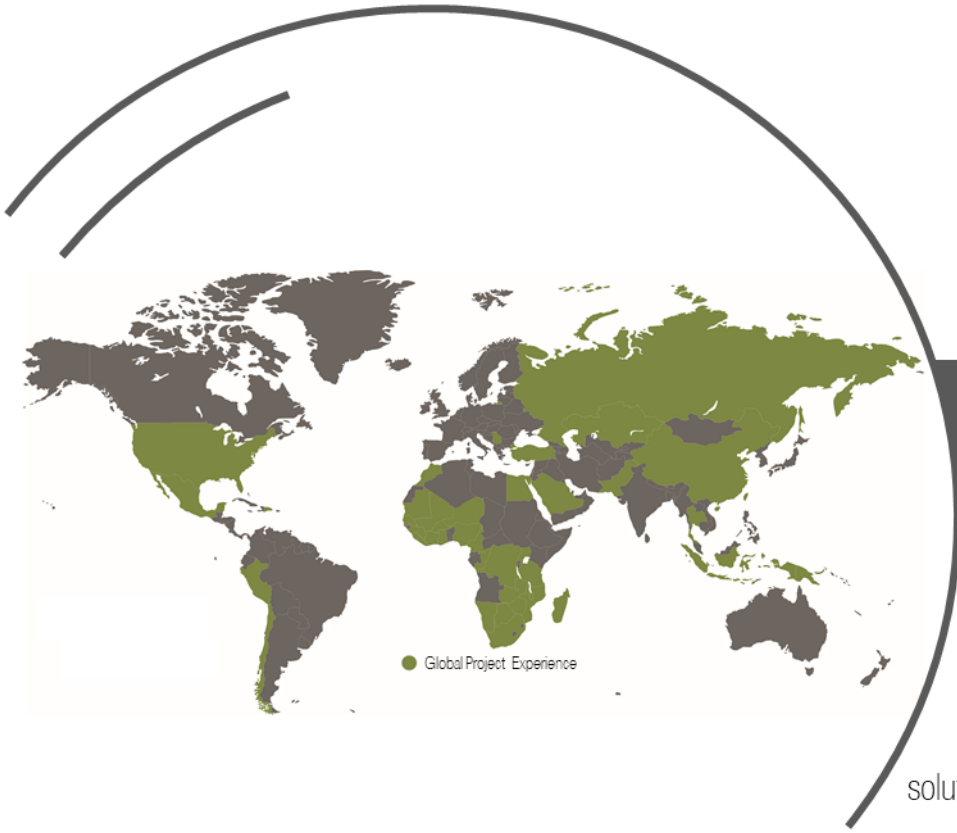

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Proposed Environmental Regulatory Process for the Middeldrift Resources Within the Existing New Clydesdale Colliery Mining Right, Situated in the Magisterial District of Nkangala, Mpumalanga Province

Fauna & Flora Impact Assessment

Prepared for:
Universal Coal NCC

Project Number:
UCD6587

June 2021

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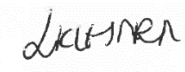
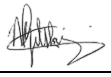
Report Type:	Fauna & Flora Impact Assessment
Project Name:	Proposed Environmental Regulatory Process for the Middeldrift Resources Within the Existing New Clydesdale Colliery Mining Right, Situated in the Magisterial District of Nkangala, Mpumalanga Province
Project Code:	UCD6587

Name	Responsibility	Signature	Date
Julia Ndou	Report compiler		February 2021
Lisa Hester	Field survey and report compiler		May 2021
Danie Otto	Technical review		May 2021
Njabulo Mzilikazi	Project Manager		June 2021

DETAILS AND DECLARATION OF THE SPECIALIST

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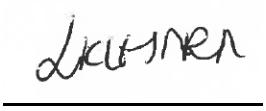
Full name:	Lisa Hester
Title/ Position:	Ecologist
Qualification(s):	BSc Hons Ecology
Experience (years):	4 years
Registration(s):	Cand. Pri. Sci 125725

I, Lisa Hester, declare that: –

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

- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



14 June 2021

Signature of the Specialist ***Date***

Findings, recommendations and conclusions provided in this report are based on the best available scientific methods and the author's professional knowledge and information at the time of compilation. Digby Wells employees involved in the compilation of this report, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

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Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

EXECUTIVE SUMMARY

Universal Coal Development (IV) Pty Ltd (hereafter Universal Coal) operates the New Clydesdale Colliery (NCC), an integrated thermal coal mine located in the Witbank coalfield, approximately 149 km east from Johannesburg in the Kriel district of Mpumalanga, South Africa. The mine comprises both underground and open-pit resources. Universal Coal had identified coal resources north of this existing NCC within their Mining Right Area (**MR Ref. No. MP30/5/1/2/2/492MR)** and as such is proposing to extend the proposed North Opencast Pit to the Middeldrift Resources (defined as Project Area). This Ecology report for the EIA should be read in collaboration with the other specialist reports prepared.

Based on Mucina & Rutherford (2006) classification of South Africa's vegetation, the proposed Project is located in an area dominated by the vegetation type Eastern Highveld Grassland, which according to those authors, is regarded as Endangered.

According to the Mpumalanga Biodiversity Sector Plan (MBSP), moderately modified, other natural and heavily modified areas are present within the Project Area. According to the South African Protected Areas Database (SAPAD) and the National Protected Areas Expansion Strategy (NPAES), the nearest nature reserves within a 35 km radius to the Project Area are the Heyns Private Nature Reserve and the John Bairns Nature Reserve.

A single season site survey was undertaken in February 2021 during the wet season. The following details were recorded:

- Much of the Project Area has been either transformed or degraded largely through historical crop production and other agricultural activities.
- Identified vegetation communities included Wetlands (Pan and Moist Grassland, see Wetland Report), Rocky Outcrops and Transformed Grassland (cultivated areas and areas of Alien Invasive Plant (AIP) proliferation). The Wetland and Rocky Outcrop communities are seen as sensitive landscapes in the context of this ecological report.
- Floral Species of Conservation Concern (SCC) recorded included:
    - Gladiolus crassifolius;
    - Gladiolus dalenii;
    - Habenaria filicornis;
    - Agapanthus africanus; and
    - Crinum macowanii.

All recorded floral SCC are protected under the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) (MNCA). They were encountered within the various wetland systems and Rocky Outcrops. Faunal SCC recorded two large wading birds, namely the Yellow-billed Stork (Endangered (EN)) and the Greater Flamingo (Near Threatened (NT)) within the non-

perennial Pan adjacent to the R547. It is assumed that the non-perennial Pan provides sustenance for the facultatively nomadic species. Other faunal SCC included:

- A Giant Bullfrog (*Pyxicephalus adspersus*) (NT), recorded within the corn fields of the cultivated fields;
- A Marsh Sylph (*Metisella meninx*) (NT), recorded in the Pan and Seep wetlands;
- A Serval (*Leptailurus serval*) (NT), recorded in close proximity to the proposed access road; and
- An African Clawless Otter (*Aonyx capensis*) (NT) tracks, recorded below the bridge on the R547 in the Steenkoolspruit.

The mining and agricultural activities in the identified vegetation communities have had direct negative ecological impacts, most notably vegetation clearing, habitat loss and fragmentation as well as AIP proliferation. Areas to be mined should be screened for the identified floral SCC and any other Red Data/protected species prior to site establishment and the construction phase. If found, these species should be relocated to a nearby site of similar habitat and permits applied for the removal.

The Project Area represents high faunal and floral diversity with numerous SCC identified throughout. The vegetation communities associated with the highest species richness were the Rocky Outcrops and wetland communities. However, in the context of the Project Area all of the remaining natural vegetation provides habitat for numerous faunal and floral species and therefore is of conservation significance. This impact assessment provides recommendations, mitigation measures, continuous monitoring measures, encourages concurrent rehabilitation and monitoring plan. The key mitigation measures include the following:

- A thorough screening prior to construction for the location of identified SCC. Permits will be required for the removal of identified floral SCC and it is advised that they be relocated to an offset area of similar habitat;
- Adhere to the recommendations and measures prescribed in the Digby Wells Wetland Report 2021, as numerous SCC were found to occur within the identified wetland habitat units; and
- Consider relocating the proposed bridge, it currently is situated within a sensitive habitat unit (Rocky Outcrop). An area that has previously been disturbed will be better suited for this proposed construction.

In conclusion, with the implementation of the recommendations and mitigation measures, residual risks will involve the proliferation of AIPs, loss of sensitive habitat for fauna and flora SCC, and fragmentation and edge effects to an endangered vegetation type (Eastern Highveld Grassland).

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ACRONYMS, ABBREVIATIONS AND DEFINITION

EIA	Environmental Impact Assessment
AIP	Alien Invasive Plant
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
IUCN	International Union for Conservation of Nature
km	Kilometres
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Rights Area
MNCA	Mpumalanga Nature Conservation (Act No. 10 of 1998)
MBSP	Mpumalanga Biodiversity Sector Plan
MTIS	Mineable tonnes in-situ
Mtpa	Million tonnes per annum
NCC	New Clydesdale Colliery
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act, 1998 (Act No. 107 of 1998)
NPAES	National Protected Areas Expansion Strategy
QDS	Quarter Degree Square
RDBs	Red Data Books
SCC	Species of Conservation Concern
SAPAD	South African Protected Areas Database
TOPS	Threatened or Protected Species
UCDIV	Universal Coal Development IV

1. Introduction

Universal Coal Development (IV) Pty Ltd (hereafter Universal Coal) operates the New Clydesdale Colliery (NCC), an integrated thermal coal mine located in the Witbank coalfield, approximately 149 km east from Johannesburg in the Kriel district of Mpumalanga, South Africa. The mine comprises both underground and open-pit resources. Universal Coal had identified coal resources north of this existing NCC within their Mining Right Area (**MR Ref. No. MP30/5/1/2/2/492MR)** and as such is proposing to extend the proposed North Opencast Pit to the Middeldrift Resources (defined as Project Area).

Universal Coal (UCD) is a multi-mine coal producer in South Africa. The NCC operated by Universal Coal Development IV (UCDIV) produced 4 million tonnes per annum (Mtpa) in 2019. This therefore equates to a ten-year Life of Mine (LOM). Middeldrift Resources are located north of NCC Diepspruit Mining Area withing the MR boundary and are proposed to be mined using opencast methods.

UCDIV requested Digby Wells Environmental (Digby Wells) to conduct a Fauna and Flora Impact Assessment for the Integrated Environmental Application Process for the inclusion of Middledrift Resources into the NCC near Kriel, Mpumalanga Province. This Fauna and Flora Impact Assessment, together with the other specialist assessments, will aim to assist in providing information for the applications.

2. Project Description

The Project is located in the Kriel district of the Mpumalanga Province. The Middeldrift resources lie North of the NCC Diepspruit Mining Area (an underground mining operation) and UCDIV is the holder of the Mineral Rights (MR) (Figure 2-1). The Project Area is a greenfields area. The intention is to exploit the resources through opencast mining methodologies.

The proposed new activities at the UCDIV NCC Mine to be authorised will entail:

- Mining of a pan;
- Construction of a bridge over the Steenkoolspruit to access the Middeldrift resources;
- Diversion of the provincial road which runs through the area of the Middeldrift site; and
- Construction of a new road (linked to the diversion) (approximately 4 km long).

The construction, operation and decommissioning phases of the Project shall comprise of the activities in Table 2-1. These Project activities will be used for the impact assessment.

Table 2-1: Project Activities

Project Phase	Project Activity
Construction Phase	Site/vegetation clearance
	Contractors laydown yard
	Access and haul road construction
	Topsoil stockpiling
Operational Phase	Open pit establishment
	Removal of rock (blasting)
	Stockpiling (i.e. soils) establishment and operation
	Operation of the open pit workings
Decommissioning Phase	Rehabilitation – rehabilitation mainly consists of spreading of the preserved subsoil and topsoil, profiling of the land and re-vegetation
	Post-closure monitoring and rehabilitation

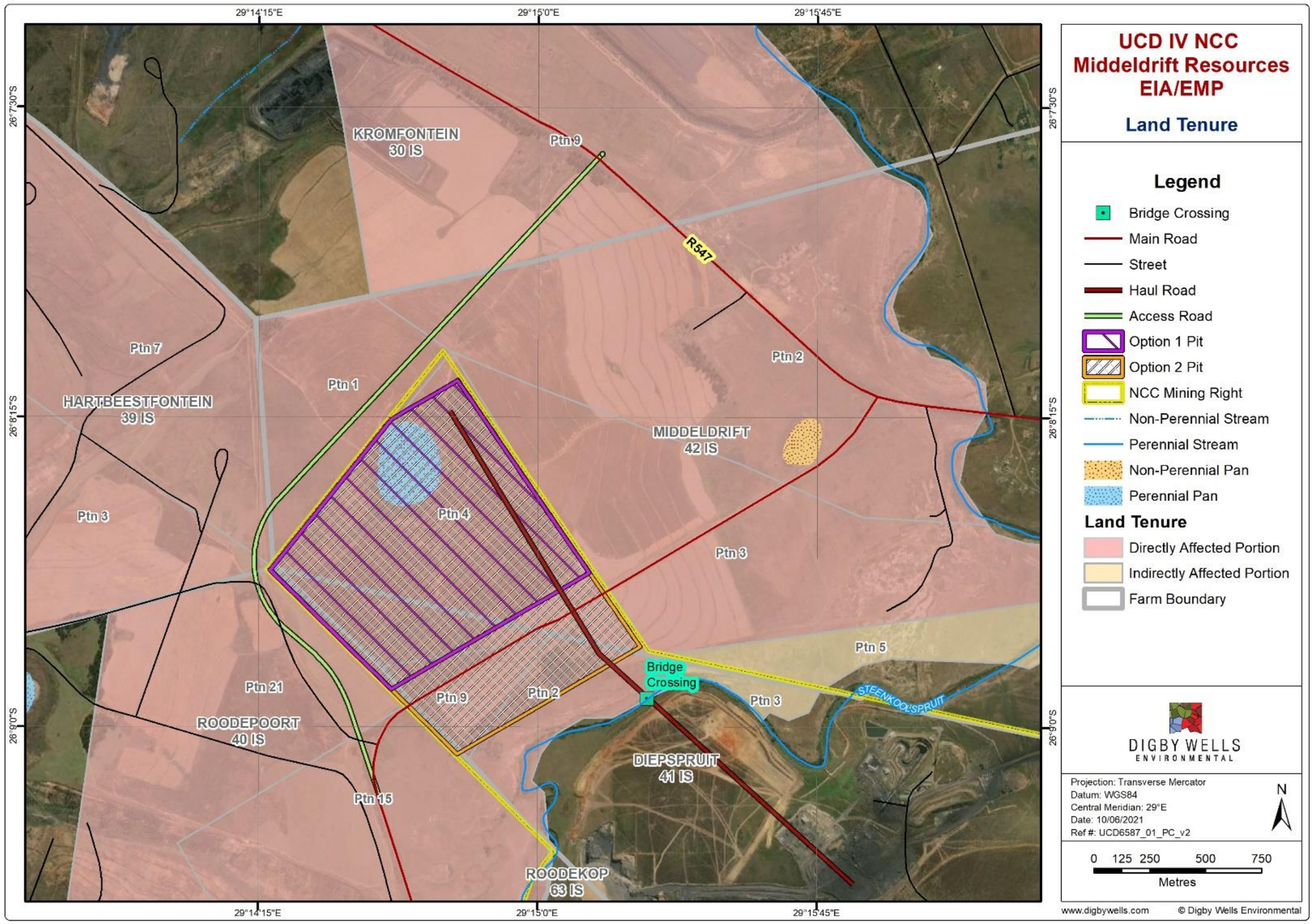

Figure 2-1: Land Tenure Map

3. Relevant Legislation, Standards and Guidelines

The requested Fauna and Flora Impact Assessment for the regulatory environmental process must comply with the requirements encapsulated in the relevant national legislation framework. The assessment will be completed in accordance with the following legislation:

Table 3-1: Applicable Legislation, Regulations, Guidelines and By-Laws

Legislation, Regulation, Guideline or By-Law	Applicability
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) The NEM:BA regulates the management and conservation of the biodiversity of South Africa within the framework provided under NEMA. This Act also regulates the protection of species and ecosystems that require national protection and also takes into account the management of alien and invasive species. The following regulations which have been promulgated in terms of the NEM:BA are also of relevance: • Alien and Invasive Species Lists, 2020 (terms of GNR 1003 in GG 43726 dated 18 September 2020 – effective from 18 October 2020); • Threatened and Protected Species Regulations; and • National list of Ecosystems Threatened and in need of protection under Section 52(1) (a) of the Biodiversity Act (GG 34809, GNR 1002, 9 December 2011).	• A Fauna and Flora Imapct Assessment has been undertaken; • The Project activities will be set out to abide by the guidelines set out in NEM:BA; • Areas of concern will be indicated and possible alternatives to avoid these areas; and • Required mitigation measures will be included in the Environmental Management Plan (EMP) in this report.
Section 24 of the Constitution of the Republic of South Africa,1996 (Act No. 108 of 1996) Wetlands are protected under the Act that states that everyone has the right to an environment that is not harmful to their health or wellbeing. It also states that the environment must be protected for the benefit of present and future generations through responsible legislative measures. The Act: • Prevents pollution and ecological degradation; • Promote conservation and secure ecological sustainability; and • Promote justifiable economic and social development using natural resources.	• A Fauna and Flora Impact Assessment; • Environmental Management Plan and Monitoring Program is included in this report; and • Recommendations to prevent, avoid, and rehabilitate possible impacts were assessed.

Legislation, Regulation, Guideline or By-Law	Applicability
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). NEMA (as amended) was set in place under Section 24 of the Constitution. Certain environmental principles under NEMA must be adhered to, to inform decision making for issues affecting the environment. Section 24 (1)(a) and (b) of NEMA state that: *The potential impact on the environment and socio-economic conditions of activities that require authorisation or permission by law and which may significantly affect the environment must be considered, investigated and assessed before their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.* The NEMA requires that pollution and degradation of the environment be avoided, or, where it cannot be avoided be minimised and treated.	• Activities that will influence the Fauna and Flora of the proposed Project Area are listed in Section 2 and have been identified as Listed Activities in the Listing Notices (as amended) and therefore require environmental authorisation before being undertaken.
Mpumalanga Biodiversity Sector Plan (2014) The Mpumalanga Biodiversity Sector Plan (MBSP) is a spatial tool that forms part of the national biodiversity planning tools and initiatives that are provided for national legislation and policy. The MBSP was published in 2014 by the Mpumalanga Tourism and Parks Agency (MTPA) and comprises a set of maps of biodiversity priority areas accompanied by contextual information and land-use guidelines for use in land-use and development planning, environmental assessment and regulation, and natural resource management. Strategically the MBSP enables the province to: • Implement the NEM:BA, 2004 provincially, and comply with requirements of the National Biodiversity Framework, 2009 (NBF) and certain international conventions; • Identify those areas of highest biodiversity that need to be considered in provincial planning initiatives; and • Address threat of climate change (ecosystem-based adaptation).	• Provides background information about the ecology of the province and natural resource management as well as tools that can be used to guide decisions around biodiversity management.

Legislation, Regulation, Guideline or By-Law	Applicability
The Mineral and Petroleum Resources Development Act (Act No.28 of 2002) (MPRDA) intends: • to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and • to provide for matters connected therewith.	• A Fauna and Flora Basic Assessment was undertaken • Environmental Management Plan and Monitoring Program is included in this report; and • Recommendations to prevent, avoid, and rehabilitate possible impacts were assessed.
SANBI, National Biodiversity Assessment (NBA) 2018 The NBA is a collaborative effort to synthesise the best available science on South Africa's biodiversity to inform policy and decision making in a range of sectors and contribute to national development priorities. It is used for the following: • The NBA is used to inform policy in the biodiversity sector, such as the National Biodiversity Framework and the National Protected Area Expansion Strategy, as well as informing policies and strategies of a range of other sectors that rely on natural resources, such as the water, agriculture and mining sectors. • The NBA provides information to help prioritise the often limited resources for managing and conserving our biodiversity – actions can focus on preventing further loss and degradation of ecosystems and ecological infrastructure, on consolidating and expanding the protected areas network; and on interventions require to restore areas in bad condition so they become functional again. • The NBA provides context and information that feeds into strategic planning processes such as strategic Environmental Assessments and bioregional planning. • The NBA provides information for a range of national level reporting processes such as the South Africa Environment Outlook and ensures that the DEA has the necessary biodiversity information to meet the international reporting commitments to the Convention on Biological Diversity (CBD).	• The guideline provides practical guidance for determining the current state of the biodiversity and ecosystem identified within the area of interest as well as providing indication of threat status and protection level for both species and ecosystems.

4. Assumptions, Limitations and Exclusions

The compilation of this Report is based on the following assumptions and limitations in Table 4-1.

Table 4-1: Limitations and Assumptions with Resultant Consequences of this Report

Assumptions and Limitations	Consequences
This fauna and flora study forms part of a larger EIA and should be read in conjunction with the EIA and other related specialist studies.	This report does not include any other specialist studies other than the fauna and flora assessment. This report cannot be used as a stand-alone report in the application for Environmental Authorisation
This Fauna and Flora Assessment was conducted during November 2020 having some access restrictions to parts of the Project Area.	Findings, recommendations, and conclusions provided in this report are based on the authors' best scientific and professional knowledge and information available at the time of compilation.
No form of this report may be amended or extended without the prior written consent of the author and/or a relevant reference to the report by the inclusion of an appropriately detailed citation. Any recommendations, statements, or conclusions drawn from or based on this report must cite or reference this report. Whenever such recommendations, statements or conclusions form part of the main report relating to the current investigation, this report must be included in its entirety.	The fauna and flora report cannot be used as a stand-alone report in the application for an Environmental Authorisation.

5. Details of Specialist

The following is a list of Digby Wells' staff who were involved in the Fauna and Flora Impact Assessment:

- **Danie Otto** manages the South African Operations at Digby Wells. He holds an M.Sc. in Environmental Management with B.Sc. Hons (Limnology & Geomorphology, and GIS & Environmental Management) and B.Sc. (Botany and Geography & Environmental Management). He is a biogeomorphologist that specialises in ecology of wetlands and rehabilitation. He has been a registered Professional Natural Scientist since 2002. Danie has 25 years of experience in the mining industry in environmental and specialist assessments, management plans, audits, rehabilitation, and research. He has experience in 8 countries and his experience is in the environmental sector of coal, gold, platinum (PGMs), diamonds, asbestos, rock, clay & sand quarries, copper, phosphate, andalusite, base metals, heavy minerals (titanium), uranium, pyrophyllite, chrome, nickel etc. He has wetland and geomorphology working experience across

Africa including specialist environmental input into various water resource related studies. These vary from studies of the wetlands of the Kruger National Park to swamp forests in central Africa to alpine systems in Lesotho.

