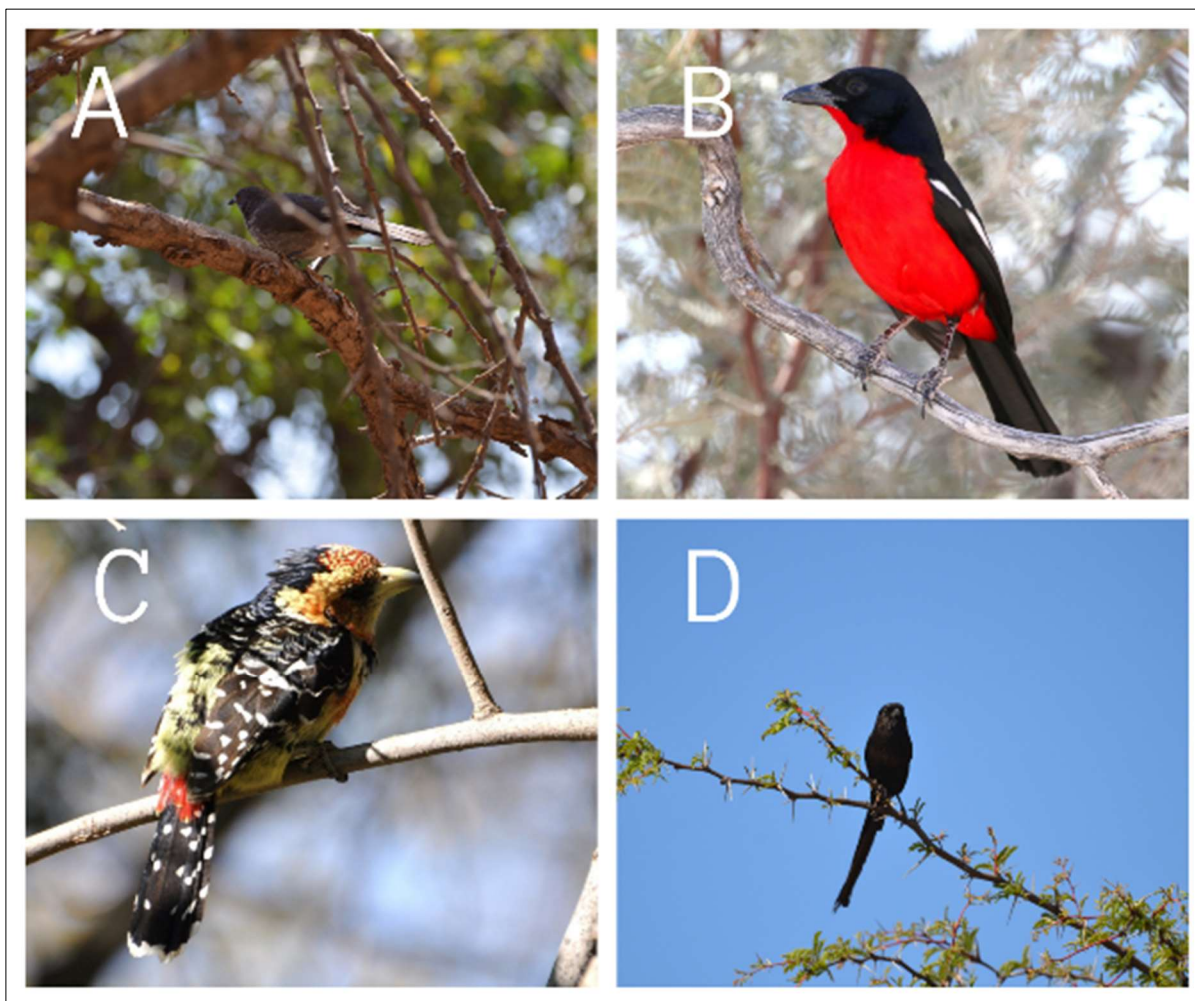


Figure 7-5 Avifaunal species recorded during the survey: A) The Arrow-marked Babbler (*Turdoides jardineii*), B) Crimson-breasted shrike (*Laniarius atrococcineus*), C) Crested Barbet (*Trachyphonus vaillantii*), and D) Magpie Shrike (*Lanius melanoleucus*).

7.4.2 Mammals

Seventeen (17) mammal species were observed in the project area (Table 7-3). Two of these species were SCC. According to personnel at the Kalgold Mine, the Cheetah (*Acinonyx jubatus*) is often recorded within the project area and surrounds, this was however not confirmed during the survey.

Table 7-3 Mammal species recorded in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Acinonyx jubatus</i>	Cheetah	VU	VU
<i>Aepyceros melampus</i>	Impala	LC	LC
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Chlorocebus pygerythrus</i>	Vervet Monkey	LC	LC
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	LC
<i>Herpestes sanguineus</i>	Common Slender Mongoose	LC	LC
<i>Hystrix africae australis</i>	Cape Porcupine	LC	LC

<i>Lepus saxatilis</i>	Scrub Hare	LC	LC
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT
<i>Phacochoerus africanus</i>	Common Warthog	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC
<i>Tragelaphus strepsiceros</i>	Greater Kudu	LC	LC

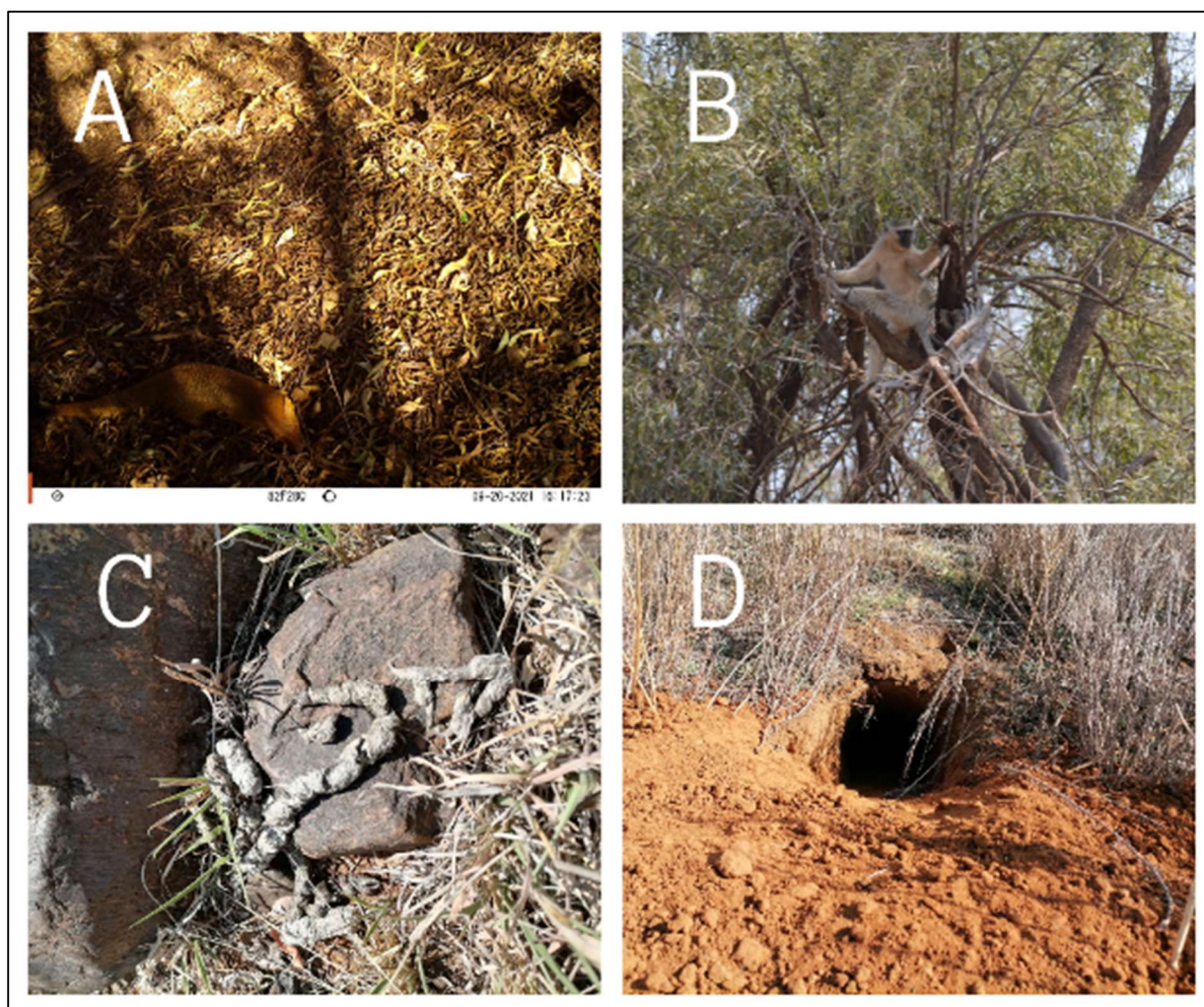


Figure 7-6 Some of the signs observed of mammal species: A) Common Slender Mongoose, B) Vervet Monkey, C) Black-backed Jackal scats, and D) Brown Hyaena den.

7.4.3 Herpetofauna (Reptiles and Amphibians)

Five reptiles and no amphibian species were recorded in the project area during the survey. None of the herpetofauna species recorded are regarded as threatened, albeit all are protected under provincial legislation. This can be attributed to the timing of the survey as well as the fact that no pitfall trapping was done. Species richness and capture rates are dependent on the time of the year, time of the day and length of survey period as well as weather conditions. In general surveys for reptiles should be conducted during the warmer months as many reptiles become inactive and retire to winter refugia during colder months, most reptile species are best surveyed in late spring and early summer months and should not be surveyed

between May and September. The same can be said for amphibians as seasonal fluctuations in amphibian population sizes occur depending on certain environmental parameters such as amount of rainfall, temperature, and humidity. Precipitation strongly influences amphibian activity, distribution, and dispersion patterns thus, many species remain underground or in aboveground retreats except for during wet periods. Therefore, the best time to survey for amphibians is often during the wet season following heavy rains.

Table 7-4 Reptiles recorded in the project area.

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Trachylepis varia</i>	Variable Skink	LC	LC
<i>Pseudaspis cana</i>	Mole Snake	LC	Unlisted
<i>Naja mossambica</i>	Mozambique Spitting Cobra	LC	Unlisted
<i>Boaedon capensis</i>	Brown House Snake	LC	LC
<i>Trachylepis capensis</i>	Cape Skink	LC	Unlisted



Figure 7-7 Mole Snake (*Pseudaspis cana*) recorded in the project area (Rian,2021; TBC,2021)

8 Terrestrial Sensitivity

8.1 Site Ecological Importance

The biodiversity theme sensitivity as indicated in the screening report was derived to be *Very High* (Figure 8-1). This was based on the CBA2, ESA1 areas as well as the proximity to the

NPAES Molopo area. The animal sensitivity was rated as *Low*, while the plant sensitivity was rated as *Medium*.

