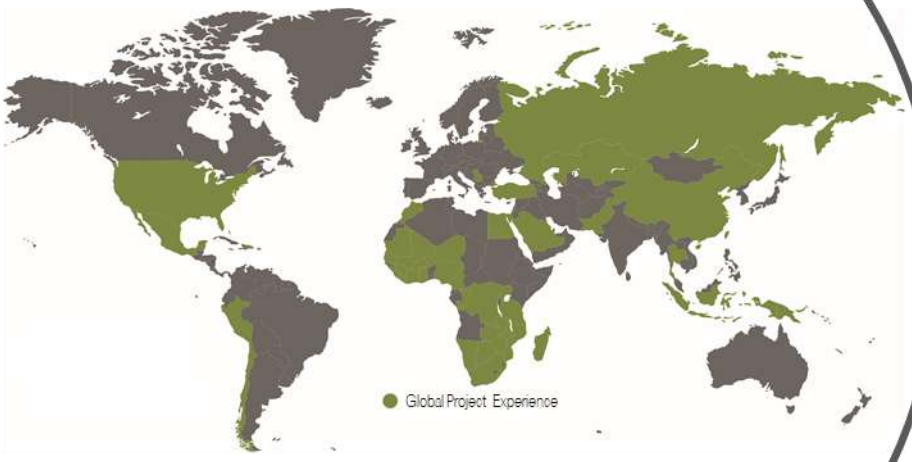

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Proposed Dalyshope Coal Mining Project, Situated in the Magisterial District of Lephalale, Limpopo Province

Fauna and Flora Impact Assessment

Prepared for:
Anglo Operations (Pty) Ltd

Project Number:
UCD6170

August 2020

DMRE ref no: LP30/1/2/3/2/1(10183) MR

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This document has been prepared by Digby Wells Environmental.

Report Type:	Fauna and Flora Impact Assessment
Project Name:	Proposed Dalyshope Coal Mining Project, Situated in the Magisterial District of Lephalale, Limpopo Province
Project Code:	UCD6170

Name	Responsibility	Signature	Date
Lisa Hester	Report Writer		August 2020
Danie Otto	Report Reviewer		August 2020
Barbara Wessels	Report Reviewer		February 2021

DETAILS AND DECLARATION OF THE SPECIALIST

Digby Wells and Associates (South Africa) (Pty) Ltd

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Full name:	Lisa Hester
Title/ Position:	Ecologist
Qualification(s):	BSc (Hons) Ecology
Experience (years):	5
Registration(s):	Pri.Sci.Cand.

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.

	16/08/2020
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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EXECUTIVE SUMMARY

Universal Coal Development IV (Pty) Ltd (UCDIV) on behalf of Anglo Operations (Pty) Ltd appointed Digby Wells Environmental (Digby Wells) to undertake the necessary studies in support of the proposed Dalyshope Coal Mining Project. This report will be focussing on the Fauna and Flora Assessments for the Environmental Impact Assessment (EIA) Phase.

The Dalyshope Study Area falls within the Limpopo Sweet Bushveld (SVcb19) as described by Mucina and Rutherford (2006) (Figure 7-2). This vegetation type occurs within Limpopo Province at an altitude of 700-1000 metres above mean sea level. This vegetation type extends across the border, into Botswana and consists of plains, which are traversed by several tributaries of the Limpopo River.

The vegetation is comprised of short, open woodland with high grazing capacity of the sweet veld. Areas which have been disturbed are dominated by thickets of Blue Thorn (*Senegalia erubescens)*, Black Thorn (*Senegalia mellifera)* and Sickle Bush (*Dichrostachys cinerea*) (Mucina and Rutherford, 2006). Tall trees include Ankle Thorn (*Vachellia robusta)* and Black Monkey Thorn (*Senegalia burkei).* Smaller trees include Blue Thorn (*Senegalia erubescens), Acacia fleckii* (*Senegalia cinerea*)*, Vachellia nilotica, Senegalia senegal, Albizia anthelminitica, Boscia albitrunca, Boscia foetida, Combretum apiculatum,* and *Terminalia sericea.*

Five major vegetation types were noted within and adjacent to the Project area (farms Dalyshope and Klaarwater). Three of these are types of bushveld with different dominant species, and the fourth a very distinctive watercourse (pan vegetation). The five identified vegetation communities are:

- Acacia (Senegalia and Vachellia) and Boscia woodland;
- *Combretum* woodland;
- *Terminalia* woodland;
- Pan vegetation; and
- Riparian vegetation (adjacent to Project area).