- **Lisa Hester (Pri.Sci.Cand)** currently holds the position of Ecologist at Digby Wells Environmental in South Africa. She obtained her BSc Honour's degree in Ecology and Conservation from the University of Witwatersrand in South Africa. Her dissertation topic involved an in-depth ecological survey of the Croc River Mountain Conservancy in Nelspruit. Since completion of her studies, Lisa has worked on numerous fauna and flora biomonitoring reports both locally and internationally (including Australia). Working on a multitude of surveys in various locations has allowed Lisa to engage upon a multi-faceted professional forum. Various scopes of work involving, ecological baseline assessments, ecological rehabilitation, wetland assessments, nest-box installations, environmental impact assessments, protected species surveys, bat surveys, species relocation and vegetation reports consists of her repertoire of work.
- **Julia Ndou** is an assistant consultant at Digby Wells Environmental. She obtained her MSc in Aquatic Health from the University of Johannesburg. Her current work experience at Digby Wells Environmental includes fieldwork, the compilation of aquatics, wetlands, fauna and flora proposals, memorandums, baseline biomonitoring and impact assessment reports.

6. Methodology

This section presents the detailed methodology undertaken during the infield assessment and during the assessment of all impacts related to the project in terms of fauna and flora (Terrestrial Biodiversity).

6.1. Desktop Gap Analysis

The desktop review involved compiling relevant information for the greater study area from reliable and recognised resources, including historical studies and assessments. The aim of the desktop study is to identify the current biodiversity and ecosystem status through various databases including the following:

- Mucina and Rutherford (2012), expected vegetation type and community structure:
- South African National Botanical Institute (SANBI), Pretoria Computerised Information System (PRECIS) List's, potential species in the proposed Project Area according to the QDS;
- Potentially occurring avifaunal species through South African Bird Atlas Project (SABAP2), BirdLife South Africa Area Directory (Barnes, 1998) and The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al., 2015);
- Potentially occurring mammal species through The Mammals of the Southern African Subregion (Skinner & Chimimba , 2005), the Animal Demography Unit Virtual Museum

(http://vmus.adu.org.za/), and The 2016 Red List of Mammals of South Africa, Lesotho and Swaziland (ww.ewt.org.za) (Child, M. F., et al.,2017);

- Potentially occurring herpetofauna species list through the SARCA (sarca.adu.org); A Guide to the Reptiles of Southern Africa (Graham, 2013); Atlas and Red List of Reptiles of South Africa, Lesotho and Swaziland (Bates et al., 2014), A Complete Guide to the Frogs of Southern Africa (Du Preez & Carruthers, 2009); Atlas and Red Data Book of Frogs of South Africa, Lesotho and Swaziland (Minter, 2004); and
- Mpumalanga Provincial legislation, potential Red Data Listed species and their current status.

6.1.1. Legislation

6.1.1.1. Mpumalanga Nature Conservation Act (Act No. 10 of 1998)

The Mpumalanga Nature Conservation Act (Act No. 10 of 1998) (MNCA) is responsible for making provisions with respect to nature conservation in the Mpumalanga province. It provides for, among other things, protection of wildlife, hunting fisheries, protection of endangered fauna and flora as listed in the Convention of International Trade in Endangered Species (CITES) of wild flora and fauna, the control of harmful animals, freshwater pollution and enforcement. The objectives of the MNCA are to consolidate the laws relating to nature conservation applicable in the Mpumalanga province and to provide for matters connected therewith. The MNCA focuses on the protection of critically endangered to vulnerable fauna, and flora within the province.

6.1.1.2. National Environmental Management Biodiversity Act (Act No. 10 of 2004)

The purpose of the National Environmental Management Biodiversity Act (Act No. 10 of 2004) (NEM:BA) is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed. In terms of the NEM:BA, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA Regulations);
- Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity; and
- Limit further loss of biodiversity and conserve endangered ecosystems.

NEM: BA restricts activities on protected species via its associated Threatened or Protected Species (TOPS) regulations and provides protection for any activity (which must be identified in terms of this Act) which may impact these species.

Additionally, the Alien and Invasive Species Regulations (GNR 506 of 2013), promulgated in terms of Section 97(1) of NEM: BA apply as well as Alien Invasive Regulations (2014) and the Invasive Species List (2018).

6.1.1.3. Red Data

Red Data Books (RDBs), are lists of threatened plants and animals specific to a certain region. They are a vital source of information in guiding conservation decisions and have guided the literature review of this study. South Africa has produced 5 RDBs dealing with each of the following: birds, land mammals, fish (freshwater and estuarine only), reptiles and amphibians, and butterflies.

The conservation status of a plant or animal species is described by the following terms:

- EXTINCT: a species for which there is a historical record, but which no longer exists in the area under review;
- ENDANGERED a species in danger of extinction, and whose survival is unlikely if the factors causing its decline to continue;
- VULNERABLE a species which it is believed will move into the endangered category if the factors causing its decline to continue; and
- RARE a species with small populations, which are not yet vulnerable or endangered, but which are at risk.

The term **THREATENED** is commonly used as a collective description for species which are endangered, vulnerable or rare.

Some species are **ENDEMIC,** i.e. they are restricted to one region and occur nowhere else. A threatened endemic species is a conservation priority.

Of special concern are protected plant and animal species. Listed species of flora and fauna are regarded as species whose representation in the wild has declined to such an extent that drastic action is needed to ensure their survival. Under anthropogenic pressure, the number of these species has reached levels where preservation management is needed, and conservation management will no longer be effective. The listing of these species under either International Union for the Conservation of Nature (IUCN) or CITES is regarded as a valuable starting point to initiate legally sanctioned management practices to bring the numbers of these species back to within acceptable numbers.

6.1.1.4. IUCN

The IUCN Red List of Threatened Species provides taxonomic, conservation status and distribution information on plants and animals that have been globally evaluated using the

IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those plants and animals that are facing a higher risk of global extinction (i.e. those listed as Critically Endangered, Endangered, and Vulnerable). The IUCN Red List also includes information on:

- Plants and animals that are categorized as Extinct or Extinct in the Wild;
- Taxa that cannot be evaluated because of insufficient information (i.e., are Data Deficient); and
- Plants and animals that are either close to meeting the threatened thresholds or that would be threatened were it not for an ongoing taxon-specific conservation programme (i.e., are Near Threatened).

The figure below shows the Current IUCN Red List categories. These categories include Critically Endangered (CR), Endangered (EN), and Vulnerable (VU), which are collectively known as the Threatened category, Conservation Dependent (CD), Near Threatened (NT), and Least Concern (LC) which are collectively known as Lower Risk.

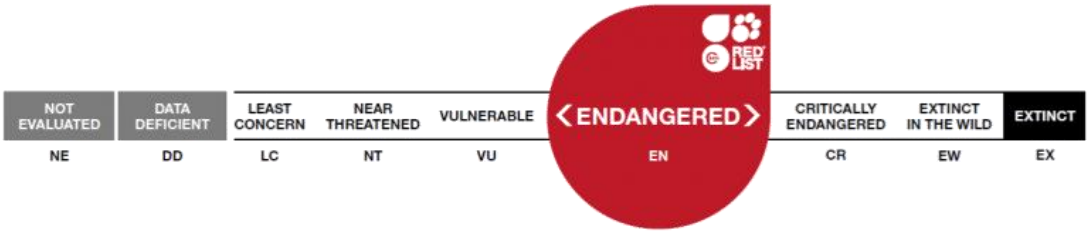

Figure 6-1: IUCN categories

Abbreviations and descriptions of each IUCN category are summarized in Table 6-1 below.

Plants and animals that have been evaluated to have a low risk of extinction are classified as Least Concern (IUCN.org) (Table 6-1)

Table 6-1: Description of IUCN Categories

IUCN Category	Abbreviation	Description
Extinct	EX	No surviving individuals of the species
Extinct In The Wild	EW	Known only to survive in captivity, or as a naturalized population outside its historic range.
Critically Endangered	CR	At a very high risk of extinction.
Endangered	EN	High risk of extinction in the wild.
Vulnerable	VU	High risk of endangerment in the wild.
Near Threatened	NT	Likely to become endangered in the near future.

IUCN Category	Abbreviation	Description
Least Concern	LC	Lowest risk. Does not qualify for a more at-risk category
Data Deficient	DD	Not enough data to make an assessment of its risk of extinction.
Not evaluated	NE	Has not yet been evaluated against the criteria.

6.1.1.5. CITES

CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival (CITES.org).

CITES works by subjecting international trade in specimens of selected species to certain controls. All import, export, re-export and introduction from the sea of species covered by the Convention has to be authorized through a licensing system. Each Party to the Convention must designate one or more Management Authorities in charge of administering that licensing system and one or more Scientific Authorities to advise them on the effects of trade on the status of the species (CITES.org). Specimens are divided into the following appendices according to the restriction on trade.

Appendices I, II and III

- Appendix I includes species threatened with extinction. Trade in specimens of these species is permitted only in exceptional circumstances;
- Appendix II includes species not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival; and
- Appendix III contains species that are protected in at least one country, which has asked other CITES Parties for assistance in controlling the trade. Changes to Appendix III follow a distinct procedure from changes to Appendices I and II, as each Party is entitled to make unilateral amendments to it.

6.1.1.6. TOPS Regulations

The Threatened or Protected Species Regulations 152 of 2007 ("TOPS Regulations") and the Lists of Critically Endangered, Endangered, Vulnerable and Protected Species (TOPS Lists) were published in 2007, in terms of the NEM:BA (South Africa, 2007(a) and (b)) and have been amended since then. These regulations through NEM:BA Chapter 4 provide for the protection and sustainable use of listed Threatened or Protected Species (TOPS) species. NEM:BA restricts activities that may be carried out in respect of Threatened or Protected Species (TOPS).

6.2. Field Investigations

Wet season infield fauna assessments took place during December 2020. Camera traps and Sherman traps were set out in locations where high faunal activity was observed and expected. During the field survey, the area was surveyed for the various fauna assemblages and floral species. The methodology of the fauna and flora assessment is described below.

6.2.1. Flora

A walkthrough of the site was undertaken to assess the vegetation. The survey searched for protected and listed plant species and declared Alien Invasive Plants (AIPs), with the overall aim to produce a full species list of all plant species present.

6.2.2. Mammals

A walkthrough of the site was done during the site survey whereby mammal species were identified by visual sightings as well as using spoor, droppings and roosting sights and available habitat. Camera traps and Sherman traps were set up in various locations where high faunal activity was observed and expected. Mammals were identified using the Smithers' Mammals of the Southern African field guide (Smithers, 2000).

6.2.3. Birds (Avifauna)

Data regarding the distribution of bird species was obtained from the Quarter Degree Square (QDS) using the information available from the SABAP2. Concurrently with the mammal survey, the principal ornithological field survey technique was used to record bird species present. Opportunistic sightings were recorded during the site survey.

Because the primary purpose of this work was to establish the presence of species, no distance or time limit was set, and hence any species seen or heard anywhere within the general vicinity of the proposed project site was recorded. Visual identification was used to confirm calls of the less common species. Bird species were confirmed using the Sasol photographic field guide (Ryan, 2009)

Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN 2019), birds listed by NEM:BA and the Eskom Red Data Book of Birds (Taylor, 2015).

6.2.4. Reptiles and Frogs

Comprehensive amphibian surveys can only be undertaken by nocturnal surveys throughout the wet season. This was beyond the current scope of the assessment and the area was surveyed diurnally for possible habitat for amphibian species. Direct/opportunistic observations were completed along trails or paths within the Project Area. Any herpetofauna species seen or heard along such paths or trails within the Project Area were identified and recorded. Another method used was to examine refuges using visual scanning of terrains to record smaller herpetofauna species which often conceal themselves under rocks and in fallen

logs, rotten tree stumps, in leaf litter, rodent burrows, ponds, old termite mounds, etc. Du Preez, *et al*. (2009) was used to confirm identification where necessary. Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN 2019) and listed by NEM:BA.

6.2.5. Invertebrates (Spiders, Scorpions, Beetles and Butterflies)

A list of visually identified and observed invertebrate species was compiled during the field survey. However, due to their cryptic nature and habits, varied stages of life cycles, seasonal and temporal fluctuations within the environment, it is unlikely that all invertebrate species will have been recorded during the site assessment period. Nevertheless, the data gathered during the general invertebrate assessment along with the habitat analysis provided an accurate indication of which invertebrate species are likely to occur in the study area. A sweep net was used to capture and identify invertebrates. The focus of this assessment was on protected species as this would narrow the field considerably. Assessment of the conservation status of species recorded focused on the various categories of Globally Threatened Species (IUCN 2019) and inverts listed by the NEM:BA.

6.2.6. Species of Conservational Concern Assessment

The term SCC in the context of this report refers to all RD (Red Data) and IUCN (International Union for the Conservation of Nature) listed fauna and flora species, as well as protected species of relevance to the project.:

- Critically Endangered (CR): A taxon is Critically Endangered when it is considered to be facing an extremely high risk of extinction in the wild (IUCN, 2019).
- Endangered (EN): A taxon is Endangered when it is considered to be facing a very high risk of extinction in the wild (IUCN, 2019).
- Vulnerable (VU): A taxon is Vulnerable when the best available evidence indicates it to be facing a high risk of extinction in the wild (IUCN, 2019).
- Near Threatened (NT): A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future (IUCN, 2010).

7. Baseline Environment

The table below (Table 7-1) gives a detailed description of the baseline attributes for the Project Area. Following the table are the associated maps for the conservation aspects of the Project Area.

Table 7-1: Baseline Environment of the UCDIV NCC Project Area

DETAILS OF THE PROJECT AREA IN TERMS OF MUCINA & RUTHERFORD (2006)		DESCRIPTION OF THE VEGETATION TYPE(S) RELEVANT TO THE PROJECT AREA ACCORDING TO MUCINA & RUTHERFORD (2006)					
Biome	According to Mucina and Rutherford (2006), the Project Area falls within a **Grassland Biome.**	**Altitude (m)**	1 520–1 780, but also as low as 1 300. (Figure 7-1)				
Bioregion	The study area is located within the **Mesic Highveld Grassland Bioregion.**	**Climate**	Strongly seasonal summer rainfall, with very dry winters.				
Vegetation Type	**Eastern Highveld Grassland**		**MAP* (mm)**	**MAT* (°C)**	**MFD* (Days)**	**MAPE* (mm)**	**MASMS* (%)**
CONSERVATION DETAILS PERTAINING TO THE PROJECT AREA (VARIOUS DATABASES)			726	14.7	32	1926	73
Mining and Biodiversity Guideline Category, DEA (2013)	The Project Area was classified as both **High Biodiversity Importance – High Risk for Mining** and **Moderate Biodiversity Importance – Moderate Risk for Mining** (Figure 7-2).	**Distribution**	Mpumalanga and Gauteng Provinces: Plains between Belfast in the east and the eastern side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief.				
National Threatened Ecosystems (2011)	According to the National List of threatened terrestrial ecosystems, the Middeldrift Resources does not fall within any original or remaining extents of a threatened ecosystem.	**Geology & Soils**	Red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup). Land types of Bb (65%) and Ba (30%).				
SAPAD & SACAD (Q4, 2018); and NPAES (2009) (see FIGURE 7-4	Two protected areas are observed within a 35 km radius to Project Area. The Heyns Private Nature Reserve is situated approximately 32 km northeast and is approximately 3700 ha (hectares). The John Bairns Private Nature Reserve is situated approximately 20 km north and is 1270 ha. Together, these Nature Reserves are not affiliated with the Mpumalanga Tourism and Parks Agency (MTPA) and are believed to be privately owned.	**Conservation**	Endangered. Target 24%. Only very small fraction conserved in statutory reserves (Nooitgedacht Dam and Jericho Dam Nature Reserves) and in private reserves (Holkranse, Kransbank, Morgenstond). Some 44% transformed primarily by cultivation, plantations, mines, urbanisation and by building of dams. Cultivation may have had a more extensive impact, indicated by land-cover data. No serious alien invasions are reported, but *Acacia mearnsii* can become dominant in disturbed sites. Erosion is very low.				
IBA (2015)	No classified IBAs within the Project Area.	**Vegetation & landscape features**	Slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Senegalia caffra, Celtis africana, Diospyros lycioides* subsp *lycioides, Parinari capensis, Protea caffra, P. welwitschii* and *Searsia magalismontanum*).				
MPUMALANGA BIODIVERSITY SECTOR PLAN (MBSP)							
CBA & ESA (Figure 7-3)	Moderately modified, other natural areas and heavily modified areas are present within the proposed Project Area (Figure 7-3).						

CBA = Critical Biodiversity Areas; ESA = Ecological Support Area; IBA = Important Bird and Biodiversity Areas; MAP – Mean annual precipitation; MAT – Mean annual temperature; MAPE – Mean annual potential evaporation; MFD = Mean Frost Days; MASMS – Mean annual soil moisture stress (% of days when evaporative demand was more than double the soil moisture supply); NBA = National Biodiversity Assessment; NPAES = National Protected Areas Expansion Strategy; SAPAD = South African Protected Areas Database.