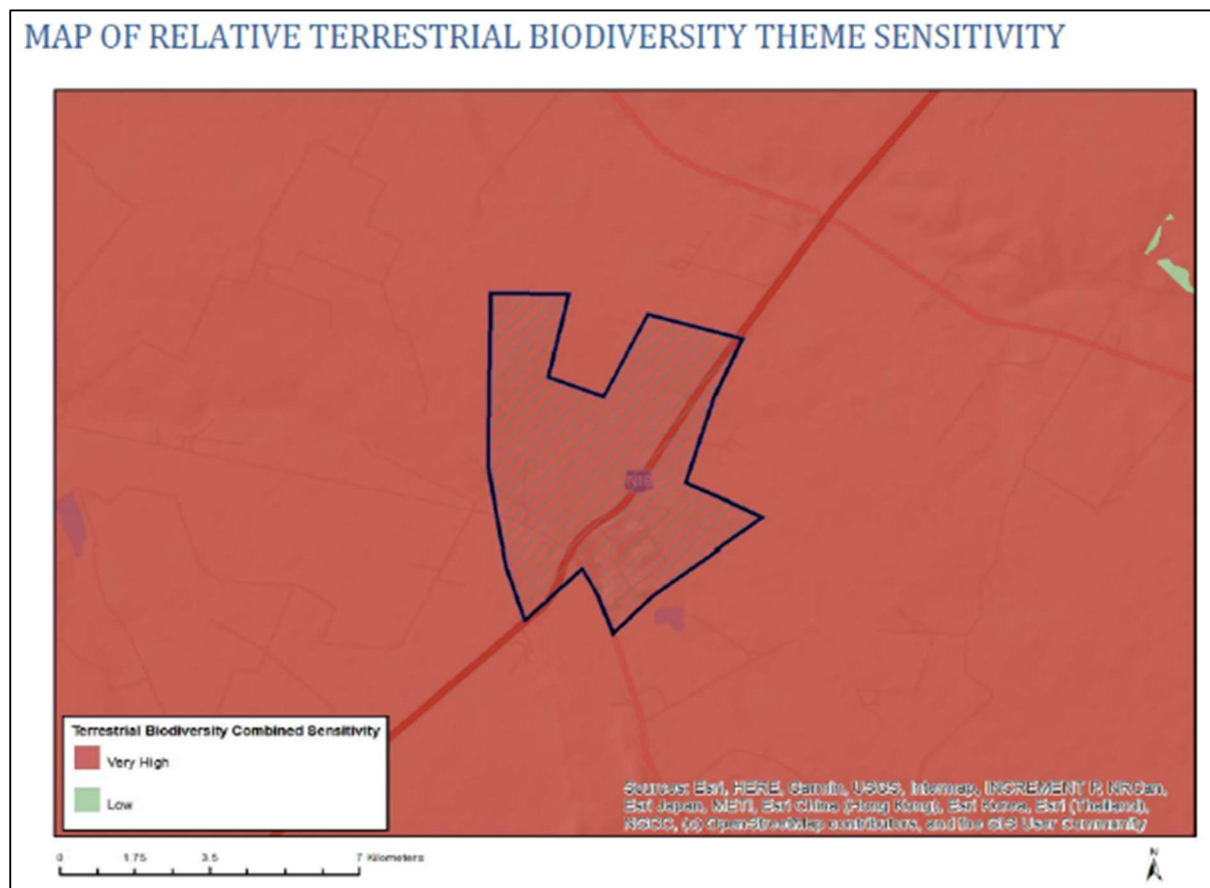


Figure 8-1 Biodiversity Theme Sensitivity, Screening Report

Three (3) different terrestrial habitat types were delineated within the project area. Based on the criteria provided in Section 5.3 of this report, all habitats within the assessment area of the proposed development were allocated a sensitivity category. The Transformed habitat unit which is the largest of the three units represents areas where vegetation cover has been significantly impacted by current and historical mining and agricultural activities as well as through infrastructure placement. This habitat unit has no conservation value and from ecological perspective is regarded as having low conservation value.

The vegetation structure within the Mafikeng Bushveld habitat unit is relatively intact, with few areas of bush encroachment, typical of overgrazing, noted as well as edge effects from mining. However, due to hosting protected tree species and its habitat value for faunal species including the NT Brown Hyena (*Parahyaena brunnea*), the habitat is considered to be of high ecological importance and sensitivity.

The Wetland (and riparian zone) habitat unit is of high ecological sensitivity due to the contribution of the various wetland (and riparian zone) features to faunal migratory connectivity, ecoservices provision and the unique habitat provided for faunal and floral species. The summary of the sensitivities for each habitat unit is presented below.

Table 8-1 Summary of habitat types delineated within the field assessment area of the project area

Habitat (Area)	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecological Importance
Wetland	Medium	Medium	Medium	Very Low	High
Mafikeng Bushveld	Medium	High	Medium	Low	High
Transformed	Medium	Low	Low	Medium	Low

Table 8-2 Guidelines for interpreting Site Ecological Importance in the context of the proposed development activities

Site Ecological Importance (SEI)	Interpretation in relation to proposed development activities
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted, limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

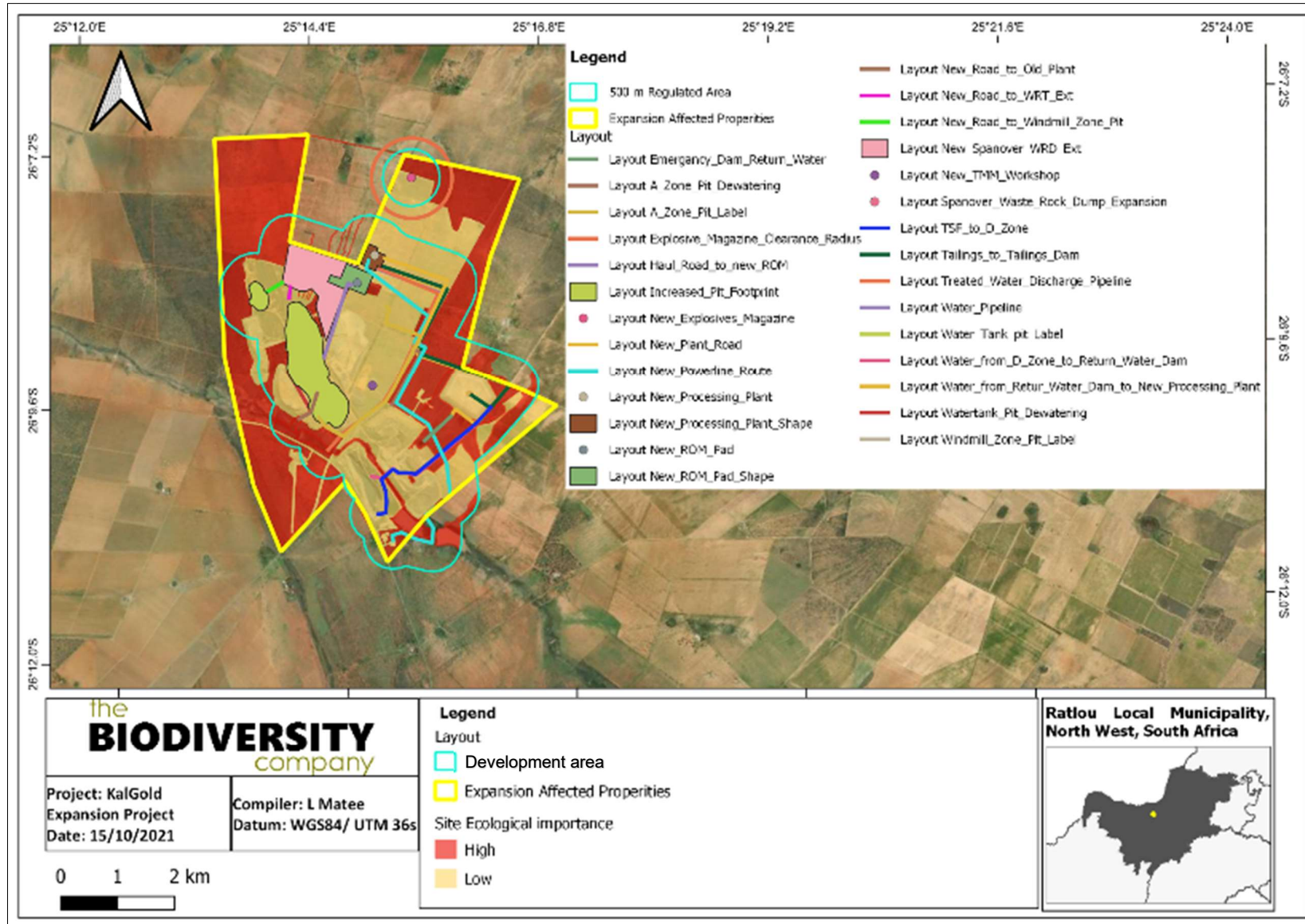


Figure 8-2 The layout of the infrastructure superimposed over the sensitivities in the area

9 Impact Assessment

Potential impacts were evaluated against the spatial data to identify relevance to the project area, specifically the proposed expansion footprint area. The relevant impacts were then subjected to a prescribed impact assessment methodology. The details of this methodology can be provided on request.

Impacts were assessed in terms of the planning, construction/operational, decommissioning/rehabilitation and closure phases. Mitigation measures were only applied to impacts deemed relevant based on the impact analysis.

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 expansion alternatives. 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 Terrestrial Ecology Impact Assessment

The anticipated impacts are derived from the main activities associated with the expansion which include:

- New Processing Plant;
- New Powerline;
- New Explosives Magazine;
- Increasing the Pit Footprint;
- Pumping tailings material into the recommissioned TSF;
- Expansion of the Spanover Waste Rock Dump (WRD);
- A Series of new Roads;
- A Series of new Pipelines;
- New Trackless Mobile Machine (TMM) Workshop; and

- New Run of Mine (ROM) Pad.

The proposed expansion infrastructure has been overlaid with the sensitivity (Figure 8-2). It is evident from the figure that a number of features will overlap with both the high and very high sensitivity areas.

9.2.1 Anticipated Impacts

The impacts anticipated for the proposed activities are considered in order to predict and quantify these impacts and assess & evaluate the magnitude on the identified terrestrial biodiversity.

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 of proposed expansion areas):	Secondary impacts anticipated
1. Destruction, fragmentation and degradation of habitats and ecosystems	Physical removal of vegetation Access roads and servitudes Power lines 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 Power lines	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 Power lines	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)	Loss of ecosystem services
	Vehicles	
	Exposed mine dumps	
	Outside lighting	
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

9.2.2 Unplanned Events

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

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.
TSF Failing or TSP Pipeline burst	Contamination of habitat as well as water resources.	Monitoring of TSF structure and follow legislative guidelines. Regular monitoring for leaks, cracks and faults in the pipeline

9.2.3 Planning Phase Impacts

The planning phase activities are considered a low risk as they typically involve desktop assessments and initial site inspections. This would include preparations and desktop work in support of waste management plans, environmental and social screening assessments, finalising drill sites 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:

9.2.3.1 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 light machinery can also lead to the trampling of both vegetation and faunal species.

9.2.3.1.1 Mitigation Measures

Please see section 10.

9.2.4 Construction Phase/Operational Phase Impacts

The following potential impacts were considered on terrestrial biodiversity for both the construction and operational phases. This phase refers to the period when construction of the additional proposed infrastructure is built/installed and then when it is in commission. This phase usually has the largest direct impact on biodiversity.

9.2.4.1 Destruction, further loss and fragmentation of the vegetation community

The vegetation communities are classed as VU, through site clearing, more of the sensitive 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.

9.2.4.1.1 Mitigation Measures

Please see section 10.

9.2.4.1.2 Cumulative Impacts

- Further loss of VU vegetation type; and
- Loss of sensitive habitat.

9.2.4.1.3 Irreplaceable Loss of Resources

- Loss of CBA 2; and
- Loss of sensitive and important habitat, especially around the wetlands/riparian areas.

9.2.4.1.4 Impacts on Alternatives Considered

No alternatives were provided.

9.2.4.2 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.

9.2.4.2.1 Mitigation Measures

Please see section 10.

9.2.4.2.2 Cumulative Impacts

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

9.2.4.2.3 Irreplaceable Loss of Resources

- Loss of CBA 2

9.2.4.2.4 Impacts on Alternatives Considered

No alternatives were provided.

9.2.4.3 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.

9.2.4.3.1 Mitigation Measures

Please see section 10.

9.2.4.3.2 Cumulative Impacts

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

9.2.4.3.3 Irreplaceable Loss of Resources

- Loss of CBA 2 area

9.2.4.3.4 Impacts on Alternatives Considered

No alternatives were provided.

9.2.4.4 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.

9.2.4.4.1 Mitigation Measures

Please see section 10.

9.2.4.4.2 Cumulative Impacts

- Loss of habitat for indigenous species.

9.2.4.4.3 Irreplaceable Loss of Resources

- Loss of faunal SCCs; and
- Loss of larger water bird species that could frequent the water sources.

9.2.4.4.4 Impacts on Alternatives Considered

No alternatives were provided.

9.2.4.5 Power line collisions and electrocutions

A number of avifauna species including two SCC were identified on site that is at risk for collisions and electrocutions.

9.2.4.5.1 Mitigation Measures

Please see section 10.

9.2.4.5.2 Cumulative Impacts

Loss of SCC species

9.2.4.5.3 Irreplaceable Loss of Resources

- Loss of faunal SCCs; and
- Loss of larger water bird species that could frequent the water sources.

9.2.4.5.4 Impacts on Alternatives Considered

No alternatives were provided.

9.2.4.6 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.

9.2.4.6.1 Mitigation Measures

Please see section 10.

9.2.4.6.2 Cumulative Impacts

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

9.2.4.6.3 Irreplaceable Loss of Resources

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

9.2.4.6.4 Impacts on Alternatives Considered

No alternatives were provided.

9.2.5 Decommissioning and Rehab/Closure Phase Impacts

This phase is when the scaling down of activities ahead of temporary or permanent closure, cessation of mining or production is initiated. During this phase, the operational phase impacts will persist until the activity reduces and the rehabilitation measures are implemented.

9.2.5.1 Continued fragmentation and degradation of habitats and ecosystems

The spread of alien invasive species will result in the loss of habitat and water for indigenous fauna and flora. Overall, the fauna assemblage will be changed. Erosion will also disrupt the vegetation in the surrounding areas and result in habitat loss.

9.2.5.1.1 Mitigation Measures

Please see section 10.

9.2.5.1.2 Cumulative Impacts

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

9.2.5.1.3 Irreplaceable Loss of Resources

- Loss of CBA 2 area.

9.2.5.1.4 Impacts on Alternatives Considered

These could be non-applicable for these phases of the project.

