

**BAUBA A HLABIRWA MINING
INVESTMENTS (PTY) LTD:
MOEIJELIJK
FAUNA TERRESTRIAL
BIODIVERSITY ASSESSMENT**

**FOR
THE PROPOSED MINING EXPANSION
ON
THE FARM MOEIJELIJK 412 KS,
LIMPOPO PROVINCE**



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Title:

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Client(s):

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Report No.:

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EXECUTIVE SUMMARY

This document has been prepared and submitted by Prescali Environmental Consultants (Pty) Ltd (Prescali) to the client: Red Kite Environmental Solutions (Pty) Ltd in response to a request for a biodiversity study of the proposed project as part of the Environmental Impact Assessment process for Bauba A Hlabirwa Mining Investments (Pty) Ltd (Moeijelijk development expansion project) in the Limpopo Province area.

It is our understanding that Moeijelijk is in the process of applying for amendment to their authorisations for expansion of their existing infrastructure.

In addition to the above, the project will be evaluated from a biodiversity viewpoint in terms of the requirements of the National Biodiversity Act, 2004 (Act No. 10 of 2004) and amendments. Field assessments was conducted on the 9th of November 2017.

The proposed site is situated within the Savanna Biome, the Central Bushveld Ecoregion and the Sekhukhune Plains Bushveld (SVcb27) and Sekhukhune Mountain Bushveld (SVcb28) vegetation units. This area forms part of the Sekhukhune Centre of Endemism (specifically the Steelpoort Subcentre) which has a high level of biodiversity with some species that can only be found within certain areas along this Centre. The Sekhukhune Plains Bushveld vegetation unit is considered to be Vulnerable with a conservation target of 19% with less than 2% statutorily conserved whilst the Sekhukhune Mountain Bushveld vegetation unit is considered to be Least Threatened with a conservation target of 24%. Only 0.4% of this vegetation unit is currently conserved in the Potlake Nature Reserve.

Previous field work was completed on the 7th of April 2015 for the original expansion aspects. Four sites were surveyed in and surrounding the proposed mining activities. The first site was located on the north-eastern facing rocky hill adjacent to the mining offices whilst the second site is situated on the north to north-western facing rocky hill that faces the current mining operations and a section of the proposed mining activities. The third site is located within the proposed footprint area and includes the area that has already been cleared during the prospecting phase. The final site is located within the grasslands (at the opposite end of the mining road) from the proposed footprint towards the mining offices. These various areas were surveyed again and specifically the footprints that is intended for the new expansion (2017).

The area assessed have been thought to consist of various degrees of disturbed characteristics and degraded in terms of diversity and adequate habitat types, although the area located to the south west of the mining development may be seen as natural and visible trends showed increasing degrees of degradation as the field work progressed from Site 1, to Site 4. There were some burrowing activities visible in certain areas which indicate that the area is still in use as range for smaller type mammals such as rodent species and reptiles/snakes. Jackals may be expected in the larger area and droppings were found to indicate their remaining presence in the area, specifically to the koppie located next to Moeijelijk and those areas stretching between Sefateng and Moeijelijk mine. Previously, signs of an Aardvark, *Orycteropus afer*, the dried compacted droppings were sighted, but was not confirmed with the help of a camera trap and no holes were sighted in the immediate vicinity. No signs of these were sighted in the updated fieldwork done in November 2017. Other droppings/pellets found were mostly of domestic livestock origin, presumably the livestock from the adjacent community who use the area for grazing purposes. Reptiles were indicated as important within the framework of the study, with one reptile occurring in the area that have protective status and three other endemic species that was recorded for the QDS.



Limited larger mammals are expected to be found and no droppings were found that indicate the activity of larger species. It was difficult to track for spores as the terrain were very dry and mostly covered with rocks as the slopes increased in height.

The mountainous terrain was deemed the most important area (habitat type) as it may be home to reptiles and insects that have specialized niches in the relevant area. Several birds-of-prey were also sighted during the field assessment and they use the terrain and adjacent valley as hunting grounds. There are several sensitive birds recorded in the baseline study that enjoys conservation status in the IUCN Red List. Species such as Cape Vulture (VU) *Gyps coprotheres*, White-backed Vulture, (EN) *Gyps africanus*, Tawny Eagle (VU) *Aquila rapax* are listed in the TOPS listing (2013). Species as listed and protected under the TOPS list (2013) are thereby enforceable under the National Environmental Management: Biodiversity Act, 2004. These were confirmed again during the 2017 assessment as the mountainous area (specifically the cliff hang) are clearly utilized by birds of prey. The species found in the 2017 study were the *Gyps coprotheres* (Cape Vulture).

As seen from the results below, the area species assemblages are typically those that you expect to see where the environment has been degraded and not in a pristine condition any more.

All injured animals sighted during the development should be protected and reported to the relevant ECO/Manager and should not be handled by the employees under any circumstance. Clear protocol should be developed on the matter.



Limitations and Assumptions

The desktop study was conducted with up to date resources and the site visit was conducted as thoroughly as possible. It might however be possible that additional information become available in time, because environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the report be viewed and acted upon with these limitations in mind. Prescali Environmental Consultants (Pty) Ltd cannot be held responsible for conclusions and pro-active mitigation measures that are made in good faith based on the available resources and information provided at the time of the directive.

To perform an exhaustive fauna survey of a study area requires an extensive amount of time (years) due to the very secretive and unpredictable movements of most reptile and mammal species and the migratory movements of bird species across seasons and time scales. Results of fauna field surveys are limited by time and funding availability as well as the movement/activity patterns of the herpetofauna, avifauna and mammalian community during the survey period. As a result, typical herpetofauna, avifauna and mammalian communities found within the study should/can therefore only be used as a general guideline.

As the investigation was conducted during three separate field assessments within the Summer period, it increases the confidence of the study done, but limitations should always be kept in mind and therefore management should focus on pro-active measures and the implementation of the precautionary principle. It should be noted that although the study was conducted in the summer, the summer rain season is yet to start, which is December/January in the Limpopo province.



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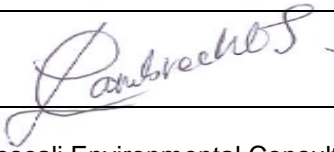
APPENDICES

Appendix A - Avifauna Baseline study



Declaration of Independence

I declare that I, Corlien Lambrechts, act as the independent specialist for the fauna assessment of this application. I conduct assessments in an objective manner, even when the views and findings might not be favourable to the Applicant. I have the expertise to conduct the assessment and will comply with the Act, regulations and other applicable legislation. I do not have conflicting interests in the undertaking of the activity. I undertake to disclose all material information in my possession that has or may have the potential of influencing any decision to be taken in respect to the application.

Signature of Specialist	
Name of Company	Prescali Environmental Consultants (Pty) Ltd
Date	08 December 2017



INTRODUCTION AND SCOPE

1 INTRODUCTION

This document has been prepared and submitted by Prescali Environmental Consultants (Pty) Ltd (Prescali) to the client: Red Kite Environmental Solutions (Pty) Ltd in response to a request for a biodiversity study of the proposed project as part of the Environmental Impact Assessment process for Bauba A Hlabirwa Mining Investments (Pty) Ltd (Moeijelijk development expansion project) in the Limpopo Province area.

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The mountainous terrain was deemed the most important area (habitat type) as it may be home to reptiles and insects that have specialized niches in the relevant area. Several birds-of-prey were also sighted during the field assessment and they use the terrain and adjacent valley as hunting grounds. There are several sensitive birds recorded in the baseline study that enjoys conservation status in the IUCN Red List. Species such as *Gyps coprotheres* (Cape Vulture) (VU), *Gyps africanus* (White-backed Vulture) (EN) and *Aquila rapax* (Tawny Eagle) (VU) are listed in the TOPS listing (2013). The species found in the 2017 study were the *Gyps coprotheres* (Cape Vulture). The *Circaetus cinereus* (Brown Snake Eagle) was sighted and therefore, the koppies are still being utilised by birds of prey as a habitat and refuge. Species as listed and protected under the TOPS list (2013) are thereby enforceable under the National Environmental Management: Biodiversity Act, 2004. These were confirmed again during the 2017 assessment as the mountainous area (specifically the cliff hang) are clearly utilized by birds of prey.

The original farm fall within the Topographical Quarter Degree Squares of 2429BD and 2430AC. These Squares were used as guideline structure to compile species lists that may occur within these regions (similar latitude and longitude values) and those recorded on the South African Biodiversity Institute Database of records. These were captured in the desktop study and represent the species that may occur on the site chosen for development.

The field survey enabled comparison of these data lists and assessment of the actual habitat types and integrity. Through comparison of datasets between the desktop study and the field survey, certain conclusions were made in terms of the integrity and carry capacity that the area has/or the conclusion



that the area have been degraded and resulted in loss of diversity as a result of current developments on the affected area.

Geospatial analysis of known species distributions and protected areas in terms of the Limpopo Conservation Plan were incorporated into the overall conclusions and a management plan was devised that would minimize the impacts and risks assessed.

2 SCOPE OF WORK

Prescali Environmental Consultants (Pty) Ltd was appointed to conduct a fauna biodiversity assessment as one of the specialist studies required for the inclusion in the EIA/EMP for the amendment of the existing authorisation of Moeijelijk. The scope of work encompassed an initial desktop study to determine the implications of the proposed development on the associated ecological system. The baseline desktop fauna biodiversity study included the following aspects:

- A desktop invertebrate and mammal study, which included determining the:
 - Endemic species; and
 - Red Data species (IUCN, SA Red Data Book & TOPs List)
- A field survey will be conducted to determine the:
 - Likelihood of ecologically significant invertebrates and mammals occurring in the area based on status of the environment;
 - Presence of endemic species;
 - Presence of exotic and invasive species;
 - Presence of IUCN Red Data species; and
 - Presence of culturally significant species.

The information from both the desktop and field survey will be used to report on the following:

- Describing the project area in terms of the most recent International, National and regional biodiversity status for fauna;
- Proposal of mitigation measures.

2.1 OBJECTIVES OF STUDY

The aim of this study includes the following objectives:

- Identify sensitive areas and species that should be avoided during the proposed expansion. These issues will be identified, evaluated and discussed.
- Make use of the South African Biodiversity Institute Database to obtain specialized information and previous surveys within the area. This will supplement the field survey and support findings.
- To determine and complete an impact assessment and risk evaluation. Relevant mitigation measures and a management plan will be proposed to reduce severity of impacts to the flora and fauna in the region.
- To provide recommendations that will support the proposed management actions.
- To provide an assessment of the result obtained, this assessment may be repeated and compared in terms of biodiversity and will aid in the rehabilitation and monitoring of the different Bauba mining development sectors proposed for the areas.



RELEVANT LEGISLATION

3 SPECIFIC LEGISLATION REQUIREMENTS

Wetlands, Rivers, Ridges, Caves and Corridors and other known sensitive areas were identified on the various farms and were specifically searched for certain species compositions or possible signs of occurrence on site.

The SA Red Data Book (Endangered Wildlife Fund) and the Threatened or Protected Species Regulations published initially in Government Gazette (23 February 2007), National Environmental Management: Biodiversity Act (Act No. 10 of 2004), also known as the TOPS List, was used to determine the degree of protection designated within the Environmental Management Plan. The latest edition of the TOPS list is discussed in detail within this document. Please refer to Section 3.2 and Section 3.3. for a comparison between the 2013 and the latest 2015 version of the TOPS list.

Specific species searched for were during the field survey conducted:

- **Mammalia:** *Chrysospalax villosus*, *Lutra maculicollis*, *Dasymys incommutus* (Riverine habitats)
- **Avi-fauna:** (Prioritised by Department of Agriculture and Rural Development):
- Cape Vulture, Blue Crane, Lesser Kestrel, African Grass-Owl, African Marsh-Harrier, White-backed Night-Heron, White-bellied Korhaan, Martial Eagle, African Finfoot, Lesser Flamingo, Secretarybird, Black Stork, Half-collared Kingfisher and Greater Flamingo. All rivers that provide suitable habitat for White-backed Night-Heron / African Finfoot / Half-collared Kingfisher (or where the presence of these species have been confirmed) should be specifically mentioned and mapped in terms of sensitivity guidelines.
- **Amphibia:** The Giant Bullfrog (*Pyxicephalus adspersus*) has been removed as special priority following re-assessment of the species' status in South Africa. The species is not truly Near Threatened in South Africa (no quantitative analysis of the Giant Bullfrog distribution against the IUCN criteria can consider them as such) and the most recent evaluation of the status of the Giant Bullfrog in December 2009 did not consider the species sufficiently threatened to be listed as Near Threatened. Given the current objectives of the C-plan i.e. to be used to protect representative habitat and generate specialist studies for threatened faunal species, the Giant Bullfrog does not qualify for inclusion as a species-specific layer requiring specialist assessments. As per the C-Plan approach, the conservation of the Giant Bullfrog and of amphibians in general will be met by the protected area network as well as the designation of priority habitats i.e., pans or quaternary catchments, with associated restrictions on land use.¹

This differs from the statement made in the 2015 North West Biodiversity Sector plan (Power & Verbugt, 2014): "*The following frog is a nationally threatened species Near Threatened: The giant bullfrog (Pyxicephalus adspersus) relies on temporary wetlands and dams in the province. This species was recorded in the northern bushveld regions, as well as the western Kalahari, as far west as Bray. It is not as threatened as the much talked about Gauteng populations*"

The Limpopo Environmental Management Act (Act No 7 of 2003) Protected Species List clearly list a Giant Bullfrog (*Pyxicephalus adspersus*) as protected game and this species have not been removed (Please refer to Table 3-2). The Act has not been amended to remove the species as is happening in

¹ Extract taken from GDARD Minimum Requirements (Updated June 2012)



other Provinces (like Gauteng 2012). The ToPS list (2013) and its amendment (2015) also does not include the Giant Bullfrog anymore as a Red listed species.²

3.1 LIMPOPO ENVIRONMENTAL MANAGEMENT ACT (ACT NO 7 OF 2003) PROTECTED SPECIES LIST

The LEMA (Act No7 of 2003) contains schedules of specially protected Wild animals (Schedule 2) and Protected Wild Animals (Schedule 3).

The following section is provided below:

- LEMA: Limpopo Environmental Act, 2003 (Act No. 7 of 2003)
 - Schedule 2: Specially Protected Wild Animals within the Limpopo Province;
 - Schedule 3: Protected Wild Animals within the Limpopo Province; and
 - Schedule 5: Wild animals to which section 31(f) applies;
- “a wild animal referred to Schedule 5 which is:
 - (i) Under the influence of tranquilising, narcotic, immobilizing or similar agent;
 - (ii) Has been lured by –
 - a) a simulation of recording of natural sound of animal
 - b) an imitating sound made by a human
 - c) bait
 - (iii) has been confined to a cage; or
 - (iv) has been confined to an enclosure, the size of which must be prescribed, from which it cannot readily escape”
- Schedule 6: Non-endemic wild animals;
- Schedule 8: Wild Animals to which section 31 (a) & (b) applies;
- “Hunting of wild and exotic animals;

Section 31(1) No person may without a permit hunt-

 - a) Specially protected wild animals;
 - b) Protected wild animals
 - c) Game”
- Schedule 10: Invertebrates to which section 61 (a) & (b) applies:

“Invertebrates:

 - (1) No person may without a permit-
 - a) Collect, catch, kill, keep, convey, purchase, sell, donate or receive as a gift, import or export or remove any invertebrate from the Province referred to in paragraph (a) of Schedule 10;
 - b) Collect, catch, keep, convey or kill, for the purpose of collection, any invertebrate in an area referred to in paragraph (b) of Schedule 10.”

Table 3-1: Schedule 2 of the Limpopo Environmental Management Act - Specially Protected Wild Animals

Schedule 2: Specially Protected Wild Animals	
Mammals	
Common Name	Scientific Name
African elephant	<i>Loxodonta africana</i>
Ant bear	<i>Orycteropus afer</i>
Black footed cat	<i>Felis nigripes</i>
Lichtenstein’s hartebeest	<i>Alcelaphus lichtensteinii</i>
Pangolin	<i>Manis temmincki</i>
Red duiker	<i>Cephalophus natalensis</i>

² The new Threatened or Protected Species (ToPS List) have been published in the Government Gazette Notice 255 of 2015, Vol. 597 Pretoria, 31 March 2015 No. 38600.



Rhinoceros, Black	<i>Diceros bicornis</i>
Rhinoceros, White	<i>Ceratotherium simum</i>
Roan antelope	<i>Hippotragus equinus</i>
Sharpe's grysbok	<i>Raphicerus sharpei</i>
Suni	<i>Neotragus moschatus</i>
Wild dog	<i>Lycaon pictus</i>
Birds	
Bald ibis	<i>Geronticus calvus</i>
Bateleur	<i>Terathopus ecaudatus</i>
Bat hawk	<i>Macheirhamphus alcinus</i>
Bittern	<i>Botaurus stellaris</i>
Blue crane	<i>Tefrapteryx paradisea</i>
Blue swallow	<i>Hirundo atrocaerulea</i>
Bustard, Kori	<i>Ardeotis kori</i>
Bustard, Stanley's	<i>Neotis denhami</i>
Cape vulture	<i>Gyps coprotheres</i>
Crested guinea fowl	<i>Guttera edouardi</i>
Falcon, Peregrine	<i>Falco peregrinus</i>
Falcon, Taita	<i>Falco fasciinucha</i>
Ground hornbill	<i>Bucorvus leadbeateri</i>
Martial eagle	<i>Polemaëtus bellicosus</i>
Parrot, Cape	<i>Poicephalus robustus</i>
Parrot, Grey headed	<i>Poicephalus fuscicollis</i>
Pel's fishing owl	<i>Scotopelia peli</i>
Saddlebill stork	<i>Ephippiorhynchus senegalensis</i>
Reptiles	
Nile crocodile	<i>Crocodylus niloticus</i>

Table 3-2: Schedule 3 of the Limpopo Environmental Management Act – Protected Wild Animals

Schedule 3: Protected Wild Animals	
Mammals	
Common Name	Scientific Name
Aardwolf	<i>Proteles cristatus</i>
African civet	<i>Civettictis civetta</i>
African wild cat	<i>Felis silvestris lybica</i>
Buffalo	<i>Syncerus caffer</i>
Bushbaby	<i>Galago crassicaudatus</i>
Bushbaby, Lesser	<i>Galago senegalensis</i>
Cape clawless otter	<i>Aonyx capensis</i>
Cheetah	<i>Acinonyx jubatus</i>
Fox, Bat-eared	<i>Otocyon megalotis</i>
Fox, Cape	<i>Vulpes chama</i>
Giraffe	<i>Giraffa camelopardalis</i>
Hedgehog	<i>Atelerix frontalis</i>
Hippopotamus	<i>Hippopotamus amphibius</i>
Honey badger	<i>Mellivora capensis</i>
Hyena, Brown	<i>Parahyaena brunnea</i>
Hyena, Spotted	<i>Crocuta</i>
Jameson's red rock rabbit	<i>Pronolagus randensis</i>



Klipspringer	<i>Oreotragus</i>
Leopard	<i>Panthera pardus</i>
Lion	<i>Panthera leo</i>
Mongoose, Mellers's	<i>Rhynchogale melleri</i>
Mongoose, Selous	<i>Paracynictis selousi</i>
Oribi	<i>Ourebia</i>
Reedbuck, Common	<i>Redunca arundinum</i>
Reedbuck, Mountain	<i>Redunca fulvorufula</i>
Rhebuck, Grey	<i>Pelea capreolus</i>
Sable antelope	<i>Hippotragus niger</i>
Samango monkey	<i>Cercopithecus mitis</i>
Serval	<i>Laptailurus serval</i>
Side-striped Jackal	<i>Canis adustus</i>
Steenbok	<i>Raphicerus campestris</i>
Tsessebe	<i>Damaliscus lunatus</i>
Yellow-spotted rock dassie	<i>Heterohyrax brucei</i>
Birds	
Any bird which is a wild animal excluding – a bird which is a specially protected wild animal; ii) a bird which is game; and iii) the following species:	
All species of mousebirds: Family Coliidae	
Black-eyed bulbul	<i>Pycnonotus barbatus</i>
Cape sparrow	<i>Passer melanurus</i>
Crow, Black	<i>Corvus capensis</i>
Crow, Pied	<i>Corvus albus</i>
Dove, Cape turtle	<i>Streptopelia capicola</i>
Dove, Laughing	<i>Streptopelia senegalensis</i>
Dove, Red-eyed turtle	<i>Streptopelia semitorquata</i>
Ostrich	<i>Struthio camelus</i>
Red-billed quelea	<i>Quelea</i>
Red-winged starling	<i>Onychognathus morio</i>
Weaver, Cape	<i>Ploceus capensis</i>
Weaver, Masked	<i>Ploceus velatus</i>
Weaver, Spotted-backed	<i>Ploceus cucullatus</i>
Reptiles and amphibians	
Bullfrog	<i>Pyxicephalus adspersus</i>
File snake, Black	<i>Mehelya nyassae</i>
File snake, Cape	<i>Mehelya capensis</i>
Python	<i>Python sebae</i>

Please note that in 2015 then Minister Edna Molema published certain amendments to the ToPS list, but the outcome of the publications will have to be seen, as the ToPs formal listing are published every 5 years, meaning that the formal listing will be published in 2018 (presumably). Please refer to Section 6.2 for a discussion of ToPS 2013 versus ToPs 2015.