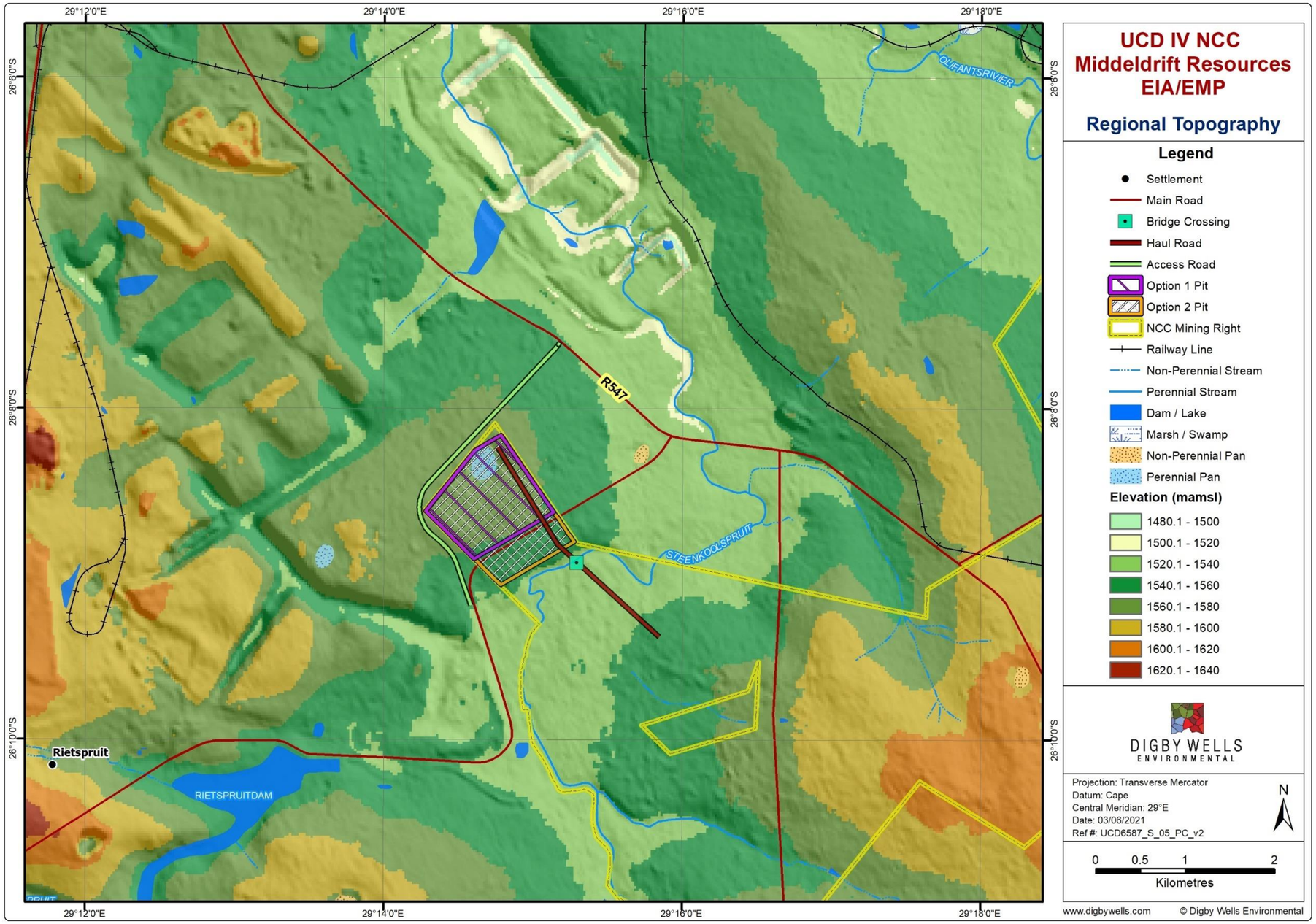

Figure 7-1: Regional Topography of the UCDIV NCC Mine Project Area

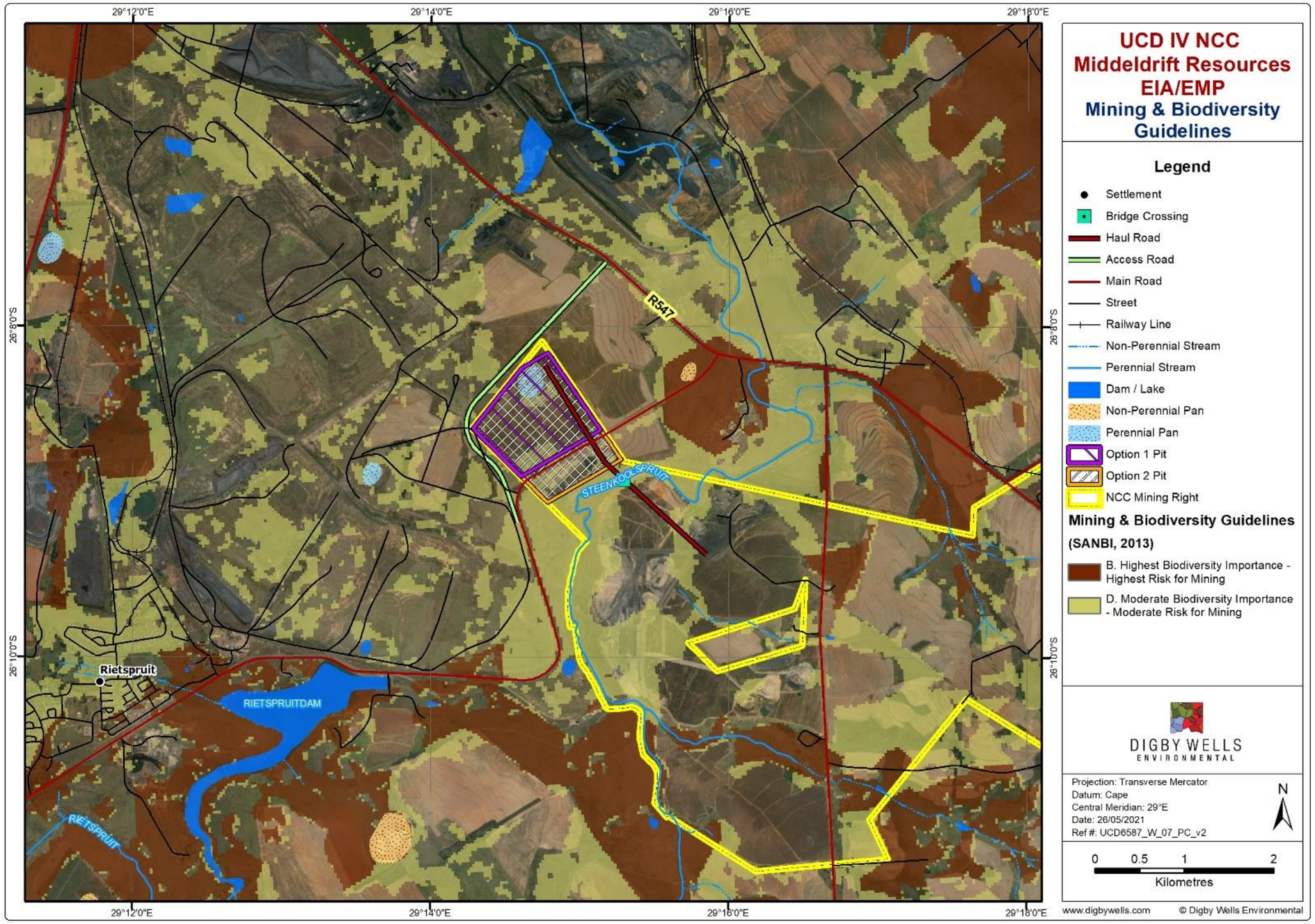

Figure 7-2: Mining and Biodiversity Guideline of the UCDIV NCC Mine Project Area

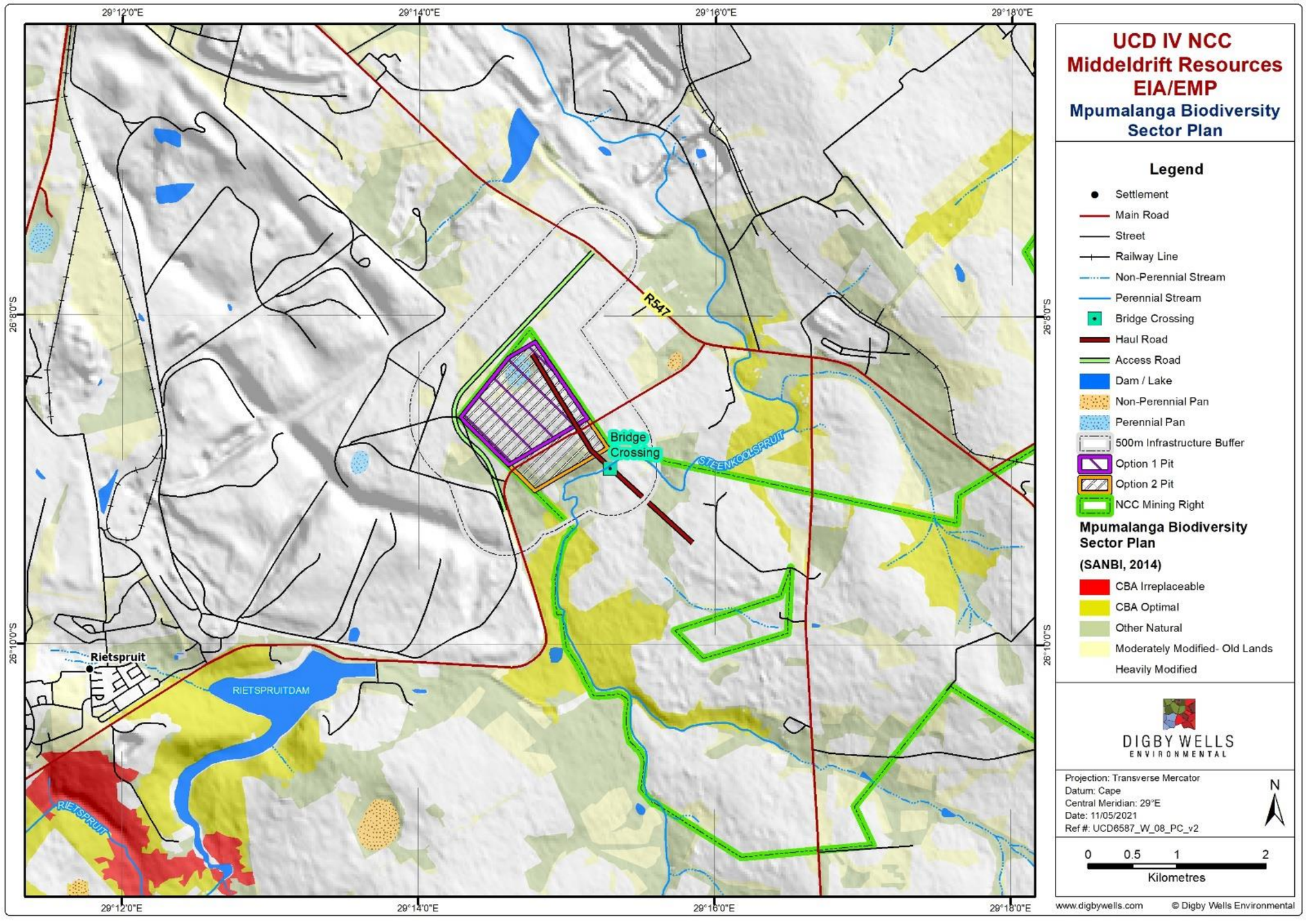

Figure 7-3: Mpumalanga Biodiversity Sector Plan (MBSP) for the NCC Mine Project Area

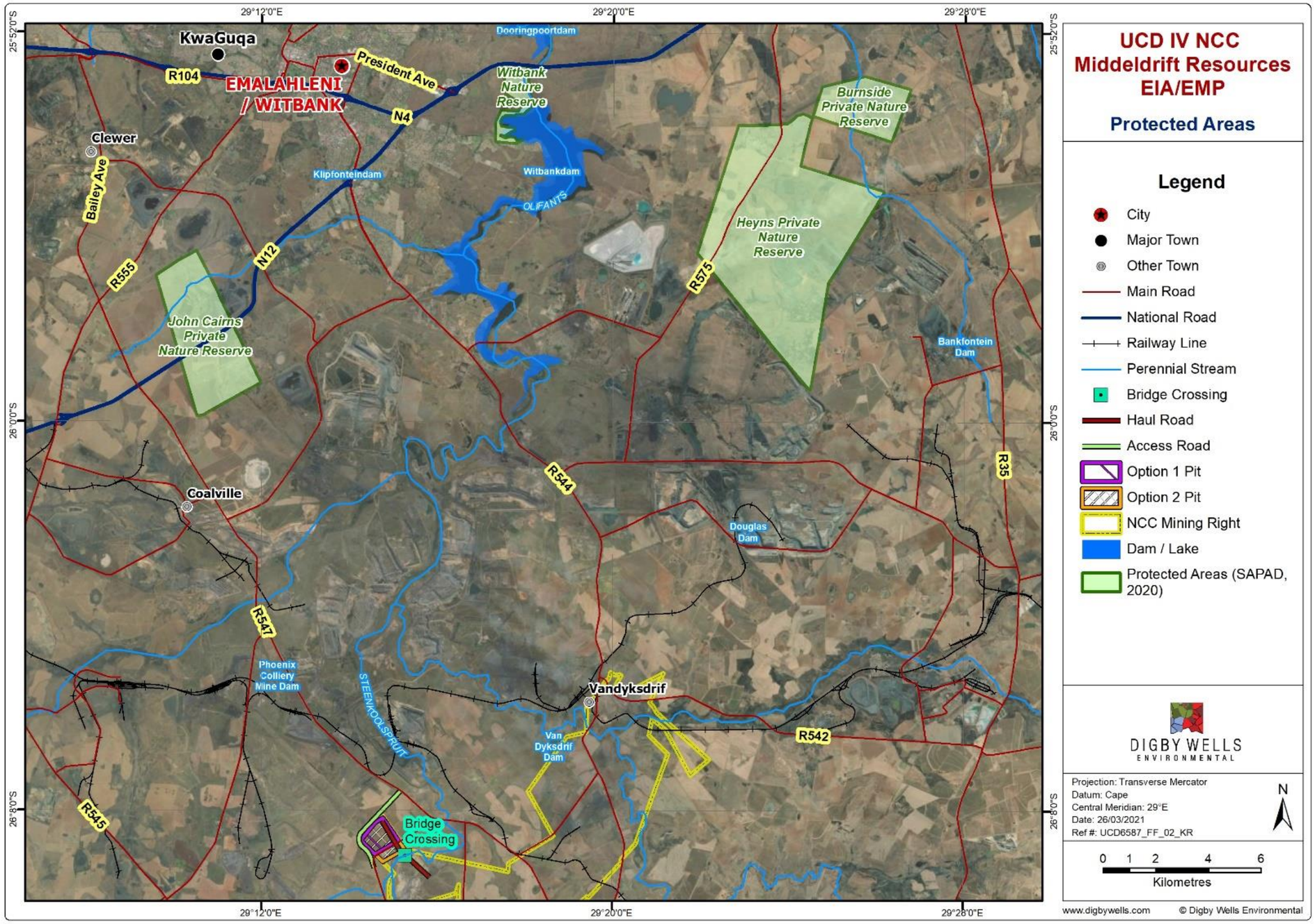

Figure 7-4: Protected Areas in Proximity to the UCDIV NCC Mine Project Area

7.1. Flora

This section describes in detail the different vegetation units encountered in the Project Area.

7.1.1. Regional Vegetation

The Project Area falls within the **Eastern Highveld Grassland (Gm12)** vegetation type as described by Mucina & Rutherford, 2012, as seen in Figure 7-5. The Grassland Biome is one of the nine South African plant Biomes and the second most biodiverse biome in South Africa. The Grassland Biome is situated primarily on the central plateau of South Africa, and the inland areas of Kwa-Zulu Natal and the Eastern Cape provinces. The biome is rich in flora and fauna diversity but is under threat due to persistent agriculture, expansion of mining and industrial activities.

The Eastern Highveld Grassland is characterised by slightly to moderately undulating plains, including some low hills and pan depressions. This vegetation type is considered to be "**Endangered**" on the National List of Threatened Terrestrial Ecosystems and is considered approximately 55% altered. It is considered to be "poorly protected" with only 13% of its' target percentage protected (Lötter, 2015). The primary factor responsible for this status is due to on-going cultivation activities within the area. The vegetation of the landscape is short dense grassland dominated by the usual highveld grass composition (*Aristida, Digitaria, Eragrostis, Themeda, Tristachya* etc) (Mucina & Rutherford, 2012). Table 7-2 lists the species expected to occur within this region.

Table 7-2: Flora Species Characteristics of the Eastern Highveld Grassland

Plant Form	Species
Graminoids[1]	*Aristida aequiglumis, A. congesta, A. junciformis* subsp. *galpinii, Brachiaria serrata, Cynodon dactylon, Digitaria monodactyla, D. tricholaenoides, Elionurus muticus, Eragrostis chloromelas, E. capensis, E. curvula, E. gummiflua, E. patentissima, E. plana, E. racemosa, E. sclerantha, Heteropogon contortus, Loudetia simplex, Microchloa caffra, Monocymbium ceresiiforme, Setaria sphacelata, Sporobolus africanus, S. pectinatus, Themeda triandra, Trachypogon spicatus, Tristachya leucothrix, T. rehmannii, Alloteropsis semialata* subsp. *eckloniana, Andropogon appendiculatus, A. schirensis, Bewsia biflora, Ctenium concinnum, Diheteropogon amplectens, Harpochloa falx, Panicum natalense, Rendlia altera, Schizachyrium sanguineum, Setaria nigrirostris, Urelytrum agropyroides.*

[1] **Graminoids** means grasses and grass like plants, such as sedges.

Plant Form	Species
Herbs	*Berkheya setifera, Haplocarpha scaposa, Justicia anagalloides, Pelargonium luridum, Acalypha angustata, Chamaecrista mimosoides, Dicoma anomala, Euryops gilfillanii, E. transvaalensis* subsp*. setilobus, Helichrysum aureonitens, H. caespititium, H. callicomum, H. oreophilum, H. rugulosum, Ipomoea crassipes, Pentanisia prunelloides* subsp. *latifolia, Selago densiflora, Senecio coronatus, Hilliardiella oligocephala, Wahlenbergia undulata.*
Geophytic[2] Herbs	*Gladiolus crassifolius, Haemanthus humilis* subsp*. hirsutus, Hypoxis rigidula* var. *pilosissima, Ledebouria ovatifolia.*
Succulent Herbs	*Aloe ecklonis.*
Low Shrubs	*Anthospermum rigidum* subsp. *pumilum, Seriphium plumosum.*

The surveys conducted in 2016 (SAS, 2016), identified two prominent vegetation types (habitat units) within and adjacent to the Project Area, namely a wetland and transformed habitat unit. The wetland habitat is associated with the floodplain and main channel of the Steenkoolspruit and a valley bottom wetland. It was observed with a moderately high ecological sensitivity as the wetland provides niche habitat for a high floral diversity and acts as a migratory corridor in an area transformed by mining and agriculture. The Digby Wells Environmental Wetland Scoping Report 2020 (DWE, 2020) has identified a Depression and Seep National Freshwater Ecosystem Priority Areas (NFEPA) Wetland within the Project Area. The transformed habitat unit was associated with historical agricultural activities, altering the ecological structure of the associated Eastern Highveld Grassland. The overall ecological functionality was deemed low.

[2] **Geophytic** means a land plant that survives an unfavourable period by means of underground food-storage organs (e.g. rhizomes, tubers, and bulbs).

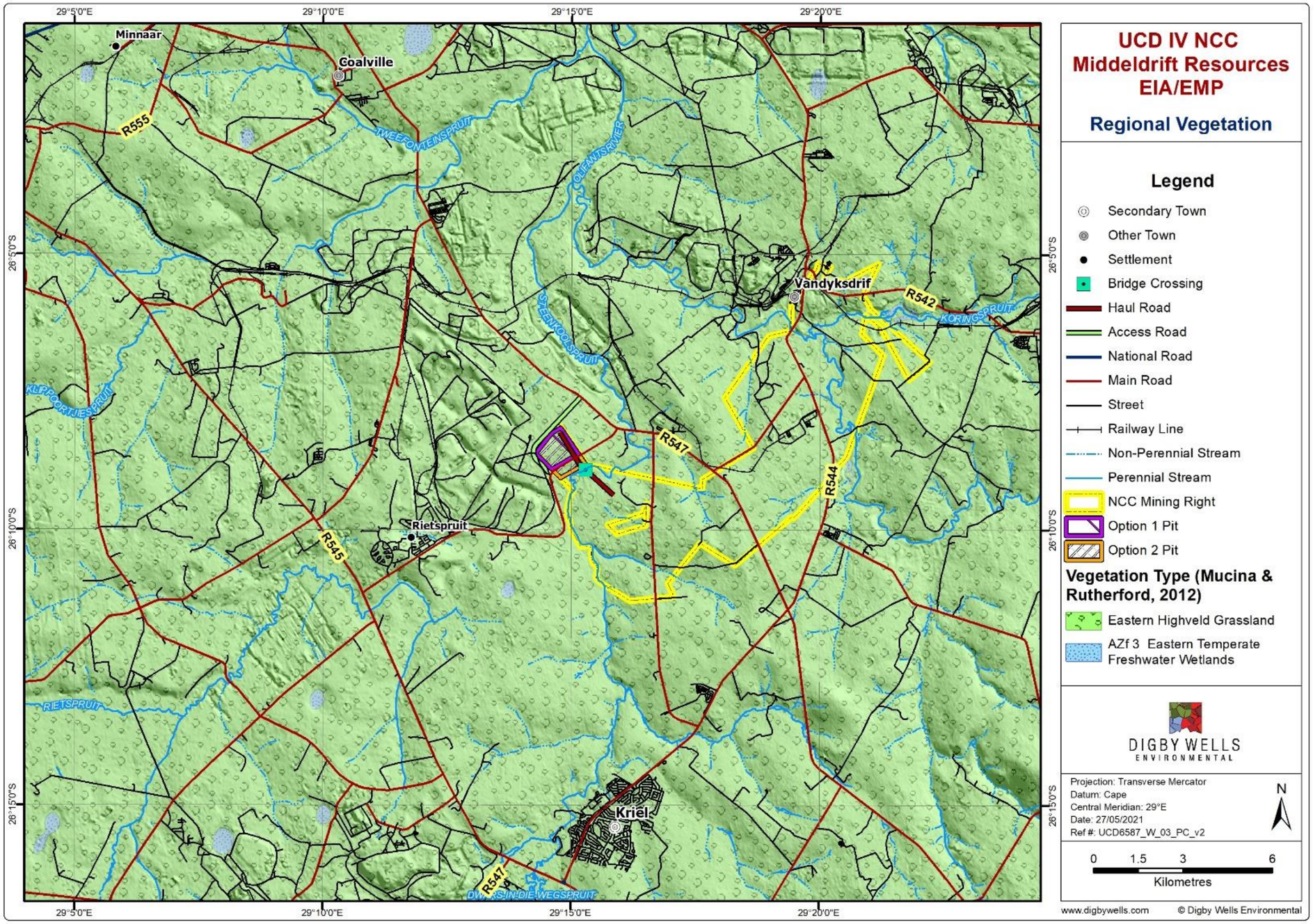

Figure 7-5: Regional Vegetation Type of the UCDIV NCC Mine Project Area

7.2. Species of Conservation Concern

7.2.1. IUCN Red Data Species

The proposed Project Area lies within two QDS 2629AA and 2629AB. According to PRECIS several Red Data listed species are expected to be present within the identified QDS.

7.2.2. Protected Flora

The New Plants of Southern Africa (NEWPOSA) species list was obtained from the South African National Biodiversity Institute (SANBI) (https://newposa.sanbi.org/), it lists all the Red Data plant species officially recorded by SANBI for the South African QDS grid. In order for a flora species to be included in this list, a specimen collected in this grid must be supplied to SANBI to be verified and recorded. This list is therefore not a comprehensive list representing only those species that may occur in the aforementioned grids, but rather a guideline as to what is to be expected. Generally, the sites sampled are small portions of the whole grid and habitats suitable for certain species. It is therefore not unusual for species in the NEWPOSA list to be absent from the sampling sites.

The floral species list obtained from NEWPOSA has indicated that one SCC may occur within the Project Area, *Khadia carolinensis,* listed as Vulnerable (VU). Previous studies conducted within close proximity to the Project Area, by Scientific Aquatic Services (SAS), 2016, identified two SCC. *Crinum macowanii* (Least Concern (LC)) was encountered throughout the wetland habitats. This species is listed as *Declining* by the IUCN and is protected under the Mpumalanga Nature Conservation Act (MNCA) of 1998. Additionally, the likelyhood of occurance for *Habenaria nyikana* would be high, as they have been prevoiusly encountered in that particular region. This species is also protected under the MNCA The potential SCC that may occur in the in the Project Area are listed in Table 7-3 below.

Table 7-3:Potential Floral Species of Conservation Concern

Species	Red Data status	SA Endemic
Aloe reitzii var. reitzii	NT	Yes
Argyrolobium longifolium	VU (A2c)	
Brachystelma minor	VU	Yes
Brachystelma stellatum	Rare	Yes
Crassula setulosa var. deminuta	NE	Yes
Crassula setulosa. var. setulosa	NE	Yes
Cryptocarya transvaalensis	LC	No
Dactylis glomerata	NE	No
Dianthus zeyheri subsp. natalensis	NE	Yes

Species	Red Data status	SA Endemic
Disa alticola	VU	Yes
Disa zuluensis	EN	Yes
Eucomis autumnalis subsp. clavata	NE	No
Eucomis vandermerwei	VU	Yes
Graderia linearifolia	VU	Yes
Habenaria barbertoni	NT	Yes
Habenaria nyikana	LC	Yes
Helichrysum aureum. var. argenteum	NE	Yes
Jamesbrittenia macrantha	NT	Yes
Khadia alticola	Rare	Yes
Khadia carolinensis	VU (A3c)	Yes
Lydenburgia cassinoides	NT	Yes
Merwilla natalensis	NT	No
Protea parvula	NT	No
Zantedeschia pentlandii	VU	Yes

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed

During the wet season survey in February 2021, four (4) floral SCC were recorded during the field assessment. These species are listed under Schedule 11 Protected Plants (Section 69 (1) (a)) of the MNCA (1998). The recorded SCC are listed in Table 7-4 below. These species were located within the identified Wetlands and Rocky Outcrops. Majority of the floral SCC recorded are summer-growing bulbous plants that host a variety of medicinal properties and are usually subjected to illegal harvesting and sold at medicinal plant markets (Notten, 2021). These plants will require permits to authorise the removal of such species as indicated in Section 69 (1) (a) and 70 (1) of Chapter 6 of the MNCA (1998).

Table 7-4: Recorded Floral SCC (2021)

Family	Species	SANBI Red List	MNCA (1998)
Iridaceae	*Gladiolus crassifolius*	Least Concern	Protected
Iridaceae	*Gladiolus dalenii*	Least Concern	Protected
Orchidaceae	*Habenaria filicornis*	Least Concern	Protected
Agapanthaceae	*Agapanthus africanus*	Least Concern	Protected
Amaryllidaceae	*Crinum macowanii*	Least Concern (declining)	Protected

7.2.3. Protected Fauna

This section will cover various groups of animals including mammals, birds, reptiles, amphibians and invertebrates.

7.2.3.1. Mammals

Mammals form a vital component of ecosystems. Not only are they important for nutrient cycling, habitat modification, consumers of plants and seed dispersal but they're also a considerable component of predators in healthy ecosystems.

The study conducted by SAS Environmental in 2016 did not encounter any mammal SCC during their site assessment however analysis of the habitat indicated that potential occurrence of Red Listed species Brown Hyena (*Parahyaena brunnea,* Near Threatened) and Cape Mole Rat (*Georychus capensis*, Endangered) may be high.

The Cape Mole Rat prefers deep, sandy soils, particularly sandy alluvial deposits along rivers and montane areas (Skinner J. &., 2005). The species has been commonly recorded in human-modified environments, such as golf courses and gardens. However, the Cape Mole Rat is thought to be a habitat specialist that requires areas with vleis and close proximity to rivers (Bennett, 2016). Threats include the afforestation in the midlands and montane grasslands of KwaZulu-Natal and Mpumalanga whereby the soil profile is altered making it less habitable and reducing area occupancy for the Cape Mole Rat (Bennett, 2016).

The Brown Hyaena is widespread across southern Africa, but it is absent from Lesotho and Swaziland. It faces multiple threats across unprotected areas, especially in regions dominated by livestock and game ranching. It has shown an ability to survive close to urban areas, where it requires some form of land cover such as the bush covers in rocky and mountainous areas (Yarnell, 2016). The motive behind the Near Threatened conservation status for this species is due to the conflict the Brown Hyena incurs with humans. Many Brown Hyenas across South Africa reside on private lands outside protected areas where the human-animal conflict transpires. Frequent poisoning, snaring, shooting and hunting of Brown Hyena occurs in the Limpopo and North West provinces. Unrecorded mortalities as a result of snaring for bushmeat is a major cause for concern and contributes to the decline of this species.

The table below (Table 7-5) lists potential SCC that may occur within the Project Area and lists the IUCN and provincial conservation status (Mpumalanga DACE, 2003). Appendix B lists other species of mammals that may occur.