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

During the decommissioning phase infrastructure will now be broken down, removed and disturbed. As the infrastructure is being removed this will disrupt the ecosystem.

9.2.5.2.1 Mitigation Measures

Please see section 10.

9.2.5.2.2 Cumulative Impacts

- Loss of suitable habitat.

9.2.5.2.3 Irreplaceable Loss of Resources

- Loss of potential faunal SCCs.

9.2.5.2.4 Impacts on Alternatives Considered

These could be non-applicable for these phases of the project.

9.2.6 Assessment of Significance

Table 9-3 shows the significance of potential impacts associated with the proposed expansion, on biodiversity before and after the implementation of mitigation measures as well as cumulative and irreplaceable loss.

Table 9-3 Assessment of significance of potential impacts on terrestrial biodiversity associated with the project

Impact	Phase	Pre-mitigation ER	Post-mitigation ER	Confidence	Public response	Cumulative Impact	Irreplaceable loss	Priority Factor	Final score
Temporary disturbance of wildlife due to increased human presence and possible use of machinery and/or vehicles.	Planning	-9	-4	High	1	2	2	1,33	-5,33
Destruction, further loss and fragmentation of the vegetation community and habitat.	Construction	-23,75	-13	High	1	3	3	1,67	-21,67
Introduction of alien species, especially plants	Construction	-17	-9	High	1	2	2	1,33	-12,00
Erosion due to storm water runoff and wind	Construction	-16	-9,75	High	1	2	2	1,33	-13,00
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, rock chips, vibration and poaching).	Construction	-18	-10,5	High	1	2	2	1,33	-14,00
Environmental pollution due to water/ mine drainage runoff potential leaks, discharges, pollutant and storage leaching into the surrounding environment	Operation	-16	-9	High	1	3	3	1,67	-15,00
Destruction, further loss and fragmentation of the vegetation community	Operation	-16	-9,75	High	1	2	2	1,33	-13,00
Introduction of alien species, especially plants	Operation	-17	-6,5	High	1	2	2	1,33	-8,67
Erosion due to storm water runoff and wind	Operation	-10,5	-5	High	1	2	2	1,33	-6,67
Displacement of faunal community due to habitat loss, direct mortalities and disturbance (road collisions, noise, light, dust, rock chips, vibration and poaching).	Operation	-16	-4	High	1	2	2	1,33	-5,33
Powerline collisions and electrocutions	Operation	-17	-10,5	High	1	3	3	1,67	-15,75
Environmental pollution due to water/ mine drainage runoff potential leaks, discharges, pollutant and storage leaching into the surrounding environment	Operation	-16	-9,75	Medium	1	3	2	1,50	-14,63
Continued encroachment of an indigenous and VU vegetation community by alien invasive plant species as well as erosion due to disturbed soils	Decommissioning	-16	-9,75	Medium	1	2	1	1,17	-11,38
Continued displacement and fragmentation of the faunal community due to ongoing anthropogenic disturbances (noise, dust and vibrations) and habitat degradation/loss (litter, road mortalities and/or poaching).	Decommissioning	-9,75	-9	Medium	1	2	1	1,17	-10,50

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 mitigation measures within this section have 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 the terrestrial study

Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Management outcome: Vegetation and Habitats				
Development within the high sensitivity areas need to be limited. Clearing of the low sensitivity areas is permitted. The areas to be developed/mined must be specifically demarcated to prevent movement into highly sensitive surrounding environments.	Life of operation	Project manager, Environmental Officer	Infrastructure Footprint	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.	All phases	Project manager, Environmental Officer	Areas of indigenous vegetation (All high sensitivity areas)	Ongoing
Where possible, existing access routes and walking paths must be made use of, and the development of new routes limited.	All phases	Environmental Officer & Design Engineer	Roads and paths used	Ongoing
All laydown, chemical toilets etc. should be restricted to low 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.	Post Construction/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 construction 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.	Post Construction/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 indigenous woody material removed during construction can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Post Construction/Closure Phase/Rehabilitation phase	Environmental Officer & Contractor	Footprint rehabilitation	During Phase
A 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	Life of Project	Environmental Officer & Contractor	Spill events, Vehicles dripping.	Ongoing

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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 Project	Project manager, Environmental Officer & Design Engineer	Water Pathways	During rain events.
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 Project	Environmental Officer & Contractor	Leaks and spills	Ongoing
Leaking equipment and vehicles must be repaired immediately or be removed from project area to facilitate repair.	Life of Project	Environmental Officer & Design Engineer	Water Quality	Monthly
Storm Water run-off & Discharge Water Quality monitoring.	Life of Project	Project manager, Environmental Officer	Any instances	Ongoing
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. <ul style="list-style-type: none"> Signs must be put up to enforce this 	Construction/Operational Phase	Project manager, Environmental Officer	Topsoil removal and storage	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 medium/high sensitivity areas. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.	Life of Project	Project manager, Environmental Officer	Speed limit of vehicles	Ongoing
Appropriate speed reduction measures (i.e humps), enforcing of speed limits via signs 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.	Life of Project	Environmental Officer & Contractor	Fire Management	During Phase
A fire management plan needs to be compiled and implemented to restrict the impact fire might have on the rehabilitated areas.	Life of Project	Project manager, Environmental Officer	Water Quality	Ongoing on a monthly basis
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	Protected Tree/Plant species	Ongoing
Any individual of the protected plants that are present needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Hi visibility flags must be placed near any threatened/protected plants in order to avoid any damage or				

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destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program. 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
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 staff or any individual into highly sensitive areas and the surrounding environments. <ul style="list-style-type: none"> 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	Life of Project	Environmental Officer	Noise levels	Ongoing
No trapping, killing, or poisoning of any wildlife is to be allowed <ul style="list-style-type: none"> Signs must be put up to enforce this; 	Life of Project	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 phase	Project manager, Environmental Officer & Design Engineer	Construction/Closure Phase	Ongoing
Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. 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. <ul style="list-style-type: none"> Signs must be put up to enforce this 	Life of Project	Health and Safety Officer	Compliance to the training.	Ongoing
Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. <ul style="list-style-type: none"> Driving on access roads close to highly sensitive areas at night should be prevented in order to reduce or prevent wildlife road mortalities which occur more frequently during this period; 	Life of Project	Project manager, Environmental Officer & Design Engineer	Activities should take place during the day.	Ongoing
Surface and ground water monitoring/analysis must be done in accordance with the conditions/ requirements of the approved Water Use Licence.	Life of Project	Project manager, Environmental Officer	Water Quality	Quarterly
Based on the observed avifaunal species, bird strikes, and electrocutions will be a highly likely, bird flappers must be placed on any transmission lines and the towers must be insulated to prevent electrocutions, especially on any transmission lines close to the river and wetland areas.	Life of Project	Environmental Officer	Presence and condition of flappers and insulation on towers.	Monthly

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The design of the proposed powerline must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins <i>et al.</i> , 2015).	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase
Where feasible all the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
All areas to be extended must be walked through prior to any activity to ensure no nests or birds area found in the area. Should any species of conservation concern not move out of the area or their nest be found in the area a suitably qualified specialist must be consulted to advise on the correct actions to be taken.	Planning and Construction	Project manager, Environmental Officer	Presence of Nests	Planning and Construction
Develop post-mining environments in conjunction with regional development plans as well as the recreation of habitats where possible or structure altered landscapes to be compatible with regional habitats	Beyond life of project	Project manager, Environmental Officer & Contractor	Habitat post mining	Indefinitely after Post Closure Phase

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 Project	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. <ul style="list-style-type: none"> Refuse bins will be emptied and secured; Temporary storage of domestic waste shall be in covered waste skips; and Waste to be removed as per contracts, a recommended waste storage period will be 10 days. 	Life of Project	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

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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 Project	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 Project	Environmental Officer & Contractor	Waste Removal	Weekly
Litter, spills, fuels, chemicals and human waste in and around the project area must be avoided. In an event, these must be reported and responded too.	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 Project	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 Project	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 Project	Environmental Officer, Contractor & Health and Safety Officer	Collection/handling of the waste.	Ongoing
Refuse bins must be emptied and secured Temporary storage of domestic waste must be in covered waste skips. The recommended domestic waste storage period will be 10 days.	Life of Project	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.	Life of Project	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 EMP. The avoidance and protection of the wetland areas must be included into a site induction.	Life of Project	Health and Safety Officer	Compliance to the training.	Ongoing

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Contractors and employees must all undergo the induction and made aware of the “no-go” to be avoided.

Management outcome: Erosion				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
Appropriate speed reduction measures (i.e 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; <ul style="list-style-type: none"> 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 Project	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 Project	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 Project	Project manager, Environmental Officer	Re-establishment of indigenous vegetation	Progressively with mining
A storm water management plan must be compiled and implemented.	Life of Project	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 Project	Project manager, Environmental Officer	Dust reducing mitigation	Before construction phase: Ongoing

11 Conclusion

The infield assessment and ariel imagery indicate large areas of transformed areas within and adjacent to the subject property with small natural vegetation scattered throughout. These natural areas support a number of important and diverse fauna and flora species. Included in these species are a protected tree, the *Vachellia erioloba* (Camel Thorn), two avifauna species of concentration concern Kori bustard (*Ardeotis kori*) and White Backed Vulture (*Gyps africanus*), and one confirmed mammal species of concern the Brown Hyena (*Parahyaena brunnea*). Areas around the water sources were given a high sensitivity based on their importance as a water supply but also because of the unique habitat these areas provide. Based on the state of the bushveld habitat and the species present these areas were given a high sensitivity, the SCC were found most abundant here.

The greatest impacts of the development were identified as the loss of habitat. The appropriate permit applications must be followed for the national protected trees, of which a number of specimens are found throughout the project area. Should the impacts be mitigated successfully, majority of them can be reduced substantially.

11.1 Specialist opinion

Based on the findings of the ecological assessment it is the opinion of the ecologists that from a biodiversity perspective, the proposed project may be considered favourably. However, all mitigation measures presented in this report should be considered by the issuing authority for authorisation. This will ensure the floral ecology within the project area, and outside of the disturbed areas remains intact, with particular mention of avoiding encroachment into the Wetland / Riparian habitat unit at stream crossings (where this cannot be avoided) and bushveld habitat of increased ecological sensitivity outside of the proposed infrastructure areas.

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13 Appendices

Appendix A Specialist declarations

DECLARATION

I, Lusanda Matee, 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.



Lusanda Matee

Terrestrial Ecologist

The Biodiversity Company

October 2021

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

October 2021

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

October 2021

DECLARATION

I, Andrew Husted, 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.



Andrew Husted

Wetland Ecologist

The Biodiversity Company

October 2021

Appendix B Flora species expected in the project area and surrounds

Family	Taxon	Author	IUCN	Ecology
Asteraceae	<i>Acanthospermum glabratum</i>	(DC.) Wild		Not Indigenous; Naturalised
Asteraceae	<i>Acanthospermum hispidum</i>	DC.		Not Indigenous; Naturalised
Amaranthaceae	<i>Aerva leucura</i>	Moq.	LC	Indigenous
Asphodelaceae	<i>Aloe braamvanwykii</i>	Gideon F.Sm. & Figueiredo	EN	Indigenous; Endemic
Asphodelaceae	<i>Aloe grandidentata</i>	Salm-Dyck	LC	Indigenous
Poaceae	<i>Andropogon schirensis</i>	Hochst. ex A.Rich.	LC	Indigenous
Poaceae	<i>Anthephora pubescens</i>	Nees	LC	Indigenous
Rubiaceae	<i>Anthospermum rigidum subsp. pumilum</i>	Eckl. & Zeyh.	LC	Indigenous
Menispermaceae	<i>Antizoma angustifolia</i>	(Burch.) Miers ex Harv.	LC	Indigenous
Aponogetonaceae	<i>Aponogeton rehmannii</i>	Oliv.	LC	Indigenous
Poaceae	<i>Aristida adscensionis</i>	L.	LC	Indigenous
Poaceae	<i>Aristida canescens subsp. canescens</i>	Henrard	LC	Indigenous
Poaceae	<i>Aristida congesta subsp. congesta</i>	Roem. & Schult.	LC	Indigenous
Poaceae	<i>Aristida meridionalis</i>	Henrard	LC	Indigenous
Poaceae	<i>Aristida mollissima subsp. mollissima</i>	Pilg.	LC	Indigenous
Poaceae	<i>Aristida scabrivalvis subsp. scabrivalvis</i>	Hack.	LC	Indigenous
Poaceae	<i>Aristida stipitata subsp. graciliflora</i>	Hack.	LC	Indigenous
Poaceae	<i>Aristida stipitata subsp. stipitata</i>	Hack.	LC	Indigenous
Poaceae	<i>Aristida vestita</i>	Thunb.	LC	Indigenous
Asparagaceae	<i>Asparagus laricinus</i>	Burch.	LC	Indigenous
Poaceae	<i>Avena sp.</i>			
Iridaceae	<i>Babiana bainesii</i>	Baker	LC	Indigenous
Acanthaceae	<i>Barleria macrostegia</i>	Nees		Indigenous
Elatinaceae	<i>Bergia sp.</i>			
Poaceae	<i>Bewsia biflora</i>	(Hack.) Gooss.	LC	Indigenous
Asteraceae	<i>Bidens bipinnata</i>	L.		Not Indigenous; Naturalised
Acanthaceae	<i>Blepharis integrifolia var. integrifolia</i>	(L.f.) E.Mey. ex Schinz	LC	Indigenous
Capparaceae	<i>Boscia foetida subsp. minima</i>	Schinz	LC	Indigenous
Capparaceae	<i>Boscia sp.</i>			
Poaceae	<i>Brachiaria marlothii</i>	(Hack.) Stent	LC	Indigenous
Poaceae	<i>Brachiaria nigropedata</i>	(Ficalho & Hiern) Stapf	LC	Indigenous
Apocynaceae	<i>Brachystelma canum</i>	R.A.Dyer	CR	Indigenous; Endemic
Asphodelaceae	<i>Bulbine abyssinica</i>	A.Rich.	LC	Indigenous
Cyperaceae	<i>Bulbostylis burchellii</i>	(Ficalho & Hiern) C.B.Clarke	LC	Indigenous
Cyperaceae	<i>Bulbostylis hispidula subsp. pyriformis</i>	(Vahl) R.W.Haines	LC	Indigenous