3.2 NOTICE 389 OF 2013 (NEM: BA)

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) has a yearly update and publication of lists of species that are threatened of protected and activities that are prohibited and exemption from restriction. The latest update is Government Gazette Notice 389 of 2013,



published on the 16 April 2013. An amendment of this has been published in 2015 for public comment as well.

Certain critically endangered species were listed and published by Minister of Water and Environmental Affairs, Ms Bono Edith Edna Molewa and will be provided in the table given below (Please refer to Table 3-3).

Table 3-3: Threatened or Protected species in terms of Notice 389 of 2013³

Scientific Name	Common Name	Status in South Africa
Invertebrates		
<i>Alaena margaritacea</i>	Wolkberg Zulu Butterfly	Critically Endangered
<i>Ceratogyrus paulseni</i>	Paulsen's Horned Baboon Spider	Critically Endangered
<i>Chrysoritis dicksoni</i>	Dickson's Strandveld Copper Butterfly	Critically Endangered
<i>Chrysoritis thysbe schloszae</i>	Schlosz's Opal Butterfly	Critically Endangered
<i>Colophon barnardi</i>	Barnard's Cape Stag Beetle	Critically Endangered
<i>Colophon berrisfordi</i>	Berrisford's Cape Stag Beetle	Critically Endangered
<i>Colophon endroedyi</i>	Endrody Younga's Cape Stag Beetle	Critically Endangered
<i>Colophon kawaii</i>	Kawai's Cape Stag Beetle	Critically Endangered
<i>Colophon montisatris</i>	Swartberg Cape Stag Beetle	Critically Endangered
<i>Colophon oweni</i>	Owen's Cape Stag Beetle	Critically Endangered
<i>Colophon thunbergi</i>	Thunberg's Cape Stag Beetle	Critically Endangered
<i>Colophon westwoodi</i>	Westwood's Cape Stag Beetle	Critically Endangered
<i>Doratogonus major</i>	Major Black Millipede	Critically Endangered
<i>Erikssonia edgei</i>	Waterberg Copper Butterfly	Critically Endangered
<i>Gulella puzeyi</i>	Puzeyi's Hunter Snail	Critically Endangered
<i>Gulella salpinx</i>	Trumpet-mouthed Hunter snail	Critically Endangered
<i>Natalina beyrichi</i>	Pondoland Cannibal Snail	Critically Endangered
<i>Opisthopatus roseus</i>	Pink Velvetworm	Critically Endangered
<i>Opisthophthalmus ater</i>	Steinkopf Burrowing Scorpion	Critically Endangered
<i>Opisthophthalmus fuscipes</i>	Dark-legged Burrowing Scorpion	Critically Endangered
<i>Orachrysops niobe</i>	Brenton Blue Butterfly	Critically Endangered
<i>Peripatopsis leonine</i>	Lion's Hill Velvetworm	Critically Endangered
<i>Proischnura polychromatica</i>	Mauve Bluet Damselfly	Critically Endangered
<i>Stygionympha dicksoni</i>	Dickson's Brown Butterfly	Critically Endangered
<i>Thestor brachycerus</i>	Knysna Skolly Butterfly	Critically Endangered
<i>Trachycystis clifdeni</i>	Dlinza Forest Pinwheel Snail	Critically Endangered
<i>Trachycystis placenta</i>	Nkandla Forest Pinwheel Snail	Critically Endangered
<i>Trimenia malagrida</i>	Scarce Mountain Copper Butterfly	Critically Endangered

³ Please note that the 2015 Amendment has changed the status and excluded some of these species



Scientific Name	Common Name	Status in South Africa
<i>Trimenia wallengrenii</i>	Wallengren's Silver-spotted Copper Butterfly	Critically Endangered
<i>Colophon cameroni</i>	Cameron's Cape Stag Beetle	Endangered
<i>Colophon eastmani</i>	Eastman's Cape Stag Beetle	Endangered
<i>Colophon haughtoni</i>	Haughton's Cape Stag Beetle	Endangered
<i>Colophon izardi</i>	Izard's Cape Stag Beetle	Endangered
<i>Colophon neli</i>	Nel's Cape Stag Beetle	Endangered
<i>Colophon primosi</i>	Primos's Cape Stag Beetle	Endangered
<i>Colophon whitei</i>	White's Cape Stag Beetle	Endangered
<i>Idiothele mira</i>	Blue-footed Baboon Spider	Endangered
<i>Oonotus rex</i>	Regal Small Stag Beetle	Endangered
<i>Opisthophthalmus chaperi</i>	Chaper's Burrowing Scorpion	Endangered
<i>Opisthophthalmus intermedius</i>	Cape Mountain Burrowing Scorpion	Endangered
<i>Opisthophthalmus latro</i>	Strandveld Burrowing Scorpion	Endangered
<i>Oonotus interioris</i>	Inland Small Stag Beetle	Vulnerable
Pisces		
<i>Barbus erubescens</i>	Twee River redbin	Critically Endangered
<i>Pseudobarbus quathlambae</i>	Maloti redbin	Critically Endangered
<i>Barbus andrewi</i>	Berg-Breede River Whitefish	Endangered
<i>Barbus serra</i>	Sawfin	Endangered
<i>Labeo seeberi</i>	Clanwilliam sandfish	Endangered
<i>Sandelia bainsii</i>	Eastern Cape rocky	Endangered
<i>Serranochromis meridianus</i>	Lowveld largemouth	Endangered
<i>Labeobarbus kimberleyensis</i>	Vaal-Orange largemouth yellowfish	Protected
<i>Oreochromis mossambicus</i>	Mozambique tilapia	Protected
Amphibia		
<i>Arthroleptella rugosa</i>	Rough Moss Frog	Critically Endangered
<i>Heleophryne rosei</i>	Table Mountain Ghost Frog	Critically Endangered
<i>Hyperolius pickersgilli</i>	Pickersgill's Reed Frog	Critically Endangered
<i>Microbatrachella capensis</i>	Micro Frog	Critically Endangered
<i>Vandijkophotnus amatolicus</i>	Amatola Toad	Critically Endangered
Reptiles		
<i>Bitis albanica</i>	Albany Adder	Critically Endangered
<i>Cryptactites peringueyi</i>	Saltmarsh Gecko	Critically Endangered (
<i>Pachydactylus rangei</i>	Namib Webfooted Gecko	Critically Endangered
<i>Psammobates geometricus</i>	Geometric Tortoise	Critically Endangered
<i>Scelotes inornatus</i>	Durban Dwarf Burrowing Skink	Critically Endangered
<i>Bitis inornata</i>	Plain Mountain Adder	Endangered
<i>Bitis armata</i>	Southern Adder	Vulnerable
<i>Bradypodion melanocephalum</i>	Blackheaded Dwarf Chameleon	Vulnerable
<i>Bradypodion thamnobates</i>	Natal Midlands Dwarf Chameleon	Vulnerable
<i>Dendroaspis angusticeps</i>	Eastern Green Mamba	Vulnerable
<i>Smaug giganteus</i>	Giant Dragon Lizard	Vulnerable
<i>Bitis gabonica</i>	Gaboon Adder	Protected



Scientific Name	Common Name	Status in South Africa
<i>Python natalensis</i>	Southern African Python	Protected
<i>Bills cornuta</i>	Many Horned Adder	Protected
<i>Bitis schneideri</i>	Namaqua Dwarf Adder	Protected
<i>Bitis xeropaga</i>	Desert Mountain Adder	Protected
<i>Bitis caudalis</i>	Horned Adder	Protected
<i>Bills atropos</i>	Berg Adder	Protected
<i>Bitis rudiba</i>	Red Adder	Protected
<i>Lamprophis fiski</i>	Fisk's House Snake	Protected
<i>Lamprophis gutattus</i>	Spotted House Snake	Protected
<i>Boaedon mentalis</i>	Large-eyed House Snake	Protected
<i>Lamprophis fuscus</i>	Yellow-bellied House Snake	Protected
<i>Pachydactylus species</i>	Thick-toed geckos	Protected / arboreal insectivorous geckos, endemic to Africa
<i>Phelsuma ocellata</i>	Namaqua Day Gecko	Protected
<i>Afroedura Africana namaquensis</i>	Namaqua Flat Gecko	Protected
<i>Goggia rupicola</i>	Namaqua Pygmy Gecko	Protected
<i>Namazonurus lawrenci</i>	Lawrence's Girdled Lizard	Protected
<i>Cordylus imkeae</i>	Rooiberg Girdled Lizard	Protected
<i>Cordylus macropholis</i>	Large-scaled Lizard	Protected
<i>Homopus signatus</i>	Namaqua Speckled Padloper	Protected
Aves		
<i>Neophron percnopterus</i>	Egyptian Vulture	Critically Endangered
<i>Bugeranus carunculatus</i>	Wattled Crane	Critically Endangered
<i>Sarothrura ayresi</i>	White-winged Flufftail	Critically Endangered
<i>Hirundo atrocaerulea</i>	Blue Swallow	Critically Endangered
<i>Neotis ludwigii</i>	Ludwig's Bustard	Endangered
<i>Poice phallus robustus</i>	Cape Parrot	Endangered
<i>Gypaetus barbatus</i>	Bearded Vulture	Endangered
<i>Necrosyrtes monachus</i>	Hooded Vulture	Endangered
<i>Terathopius ecaudatus</i>	Bateleur	Vulnerable
<i>Neotis denhami</i>	Denham's Bustard	Vulnerable
<i>Anthropoides paradiseus</i>	Blue Crane	Vulnerable
<i>Balearica regulorum</i>	Grey Crowned Crane	Vulnerable
<i>Polemaetus bellicosus</i>	Martial Eagle	Vulnerable
<i>Aquila rapax</i>	Tawny Eagle	Vulnerable
<i>Bucorvus leadbeateri</i>	Southern Ground- Hornbill	Vulnerable
<i>Geronticus calvus</i>	Southern Bald Ibis	Vulnerable
<i>Gyps coprotheres</i>	Cape Vulture	Vulnerable
<i>Aegyptius tracheliotos</i>	Lappet faced Vulture	Vulnerable
<i>Aegyptius occipitalis</i>	White headed Vulture	Vulnerable
<i>Ardeotis kori</i>	Kori Bustard	Protected
<i>Falco faschiinucha</i>	Taita Falcon	Protected
<i>Poicephalus fuscicollis</i>	Grey-headed Parrot	Protected
<i>Gyps africanus</i>	White-backed Vulture	Protected
<i>Phalacrocorax lucidus</i>	White breasted cormorant	Protected
<i>Sterna species</i>	Terns	Protected



Scientific Name	Common Name	Status in South Africa
<i>Threskiornis aethiopicus</i>	Sacred Ibis	Protected
Mammalia		
<i>Bunolagus monticularis</i>	Riverine rabbit	Critically Endangered
<i>Cryptochloris wintoni</i>	De Winton's Golden Mole	Critically Endangered
<i>Damaliscus lunatus</i>	Tsessebe	Endangered
<i>Diceros bicornis</i>	Black Rhinoceros	Endangered
<i>Lycaon pictus</i>	African Wild Dog	Endangered
<i>Ourebia ourebi</i>	Oribi	Endangered
<i>Acinonyx jubatus</i>	Cheetah	Vulnerable
<i>Cercopithecus mitis labiatus</i>	Samango Monkey	Vulnerable
<i>Diceros bicornis minor</i>	Black Rhino	Vulnerable
<i>Equus zebra hartmannae</i>	Hartmann's Mountain Zebra	Vulnerable
<i>Equus zebra</i>	Cape Mountain Zebra	Vulnerable
<i>Manis temminckii</i>	Pangolin	Vulnerable
<i>Panthera leo</i>	Lion	Vulnerable
<i>Philantomba monticola</i>	Blue Duiker	Vulnerable
<i>Canis adustus</i>	Side-striped Jackal	Protected
<i>Ceratotherium simum</i>	White Rhinoceros	Protected
<i>Crocuta</i>	Spotted Hyena	Protected
<i>Felis nigripes</i>	Black-footed Cat	Protected
<i>Hyaena brunnea</i>	Brown Hyena	Protected
<i>Leptailurus serval</i>	Serval	Protected
<i>Loxodonta africana</i>	African Elephant	Protected
<i>Neotragus moschatus</i>	Suni	Protected
<i>Otycteropus afer</i>	Aardvark	Protected
<i>Otocyon megalotis</i>	Bat-eared Fox	Protected
<i>Panthera pardus</i>	Leopard	Protected
<i>Raphicerus melanotis</i>	Cape Grysbok	Protected
<i>Vulpes chama</i>	Cape Fox	Protected
<i>Alcelaphus buselaphus</i>	Red Hartebeest	Protected
<i>Alcelaphus buselaphus lichtensteinii</i>	Lichtenstein's Hartebeest	Protected
<i>Cephalophus natalensis</i>	Natal Red Duiker	Protected
<i>Connochaetes gnou</i>	Black Wildebeest	Protected
<i>Connochaetes taurinus</i>	Blue Wildebeest	Protected
<i>Damaliscus pygargus phiNpsi</i>	Blesbok	Protected
<i>Damaliscus pygargus</i>	Bontebok	Protected
<i>Giraffa camelopardalis</i>	Giraffe	Protected
<i>Hippotragus equinus</i>	Roan Antelope	Protected
<i>Hippotragus niger</i>	Sable Antelope	Protected
<i>Oreotragus</i>	Klipspringer	Protected
<i>Oryx gazella</i>	Gemsbok	Protected
<i>Pelea capreolus</i>	Grey Rhebok	Protected
<i>Raphicerus sharpei</i>	Sharpe's Grysbok	Protected
<i>Redunca arundinum</i>	Southern Reedbuck	Protected
<i>Syncerus caffer</i>	Cape Buffalo	Protected
<i>Tragelaphus angasii</i>	Nyala	Protected
<i>Tragelaphus scriptus</i>	Bushbuck	Protected
<i>Aonyx capensis</i>	Cape Clawless Otter	Protected



The status provided by the Government Gazette in terms of Notice 389 implies:

- Critically endangered: Section 56(1)(a) applies to the species awarded this status in terms of NEM:BA⁴, meaning: “*Critically endangered species, being any indigenous species facing an extremely high risk of extinction in the wild in the immediate future*”
- Endangered species: Section 56(1)(b) applies to the species awarded this status in terms of NEM:BA, meaning: “*Endangered species, being any indigenous species facing a high risk of extinction in the wild in the near future, although they are not a critically endangered species*”
- Vulnerable species: Section 56(1)(c) applies to the species awarded this status in terms of NEM:BA, meaning: “*Vulnerable species, being any indigenous species facing an extremely high risk of extinction in the wild in the medium-term future, although they are not a critically endangered species or an endangered species*”
- Protected species: Section 56(1)(d) applies to the species awarded this status in terms of NEM:BA, meaning: “*Protected species, being any species, which are of such high conservation value or national importance that they require national protection, although they are not listed in terms of paragraph (a), (b) or (c)*”

All listed animals in terms of the Act need special permits to be handled, kept, breeding or any other form of propagating, trade and relocation/moving. Any action intended in terms of potential harm, hunting, destruction/killing or international trade are in most cases prohibited.

3.3 NEMBA: NOTICE 255 OF 2015

Threatened or protected species listed in terms of Notice 255 of 2015 (NEMBA) is indicated below.

Table 3-4: Threatened or Protected Species lists of Notice 255 of 2015

Scientific Name	Common Name	Status in South Africa
Invertebrates		
<i>Ceratogyrus paulseni</i>	Paulsen's Horned Baboon Spider	Critically endangered
<i>Colophon bamardi</i>	Bamard's Cape Stag Beetle	Critically endangered
<i>Colophon berrisfordi</i>	Berrisford's Cape Stag Beetle	Critically endangered
<i>Colophon endroedyi</i>	Endrody-Younga's Cape Stag Beetle	Critically endangered
<i>Colophon kawaii</i>	Kawai's Cape Stag Beetle	Critically endangered
<i>Colophon montisatris</i>	Swartberg Cape Stag Beetle	Critically endangered
<i>Colophon oweni</i>	Owen's Cape Stag Beetle	Critically endangered
<i>Colophon thunbergi</i>	Thunberg's Cape Stag Beetle	Critically endangered
<i>Colophon westwoodi</i>	Westwood's Cape Stag Beetle	Critically endangered
<i>Opisththalmus ater</i>	Steinkopf Burrowing Scorpion	Critically endangered
<i>Opisththalmus fuscipes</i>	Dark-legged Burrowing Scorpion	Critically endangered
<i>Colophon cameroni</i>	Cameron's Cape Stag Beetle	Endangered
<i>Colophon eastmani</i>	Eastman's Cape Stag Beetle	Endangered
<i>Colophon haughtoni</i>	Haughton's Cape Stag Beetle	Endangered
<i>Colophon izardi</i>	Izard's Cape Stag Beetle	Endangered
<i>Colophon neli</i>	Nel's Cape Stag Beetle	Endangered
<i>Colophon primosi</i>	Primos's Cape Stag Beetle	Endangered
<i>Colophon whitei</i>	Whites Cape Stag Beetle	Endangered

⁴ National Environmental Management: Biodiversity Act, 1998 (Act 10 of 1998)



Scientific Name	Common Name	Status in South Africa
<i>Idiothele mira</i>	Blue-footed Baboon Spider	Endangered
<i>Oonotus rex</i>	Regal Small Stag Beetle	Endangered
<i>Opisthophthalmus chaperi</i>	Chaper's Burrowing Scorpion	Endangered
<i>Opisthophthalmus intermedius</i>	Cape Mountain Burrowing Scorpion	Endangered
<i>Opisthophthalmus latro</i>	Strandveld Burrowing Scorpion	Endangered
<i>Oonotus interioris</i>	Inland Small Stag Beetle	Vulnerable
Fresh water Fish		
<i>Barbus andrewi</i>	Berg-Breede River Whitefish	Endangered
<i>Barbus serra</i>	Sawfin	Endangered
<i>Labeo seeberi</i>	Clanwilliam sandfish	Endangered
<i>Sandelia bainsii</i>	Eastern Cape rocky	Endangered
<i>Serranochromis meridianus</i>	Lowveld largemouth	Endangered
<i>Labeobarbus capensis</i>	Clanwilliam yellowfish	Vulnerable
<i>Labeobarbus kimberleyensis</i>	Vaal-Orange largemouth yellowfish	Protected
Reptiles		
<i>Bitis albanica</i>	Albany Adder	Critically Endangered
<i>Pachydactylus rangei</i>	Namib Web-footed Gecko	Critically Endangered
<i>Psammobates geometricus</i>	Geometric Tortoise	Critically Endangered
<i>Bitis inomata</i>	Plain Mountain Adder	Endangered
<i>Bitis atmata</i>	Southern Adder	Vulnerable
<i>Bradypodion melanocephalum</i>	Black-headed Dwarf Chameleon	Vulnerable
<i>Bradypodion thamnobates</i>	Natal Midlands Dwarf Chameleon	Vulnerable
<i>Crocodylus niloticus</i>	Nile Crocodile	Vulnerable
<i>Dendroaspis angusticeps</i>	Eastern Green Mamba	Vulnerable
<i>Homopus signatus</i>	Speckled tortoise	Vulnerable
<i>Pachydactylus goodi</i>	Good's Gecko	Vulnerable
<i>Smaug giganteus</i>	Sungazer	Vulnerable
<i>Bills gabonica</i>	Gaboon Adder	Protected
<i>Cordylus imkeae</i>	Rooiberg Girdled Lizard	Protected
<i>Cordylus macropholis</i>	Large-scaled Lizard	Protected
<i>Python natalensis</i>	Southern African Python	Protected
Avifauna		
<i>Bugeranus carunculatus</i>	Wattled Crane	Critically Endangered
<i>Falco faschiinucha</i>	Taita Falcon	Critically Endangered
<i>Gypaetus barbatus</i>	Bearded Vulture	Critically Endangered
<i>Neophron percnopterus</i>	Egyptian Vulture	Critically Endangered
<i>Aegyptius occipitalis</i>	White-headed Vulture	Endangered
<i>Aquila rapax</i>	Tawny Eagle	Endangered
<i>Aegyptius tracheliotos</i>	Lappet-faced Vulture	Endangered
<i>Balearica regulorum</i>	Grey Crowned Crane	Endangered
<i>Bucorvus leadbeateri</i>	Southern Ground-Hornbil	Endangered
<i>Gyps africanus</i>	White-backed Vulture	Endangered
<i>Gyps coprotheres</i>	Cape Vulture	Endangered
<i>Necrosyrtes monachus</i>	Hooded Vulture	Endangered
<i>Neotis ludwigii</i>	Ludwig's Bustard	Endangered