Table 7-5:Potential Faunal Species of Conservation Concern

Common Name	Species	MP 2003 Status	IUCN 2016 Status
Cape Mole Rat	*Georychus capensis*	EN	LC
Sclater's Golden Mole	*Chlorotalpa sclateri montana*	CR	LC

Common Name	Species	MP 2003 Status	IUCN 2016 Status
Highveld Golden Mole	*Amblysomus septentrionalis*	VU	NT
Rough-haired Golden Mole	*Chrysospalax villosus rufopallidus*	CR	VU
Rough-haired Golden Mole	*Chrysospalax villosus rufus*	EN	VU
Juliana's Golden Mole	*Neamblysomus julianae*	EN	VU
Robust Golden Mole	*Amblysomus robustus*	VU	VU
Meester's Golden Mole	*Amblysomus hottentotus meesteri*	VU	NYBA
Laminate Vlei Rat	*Otomys laminatus*	VU	LC
Peak-saddle Horseshoe Bat	*Rhinolophus blasii empusa*	EN	LC
Lesser Long-fingered Bat	*Miniopterus fraterculus*	VU	LC
Welwitsch's Hairy Bat	*Myotis welwitschii*	EN	LC
Short-eared Trident Bat	*Cloeotis percivali australis*	EN	LC
Aardvark	*Orycteropus afer*	NT	LC
Brown Hyena	*Parahyaena brunnea*	NT	NT
Oribi	*Ourebia ourebi*	VU	LC
African striped weasel	*Poecilogale albinucha*	NE	LC
Aardwolf	*Proteles cristatus*	NT	LC
Natal Red Rock Rabbit	*Pronolagus crassicaudatus ruddi*	NT	NYBA

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed

7.2.3.2. Avifauna (Birds)

Birds have been viewed as good ecological indicators, since their presence or absence tends to represent conditions pertaining to the proper functioning of an ecosystem. Bird communities and ecological condition are linked to land cover. As the land cover of an area changes, so do the types of birds in that area. Land cover is directly linked to habitats within the study area. The diversity of these habitats should support many different species.

The watercourses within the Project Area, namely the wetland (and pan vegetation) and the Steenkoolspruit, provide important breeding and foraging grounds for numerous bird species. The fauna and flora assessment conducted in 2016 (SAS, 2016) observed Bald Ibis (*Geronticus calvus,* VU) adjacent to the Project Area. Based on the recordings from the South African Bird Atlas Project (SABAP2), over 100 species of birds have been identified within the local pentad (QDS). These birds are comprised of bushveld and grassland species (see Appendix F). Twelve (12) species of the potentially occurring species have been assigned a Red Data status are listed in Table 7-6 below, along with their IUCN and provincial (Mpumalanga DACE, 2003) conservation status.

Table 7-6: Potential Avifaunal SCC that may occur within the Project Area

Species	Common Name	MP Status	IUCN 2016 Status
Sarothrura ayresi	White Winged Flufftail	CR	CR
Heteromirafra ruddi	Rudd's Lark	CR	VU
*Geronticus calvus**	Bald Ibis	VU	VU
Bugeranus carunculatus	Wattled Crane	CR	VU
Anthropoides paradiseus	Blue Crane	VU	VU
Balearica reguloru,	Grey Crowned Crane	VU	EN
Eupodotis caerulescens	Blue Korhaan	VU	NT
Neotis denhami	Stanley's Bustard	VU	NT
Circus ranivorus	African Marsh Harrier	VU	LC
Sagittarius serpentarius	Secretarybird	VU	VU
Tyto capensis	Grass Owl	VU	LC
Eupodotis cafra	White Bellied Korhaan	VU	LC

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed

7.2.3.3. Reptiles

Reptiles are ectothermic (cold-blooded) meaning their internal basal temperature is influenced by their surrounding external environment, as a result, reptiles are dependent on environmental heat sources. Thus, many reptiles regulate their body temperatures by basking in the sun, or warmer surfaces (or substrates). Substrates are an important determining factor for identifying which habitats are suitable for which species of reptile. Rocky outcrops and suitable woody vegetation would increase habitat and intern diversity of reptiles. In the Diepspruit 41IS farm portion, a ridge with numerous rocky outcrops is situated south to the Project Area. This portion of habitat will provide refuge for numerous reptilian species and will be a key feature during site visits.

According to historical studies, no reptile SCC were recorded during the site assessment in 2016 (SAS, 2016). Reptiles expected to occur on site are listed in Appendix C**.** Potential reptile SCC and their associated conservation status are listed below in Table 7-7.

Table 7-7: Potential Reptile SCC that may occur in the Project Area

Common Name	Species	MP Status	IUCN 2016 Status
Haacke's Flat Gecko	*Afroedura haackei*	EN	NYBA
Abel Erasmus Pass Flat Gecko	*Afroedura sp.*	EN	NYBA
Mariepskop Flat Gecko	*Afroedura sp.*	EN	NYBA
Rondavels Flat Gecko	*Afroedura sp.*	EN	NYBA
Natal Purple Glossed Snake	*Amblyodipsas concolor*	VU	LC
Lowveld Shieldnosed Snake	*Aspidelaps scutatus intermedius*	VU	NYBA
Wolkberg Dwarf Chameleon	*Bradypodion transvaalense* complex	VU	LC
Sungazer/ Giant Girdled Lizard	*Cordylus giganteus*	VU	VU
Barberton Girdled Lizard	*Cordylus warren barbertonensis*	VU	NYBA
Lebombo Girdled Lizard	*Cordylus warreni warreni*	VU	NYBA
Swazi Rock Snake	*Lamprophis swazicus*	VU	NT
Transvaal Flat Lizard	*Platysaurus orientalis orientalis*	NT	NYBA
Wilhelm's Flat Lizard	*Platysaurus wilhelmi*	VU	NYBA

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed

7.2.3.4. Amphibians

Amphibians are viewed to be good indicators of changes to the whole ecosystem as they are sensitive to changes in the aquatic and terrestrial environments (Waddle, 2006). Most species of amphibians are dependent on the aquatic environment for reproduction. Additionally, amphibians are sensitive to water quality and ultraviolet radiation because of their permeable skin (Gerlanc, 2005).

Important habitat features for amphibians include wetland clusters. These are groups of wetlands (within a 1 km buffer) that are considered to function as a unit in a landscape,

allowing for important ecological processes such as migration of frogs and insects between wetlands to take place. Two pans have been identified within the Project Area and thus provide ideal habitat (among others) for the SCC Giant African Bullfrog (*Pyxicephalus adspersus*), thus this species is therefore expected to occur. This is an SCC due to the loss of habitat from negative anthropogenic activities, the Giant African Bullfrog is listed as Near Threatened (NT) in South Africa according to the IUCN. Expected amphibians to occur in the region are listed in Appendix D.

7.2.3.5. Invertebrates

Butterflies are a good indication of the various habitats available in a specific area (Woodhall, 2005). Although many species are eurytropes (able to use a wide range of habitats) and are widespread and common, South Africa has many stenotrope (specific habitat requirements with populations concentrated in a small area) species which may be very specialised (Woodhall, 2005). Butterflies are useful indicators as they are relatively easy to locate,catch, and identify. It is for this reason that Lepidoptera (moths and butterflies) will be used as the primary focus for the invertebrate survey. One SCC that is likely to occur is the Marsh Sylph (*Metisella meninx*). This is a marsh species that requires thick clumps of grass, particularly *Leersia hexandra* (Poacea), and unpolluted environments. A marsh habitat is one of the most easily disrupted habitats and the apparent plight of this species brings it sharply into focus (Henning, 2009). Likely occurring Red Data species are listed below in Table 7-8. The specific Red Data conservation status is not always known.

Table 7-8: Potential Lepidoptera SCC that may occur in the Project Area

Species	Common Name	MP 2015	IUCN 2016
Aloeides rossouwi	Rossouw's Copper	EN	VU
Pseudagrion coeleste	Catshead Sprite	CR	LC
Metisella meninx	Marsh Sylph	NT	NT

EN = Endangered, CR = Critically Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, NYBA = Not yet been assessed

7.3. Flora

7.3.1. Vegetation Communities

The site assessment in February 2021 concluded that the vegetation habitats delineated within this Project Area include grasslands, outcrops of sandstone, wetlands and areas which have been modified and transformed from their original state. Three broadly defined habitats have been identified and are discussed in further detail below (see Figure 7-6 below). The Project Area comprises of Wetland (Moist Grassland and Pan Vegetation), Rocky Outcrops and Transformed habitat units.

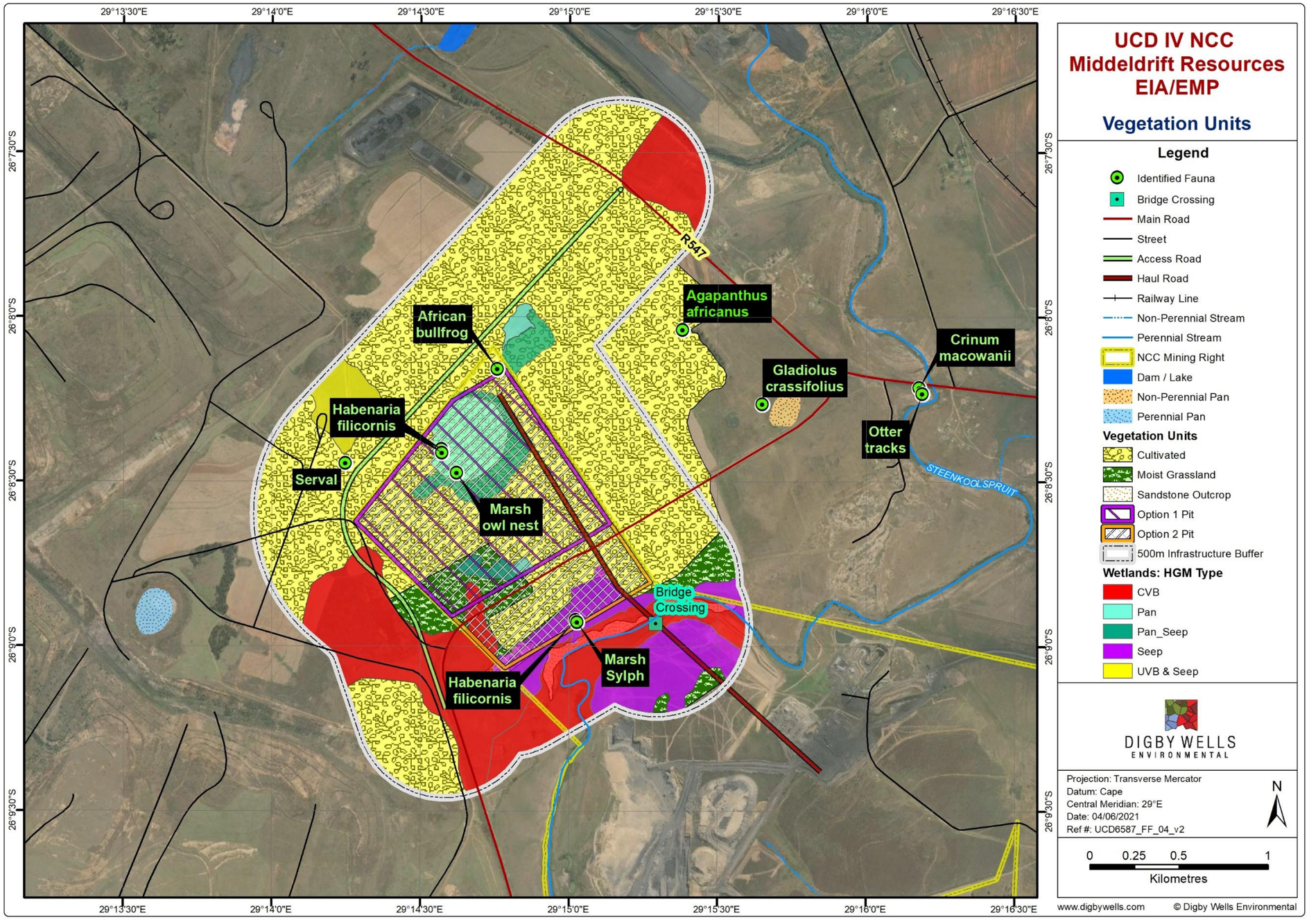

Figure 7-6: Vegetation Units within the Project Area

7.3.1.1. Wetland Systems

The wetland areas within the Project Area are highly ecologically important for faunal assemblages and habitat for floral SCC. The wetland systems and associated drainage lines provide basis for the trophic chain as well as essential ecological corridors for faunal movement. Continuous biomonitoring of the wetlands is recommended to identify the deterioration factors and provide mitigation measures to prevent further degradation of the systems. There are five (5) Hydrogeomorphic (HGM) Units (wetlands) identified and described by the Digby Wells Wetland Report (DWE, 2021) are listed below as:

- Channelled Valley Bottom (CVB);
- Pan;
- Pan Seep;
- Seep; and
- Unchannelled Valley Bottom (UVB) and Seep.

The locations of the HGM units are depicted in Figure 7-6 above. Numerous faunal and floral SCC were encountered within the delineated wetlands. The Pan HGM units in the Option 1 Pit, displayed an intact moist pasture grassland with a dominance in wetland indicating species such as *Leersia hexandra* and *Imperata cylindrica*. The remaining HGM units and areas of moist grassland are characterized by *Agrostis lacnantha, Panicum ecklonii* and *Eragrostis plana* Table 7-9 describes the wetland systems in detail.

Wetlands are highly sensitive habitats due to their levels of biodiversity and sensitivity to disturbances. The overlay of aquatic and terrestrial habitat results in a varied habitat which attracts a high number of species. Invertebrate and Amphibian diversity is most remarkably high with particular note of avifaunal activity, most notably the Grass Owl (*Tyto capensis*) (VU), and although not recorded during the survey, may occur in these areas. The three habitats are regarded as being particularly sensitive as a result of the associated faunal species that rely on them.

Table 7-9: Vegetation description of the Wetland Systems

***Agrostis lacnantha -Panicum ecklonii* Moist Pasture Grasslands**	
Photographic representation	 
Description of area	Consists of hydromorphic grasslands, inundated pans and associated marginal grassland vegetation, and vegetated pans.
Coverage of area	90 ha
Current condition	Majority of the HGM units identified within the Project Area have varying degrees of disturbances such as AIP proliferation, cultivation, impacts from cattle and uncontrolled grazing as well as excavated lands. Most prominent AIPs included *Persicaria lapathafolia, Juncus effuses, Solanum sisymbriifolium, Verbena brasiliensis,* and *Cirsium vulgare.*
Species of Conservation Concern	As seen in Figure 7-6, several faunal and floral SCC were observed within the identified HGM units. Species included Serval, African Bullfrog, *Gladiolus sp., Agapanthus africanus* and *Habenaria filicornis*. Two large wading birds of concern, Yellow-billed Stork and Greater Flamingo were observed within then pan adjacent to the Project Area next to the R547. The wetland systems provide habitat for a number of SCC and are regarded as sensitive habitats.
Common species	Common species within the wetlands are representative of moist grasslands and host numerous wetland indicating species such as *Agrostis lacnantha, Chironia palustris, Eragrostis plana, Monopsis decipiens, Helichrysum pillosellum, Juncus sp.,* and *Hemarthria altissima*. Species encountered in the unit are depicted below.

Images	  *Nidorella anomala* and *Helichrysum aureonitens*
	  *Limosella lineata* and *Mariscus congestus*

	 *Dipcadi ciliare* (left) and *Dipcadi marlothii* (right)
***Imperata cylindrica – Leersia hexandra* Pan Vegetation**	
Photographic representation	

	
Description of area	Consists of hydromorphic grasslands, inundated pan and associated marginal vegetation.
Coverage of area	Approximately 14 ha
Current condition	The Pan in the northern portion of the Option 1 Pit was in good condition with moderate subjection to ecosystem changes (see Wetland Report 2021). It has a dense herbaceous layer of *Leersia hexandra* with an inundated pan in the middle. The SCC, Marsh Sylph and *Habenaria filicornis*, were encountered within the inundated grasses. This unit is encompassed by cultivated fields of corn and disturbed areas of road verges that have high AIP proliferation consisting of *Campuloclinium macrocephalum* (1b), *Solanum sisymbriifolium* (1b), *Pennisetum clandestium* (1b), *Conyza sumatriensis* (AIP), and *Verbena brasiliensis* (1b). the surrounding agricultural activities are negatively impacting the pan and promoting AIP proliferation due the influx of nitrification of the water table. AIPs observed in the pan, included *Lagarosiphon major, Myriophyllum aquaticum* (1b), and *Rumex crispus.*
Species of Conservation Concern	One faunal SCC was observed within this unit, the Marsh Sylph, a Vulnerable (VU A3ce) butterfly that inhabits marshes and is dependent on the grass *Leersia hexandra* (Henning, 2009). More details are discussed in Section 0 below. One floral SCC was encountered within this unit, an orchid, namely *Habenaria filicornis.* This species is protected under the MNCA (1998) and requires a permit for removal.
Common species	The most dominant species inhabiting this unit included grasses such as *Imperata cylindrica. Leersia hexandra, Panicum coloratum, Setaria sphacelate var. sericea* and *Eragrostis inamoena* and sedges such as *Juncus oxycarpus, Schoenoplectus muricinux* and *Juncus punctirius*.

Images	 *Habenaria filicornis* (SCC) (left) and *Alectra sessiliflora* (right)
	 *Sebaea leiostyla* (top left), *Anthericum fasciculatum* (right) and *Cleome maculat* (bottom left).

7.3.1.2. Rocky Outcrop

Rocky Outcrops are geological features that encompass a wide variety of physical environments such as escarpments, overhangs, and cliffs (Fitzsimons, 2017). They support high levels of species diversity and endemism, and provide stable micro-climates. They provide ecological refuges for colonial species such as seabirds, bats and swifts for ancient lineages. Rocky outcrops provide steppingstone habitats across landscapes and facilitate the

movement of migratory bird species and other wide-ranging fauna. As rocky environments are less fertile, steep-sided and less accessible than the surrounding landscapes, they are typically less prone to human disturbances. Nonetheless, rocky outcrops are susceptible to a variety of threats including soil compaction, erosion from livestock and nutrient enrichment and weed invasion. Twenty-five (25) of the 110 floral species were recorded within this unit. Although this unit is not directly within the confines of the Project Area, its proximity is very near and provides habitat for fauna and flora SCC. Species composition and a general description of the unit is elaborated in Table 7-10 below.

Table 7-10: Vegetation description of the Rocky Outcrop Unit

Sandstone Rocky Outcrop Vegetation	
Photographic representation	
Description of area	The sandstone outcrops are located along the Steenkoolspruit, adjacent to the east and southern portion of the Project Area. The plateau of the exposed rock descends into the Steenkoolspruit.
Coverage of area	Although not directly within the Project Area the exposed rock in near proximity in the south eastern portion cover approximately 6 ha of land.
Current condition	The area is relatively undisturbed due to its limited accessibility, however, few disturbances from cattle and AIP proliferation were observed. It hosts a large diversity of floral species and provides refugia for numerous fauna species including SCC.

Species of Conservation Concern	Floral SCC were recorded included two bulbous perennial species that require shallow fertile soils and good drainage, namely *Crinum macowanii* and *Gladiouls dalenii*. Both protected under the MNCA (1988) and require permits for removal. Indirect evidence (tracks and scats) of the African Clawless Otter (NT) (Okes N., 2016) were encountered in the north-eastern portion of the Steenkoolspruit. Further details are on the Otter is provided in Section 7.4.1 below.
Common species	Some of the representative flora of the identified vegetation type (Eastern Highveld Grassland) are present within this unit. Geophytic herbs and forbs such as *Gladiolus sp., Ledebouria sp., Helichrysum sp., Berkheya sp., Hypoxis sp.,* and *Senecio sp* were identified in the near periphery of the exposed rocks. As the outcrops are considered microhabitats due to their isolation from the surrounding environment, a variety of floral diversity has been observed. The following succulents, fords and woody shrubs were identified within the rocky mantles: *Crassula capitella, C. setulose, Nerine angustifolia, Searsia denata* and *S. magalismontana.* These species can be observed in the images below.
Images	  *Nerine angustifolia* (left) and *Searsia magalismontana* (right)
	  *Crassula setulosa* (left) and *Crassula capitella* (right)

Riocreuxia torulosa (left) and *Polygala amatymbica* (right)

7.3.1.3. Transformed Habitat

For the purpose of this report, transformed land refers to areas that have been changed or disturbed to such an extent that all-natural habitats, biota and ecosystem functions have been fragmented or lost. The transformed areas within the Project Area were predominantly due to the agricultural practises and cultivation of maise/corn (*Zea mays*) and soybean (*Glycine max*) which constitutes the majority (approximately 260 ha) of the total Project Area. The current land use practices have completely altered the landscape and has permitted AIP proliferation and loss of sensitive habitats, such as wetlands and the existing natural grassland, namely the Eastern Highveld Grassland (Endangered) (Mucina & Rutherford, 2012).

7.3.1.3.1. Exotics

Previous natural grasslands have been altered and/or transformed and have been replaced by carpets of *Pennisetum clandestinum* and pioneering AIP shrubs, trees and forbs such as *Acacia mearnsii, Populus x canescens Eucalyptus camaldulensis, Datura stramonium, Cirsium vulgare, Solanum sisymbrifolium,* and *Verbena brasiliensis, V. officianalis* can be observed throughout the transformed areas. The table below (Table 7-11) lists all AIPs recorded and their respective NEM:BA Status Category. Remains of old rubble and/or building ruins and previous land practices are observed as unrehabilitated landscapes providing ideal hosting for pioneering AIP species. Cattle grazing was observed throughout the entire Project Area. Vegetation considered in a “natural” state (where no evidence of transformation was observed) were identified within the margins of the wetland areas and rocky outcrops. Dense stands of *Populus x canescens* were observed along the margins of the Seep wetland in the eastern portion. These dense stands of AIPs accelerate due to the favourable growing conditions, they consume large amounts of water, thereby lowing the water table and thereby threatening the water supplies in the ecology of the region (Bromilow, 2010)

Table 7-11: AIPs recorded in the Project Area

Species	Category[3]
*Acacia mearnsii**	2
Agave tequilana	2
*Amaranthus viridus**	Invasive
*Arundo donax**	1b
*Bidens pilosa**	Invasive
*Campuloclinium macrocephalum**	1b
*Centella asiatica**	Invasive
*Cirsium vulgare**	1b
*Cosmos bipinnatus**	Invasive
*Conyza bonariensis**	Invasive
*Datura stramonium**	1b
*Eucalyptus camaldulensis**	1b
*Eucalyptus diversicolor**	2
*Gomphrena celosioides**	Invasive
*Hypericum forrestii**	Invasive
*Myriophyllum aquaticum**	1b
*Nymphoides thunbergiana**	Invasive
*Oenothera rosea**	Invasive
*Paspalum notatum**	Invasive
*Pennisetum clandestinum**	1b
*Persicaria longiseta**	Invasive
*Populus x canescens**	2
*Raphanus raphanistrum**	Invasive
*Richardia brasiliensis**	Invasive
*Solanum sisymbrifolium**	1b
*Tagetes minuta**	Invasive
*Verbena brasiliensis**	1b
*Verbena officianalis**	Invasive

[3] *In accordance with the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Alien and Invasive Species List, 2020

Areas which have been transformed still provide habitat to numerous faunal species however due to the nature of terrestrial ecological modification much of the species which exist here are transitional or introduced. The alien vegetation in these areas provide habitat for a number of species which would not usually occur in the Project Area. Cultivated areas do not necessarily provide shelter for species; however they do provide abundant food. Small mammal species and avifauna species benefit from these areas. Figure 7-7 illustrates the transformed areas and AIPs encountered in the Project Area.