Poaceae	<i>Cenchrus ciliaris</i>	L.	LC	Indigenous
Scrophulariaceae	<i>Chaenostoma patrioticum</i>	(Hiern) Kornhall	LC	Indigenous
Fabaceae	<i>Chamaecrista biensis</i>	(Steyaert) Lock	LC	Indigenous
Fabaceae	<i>Chamaecrista mimosoides</i>	(L.) Greene	LC	Indigenous
Verbenaceae	<i>Chascanum hederaceum</i> var. <i>hederaceum</i>	(Sond.) Moldenke		Indigenous
Pteridaceae	<i>Cheilanthes hirta</i> var. <i>brevipilosa</i>	Sw.	LC	Indigenous; Endemic
Poaceae	<i>Chloris virgata</i>	Sw.	LC	Indigenous
Agavaceae	<i>Chlorophytum angulicaule</i>	(Baker) Kativu		Indigenous
Agavaceae	<i>Chlorophytum fasciculatum</i>	(Baker) Kativu		Indigenous
Agavaceae	<i>Chlorophytum recurvifolium</i>	(Baker) C.Archer & Kativu		Indigenous
Asteraceae	<i>Chrysocoma obtusata</i>	(Thunb.) Ehr.Bayer	LC	Indigenous
Cleomaceae	<i>Cleome rubella</i>	Burch.	LC	Indigenous
Commelinaceae	<i>Commelina africana</i> var. <i>barberae</i>	L.	LC	Indigenous
Commelinaceae	<i>Commelina africana</i> var. <i>lancispatha</i>	L.	LC	Indigenous
Commelinaceae	<i>Commelina livingstonii</i>	C.B.Clarke	LC	Indigenous
Asteraceae	<i>Conyza bonariensis</i>	(L.) Cronquist		Not Indigenous; Naturalised
Malvaceae	<i>Corchorus asplenifolius</i>	Burch.	LC	Indigenous
Fabaceae	<i>Crotalaria barkae</i> subsp. <i>barkae</i>	Schweinf.	LC	Indigenous
Fabaceae	<i>Crotalaria distans</i> subsp. <i>distans</i>	Benth.	LC	Indigenous
Fabaceae	<i>Crotalaria lotoides</i>	Benth.	LC	Indigenous
Fabaceae	<i>Crotalaria spartioides</i>	DC.	LC	Indigenous
Fabaceae	<i>Crotalaria sphaerocarpa</i> subsp. <i>sphaerocarpa</i>	Perr. ex DC.	LC	Indigenous
Cucurbitaceae	<i>Cucumis</i> sp.			
Commelinaceae	<i>Cyanotis speciosa</i>	(L.f.) Hassk.	LC	Indigenous
Poaceae	<i>Cymbopogon pospischilii</i>	(K.Schum.) C.E.Hubb.	NE	Indigenous
Poaceae	<i>Cymbopogon prolixus</i>	(Stapf) E.Phillips	LC	Indigenous
Poaceae	<i>Cynodon dactylon</i>	(L.) Pers.	LC	Indigenous
Poaceae	<i>Cynodon hirsutus</i>	Stent	LC	Indigenous; Endemic
Poaceae	<i>Cynodon polevansii</i>	Stent	LC	Indigenous; Endemic
Cyperaceae	<i>Cyperus bellus</i>	Kunth	LC	Indigenous
Cyperaceae	<i>Cyperus decurvatus</i>	(C.B.Clarke) C.Archer & Goetgh.	LC	Indigenous
Cyperaceae	<i>Cyperus difformis</i>	L.	LC	Indigenous
Cyperaceae	<i>Cyperus fastigiatus</i>	Rottb.	LC	Indigenous
Cyperaceae	<i>Cyperus fulgens</i>	C.B.Clarke	LC	Indigenous
Cyperaceae	<i>Cyperus margaritaceus</i> var. <i>margaritaceus</i>	Vahl	LC	Indigenous
Cyperaceae	<i>Cyperus palmatus</i>	(Lye) C.Archer & Goetgh.	LC	Indigenous
Cyperaceae	<i>Cyperus rubicundus</i>	Vahl	LC	Indigenous

Cyperaceae	<i>Cyperus sphaerospermus</i>	Schrad.	LC	Indigenous
Cyperaceae	<i>Cyperus usitatus</i>	Burch.	LC	Indigenous
Solanaceae	<i>Datura inoxia</i>	Mill.		Not Indigenous; Naturalised
Poaceae	<i>Diandrochloa namaquensis</i>	(Nees) De Winter	LC	Indigenous
Pedaliaceae	<i>Dicerocaryum senecioides</i>	(Klotzsch) Abels	LC	Indigenous
Poaceae	<i>Dichanthium annulatum var. papillosum</i>	(Forssk.) Stapf	LC	Indigenous
Fabaceae	<i>Dichrostachys cinerea subsp. africana</i>	(L.) Wight & Arn.	NE	Indigenous
Scrophulariaceae	<i>Diclis petiolaris</i>	Benth.	LC	Indigenous
Asteraceae	<i>Dicoma anomala subsp. gerrardii</i>	Sond.	LC	Indigenous
Poaceae	<i>Digitaria eriantha</i>	Steud.	LC	Indigenous
Poaceae	<i>Digitaria sp.</i>			
Poaceae	<i>Diheteropogon amplexens var. amplexens</i>	(Nees) Clayton	LC	Indigenous
Ebenaceae	<i>Diospyros lycioides subsp. lycioides</i>	Desf.		Indigenous
Hyacinthaceae	<i>Dipcadi viride</i>	(L.) Moench		Indigenous
Iridaceae	<i>Duthieastrum linifolium</i>	(E.Phillips) M.P.de Vos	LC	Indigenous; Endemic
Poaceae	<i>Echinochloa colona</i>	(L.) Link	LC	Indigenous
Poaceae	<i>Echinochloa holubii</i>	(Stapf) Stapf	LC	Indigenous
Poaceae	<i>Elionurus muticus</i>	(Spreng.) Kunth	LC	Indigenous
Poaceae	<i>Enneapogon cenchroides</i>	(Licht. ex Roem. & Schult.) C.E.Hubb.	LC	Indigenous
Poaceae	<i>Enneapogon scoparius</i>	Stapf	LC	Indigenous
Poaceae	<i>Eragrostis barbinodis</i>	Hack.	LC	Indigenous
Poaceae	<i>Eragrostis biflora</i>	Hack. ex Schinz	LC	Indigenous
Poaceae	<i>Eragrostis chloromelas</i>	Steud.	LC	Indigenous
Poaceae	<i>Eragrostis cilianensis</i>	(All.) Vignolo ex Janch.	LC	Indigenous
Poaceae	<i>Eragrostis lehmanniana var. lehmanniana</i>	Nees	LC	Indigenous
Poaceae	<i>Eragrostis obtusa</i>	Munro ex Ficalho & Hiern	LC	Indigenous
Poaceae	<i>Eragrostis pallens</i>	Hack.	LC	Indigenous
Poaceae	<i>Eragrostis pseudobtusa</i>	De Winter	NE	Indigenous; Endemic
Poaceae	<i>Eragrostis rigidior</i>	Pilg.	LC	Indigenous
Poaceae	<i>Eragrostis rotifer</i>	Rendle	LC	Indigenous
Poaceae	<i>Eragrostis sp.</i>			
Poaceae	<i>Eragrostis superba</i>	Peyr.	LC	Indigenous
Poaceae	<i>Eragrostis trichophora</i>	Coss. & Durieu	LC	Indigenous
Poaceae	<i>Eragrostis viscosa</i>	(Retz.) Trin.	LC	Indigenous
Ebenaceae	<i>Euclea crispa subsp. ovata</i>	(Thunb.) Gurke		Indigenous
Euphorbiaceae	<i>Euphorbia duseimata</i>	R.A.Dyer	LC	Indigenous; Endemic
Poaceae	<i>Eustachys paspaloides</i>	(Vahl) Lanza & Mattei	LC	Indigenous

Convolvulaceae	<i>Evolvulus alsinoides</i>	(L.) L.	LC	Indigenous
Asteraceae	<i>Felicia clavipilosa subsp. clavipilosa</i>	Grau	LC	Indigenous
Asteraceae	<i>Felicia muricata subsp. muricata</i>	(Thunb.) Nees	LC	Indigenous
Asteraceae	<i>Flaveria bidentis</i>	(L.) Kuntze		Not Indigenous; Naturalised; Invasive
Apocynaceae	<i>Fockea angustifolia</i>	K.Schum.	LC	Indigenous
Asteraceae	<i>Gazania krebsiana subsp. serrulata</i>	Less.	LC	Indigenous
Asteraceae	<i>Geigeria aspera var. aspera</i>	Harv.	LC	Indigenous
Asteraceae	<i>Geigeria filifolia</i>	Mattf.	LC	Indigenous
Asteraceae	<i>Geigeria ornativa subsp. ornativa</i>	O.Hoffm.	LC	Indigenous
Iridaceae	<i>Gladiolus permeabilis subsp. edulis</i>	D.Delaroche	LC	Indigenous
Asteraceae	<i>Gnaphalium filagopsis</i>	Hilliard & B.L.Burt	LC	Indigenous
Amaranthaceae	<i>Gomphrena celosioides</i>	Mart.		Not Indigenous; Naturalised
Malvaceae	<i>Grewia flava</i>	DC.	LC	Indigenous
Malvaceae	<i>Grewia retinervis</i>	Burret	LC	Indigenous
Celastraceae	<i>Gymnosporia tenuispina</i>	(Sond.) Szyszyl.	LC	Indigenous
Pedaliaceae	<i>Harpagophytum procumbens subsp. procumbens</i>	(Burch.) DC. ex Meisn.	NE	Indigenous
Asteraceae	<i>Helichrysum cerastioides var. cerastioides</i>	DC.	LC	Indigenous
Boraginaceae	<i>Heliotropium ciliatum</i>	Kaplan	LC	Indigenous
Boraginaceae	<i>Heliotropium nelsonii</i>	C.H.Wright	LC	Indigenous
Malvaceae	<i>Hermannia boraginiflora</i>	Hook.	LC	Indigenous
Malvaceae	<i>Hermannia erodioides</i>	(Burch. ex DC.) Kuntze	LC	Indigenous
Malvaceae	<i>Hermannia quartiniana</i>	A.Rich.	LC	Indigenous
Malvaceae	<i>Hermannia stellulata</i>	(Harv.) K.Schum.	LC	Indigenous
Malvaceae	<i>Hermannia tomentosa</i>	(Turcz.) Schinz ex Engl.	LC	Indigenous
Amaranthaceae	<i>Hermbstaedtia odorata var. aurantiaca</i>	(Burch.) T.Cooke	NE	Indigenous
Poaceae	<i>Heteropogon contortus</i>	(L.) Roem. & Schult.	LC	Indigenous
Malvaceae	<i>Hibiscus engleri</i>	K.Schum.	LC	Indigenous
Malvaceae	<i>Hibiscus pusillus</i>	Thunb.	LC	Indigenous
Malvaceae	<i>Hibiscus trionum</i>	L.		Not Indigenous; Naturalised
Asteraceae	<i>Hilliardiella elaeagnoides</i>	(DC.) Swelank. & J.C.Manning		Indigenous
Asteraceae	<i>Hirpicium bechuanense</i>	(S.Moore) Roessler	LC	Indigenous
Poaceae	<i>Hyparrhenia hirta</i>	(L.) Stapf	LC	Indigenous
Fabaceae	<i>Indigofera comosa</i>	N.E.Br.	LC	Indigenous
Fabaceae	<i>Indigofera filipes</i>	Benth. ex Harv.	LC	Indigenous
Fabaceae	<i>Indigofera rhytidocarpa subsp. rhytidocarpa</i>	Benth. ex Harv.	LC	Indigenous
Fabaceae	<i>Indigofera sessilifolia</i>	DC.	LC	Indigenous
Convolvulaceae	<i>Ipomoea bolusiana</i>	Schinz	LC	Indigenous