Scientific Name	Common Name	Status in South Africa	
<i>Poicephalus robustus</i>	Cape Parrot	Endangered	
<i>Polemaetus bellicosus</i>	Martial Eagle	Endangered	
<i>Terathopius ecaudatus</i>	Bateleur	Endangered	
<i>Geronticus calvus</i>	Southern Bald Ibis	Vulnerable	
<i>Neotis denhami</i>	Denham's Bustard	Vulnerable	
<i>Anthropoides paradiseus</i>	Blue Crane	Protected	
<i>Ardeotis kori</i>	Kori Bustard	Protected	
<i>Poicephalus fuscicollis suahelicus</i>	Grey-headed Parrot	Protected	
Mammals			
<i>Dicerosbicomis bicomis</i>	South Western Black Rhinoceros	Endangered	
<i>Hippotragusequinus</i>	Southern Roan Antelope	Endangered	
<i>Lycaon pictus</i>	African Wild dog	Endangered	
<i>Ourebia ourebi</i>	Oribi	Endangered	
<i>Acinonyx jubatus</i>	Cheetah	Vulnerable	
<i>Cercopithecus mitis labiatus</i>	Samango Monkey	Vulnerable	
<i>Diceros bicomis minor</i>	South Central Black Rhinoceros	Vulnerable	
<i>Equus zebra hartmannae</i>	Hartmann's Mountain Zebra	Vulnerable	
<i>Hippotragus niger</i>	Sable Antelope	Vulnerable	
<i>Manis temminckii</i>	Pangolin	Vulnerable	
<i>Panthera leo</i>	Lion	Vulnerable	
<i>Philantomba monticola</i>	Blue Duiker	Vulnerable	
<i>Ceratotherium simum</i>	Southern White Rhinoceros	Protected – High Conservation value	
<i>Crocuta</i>	Spotted Hyaena		
<i>Felis nigripes</i>	Black-footed Cat		
<i>Hyaena brunnea</i>	Brown Hyaena		
<i>Leptailurus serval</i>	Serval		
<i>Loxodonta Africana</i>	African Elephant		
<i>Neotragus moschatus</i>	Suni		
<i>Otycteropus afer</i>	Aardvark		
<i>Otocyon megalotis</i>	Bat-eared Fox		
<i>Panthera pardus</i>	Leopard		
<i>Vulpes chama</i>	Cape Fox		
<i>Connochaetes gnou</i>	Black Wildebeest		Protected – to be managed ecologically sustainable
<i>Damaliscus lunatus</i>	Tsessebe		
<i>Damaliscus pygargus</i>	Bontebok		
<i>Equus zebra</i>	Cape Mountain Zebra		
<i>Alcelaphus buselaphus</i>	Red hartebeestIn		
<i>Connochaetes taurinus</i>	Blue Wildebeest		
<i>Damaliscus pygargus phillipsi</i>	Blesbok		
<i>Equus quagga burchelli</i>	Burchell zebra		
<i>Raphicerus melonotis</i>	Cape Grysbok		
<i>Raphicerus sharpie</i>	Sharpe's Grysbok		



STUDY AREA CHARACTERISTICS

4 OVERVIEW OF STUDY AREA

4.1 LOCALITY OF PROPOSED ACTIVITIES

The project area is located in the Limpopo Province and falls within the Sekhukhune District Municipality (DC47) and within the Greater Tubatse/Fetakgomo Local Municipality.

4.2 ACTIVITY DESCRIPTION

Bauba A Hlabirwa Mining Investments (Pty) Ltd (Bauba) holds a mining right over the farm Moeijelijk 412 KS for their current operations. Moeijelijk Chrome Mine is situated 70 km north of the town of Steelpoort in the Limpopo Province.

Bauba is currently opencast mining the LG6 chromitite package on the farm Moeijelijk 412 KS. Additional chromitite layers are present on the same farm, near the surface. Thus, Moeijelijk Chrome Mine proposes to extend the existing opencast operations on the Mining Right area in order to access further ore deposits. The mine also proposes to establish a wash plant and associated facilities such as residue stockpiles. The residue material from the wash plant will be allowed to dry, where after it will be stockpiled, thus no tailings dam will be constructed for the project.

The following activities which necessitates the amendment of the Mining Right and Water Use Licence are proposed:

- The extension of the existing opencast pit across various watercourses to access the remainder of the LG6 on the Mining Right area;
- Mining of all UG on the slope above the current opencast pit;
- The development of a new opencast pit across various watercourses to access the LG2 and LG3 chromitite on the Mining Right area;
- The extension of the ROM stockpile area;
- The construction of a river crossing (culvert);
- Construction of wash plant; and
- Construction of residue drying and stockpiling facilities.

4.3 VEGETATION UNIT AND DESCRIPTION

The study area is situated within the Sekhukhune Mountain Bushveld, the Sekhukhune Plains Bushveld and the Leolo Summit Sourveld.

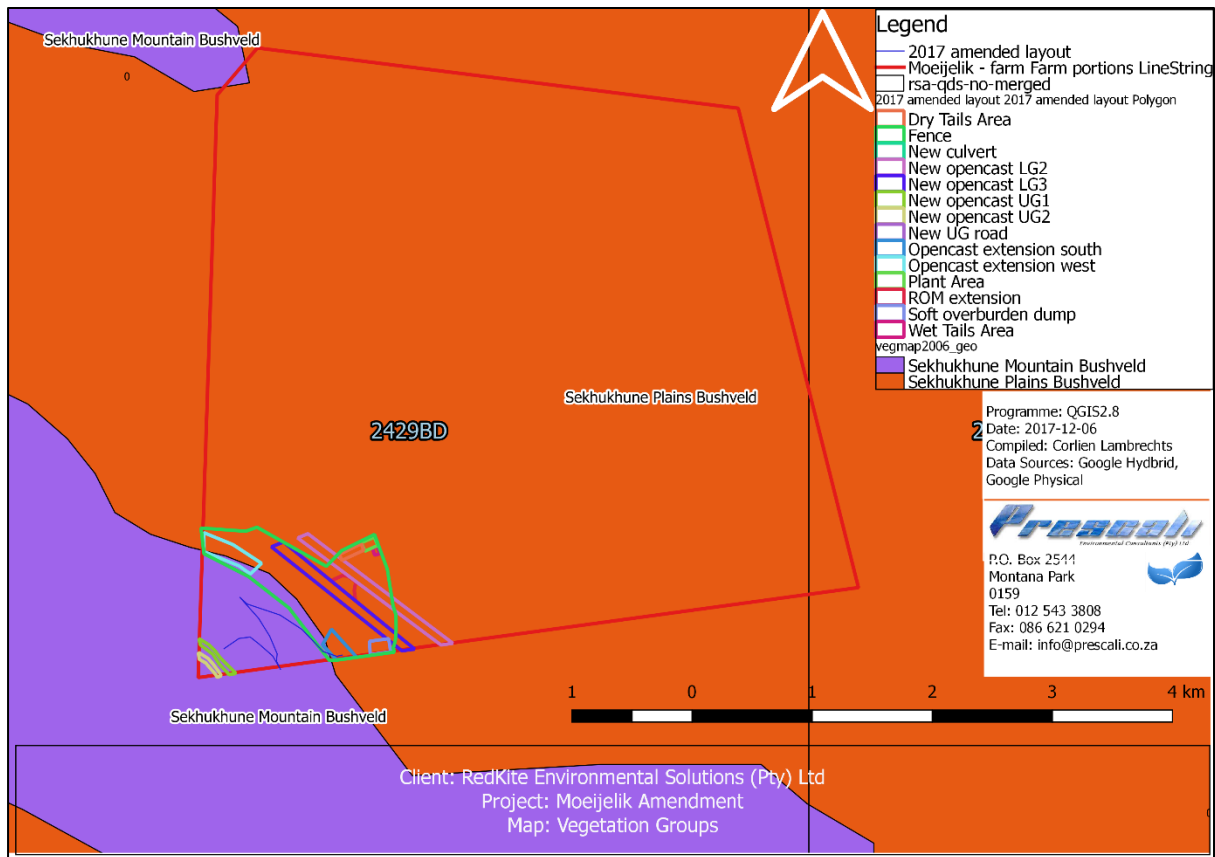


Figure 4-1: Vegetation Groups surrounding the Moeijelijk mine

An in-depth Flora Assessment (Vegetation analysis) has been conducted in conjunction with the Fauna Assessment (this report) but has not been included in this report (except where relevant to habitat of relevant species discussed). Please refer to the Flora Assessment for details regarding specifics on vegetation species encountered etc.



METHODOLOGY DESCRIPTION

5 METHODS

5.1 DESKTOP ASSESSMENT

5.1.1 FAUNA ASSESSMENT AND SPECIES LISTS COMPILED

A baseline assessment was conducted to establish whether any potentially sensitive species might occur on site. The South African National Biodiversity Institute's (SANBI) online biodiversity tool was used to query a species list for the 2429BD and 2430AC quarter degree square grid cell (QDS) (Figure 5-1). The Virtual Museum and Animal Demography Unit (ADU) was used to compile species lists based on the sightings and data gathering from the South African Biodiversity Institute.

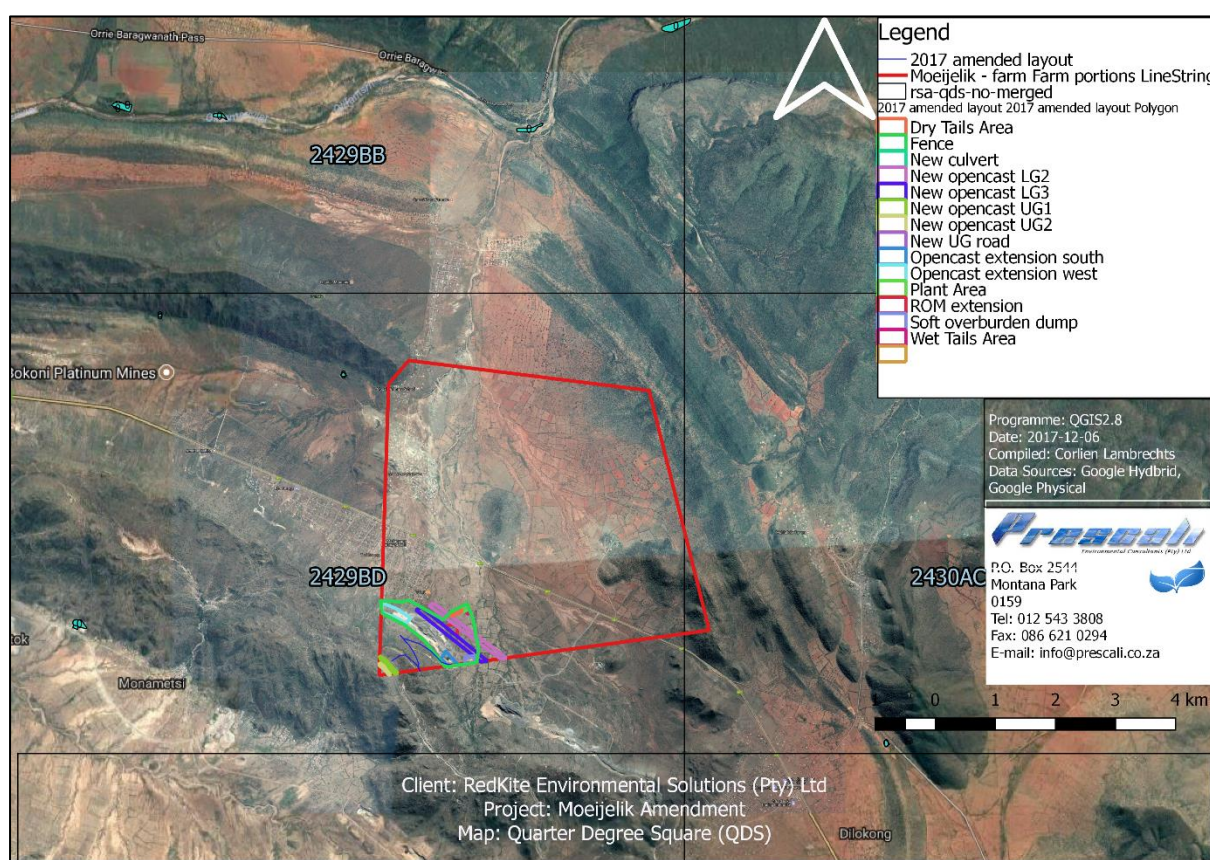


Figure 5-1: Quarter Degree Square Framework of the Moeijelijk project

The vegetation map published in Mucina & Rutherford (Mucina & Rutherford, 2006) and illustrated on the SANBI website was consulted to determine the vegetation unit. Information regarding the red list and sensitive vegetation species found in the area was determined before the field survey and the separate flora evaluation that was conducted. This was supplemented by researching available books and peer reviewed websites.

The importance of a baseline study is to provide a reference condition to determine the current state of the environment and to draw comparisons between the potential of the area and current degradation from surrounding land uses. This will be conducted in terms of the future changes due to the proposed development by the client.



Aerial photographs and satellite imagery were used to delineate potential sensitive areas and wetland areas before the field visit. This served as the foundation for selecting various sample sites for field surveying.

5.2 FIELD SURVEY

5.2.1 SAMPLING AND IDENTIFICATION

Field assessments was conducted on the 9th of November 2017. The field investigation was conducted to supplement and confirm several findings of the desktop analysis at this stage of the development (EIA process).

The objective of the assessment served as a fatal flaw analysis to determine whether there are any major ecological concerns with regards to the site selected for the proposed Moeijelijk sites on the various farms investigated.

Multiple areas on the were identified for inclusion into the field survey, but since it is an existing mine with infrastructure amendments, these were chosen based on areas in the vicinity of the proposed infrastructure and the mountainous areas which was the only natural habitat remaining associated with the Moeijelijk mine. Large areas where surveyed for different habitat types and specifically certain areas that still maintain a natural state.

5.3 DATA ANALYSIS

5.3.1 COMPARISON AND EVALUATION

Information obtained during the desktop assessment (baseline study) and the field survey were analysed and compared. Conclusions and interpretation of data obtained were deduced from knowledge, literature and case studies. Habitat analysis at various sampling points were included during the analysis and sensitive species and areas were identified for this specific development and what it infrastructure and operation entails.

5.3.2 GEO SPATIAL ANALYSIS AND SENSITIVE AREAS

Geospatial analysis in terms of sensitive areas and known species distribution were used in comparison with the data gathered to make certain deductions. This will also aid the planning and positioning of the infrastructure as well as management for the various proposed development activities. Better protection will be awarded to sensitive areas that have unique species compositions or sensitive habitat types.

5.3.3 RISK DETERMINATION

Impact assessment was conducted to determine the risk to these species and to analyse the anticipated impacts and their significance.

5.3.4 FINDINGS AND MANAGEMENT

A Fauna Management Plan was designed to mitigate these specific impacts and several recommendations were made in terms of findings.



TERRESTRIAL EVALUATION RESULTS

6 FAUNA EVALUATION BASELINE STUDY

6.1 DESCRIPTION OF EVALUATION AND FINDINGS

The faunal investigation provides a description of the ecological diversity in terms of species identification as well as the occurrence of threatened/sensitive species that is dependent on available habitat. During the desktop analysis, it was determined that several Red Data species were listed on the South African National Biodiversity database (SANBI) for the four different QDS that encompass the specific area.

The most important species of concern that will lead the management is determined to be:

- Species with specialized niches (riverine, ridges or wetland areas);
- Species with large range requirements (grazing mammals);
- Species that have limited adaptation capabilities (such as reptile niches);
- Migrating species (importance of the ecological and aquatic corridor); and
- Species that use the different Mountain ranges in the area as part of their larger range (predatory species).

6.2 TOPS 2013 VERSUS TOPS 2015

At a Meeting report regarding the Threatened or Protected Species List (ToPS): Regulations: Department of Environmental Affairs Briefing,⁵ relevant legislation included the National Management Biodiversity Act (NEMBA), National Environment: Protected Areas Act (NEMPAA), provincial legislation as well as Multilateral Environment Agreements on biodiversity.

The background for the substantive review and promulgation of the Threatened or Protected Species (ToPS) Regulations was to provide for the registration of persons and facilities, provide for the regulation of specific restricted activities like hunting, provide for the prohibition of specific restricted activities like the killing of animals as well as to provide protection for wild populations listed as Threatened or Protected Species.

When the ToPS Regulations were implemented, NEMBA did not contain an enabling provision for the exemption of a person from permit requirements for the carrying out of restricted activities. In fact, the definition of restricted activities was very broad and could thus be cumbersome when a person wanted to carry out restricted activities. As a consequence, an enabling provision was included in NEMBA during an amendment process in September 2009, even though it did not make provision for conditions for exemption.

There were other areas which also required substantive amendment of the TOPS Regulations, which included:

- Amendment of certain definitions like rehabilitation facilities and providing new definitions like hybridization;
- Providing additional categories for compulsory registration like freight agents;
- Providing for additional punishable offences like the non-marking of rhino horn and elephant ivory; and
- The species list needed to be revised.

⁵ <https://pmg.org.za/committee-meeting/21690/>



According to the meeting, this was because the scientific basis for the inclusion of some species was questioned as well as the rationale for species that should have been included in the list but which had been omitted. Therefore, there was a need for the re-assessment of the categorization of species based on pre-determined scientific criteria. This was in line with section 56(2) of NEMBA that requires the Minister to review the list of species every five years.

The review process would involve the repeal of the 2007 TOPS Regulations, when the new Regulations were implemented. The Department of Environmental Affairs had drafted the revised TOPS Regulations with assistance from the South African National Biodiversity Institute (SANBI). Thereafter, a series of workshops were conducted during January to May 2011 with provincial conservation authorities, experts in the different taxonomic groups and industry stakeholders, in preparation for the drafting of the revised TOPS Regulations and species list.

The Office of the Chief State Law Advisor (OCSLA) was consulted and further advised that a further amendment of NEMBA would be required, so as to implement a practical system for exemptions. As a consequence, the first draft revised regulations and species list were discussed with stakeholders, during workshops in October 2011. Further, marine aspects were also included when the transfer of certain functions in Marine Living Resources Act (MLRA) to the Department of Agriculture, Forestry and Fisheries (DAFF) was affected. Definitions and regulatory provisions involving marine species were included in TOPS, particularly in relation to boat based whale and whale watching as well as shark cage diving.

Thereafter, the approval through the intergovernmental structures was obtained, in 2012, to publish the draft revised TOPS regulations and species list for public participation. Following legal vetting and approval by the Minister, the draft documents were published in the Government Gazette on 16 April 2013, for public participation. Stakeholder workshops were also conducted in May 2013 so as to address questions and concerns raised during the public participation process. Eventually, due to the substantive amendments, and upon internal legal advice, approval was obtained through the intergovernmental structures in 2014 to re-publish the revised draft documents for public participation. Consequently, the revised Regulations were again republished in the Gazette on 31 March 2015 for public participation.