Figure 7-7: Top left: *Nymphoides thunbergia*. Representative images of the transformed landscape within the Project Area

7.4. Fauna

This section represents the results from the field survey conducted during February 2021.

7.4.1. Mammals

A total of twelve mammals (12) were recorded during the infield assessments. The mammal species were encountered and observed throughout the Project Area within the various habitat units. Various mammals of the Herpestidae (Mongoose) family were observed throughout the

numerous wetlands. Tracks of a Water Mongoose were observed in the marshes of the non-perennial Pan adjacent to the R547. Numerous sightings of Black-backed Jackal and Scrub Hare were recorded throughout the Project Area.

Two mammal SCC were recorded within the Project Area, namely the Serval and African Clawless Otter, both listed as Near Threatened according to the Regional Red List Assessment of the IUCN. A list of all mammals recorded in the Project Area is presented in Table 7-12 below.

Otter tracks were encountered below the bridge of the R547 directly adjacent to the north eastern portion of the Project Area (see Figure 7-8). Evidently, the Otters are inhabiting the Steenkoolspruit as African Clawless Otters are predominantly aquatic and are seldom found far from permanent water sources. Generally, they are found in marine habitats but they are also associated with riverine habitats, particularly with rocks, dense vegetation, and undisturbed long grasses (Perrin, 2000). Fresh water is an essential habitat requirement not only for drinking but for rinsing their coats. The African Clawless Otter is predominantly crepuscular, meaning they are mostly active at dawn and dusk. The major threat to the African Clawless Otter is the deterioration of freshwater ecosystems. In South Africa, 84% of the river ecosystems are threatened, while 54% are Critically Endangered (Nel, 2011). Riverside, wetland and coastal habitats must be protected to allow sufficient breeding and foraging environments necessary for them to persist and disperse between habitats (Okes N., 2016).

A Serval kitten was encountered adjacent to the proposed road diversion (see Figure 7-6 and Figure 7-8 below). Servals are found in many protected areas within South Africa and are included on CITES Appendix II and protected under national legislation (TOPS regulations) (SANBI, 2018). It is listed as Least Concern (LC) globally and Near Threatened (NT) nationally on the IUCN Red List. Effective conservation of Serval depends on the conservation of wetlands, particularly wetlands in fragmented landscapes. Wetlands form a micro habitat in a mosaic of farmland for several wetland-dependent species; they are reservoirs of small mammal populations that are major dietary components of Servals. Consequently, if wetlands are protected in a mosaic of farmland use, the landscape may support the persistence of Serval populations.

Table 7-12: Mammals recorded in Project Area

Family	Species	Common Name	Conservation status
Bovidae	*Sylvicapra grimmia*	Bush Duiker	LC
Canidae	*Canis mesomelas*	Black-backed Jackal	LC
Felidae	***Leptailurus serval***	**Serval**	**NT**
Herpestidae	Atilax paludinosus	Water Mongoose	LC
Herpestidae	*Cynictis penicillate*	Yellow Mongoose	LC
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC

Family	Species	Common Name	Conservation status
Leporidae	*Lepus saxatilis*	Scrub Hare	LC
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	LC
Muridae	*Gerbilliscus brantsii*	Highveld Gerbil	LC
Muridae	*Otomys angoniensis*	Angoni Vlei Rat	LC
Muridae	*Rhabdomys pumilio*	Four-striped Grass Mouse	LC
Mustelidae	***Aonyx capensis***	**African Clawless Otter**	**NT**

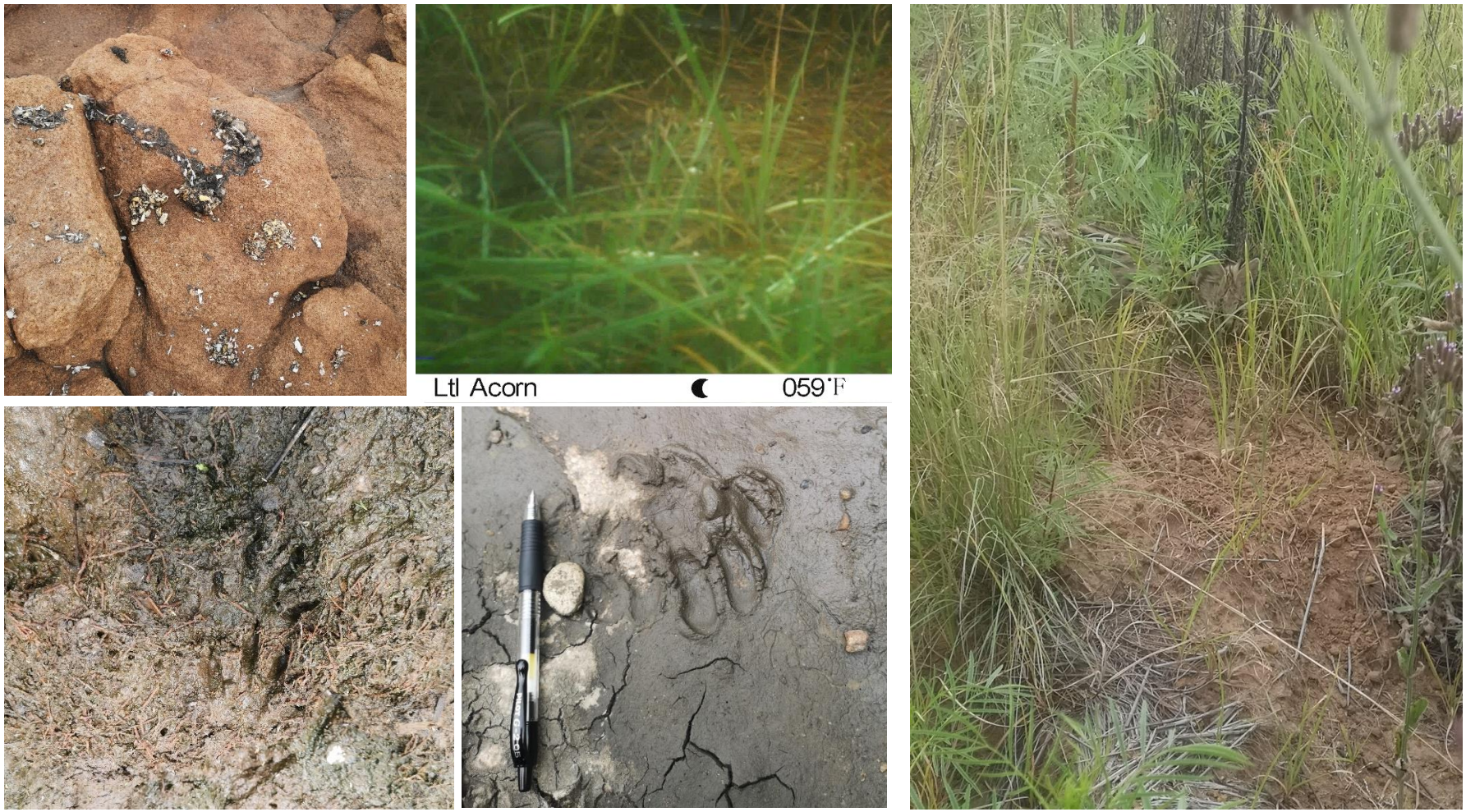

Figure 7-8: Top Left: African Clawless Otter scats. Bottom Left: Water Mongoose tracks Middle: African Clawless Otter tracks. Right: Serval

7.4.2. Birds

Birds are viewed as good ecological indicators, as their presence or absence tends to represent conditions of a functioning ecosystem. The direct link between bird diversity and land cover portrays a direct indication of the habitats in the area of interest.

According to the SABAP2 database, over 100 species of birds have been identified in the area (see Appendix F). The majority of these birds are comprised of grassland and waterbird species. Thirty-seven (37) birds were recorded during the field assessment in February 2021. The identified birds are listed in Table 7-13 below. The two pans identified within the region provided ideal habitat for a number of waterbirds including; Ruffs, Grey Herons, Bitterns, White-winged Terns, Reed Cormorant, Yellow-billed Ducks, Red Knobbed Coots and Red-billed Teals.

Two bird SCC were encountered and recorded within the Project Area, namely the Yellow-billed Stork (Endangered) and Greater Flamingo (Near Threatened). Both species were observed within the pan situated in the north eastern portion of the Project Area (see Figure 7-9). During the survey in February 2021, the pan was filled with water and provided habitat for an array of bird life, most notably waterfowl. The two listed bird species are dependent on perennial water bodies for their survival and their ecological requirements are briefly discussed below,

The Yellow-billed Stork is reasonably common at wetlands, yet the species currently breeds at a single site, therefore resulting in a highly restricted (breeding) range in Area of Occupancy (AoO) (Taylor, 2015). In South Africa, there is an Important Birding Area (IBA) in KwaZulu-Natal, at the Nsumo Pan in the Mkuze Game Reserve, where this species reportedly regularly breeds (Bowker, 2012). The AoO in the Nsumo Pan is a mere 2 km^2 in size. Other isolated breeding records include the Engelhardt Dam in the Kruger National Park. The Yellow-billed Stork forage in a diversity of permanent and seasonal wetland habitats, with open shallow water that is generally free of vegetation. They forage on frogs, small fish and other small aquatic prey. Loss of wetland habitat is the major threat to this species' population. The bird is dependent on a system of pans, marshes and floodplains for foraging and suitable trees for nesting. Therefore, conservation and preservation of wetland systems is necessary for sustaining the existence of this species within South Africa.

Lastly, the southern African population of the Greater Flamingo has undergone declines of more than 40% over the past three generations (Taylor, 2015). In South Africa, important numbers have been recorded at the following wetlands: Lake St Lucia (KwaZulu-Natal), Leeupan (North West), Kamfers Dam (Northern Cape) and Langebaan Lagoon, Strandfontein Sewage Works and the Berg River Estuary (Western Cape). The Greater Flamingo has benefitted from certain man-made habitats such as salt works, sewage works and large impoundments (Taylor, 2015). The Greater Flamingo occur in large flocks and movement generally takes place at night and in response to the inundation of ephemeral pans. (Simmons, 2005). They feed on brine shrimp, brine flies, molluscs and diatoms by wading through the water. Most breeding activity occurs at the Etosha and Sua Pan in southern Africa. Their

largest threats consist of soda-ash mining around their breeding sites, collisions with fences and overhead powerlines in South Africa. Rapidly declining water levels reduce food supplies and increase their risk of predation. Conservation of their suitable feeding sites in South Africa is imperative to sustain and support their population. The pans identified within the Project Area provide suitable foraging sites for the Greater Flamingos.

Table 7-13: Bird species recorded in the Project Area

Common Name	Species	Conservation Status	Veg Type
Lesser Swamp-Warbler	*Acrocephalus gracilirostris*	LC	Wetland
Egyptian Goose	*Alopochen aegyptiaca*	LC	Pan
Red-billed Teal	*Anas erythrorhyna*	LC (Decreasing)	Pan
Cape Shoveler	*Anas smithii*	LC	Pan
Yellow-billed Duck	*Anas undulata*	LC	Pan
Grey Heron	*Ardea cinerea*	LC	Pan
Black-headed Heron	*Ardea melanocephala*	LC	Pan
Marsh Owl	*Asio capensis*	LC	Wetland
White-fronted Plover	*Charadrius marginatus*	LC	Pan
White-winged Tern	*Chlidonias leucopterus*	LC	Pan
Zitting Cisticola	*Cisticola juncidis*	LC	Wetland
White-faced Whistling Duck	*Dendrocygna viduata*	LC	Pan
Black-winged Kite	*Elanus caeruleus*	LC	Wetland
Yellow Bishop	*Euplectes capensis*	LC	Wetland
Southern Red Bishop	*Euplectes orix*	LC	Pan
Long-tailed Widowbird	*Euplectes progne*	LC	Transformed
Red-knobbed Coot	*Fulica cristata*	LC	Pan
African Snipe	*Gallinago nigripennis*	LC	Pan
Black-winged Stilt	*Himantopus himantopus*	LC	Pan
Greater Striped Swallow	*Hirundo cucullata*	LC	Grassland
South African Cliff Swallow	*Hirundo spilodera*	LC	Pan
Little Bittern	*Ixobrychus minutus*	LC	Pan
Reed Cormorant	*Microcarbo africanus*	LC	Pan

Common Name	Species	Conservation Status	Veg Type
Yellow-billed Stork	***Mycteria ibis***	**EN[4]**	**Pan**
Helmeted Guineafowl	*Numida meleagris*	LC	Transformed
Ruff	*Philomachus pugnax*	LC (Decreasing)	Pan
Greater Flamingo	***Phoenicopterus roseus***	**NT[4]**	**Pan**
African Spoonbill	*Platalea alba*	LC	Pan
Spur-winged Goose	*Plectropterus gambensis*	LC	Pan
Glossy Ibis	*Plegadis falcinellus*	LC	Pan
Swainson's Spurfowl	*Pternistis swainsonii*	LC	Transformed
Pied Starling	*Spreo bicolor*	LC	Cultivated
Little Grebe	*Tachybabtus ruficollis*	LC (Decreasing)	Pan
Marsh Sandpiper	*Trigna stagnatilis*	LC	Pan
Wood Sandpiper	*Tringa glareola*	LC	Pan
Blacksmith Lapwing	*Vanellus armatus*	LC	Pan
Pin-tailed Whydah	*Vidua macroura*	LC	Grassland

[4] 2015 Regional Status as defined by BildLife South Africa (Taylor, 2015)

Figure 7-9:Top Row: Yellow-billed Stork, African Spoonbill, and Marsh Owl nest. Bottom Row: Greater Flamingo's observed in pan and Black-winged Kite

7.4.3. Herpetofauna

Herpertofauna is defined as reptiles and amphibians inhabiting a given area. Reptiles are ectothermic (cold-blooded) meaning they are organisms that control body temperature through external means. As a result, reptiles are dependent on environmental heat sources. Due to this, many reptiles regulate their body temperature by basking in the sun, or in warmer areas. Substrate is an important factor determining which habitats are suitable for which species of reptile.

According to Carruthers (2001), a number of factors influence the distribution of amphibians, but because amphibians have porous skin they generally prosper in warm and damp habitats. The presence of suitable habitat (wetland) within the Project Area provides a number of different species of amphibians.

The brevity of the survey meant that relatively few reptiles were observed compared to that of mammals and birds. During the field assessment, three amphibian species were identified within the wetland, and pans, via its call and by direct sightings. The Delalande's River Frog (*Amietia delalandii*), Bubbling Kassina (*Kassina senegalensis*) and the Boettger's Caco (*Cacosternum boettgeri*) (all Least Concern) were recorded within the wetlands (listed in Table 7-14). One amphibian SCC was recorded within the corn fields of the cultivated fields, the Giant Bullfrog (*Pyxicephalus adspersus*), see Figure 7-10 below. The location of the recording can be viewed in Figure 7-5.

The Giant Bullfrog is considered to be Near Threatened (NT) and is the largest amphibian found in Southern Africa. In Mpumalanga and Gauteng, the males reach a snout-vent length of 245mm and a mass of up to 1.4kg (unpublished data and experienced observation). In contrast to most other frogs, males are larger than females. In adults the dorsum is dark olive green, but many vary from brown to grey and even blue while short sections of the longitudinal skin ridges can be white or cream.

Although the Giant Bullfrog is widely distributed in the atlas region, it occurs in the north eastern region of the Western Cape, central and southern region of the Eastern Cape, eastern section of the Northern Cape, Free State, Gauteng, Limpopo and a few localities in Mpumalanga along the Highveld region. The preferred habitat is also varied but importantly it breeds in seasonal, shallow, grassy pans in flat open areas but also utilises non-permanent *vleis* and shallow water on the margins of waterholes and pans which make the pans on site ideal breeding grounds for this species.

Adult bullfrogs spend the dry periods in burrows, usually at depths of between 0.5- and 1m depending on the type and humidity of the soil and generally feed on prey such as small birds, lizards, rodents, snakes, insects, crabs and even other frogs. Birds are the major predators of bullfrogs. Records include species such as African Marsh Harriers, Marsh Owl, Saddle-billed Stork, Pelicans and the larger egrets (Great White, Yellow Billed and Little) all feeding on this species.

Reptiles are notoriously difficult to comprehensively detect during short field surveys, due to many species in this group naturally occurring at low densities and being inherently illusive.

Two species of reptile were identified, namely an African Striped Skink (*Trachylepis striata*) and the Common Brown Water Snake (*Lycodonomorphus rufulus*) (both Least Concern). The Skink was encountered basking on the outcrops of the sandstone sheaths. The remaining grassland and wetland habitats provide both hunting sites and shelter for herpetofauna, primarily amphibians colonizing the wetlands which in turn attracts reptile predators.

The observed species diversity for both reptiles and amphibians was considerably low. The weather during the field survey was wet and overcast, this may have hindered the presence of herpetofauna (specifically reptile) species within the Project Area.

Table 7-14: Amphibian species recorded

Family	Species	Common Name	Conservation Status
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	LC
Pyxicephalidae	***Pyxicephalus adspersus***	**Giant African Bullfrog**	**NT**

Figure 7-10: Left: Giant Bullfrog. Right: Delalande's River Frog

7.4.4. Invertebrates

Invertebrates are the main components of faunal diversity in grasslands, playing substantial roles in ecosystem processes including nutrient cycling and pollination. Grassland invertebrate communities are heavily dependent on plant diversity and production within a given system (Barnett and Facey, 2016). During the field survey in February, a total of 27 invertebrates were observed and are listed in Table 7-15 below. Various images of invertebrates were captured during the field assessment and are presented in Figure 7-11 below. The SCC, Marsh Sylph (*Metisella meninx*), was recorded in the Pan and Seep wetland entering the sheath of exposed sandstone (see Figure 7-6). *M.* meninx is an obligate wetland species and depends on the occurrence of *Leersia hexandra* (Rice Grass), of which has been recorded in majority of the wetland habitats. Henning (2009) states that this species requires unpolluted marsh habitats. The adults tend to roost low down in the wetland vegetation, above the water level – which makes the susceptible to unexpected flooding. Adults rely on nectar to replenish their energy demands, of which has been noted to be obtained from *Verbena bonariensis, V. brasiliensis,* and *Persicaria spp* (all of which were recorded within the wetland habitats).

Table 7-15: Invertebrate species recorded

Family	Species	Conservation status	Common name
Acrididae	*Locustana pardalina*	LC	Brown Locust
Carabidae	*Lophyra sp*	LC	Tiger Beetles
Cercopidae	*Locris arithmetica*	LC	Red-spotted Spittle Bug
Coccinellidae	*Henosepilachna bifasciata*	LC	Cucurbit Ladybug
Coenagrionidae	Africallagma glaucum	LC	Swamp Bluet
Coreidae	*Cletus sp.*	LC	Leaffooted bug
Crambidae	*Spoladea recurvalis*	LC	Beet Webworm
Erebidae	*Lacipa nobilis*	LC	Noble Lacipa
Eumenidae	*Parachilus capensis*	LC	
Hesperiidae	***Metisella meninx***	**NT**	**Marsh Sylph**
Libellulidae	*Crocothemis sanguinolenta*	LC	Small Scarlet
Libellulidae	Urothemis assignata	LC	Red Basker
Lycosidae	*Hogna spenceri*	LC	Wolf Spider
Melyridae	*Astylus atromaculatus*	LC	Spotted Maize Beetle
Nymphalidae	*Junonia oenone oenone*	LC	Blue Pansy
Nymphalidae	*Byblia ilithyia*	LC	Spotted Joker
Nymphalidae	*Hypolimnas misippus*	LC	Diadem

Family	Species	Conservation status	Common name
Nymphalidae	*Acraea rahira*	LC	Marsh Acraea
Nymphalidae	*Junonia orithya madagascariensis*	LC	Eyed Pansy
Pentatomidae	*Nezara viridula*	LC	Green Vegetable Bug
Pieridae	*Catopsilia florella*	LC	African Migrant
Pieridae	*Eurema brigitta*	LC	Grass Yellow
Pyrgomorphidae	*Dictyophorus spumans*	LC	Koppie Foam Grasshopper
Scarabaeidae	*Tephraea dichroa*	LC	Wild Potato Fruit Chafer
Syrphidae	*Allagrapta fuscotibialis*	LC	Hoverfly
Tettigoniidae	*Conocephalu caudalis*	LC	Meadow Katydid
Tingidae	*Plerochila australis*	LC	Olive Lace Bug

Figure 7-11: Top: Nobel Lacipa (left) and Eyed Pansy (right). Bottom: Marsh Sylph (left) and Wolf Spider (right)

8. Sensitivity Analysis

The sensitivity analysis takes into account all of the desktop data (Mpumalanga C-Plan, Threatened Ecosystems, IBAs and the NPAES), as well as the field data gathered during the site visits. The outcome of this assessment depicts sensitivity ranging from low to high in the Project Area. High sensitivity was assigned to the Rocky Outcrops and Wetland habitats as they provide habitat for SCC and their irreplaceability as unique biodiversity features. Various habitats within the Project Area sustain a high diversity of faunal and floral SCC. The drainage and wetland systems are associated with a high ecological sensitivity as they provide refugia and habitat for numerous faunal SCC, promote movement of faunal species and act as corridors and also provide vital ecosystem services. Areas with moderate sensitivity included those that were considered in a natural state with minor anthropogenic disturbances and presence of SCC such as the intact grasslands and moderate rocky slopes. Low sensitivity was assigned to the transformed areas as they have been previously heavily degraded and are proliferated with AIPs. The map below illustrates the areas of concern confined to the Project Area in Figure 12.

It is recommended that areas of high sensitivity be actively conserved throughout the life of the proposed Project, as well as after decommissioning and closure. These areas should not be cleared or impacted in any way by construction activities. Areas of moderate sensitivity should be avoided as far as possible, and ideally conserved along with areas of high sensitivity. Mining activities and associated infrastructure should proceed with caution in these areas. Areas of low sensitivity are recommended for construction activities, however, should any SCC occur, the area is to be avoided or removal of the species from the area. If this cannot be done, the appropriate permits should be obtained for their removal.