Convolvulaceae	<i>Ipomoea oblongata</i>	E.Mey. ex Choisy	LC	Indigenous
Convolvulaceae	<i>Ipomoea obscura</i> var. <i>obscura</i>	(L.) Ker Gawl.	LC	Indigenous
Convolvulaceae	<i>Ipomoea oenotherae</i> var. <i>oenotherae</i>	(Vatke) Hallier f.	LC	Indigenous
Lamiaceae	<i>Kalaharia uncinata</i>	(Schinz) Moldenke		Indigenous
Kewaceae	<i>Kewa bowkeriana</i>	(Sond.) Christenh.	LC	Indigenous
Rubiaceae	<i>Kohautia subverticillata</i> subsp. <i>subverticillata</i>	(K.Schum.) D.Mantell	LC	Indigenous
Cyperaceae	<i>Kyllinga erecta</i> var. <i>erecta</i>	Schumach.	LC	Indigenous
Amaranthaceae	<i>Kyphocarpa angustifolia</i>	(Moq.) Lopr.	LC	Indigenous
Verbenaceae	<i>Lantana mearnsii</i> var. <i>latibracteolata</i>	Moldenke		Indigenous
Poaceae	<i>Leptochloa fusca</i>	(L.) Kunth	LC	Indigenous
Limeaceae	<i>Limeum argute-carinatum</i> var. <i>kwebense</i>	Wawra ex Wawra & Peyr.		Indigenous
Verbenaceae	<i>Lippia scaberrima</i>	Sond.		Indigenous
Fabaceae	<i>Listia heterophylla</i>	E.Mey.	LC	Indigenous
Lobeliaceae	<i>Lobelia sonderiana</i>	(Kuntze) Lammers	LC	Indigenous
Fabaceae	<i>Lotononis crumanina</i>	Burch. ex Benth.	LC	Indigenous
Solanaceae	<i>Lycium cinereum</i>	Thunb.	LC	Indigenous
Solanaceae	<i>Lycium pilifolium</i>	C.H.Wright	LC	Indigenous
Malvaceae	<i>Malva pusilla</i>	Sm.		Not Indigenous; Naturalised
Marsileaceae	<i>Marsilea macrocarpa</i>	C.Presl	LC	Indigenous
Marsileaceae	<i>Marsilea</i> sp.			
Malvaceae	<i>Melhanian prostrata</i>	DC.	LC	Indigenous
Poaceae	<i>Melinis nerviglumis</i>	(Franch.) Zizka	LC	Indigenous
Poaceae	<i>Melinis repens</i> subsp. <i>repens</i>	(Willd.) Zizka	LC	Indigenous
Fabaceae	<i>Melolobium candicans</i>	(E.Mey.) Eckl. & Zeyh.	LC	Indigenous
Fabaceae	<i>Melolobium microphyllum</i>	(L.f.) Eckl. & Zeyh.	LC	Indigenous
Cucurbitaceae	<i>Momordica balsamina</i>	L.	LC	Indigenous
Geraniaceae	<i>Monsonia angustifolia</i>	E.Mey. ex A.Rich.	LC	Indigenous
Fabaceae	<i>Mundulea sericea</i> subsp. <i>sericea</i>	(Willd.) A.Chev.	LC	Indigenous
Amaryllidaceae	<i>Nerine frithii</i>	L.Bolus	LC	Indigenous; Endemic
Amaryllidaceae	<i>Nerine</i> sp.			
Asteraceae	<i>Nidorella resedifolia</i> subsp. <i>resedifolia</i>	DC.	LC	Indigenous
Ochnaceae	<i>Ochna pretoriensis</i>	E.Phillips	LC	Indigenous
Lamiaceae	<i>Ocimum angustifolium</i>	Benth.	LC	Indigenous
Asteraceae	<i>Osteospermum muricatum</i> subsp. <i>muricatum</i>	E.Mey. ex DC.	LC	Indigenous
Asteraceae	<i>Osteospermum scariosum</i> var. <i>scariosum</i>	DC.	NE	Indigenous
Oxalidaceae	<i>Oxalis depressa</i>	Eckl. & Zeyh.	LC	Indigenous
Anacardiaceae	<i>Ozoroa paniculosa</i> var. <i>paniculosa</i>	(Sond.) R.Fern. & A.Fern.	LC	Indigenous

Anacardiaceae	<i>Ozoroa paniculosa</i> var. <i>salicina</i>	(Sond.) R.Fern. & A.Fern.	LC	Indigenous
Poaceae	<i>Panicum coloratum</i>	L.	LC	Indigenous
Poaceae	<i>Panicum kalaharensis</i>	Mez	LC	Indigenous
Poaceae	<i>Panicum maximum</i>	Jacq.	LC	Indigenous
Poaceae	<i>Panicum schinzii</i>	Hack.	LC	Indigenous
Poaceae	<i>Panicum</i> sp.			
Rubiaceae	<i>Pavetta zeyheri</i> subsp. <i>zeyheri</i>	Sond.	LC	Indigenous
Malvaceae	<i>Pavonia burchellii</i>	(DC.) R.A.Dyer	LC	Indigenous
Apocynaceae	<i>Pentarrhinum insipidum</i>	E.Mey.	LC	Indigenous
Asteraceae	<i>Pentzia calcarea</i>	Kies	LC	Indigenous
Asteraceae	<i>Pentzia globosa</i>	Less.	LC	Indigenous
Poaceae	<i>Perotis patens</i>	Gand.	LC	Indigenous
Phyllanthaceae	<i>Phyllanthus parvulus</i> var. <i>garipensis</i>	Sond.	LC	Indigenous
Phyllanthaceae	<i>Phyllanthus parvulus</i> var. <i>parvulus</i>	Sond.	LC	Indigenous
Plumbaginaceae	<i>Plumbago zeylanica</i>	L.		Not Indigenous; Naturalised
Poaceae	<i>Pogonarthria squarrosa</i>	(Roem. & Schult.) Pilg.	LC	Indigenous
Asteraceae	<i>Polydora poskeana</i>	(Vatke & Hildebr.) H.Rob.	LC	Indigenous
Polygalaceae	<i>Polygala leptophylla</i> var. <i>leptophylla</i>	Burch.	LC	Indigenous
Polygonaceae	<i>Polygonum plebeium</i>	R.Br.	LC	Indigenous
Fabaceae	<i>Pomaria burchellii</i> subsp. <i>burchellii</i>	(DC.) B.B.Simpson & G.P.Lewis	LC	Indigenous
Fabaceae	<i>Prosopis velutina</i>	Wooton	NE	Not Indigenous; Naturalised; Invasive
Asteraceae	<i>Pseudognaphalium luteoalbum</i>	(L.) Hilliard & B.L.Burt	LC	Not Indigenous; Naturalised
Asteraceae	<i>Pseudognaphalium oligandrum</i>	(DC.) Hilliard & B.L.Burt	LC	Indigenous
Pedaliaceae	<i>Pterodiscus speciosus</i>	Hook.	LC	Indigenous
Ranunculaceae	<i>Ranunculus multifidus</i>	Forssk.	LC	Indigenous
Apocynaceae	<i>Raphionacme velutina</i>	Schltr.	LC	Indigenous
Fabaceae	<i>Rhynchosia adenodes</i>	Eckl. & Zeyh.	LC	Indigenous
Fabaceae	<i>Rhynchosia</i> sp.			
Fabaceae	<i>Rhynchosia totta</i> var. <i>longicalyx</i>	(Thunb.) DC.		Indigenous
Fabaceae	<i>Rhynchosia totta</i> var. <i>totta</i>	(Thunb.) DC.	LC	Indigenous
Fabaceae	<i>Rhynchosia totta</i> var. <i>venulosa</i>	(Thunb.) DC.		Indigenous
Acanthaceae	<i>Ruellia patula</i>	Jacq.		Indigenous
Lamiaceae	<i>Salvia coccinea</i>	Etl.		Not Indigenous; Naturalised
Lamiaceae	<i>Salvia disermas</i>	L.	LC	Indigenous
Lamiaceae	<i>Salvia runcinata</i>	L.f.	LC	Indigenous
Ruscaceae	<i>Sansevieria</i> sp.			
Poaceae	<i>Schizachyrium sanguineum</i>	(Retz.) Alston	LC	Indigenous
Asteraceae	<i>Schkuhria pinnata</i>	(Lam.) Kuntze ex Thell.		Not Indigenous; Naturalised

Poaceae	<i>Schmidtia pappophoroides</i>	Steud.	LC	Indigenous
Cyperaceae	<i>Schoenoplectus muricinux</i>	(C.B.Clarke) J.Raynal	LC	Indigenous
Anacardiaceae	<i>Searsia ciliata</i>	(Licht. ex Schult.) A.J.Mill.		Indigenous
Anacardiaceae	<i>Searsia leptodictya forma leptodictya</i>	(Diels) T.S.Yi, A.J.Mill. & J.Wen		Indigenous
Anacardiaceae	<i>Searsia pyroides var. pyroides</i>	(Burch.) Moffett		Indigenous
Anacardiaceae	<i>Searsia tenuinervis</i>	(Engl.) Moffett		Indigenous
Convolvulaceae	<i>Seddera capensis</i>	(E.Mey. ex Choisy) Hallier f.	LC	Indigenous
Scrophulariaceae	<i>Selago densiflora</i>	Rolfe	LC	Indigenous
Fabaceae	<i>Senegalia hereroensis</i>	(Engl.) Kyal. & Boatwr.	LC	Indigenous
Fabaceae	<i>Senna italica subsp. arachoides</i>	Mill.	LC	Indigenous
Amaranthaceae	<i>Sericocoma avolans</i>	Fenzl	LC	Indigenous
Amaranthaceae	<i>Sericorema remotiflora</i>	(Hook.f.) Lopr.	LC	Indigenous
Pedaliaceae	<i>Sesamum triphyllum var. triphyllum</i>	Welw. ex Asch.	LC	Indigenous
Fabaceae	<i>Sesbania notialis</i>	J.B.Gillett	LC	Indigenous; Endemic
Poaceae	<i>Setaria nigrirostris</i>	(Nees) T.Durand & Schinz	LC	Indigenous
Poaceae	<i>Setaria sphacelata var. torta</i>	(Schumach.) Stapf & C.E.Hubb. ex M.B.Moss	LC	Indigenous
Malvaceae	<i>Sida cordifolia subsp. cordifolia</i>	L.	LC	Indigenous
Solanaceae	<i>Solanum campylacanthum</i>	Hochst. ex A.Rich.		Indigenous
Solanaceae	<i>Solanum tomentosum</i>	L.		Indigenous; Endemic
Poaceae	<i>Sporobolus fimbriatus</i>	(Trin.) Nees	LC	Indigenous
Poaceae	<i>Sporobolus nitens</i>	Stent	LC	Indigenous
Poaceae	<i>Sporobolus oxyphyllus</i>	Fish	LC	Indigenous; Endemic
Poaceae	<i>Sporobolus sp.</i>			
Poaceae	<i>Stipagrostis ciliata var. capensis</i>	(Desf.) De Winter	LC	Indigenous
Poaceae	<i>Stipagrostis uniplumis var. neesii</i>	(Licht.) De Winter	LC	Indigenous
Poaceae	<i>Stipagrostis uniplumis var. uniplumis</i>	(Licht.) De Winter	LC	Indigenous
Orobanchaceae	<i>Striga gesnerioides</i>	(Willd.) Vatke	LC	Indigenous
Pottiaceae	<i>Syntrichia laevipila</i>	Brid.		Indigenous
Asteraceae	<i>Tagetes erecta</i>	L.		Not Indigenous; Naturalised
Tamaricaceae	<i>Tamarix ramosissima</i>	Ledeb.		Not Indigenous; Naturalised; Invasive
Asteraceae	<i>Tarchonanthus camphoratus</i>	L.	LC	Indigenous
Fabaceae	<i>Tephrosia burchellii</i>	Burt Davy	LC	Indigenous
Combretaceae	<i>Terminalia sericea</i>	Burch. ex DC.	LC	Indigenous
Lamiaceae	<i>Teucrium trifidum</i>	Retz.	LC	Indigenous
Poaceae	<i>Themeda triandra</i>	Forssk.	LC	Indigenous
Pottiaceae	<i>Tortella xanthocarpa</i>	(Schimp. ex Mull.Hal.) Broth.		Indigenous
Asphodelaceae	<i>Trachyandra burkei</i>	(Baker) Oberm.	LC	Indigenous