There were certain key issues that necessitated the second-time republication of the regulations and species list. The new format of the revised list, including the different columns for the species, exemptions, prohibitions and permit requirements, was not user friendly and was difficult to interpret and understand, and so the numbers of columns were reduced.

A provision was included, to clarify the use of scientific names of species in cases of changes in the taxonomy of species. Sub categories were created within the category for protected species; that is, species of high conservation value like the elephant and rhino, and species that were to be managed in an ecologically sustainable manner.

Species were now included in Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) which had not previously been in the other categories.

Furthermore, a number of species had been moved between categories especially birds and plants. A number of species that were included due to the threat caused by habitat destruction like the blue swallow and some golden mole species had been moved. In that regard, the new republication of the regulations had new provision for semi-extensive wildlife systems, requirements for carrying out compulsory risk assessments, new provisions relating to the carrying out of restricted activities involving fresh water fish, and provisions relating to protected species under Appendix I.



Finally, it was reported that the move to implementing the revised TOPS Regulations and species list was under way and would be ready as soon as the final draft documents had been approved. Legal vetting was happening, and a socio-economic impact assessment was being carried out, seeking approval from the Minister of the Department of Environmental Affairs on welfare matters and eventually intending to submit to Parliament the final Regulations under section 97(3A) of NEMBA.

6.3 DESKTOP EVALUATION

6.3.1 LEGISLATION RELEVANT TO FAUNA

Provincial legislation and NEMBA also grant protective status over several species that are globally (IUCN) of least concern (LC). These species are listed within this document body as well as the complete baseline study that is included within this section and the Appendices for reference.

The NEMBA also includes several species that have to be protected if they occur in the proposed development Area; these lists have been published in the Government Gazette No. 29657 of 23 February 2007 (ToPS List), re-published in 2013 and the amendment published in 2015. The latest of which have been incorporated into the Fauna study that was conducted at the various farms.

Species were selected based on their conservation importance. This generally included all Red Data Listed or threatened taxa for which sufficiently precise locality data were available. Priority was also given to local endemics as sensitive species which has limited range and has unique relationships with their given environment within the Sekhukhune habitat types.

6.3.2 SPECIES DETERMINATION, HABITAT, CORRIDOR AND CONNECTIVITY IMPORTANCE

During the Desktop study, a list of potential fauna species occurring in the area were compiled and included in this section of the document for the various affected quarter degree grid cells.

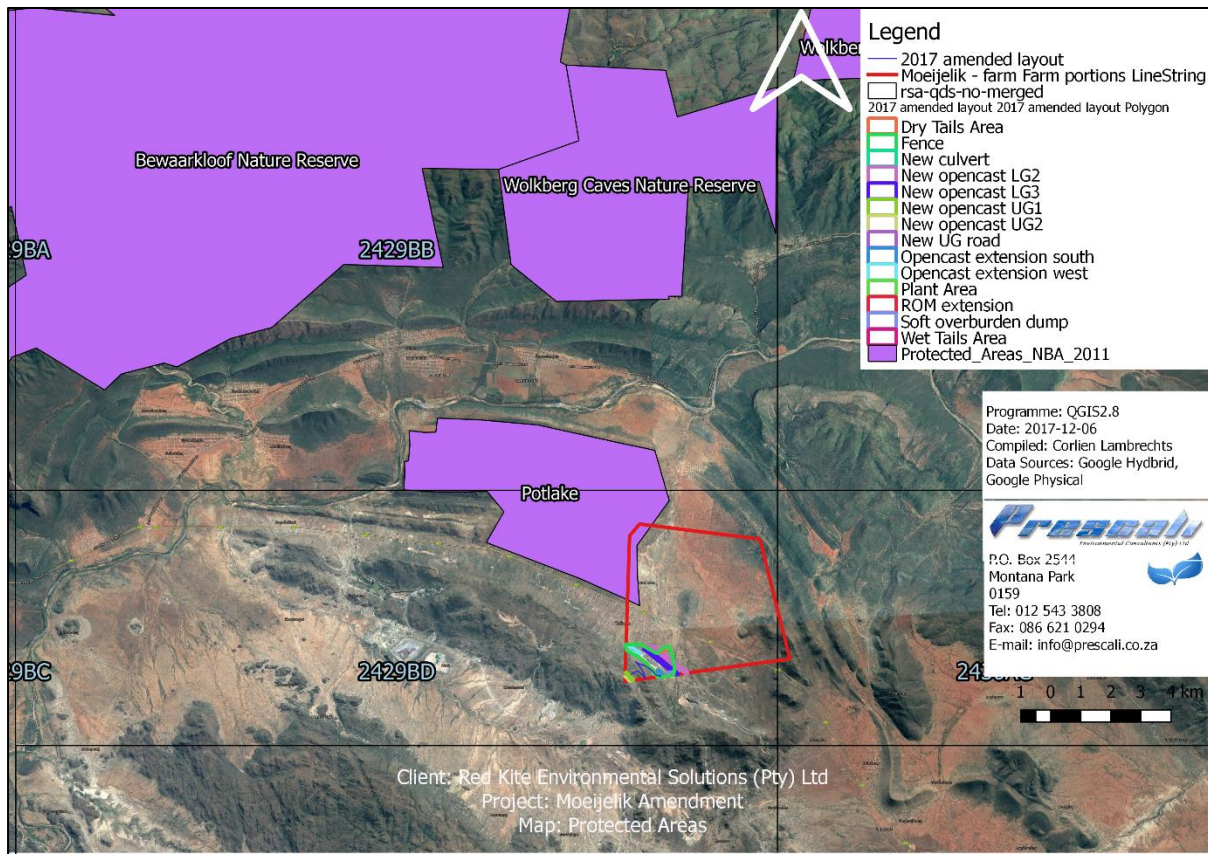


Figure 6-1: Protected Areas near the project sites

There are several Protected areas in close vicinity of the project areas. The closest protected areas are those North of the farm Moeijelijk, which is Potlake and the Wolkberg Wilderness Area. The Potlake protected area is not part of the Moeijelijk expansion project and the infrastructure amendments and expansions are closely associated with the existing mine infrastructure.

It is important to note that availability of water and amount of wetland habitat type, if near the proposed area, these may signal the additional protection granted by the African-Eurasian Waterbird Agreement (African-Eurasian Waterbird Agreement, 1999). Agreement that may be described as an intergovernmental treaty dedicated to the conservation of migratory waterbirds and their habitat protection across Africa, Europe, Asia, Greenland and Canadian Archipelago.

AEWA covers a large area of the globe, from the North Pole to South Africa, with South Africa being at the end of the flyway of a large number of migratory species. The species use the wetlands of South Africa as an area to winter during the harsh conditions of the Northern Hemisphere. These include the white stork, great white pelican, glossy ibis, greater and lesser flamingo, a large number of duck species, and sea birds such as gulls and terns.

The Agreement states that the Parties shall:

- Provide strict conservation measures for endangered waterbird species;
- Ensure use of these species is based upon the best available knowledge of their ecology and is sustainable for the species and the habitat;
- Identify sites and habitats for these species and encourage the protection, management, rehabilitation and restoration of these sites;
- Co-ordinate efforts to ensure that a network of habitats throughout a range of a species is maintained;



- Investigate problems that are posed or likely to be posed by humans on the conservation of these species;
- Co-operate in emergency situations;
- Prohibit the introduction of non-native waterbird species which could detrimentally impact on the conservation of the species or its habitat;
- Initiate and support research into the biology and ecology of migratory waterbird species;
- Analyse the training needs in the country, such as waterbird surveys, monitoring, ringing and wetland management;
- Develop and maintain awareness programmes; and
- Exchange information and results from research, surveys and monitoring actions.

The Department favours the Agreement as a means of focusing attention on migratory species and firming up policy.⁶

6.3.3 AD HOC SENSITIVE SPECIES

Specific bird species may be classified as sensitive within the particular site because, as the mountain just behind the Moeijelijk mine infrastructure is the most dominant feature of this area and birds, especially bird of prey and specialised reptile species will use this area as refuge and habitat.

Birds that use wetlands for breeding depend on the physical and biological attributes of the wetland. There was no obvious wetland associated areas near the proposed expansions, except the drainage lines to the north of the mine where the opencast areas will extend to. These will require additional licensing under the National Water Act (Act no. 36) of 1998, if these are to be intersected. These drainage lines were dry and occurred in a very disturbed area which is clearly associated with the community domestic animals.

Birds have daily and seasonal dependencies on wetlands for food and other life-support systems. They are all dependent on a specific plant community to either construct their nests or as food and preferred habitat. Migratory birds will also be harshly affected if the wetland areas are impacted and destroyed during their absence. Results of the declining plant community (wetland specific and riparian vegetation) will be that inter- and intra-specific competition will increase, leading to detrimental results for most of these species.

Sensitive species that may occur as a result of the wetland and permanent riverine habitat and does not respond well to disturbance, these include water bird species and water fowl (refuge and breeding habitat).

6.4 MOEIJELIJK DESKTOP DATA

6.4.1 MAMMALIAN SPECIES ANALYSIS

Table 6-1: Mammalian species desktop study

Family	Genus	Species	Common name	Red list category	Atlas region endemic	Probability of Occurrence
2429BD						
Bovidae	<i>Aepyceros</i>	<i>melampus</i>	Impala	Least Concern	Yes	Possibly

⁶ <https://pmg.org.za/committee-meeting/3231/>

As stated by Ms. Njobe, Director of Biodiversity and Heritage and Dr. Botha, Deputy Director (4 April 2000)



Bovidae	<i>Alcelaphus</i>	<i>buselaphus</i>	Hartebeest	Not listed	Yes	Not Likely
Bovidae	<i>Oreotragus</i>	<i>oreotragus</i>	Klipspringer	Least Concern	Yes	Possibly
Bovidae	<i>Sylvicapra</i>	<i>grimmia</i>	Bush Duiker	Least Concern	Yes	Possibly
Bovidae	<i>Tragelaphus</i>	<i>strepsiceros</i>	Greater Kudu	Least Concern	Yes	Not Likely
Felidae	<i>Panthera</i>	<i>pardus</i>	Leopard	Least Concern, ToPs Protected 2015	Yes	Not Likely
Giraffidae	<i>Giraffa</i>	<i>camelopardalis</i>	Nubian Giraffe	Least Concern		Not Likely
Mustelidae	<i>Mellivora</i>	<i>capensis</i>	Honey Badger	Near Threatened	Yes	Possibly
Rhinolophidae	<i>Rhinolophus</i>	<i>smithersi</i>	Smithers' Horseshoe Bat	Not listed	Yes	Possibly
2430AC						
Hyaenidae	<i>Hyaena</i>	<i>brunnea</i>	Brown Hyena	Near Threatened	Yes	Not Likely

In the desktop study it was determined that the list provided above was recorded for the specific quarter degree squares, it does not mean that these do occur on-site. Those not expected on-site include:

- *Alcelaphus buselaphus* (Hartebeest);
- *Tragelaphus strepsiceros* (Greater Kudu);
- *Panthera pardus* (Leopard);
- *Giraffa Camelopardalis* (Nubian Giraffe); and
- *Hyaena brunnea* (Brown Hyena).

6.4.2 AVI-FAUNA ANALYSIS

6.4.2.1 Birds that could occur in the area

The spatial scale of the specialist assessment should take into account the life history (breeding, foraging and dispersal) of the species in question. For example, if a waterbird species forages in wetlands, but breeds in terrestrial habitat or *vice versa* then it is important to consider impacts on both terrestrial and aquatic habitats and not simply propose a buffer for the highly sensitive wetland.

Linkages between habitat patches are also important as species are often dependent on a network of habitat patches rather than on a single site. In this context the design and placement of fences and powerlines may be important to consider and not simply the integrity of the habitat itself.

Important Birding Areas were identified and visually illustrated within the figure provided (Please refer to **Figure 6-2** below). As may be seen, the development site does not fall within an Important Biodiversity and Birding zone. The closest Important Biodiversity and Bird zone is the Wolkberg Forest Belt and this corresponds to the Protected areas showing Potlake and Wolkberg (**Figure 6-1**).

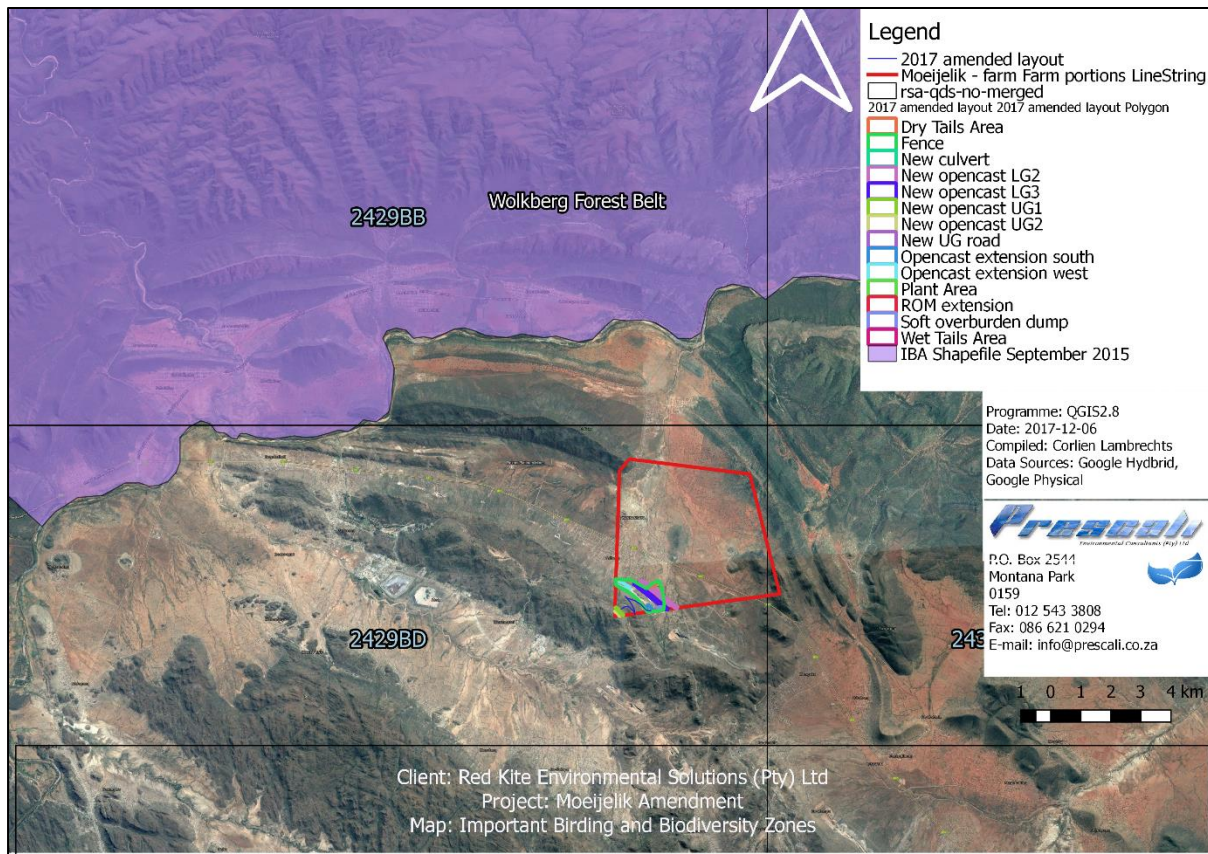


Figure 6-2: Important Birding Areas (IBA)

A complete list of potential bird species occurring in the relevant degree cells was included at the foot of the document. Please refer to **Appendix A** for a complete list of birds that are expected to occur within the area.

6.4.3 AMPHIBIAN ANALYSIS

The habitat type within the area implies that there are no obvious suitable areas or niches for amphibian species closely related to the Moeijelijk mining area. No large bodies of surface water or pans are present, but there are smaller river-like drainage lines to the North of the Moeijelijk mine as well as a valley to the back of the mountains found behind Moeijelijk mine. No amphibians or suitable sites were found during the field assessment associated with the areas designated for development.

The overall amphibian study conducted was mainly of a desktop nature, gathering information from the Frog Atlas of South Africa for the specific Quarter Degree Squares; indicating several species have been observed within the area.

The amphibians known to occur within the area and are included in the table given below. No sites have confirmed amphibian activity during the field visit, especially no area close to the development.

Regarding red listed status of Amphibia, it is interesting to note that the 2013 ToPS regulations has listed several frogs in the National Legislation, while the 2015 amendment does not contain any Amphibia to be considered for priority.

Table 6-2: Amphibian species within the area (Minter, et al., 2004)



Family	Genus	Species	Common name	Red list category	Atlas region endemic
2429BD					
Brevicipitidae	<i>Breviceps</i>	<i>adpersus</i>	Bushveld Rain Frog	Least Concern	No
Bufo	<i>Sclerophrys</i>	<i>garmani</i>	Olive Toad	Least Concern	No
Bufo	<i>Sclerophrys</i>	<i>gutturalis</i>	Guttural Toad	Least Concern	No
Hyperoliidae	<i>Hyperolius</i>	<i>marmoratus</i>	Painted Reed Frog	Least Concern	No
Hyperoliidae	<i>Kassina</i>	<i>senegalensis</i>	Bubbling Kassina	Least Concern	No
Ptychadenidae	<i>Ptychadena</i>	<i>anchietae</i>	Plain Grass Frog	Least Concern	No
Pyxicephalidae	<i>Tomopterna</i>	<i>cryptotis</i>	Tremelo Sand Frog	Least Concern	No
Pyxicephalidae	<i>Tomopterna</i>	<i>natalensis</i>	Natal Sand Frog	Least Concern	No
2430AC					
Arthroleptidae	<i>Leptopelis</i>	<i>mossambicus</i>	Brownbacked Tree Frog	Least Concern	No
Brevicipitidae	<i>Breviceps</i>	<i>adpersus</i>	Bushveld Rain Frog	Least Concern	No
Bufo	<i>Poyntonophrynus</i>	<i>fenoulheti</i>	Northern Pygmy Toad	Least Concern	No
Bufo	<i>Schismaderma</i>	<i>carens</i>	Red Toad	Least Concern	No
Bufo	<i>Sclerophrys</i>	<i>garmani</i>	Olive Toad	Least Concern	No
Bufo	<i>Sclerophrys</i>	<i>gutturalis</i>	Guttural Toad	Least Concern	No
Bufo	<i>Sclerophrys</i>	<i>pusilla</i>	Flatbacked Toad	Least Concern	No
Hyperoliidae	<i>Hyperolius</i>	<i>marmoratus</i>	Painted Reed Frog	Least Concern	No
Hyperoliidae	<i>Hyperolius</i>	<i>pusillus</i>	Water Lily Frog	Least Concern	No
Hyperoliidae	<i>Kassina</i>	<i>senegalensis</i>	Bubbling Kassina	Least Concern	No
Microhylidae	<i>Phrynomantis</i>	<i>bifasciatus</i>	Banded Rubber Frog	Least Concern	No
Phrynobatrachidae	<i>Phrynobatrachus</i>	<i>mababiensis</i>	Dwarf Puddle Frog	Least Concern	No
Pipidae	<i>Xenopus</i>	<i>laevis</i>	Common Platanna	Least Concern	No
Ptychadenidae	<i>Ptychadena</i>	<i>anchietae</i>	Plain Grass Frog	Least Concern	No
Ptychadenidae	<i>Ptychadena</i>	<i>oxyrhynchus</i>	Sharpnosed Grass Frog	Least Concern	No
Ptychadenidae	<i>Ptychadena</i>	<i>porosissima</i>	Striped Grass Frog	Least Concern	No
Pyxicephalidae	<i>Amietia</i>	<i>delalandii</i>	Delalande's River Frog	Least Concern	Yes



Pyxicephalidae	<i>Pyxicephalus</i>	<i>edulis</i>	African Bull Frog	Least Concern	No
Pyxicephalidae	<i>Tomopterna</i>	<i>cryptotis</i>	Tremelo Sand Frog	Least Concern	No
Pyxicephalidae	<i>Tomopterna</i>	<i>marmorata</i>	Russetbacked Sand Frog	Least Concern	No
Pyxicephalidae	<i>Tomopterna</i>	<i>natalensis</i>	Natal Sand Frog	Least Concern	No
Rhacophoridae	<i>Chiromantis</i>	<i>xerampelina</i>	Southern Foam Nest Frog	Least Concern	No

The following amphibian was given as an endemic species within the designated QDS

- *Amietia delalandii* Delalande's River Frog (Least Concern)

6.4.4 REPTILE ANALYSIS

GDARD requirements for minimum requirements for a biodiversity assessment (used as guideline for the compilation of this report) noted that reptile surveys are not seen as a requirement anymore due to the fact that the conservation plans for the provinces (C-Plan layers) have been designed to incorporate protection and conservation areas that are deemed adequate for the habitat protection and ultimate conservation of the species.