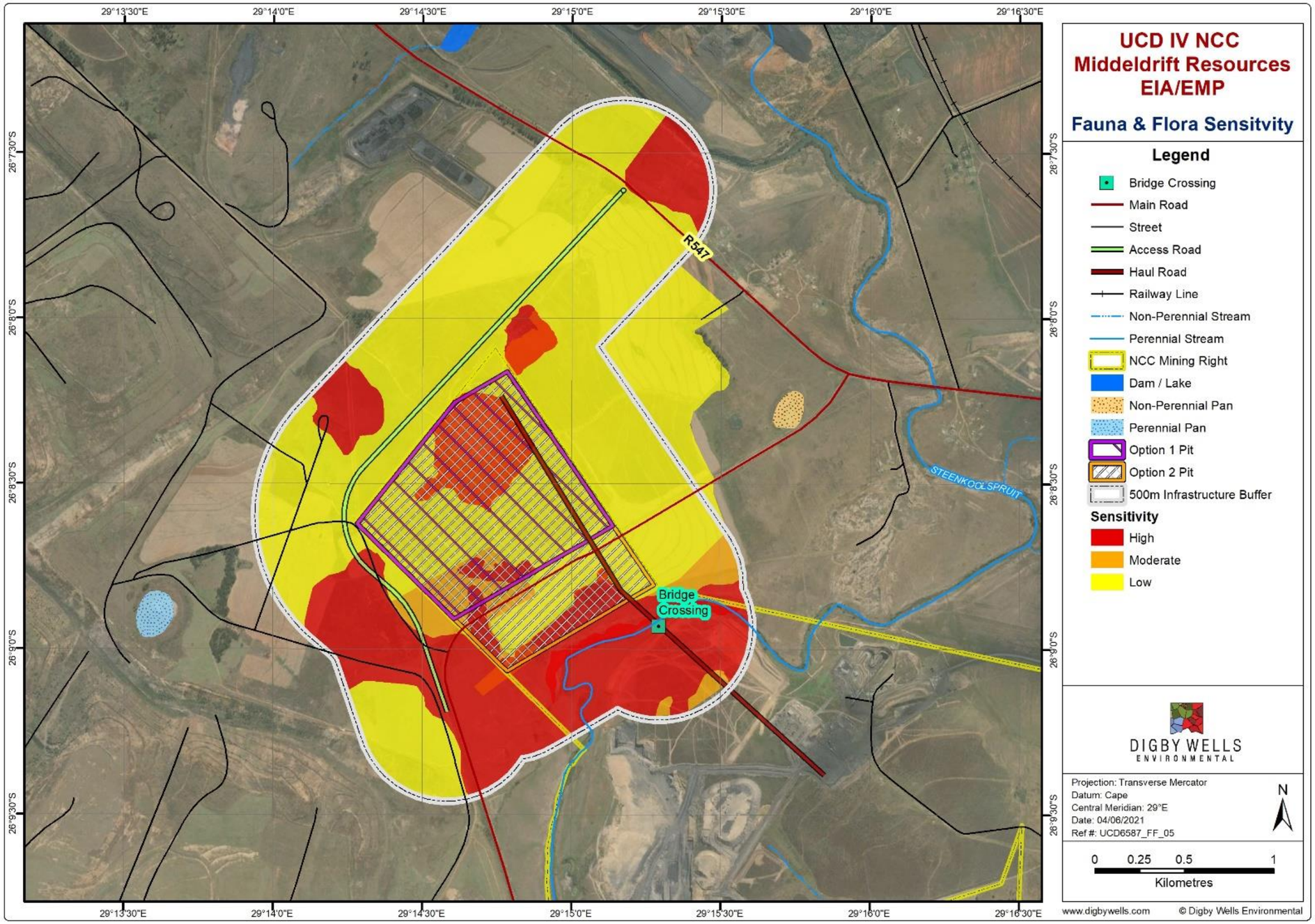

Figure 12: Sensitivity Map

9. Impact Assessment

The fauna and flora impacts were assessed for the three phases of the project life, including the construction, operational and decommissioning phases. The impacts were based on the impact's magnitude as well as the receiver's sensitivity, concluding an impact significance rating which identifies the most important impacts that require management.

The impacts that will potentially affect the fauna and flora of the Project Area are:

- Clearing of the vegetation within the development footprint of the Project Area. Clearing the vegetation will result in loss of the vegetation communities, biodiversity, and identified SCC. Loss of these components will degrade the overall habitat and ecosystem services;
- Sensitive areas such as pans, and wetlands will be impacted. There is a risk of water contamination, loss of water quality and quantity. Contaminated water will affect the surrounding areas, and decrease the overall functioning of the ecosystem;
- The current land use (agriculture and minor cattle grazing) will be negatively impacted due to the mining and infrastructure. This will result in a loss of grazing, wildlife which in turn will negatively impact the local economy; and
- Vegetation clearance and removal of topsoil will deplete the soil fertility and encourage AIP proliferation and erosion, further degrading the land and the services it provides.

Methodology used for the impact assessment is represented in Appendix A.

9.1. Construction Phase

Activities during the Construction Phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 9-1.

Table 9-1: Construction Phase Interactions and Impacts of Activity

Interaction	Impact
Removal of vegetation / topsoil for establishment of open cast mining and linear infrastructure	• Removal of all vegetation within the development footprint, permits the loss of vegetation and habitat communities (including fauna and flora SCC), biodiversity and ecosystem services; and soil compaction, increased runoff and soil erosion; and • Fragmentation, edge effects and degradation to the ecosystem.
Diesel storage and explosives magazine	• Potential spillage of hydrocarbons (diesel/fuel) thus contaminating the soil and surrounding water; • Decline in habitat quality for biodiversity and SCC; and • Increased vehicle movement.

Interaction	Impact
Construction of additional infrastructure (Noise generation/ increased noise level)	• Increased faunal casualties and vegetation removal; and • Changes to the landscape, causing ponding and undulating topographies.
Construction of access road and haul roads	• Vegetation removal, dust pollution, soil erosion, compaction, sedimentation and AIP proliferation and faunal casualties; • Increased vehicle movement promoting potential faunal causalities; and • Increased compaction and sedimentation.
Stockpiling of soils, rock dump and discard dump establishment.	• Compaction of soils; • Low vegetation growth. If stockpiles unvegetated, potential erosion and spontaneous combustion and • Increased run off and erosion.

9.1.1. Impact Description

The construction of surface infrastructure within the Project Area will take place in various areas which will affect the current habitat and vegetation types present. The open cast pits are proposed within a sensitive pan habitat where SCC were recorded. The proposed bridge crossing is located within the Rocky Outcrop habitat unit. This unit supports faunal SCC such as the African Clawless Otter (NT) recorded upstream in the Steenkoolspruit.

The habitats within the proposed area of development will be directly impacted on as the existing vegetation will be removed to permit the proposed mining activities. The placement of the infrastructure will include the complete removal of vegetation present on the footprints of the proposed infrastructure.

Provincially protected floral species, namely *Agapanthus africanus, Crinum macowanii, Gladiolus sp* and *Habenaria filicornis* were recorded in various locations within the Project Area. Removal or destruction of the protected species will necessitate an application with the relevant local authorities to permit the removal (MNCA,1998).

With the clearing of indigenous vegetation, open areas will occur where vegetation will be replaced by fast growing AIPs. This impact can be greatly reduced with the correct implementation of an alien vegetation management plan.

9.1.2. Management Objectives

Management objective for the site clearance activity will include informing the mine where the location of the vegetation communities are, including the location of the protected fauna and flora, and how to limit impacts to these.

The management objectives are to prevent the loss of important landscapes, species of plants and animals (Red Data and Nationally or Provincially listed species). This is achieved by

avoiding destruction of areas where these species occur. In the case of plants, if this is not possible, relocation or removal permits are required for the relocation of all protected species. A thorough screening must take place to quantify and locate all protected species. If relocation is not possible than replacing all removed protected species must occur after operation of the mine and during the commencement of the rehabilitation.

9.1.3. Management Actions

In accordance with the Red List Plant Guidelines (SANBI, 2020), it is imperative to adhere to the following conservation techniques regarding Red Listed plant species:

- All populations of Near Threatened and Threatened plant taxa must be conserved *in situ* (locally);
- All populations of Threatened (See Section 7.2.2) plant taxa must be protected with a buffer zone in accordance with guidelines; and
- An Ecological Management Plan must be compiled in respect of all actions that affect populations of Red List Plant Species. The Ecological Management Plan must ensure long-term persistence of the SCC, include a monitoring programme for the species, facilitate natural ecological processes, minimise artificial edge effects and include an AIP eradication and monitoring plan.
- An alien plant management strategy to preserve remaining natural habitat and avoid alien plant infestations. Such a strategy will entail the identification of areas where easy propagation of invasive species may occur. Thereafter specific eradication measures can be prescribed for the species present.
- Destruction of natural vegetation should be limited to the areas essential for the development. Once site clearing and construction are complete, the environmental officer must ensure the construction areas are rehabilitated to an acceptable standard to accomplish the aim of the rehabilitated area. Open and steep areas are prone to erosion and these must be marked and attended to before the following wet season starts.
- Rehabilitation of disturbed areas should take place within a month of construction. All bare patches of soil should be vegetated, preferably with pioneer species which will colonise open and disturbed areas relatively quickly and prevent erosion and alien vegetation establishing.

Please refer to the Digby Wells Rehabilitation Report (2021) for the recommended seed mix ideal for soil stabilising and erosion prevention.

Illegal waste dumping, including building waste and rubble, should be prohibited. Such illegal dumping sites are prone to alien vegetation recruitment. The environmental manager must ensure that after each building site is rehabilitated, there are no rubble piles remaining.

9.1.4. Impact Ratings

Impacts associated with the construction phase are presented below in Table 9-2.

Table 9-2: Construction Phase Interactions, and Impacts of Activity Rating

Activity, and Interaction: Removal of vegetation / topsoil for establishment of open cast mining and linear infrastructure			
Impact Description: • Loss of plant communities and sensitive landscapes including floral SCC and pan vegetation; • Loss of biodiversity; • Increased erosion; • Potential for AIP proliferation; • Loss of faunal habitat including faunal SCC.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	6	The impact of the vegetation clearance will occur during the life of the project, although reduced during the decommissioning phase	Major (negative) - 133
Extent	3	Vegetation removal will occur within the pit areas , proposed roads and construction of bridge.	
Severity	6	Serious loss of the vegetation communities (including grassland and wetlands) limiting ecosystem functioning	
Probability	7	Definite probability of vegetation clearing particularly in the pit areas, proposed roads and construction of bridge.	
Nature	Negative		
Mitigation measures			
• Keep site clearing to a minimal, and restrict vehicle movement to dedicated areas, outside of wetlands and ridges; • Keep site clearing and impacts within the Mining Right Area (MRA); • Alien plant management strategy should be implemented; • Make use of existing roads to encourage minimal impacts/footprint; • Avoid sensitive areas such as rocky outcrops and wetlands (See Sensitivity Map, Figure 12); • The footprint of the mine should be as compact as possible from a design point of view; and • Adhere to 100 m protective buffers around pans.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**

Duration	6	The impact will occur beyond project life, specifically during the construction, and operational phases.	Moderate (negative) - 77
Extent	3	Vegetation removal is limited only to the pit areas , proposed roads and construction of bridge.	
Intensity	3	Moderate loss, and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning.	
Probability	7	There is a definite probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		
Activity, and Interaction: Stockpile and dumping of waste material			
Impact Description: • Heavy machinery utilised increasing vehicle movement in the area, increasing soil compaction, habitat disturbances and vegetation removal; • Natural vegetation will be removed, damaged and fragmented promoting edge effects and AIP proliferation; and • Increased soil compaction and erosion.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	6	The impact of habitat fragmentation and loss of fauna and flora will occur during and after the life of the project.	Moderate (negative) - 105
Extent	4	This fragmentation will only occur within the impacted area and its near surroundings.	
Intensity	5	If not mitigated, once the resources have been lost from the landscape it can be difficult to recover and restore.	
Probability	7	Site clearance has to take place for construction of the various infrastructures which will encourage the fragmentation and loss of fauna and flora and AIP proliferation.	
Nature	Negative		
Mitigation measures			

<table>
<tr><td colspan="4">

- Restoration and rehabilitation of removed vegetation and SCC during rehab phase;
- Construction must be kept within the infrastructure footprint area, to reduce fragmentation as much as possible;
- No establishment of rubble piles;
- Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter; and
- Corridors (infrastructure and ecological) set aside within the mine area would mitigate fragmentation substantially, especially if this could be managed with the community over an extended period of time.

</td></tr>
<tr><td colspan="4">Post-Mitigation</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Motivation</td><td>Significance</td></tr>
<tr><td>Duration</td><td>4</td><td>The impact will occur during the life of the project.</td><td rowspan="5">Minor (negative) - 60</td></tr>
<tr><td>Extent</td><td>3</td><td>Loss of fauna and flora and habitat degradation is extending only as far as the development area.</td></tr>
<tr><td>Intensity</td><td>3</td><td>Moderate loss, and/or effects to biological or physical resources or moderate sensitive environments, affecting ecosystem functioning.</td></tr>
<tr><td>Probability</td><td>6</td><td>High probability that the impact will continue to occur.</td></tr>
<tr><td>Nature</td><td>Negative</td><td></td></tr>
<tr><td colspan="4">Activity, and Interaction: Access and haul roads construction</td></tr>
<tr><td colspan="4">Impact Description:

- Removal of vegetation and basal layer;
- Increased proliferation of AIPs;
- Adhere to health and safety protocols within the operations of the mine and adhere to speed limits to minimise faunal casualties;
- Increased faunal casualties; and
- Increased dust pollution.

</td></tr>
<tr><td colspan="4">Prior Mitigation</td></tr>
<tr><td>Dimension</td><td>Rating</td><td>Motivation</td><td>Significance</td></tr>
<tr><td>Duration</td><td>6</td><td>The impact of haul roads will extend beyond the life of the project.</td><td rowspan="3">Moderate (negative) - 91</td></tr>
<tr><td>Extent</td><td>3</td><td>Loss of fauna and flora will only occur within the impacted area and its near surroundings.</td></tr>
<tr><td>Intensity</td><td>4</td><td>If not mitigated serious loss will occur to the moderately sensitive environment.</td></tr>
</table>

Probability	6	Site clearance has to take place for construction of the access and haul roads, so vegetation removal is inevitable.	
Nature	Negative		
Mitigation measures			
• Keep site clearing to a minimum; • If any erosion occurs, corrective actions must be taken to minimise any further erosion from taking place at regular intervals or after high rainfall events; • Staff of the mine must adhere to policies within the operation of the mine, such as adhering to designated speed limits; • Restoration and rehabilitation of any removed vegetation and SCC should occur during the rehab phase; and • AIPs should be continuously monitored and controlled throughout the life of the mine and thereafter.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	5	The impacts will occur during the life of the project.	Minor (negative) - 54
Extent	3	Loss of fauna and flora is limited only to the footprint of the access and haul roads, exposed areas due to mitigation measures being implemented, such as limit vehicle movement, and restrict movement to specific sites.	
Intensity	3	Moderate loss, and/or effects to biological or physical resources or moderately sensitive environments, limiting ecosystem functioning.	
Probability	6	High probability that the impact will continue to occur.	
Nature	Negative		

9.2. Operational Phase

Activities during the Operational Phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 9-3.

Table 9-3: Operational Phases Interactions and Impacts

Interaction	Impact
Infrastructure area containing stockpile areas	• Loss of habitat integrity and ecosystem services; and • Loss of biodiversity and sensitive fauna and flora.

Interaction	Impact
Maintenance of haul roads, operation of machinery, and stormwater management infrastructure and stockpile areas	• Removal of vegetation, habitats and increased soil erosion, soil contamination and compaction. • Removal of soil and vegetation, increased faunal casualties (road kill); • Increased erosion and sedimentation decreasing vegetation cover; • Destruction of vegetation and habitat, dust pollution, and AIP proliferation; • Increased vehicle movement in the area, increasing soil compaction, and runoff potential; and • Unexpected changes in the topography and overall habitats.
Removal of rock (blasting)	• Habitat removal; and • Increased faunal casualties.
Concurrent rehabilitation as mining progresses	• Loss of habitat integrity and ecosystem services; and • Loss of biodiversity and sensitive fauna and flora.
Use of hydrocarbons for machinery and vehicles	• Contamination of soil, water and surrounding areas / habitats (pan vegetation) from Hydrocarbon waste/spills (lubricants, oil, explosives, and fuels).

9.2.1.1. *Impact Description*

Site clearance will take place in areas where the mining will continue and infrastructure will be established.

Removal of vegetation will cause a secondary impact on the faunal life due to the habitat destruction. There may be a direct impact on animal life, as haul roads will be utilised and expanded during this phase and there will be an increase in road kill. Continuous project activities during the operational phase will increase dust production and if not mitigated will have negative impacts on the surrounding vegetation and habitats.

9.2.1.1.1. *Management Objectives*

Management objectives during the operational phase will concentrate on preventing the loss of vegetation and/or habitat and species that surround the operations. This can be accomplished by not allowing the condition of the vegetation and surrounds to deteriorate after the project activities have begun.

9.2.1.1.2. *Management Actions*

Management actions to mitigate the impacts described can be summarised as follows:

- Monitoring of alien invasive sprawl during the operation is recommended as the surrounding vegetation is relatively intact and free from alien invasive plants;

- Ensure no loss of faunal SCC by activating anti-poaching units that will be incorporated during the mine life cycle;
- Keep sight clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands (pans) and ridges; and
- Monitor dust pollution.

9.2.1.1.3. Impact Ratings

The operational phase impacts are rated in Table 9-4.

Table 9-4: Operational Phase Interactions, and Impacts of Activity Rating

Activity, and Interaction: Infrastructure area containing stockpile areas			
Impacts: • Loss of habitat integrity and damage to surrounding ecosystem services (such as freshwater courses and wetlands); • Increased risk of dust pollution inundating surrounding undisturbed vegetation; • Rick of erosion of the stockpiles; • Risk of AIP proliferation; and • Loss of biodiversity and sensitive fauna and flora.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	5	The impact will occur during the life of the Project and will cease after the operational life span.	Minor (negative) - 72
Extent	3	Impacts will extend as far as the development site area	
Intensity	4	Serious environmental effects. These activities will result in modification of the landscape and loss of fauna and flora.	
Probability	6	There is a high probability.	
Nature	Negative		
Mitigation measures			
• Monitoring of alien invasive sprawl during the operation is recommended as the surrounding vegetation is relatively intact and free from alien invasive plants. • Monitor dust pollution discussed in Section 10. • Vegetate stockpiles to prevent soil loss, leachate, organic material loss, erosion, and sedimentation.			
Post-Mitigation			

Dimension	Rating	Motivation	Significance
Duration	4	Impacts can be reversed with adequate management	Minor (negative) -
Extent	3	Impact extending as far as the development site area.	
Intensity	2	Minor loss and damage to fauna and flora and habitats if mitigation measures are not adhered to.	
Probability	4	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		
Activity, and Interaction: Maintenance of haul roads, machinery, and stormwater management infrastructure and stockpile areas.			
Impacts: • Removal of vegetation, habitats and increased soil erosion, soil contamination and compaction; • Removal of soil and vegetation, increased faunal casualties (road kill); • Increased erosion and sedimentation decreasing vegetation cover; • Destruction of vegetation and habitat, dust pollution, and AIP proliferation; • Adhere to health and safety protocols within the operations of the mine and adhere to speed limits to minimise faunal casualties; • Increased vehicle movement in the area, increasing soil compaction, and runoff potential; and • Unexpected changes in the topography and overall habitats.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	6	The impact will occur during the life of the project and result in permanent changes to the landscape and habitats.	Moderate negative (-91)
Extent	3	Impacts will extend as far as the development site area.	
Intensity	4	Serious environmental effects. These activities will result in modification of the landscape and loss of fauna and flora.	
Probability	7	The probability is very high	
Nature	Negative		
Mitigation measures			

- Monitoring of alien invasive sprawl during the operation is recommended as the surrounding vegetation is relatively intact and free from alien invasive plants.
- Ensure no loss of faunal SCC by activating anti-poaching units that will be incorporated during the mine life cycle.
- Monitor dust pollution as will be discussed in Section 11.
- Keep sight clearing to a minimal, and restrict vehicle movement to dedicated areasoutside of wetlands (pans).
- Vegetate stockpiles to prevent soil loss, organic material loss, erosion, and sedimentation.

Post-Mitigation			
Duration	4	The impact will occur on a long-term basis, specifically during the construction, and operational phases.	Minor negative (-40)
Extent	3	Removal of vegetation, soil stripping and stockpiling is limited only to current mine areas, provided that mitigation measures are implemented.	
Intensity	3	Moderate loss and damage to fauna and flora and habitats if mitigation measures are not adhered to.	
Probability	4	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		

Activity, and Interaction: Removal of rock(blasting) and concurrent rehabilitation as mining progresses

Impacts:

- Removal of vegetation, habitats and increased soil erosion and compaction;
- Destruction of and changes to the habitats;
- Increased dust pollution due to erosion and vehicular activity;
- Risk of AIP proliferation;
- Habitat removal;
- Increased faunal casualties;
- Loss of habitat integrity and ecosystem services; and
- Loss of biodiversity and sensitive fauna and flora.

Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	5	The impact will occur during the life of the project and result in permanent changes to the landscape and habitats.	Minor Negative

Extent	3	Impacts will extend as far as the development site area.	(- 84)
Intensity	5	These activities will result in modification of the landscape and loss of fauna and flora.	
Probability	6	The probability is very high	
Nature	Negative		
Mitigation measures			
• Monitoring of alien invasive sprawl during the operation is recommended as the surrounding vegetation is relatively intact and free from alien invasive plants. • Ensure no loss of faunal SCC by activating anti-poaching units that will be incorporated during the mine life cycle. • Monitor dust pollution discussed in Section 10 • Keep sight clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands (pans). • Explosives for the blasting must be stored in an approved tamper-proof explosive storage unit. • Vegetate stockpiles to prevent soil loss, organic material loss, erosion, and sedimentation.			
Post-Mitigation			
Duration	5	The impact will occur on a long-term basis, specifically during the construction, and operational phases.	Negligible Negative (- 30)
Extent	3	Removal of vegetation, soil stripping and stockpiling is limited only to current mine areas, provided that mitigation measures are implemented.	
Intensity	2	Moderate loss and damage to fauna and flora and habitats if mitigation measures are not adhered to.	
Probability	3	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		
Activity, and Interaction: Use of hydrocarbons on site for vehicle use			
Impacts: • Potential leaking or spillage of hydrocarbons form vehicle use in the Project Area. Contamination of soil, water and surrounding areas / habitats (pan vegetation) from Hydrocarbon waste/spills (lubricants, oil, explosives, and fuels).			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**

Duration	3	The impact will occur during the life of the project, although reduced during the decommissioning phase	Minor Negative (- 60)
Extent	3	Contamination may occur in areas where high vehicle or machinery activities will take place.	
Intensity	4	Could be serious if leaks are detected in the sensitive water systems on site.	
Probability	6	The probability is very high.	
Nature	Negative		
Mitigation measures			
• All spills should be immediately cleaned up, and treated accordingly; and • Re-fuelling must take place on a bunded surface area away from sensitive habitats such as the pan vegetation to prevent the ingress of hydrocarbons into the topsoil.			
Post-Mitigation			
Duration	5	The impact will occur on a long-term basis, specifically during the construction, and operational phases.	Negligible Negative (- 30)
Extent	3	Spillage and contamination is limited only to storage areas, provided that management measures are implemented	
Intensity	2	Short - term environmental effects due to prevention measures and rehabilitation.	
Probability	3	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		

9.3. Decommissioning Phase

Activities during the decommissioning phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 9-5.