Asphodelaceae	<i>Trachyandra laxa var. rigida</i>	(N.E.Br.) Oberm.	LC	Indigenous
Asphodelaceae	<i>Trachyandra saltii var. saltii</i>	(Baker) Oberm.	LC	Indigenous
Euphorbiaceae	<i>Tragia dioica</i>	Sond.	LC	Indigenous
Poaceae	<i>Tragus berteronianus</i>	Schult.	LC	Indigenous
Poaceae	<i>Tragus koelerioides</i>	Asch.	LC	Indigenous
Poaceae	<i>Tragus racemosus</i>	(L.) All.	LC	Indigenous
Aizoaceae	<i>Trianthema salsoloides var. transvaalensis</i>	Fenzl ex Oliv.	LC	Indigenous
Aizoaceae	<i>Trianthema sp.</i>			
Zygophyllaceae	<i>Tribulus terrestris</i>	L.	LC	Indigenous
Poaceae	<i>Tricholaena monachne</i>	(Trin.) Stapf & C.E.Hubb.	LC	Indigenous
Poaceae	<i>Trichoneura grandiglumis</i>	(Nees) Ekman	LC	Indigenous
Poaceae	<i>Triraphis andropogonoides</i>	(Steud.) E.Phillips	LC	Indigenous
Poaceae	<i>Triraphis purpurea</i>	Hack.	LC	Indigenous
Poaceae	<i>Triraphis schinzii</i>	Hack.	LC	Indigenous
Poaceae	<i>Urelytrum agropyroides</i>	(Hack.) Hack.	LC	Indigenous
Poaceae	<i>Urochloa brachyura</i>	(Hack.) Stapf	LC	Indigenous
Fabaceae	<i>Vachellia karroo</i>	(Hayne) Banfi & Gallaso	LC	Indigenous
Fabaceae	<i>Vachellia luederitzii var. luederitzii</i>	(Engl.) Kyal. & Boatwr.	LC	Indigenous
Rubiaceae	<i>Vangueria infausta subsp. infausta</i>	Burch.	LC	Indigenous
Santalaceae	<i>Viscum rotundifolium</i>	L.f.		Indigenous
Malvaceae	<i>Waltheria indica</i>	L.	LC	Indigenous
Solanaceae	<i>Withania somnifera</i>	(L.) Dunal	LC	Indigenous
Asteraceae	<i>Xanthium strumarium</i>	L.		Not Indigenous; Naturalised; Invasive
Convolvulaceae	<i>Xenostegia tridentata subsp. angustifolia</i>	(L.) D.F.Austin & Staples		Indigenous
Rhamnaceae	<i>Ziziphus mucronata subsp. mucronata</i>	Willd.		Indigenous
Rhamnaceae	<i>Ziziphus zeyheriana</i>	Sond.		Indigenous
Fabaceae	<i>Zornia milneana</i>	Mohlenbr.	LC	Indigenous

Appendix C Avifauna species expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Accipiter badius</i>	Shikra	Unlisted	LC
<i>Accipiter minullus</i>	Sparrowhawk, Little	Unlisted	LC
<i>Acridotheres tristis</i>	Myna, Common	Unlisted	LC
<i>Acrocephalus arundinaceus</i>	Reed-warbler, Great	Unlisted	LC
<i>Acrocephalus baeticatus</i>	Reed-warbler, African	Unlisted	Unlisted
<i>Acrocephalus gracilirostris</i>	Swamp-warbler, Lesser	Unlisted	LC
<i>Acrocephalus palustris</i>	Warbler, Marsh	Unlisted	LC
<i>Acrocephalus schoenobaenus</i>	Warbler, Sedge	Unlisted	LC
<i>Actitis hypoleucos</i>	Sandpiper, Common	Unlisted	LC
<i>Actophilornis africanus</i>	Jacana, African	Unlisted	LC
<i>Afrotis afraoides</i>	Korhaan, Northern Black	Unlisted	LC
<i>Alcedo cristata</i>	Kingfisher, Malachite	Unlisted	Unlisted
<i>Alopochen aegyptiacus</i>	Goose, Egyptian	Unlisted	LC
<i>Amadina erythrocephala</i>	Finch, Red-headed	Unlisted	LC
<i>Amandava subflava</i>	Waxbill, Orange-breasted	Unlisted	Unlisted
<i>Amaurornis flavirostris</i>	Crake, Black	Unlisted	LC
<i>Anas capensis</i>	Teal, Cape	Unlisted	LC
<i>Anas erythrorhyncha</i>	Teal, Red-billed	Unlisted	LC
<i>Anas smithii</i>	Shoveler, Cape	Unlisted	LC
<i>Anas undulata</i>	Duck, Yellow-billed	Unlisted	LC
<i>Anhinga rufa</i>	Darter, African	Unlisted	LC
<i>Anthoscopus minutus</i>	Penduline-tit, Cape	Unlisted	LC
<i>Anthus cinnamomeus</i>	Pipit, African	Unlisted	LC
<i>Anthus leucophrys</i>	Pipit, Plain-backed	Unlisted	LC
<i>Anthus vaalensis</i>	Pipit, Buffy	Unlisted	LC
<i>Apus affinis</i>	Swift, Little	Unlisted	LC
<i>Apus apus</i>	Swift, Common	Unlisted	LC
<i>Apus barbatus</i>	Swift, African Black	Unlisted	LC
<i>Apus caffer</i>	Swift, White-rumped	Unlisted	LC
<i>Aquila wahlbergi</i>	Eagle, Wahlberg's	Unlisted	LC
<i>Ardea cinerea</i>	Heron, Grey	Unlisted	LC
<i>Ardea goliath</i>	Heron, Goliath	Unlisted	LC
<i>Ardea melanocephala</i>	Heron, Black-headed	Unlisted	LC
<i>Ardeola ralloides</i>	Heron, Squacco	Unlisted	LC
<i>Ardeotis kori</i>	Bustard, Kori	NT	NT
<i>Arenaria interpres</i>	Turnstone, Ruddy	Unlisted	LC

<i>Asio capensis</i>	Owl, Marsh	Unlisted	LC
<i>Batis pririt</i>	Batis, Pirit	Unlisted	LC
<i>Bostrychia hagedash</i>	Ibis, Hadedda	Unlisted	LC
<i>Bradornis infuscatus</i>	Flycatcher, Chat	Unlisted	LC
<i>Bradornis mariquensis</i>	Flycatcher, Marico	Unlisted	LC
<i>Bubalornis niger</i>	Buffalo-weaver, Red-billed	Unlisted	LC
<i>Bubo africanus</i>	Eagle-owl, Spotted	Unlisted	LC
<i>Bubo lacteus</i>	Eagle-owl, Verreaux's	Unlisted	LC
<i>Bubulcus ibis</i>	Egret, Cattle	Unlisted	LC
<i>Buphagus erythrorhynchus</i>	Oxpecker, Red-billed	Unlisted	Unlisted
<i>Burhinus capensis</i>	Thick-knee, Spotted	Unlisted	LC
<i>Buteo vulpinus</i>	Buzzard, Steppe	Unlisted	Unlisted
<i>Butorides striata</i>	Heron, Green-backed	Unlisted	LC
<i>Calamonastes fasciolatus</i>	Wren-warbler, Barred	Unlisted	LC
<i>Calandrella cinerea</i>	Lark, Red-capped	Unlisted	LC
<i>Calendulauda africanoides</i>	Lark, Fawn-coloured	Unlisted	LC
<i>Calendulauda sabota</i>	Lark, Sabota	Unlisted	LC
<i>Calidris ferruginea</i>	Sandpiper, Curlew	LC	NT
<i>Calidris minuta</i>	Stint, Little	LC	LC
<i>Camaroptera brachyura</i>	Camaroptera, Green-backed	Unlisted	LC
<i>Camaroptera brevicaudata</i>	Camaroptera, Grey-backed	Unlisted	Unlisted
<i>Campethera abingoni</i>	Woodpecker, Golden-tailed	Unlisted	LC
<i>Campethera bennettii</i>	Woodpecker, Bennett's	Unlisted	LC
<i>Caprimulgus rufigena</i>	Nightjar, Rufous-cheeked	Unlisted	LC
<i>Centropus burchellii</i>	Coucal, Burchell's	Unlisted	Unlisted
<i>Centropus superciliosus</i>	Coucal, White-browed	Unlisted	LC
<i>Cercomela familiaris</i>	Chat, Familiar	Unlisted	LC
<i>Cercotrichas leucophrys</i>	Scrub-robin, White-browed	Unlisted	LC
<i>Cercotrichas paena</i>	Scrub-robin, Kalahari	Unlisted	LC
<i>Certhilauda chuana</i>	Lark, Short-clawed	LC	LC
<i>Ceryle rudis</i>	Kingfisher, Pied	Unlisted	LC
<i>Chalcomitra amethystina</i>	Sunbird, Amethyst	Unlisted	LC
<i>Charadrius pecuarius</i>	Plover, Kittlitz's	Unlisted	LC
<i>Charadrius tricollaris</i>	Plover, Three-banded	Unlisted	LC
<i>Chersomanes albofasciata</i>	Lark, Spike-heeled	Unlisted	LC
<i>Chlidonias hybrida</i>	Tern, Whiskered	Unlisted	LC
<i>Chlidonias leucopterus</i>	Tern, White-winged	Unlisted	LC
<i>Chrysococcyx caprius</i>	Cuckoo, Diderick	Unlisted	LC
<i>Chrysococcyx klaas</i>	Cuckoo, Klaas's	Unlisted	LC

<i>Ciconia abdimii</i>	Stork, Abdim's	NT	LC
<i>Ciconia ciconia</i>	Stork, White	Unlisted	LC
<i>Ciconia nigra</i>	Stork, Black	VU	LC
<i>Cinnyricinclus leucogaster</i>	Starling, Violet-backed	Unlisted	LC
<i>Cinnyris fuscus</i>	Sunbird, Dusky	Unlisted	LC
<i>Cinnyris mariquensis</i>	Sunbird, Marico	Unlisted	LC
<i>Cinnyris talatala</i>	Sunbird, White-bellied	Unlisted	LC
<i>Circaetus cinereus</i>	Snake-eagle, Brown	Unlisted	LC
<i>Circaetus pectoralis</i>	Snake-eagle, Black-chested	Unlisted	LC
<i>Circus macrourus</i>	Harrier, Pallid	NT	NT
<i>Cisticola aridulus</i>	Cisticola, Desert	Unlisted	LC
<i>Cisticola chiniana</i>	Cisticola, Rattling	Unlisted	LC
<i>Cisticola fulvicapilla</i>	Neddicky, Neddicky	Unlisted	LC
<i>Cisticola juncidis</i>	Cisticola, Zitting	Unlisted	LC
<i>Cisticola rufilatus</i>	Cisticola, Tinkling	Unlisted	LC
<i>Cisticola textrix</i>	Cisticola, Cloud	Unlisted	LC
<i>Cisticola tinniens</i>	Cisticola, Levillant's	Unlisted	LC
<i>Clamator jacobinus</i>	Cuckoo, Jacobin	Unlisted	LC
<i>Colius colius</i>	Mousebird, White-backed	Unlisted	LC
<i>Columba arquatrix</i>	Olive-pigeon, African	Unlisted	LC
<i>Columba guinea</i>	Pigeon, Speckled	Unlisted	LC
<i>Columba livia</i>	Dove, Rock	Unlisted	LC
<i>Coracias caudatus</i>	Roller, Lilac-breasted	Unlisted	LC
<i>Coracias garrulus</i>	Roller, European	NT	LC
<i>Coracias naevius</i>	Roller, Purple	Unlisted	LC
<i>Corvus albus</i>	Crow, Pied	Unlisted	LC
<i>Corvus capensis</i>	Crow, Cape	Unlisted	LC
<i>Corythaixoides concolor</i>	Go-away-bird, Grey	Unlisted	LC
<i>Cossypha caffra</i>	Robin-chat, Cape	Unlisted	LC
<i>Cossypha humeralis</i>	Robin-chat, White-throated	Unlisted	LC
<i>Coturnix coturnix</i>	Quail, Common	Unlisted	LC
<i>Coturnix delegorguei</i>	Quail, Harlequin	Unlisted	LC
<i>Creatophora cinerea</i>	Starling, Wattled	Unlisted	LC
<i>Crithagra atrogularis</i>	Canary, Black-throated	Unlisted	LC
<i>Crithagra flaviventris</i>	Canary, Yellow	Unlisted	LC
<i>Crithagra mozambica</i>	Canary, Yellow-fronted	Unlisted	LC
<i>Cuculus clamosus</i>	Cuckoo, Black	Unlisted	LC
<i>Cuculus gularis</i>	Cuckoo, African	Unlisted	LC
<i>Cursorius temminckii</i>	Cursor, Temminck's	Unlisted	LC