This is not the case in terms of ToPs listing (2015) where Amphibians was removed, but certain reptile species are still listed in terms of National Protection level. Therefore, sightings and suitable habitat areas identified within this report. If the species was thought to occur within the area and signs of occurrence were witnessed, this was included within the Field survey section below (Section 5.2). A complete desktop study was conducted to include as a habitat assessment.

Table 6-3: Reptiles captured in desktop study (Alexander & Marais, 2007) (Bates, et al., 2014)

Family	Genus	Species	Common name	Red list category	Atlas region endemic
2429BD					
Agamidae	<i>Agama</i>	<i>atra</i>	Southern Rock Agama	Least Concern (SARCA 2014)	No
Colubridae	<i>Philothamnus</i>	<i>semivariatus</i>	Spotted Bush Snake	Least Concern (SARCA 2014)	No
Cordylidae	<i>Platysaurus</i>	<i>orientalis fitzsimonsi</i>	FitzSimons' Flat Lizard	Near Threatened (SARCA 2014)	Yes
Cordylidae	<i>Platysaurus</i>	<i>orientalis</i>	Sekhukhune Flat Lizard	Least Concern (SARCA 2014)	Yes
Cordylidae	<i>Smaug</i>	<i>vandami</i>	Van Dam's Girdled Lizard	Least Concern (SARCA 2014)	Yes
Gekkonidae	<i>Lygodactylus</i>	<i>nigropunctatus</i>	Black-spotted Dwarf Gecko	Least Concern (SARCA 2014)	Yes
Lacertidae	<i>Pedioplanis</i>	<i>lineocellata</i>	Spotted Sand Lizard	Least Concern (SARCA 2014)	No
Scincidae	<i>Trachylepis</i>	<i>margaritifer</i>	Rainbow Skink	Least Concern (SARCA 2014)	No
Scincidae	<i>Trachylepis</i>	<i>varia</i>	Variable Skink	Least Concern (SARCA 2014)	No



Testudinidae	<i>Psammobates</i>	<i>oculifer</i>	Serrated Tent Tortoise	Least Concern (SARCA 2014)	No
2430AC					
Cordylidae	<i>Platysaurus</i>	<i>orientalis</i>	Sekhukhune Flat Lizard	Least Concern (SARCA 2014)	Yes
Cordylidae	<i>Smaug</i>	<i>vandami</i>	Van Dam's Girdled Lizard	Least Concern (SARCA 2014)	Yes
Gekkonidae	<i>Hemidactylus</i>	<i>mabouia</i>	Common Tropical House Gecko	Least Concern (SARCA 2014)	No
Gekkonidae	<i>Homopholis</i>	<i>wahlbergii</i>	Wahlberg's Velvet Gecko	Least Concern (SARCA 2014)	No
Gekkonidae	<i>Lygodactylus</i>	<i>capensis</i>	Common Dwarf Gecko	Least Concern (SARCA 2014)	No
Gekkonidae	<i>Lygodactylus</i>	<i>nigropunctatus</i>	Black-spotted Dwarf Gecko	Least Concern (SARCA 2014)	Yes
Gerrhosauridae	<i>Matobosaurus</i>	<i>validus</i>	Common Giant Plated Lizard	Least Concern (SARCA 2014)	No
Lacertidae	<i>Heliobolus</i>	<i>lugubris</i>	Bushveld Lizard	Least Concern (SARCA 2014)	No
Scincidae	<i>Mochlus</i>	<i>sundevallii</i>	Sundevall's Writhing Skink	Least Concern (SARCA 2014)	No
Scincidae	<i>Trachylepis</i>	<i>capensis</i>	Cape Skink	Least Concern (SARCA 2014)	No
Scincidae	<i>Trachylepis</i>	<i>margaritifer</i>	Rainbow Skink	Least Concern (SARCA 2014)	No
Scincidae	<i>Trachylepis</i>	<i>varia</i>	Variable Skink	Least Concern (SARCA 2014)	No
Testudinidae	<i>Kinixys</i>	<i>lobatsiana</i>	Lobatse Hinged Tortoise	Least Concern (SARCA 2014)	No
Viperidae	<i>Bitis</i>	<i>arietans</i>	Puff Adder	Least Concern (SARCA 2014)	No

The area has a high amount of lizard species captured in the desktop study, which is expected as the only remaining natural habitat within the immediate vicinity are the mountainous areas and small to intermediate rocky outcrops (koppies) found to the back of the Moeijelijk farm.

Several endemic species are found within the region, these include:

- *Platysaurus orientalis fitzsimonsi* FitzSimons' Flat Lizard (Near Threatened)
- *Platysaurus orientalis* Sekhukhune Flat Lizard (Least Concern)
- *Smaug vandami* Van Dam's Girdled Lizard (Least Concern)
- *Lygodactylus nigropunctatus* Black-spotted Dwarf Gecko (Least Concern)

The specific QDS associated with the Moeijelijk development has a red listed reptile species known to occur within the relevant QDS, namely the *Platysaurus orientalis fitzsimonsi* (FitzSimons' Flat Lizard), which is listed as Near Threatened (SARCA 2014).



6.4.5 INVERTEBRATES

In terms of LEMA, the following is stated:

“61. Prohibited acts—

1. No person may without a permit—
 - a) collect, catch, kill, keep, convey, purchase, sell, donate or receive as a gift, import into or export or remove from the Province, any invertebrate referred to in paragraph (a) of Schedule 10;
 - b) collect, catch, keep, convey or kill, for the purpose of collection, any invertebrate in an area referred to in paragraph (b) of Schedule 10;
 - c) import into, or convey in or through, the Province, any alien invertebrate for entomology, commercial or collection purposes;
 - d) collect, catch, keep or import into, convey in or through, or export or remove from, the Province any other invertebrate not referred to in paragraph (a) of Schedule 10 for entomology, commercial or collection purposes; or
 - e) collect, catch or kill any invertebrate in a Provincial Nature Reserve or Site of Ecological Importance.
2. No person may without a permit in terms of this Act or other document issued in terms of any other relevant legislation, convey any invertebrate referred to in paragraph (a) of Schedule 10 through the Province.”

Table 6-4: Schedule 10: Invertebrates to which Section 61(1) (a) and (b) applies

Common name	Scientific name
(a) All species of Baboon Spiders belonging to the genera referred hereby	<i>Ceratogyrus spp;</i> <i>Harpactira spp; and</i> <i>Pterinocchilus spp.</i>
The following Alaena species	<i>Alaena margaritacea</i>
The following Ericssonina species	<i>Ericssonina acraeina</i>
Lotana Blue Butterfly	<i>Lepidochrysops lotana</i>

Table 6-5: TOPS (2015 Amendment) Invertebrates given priority

Scientific Name	Common Name	Status in South Africa
Invertebrates		
<i>Ceratogyrus paulseni</i>	Paulsen's Horned Baboon Spider	Critically endangered
<i>Colophon bamardi</i>	Bamard's Cape Stag Beetle	Critically endangered
<i>Colophon berrisfordi</i>	Berrisford's Cape Stag Beetle	Critically endangered
<i>Colophon endroedyi</i>	Endrody-Younga's Cape Stag Beetle	Critically endangered
<i>Colophon kawaii</i>	Kawai's Cape Stag Beetle	Critically endangered
<i>Colophon montisatris</i>	Swartberg Cape Stag Beetle	Critically endangered
<i>Colophon oweni</i>	Owen's Cape Stag Beetle	Critically endangered
<i>Colophon thunbergi</i>	Thunberg's Cape Stag Beetle	Critically endangered
<i>Colophon westwoodi</i>	Westwood's Cape Stag Beetle	Critically endangered
<i>Opisthophthalmus ater</i>	Steinkopf Burrowing Scorpion	Critically endangered
<i>Opisthophthalmus fuscipes</i>	Dark-legged Burrowing Scorpion	Critically endangered
<i>Colophon cameroni</i>	Cameron's Cape Stag Beetle	Endangered
<i>Colophon eastmani</i>	Eastman's Cape Stag Beetle	Endangered
<i>Colophon haughtoni</i>	Haughton's Cape Stag Beetle	Endangered
<i>Colophon izardi</i>	Izard's Cape Stag Beetle	Endangered
<i>Colophon neli</i>	Nel's Cape Stag Beetle	Endangered



Scientific Name	Common Name	Status in South Africa
<i>Colophon primosi</i>	Primos's Cape Stag Beetle	Endangered
<i>Colophon whitei</i>	Whites Cape Stag Beetle	Endangered
<i>Idiothele mira</i>	Blue-footed Baboon Spider	Endangered
<i>Oonotus rex</i>	Regal Small Stag Beetle	Endangered
<i>Opisththalmus chaperi</i>	Chaper's Burrowing Scorpion	Endangered
<i>Opisththalmus intermedius</i>	Cape Mountain Burrowing Scorpion	Endangered
<i>Opisththalmus latro</i>	Strandveld Burrowing Scorpion	Endangered
<i>Oonotus interioris</i>	Inland Small Stag Beetle	Vulnerable

6.4.5.1 Insect evaluation

Insects will remain if habitat stays favourable. Insects are also mostly dependent on smaller scale variations and habitats and are unlikely to be disturbed to a significant scale due to mining activities which is mostly proposed underground, except for the opencast on Waterkop and the various prospecting activities proposed.

Invertebrates are increasingly being used as environmental health indicators or more specifically as 'bioindicators'. This has been more prevalent in aquatic systems but is increasing on a terrestrial level.

The term 'bioindicator' also applies to emergency disciplines of biodiversity surrogacy where potential 'surrogate' or 'target' taxa are examined for their capacity to provide an indication of total species diversity and abundance (Andersen, 1997). It is important to note that although insects as biodiversity indicators has been used extensively, more and more results are showing that it is just not as simple as that, where no significance differences existed between diversity in invertebrates between impacted and natural areas. Dr Mark Robertson from the University of Pretoria, CIB and Department of Zoology and Entomology has done extensive invertebrate research on this (Lambrechts, 2015) (Gever, 2015). What seems to be becoming apparent, is that only certain species may be caught in a more natural or a more impacted landscape, which is the only meaningful result. Diversity calculations and assessments showed no relevant difference between individuals and number of species.

It is anticipated that these impacts will be adequately mitigated if the Environmental Management Plan is incorporated into the design and the necessary mitigation measures are implemented. Therefore, the impact on the Class: Insecta is anticipated to be marginally low.

The usage of SASS 5 (South African Scoring System) to monitor and record aquatic invertebrates, which will be most affected and includes a study of the insects, specifically Odonata (Dragon Flies and Damselflies) species and their nymphs and larvae found within the water environment.

6.4.5.2 Spiders

All species of Baboon Spiders belonging to the genera referred hereby *Ceratogyrus spp*, *Harpactira spp*, *Pterinocchilus spp* enjoy protection under LEMA. These species if encountered during any stage of the development will trigger the need for intervention to protect and relocate these species. Baboon spider nest will be associated to the Koppie areas and valleys to the other side of the Koppie where the illegal mining has taken place and where the new opencast for UG1 and UG 2 is proposed.

6.4.5.3 Scorpions

In terms of the Threatened or Protected Species lists amendment (2015), four burrowing scorpions have been included for priority. These are:

- *Opisththalmus ater* Steinkopf Burrowing Scorpion (Critically endangered)



- *Opisthophthalmus fuscipes* Dark-legged Burrowing Scorpion (Critically endangered)
- *Opisthophthalmus intermedius* Cape Mountain Burrowing Scorpion (Endangered)
- *Opisthophthalmus latro* Strandveld Burrowing Scorpion (Endangered)

The first two may occur within the Limpopo province, but all of these species are entering the illegal pet trade and is protected by law.

6.4.5.4 Butterflies

The species that was recorded during the desktop assessment (Mecenero, et al., 2013) is included below:

Table 6-6: Butterfly species known to occur within the area

Family	Genus	Species	Common name	Red list category	Atlas region endemic
2429BD					
Eupterotidae	<i>Marmaroplegma</i>	<i>paragarda</i>		Not listed	No
Lycaenidae	<i>Actizera</i>	<i>lucida</i>	Rayed blue	Least Concern	No
Lycaenidae	<i>Aloeides</i>	<i>molomo</i>	Molomo copper	Least Concern	Yes
Lycaenidae	<i>Aloeides</i>	<i>swanepoeli</i>	Swanepoel's copper	Least Concern	Yes
Lycaenidae	<i>Eicochrysops</i>	<i>messapus</i>	Cupreous blue	Least Concern	No
Pieridae	<i>Belenois</i>	<i>aurota</i>	Brown-veined white	Least Concern	No
Pieridae	<i>Colotis</i>	<i>annae</i>	Scarlet tip	Least Concern	No
Pieridae	<i>Colotis</i>	<i>auxo</i>	Sulphur orange tip	Least Concern	No
2430AC					
Hesperiidae	<i>Parosmodes</i>	<i>morantii</i>	Morant's orange	Least Concern	No
Hesperiidae	<i>Pelopidas</i>	<i>thrax</i>	White-banded swift	Least Concern	No
Hesperiidae	<i>Spialia</i>	<i>ferax</i>	Common sandman	Least Concern	No
Lycaenidae	<i>Axiocerses</i>	<i>amanga</i>	Bush scarlet	Least Concern	No
Lycaenidae	<i>Axiocerses</i>	<i>tjoane</i>	Eastern scarlet	Least Concern	No
Lycaenidae	<i>Azanus</i>	<i>jesous</i>	Topaz babul blue	Least Concern	No
Lycaenidae	<i>Azanus</i>	<i>moriqua</i>	Black-bordered babul blue	Least Concern	No
Lycaenidae	<i>Cigaritis</i>	<i>natalensis</i>	Natal bar	Least Concern	No
Lycaenidae	<i>Cnodontes</i>	<i>penningtoni</i>	Pennington's buff	Least Concern	No
Lycaenidae	<i>Euchrysops</i>	<i>subpallida</i>	Ashen smoky blue	Least Concern	No
Lycaenidae	<i>Lampides</i>	<i>boeticus</i>	Pea blue	Least Concern	No
Lycaenidae	<i>Leptotes</i>	<i>pirithous</i>	Common zebra blue	Least Concern	No
Lycaenidae	<i>Tuxentius</i>	<i>melaena</i>	Black pie	Least Concern (SABCA 2013)	No
Lycaenidae	<i>Virachola</i>	<i>antalus</i>	Brown playboy	Least Concern	No



Nymphalidae	<i>Acraea</i>	<i>neobule</i>	Wandering donkey acraea	Least Concern	No
Nymphalidae	<i>Bicyclus</i>	<i>anyana</i>	Squinting bush brown	Least Concern	No
Nymphalidae	<i>Charaxes</i>	<i>saturnus</i>	Foxy charaxes	Least Concern	No
Nymphalidae	<i>Danaus</i>	<i>chrysippus</i>	African monarch (subsp. alcippus)	Not listed	No
Nymphalidae	<i>Danaus</i>	<i>chrysippus</i>	African monarch, Plain tiger	Least Concern	No
Nymphalidae	<i>Dingana</i>	<i>angusta</i>	Long Tom widow	Least Concern	Yes
Nymphalidae	<i>Junonia</i>	<i>oenone</i>	Blue pansy	Least Concern	No
Nymphalidae	<i>Telchinia</i>	<i>esebria</i>	Dusky acraea	Least Concern	No
Nymphalidae	<i>Vanessa</i>	<i>cardui</i>	Painted lady	Least Concern	No
Nymphalidae	<i>Ypthima</i>	<i>impura</i>	Impure ringlet	Least Concern	No
Pieridae	<i>Belenois</i>	<i>aurota</i>	Brown-veined white	Least Concern	No
Pieridae	<i>Catopsilia</i>	<i>florella</i>	African migrant	Least Concern	No
Pieridae	<i>Colotis</i>	<i>evagore</i>	Small orange tip	Least Concern	No
Pieridae	<i>Colotis</i>	<i>vesta</i>	Veined tip	Least Concern	No

The butterfly species identified as endemic for the region is the following:

- *Aloeides molomo* Molomo copper (Least Concern) (SABCA 2013)
- *Aloeides swanepoeli* Swanepoel's copper (Least Concern) (SABCA 2013)
- *Dingana angusta* Long Tom widow (Least Concern) (SABCA 2013)

No red listed butterflies were recorded for the region where the Moeijelijk farm is located and specifically the area proposed for development extensions to existing infrastructure as these areas are already disturbed.

Butterflies are sensitive to small changes in habitat and climatic differentiations will affect the success of butterflies within the area. Vast clearances or change in vegetation may be detrimental for the species that reside here. The result will be that butterflies will migrate to avoid adverse environmental conditions, but only for short distances, thus suitable habitat should remain in close range of development activities. Butterflies are important contributors to pollination and are considered important biodiversity indicators, since many species have specific relationships with plant hosts and may give an indication of intact communities within habitat types.

It is important to note that many groups of invertebrates actually have the tendency to increase their overall diversity and abundance in disturbed areas such as edges around natural areas. This is because edge environments tend to have a high density of potential food plants as well as providing niches for other species that are not frequently recorded within the sampling area itself. This is the opposite of what one would expect in disturbed situations and is only noted in invertebrate species.



6.4.5.5 Beetles

Species which are awarded Protective status in terms of NEMBA (Act 10 of 2004) that might occur within the area is Stag beetles and Tiger beetles. These should be protected when encountered during any stage of development. These species are easily identified due to their large mandibles and the Tiger beetle often has yellowish markings displayed on the elytron.⁷ This is not always the case and they may be uniform or even dark or luminous green depending on specific species. Tiger beetles are considered a good indicator species and have been used in ecological studies on biodiversity.

The 2015 ToPS amendment also included these Stag Beetles and Tiger Beetles within its protection priority lists.

6.5 MOEIJELIJK: FAUNA EVALUATION (FIELD SURVEY)

Several sites were identified to be investigated during the field survey in terms of possible sensitivity due to location (with regards to the proposed development) or habitat type. Koppies and ridges also enjoyed priority due to known fact that these represent specialised niches and therefore animals inhabiting these may have less chance to survive changes to their habitat.

Also, the specific sites were chosen as to accommodate the proposed plan of the Bauba Mine and where the infrastructure is planned.