Table 9-5: Decommissioning Phase Interactions and Impacts

Interaction	Impact
Demolition, and removal of infrastructure – once Project activities have been concluded infrastructure will be demolished in preparation for the final land rehabilitation. The road diversion and bridge will be a permanent feature.	• Disturbance of soils, and subsequent erosion by wind, and water; • Increased vehicle movement in the area, increasing soil erosion and habitat destruction; • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the surrounding grounds; • AIP proliferation; and • Changes in topography and landscape
Rehabilitation – re-vegetation and profiling of the land.	• Exposure of soils, and subsequent compaction, erosion, and sedimentation; • Soil compaction, and increased runoff potential due to vehicle movement during rehabilitation programs; • Loss of organic material, and vegetation cover; and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of soil.
Post-closure monitoring and rehabilitation	• Minimal negative impacts on the environment such as removal and dismantling of infrastructure or machinery.

9.3.1. Impact Description

The decommissioning phase will enable the rehabilitation of the removed indigenous vegetation and Red Listed species. The removal of any infrastructure or machinery may also take place, whereby these will be dismantled and trucked away.

9.3.1.1. Management Objectives

The objective for this phase will be to maximise the success of the rehabilitation that will take place after infrastructure is removed and the opencast pit is backfilled, and to furthermore reduce any impacts that may occur during this phase.

9.3.1.2. Management Actions

Decommissioning of the infrastructure and infilling of the pit will be predominantly a rehabilitation activity. These areas will be sloped and revegetated with indigenous plant species that represent the vegetation types and communities identified.

In order for the decommissioning to be a positive impact, the removal of the infrastructure and backfilling of the pit must be completed so as to not harm or negatively impact surrounding intact vegetation. The aim will be to ensure the disturbed footprint areas are vegetated and that erosion through runoff and wind does not occur. Efforts will be maximised if rehabilitation is completed before the wet season sets in to make use of the rainfall to assist in plant growth.

9.3.1.3. Impact Ratings

The decommissioning phase impacts are listed in Table 9-6 below.

Table 9-6: Decommissioning Phase Interactions, and Impacts of Activity Rating

Activity and Interaction: Movement of vehicles and heavy machinery			
Impact Description: • Compaction of soil; • Potential faunal casualties; • Increased runoff potential; and • Increased erosion and decline in revegetation potential.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	3	Impacts can be managed during the decommissioning phase.	Minor (negative) - 55
Extent	3	Impacts will be localised within the operational pits and roads	
Intensity	4	Erosion and decline in vegetation due to increased runoff from compacted areas.	
Probability	5	Movement of vehicles and heavy mine machinery will result in soil compaction and possible faunal casualties.	
Nature	Negative		
Mitigation measures			
• Rehabilitate the compacted, eroded areas by deep ripping to loosen the soil and revegetate the area as soon as possible; • Ensure proper stormwater management designs are in place to ensure no run-off or pooling occurs; • Adhere to health and safety protocols within the operations of the mine and adhere to speed limits to minimise faunal casualties; and • Only designated access routes are to be used to reduce any unnecessary compaction.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	4	The impact will occur on a small scale, specifically during rehabilitation and monitoring.	Negligible (negative)

Extent	2	The impact is limited only to specific areas, provided that mitigation measures are implemented.	- 32
Intensity	2	Minor loss, and/or effects to biological or physical resources not affecting ecosystem functioning.	
Probability	4	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		

Activity, and Interaction: Demolition of infrastructure and preparation for rehabilitation of affected areas

Impact Description:

- Disturbance of soils, and subsequent erosion by wind and water;
- Increased vehicle movement in the area, increasing soil erosion and habitat destruction;
- Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the surrounding grounds;
- AIP proliferation; and
- Unexpected changes in topography and landscape.

Prior Mitigation

Dimension	Rating	Motivation	Significance
Duration	6	The impacts will remain for some time after the life of a Project.	Minor (negative) - 65
Extent	3	Impacts will be localised as far as the extent of the devlopment	
Intensity	4	Serious medium-term environmental effects.	
Probability	5	The impact may likely occur.	
Nature	Negative		

Mitigation measures

- Continue with concurrent Rehabilitation, begin with stockpiles, bare grounds and dumps, implement rehabilitation measures;
- Address eroded and compacted areas by deep ripping to loosen the soil, and revegetate the area as soon as possible to prevent AIP sprawl;
- Inventory of hazardous waste materials stored on-site should be compiled and complete removal arranged; and
- Only designated access routes are to be used to reduce any unnecessary compaction.

Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	2	The impact will be less than a year if rehabilitation measures are implemented correctly.	Negligible (negative) - 24
Extent	2	The impact will be limited to the site due to the implementation of mitigation measures.	
Intensity	2	Minor effects on the biological or physical environment. Environmental damage can be rehabilitated internally with/ without the help of external consultants.	
Probability	4	The impact can occur.	
Nature	Negative		
Activity, and Interaction: Rehabilitation – re-vegetation and profiling of the land.			
Impact Description: • Exposure of soils, and subsequent compaction, erosion, and sedimentation; • Soil compaction, and increased runoff potential due to vehicle movement during rehabilitation programs; • AIP proliferation; • Loss of organic material, basal layer and vegetation cover; and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of soil.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	4	The impacts caused during the rehabilitation activities will have a long-lasting effect if not managed.	Minor negative (-56)
Extent	4	The impact could spread beyond the local development boundaries due to the ability of degraded landscape or alien invasive species impacting the area.	
Intensity	5	These impacts have serious implications to the revival of the disturbed areas.	
Probability	5	These are commonly observed impacts for the rehabilitation phase.	
Nature	Negative		
Mitigation measures			

- During the decommissioning phase, rehabilitation must start as soon as possible and preferably in the growing season (October to February) to ensure adequate plant recruitment;
- Address eroded and compacted areas by deep ripping to loosen the soil, and revegetate the area as soon as possible;
- Inventory of hazardous waste materials stored on-site should be compiled and complete removal arranged; and
- Only designated access routes are to be used to reduce any unnecessary compaction.

Post-Mitigation

Dimension	Rating	Motivation	Significance
Duration	6	The impact will be less than a year if rehabilitation measures are implemented correctly	Positive Impact 66
Extent	3	The impact will be limited to the site due to the implementation of mitigation measures	
Intensity	2	Minor effects on the biological or physical environment. Environmental damage can be rehabilitated internally with/ without the help of external consultants.	
Probability	6	The impact can occur	
Nature	Positive		

Activity, and Interaction: Post-closure monitoring and rehabilitation

Impact Description:

- Minimal negative impacts on the environment;
- Activities involve the rehabilitation processes of reprofiling the soils and re-vegetation thereafter;
- Impacts include the possibility of erosion and sedimentation;
- Proliferation of AIPs; and
- Change in the habitat and species composition.

Prior Mitigation

Dimension	Rating	Motivation	Significance
Duration	7	The impact will be permanent.	Negligible (negative) 30
Extent	1	Limited to isolated sections of the Project Area.	

Intensity	4	Moderate loss, and/or effects to biological or physical resources or low sensitive environments, limiting ecosystem functioning.	
Probability	5	Likely: The impact may occur. <65% probability	
Nature	Negative		
Mitigation measures			
• During the decommissioning phase, rehabilitation must start as soon as possible and preferably in the growing season (October to February) to ensure adequate plant recruitment; • Stockpiles, open pits and dumps are to be rehabilitated; • Ensure sufficient irrigation and fertilizing of newly planted vegetation to facilitate rapid establishment; and • Replant with species identified within each vegetation community.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	6	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Positive Impact 66
Extent	3	Local area will be affected.	
Intensity	2	Low positive impact.	
Probability	6	Almost certain with a high probability that the impact will occur.	
Nature	Positive		

9.4. Cumulative Impacts

It is necessary to consider the impacts that the future development will have from a wide-ranging perspective by considering land-use and transformation of the natural habitat in surrounding areas. Cumulative impacts are assessed by considering past, present and anticipated changes to the biodiversity. Roads, other mining activity and agricultural activity in the area contribute to this regard. The proposed project is localised in extent but could affect SSC if not managed carefully.

The further removal of habitat/vegetation types to allow construction will bring about a reduction of natural areas, and the increase of the edge effect. The impacts on the ecology of the area will be significant. It is expected that there will be great losses of vegetation and flora along with associated faunal habitat and ecosystem services. Albeit the Project Area resides

in the Endangered Eastern Highveld Grassland vegetation type which is currently poorly protected. The cumulative loss of the vegetation type as well as the SCC within it should be considered proactively. The primary impacts will include fragmentation and edge effects, isolating pockets of vegetation decreasing movement and corridors for wildlife and threatened species.

Secondary cumulative impacts will include increased accessibility to the site and the resulting increase in development and resource dependence. Ideally, a strategic environmental plan for the area should be developed and adhered to. This should include the conservation of important areas as well as the provision of corridors for faunal movement.

9.5. Unplanned and Low Risk Events

Major unplanned risks are associated with infrastructure or machinery malfunctioning and contamination of surrounding ground and ground water. Potentially hazardous substances can contaminate the area via accidental spillage or leakage. It is imperative that the requirements of South African legislation are met for minimisation of pollution. These are described in Table 9-7 below.

Table 9-7: Unplanned Events and Associated Mitigation Measures

Unplanned Risk	Mitigation Measures
Leaking or spillage of hazardous substances.	• If a spill occurs, it is to be cleaned up immediately (Rapid/Drizit type spill kits) and consequently reported to the authorities; • All infrastructure carrying or transporting such substances is to be checked frequently and maintained; and • Ensure all staff are adequately informed and safety measures are in place for such instances.
Hydrocarbon spillage from vehicles	• If leak occurs from vehicle, place drip trays below the leak; • All vehicles are to be serviced on concrete areas and off site; and • Machines must be parked upon hard parking surfaces and checked daily for leaks.
Infrastructure malfunction leading towards dirty water spillage or spontaneous combustion	• All infrastructure, machinery and associated setups are to be serviced and checked throughout the project life cycle; • All staff are to be informed about potential hazards and consequently prepared for malfunctioning; • Protocols are to be induced at every phase of the project life cycle; and • If such hazards were to occur, the appropriate authorities are to be notified and the incident recorded.

Unplanned Risk	Mitigation Measures
Excess dust pollution	• Excess dust in construction sites is mitigated via various methods and are site specific. The recommended methods for this site would be spraying of water, mulch from the removed vegetation and tackifiers and soil stabilisers that don't harden the soils.

10. Environmental Management Plan

The objective of an EMP is to present mitigations to (a) manage undue or reasonably avoidable adverse impacts associated with the development of the project and (b) enhance potential positives.

Mitigation measures will sometimes be built into the base of a project and should be considered as part of the "pre-mitigation" scenario; additional mitigation must be recommended if the impact assessment indicates it is necessary.

The key objectives of EMPs are to give mitigation measures to:

- Identify the actual environmental, socio-economic and public health impacts of the project and check if the observed impacts are within the levels predicted in the EIA;
- Determine that mitigation measures or other conditions attached to project approval (e.g. by legislation) are properly implemented and work effectively;
- Adapt the measures and conditions attached to project approval in the light of new information or take action to manage unanticipated impacts if necessary; and
- Gauge if predicted benefits of the project are being achieved and maximized; and
- Gain information for improving similar projects and EIA practice in the future.

The EMP is described in Table 10-1 below.

Table 10-1: Environmental Management Plan

Activities		Potential Impacts	Mitigation Measure	Mitigation Type	The period for implementation
Construction Phase	• Site clearing, and preparation by the removal of vegetation and associated habitats and removal of soils; • Movement of vehicles, and heavy machinery; • Construction of infrastructure, including access and haul roads, merging bridge and opencast pit; and • Waste management activities, including handling of hydrocarbon chemicals, transportation of waste material, transportation of product coal, and disposal of waste material.	• Removal of vegetation, basal cover, and thus increasing the potential of loss of topsoil, organic material, and increased erosion potential; • Loss of sensitive habitat; • Removal of flora and fauna SCC and faunal habitat; • Removal of vegetation communities such as woodlands and pans (wetlands); • AIP proliferation; • Increased runoff potential and consequently sedimentation and compaction of the soil; • Potential spillage of hydrocarbons such as oils, fuels (diesel), and grease, thus contamination of the soils and surrounding grounds; • Risk of fire during the dry season; and • Increased dust pollution.	• Keep site clearing to an absolute minimum by adhering to the Project layout only, and restrict vehicle movement to dedicated areas, specifically outside of wetlands (pans) and rocky outcrops; • Floral SCC located in areas of development should be marked prior to commencement of construction. Necessary permits for relocations of protected species must be obtained from the relevant government department. The relocation strategy must be approved by relevant authorities prior to relocation to a safe and ideal location. Sourcing representative and indigenous flora to rehabilitate the area, local nurseries and contractors should be contracted to supply the saplings and seed mixes; • Make use of and upgrade existing roads to encourage minimal impacts/footprint to the Project Area, this would limit the impacts proposed from the construction of the road diversion; • The bridge crossing is proposed in a highly faunal and floral sensitive habitat (see Sensitivity Map Figure 12). It is thus proposed that a new location in an area where disturbances and alterations have already occurred be targeted for the proposed bridge crossing, as this will prevent destruction of undisturbed natural habitat for faunal and floral SCC; • Whilst the removal of vegetation is underway, key monitoring methods should be focussed on the prevention of AIP proliferation during the construction and operational phase. Measures must be in place to prevent the spread of AIPs; • Erosion prevention is key thus runoff must be controlled, and managed by use of proper stormwater management measures; • Management of dust may involve the spraying of water and / or covering exposed pits with mulch. Mulch can be sourced from the removed vegetation from the site; • Vehicles should regularly be surveyed and checked that oils spill and other contaminants are not exposed to the soils; • Storage and re-fuelling of vehicles must take place on bunded impervious surfaces to prevent seepage of hydrocarbons into the soil; • Fuel, grease, and oil spills should be remediated using a commercially available emergency clean up kits. However, for major spills (>5L), if soils are contaminated, they must be stripped, and disposed of at a licensed waste disposal site; and • Fire management plan is recommended in case of uncontrolled fires during the dry season.	***Modify, remedy, control, or stop*** Concurrent rehabilitation through the life of mine	Life of Construction Phase

Activities		Potential Impacts	Mitigation Measure	Mitigation Type	The period for implementation
Operational Phase	• Vehicle, and heavy machinery movement • Open-pit establishment • Removal of rock (blasting) • Stockpiling (rock dumps, soils, ROM, discard dump) establishment, and operation • Waste management activities • Diesel storage, explosives magazine, and handling, and treatment of hazardous products (including fuel, explosives, and oil).	• Increased vehicle movement in the area, Increasing the risk of faunal casualties due to road kill; • Increased risk of AIP proliferation without adequate control measures; • Increased dust pollution; • Increase risk of fire during dry season; • Increased erosion, runoff and compaction of soil and consequently sedimentation potential; • Changes to the landscape with subsequent removal of faunal habitats and a decrease in biodiversity and loss of SCC (faunal and floral); and • Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the soils and surrounding grounds.	• Make use of existing roads to ensure minimal impacts and footprint to the Project Area; • Monitor AIPs and ensure measures are in place to prevent spread and proliferation; • All bare patches of soil should be vegetated, preferably with pioneer species (such as *Cynodon dactylon*, *Chloris gayana and Digitaria eriantha*) which will colonise open and disturbed patches quickly; • Avoid disturbing extensive footprint of sensitive areas as much as possible – i.e. ridges and wetlands (see Sensitivity Map); • Adhere to the recommended mitigation measures around the sensitive wetland pans (refer to the Digby Wells Wetland Report, 2021); • Management of dust may involve the use of dust suppressants, spraying of water and / or covering exposed pits with mulch. • Monitoring must be carried out during the operational phase to ensure no unnecessary impact to the remaining vegetation and associated habitats, and if so that a remediation plan is put in place as soon as possible; • In support of the Digby Wells Wetland Report 2021, a Storm Water Management Plan (SWMP) should already be implemented. This should consider all high land capability areas, high potential erosion areas, wetlands, and other watercourses associated with the new developments/infrastructure which should divert stormwater away from the surface infrastructure, and back into natural watercourses to maintain catchment yield as far as possible. The SWMP should also convey stormwater to silt traps to limit erosion and the subsequent increase of suspended solids in downstream watercourses; • Fire management plan is recommended in case of uncontrolled fires during the dry season; • Hydrocarbons should be used in an environmentally safe manner with correct storage as per each chemical's specific storage descriptions; and • Re-fuelling of vehicles and machinery must take place on a sealed surface area away from wetlands to prevent the ingress of hydrocarbons in the surrounding area.	***Modify, remedy, control, or stop*** Concurrent rehabilitation through the life of mine	Life of Operational Phase

Activities		Potential Impacts	Mitigation Measure	Mitigation Type	The period for implementation

Decommissioning Phase	• Movement of vehicles, and heavy machinery removing infrastructure;
	• Rehabilitation – rehabilitation mainly consists of reprofiling the landscape via re-vegetation.
	• Post-closure monitoring, and rehabilitation
		• Increased vehicle movement in the area, Increasing the risk of faunal casualties due to roadkill;
		• Increased risk of AIP proliferation without adequate control measures;
		• Increased erosion, runoff and compaction of soil and consequently sedimentation potential;
		• Changes to the landscape with subsequent removal of faunal habitats and a decrease in biodiversity and loss of SCC (faunal and floral); and
		• Potential spillage of hydrocarbons such as oils, fuels, and grease, thus contamination of the soils and surrounding grounds.
			• Address areas that have been impacted by erosion, compaction, sedimentation by loosening the soil, and revegetate the area as soon as possible;
			• Begin with the rehabilitation of the vegetation and replant with indigenous flora identified in vegetation communities, particularly pioneer species.
			• Ensure removal of all AIPs. This can be done manually and if necessary, with a systemic solution such as Round-Up;
			• Ensure designated access routes and roads are used to reduce any unnecessary compaction and degradation;
			• Inventory of hazardous waste materials stored on-site should be compiled, and complete removal must be arranged;
			• Rehabilitation and a Monitoring Plan should be implemented. In terms of biodiversity, a key component of the rehabilitation is the re-establishment of natural vegetation. The overall objectives for the establishment of natural vegetation are to:
			  • Create a sustainable cover that prevents erosion and promotes ecological succession;
			  • Avoid soil loss and reduce sedimentation into freshwater and aquatic ecosystems;
			  • Re-establish ecosystem processes to ensure sustainable land use; and
			  • Restore the biodiversity of the area as far as possible.
			• Rehabilitation of the vegetation cover will require varying species that complement the soil moisture content of the landscape. Rehabilitation of the dryland areas and rocky slopes will require good soil stabilising, easily establishing and nurse cropping grass species such as Chloris gayana, Cynodon dactylon, Eragrostis curvula and E. tef. Drainage areas, seepage zones and permanent wet areas will require species that stabilize the soils and are able to grow in permanent wet areas such as C. gayana and Typha capensis
				Modify, remedy, control, or stop
				Concurrent rehabilitation through the life of mine
					Life of Decommissioning Phase

11. Monitoring Programme

A monitoring programme is essential as a management tool to detect negative impacts and variations as they arise and ensure that the necessary mitigation measures are implemented together with the effectiveness of the management measures in place. Table 11-1 describes the monitoring plan that is to be implemented from the construction phase through to monitoring after decommissioning. The program includes each element, frequency of monitoring and the person responsible thereof.

Monitoring should be done in terms of:

- Appendix 6 of the NEMA EIA Regulations, 2014, (as amended);
- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM: WA);
- National Forest Act, 1998 (Act No. 84 of 1998) (NFA); and
- Mpumalanga Biodiversity Sector Plan (MBSP, 2014).

Table 11-1: Monitoring Plan

Monitoring Element	Comment	Frequency	Responsibility
Alien Invasive Management	During the operational phase the presence if AIPs should be detected and monitored every six (6) months. An active programme of weed management, to control the presence and spread of invasive weeds, will need to be instituted so that encroaching weeds (from edge effects and fragmentation) are controlled by means appropriate to the species. This should run for the life of the mine and five years after rehabilitation.	Annually during the wet season (December to February) for the first five years after rehabilitation.	Environmental Officer
Vegetation Cover Monitoring	The natural vegetation cover established on the disturbed areas needs to be monitored annually for the first five years after rehabilitation has been carried out, to ensure that the rehabilitation work has been successful in terms of stabilising the newly formed surfaces (preventing air and water erosion from affecting those surfaces), and that the newly established vegetation cover is trending towards convergence with the original vegetation cover found on the areas prior to	Annually during the wet season for the first five years after rehabilitation.	Botanist / Flora Specialist

Monitoring Element	Comment	Frequency	Responsibility
	disturbance (and on adjacent undisturbed areas). Parameters to be followed during monitoring: • Plant species present/absent; • Weed species composition; • Species density (number of individuals); • Species frequency (number of times species is recorded); • Basal cover; and • Biomass for ground cover.		
Red Data listed fauna and flora	All protected and Red Data plant and animal species must be marked prior to any construction taking place.	Monitored every 6 months from rehabilitation	Field Specialist
Fauna monitoring	This will be closely linked to the flora monitoring to enable scientific conclusions and comparisons. To successfully monitor faunal and floral biodiversity with a Savannah biome, a solid baseline (pre-construction) will be established through the first round of monitoring. This needs to be supplemented with regular repeats to compile a reasonable comparison between the pre-construction faunal communities present and faunal communities found in the same areas during various stages of construction and operation of the proposed project. It is recommended that this monitoring be carried out through the life of the mine and concurrently during rehabilitation.	Monitored every 6 months from rehabilitation	Field Specialist

12. Stakeholder Engagement Comments Received

The consultation process affords Interested and Affected Parties (I&APs) opportunities to engage in the EIA process. The objectives of the Public Participation Process (PPP) include the following:

- To ensure that I&APs are informed about the Project;
- To provide I&APs with an opportunity to engage and provide comment on the Project;

- To draw on local knowledge by identifying environmental and social concerns associated with the Project;
- To involve I&APs in identifying methods in which concerns can be addressed;
- To verify that stakeholder comments have been accurately recorded; and
- To comply with the legal requirements.

The PPP has been completed in part, as a process separate to the Fauna and Flora Environmental Impact Assessment. No standalone consultation was undertaken as part of this assessment. Should any I&AP comments be submitted in relevance to fauna and flora during the PPP, these will be considered in the final EIA report.

Site surveys can often present an opportunity for informal consultation with specific stakeholders (usually farm owners, managers and employees). None were encountered during the wet season survey conducted for the study during February 2021.

13. Recommendations

The following actions are recommended to reduce adverse effects on the fauna and flora of the Project Area.