<i>Cypsiurus parvus</i>	Palm-swift, African	Unlisted	LC
<i>Dendrocygna viduata</i>	Duck, White-faced Whistling	Unlisted	LC
<i>Dendroperdix sephaena</i>	Francolin, Crested	Unlisted	LC
<i>Dendropicos fuscescens</i>	Woodpecker, Cardinal	Unlisted	LC
<i>Dicrurus adsimilis</i>	Drongo, Fork-tailed	Unlisted	LC
<i>Dryoscopus cubla</i>	Puffback, Black-backed	Unlisted	LC
<i>Egretta alba</i>	Egret, Great	Unlisted	LC
<i>Egretta garzetta</i>	Egret, Little	Unlisted	LC
<i>Egretta intermedia</i>	Egret, Yellow-billed	Unlisted	LC
<i>Elanus caeruleus</i>	Kite, Black-shouldered	Unlisted	LC
<i>Emberiza flaviventris</i>	Bunting, Golden-breasted	Unlisted	LC
<i>Emberiza impetuani</i>	Bunting, Lark-like	Unlisted	LC
<i>Emberiza tahapisi</i>	Bunting, Cinnamon-breasted	Unlisted	LC
<i>Eremomela icteropygialis</i>	Eremomela, Yellow-bellied	Unlisted	LC
<i>Eremomela usticollis</i>	Eremomela, Burnt-necked	Unlisted	LC
<i>Eremopterix leucotis</i>	Sparrowlark, Chestnut-backed	Unlisted	LC
<i>Eremopterix verticalis</i>	Sparrowlark, Grey-backed	Unlisted	LC
<i>Estrilda astrild</i>	Waxbill, Common	Unlisted	LC
<i>Estrilda erythronotos</i>	Waxbill, Black-faced	Unlisted	LC
<i>Euplectes afer</i>	Bishop, Yellow-crowned	Unlisted	LC
<i>Euplectes albonotatus</i>	Widowbird, White-winged	Unlisted	LC
<i>Euplectes orix</i>	Bishop, Southern Red	Unlisted	LC
<i>Euplectes progne</i>	Widowbird, Long-tailed	Unlisted	LC
<i>Eurocephalus anguimans</i>	Shrike, Southern White-crowned	Unlisted	LC
<i>Falco amurensis</i>	Falcon, Amur	Unlisted	LC
<i>Falco biarmicus</i>	Falcon, Lanner	VU	LC
<i>Falco chicquera</i>	Falcon, Red-necked	Unlisted	NT
<i>Falco naumanni</i>	Kestrel, Lesser	Unlisted	LC
<i>Falco rupicoloides</i>	Kestrel, Greater	Unlisted	LC
<i>Falco rupicolus</i>	Kestrel, Rock	Unlisted	LC
<i>Fulica cristata</i>	Coot, Red-knobbed	Unlisted	LC
<i>Gallinago nigripennis</i>	Snipe, African	Unlisted	LC
<i>Gallinula chloropus</i>	Moorhen, Common	Unlisted	LC
<i>Glaucidium perlatum</i>	Owlet, Pearl-spotted	Unlisted	LC
<i>Granatina granatina</i>	Waxbill, Violet-eared	Unlisted	LC
<i>Gyps africanus</i>	Vulture, White-backed	CR	CR
<i>Gyps coprotheres</i>	Vulture, Cape	EN	EN
<i>Halcyon albiventris</i>	Kingfisher, Brown-hooded	Unlisted	LC
<i>Halcyon chelicuti</i>	Kingfisher, Striped	Unlisted	LC

<i>Halcyon senegalensis</i>	Kingfisher, Woodland	Unlisted	LC
<i>Haliaeetus vocifer</i>	Fish-eagle, African	Unlisted	LC
<i>Himantopus himantopus</i>	Stilt, Black-winged	Unlisted	LC
<i>Hippolais icterina</i>	Warbler, Icterine	Unlisted	LC
<i>Hirundo abyssinica</i>	Swallow, Lesser Striped	Unlisted	LC
<i>Hirundo albicularis</i>	Swallow, White-throated	Unlisted	LC
<i>Hirundo cucullata</i>	Swallow, Greater Striped	Unlisted	LC
<i>Hirundo dimidiata</i>	Swallow, Pearl-breasted	Unlisted	LC
<i>Hirundo fuligula</i>	Martin, Rock	Unlisted	Unlisted
<i>Hirundo rustica</i>	Swallow, Barn	Unlisted	LC
<i>Hirundo semirufa</i>	Swallow, Red-breasted	Unlisted	LC
<i>Hirundo spilodera</i>	Cliff-swallow, South African	Unlisted	LC
<i>Indicator indicator</i>	Honeyguide, Greater	Unlisted	LC
<i>Indicator minor</i>	Honeyguide, Lesser	Unlisted	LC
<i>Lagonosticta rhodopareia</i>	Firefinch, Jameson's	Unlisted	LC
<i>Lagonosticta senegala</i>	Firefinch, Red-billed	Unlisted	LC
<i>Lamprotornis australis</i>	Starling, Burchell's	Unlisted	LC
<i>Lamprotornis nitens</i>	Starling, Cape Glossy	Unlisted	LC
<i>Laniarius atrococcineus</i>	Shrike, Crimson-breasted	Unlisted	LC
<i>Lanius collaris</i>	Fiscal, Common (Southern)	Unlisted	LC
<i>Lanius collurio</i>	Shrike, Red-backed	Unlisted	LC
<i>Lanius minor</i>	Shrike, Lesser Grey	Unlisted	LC
<i>Larus cirrocephalus</i>	Gull, Grey-headed	Unlisted	LC
<i>Leptoptilos crumeniferus</i>	Stork, Marabou	Unlisted	LC
<i>Lophotis ruficrista</i>	Korhaan, Red-crested	Unlisted	LC
<i>Lybius torquatus</i>	Barbet, Black-collared	Unlisted	LC
<i>Macronyx capensis</i>	Longclaw, Cape	Unlisted	LC
<i>Malcorus pectoralis</i>	Warbler, Rufous-eared	Unlisted	LC
<i>Megaceryle maximus</i>	Kingfisher, Giant	Unlisted	Unlisted
<i>Melierax canorus</i>	Goshawk, Southern Pale Chanting	Unlisted	LC
<i>Melierax gabar</i>	Goshawk, Gabar	Unlisted	LC
<i>Merops apiaster</i>	Bee-eater, European	Unlisted	LC
<i>Merops bullockoides</i>	Bee-eater, White-fronted	Unlisted	LC
<i>Merops hirundineus</i>	Bee-eater, Swallow-tailed	Unlisted	LC
<i>Merops persicus</i>	Bee-eater, Blue-cheeked	Unlisted	LC
<i>Merops pusillus</i>	Bee-eater, Little	Unlisted	LC
<i>Milvus aegyptius</i>	Kite, Yellow-billed	Unlisted	Unlisted
<i>Mirafra africana</i>	Lark, Rufous-naped	Unlisted	LC
<i>Mirafra apiata</i>	Lark, Cape Clapper	Unlisted	LC

<i>Mirafra cheniana</i>	Lark, Melodious	LC	LC
<i>Mirafra fasciolata</i>	Lark, Eastern Clapper	Unlisted	LC
<i>Mirafra marjoriae</i>	Lark, Agulhas Clapper	Unlisted	Unlisted
<i>Mirafra passerina</i>	Lark, Monotonous	Unlisted	LC
<i>Monticola brevipes</i>	Rock-thrush, Short-toed	Unlisted	LC
<i>Motacilla capensis</i>	Wagtail, Cape	Unlisted	LC
<i>Muscicapa striata</i>	Flycatcher, Spotted	Unlisted	LC
<i>Mycteria ibis</i>	Stork, Yellow-billed	EN	LC
<i>Myrmecocichla formicivora</i>	Chat, Anteating	Unlisted	LC
<i>Netta erythrophthalma</i>	Pochard, Southern	Unlisted	LC
<i>Nilaus afer</i>	Brubru	Unlisted	LC
<i>Numida meleagris</i>	Guineafowl, Helmeted	Unlisted	LC
<i>Nycticorax nycticorax</i>	Night-Heron, Black-crowned	Unlisted	LC
<i>Oena capensis</i>	Dove, Namaqua	Unlisted	LC
<i>Oenanthe monticola</i>	Wheatear, Mountain	Unlisted	LC
<i>Oenanthe pileata</i>	Wheatear, Capped	Unlisted	LC
<i>Oriolus larvatus</i>	Oriole, Black-headed	Unlisted	LC
<i>Ortygospiza atricollis</i>	Quailfinch, African	Unlisted	LC
<i>Oxyura maccoa</i>	Duck, Maccoa	NT	NT
<i>Parisoma subcaeruleum</i>	Tit-babbler, Chestnut-vented	Unlisted	Unlisted
<i>Parus cinerascens</i>	Tit, Ashy	Unlisted	LC
<i>Passer diffusus</i>	Sparrow, Southern Grey-headed	Unlisted	LC
<i>Passer domesticus</i>	Sparrow, House	Unlisted	LC
<i>Passer griseus</i>	Sparrow, Northern Grey-headed	Unlisted	LC
<i>Passer melanurus</i>	Sparrow, Cape	Unlisted	LC
<i>Passer motitensis</i>	Sparrow, Great	Unlisted	LC
<i>Pelecanus rufescens</i>	Pelican, Pink-backed	VU	LC
<i>Peliperdix coqui</i>	Francolin, Coqui	Unlisted	LC
<i>Petronia superciliaris</i>	Petronia, Yellow-throated	Unlisted	LC
<i>Phalacrocorax africanus</i>	Cormorant, Reed	Unlisted	LC
<i>Phalacrocorax carbo</i>	Cormorant, White-breasted	LC	LC
<i>Philetairus socius</i>	Weaver, Sociable	Unlisted	LC
<i>Philomachus pugnax</i>	Ruff	Unlisted	LC
<i>Phoeniconaias minor</i>	Flamingo, Lesser	NT	NT
<i>Phoenicopterus ruber</i>	Flamingo, Greater	NT	LC
<i>Phoeniculus purpureus</i>	Wood-hoopoe, Green	Unlisted	LC
<i>Phylloscopus trochilus</i>	Warbler, Willow	Unlisted	LC
<i>Platalea alba</i>	Spoonbill, African	Unlisted	LC
<i>Plectropterus gambensis</i>	Goose, Spur-winged	Unlisted	LC

<i>Plegadis falcinellus</i>	Ibis, Glossy	Unlisted	LC
<i>Plocepasser mahali</i>	Sparrow-weaver, White-browed	Unlisted	LC
<i>Ploceus velatus</i>	Southern Masked-weaver, Southern	Unlisted	LC
<i>Podiceps cristatus</i>	Grebe, Great Crested	Unlisted	LC
<i>Polemaetus bellicosus</i>	Eagle, Martial	EN	VU
<i>Porphyrio madagascariensis</i>	Swamphen, African Purple	Unlisted	Unlisted
<i>Prinia flavicans</i>	Prinia, Black-chested	Unlisted	LC
<i>Prinia subflava</i>	Prinia, Tawny-flanked	Unlisted	LC
<i>Prionops plumatus</i>	Helmet-shrike, White-crested	Unlisted	LC
<i>Psophocichla litsipsirupa</i>	Thrush, Groundscraper	Unlisted	Unlisted
<i>Pternistis adspersus</i>	Spurfowl, Red-billed	Unlisted	LC
<i>Pternistis swainsonii</i>	Spurfowl, Swainson's	Unlisted	LC
<i>Pterocles burchelli</i>	Sandgrouse, Burchell's	Unlisted	LC
<i>Pterocles namaqua</i>	Sandgrouse, Namaqua	Unlisted	LC
<i>Ptilopusus granti</i>	Scops-owl, Southern White-faced	Unlisted	Unlisted
<i>Pycnonotus nigricans</i>	Bulbul, African Red-eyed	Unlisted	LC
<i>Pycnonotus tricolor</i>	Bulbul, Dark-capped	Unlisted	Unlisted
<i>Pytilia melba</i>	Pytilia, Green-winged	Unlisted	LC
<i>Quelea quelea</i>	Quelea, Red-billed	Unlisted	LC
<i>Recurvirostra avosetta</i>	Avocet, Pied	Unlisted	LC
<i>Rhinopomastus cyanomelas</i>	Scimitarbill, Common	Unlisted	LC
<i>Rhinoptilus africanus</i>	Cursorer, Double-banded	Unlisted	LC
<i>Riparia cincta</i>	Martin, Banded	Unlisted	LC
<i>Riparia paludicola</i>	Martin, Brown-throated	Unlisted	LC
<i>Rostratula benghalensis</i>	Painted-snipe, Greater	NT	LC
<i>Sagittarius serpentarius</i>	Secretarybird	VU	VU
<i>Sarkidiornis melanotos</i>	Duck, Comb	Unlisted	LC
<i>Saxicola torquatus</i>	Stonechat, African	Unlisted	LC
<i>Scleroptila levaillantoides</i>	Francolin, Orange River	Unlisted	LC
<i>Scopus umbretta</i>	Hamerkop, Hamerkop	Unlisted	LC
<i>Sigelus silens</i>	Flycatcher, Fiscal	Unlisted	LC
<i>Spizocorys conirostris</i>	Lark, Pink-billed	Unlisted	LC
<i>Sporopipes squamifrons</i>	Finch, Scaly-feathered	Unlisted	LC
<i>Spreo bicolor</i>	Starling, Pied	Unlisted	LC
<i>Stenostira scita</i>	Flycatcher, Fairy	Unlisted	LC
<i>Streptopelia capicola</i>	Turtle-dove, Cape	Unlisted	LC
<i>Streptopelia semitorquata</i>	Dove, Red-eyed	Unlisted	LC
<i>Streptopelia senegalensis</i>	Dove, Laughing	Unlisted	LC
<i>Struthio camelus</i>	Ostrich, Common	Unlisted	LC