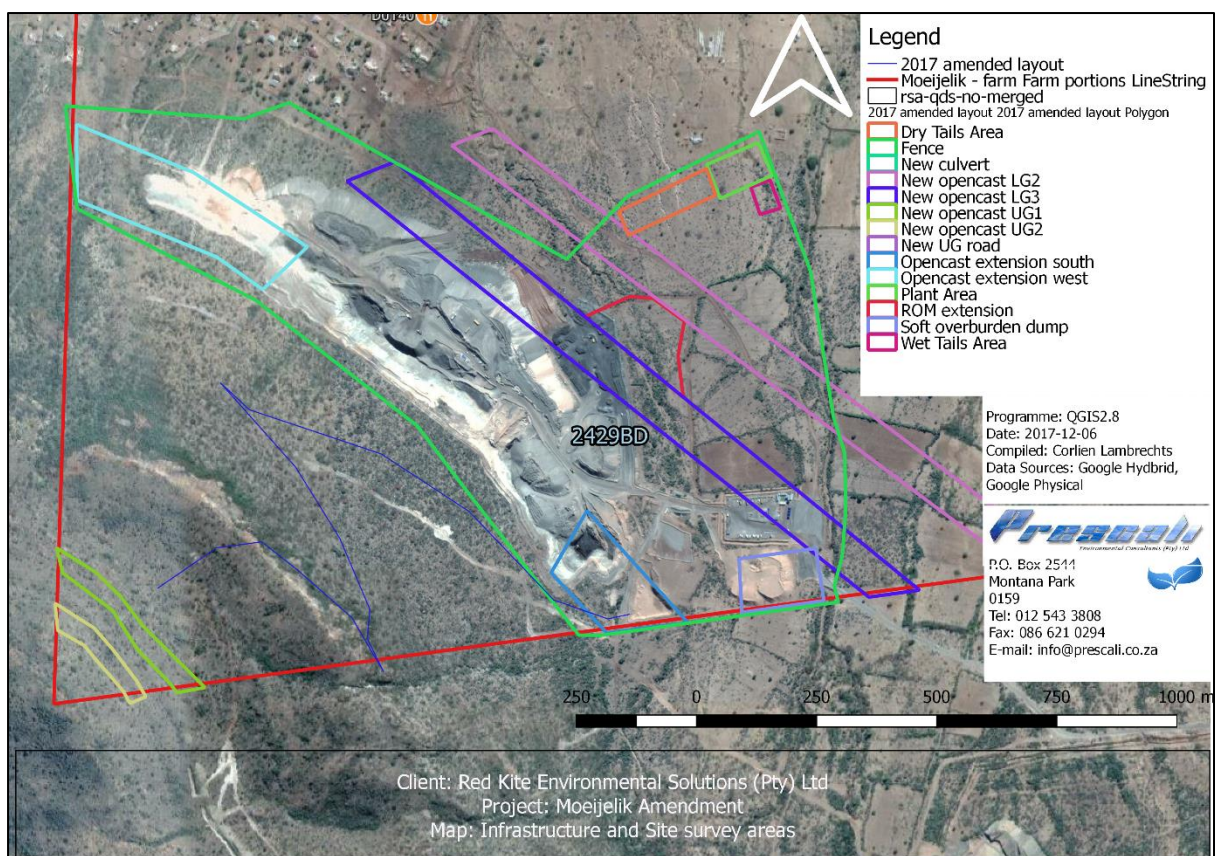


Figure 6-3: Proposed development sites for the Moeijelijk development

The sites selected were used as starting point and was further explored on foot by walking transects towards the proposed development areas. This approach covered large areas of ground on foot and

⁷ Modified hardened forewing serving as a protective wing-case for the hindwings underneath



the remainder was done by vehicle, mainly those areas not to be directly affected by the proposed infrastructure. The mountain on the back of Moeijelijk was accessed from Sefateng and walked across the valley towards the other side to be able to access the mountain from the other side as the cliffs were too steep to climb.

Areas in terms of the Limpopo Conservation Plan was also used and incorporated into the selection of sites. Areas of “High significance” enjoyed priority over “areas where no natural habitat remains”.

Figure 6-4: Limpopo Conservation Plan (Terrestrial Biodiversity Assessment)

The farm Moeijelijk are shown to be delineated as Ecological Support areas 1 and Ecological Support Areas 2. The area in question for this development is located behind in and around the existing infrastructure of the Moeijelijk mine.

6.5.1 SUMMARIES OF SITE RESULTS AND SPECIES RECORDED

6.5.1.1 General Observations and notes

The area is generally considered to be in a degraded condition, some areas show signs of disturbances related to the use of the area by the community for either grazing purposes and planting of crops. Other areas show signs of trampling of domestic or grazing animals, especially the area located to the north of the Moeijelijk mine where the community is currently residing and keeping their domestic animals.

The mountainous area(koppie) is in a fair condition, but not pristine as there was signs of human and domestic animals and a large mechanised illegal mining operation presumably part of a community endeavour behind the mountain, next to the valley.

Main features considered from an ecological point of view were the mountainous terrain and what natural habitat it had remaining for the area.





Figure 6-5: View from the top of the mountain down to the Moeijelijk mine development





Figure 6-6: Rocky banks and veld where the new opencast areas are proposed



Figure 6-7: Site photos of the areas associated the extensions of the plant infrastructure

6.5.1.2 Species observed to inhabit the area within and around the Moeijelijk development site

Table 6-7: Species observed at the sites evaluated for Moeijelijk (General species observations)

Family	Species	Common Name	Sighting/Finding	Status and IUCN
Invertebrates				



Agelenidae		Funnel-web spiders	Sightings in grass areas	Least Concern
Sparassidae	<i>Pseudomicrommata longipes</i>	Grass huntsman/groot-dwaal krap spinnekop	Sightings	Least Concern
Carabidae	<i>Tefflus</i>	Peaceful giant ground beetles	Sightings	Least Concern
Pyrgomorphidae	<i>Phymateus viridipes</i>	Green milkweed locust	Sightings	Not listed
Achatinidae	<i>Achatina</i> .	African giant snail	Shells	Least Concern
Spirostreptidae	<i>Archispirostreptus gigas</i>	Giant millipedes	exoskeletons	Least Concern
Anthophoridae	<i>Xylocopa scioensis</i>	Carpenter Bee	Sightings	Not listed
Formicidae	<i>Camponotus niveosetosus irredux</i>	Hairy sugar ants	Sightings	Not listed
Butterfly species				
Nymphalidae	<i>Danaus chrysippus</i>	African Monarch	Sighting	Least Concern
Nymphalidae	<i>Junonia hierta</i>	Yellow Pansy	Sightings	Least concern, fairly common
Pieridae	<i>Colotis evagore antigone</i>	Small orange tip	Sightings	Least Concern
Pieridae	<i>Dixeria pigea</i>	Ant-heap white/ant-heap small white	Sightings	Least Concern
Pieridae	<i>Colias electro</i>	African Clouded yellow/ Lucerne butterfly	Sightings	Least Concern
Lycaenidae	<i>Zizeeria Knysna</i>	Dark grass blue/ African grass blue	Sightings	Least Concern
Reptilian species				
Scincidae	<i>Trachylepis quinquetaeniata</i>	Five-Lined Mabuya, Rainbow Skink	Sighted	Least Concern
Scincidae	<i>Trachylepis striata</i>	Eastern Striped Skink	Sighted	Least Concern
Mammalian species				
Bovidae	<i>Sylvicapra grimmia</i>	Common Duiker (Bush Duiker)	Spoor and Dung found (Stuart & Stuart, 2013)	Least Concern
Canidae	<i>Canis mesomelas</i>	Jackal Black-backed	Droppings	Least Concern except for Side-striped which is protected
Pedetidae	<i>Pedetes capensis</i>	Springhare	Droppings and middens	Least Concern
Bovidae	<i>Bos taurus</i>	Cattle	Sightings and Dung	Domestic
Equidae	<i>Equus africanus</i>	Donkeys	Sightings and Dung	Domestic
Bovidae	<i>Capra aegagrus hircus</i>	Goats	Sightings and Dung	Domestic



Avi-fauna				
Fringillidae	<i>Emberiza capensis</i>	Cape bunting (Rooivlerk streepkoppie)	Sightings	Least Concern
Sylviidae	<i>Parisoma subcaeruleum</i>	Chestnut vented Tit Babbler (Bosveldtjeriktik)	Sightings	Least Concern
Coliidae	<i>Colius striatus</i>	Speckled Mousebird/ Gevlekte muisvoël	Sightings	Least Concern
Motacillidae	<i>Motacilla aguimp</i>	African Pied Wagtail (Bontkwikkie)	Sightings	Least Concern
Hirundinidae	<i>Hirundo rustica</i>	Barn Swallow	Sighting	Least Concern
Corvidae	<i>Corvus albus</i>	Pied Crow	Sightings	Least Concern, Protected wild animals in Schedule 3 TOPS
Sturnidae	<i>Lamprotornis nitens</i>	Starling	Sightings along roads	Least Concern
Muscicapidae	<i>Sigelus silens</i>	Fiscal Flycatcher	Sighted in field	Least Concern
Pycnonotidae	<i>Pycnonotus barbatus</i>	Blackeyed Bulbul / Swart-ogie tiptol	Sighted	Least Concern
Cuculidae	<i>Cuculus solitarius</i>	Red-chested Cuckoo/ Piet my vrou	Characteristic call	Least Concern
Muscicapidae	<i>Monticola rupestris</i>	Cape Rock- Thrush	Sightings	Least Concern
Ploceidae	<i>Ploceus cucullatus</i>	Village Weavers/Spotted- back weaver	Sightings	Least Concern
Dicruridae	<i>Dicrurus adsimilis</i>	fork-tailed drongo	Multiple sightings	Least Concern
Birds of Prey				
Accipitridae	<i>Circaetus cinereus</i>	Brown Snake- Eagle	Sighting	Least COncern
Accipitridae	<i>Gyps coprotheres</i>	Cape Vulture.	Sighting	Endangered (IUCN). TOPS 2015



6.5.1.3 Previous fieldwork done in 2015

6.5.1.3.1 Photos taken during previous ecological assessment



Figure 6-8: View towards mountainous area (koppie)



Figure 6-9: View towards community



Figure 6-10: Drainage lines next to community areas

6.5.1.4 Summary of findings (2015)

The rocky area may be home to several rodent species and rock hyraxes. This was deemed the most important area (habitat type) as it may be home to reptiles and insects that have specialized niches in the relevant area. This area is also important in terms of required habitat type for the birds sighted during the field assessment, which depend on a rocky mountainous range and an adjacent open valley for breeding and foraging purposes.

As seen from the results below, the area species assemblages are typically those that you expect to see where the environment has been degraded in a manner and not in a pristine condition any more, specifically when looking at the bird species seen during the assessment. These may be compared to neighborhood/residential species seen in suburb areas and may be interpreted as a sign of the degree of modification already present in the area due to large scale mining developments and informal communities in the area.

Table 6-8: Summary List of Faunal Species Identified during the field assessment

Family	Species	Common Name	Status
INSECTA ⁸			

⁸ Most of the Insects found has not been assessed in terms of the IUCN Red List (2013.2), but are listed within the Catalogue of Life also published by the IUCN and contains a comprehensive and authoritative global index of species currently available. The



Family	Species	Common Name	Status
Pierinae	<i>Belenois creona severina</i>	African Common White	Not assessed
Pierinae	<i>Eurema brigitta</i>	Broad-Bordered Grass Yellow	
Pieridae	<i>Pontia helice helice</i>	Meadow white	Not assessed
Nymphalidae	<i>Hamanumida daedalus</i>	Guinea-fowl butterfly	Least Concern
Geometridae	<i>Rhodometra sacraria</i>	Vestal	Not assessed
Coleoptera	<i>Pachnoda sinuata</i>	Garden Fruit Chafer	Not assessed
Cicadidae	<i>unknown</i>	Cicadas	Not assessed
Formicidae	<i>Camponotus fulvopilosus</i>	Balbyter Sugar ants	Not assessed
Pyrgomorphidae Order: Orthoptera	<i>Zonocerus elegans</i>	Elegant Grasshopper	Not assessed
Orthoptera	<i>Catantops humeralis</i>	Grasshopper species	Least Concern
Orthoptera	<i>Locustana pardalina</i>	Brown Locust	Least Concern
Orthoptera	<i>Acanthacris ruficornis</i>	Garden Locust	Least Concern
Mantidae	<i>Sphodromantis gastrica</i>	Giant Praying Mantis	Not assessed
Coleoptera	<i>Mylabris oculata</i>	Bean Beetle	Not assessed
ARACHNIDA			
Eresidae	<i>Stegodyphus dumicola</i>	Social nest spider	Not assessed
Araneidae	<i>Orb spider. spp unknown</i>	Orb spider	Not assessed
DIPLOPODA			
Order: Spirostreptida	<i>Spirostreptidae (species unknown)</i>	Millipede	Not assessed
REPTILIA			
Scincidae	<i>Trachylepis punctatissima</i>	Montane Speckled Skink	Least Concern
Scincidae	<i>Trachylepis margaritifera</i> ⁹	Five-lined rainbow skink	Not assessed
Lacertidae	<i>Pedioplanis lineocellata</i>	Spotted Sand Lizard	Least Concern
Colubridae	<i>Psammophis subtaeniatus</i>	Western stripe-bellied sand snake	Least Concern
MAMMALIA			
Bovidae	<i>Bos primigenius</i>	Cattle	Domesticated
Equidae	<i>Equus africanus</i>	Donkeys	Domesticated
Leporidae	<i>Lepus saxatilis</i>	Scrub Hare (Kolhaas)	Least Concern
Procaviidae	<i>Procavia capensis</i>	Rock hyrax	Least concern
Orycteropodidae	<i>Orycteropus afer</i>	Aardvark dropping sighted ¹⁰	Least Concern, but Protected in South Africa ¹¹
Muridae	<i>Rhabdomys pumilio</i>	Four-striped grass mouse	Least Concern
AVES			
Coliidae	<i>Colius striatus</i>	Speckled Mousebird	Least Concern
Accipitridae	<i>Buteo vulpinus</i>	Steppe Buzzard	Least Concern
Dicruridae	<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	Least Concern
Pycnonotidae	<i>Pycnonotus barbatus tricolor</i>	Dark-capped Bulbul	Least Concern

Catalogue of Life supports the major conservation and biodiversity resources such as GBIF (Global Biodiversity Information Facility), the Encyclopedia of Life and IUCN Red List of threatened species. All of these are confirmed Least Concern (LC) in South Africa by SANBI

⁹ Initially known as *Trachylepis quinquetaeniata*

¹⁰ Aardvark compacted droppings sighted and photographed, although no holes were sighted and no confirmation by camera trapping was done during the field assessment.

¹¹ South African Legislation (2013) Notice 389 of 2013, National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004): Publication of lists of species that are threatened of Protected, Activities that are prohibited and exempted from extinction, Government Gazette, 16 April 2013.



Family	Species	Common Name	Status
Ploceidae	<i>Ploceus ocularis</i>	spectacled weaver	Least Concern
Musophagidae	<i>Corythaixoides concolor</i>	Grey go-away bird (Kwêvoël/ Grey Loerie)	Least Concern
Corvidae	<i>Corvus albus</i>	Pied crow	Least Concern
Ploceidae	<i>Ploceus spp.</i>	Weaver, woven balls with no spout entrance	Least concern

6.5.1.4.1 Comparison between the 2015 and 2017 study in terms of habitat

As may be seen when comparing photographs taken in the 2017 survey, these areas are found to be the similar in condition, except the previous photograph (Figure 6-9), which is currently where the existing infrastructure of Moeijelijk is. The areas associated with the community (such as the drainage lines, Figure 6-10) and the koppie areas which was surveyed in 2015, corresponds to the findings for the 2017 study. It should be noted that the areas associated with the drainage lines did seem more degraded than what the previous study have captured. This may be due to the Moeijelijk mine developments over the year or those of the community, moving between the mine and the domestic camps.

In terms of species found during these assessments, it is clear that the species found during both assessments are mostly species associated with transformed habitat types and anthropogenic influences. The areas are not pristine and the areas surveyed, although similar that that of the 2015 survey, where more degraded during the 2017 study. The koppie has been subjected to the activity of illegal miners on the other side next to the valley and roads have been made for their equipment, which has also impacted on the overall ecology of the koppie area. Different reptile species were encountered between the 2015 and the 2017 study, but all of these species is thought to still occur within the mountainous areas as well as those captured in the desktop study as the habitat remains favorable for reptiles.

6.5.2 ENDEMIC SPECIES AND STATUS

All Endemic species identified under the fauna evaluation within the desktop study under the various category/groups of animal species were assessed and given under the relevant sections depending on their species and locality within the Moeijelijk expansion development.

7 SENSITIVITY MAPPING AND GEOSPATIAL ANALYSIS

The Limpopo Conservation Plan was used as a general guideline to determine the conservation targets and current conservation of the area to be impacted by the expansion of the Moeijelijk mine (Please refer to Figure 6-4 for a visual illustration). Ecological support areas 1 and Ecological support areas 2 was found to be the dominant areas where the new infrastructure expansions are proposed.

The koppie, although impacted by mining activities and human movement due to the activities in and surrounding it, as well as the illegal mining encountered on the other side, was thought to be the most sensitive area in the Moeijelijk vicinity. These areas represent specialised niches and habitat for certain insects, reptiles and bird species and should be protected as far as possible during all stages of the developments on Moeijelijk. The road proposed to connect the two new opencast sections and the Moeijelijk mine will have to be managed wisely as it will fragment the ecology of the koppie further. It is recommended that the road be moved to go as far as possible around the koppie if feasible.

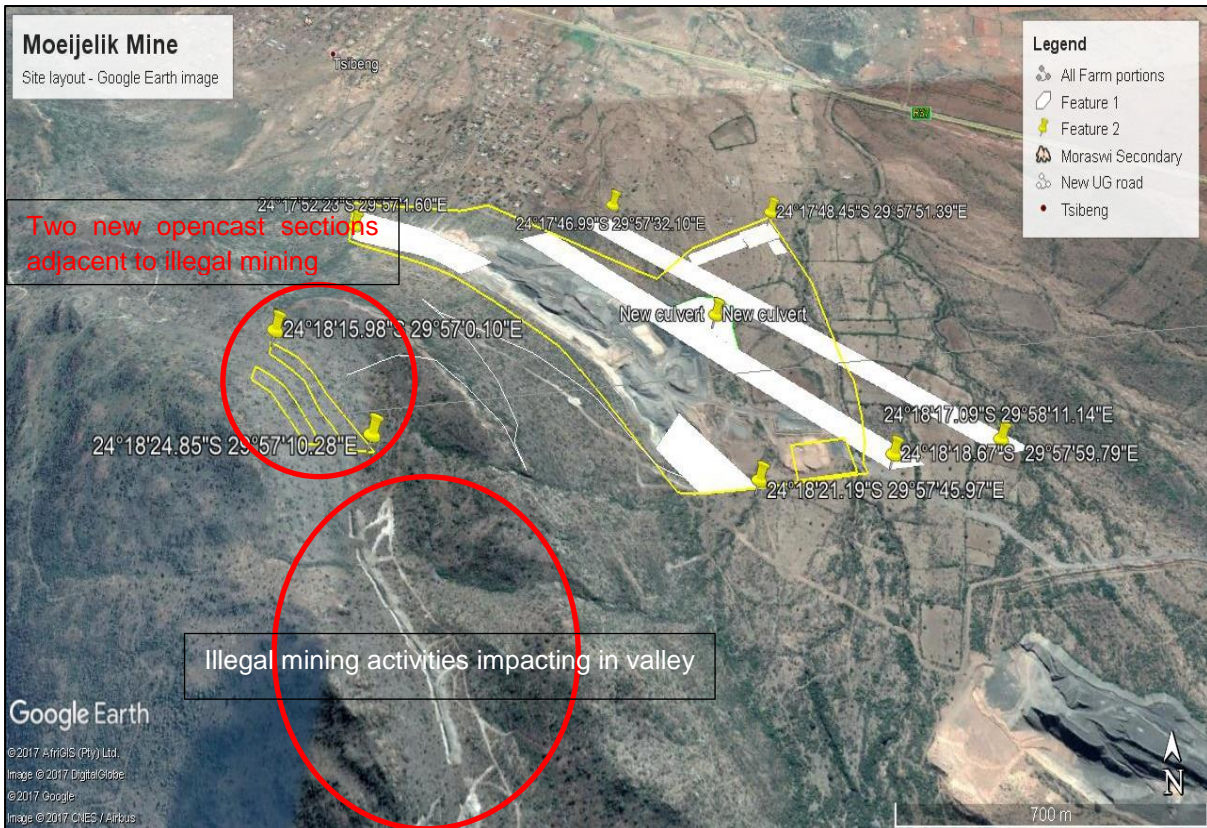


Figure 7-1: Impacts associated with the backside of the Koppie, where the new opencast sections for UG1 and UG2 is proposed