Table 13-1: Possible Impacts and Recommendations

Possible Impacts	Recommendations	Person Responsible
Loss of Fauna SCC	• All identified faunal SCC must be located and relocated, if possible, before the construction phase.	Biodiversity specialist, and Universal Coal PM
Loss of Vegetation cover and Flora SCC	• All floral SCC must be identified and located. Protected Plant Permits from local governing authorities (Department of Environment Forestry and Fisheries) will be required for either the destruction or removal of protected flora (MNCA, 1998). • Regional relocation of protected species within development footprint must be instilled to offset the overall loss of floral SCC within the Project Area. As recommended in Section 10, replanting of indigenous flora during the rehabilitation phase as a means to re-vegetate the area after decommissioning the mining activities.	Field Specialist, and Universal Coal PM

Possible Impacts	Recommendations	Person Responsible
Habitat and landscape fragmentation	• Restriction of vehicle movement over sensitive areas to reduce degradation of undisturbed areas. • Minimise unnecessary removal of the natural vegetation cover outside the development footprint. • After rehabilitation the area must be fenced, and animals (cattle) should be kept off the area until the vegetation is self-sustaining and established.	Field Specialist, Communal Nursery and Universal Coal PM

14. Reasoned Opinion Whether Project Should Proceed

Based on the baseline information, and impact assessment significance ratings, it is the opinion of the specialist that this Project may potentially inflict irreversible damage to sensitive habitats such as Wetlands and Rocky Outcrops. These sensitive landscapes were found to host numerous faunal and floral SCC. However, it is highly recommended that concurrent rehabilitation, management and mitigation measures are correctly implemented to minimise all potential impacts (identified in Section 9 and 10) on the fauna and flora of the site.

Managing measures to minimise potential negative impacts as set out in Section 10 should form part of the conditions throughout the development of the Project. Protected species will require permit applications for the removal of identified protected species within the development footprint, so it is strictly advised to keep development and removal within the footprint. It is also highly recommended that watercourses (wetlands and pans) be avoided and not impacted with application of the recommended mitigation measures prescribed the Digby Wells Wetland Report 2021 to any of the identified wetland systems that will be impacted by the Project. In addition to avoidance measures, the proposed bridge location should be relocated to an area where the existing environment has already endured disturbances, as the current proposed location is within a habitat unit (Rocky Outcrop) that is relatively undisturbed and will have severe consequences on the receiving environment and SCC if disturbed or altered.

Fauna and flora management measures and monitoring requirements as set out in this report should form part of the conditions of the ongoing activities of the mine.

15. Conclusion

Based on Mucina & Rutherford (2006) classification of South Africa's vegetation, the proposed Project is located in an area dominated by the vegetation type Eastern Highveld Grassland, which according to those authors, is regarded as Endangered. According to the MBSP, moderately modified, other natural and heavily modified areas are present within the Project Area. According to the SAPAD and NPAES, the nearest reserves within a 35 km radius to the Project Area are the Heyns Private Nature Reserve and the John Bairns Nature Reserve.

A single season site survey was undertaken in February 2021 during the wet season. The following details were recorded:

- Much of the Project Area has been either transformed or degraded largely through historical crop production and other agricultural activities.
- Identified vegetation communities included Wetlands (Pan and Moist Grassland, see Wetland Report), Rocky Outcrops and Transformed Grassland (cultivated areas and areas of Alien Invasive Plant (AIP) proliferation). The Wetland and Rocky Outcrop communities are seen as sensitive landscapes in the context of this ecological report.
- Floral Species of Conservation Concern (SCC) recorded included:
    - Gladiolus crassifolius;
    - Gladiolus dalenii;
    - Habenaria filicornis;
    - Agapanthus africanus; and
    - Crinum macowanii.

All recorded floral SCC are protected under the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) (MNCA). They were encountered within the various wetland systems and Rocky Outcrops. Faunal SCC recorded two large wading birds, namely the Yellow-billed Stork (Endangered (EN)) and the Greater Flamingo (Near Threatened (NT)) within the non-perennial Pan adjacent to the R547. It is assumed that the non-perennial Pan provides sustenance for the facultatively nomadic species. Other faunal SCC included:

- A Giant Bullfrog (*Pyxicephalus adspersus*) (NT), recorded within the corn fields of the cultivated fields;
- A Marsh Sylph (*Metisella meninx*) (NT), recorded in the Pan and Seep wetlands;
- A Serval (*Leptailurus serval*) (NT), recorded in close proximity to the proposed access road; and
- An African Clawless Otter (*Aonyx capensis*) (NT) tracks, recorded below the bridge on the R547 in the Steenkoolspruit.

The mining activities in the identified vegetation communities have had direct negative ecological impacts, most notably vegetation clearing, habitat loss and fragmentation as well as AIP proliferation. Areas to be mined should be screened for the identified floral and faunal SCC and any other Red Data/protected species prior to construction. If found these species should be relocated to a nearby site of similar habitat and permits applied for the removal.

The Project Area represents high faunal and floral diversity with numerous SCC identified throughout. The vegetation communities associated with the highest species richness were the Rocky Outcrops and Wetland communities. However, in the context of the Project Area all the remaining natural vegetation provides habitat for numerous faunal and floral species and

therefore is of conservation significance. Recommendations and mitigation measures are provided in the Impact Assessment. Important recommendations include the following:

- Management and control of AIP proliferation throughout the life of the Project;
- Keep footprint to a minimum and adhere to protective buffers recommended in the Wetland Report (DWE, 2021); and
- A thorough screening prior to construction for the locality of faunal and floral SCC should be done. Protected flora will require permits for removal or destruction.

This assessment provides mitigation measures, continuous monitoring measures, encourages concurrent rehabilitation and monitoring plan.

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Appendix A: Impact Assessment Methodology

Impact Assessment Methodology

Details of the impact assessment methodology used to determine the significance of impacts to fauna and flora is provided below.

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 16-1. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts. Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this Impact Assessment Report. The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 16-1, which is extracted from Table 16-2. The description of the significance ratings is discussed in Table 16-3. It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 16-1: Impact Assessment Parameter Ratings

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to highly sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability.

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
5	Serious loss and/or damage to physical or biological resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province/ Region Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.
4	Serious loss and/or damage to physical or biological resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense natural and / or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
3	Moderate loss and/or damage to biological or physical resources of low to moderately sensitive environments and, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.

Rating	Intensity/ Replicability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	Very limited/Isolated Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely / None: Expected never to happen. <1% probability.

Table 16-2: Probability/Consequence Matrix

Probability \ Significance	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Table 16-3: Significance Rating Description

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Major (positive) (+)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Moderate (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Negligible (negative) (-)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Minor (negative) (-)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a significant and usually a long-term change to the (natural and / or social) environment and result in major changes.	Moderate (negative) (-)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Major (negative) (-)

Appendix B: Mammals

Family	Scientific Name	Common Name	Red List Category
Bovidae	*Aepyceros melampus*	Impala	LC
Bovidae	*Connochaetes gnou*	Black Wildebeest	LC
Bovidae	*Damaliscus pygargus phillipsi*	Blesbok	LC
Bovidae	*Oryx gazella*	Gemsbok	LC
Bovidae	*Ourebia ourebi*	Oribi	EN
Bovidae	*Pelea capreolus*	Vaal Rhebok	NT
Bovidae	*Redunca arundinum*	Southern Reedbuck	LC
Bovidae	*Redunca fulvorufula*	Mountain Reedbuck	LC
Bovidae	*Sylvicapra grimmia*	Bush Duiker	LC
Bovidae	*Syncerus caffer*	African Buffalo	LC
Bovidae	*Taurotragus oryx*	Common Eland	LC
Bovidae	*Tragelaphus scriptus*	Bushbuck	LC
Bovidae	*Tragelaphus strepsiceros*	Greater Kudu	LC
Canidae	*Canis mesomelas*	Black-backed Jackal	LC
Equidae	*Equus quagga*	Plains Zebra	LC
Erinaceidae	*Atelerix frontalis*	Southern African Hedgehog	NT
Felidae	*Caracal caracal*	Caracal	LC
Felidae	*Leptailurus serval*	Serval	NT
Felidae	*Panthera pardus*	Leopard	VU
Herpestidae	*Cynictis penicillata*	Yellow Mongoose	LC
Hyaenidae	*Proteles cristata*	Aardwolf	LC
Hystricidae	*Hystrix africaeaustralis*	Cape Porcupine	LC
Leporidae	*Lepus saxatilis*	Scrub Hare	LC
Muridae	*Aethomys namaquensis*	Namaqua Rock Mouse	LC
Muridae	*Gerbilliscus brantsii*	Highveld Gerbil	LC
Muridae	*Lemniscomys rosalia*	Single-Striped Lemniscomys	LC
Muridae	*Mastomys natalensis*	Natal Mastomys	LC
Muridae	*Otomys angoniensis*	Angoni Vlei Rat	LC
Muridae	*Rhabdomys pumilio*	Xeric Four-striped Grass Rat	LC

Family	Scientific Name	Common Name	Red List Category
Mustelidae	*Aonyx capensis*	African Clawless Otter	NT
Mustelidae	*Ictonyx striatus*	Striped Polecat	LC
Mustelidae	*Mellivora capensis*	Honey Badger	LC
Nesomyidae	*Dendromus mystacalis*	Chestnut African Climbing Mouse	LC
Orycteropodidae	*Orycteropus afer*	Aardvark	LC
Procaviidae	*Procavia capensis*	Cape Rock Hyrax	LC
Soricidae	*Crocidura flavescens*	Greater Red Musk Shrew	LC
Soricidae	*Myosorex varius*	Forest Shrew	LC
Suidae	*Phacochoerus africanus*	Common Warthog	LC
Viverridae	*Genetta tigrina*	Cape Genet (Cape Large-spotted Genet)	LC

Appendix C: Reptiles

Family	Scientific Name	Common Name	Red List Category
Agamidae	*Agama atra*	Southern Rock Agama	LC
Colubridae	*Dasypeltis scabra*	Rhombic Egg-eater	LC
Cordylidae	*Cordylus vittifer*	Common Girdled Lizard	LC
Cordylidae	*Pseudocordylus melanotus melanotus*	Common Crag Lizard	LC
Elapidae	*Hemachatus haemachatus*	Rinkhals	LC
Gekkonidae	*Pachydactylus affinis*	Transvaal Gecko	LC
Gerrhosauridae	*Gerrhosaurus flavigularis*	Yellow-throated Plated Lizard	LC
Lamprophiidae	*Aparallactus capensis*	Black-headed Centipede-eater	LC
Lamprophiidae	*Homoroselaps lacteus*	Spotted Harlequin Snake	LC
Lamprophiidae	*Psammophis crucifer*	Cross-marked Grass Snake	LC
Lamprophiidae	*Psammophylax rhombeatus*	Spotted Grass Snake	LC
Lamprophiidae	*Pseudaspis cana*	Mole Snake	LC
Scincidae	*Acontias gracilicauda*	Thin-tailed Legless Skink	LC
Scincidae	*Trachylepis punctatissima*	Speckled Rock Skink	LC
Typhlopidae	*Afrotyphlops bibronii*	Bibron's Blind Snake	LC

Appendix D: Amphibians

Family	Species	Common Name	Red List Category
Bufonidae	*Sclerophrys capensis*	Raucous Toad	LC
Bufonidae	*Sclerophrys gutturalis*	Guttural Toad	LC
Bufonidae	*Sclerophrys pusilla*	Flatbacked Toad	LC
Hyperoliidae	*Kassina senegalensis*	Bubbling Kassina	LC
Hyperoliidae	*Semnodactylus wealii*	Rattling Frog	LC
Phrynobatrachidae	*Phrynobatrachus natalensis*	Snoring Puddle Frog	LC
Ptychadenidae	*Ptychadena porosissima*	Striped Grass Frog	LC
Pyxicephalidae	*Amietia delalandii*	Delalande's River Frog	LC
Pyxicephalidae	*Amietia fuscigula*	Cape River Frog	LC
Pyxicephalidae	*Cacosternum boettgeri*	Common Caco	LC
Pyxicephalidae	*Cacosternum nanum*	Bronze Caco	LC
Pyxicephalidae	*Strongylopus fasciatus*	Striped Stream Frog	LC
Pyxicephalidae	*Strongylopus grayii*	Clicking Stream Frog	LC
Pyxicephalidae	*Tomopterna sp.*		LC
Pyxicephalidae	*Tomopterna cryptotis*	Tremelo Sand Frog	LC
Pyxicephalidae	*Tomopterna natalensis*	Natal Sand Frog	LC
Pyxicephalidae	*Tomopterna tandyi*	Tandy's Sand Frog	LC
Hyperoliidae	*Afrixalus fornasinii*	Fornasini Spiny Reed Frog	VU
Brevicipitidae	*Breviceps sopranus*	Whistling Rain Frog	VU
Heleophrynidae	*Heleophryne natalensis*	Natal Ghost Frog	VU
Hemisotidae	*Hemisus guttatus*	Spotted Snout-burrower	VU
Hyperoliidae	*Hyperolius semidiscus*	Yellow-striped Reed Frog	VU
Pyxicephalidae	*Pyxicephalus adspersus*	Giant African Bullfrog	NT

Appendix E: Lepidoptera (Moths and Butterflies)

Family	Species	Common Name	Red List Category
EREBIDAE	Grammodes euclidioides subsp euclidioides	-	Not listed
GEOMETRIDAE	Chiasmia simplicilinea	Oblique Peacock	LC
GEOMETRIDAE	Rhodometra sacraria	-	LC
HESPERIIDAE	Afrogegenes sp.	-	LC
HESPERIIDAE	Borbo borbonica borbonica	Olive-haired Swift	LC
HESPERIIDAE	Coeliades pisistratus	Two-pip Policeman	LC
HESPERIIDAE	Metisella meninx	Marsh Sylph	NT
HESPERIIDAE	Pelopidas mathias	Black-branded Swift	LC
LYCAENIDAE	Chilades trochylus	Grass Jewel Blue	LC
LYCAENIDAE	Lampides boeticus	Pea Blue	LC
LYCAENIDAE	Leptotes sp.	-	LC
LYCAENIDAE	Zizeeria knysna knysna	African Grass Blue	LC
NOCTUIDAE	Acontia caffraria	-	Not listed
NYMPHALIDAE	Acraea natalica	Black-based Acraea	LC
NYMPHALIDAE	Danaus chrysippus orientis	African Plain Tiger	LC
NYMPHALIDAE	Hypolimnas misippus	Common Diadem	LC
NYMPHALIDAE	Junonia hierta cebrene	Yellow Pansy	LC
NYMPHALIDAE	Junonia oenone oenone	Dark Blue Pansy	LC
NYMPHALIDAE	Junonia orithya madagascariensis	African Blue Pansy	LC
NYMPHALIDAE	Telchinia rahira rahira	Marsh Telchinia	LC
NYMPHALIDAE	Telchinia serena	Dancing Telchinia	LC
NYMPHALIDAE	Vanessa cardui	Painted Lady	LC
PIERIDAE	Belenois aurota	Pioneer Caper White	LC
PIERIDAE	Catopsilia florella	African Migrant	LC
PIERIDAE	Eurema brigitta brigitta	Broad-bordered Grass Yellow	LC
PIERIDAE	Pontia helice helice	Southern Meadow White	LC
SPHINGIDAE	Cephonodes hylas virescens	-	Not listed
SPHINGIDAE	Macroglossum trochilus	-	Not listed

Appendix F: Birds

Common Group	Common Name	Scientific Name	IUCN Status
Bishop	Southern Red	*Euplectes orix*	LC
Bishop	Yellow-crowned	*Euplectes afer*	LC
Bokmakierie	Bokmakierie	*Telophorus zeylonus*	LC
Bulbul	Dark-capped	*Pycnonotus tricolor*	LC
Buzzard	Jackal	*Buteo rufofuscus*	LC
Buzzard	Steppe	*Buteo vulpinus*	LC
Canary	Black-throated	*Crithagra atrogularis*	LC
Canary	Yellow-fronted	*Crithagra mozambicus*	LC
Chat	Anteating	*Myrmecocichla formicivora*	LC
Cisticola	Cloud	*Cisticola textrix*	LC
Cisticola	Levaillant's	*Cisticola tinniens*	LC
Cisticola	Wing-snapping	*Cisticola ayresii*	LC
Cisticola	Zitting	*Cisticola juncidis*	LC
Coot	Red-knobbed	*Fulica cristata*	LC
Cormorant	Reed	*Phalacrocorax africanus*	LC
Cormorant	White-breasted	*Phalacrocorax carbo*	LC
Crow	Pied	*Corvus albus*	LC
Cuckoo	Diderick	*Chrysococcyx caprius*	LC
Darter	African	*Anhinga rufa*	LC
Dove	Laughing	*Streptopelia senegalensis*	LC
Dove	Red-eyed	*Streptopelia semitorquata*	LC
Duck	African Black	*Anas sparsa*	LC
Duck	Maccoa	*Oxyura maccoa*	LC
Duck	White-backed	*Thalassornis leuconotus*	LC
Duck	Yellow-billed	*Anas undulata*	LC
Egret	Cattle	*Bubulcus ibis*	LC
Egret	Yellow-billed	*Egretta intermedia*	LC
Falcon	Amur	*Falco amurensis*	LC
Fiscal	Common (Southern)	*Lanius collaris*	LC
Francolin	Grey-winged	*Scleroptila africanus*	LC

Common Group	Common Name	Scientific Name	IUCN Status
Goose	Egyptian	*Alopochen aegyptiacus*	LC
Goose	Spur-winged	*Plectropterus gambensis*	LC
Grassbird	Cape	*Sphenoeacus afer*	LC
Grebe	Little	*Tachybaptus rucicollis*	LC
Guineafowl	Helmeted	*Numida meleagris*	LC
Hamerkop	Hamerkop	*Scopus umbretta*	LC
Heron	Black-headed	*Ardea melanocephala*	LC
Ibis	Glossy	*Plegadis falcinellus*	LC
Ibis	Hadeda	*Bostrychia hagedash*	LC
Ibis	Southern Bald	*Geronticus calvus*	VU
Kite	Black-shouldered	*Elanus caeruleus*	LC
Lapwing	Black-winged	*Vanellus melanopterus*	LC
Lapwing	Blacksmith	*Vanellus armatus*	LC
Lapwing	Crowned	*Vanellus coronatus*	LC
Lark	Red-capped	*Calandrella cinerea*	LC
Lark	Spike-heeled	*Chersomanes albofasciata*	LC
Longclaw	Cape	*Macronyx capensis*	LC
Martin	Banded	*Riparia cincta*	LC
Martin	Brown-throated	*Riparia paludicola*	LC
Martin	Rock	*Hirundo fuligula*	LC
Masked Weaver	Southern	*Ploceus velatus*	LC
Moorhen	Common	*Gallinula chloropus*	LC
Mousebird	Speckled	*Colius striatus*	LC
Myna	Common	*Acridotheres tristis*	LC
Pigeon	Speckled	*Columba guinea*	LC
Pipit	African	*Anthus cinnamomeus*	LC
Plover	Three-banded	*Charadrius tricollaris*	LC
Pochard	Southern	*Netta erythrophthalma*	LC
Quail	Common	*Coturnix coturnix*	LC
Quailfinch	African	*Ortygospiza atricollis*	LC

Common Group	Common Name	Scientific Name	IUCN Status
Quelea	Red-billed	*Quelea quelea*	LC
Reed-warbler	Great	*arundinaceus*	LC
Robin-chat	Cape	*Cossypha caffra*	LC
Sandpiper	Wood	*Tringa glareola*	LC
Secretarybird	Secretarybird	*Sagittarius serpentarius*	VU (NT) - MBSP
Seedeater	Streaky-headed	*Crithagra gularis*	LC
Shoveler	Cape	*Anas smithii*	LC
Sparrow	Cape	*Passer melanurus*	LC
Sparrow	House	*Passer domesticus*	LC
Sparrow	Southern Grey-headed	*Passer diffusus*	LC
Spurfowl	Swainson's	*Pternistis swainsonii*	LC
Starling	Pied	*Spreo bicolor*	LC
Stonechat	African	*Saxicola torquatus*	LC
Stork	White	*Ciconia ciconia*	LC
Sunbird	Amethyst	*Chalcomitra amethystina*	LC
Swallow	Barn	*Hirundo rustica*	LC
Swallow	Greater Striped	*Hirundo cucullata*	LC
Swallow	White-throated	*Hirundo albigularis*	LC
Swift	Common	*Apus apus*	LC
Swift	Little	*Apus affinis*	LC
Swift	White-rumped	*Apus caffer*	LC
Teal	Hottentot	*Anas hottentota*	LC
Teal	Red-billed	*Anas erythrorhyncha*	LC
Tern	Whiskered	*Chlidonias hybrida*	LC
Tern	White-winged	*Chlidonias leucopterus*	LC
Thick-knee	Spotted	*Burhinus capensis*	LC
Turtle-dove	Cape	*Streptopelia capicola*	LC
Wagtail	Cape	*Motacilla capensis*	LC
Warbler	Dark-capped Yellow	*Chloropeta natalensis*	LC

Common Group	Common Name	Scientific Name	IUCN Status
Warbler	Willow	*Phylloscopus trochilus*	LC
Waxbill	Common	*Estrilda astrild*	LC
Weaver	Cape	*Ploceus capensis*	LC
Wheatear	Mountain	*Oenanthe monticola*	LC
White-eye	Cape	*Zosterops virens*	LC
Whydah	Pin-tailed	*Vidua macroura*	LC
Widowbird	Fan-tailed	*Euplectes axillaris*	LC
Widowbird	Long-tailed	*Euplectes progne*	LC
Wryneck	Red-throated	*Jynx ruficollis*	LC

Appendix G: Previously recorded Plants (SAS, 2016)

Grass/sedge/reed species	Transformed Habitat Unit	Wetland Habitat Unit
**Acacia mearnsii*	X	
Gomphocarpus 89ornicula	X	X
**Bidens 89ornic*	X	X
**Canna indica*	X	
**Conyza bonariensis*	X	X
**Cosmos bipinnata*	X	
Crinum macowanii		X
**Datura stramonium*	X	X
**Eucalyptus camaldulensis*	X	X
**Gomphrena celosiodes*	X	
**Ipomoea purpurea*	X	
**Oxalis 89orniculate*	X	
**Pennisetum clandestinum*	X	X
**Plantago lanceolata*	X	
**Populus x canescens*	X	X
**Solanum mauritianum*	X	X
**Verbena bonariensis*	X	X
**Zea mays*	X	
**Zinnia peruviana*	X	
Andropogon eucomus	X	
Berkheya radula	X	X
Chloris gayana	X	
Chloris virgata	X	
Cymbopogon plurinodis	X	
Cynodon dactylon	X	
Cyperus rupestris	X	
Digitaria eriantha	X	
Eragrostis chloromelas	X	X
Eragrostis curvula	X	X
Eragrostis plana	X	X

Grass/sedge/reed species	Transformed Habitat Unit	Wetland Habitat Unit
Erarostis chloromelas	X	
Harpochloa falx	X	
Helichrysum species	X	
Hyparrhenia hirta	X	X
Hypoxis rigidula	X	
Imperata cylindrica	X	
Juncus effusus		X
Kylinga alba		X
Leersia hexandra		X
Mariscus congestus		X
Nemesia fruticans	X	
Phragmites australis		X
**Salix babylonica*		X
Schoenoplectus corymbosus		X
Sporobolus africanus		X
Turbina oblongata	X	
Typha capensis		X
Urochloa mosambicensis	X	
Verbena bonariensis	X	

*Denotes Alien Invasive Plant