<i>Sylvia borin</i>	Warbler, Garden	Unlisted	LC
<i>Sylvia communis</i>	Whitethroat, Common	Unlisted	LC
<i>Sylvietta rufescens</i>	Crombec, Long-billed	Unlisted	LC
<i>Tachybaptus ruficollis</i>	Grebe, Little	Unlisted	LC
<i>Tachymarpis melba</i>	Swift, Alpine	Unlisted	LC
<i>Tadorna cana</i>	Shelduck, South African	Unlisted	LC
<i>Tchagra australis</i>	Tchagra, Brown-crowned	Unlisted	LC
<i>Tchagra senegalus</i>	Tchagra, Black-crowned	Unlisted	LC
<i>Telophorus sulfureopectus</i>	Bush-shrike, Orange-breasted	Unlisted	LC
<i>Telophorus zeylonus</i>	Bokmakierie, Bokmakierie	Unlisted	LC
<i>Terpsiphone viridis</i>	Paradise-flycatcher, African	Unlisted	LC
<i>Thalassornis leuconotus</i>	Duck, White-backed	Unlisted	LC
<i>Threskiornis aethiopicus</i>	Ibis, African Sacred	Unlisted	LC
<i>Tockus leucomelas</i>	Hornbill, Southern Yellow-billed	Unlisted	LC
<i>Tockus nasutus</i>	Hornbill, African Grey	Unlisted	LC
<i>Torgos tracheliotus</i>	Vulture, Lappet-faced	EN	EN
<i>Trachyphonus vaillantii</i>	Barbet, Crested	Unlisted	LC
<i>Tricholaema leucomelas</i>	Barbet, Acacia Pied	Unlisted	LC
<i>Tringa glareola</i>	Sandpiper, Wood	Unlisted	LC
<i>Tringa nebularia</i>	Greenshank, Common	Unlisted	LC
<i>Tringa stagnatilis</i>	Sandpiper, Marsh	Unlisted	LC
<i>Turdoides bicolor</i>	Babbler, Southern Pied	Unlisted	LC
<i>Turdoides jardineii</i>	Babbler, Arrow-marked	Unlisted	LC
<i>Turdus olivaceus</i>	Thrush, Olive	Unlisted	LC
<i>Turdus smithi</i>	Thrush, Karoo	Unlisted	LC
<i>Turnix sylvaticus</i>	Buttonquail, Kurrichane	Unlisted	LC
<i>Tyto alba</i>	Owl, Barn	Unlisted	LC
<i>Upupa africana</i>	Hoepoe, African	Unlisted	LC
<i>Uraeginthus angolensis</i>	Waxbill, Blue	Unlisted	LC
<i>Urocolius indicus</i>	Mousebird, Red-faced	Unlisted	LC
<i>Urolestes melanoleucus</i>	Shrike, Magpie	Unlisted	LC
<i>Vanellus armatus</i>	Lapwing, Blacksmith	Unlisted	LC
<i>Vanellus coronatus</i>	Lapwing, Crowned	Unlisted	LC
<i>Vidua chalybeata</i>	Indigobird, Village	Unlisted	LC
<i>Vidua macroura</i>	Whydah, Pin-tailed	Unlisted	LC
<i>Vidua paradisaea</i>	Paradise-whydah, Long-tailed	Unlisted	LC
<i>Vidua regia</i>	Whydah, Shaft-tailed	Unlisted	LC
<i>Zosterops pallidus</i>	White-eye, Orange River	Unlisted	LC
<i>Zosterops virens</i>	White-eye, Cape	Unlisted	LC

Appendix D Mammals expected in the project area

Species	Common name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Aethomys ineptus</i>	Tete Veld Rat	LC	LC
<i>Aethomys namaquensis</i>	Namaqua rock rat	LC	LC
<i>Alcelaphus buselaphus</i>	Hartebeest	LC	LC
<i>Antidorcas marsupialis</i>	Slater's Shrew	LC	LC
<i>Aonyx capensis</i>	Cape Clawless Otter	NT	NT
<i>Atelerix frontalis</i>	South Africa Hedgehog	NT	LC
<i>Canis mesomelas</i>	Black-backed Jackal	LC	LC
<i>Caracal caracal</i>	Caracal	LC	LC
<i>Ceratotherium simum</i>	White Rhinoceros	NT	NT
<i>Connochaetes gnou</i>	Black Wildebeest	LC	LC
<i>Connochaetes taurinus</i>	Blue Wildebeest	LC	LC
<i>Crociodura cyanea</i>	Reddish-grey Musk Shrew	LC	LC
<i>Crocuta crocuta</i>	Spotted Hyaena	NT	LC
<i>Cynictis penicillata</i>	Yellow Mongoose	LC	LC
<i>Dendromus melanotis</i>	Grey Climbing Mouse	LC	LC
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	LC	LC
<i>Diceros bicornis</i>	Black Rhinoceros	EN	CR
<i>Elephantulus myurus</i>	Eastern Rock Sengi	LC	LC
<i>Eptesicus hottentotus</i>	Long-tailed Serotine Bat	LC	LC
<i>Equus quagga</i>	Plains Zebra	LC	NT
<i>Felis nigripes</i>	Black-footed Cat	VU	VU
<i>Felis silvestris</i>	African Wildcat	LC	LC
<i>Genetta genetta</i>	Small-spotted Genet	LC	LC
<i>Gerbilliscus brantsii</i>	Highveld Gerbil	LC	LC
<i>Gerbilliscus leucogaster</i>	Bushveld Gerbil	LC	LC
<i>Gerbilliscus paeda</i>	Hairy-footed Gerbil	LC	Unlisted
<i>Giraffa camelopardalis</i>	Giraffe	LC	VU
<i>Herpestes sanguineus</i>	Slender Mongoose	LC	LC
<i>Hystrix africaeaustralis</i>	Cape Porcupine	LC	LC
<i>Ictonyx striatus</i>	Striped Polecat	LC	LC
<i>Lemniscomys rosalia</i>	Single-striped Mouse	LC	LC
<i>Lepus capensis</i>	Cape Hare	LC	LC
<i>Lepus saxatilis</i>	Scrub Hare	LC	LC
<i>Lepus victoriae</i>	African Savanna Hare	LC	LC
<i>Melacothrix typica</i>	Large-eared Mouse	LC	Unlisted
<i>Mastomys coucha</i>	Multimammate Mouse	LC	LC

<i>Mellivora capensis</i>	Honey Badger	LC	LC
<i>Mus musculus</i>	House Mouse	Unlisted	LC
<i>Mystromys albicaudatus</i>	White-tailed Rat	VU	EN
<i>Neoromicia capensis</i>	Cape Serotine Bat	LC	LC
<i>Orycteropus afer</i>	Aardvark	LC	LC
<i>Oryx gazella</i>	Gemsbok	LC	LC
<i>Otocyon megalotis</i>	Bat-eared Fox	LC	LC
<i>Panthera pardus</i>	Leopard	VU	VU
<i>Papio ursinus</i>	Chacma Baboon	LC	LC
<i>Parahyaena brunnea</i>	Brown Hyaena	NT	NT
<i>Pedetes capensis</i>	Springhare	LC	LC
<i>Phacochoerus africanus</i>	Common Warthog	LC	LC
<i>Poecilogale albinucha</i>	African Striped Weasel	NT	LC
<i>Proteles cristata</i>	Aardwolf	LC	LC
<i>Raphicerus campestris</i>	Steenbok	LC	LC
<i>Rhabdomys pumilio</i>	Xeric Four-striped Mouse	LC	LC
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe Bat	LC	LC
<i>Rhinolophus darlingi</i>	Darling's Horseshoe Bat	LC	LC
<i>Rhinolophus denti</i>	Dent's Horseshoe Bat	NT	LC
<i>Saccostomus campestris</i>	Pouched Mouse	LC	LC
<i>Sauromys petrophilus</i>	Flat-headed Free-tail Bat	LC	LC
<i>Smutsia temminckii</i>	Temminck's Ground Pangolin	VU	VU
<i>Steatomys krebsii</i>	Krebs's Fat Mouse	LC	LC
<i>Suricata suricatta</i>	Suricate	LC	LC
<i>Sylvicapra grimmia</i>	Common Duiker	LC	LC
<i>Syncerus caffer</i>	African Buffalo	LC	LC
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	LC	LC
<i>Thallomys paedulus</i>	Tree Rat	LC	LC
<i>Tragelaphus oryx</i>	Common Eland	LC	LC
<i>Vulpes chama</i>	Cape Fox	LC	LC
<i>Xerus inauris</i>	Cape Ground Squirrel	LC	LC

Appendix E Reptiles species expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	LC	LC
<i>Agama atra</i>	Southern Rock Agama	LC	LC
<i>Aparallactus capensis</i>	Black-headed Centipede-eater	LC	LC
<i>Chamaeleo dilepis</i>	Common Flap-neck Chameleon	LC	LC
<i>Dasypeltis scabra</i>	Rhombic Egg-eater	LC	LC
<i>Gerrhosaurus flavigularis</i>	Yellow-throated Plated Lizard	LC	Unlisted
<i>Hemachatus haemachatus</i>	Rinkhals	LC	LC
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	LC	Unlisted
<i>Lycodonomorphus rufulus</i>	Brown Water Snake	LC	Unlisted
<i>Lygodactylus capensis capensis</i>	Common Dwarf Gecko	LC	Unlisted
<i>Naja annulifera</i>	Snouted Cobra	LC	Unlisted
<i>Pachydactylus capensis</i>	Cape Gecko	LC	Unlisted
<i>Prosymna ambigua</i>	Angolan Shovel-snout	Unlisted	LC
<i>Psammophis trinasalis</i>	Fork-marked Sand Snake	LC	Unlisted
<i>Psammophylax tritaeniatus</i>	Striped Grass Snake	LC	LC
<i>Rhinotyphlops lalandei</i>	Delalande's Beaked Blind Snake	LC	Unlisted
<i>Stigmochelys pardalis</i>	Leopard Tortoise	LC	LC
<i>Trachylepis capensis</i>	Cape Skink	LC	Unlisted
<i>Trachylepis punctatissima</i>	Speckled Rock Skink	LC	LC
<i>Trachylepis varia</i>	Variable Skink	LC	LC

Appendix F Amphibians expected in the project area

Species	Common Name	Conservation Status	
		Regional (SANBI, 2016)	IUCN (2017)
<i>Amietia fuscigula</i>	Cape River Frog	LC	LC
<i>Breviceps adspersus</i>	Bushveld Rain Frog	LC	LC
<i>Cacosternum boettgeri</i>	Common Caco	LC	LC
<i>Kassina senegalensis</i>	Bubbling Kassina	LC	LC
<i>Phrynobatrachus natalensis</i>	Snoring Puddle Frog	LC	LC
<i>Phrynomantis bifasciatus</i>	Banded Rubber Frog	LC	LC
<i>Ptychadena anchietae</i>	Plain Grass Frog	LC	LC
<i>Pyxicephalus adspersus</i>	Giant Bullfrog	LC	LC
<i>Schismaderma carens</i>	African Red Toad	LC	LC
<i>Sclerophrys garmani</i>	Olive Toad	LC	LC
<i>Sclerophrys gutturalis</i>	Guttural Toad	LC	LC
<i>Sclerophrys poweri</i>	Power's Toad	LC	LC
<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	LC	LC
<i>Tomopterna tandyi</i>	Tandy's Sand Frog	LC	LC
<i>Xenopus laevis</i>	Common Platanna	LC	LC