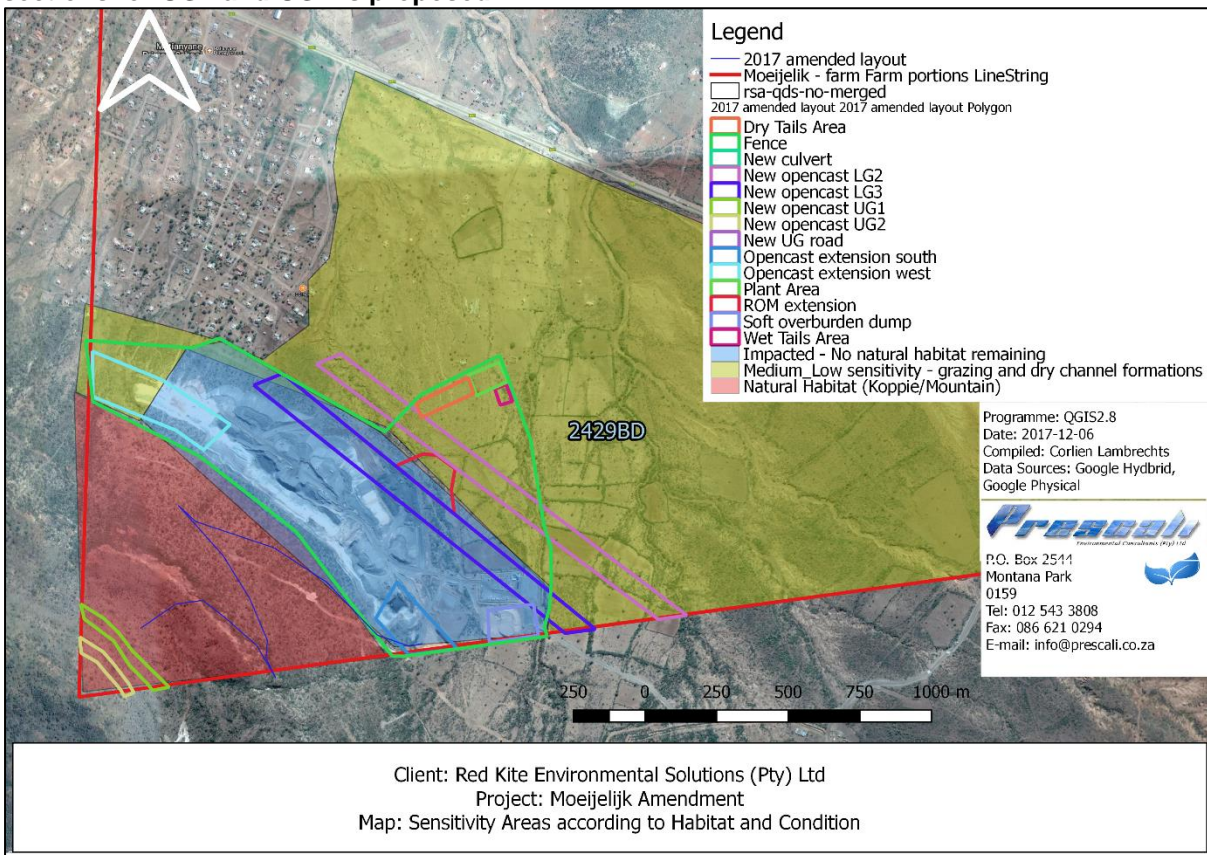


Figure 7-2: Sensitivity delineated according to habitat remaining and condition thereof



Other Geospatial Data layers assessments used were the South African Biodiversity Institute, National Freshwater Ecosystem Priority Areas (NFEPA Wetland Assessments). These include several assessments in terms of wetlands located within the area:

- Frog Metadata Layers (FROG): Contains wetlands within 500 meters of a IUCN Threatened Frog Point Locality;
- Threatened Waterbird Point (CWAC): Contains wetlands within a 500 m of a Threatened Waterbird Point Locality; and
- Threatened Cranes (CRANE): Contains wetlands with the majority of its area within a sub-quaternary catchment that has sightings or breeding areas for Threatened Wattled Cranes and Blue Cranes.

Findings:

- No IUCN Threatened frog point localities within the area (not within 50-100 km from site);
- No Threatened waterbird point localities within the immediate area (closest one is shown near the Kruger National Park and Hoedspruit;
- Another area is shown in the vicinity between Polokwane and Mokopane (presumable associated with the Nyl);
- Another associated with the Blyde River Canyon;



INTERPRETATION OF FINDINGS

8 DISCUSSION OF FINDINGS

8.1.1.1 Terrestrial richness compared between the various areas found on Moeijelijk

An evaluation of the habitat type and the state of the environment leads to the assumption that there is a low wildlife diversity and low richness within this area. The indication of diversity and richness in numbers were mostly made on quantity of droppings and spoor (Stuart & Stuart, 2013) found in bare patches and visible routes travelled by these animals. The animals that could additionally occur within this area (porcupines, serval, jackals etc.) are known to have a predominant nocturnal nature and activity during daytime is not expected. The most dominant droppings found were those associated with the community domestic animals that forage in the area.

From an ecological point of view, the koppie had the most diverse habitat types and diversity of species, even though signs of disturbance and impacts due to illegal mining has clearly impacted the area. Although no wetlands or water bodies were present, the drainage lines found between Moeijelijk and the community should be adequately licensed and mitigated in terms of potential impacts the new infrastructure extensions may have on these elements.

8.1.1.2 Mammals recorded

The habitat type suggests sparse species diversity in terms of mammalian groups. The farm has been mostly cultivated and some of the natural habitat has been destroyed or is currently informal settlements where the communities are based, as confirmed by the CPIan and the field visit. The current land uses are subsistence farming, community settlements (houses), grazing and the existing Moeijelijk and Sefateng mine. Sightings of mammals were limited, as was spoor or droppings. The dung pellets/droppings/scat and spoor were investigated (Stuart & Stuart, 2013). No obvious signs of a red listed mammal were found within the designated development areas. Jackal activity was found behind the koppie with droppings near the valley areas, which indicate that these animals are hunting in and about the more natural zones associated with Moeijelijk farm.

8.1.1.3 Aves assessment

The birds noted in the desktop study show that the species richness and diversity is high within the area. Most birds expected to be seen within the area are those that utilise the unique vegetation structures and the mountainous areas which offer a variety of habitats in and surrounding the Sekhukhune mountains. Due to the disturbances of the existing mining related activities associated with Moeijelijk and Sefateng mine, birds will prefer the more natural areas associated with the koppie and the valley to the other side of the Koppie.

The area designated for the expansion activities of the existing infrastructure does not fall within an Important Birding and Biodiversity zone (please refer to Figure 6-2 above) and even so, no known Frog, Threatened birds or known Crane point localities are given within the NFEPA database for the site.

It may be concluded that all bird species recorded within the Desktop study is anticipated to occur within the areas visited (even if not confirmed during Field survey). It should be noted that habitat transformation has significantly decreased the available habitats for all species due to the community activities, the existing mines and the large illegal mining sections found within the koppie.



8.1.1.3.1 Protected Birds recorded

Avi-fauna species that are red listed was found to occur within the koppies, specifically the cliffs. All vultures are protected in terms of either LEMA or ToPS listings. The species found in the 2017 study were the *Gyps coprotheres* (Cape Vulture). Other birds of prey, specifically the *Circaetus cinereus* (Brown Snake-Eagle) has been sighted in flight on the Koppie area.

Also, occurring on all sites investigated within the farm, were the *Corvus albus* (Pied Crow), which does not have a red listing status (Least Concern), but is listed as Protected wild animals in Schedule 3 ToPS (2015 Amendment). This bird is a regular sighting in the Limpopo province and prefers to seek habitat close to settlements over natural habitat, due to its scavenging nature.

8.1.1.4 Reptiles recorded

Only two lizard species were encountered during the field survey, but the desktop study for the specific area is thought to include the species to be found within the area. The koppie area had a high availability of ridges or rocky formations which is the preferred niche for most of these species. General skink species such as the Rainbow skink (*Trachylepis quinquetaeniata*) and Eastern striped skink (*Trachylepis striata*) was readily found on all sites and has no red listed status.

The area has a red listed reptile species known to occur within the relevant QDS, namely the *Platysaurus orientalis fitzsimonsi* (FitzSimons' Flat Lizard), which is listed as Near Threatened (SARCA 2014).

It is also evident that snakes will be fairly common within the area during summer, with adequate food and shelter available. Please refer to the potential list of species regarding reptiles (Table 6-3).

8.1.1.5 Amphibian assessment

Dry tributaries which may or may not carry water after rainfall was sighted between the mine and the community, the connectivity of these are unknown and fell outside the scope of the study, but no amphibians were sighted here and the natural condition of these systems have been impacted. However, the following amphibian was given as an endemic species within the designated area during the desktop study: *Amietia delalandii* (Delalande's River Frog), but it has a status of Least Concern.

8.1.1.6 Invertebrate assessment

The insect evaluation was conducted on a desktop level and those identified during the field assessment. No insects or listed butterflies were sighted for the area or known to occur in the vicinity. The Wolkberg area is the most important habitat for butterflies and is located approximately 17 kilometres away from the Moeijelijk expansion project.



IMPACT ASSESSMENT

9 ENVIRONMENTAL IMPACT ASSESSMENT

All forms of development, albeit for mining, industrial, urban or residential purposes, will have an immediate effect on the natural environment. It is therefore of utmost importance to provide information on the environmental consequences these activities will have and to inform the decision-makers thereof.

For this impact assessment, Red Kite Environmental Solutions (Pty) Ltd had prescribed a preferred format. The preferred format has been incorporated into the document and an explanation of the impact assessment criteria is defined below (Table 9-1).

9.1 Methodology

Risk assessment involves the calculation of the magnitude of potential consequences (levels of impacts) and the likelihood (levels of probability) of these consequences to occur. Risk = Consequence + Likelihood; where: (i) likelihood is the probability of occurrence of an impact that affects the environment; and, (ii) consequence is the environmental impact if an event occurs.

Consequence can be calculated as the sum of the risk levels comprising environment type, nature, extent and duration of the potential impact. Likelihood can be calculated as the sum of the risks of frequency and probability of the impact occurring. The likelihood and consequence can input into a matrix in order to identify the significance of the risk occurring. The C + L matrix method therefore combines the scores from the qualitative or semi-quantitative ratings of consequence (levels of impact) and the likelihood (levels of probability) that a specific consequence will occur (not just any consequence) to generate a risk score and risk rating.



Table 9-1: Impact Assessment Criteria defined

Assessment	Definition	Quantification				
		1	2	3	4	5
Environment Type	Type of environment anticipated to be impacted	Degraded sites/ heavy industrial areas/ high density townships	High density residential/ retail and office complexes/ central business districts/ medium industrial/ large- scale agriculture ¹²	Medium density residential/ light industrial/ office parks/ sports facilities/ medium- scale agriculture ¹³	Low density residential/ small- scale agricultural ¹⁴ / small holdings	Greenfield sites/ nature reserves/ protected areas/ natural recreational facilities
Nature	The potential of the impact to cause harm	Negligible Impact	Minor Impact	Moderate Impact	High Impact	Severe/Irreversible Impact
Extent	The spatial extent or population extent of an impact	Within project area (<500m from project)	Surrounding area (500m – 1km radius)	Outside project area (1 – 5km radius)	Regional and provincial (5 – 50km radius)	National or international (>50km radius)
Duration	The period the impact will interact with the receiving environment	Immediate (days)	Short term (weeks)	Medium term (months)	Long term (years)	Beyond life of project
Frequency	How often the impact will occur	Less than once a year	Annually	Monthly	Weekly	Daily
Probability	The likelihood of the impact occurring	Rare	Unlikely	Possible	Likely	Almost certain

¹² Large Scale Agricultural viz. commercial tree plantations, etc.

¹³ Medium Scale Agricultural viz. crop and cattle farming, etc.

¹⁴ Small Scale Agricultural viz. nurseries and fish farms, etc.



The following significance rating can be derived from the ratings matrix:

Environmental Significance		Description of Rating
2 – 8	Low Significance	No specific management action required
9 – 11	Medium-low Significance	Administrative management actions required
12 – 17	Medium Significance	Management and monitoring action plans required
18 – 23	Medium-high Significance	Specific management and monitoring plans required
24 – 30	High Significance	Detailed management and monitoring plans required, potential red flag impact

10 IMPACT ASSESSMENT AND MITIGATION MEASURES

10.1 MOEIJEIJK MINE EXPANSION RISK ASSESSMENT

10.1.1 CONSTRUCTION PHASE AND OPERATIONAL PHASE

10.1.2 CONSTRUCTION IMPACTS ON THE NATURAL ENVIRONMENT

Impact		
<p>The construction activities might result in impacts to the natural environment due to increased movement, traffic and construction personnel to the area. Constructing activities and heavy construction vehicles might result in compaction of the soil and destruction of vegetation habitat which will impact on the animals that use the area as habitat. Storing of foreign materials, such as construction material, mixing of concrete or collection and delivering could result in pollution. The remaining natural areas will be severely impacted if not managed well. Construction will result in increase of potentially destructive movement within the designated area.</p>		
Mitigation		
<ul style="list-style-type: none"> • The construction area should be well demarcated and construction workers should not enter into adjacent areas. • To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees. • Continuous rehabilitation of the area should occur during construction, where re-vegetation practices should enjoy priority. • Seed mixes should match the surrounding vegetation structures and those specifically found in the Sekhukhune Plains Bushveld and Sekhukhune Mountain Bushveld vegetation types. • Prevent impacts from impacting on the multiple drainage lines identified during the field visit. These were dry channels but will facilitate the movement of water during rainfall events. 		
Potential impact predicted on Fauna during construction		
Aspect	No Mitigation	With Mitigation
Environment Type	Degraded sites/ heavy industrial areas/ high density townships (1)	Degraded sites/ heavy industrial areas/ high density townships (1)
Nature	Moderate impact (3)	Minor Impact (2)
Extent	Surrounding area (500m – 1km radius) (2)	Surrounding area (500m – 1km radius) (2)
Duration	Medium term (months) (3)	Medium term (months) (3)
Frequency	Daily (5)	Daily (5)



Probability	Almost certain (5)	Possible (3)
CONSEQUENCE	9	8
LIKELIHOOD	10	8
Significance Rating (SR)	Medium-high Significance (19)	Medium Significance (16)

Impact

The possible impacts associated with the koppie and the road construction proposed to connect the two new opencast areas and the Moeijelijk mine may lead to fracturing the habitat on the koppie, which has already been degraded by the existing gravel road going up to the location proposed and the illegal large-scale mining that has been conducted adjacent to the designated development area.

Mitigation

- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.
- Attempt to move the road to better align to already disturbed areas or other roads that have already been developed, either legally or illegally, but lead past the illegal mining zones.

Potential impact predicted on Fauna during construction

Aspect	No Mitigation	With Mitigation
Environment Type	Greenfield sites/ nature reserves/ protected areas/ natural recreational facilities (5) – The Koppie	Low density residential/ small- scale agricultural/ small holdings (4)
Nature	High impact (4)	Moderate Impact (3)
Extent	Outside project area (1 – 5km radius) (3)	Surrounding area (500m – 1km radius) (2)
Duration	Long term (years) (4)	Long term (years) (4)
Frequency	Daily (5)	Daily (5)
Probability	Likely (4)	Possible (3)
CONSEQUENCE	16	13
LIKELIHOOD	9	8
Significance Rating (SR)	High Significance (25)	Medium-high Significance (22)

Impact

The possible impacts on the area to the north-eastern side of Moeijelijk mine associated with the community but also constitutes an area with large drainage lines (such as diversion of the drainage lines or changes to the beds and banks). These, although degraded, feed the drainage system found within the Tsibeng area (may be interfered with due to construction activities) may be impacted in some way and may result in the destruction of riparian habitat or possible habitat being utilised by species within the area.

Mitigation

- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees or any other party associated with the drilling activities.
- Changes that will impact the drainage lines should be licensed under the National Water Act (Act No. 36 of 1998) and be subjected to the appropriate rehabilitation of riparian zones and ecological rehabilitation in terms of vegetation to ensure habitat stays favourable for species that may have specialised niches that depend on these aquatic systems.

Potential impact predicted on Fauna

Aspect	No Mitigation	With Mitigation
Environment Type	Low density residential/ small- scale agricultural/ small holdings (4)	Low density residential/ small- scale agricultural/ small holdings (4)



Nature	Moderate Impact (3)	Negligible Impact (1)
Extent	Outside project area (1 – 5 km radius) (3)	Within project area (<500m from project) (1)
Duration	Medium term (months) (3)	Medium term (months) (3)
Frequency	Daily (5)	Daily (5)
Probability	Possible (3)	Unlikely (2)
CONSEQUENCE	13	9
LIKELIHOOD	8	7
Significance Rating (SR)	Medium-high Significance (21)	Medium Significance (16)

10.1.3 OPERATIONAL IMPACTS ON THE NATURAL ENVIRONMENT

Impact

The operational activities might result in impacts to the remaining natural environment due to prolonged activity and movement to and from the area. Movement, noise and waste management is the main impacts that should be managed within this phase. It should be kept in mind that Moeijelijk is an existing mine and therefore these are only an expansion operation as these impacts already exist to a smaller scale at present. The impacts are foreseen to be less severe than Construction phase, although the threat of this stage is not the magnitude of the impact, rather the duration. Artificial lighting may also impact the surrounding natural environment and animals tend to move away from light, while others may be drawn towards it.

Mitigation

- Movement should be restricted and visitors, vehicles should not enter into restricted areas. Fencing the footprint area will prevent movement into the natural veld areas and keep the impacts regulated within a controlled environment. Animals may get used to movement by people in designated areas if it is a predictable situation. If movement is allowed into natural areas on a regular basis and the smell and sound of humans are found outside the demarcated development zones, it may result in animals moving away from the area and those that have specialised niches may flee and starve due to limited range and adaptability.
- Continuous rehabilitation of the area should occur to ensure all impacts identified during operational phase is speedily managed and restored. This included erosion and the management of Invasive plant species that may decrease the integrity of the Sekhukhune vegetation types as a specialised habitat for animals.
- Noise impacts should be monitored and kept in accordance to the regulated standard prescribed for the zoning of the area.
- Special lighting in the evenings should be used to limit disturbance of animals (especially since most of these animals are deemed nocturnal) and the attraction of insects to these lights that often lead to their death. The current use of high-power security lighting for public areas and domains have a devastating effect on the nocturnal animals and insects by attracting them away from their natural environment, leading to certain death. A Mercury arc and halogen lamps emit light in the white spectrum, disorientating nocturnal insects and animals and in turn prevents mating and depletes the natural environment of many species as they die circling the lights. Yellow Sodium lights are prescribed as they do not attract invertebrates at night and will not disturb the existing wildlife on the koppies and the more natural areas. Sodium lamps require a third less energy.
- Prevent impacts and waste from reaching the various drainage areas and areas outside the dirty footprint areas. This should be prevented by storing hazardous wastes in bunded areas. Domestic waste and other waste should be managed in the appropriate manner and apply good housekeeping practices will aid this issue.
- Strict rules and punishment should be adhered to offenders entering the natural environment outside of the footprint.
- Workers should not be housed outside regulated footprint areas.



Potential impact predicted on Fauna during operational phase of the Mine		
Aspect	No Mitigation	With Mitigation
Environment Type	Degraded sites/ heavy industrial areas/ high density townships (1)	Degraded sites/ heavy industrial areas/ high density townships (1)
Nature	Moderate impact (3)	Minor Impact (2)
Extent	Outside project area (1 – 5 km radius) (3)	Surrounding area (500 m – 1 km radius) (2)
Duration	Long term (years) (4)	Long term (years) (4)
Frequency	Daily (5)	Daily (5)
Probability	Likely (4)	Possible (3)
CONSEQUENCE	11	9
LIKELIHOOD	9	8
Significance Rating (SR)	Moderate-high Significance (20)	Medium Significance (17)

The only threatening impact anticipated will be the result of long-term activity and associated disturbance brought on by the humans that penetrate the natural environment surrounding the actual footprint areas. This is specifically relevant to the road which is proposed over the mountain which is relatively undisturbed when compared to other areas found in the vicinity. This will lead to systematic degradation of areas, creating a larger footprint that was anticipated from the original development site and increased fragmentation of the remaining natural habitat.

10.1.4 CLOSURE/POST-CLOSURE PHASE FOR MOEIJEIJK MINE

10.1.4.1 Impacts on the Natural Environment

Increased activity and traffic within a shorter timeframe (closure phase) may degrade the area the same manner as may be expected in the construction phase, although these impacts are short term and followed by increased habitat restoration and decreased movement within the area. The possibility exists for rehabilitation to be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance. Rehabilitation plans should be planned long before the closure phase is due to ensure that the endpoint of the operational phase is in line with what the rehabilitation phase will be able to achieve. Continuous rehabilitation and planning should also take place during the operational phase.

Possible mitigation measures:

To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.

Activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act.

Ensure that an acceptable aesthetic scenario is created post closure. This will be reached through adequate rehabilitation practices by restoring damaged and degraded habitat areas and removing all remaining structures associated with mining. Annual monitoring of the vegetation and habitat types should be instigated until the rehabilitation and replanted vegetation is self-sustainable. When closure is considered successful and / or rehabilitation is complete, unnecessary fences should be lifted to restore larger foraging areas, especially for mammalian species within the area.

Impact



Increased activity and traffic within a shorter timeframe (closure phase) may degrade the area if adherence is not in-line with the Environmental Management Plan (EMP) and Final Rehabilitation programme compiled for the specific Moeijelijk mine.

Mitigation

- Existing pathways should be clearly demarcated and be kept to. It is important that animals (wildlife and domestic animals) are not handled, removed, killed or interfered with.
- Activities must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962).
- Rehabilitation of degraded areas is compulsory.

Potential impact predicted on Fauna during decommissioning phase

Aspect	No Mitigation	With Mitigation
Environment Type	Degraded sites/ heavy industrial areas/ high density townships (1)	Degraded sites/ heavy industrial areas/ high density townships (1)
Nature	Moderate Impact (3)	Minor Impact (2)
Extent	Outside project area (1 – 5 km radius) (3)	Within project area (<500m from project) (1)
Duration	Medium term (months) (3)	Medium term (months) (3)
Frequency	Daily (5)	Daily (5)
Probability	Possibly (3)	Unlikely (2)
CONSEQUENCE	10	7
LIKELIHOOD	8	7
Significance Rating (SR)	Medium-high Significance (18)	Medium Significance (14)

10.1.5 IMPACTS ON ANIMAL SPECIES**Impact**

Previously destroyed habitat and shelter will start to increase as the decommissioning and rehabilitation comes to an end. The impact is therefore seen as minimal and animals will start to inhabit previous areas that have been deemed inhabitable due to activity and noises.

The overall impacts of the decommissioning are expected to be largely positive and will decrease human activities and movement within the affected areas. This will allow animal populations to increase and move back to affected areas that was previously abandoned.

Mitigation

- Active rehabilitation of degraded landscapes should commence.
- Wetland rehabilitation should be implemented to all affected wetland areas (those located to the north-eastern side of Moeijelijk that might have been affected by the Moeijelijk expansion project).
- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.
- Activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act.
- Ensure that an acceptable aesthetic scenario is created post closure. This will be reached through adequate rehabilitation practices by restoring damaged and degraded habitat areas.
- When closure is considered successful and rehabilitation complete, unnecessary fences should be lifted to restore larger foraging areas, especially for larger mammalian species within the area.
- Impacts will begin to subside and move towards a positive scale (ideally).
- Impacts on the Koppie should be rehabilitated in accordance to recommendations made by an ecologist depending on what the condition of the Koppie and the associated rocky habitats are after the closure of the Moeijelijk mine.

Potential impact predicted on Fauna during decommissioning phase

Aspect	No Mitigation	With Mitigation
Environment Type	Degraded sites/ heavy industrial	Degraded sites/ heavy industrial areas/



	areas/ high density townships (1)	high density townships (1)
Nature	Minor Impact (2)	Negligible Impact (1)
Extent	Outside project area (1 – 5 km radius) (3)	Within project area (<500m from project) (1)
Duration	Medium term (months) (3)	Immediate (days) (1)
Frequency	Daily (5)	Annually (1) (Annual monitoring requirements after closure)
Probability	Possibly (3)	Unlikely (2)
CONSEQUENCE	9	4
LIKELIHOOD	8	3
Significance Rating (SR)	Medium Significance (17)	Low Significance (7)



11 TERRESTRIAL MANAGEMENT PLAN

11.1 PRE-CONSTRUCTION PHASE

- It is firstly recommended that the road proposed over the Koppie to connect the Moeijelijk mine with the two proposed opencast sections (UG1 and UG2) seek an alternative layout or attempt to connect with another road that is already existing and lead past the illegal mining sections, if feasible.
- Layout design needs to be pre-approved with Departments if required in terms of the National Water Act, 36 of 1998 (Water Use Licence) if activities are within 500 metres of wetlands/drainage lines. This will apply for the extension of the infrastructure towards the northern and north-eastern sides of the existing footprint as these are where the dry drainage channels are located associated with the Tsibeng community.
- Relevant Authorisation needed for all Protected species in terms of NEM:BA (TOPS List 2015) These are not deemed necessary at this stage of the development as no relocation of species will be required for the development.

11.2 CONSTRUCTION AND OPERATIONAL PHASES

11.2.1 AIMS AND OBJECTIVES

- An ECO should be appointed during construction on all footprints to ensure that no animal is harmed and no breeding ground or unexpected discovery of red listed/sensitive animals that may require relocation is handled incorrectly by uninformed personnel.
- Prevent the needless loss of or damage to flora particularly with regard to protected, endemic, near-endemic and rare species to keep the specific habitat type as unaltered as possible. This will include the active management of Alien and Invasive species which tend to increase with the alteration of a site. The change of vegetation structure will have a negative impact on the species currently inhabiting the area.
- Establish a monitoring programme for early detection of alien invasive species and establish an alien invasive eradication and control programme.
- Prevent death, injury or hindrance to any fauna encountered during the project phases, and particularly with regard to any protected or endemic species.
- Prevent significant alteration to the ecosystems in the area, specifically, the mountainous terrains encountered and the steep cliff sections associated with the Koppie which is home to birds of prey and reptile species that may occur within the area (or larger area).
- Prevent impacts from reaching the downstream river environments at any stage of the development as these will impact the aquatic life within the systems as well as impact all the animals using the water resources on-site as well as downstream.

11.2.2 FAUNA AND HABITAT MITIGATION AND MANAGEMENT MEASURES

11.2.2.1 Fauna Management

- Ensure awareness amongst all staff, contractors and visitors to site to not needlessly harm or hinder animals or damage flora that is endemic and serve as habitat for the animals inhabiting the area.
- The Fauna management plan should be closely followed and implemented along with the flora assessment management plan to protect not only the animal species but also the natural environment which they inhabit.
- Allow animals to escape areas of activity freely and do not hinder their movement, especially avoid the natural ecological corridors created by the different drainage lines encountered to the northern sides of Moeijelijk. The mountainous areas also serve as an ecological corridor



between different areas and movement along the mountain ranges should not be prevented or fenced in a manner which will endanger the connectivity between larger areas.

- Develop in terms of the Limpopo Conservation Plan (Please refer to Figure 6-4 by rather developing areas where it already states no natural habitat remaining and avoiding areas where there is mostly natural area left (which is already minimal on several areas due to farming and rural settlements by the communities that surround the Moeijelijk development sites). This was largely done when viewing the proposed expansion footprint, except for the proposed road over the mountain which may find a better alternative routing if feasible. This will help lessen the fragmentation a road may create through the only remaining natural habitat area found in the Moeijelijk vicinity.
- All injured animals sighted during the development should be protected and moved to receive rehabilitation at the designated centre (the SHEQ should find out which centres will be appropriate for the species in the Limpopo province) and should not be handled by the employees under any circumstance. Clear protocol should be developed on the matter.
- Have a policy in place to prohibit hunting for food or pleasure (rifles, snares, dogs) by the workers or employees of the development. These conditions should be written into contractor's agreements with strict penalty clauses. Employees engaging in any of these activities should be faced with disciplinary action. All hunting activities will require special permits and should be avoided wherever possible.
- To minimize potential impacts to animal species, animals (wildlife and domestic animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees.
- Do not promote residential camps within the natural areas as this will be a valuable contribution to the Fauna Management of the area and will limit human activity around the clock and associated degradation and disturbance to the natural environment. As Moeijelijk is an existing mine, the new workers that will be required as part of the expansion should have or seek alternative housing. It was noted that residential camps or housing was not in the included infrastructure layout provided by the client.
- Domestic cats should be managed and preferably neutered or not allowed at all aiming to prevent large domestic cat populations that will utilize the natural bushveld as hunting and breeding areas (they will act as "unnatural predators" that is introduced with quick breeding cycles and populations will easily escalate if left unchecked). They will destroy bird populations within the area, as well as impact smaller mammalian species which will have detrimental effects on the natural environment. Several instances are documented where domestic cats have destroyed natural areas due to unchecked numbers and will lead to degraded state of pristine areas and populations. This could be implemented by an "Observe-and-Report" programme (which could be applied to every aspect within this management plan), where anyone who sees a kitten should report to the ECO or Environmental Department. Penalties should be investigated to limit the occurrence of this happening inside employee residential areas. Environmental awareness may also help to prevent this by educating the people about this possibility if bringing pets into the area. Due the difficulty in preventing and management of this aspect, it is recommended that no pets be allowed from the beginning of the construction phase until closure (Kays & Dewan, 2004).
- Activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act.
- All activities should be restricted to one area within the farm and activity and access into larger intact areas should be avoided at all cost. Strict measurements should be implemented. No foraging, food and wood collecting within the veld should be allowed.
- A strict policy should be developed and communicated to all employees in terms of injured animals and prescribed plan of action in such a case scenario.



- All activity should be avoided in restricted areas and possible wetland zones, incorporating those findings from the wetland assessment done for the project, unless authorisations are obtained for this, then management of these activities will be important.
- All noisy equipment should be avoided or mitigated to lessen sound levels as well as vibration levels should be controlled to limit impact on biodiversity and sensitive species.
- Undisturbed natural areas should be designated in the planning phase and should remain intact throughout the lifetime of the proposed development as well as closure and decommissioning phase.
- Special lighting in the evenings should be used to limit disturbance of animals (especially since most of these animals are deemed nocturnal) and the attraction of insects to these lights that often lead to their death. The current use of high-power security lighting for public areas and domains have a devastating effect on the nocturnal animals and insects by attracting them away from their natural environment, leading to certain death. A Mercury arc and halogen lamps emit light in the white spectrum, disorientating nocturnal insects and animals and in turn prevents mating and depletes the natural environment of many species as they die circling the lights. Yellow Sodium lights are prescribed as they do not attract invertebrates at night and will not disturb the existing wildlife. Sodium lamps require a third less energy.
- An active body to report any problems and observations made (of prohibited activities) or should be designated to an existing committee; this may be the ECO or the SHEQ or any other decided management body within the operational framework of the Moeijelijk mine, which is designated responsibility of this management plan.

11.2.3 MONITORING

Monitoring framework should be instigated and managed by their responsible body and the following system may enforce good practice:

- Implement an “Observe and report” approach which will enable employees to report any disturbance of fauna or degradation that they encounter during the operational phase.
- Activity restrictions of the ecological and aquatic corridors will need to be included to ensure the restriction of human movement within these sensitive zones, except when the required license has been obtained to allow for controlled modifications specifically to the drainage lines within these areas. Access to the mountainous areas should be avoided and there is no reason for entering these areas.
- This biodiversity baseline assessment conducted should be used to compare results with future biodiversity assessments (especially over different stages of the year to gain seasonal variation) and get a more accurate biodiversity standard to be managed accordingly.
- Annual biodiversity monitoring during September to March of areas both affected and unaffected by activities should be initiated to determine annual fluctuation in species numbers and if necessary relate this to activities on site.
- Determine annual fluctuation in species numbers and if necessary relate this to activities on site.
- Establish a monitoring programme for early detection of alien invasive species and establish and alien invasive awareness, eradication and control programme.

11.3 DECOMMISSIONING AND CLOSURE

11.3.1 AIMS AND OBJECTIVES

- Prevent needless loss of or damage to natural vegetation and animals particularly with regard to protected and endemic species.
- Prevent death, injury or hindrance to fauna particularly with regard to protected species.
- Prevent alien invasive species introduction and spread throughout the area as these will quickly enter the natural environment and decrease the integrity of the natural vegetation and endemic nature of the vegetation as these fall within endemic zones.



- Rehabilitate wetlands, vegetation, roads and habitat of the area that may have been degraded during any phase of the development.
- Comply with the Water Use Licence aspects if client was required to apply for managed impacts on the drainage lines found towards the northern development footprints for the Moeijelijk expansion project. Avoidance of these is the overall recommendation during all phases of the various developments.

11.3.2 FAUNA AND FLORA MITIGATION AND MANAGEMENT MEASURES

11.3.2.1 Fauna Management proposed

- A management plan for control of invasive/exotic plant species needs to be implemented.
- A rehabilitation plan should be implemented including grazing rehabilitation aspects or it should be determined what the end use of the land will be. It is recommended that the areas be restored to its natural state as far as possible after decommissioning as to preserve and regain the habitat and vegetation lost from these endemic regions.
- This includes process of replanting the vegetation if required and this should be governed by a vegetation expert. Wetland rehabilitation plans should be prescribed by a wetland specialist before any development begins.
- Close monitoring of faunal communities to ensure that ecology is restored and self-sustaining before a closure certificate may be issued.
- The use of the farm for conservation purposes post-closure is a great possibility, but due to the fact that the areas are surrounded and used by the local communities for mostly grazing of their cattle, this may not be a feasible idea, even when the area is located within an endemic zones and formal conservation would be ideal. A small portion of the Moeijelijk farm across the road is already part of the Potlake reserve.
- Ensure awareness amongst all staff, contractors and visitors to the site to not needlessly damage any part of the natural environment.
- Rehabilitate wetlands under the supervision of a wetland specialist of ECO that has knowledge of wetlands and the specific endemic nature of the environment within these mountains.
- Re-vegetation of all degraded areas and bare patches is advised to speed recovery to natural, self-sustaining state as soon as possible.
- Ensure awareness amongst all staff, contractors and visitors to the site to not needlessly harm or hinder animals. At this stage after years of operation, there is a good chance that smaller animals and birds have utilized several man-made structures as their home or breeding areas. Caution to avoid these species and destruction of their nests are also advised.
- General management in terms of dust and traffic control will ensure low hindrance to the fauna communities and should be adequate. These measures are discussed below in the following section.

11.4 GENERAL GOOD PRACTICE GUIDELINE AND MANAGEMENT

General

- Protect and preserve all surrounding areas unaffected by the mining development keep impacts controlled within the designated footprint areas.

Traffic

- Ensure trucks and vehicles remain on roads and areas designated as a construction site to limit disturbance to areas unaffected by construction.



- Plan the best routes to access the sites before upgrading and building any roads, as access to the sites using already impacted areas is the best option to ensure unnecessary fracture of the overall natural landscape.
- Ensure drivers are informed that off-road travelling is prohibited except where otherwise not practically feasible.
- Ensure speed limits are set on all roads and enforce speed limits. Ensure all drivers at the site are informed about speed limits.

Spills

- Regularly maintain equipment to reduce risk of hydrocarbon leaks, and have communication channels set up to report incidences and action plans in place to address issues immediately.
- Spills should be handled immediately and even the dry drainage channels found towards the north which will facilitate water downstream after a rainfall event. These systems will distribute any wastes not adequately managed downstream to impact on downstream aquatic ecosystems.
- Report all incidences immediately and have action plans in place to deal with any issues arising immediately.

Noise

- Reduce night time noises from mining areas.
- Restrict movement in the evenings by avoiding any unnecessary personnel or activities on the footprint during night times.

Housekeeping

- Ensure adequate domestic waste bins are supplied and that domestic waste is removed by a reputable contractor. Adhere to the waste management plan.
- Erect posters to educate staff about the dangers of littering and dangers of damaging sensitive and endemic plant species they may encounter.
- Save water and ensure knowledge of saving the environment is passed between the employees and discussed at meetings held specifically to promote environmental awareness.
- Do not let any litter or pollution enter the rivers or the tributaries and drainage systems found towards the northern and north-eastern sides of the Moeijelijk development.

11.4.1.1 Monitoring

- Continue with annual biodiversity monitoring. Include biodiversity monitoring sites in rehabilitated areas to determine if these are improving with regard to habitat.
- Continue with alien invasive monitoring, eradication and control programme.



12 CONCLUSIONS

Moeijelijk is in the process of applying for amendment to their authorisations for expansion of their existing infrastructure. Previous ecological field work was completed on the 7th of April 2015 for the original expansion aspects. Four sites were surveyed in and surrounding the proposed mining activities. The first site was located on the north-eastern facing rocky hill adjacent to the mining offices whilst the second site is situated on the north to north-western facing rocky hill that faces the current mining operations and a section of the proposed mining activities. The third site is located within the proposed footprint area and includes the area that has already been cleared during the prospecting phase. The final site is located within the grasslands (at the opposite end of the mining road) from the proposed footprint towards the mining offices. These various areas were surveyed again and specifically the footprints that is intended for the new expansion (2017) and results compared and analysed again.

The area assessed have been thought to consist of various degrees of disturbed characteristics and degraded in terms of diversity and adequate habitat types, although the area located to the south west of the mining development may be seen as natural and visible trends showed increasing degrees of degradation.

The mountainous terrain was deemed the most important area (habitat type) as it may be home to reptiles and insects that have specialized niches in the relevant area. Several birds-of-prey were also sighted during the field assessment and they use the terrain and adjacent valley as hunting grounds. There are several sensitive birds recorded in the baseline study that enjoys conservation status in the IUCN Red List. Species such as *Gyps coprotheres* (Cape Vulture) (VU), *Gyps africanus* (White-backed Vulture) (EN) and *Aquila rapax* (Tawny Eagle) (VU) are listed in the TOPS listing (2013). The species found in the 2017 study were the *Gyps coprotheres* (Cape Vulture). The *Circaetus cinereus* (Brown Snake Eagle) was sighted and therefore, the koppies are still being utilised by birds of prey as a habitat and refuge. Species as listed and protected under the TOPS list (2013) are thereby enforceable under the National Environmental Management: Biodiversity Act, 2004. These were confirmed again during the 2017 assessment as the mountainous area (specifically the cliff hang) are clearly utilized by birds of prey.

The original farm fall within the Topographical Quarter Degree Squares of 2429BD and 2430AC. These Squares were used as guideline structure to compile species lists that may occur within these regions (similar latitude and longitude values) and those recorded on the South African Biodiversity Institute Database of records. These were captured in the desktop study and represent the species that may occur on the site chosen for development.

The field survey enabled comparison of these data lists and assessment of the actual habitat types and integrity. Through comparison of datasets between the desktop study and the field survey, certain conclusions were made in terms of the integrity and carry capacity that the area has/or the conclusion that the area have been degraded and resulted in loss of diversity as a result of current developments on the affected area. As may be seen when comparing photographs taken in the 2017 survey, these areas are found to be the similar in condition, except the previous photograph (Figure 6-9), which is currently where the existing infrastructure of Moeijelijk is. The areas associated with the community (such as the drainage lines, Figure 6-10) and the koppie areas which was surveyed in 2015, corresponds to the findings for the 2017 study. It should be noted that the areas associated with the drainage lines did seem more degraded than what the previous study have captured. This may be due to the Moeijelijk mine developments over the year or those of the community, moving between the mine and the domestic camps.

In terms of species found during these assessments, it is clear that the species found during both assessments are mostly species associated with transformed habitat types and antropogenic



influences. The areas are not pristine and the areas surveyed, although similar that that of the 2015 survey, where more degraded during the 2017 study. The koppie has been subjected to the activity of illegal miners on the other side next to the valley and roads have been made for their equipment, which has also impacted on the overall ecology of the koppie area. Different reptile species were encountered between the 2015 and the 2017 study, but all of these species is thought to still occur within the mountainous areas as well as those captured in the desktop study as the habitat remains favorable for reptiles.

Geospatial analysis of known species distributions and protected areas in terms of the Limpopo Conservation Plan were incorporated into the overall conclusions and a management plan was devised that would minimize the impacts and risks assessed.

All injured animals sighted during the development should be protected and reported to the relevant ECO/Manager and should not be handled by the employees under any circumstance. Clear protocol should be developed on the matter.



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- Threatened or Protected Species (ToPS List); Species lists published in the Government Gazette No 389 of 16 April 2013
- Threatened or Protected Species (ToPS List) Species list published in the Government Gazette No 255 of 31 March 2015
- Limpopo Environmental Management Act (LEMA)
- Conservation of Agricultural Resources Act (Act 43 of 1983)

Internet Databases:



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IUCN: <http://iucnredlist.org>

European Commission: www.eusoils.jrc.ec.europa.eu

Web: Biodiversityexplorer.org

SANBI Database: www.sanbi.org

SANBI GIS: www.bgis.sanbi.org

sabap2.adu.org.za



Appendix A

Avifauna Baseline study



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Terrestrial Biodiversity: Moeijelijk Expansion Project