Three Nationally Protected Tree species (according to Schedule A the National Forests Act (Act No. 89 of 1998) (NFA)) and one Declining yet Least Concern (International Union for Conservation of Nature status) species (according to the South African Red Data list) was identified during the field investigations (Table 7-1). *Combretum imberbe, Vachellia erioloba* and *Boscia albitrunca* were found throughout the Project area.

Faunal Species of Conservation Concern (SCC) identified within the Project area consisted Brown Hyeana (*Hyeana brunnea*) (NT), Leopard (*Panthera pardus*) (recorded during 2013 Digby Wells field survey), Saddle-billed Stork (*Ephippiorhynchus senegalensis*) (EN), Giant Bullfrog (*Pyxicephalus adspersus*) (Protected, LEMA, 2003) and Baboon Spider (*Augacephalus ezendami*) (ToPS).

A sensitivity assessment identified high sensitivity towards the Riparian and Pan areas owing to the ecosystem services they provided and their irreplaceability as unique biodiversity features. Moderate sensitivity was given to the rest of the Project area, as numerous protected trees where identified throughout the site. The floral and faunal SCC identified within the Project area influenced the areas of sensitivity. See sensitivity map, Figure 7-13.

Impacts on the fauna and flora associated with the proposed opencast mining activities and associated infrastructure include the loss of vegetation communities, biodiversity (loss of faunal and floral species of conservation concern) and ecosystem functioning (pan vegetation and wetlands). If no mitigation is introduced, significance of the impacts ranges from moderately negative to majorly negative. If mitigation measures are adhered to significance of the impacts range from positive to minor negatives (see Section 8 Impact Assessment). Section 9 and section 10 describes a management plan for the rehabilitation and monitoring during the construction, operational, and decommissioning phase of the project. It is highly recommended to ensure that these management measures be followed to limit the impacts to the fauna and flora of the Project area.

Based on the understanding of the Project while considering the results of the impact assessment, Digby Wells does not object to the Project from a faunal and floral perspective; taken into consideration the provided Environmental Management Plan, Monitoring Program, and Recommendations are adopted.

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ACRONYMS, ABBREVIATIONS AND DEFINITION

CARA	Conservation of Agricultural Resources Act
°C	Degree Celsius
Digby Wells	Digby Wells Environmental
EA	Environmental Assessment
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GIS	Geographic Information System
GPS	Global Positioning System
ha	Hectare
IWUL	Integrated Water Use License
km	Kilometers
L	Litre
LOM	Life of Mine
m	Metre
mg	Milligrams
mm	Millimeter
MRA	Mining Rights Area (defines the farms included in the Mining Right boundary)
MPRDA	Mineral and Petroleum Resources Development Amendment Act, 2002 (Act No. 28 of 2002)
Mtpa	Million tonnes per annum
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
NFA	National Forest Act, 1998 (Act No. 84 of 1998)
Project Area	Proposed Dalyshope Coal Mine Development Footprint Area, OC 1, and proposed infrastructure area, on the farm portions, Klaarwater 231 LQ, and Dalyshope 232 LQ
Study Area	Areas and farms (including Nazarov) surrounding the Project Area
SANAS	South African National Accreditation System
SCC	Species of Conservation Concern
UCD	Universal Coal PLC
WUL	Water Use License

Legal Requirement		Section in Report
(1)	A specialist report prepared in terms of these Regulations must contain-	
(a)	details of- (i) the specialist who prepared the report; and (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	Section 5
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page I to II
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	Section 2 and 3
cA	And indication of the quality and age of the base data used for the specialist report;	Section 5
cB	A description of existing impacts on site, cumulative impacts of the proposed development and levels of acceptable change;	Section 8
(d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 7.1
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of the equipment and modelling used;	Section 5
(f)	Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives;	Section 7.4.4
(g)	an identification of any areas to be avoided, including buffers;	Figure 7-13
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figure 7-13
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 4
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 8
(k)	any mitigation measures for inclusion in the EMPr;	Section 10
(l)	any conditions/aspects for inclusion in the environmental authorisation;	Section 10
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 10
(n)	a reasoned opinion (Environmental Impact Statement) -	Section 13

Legal Requirement		Section in Report
	whether the proposed activity, activities or portions thereof should be authorised; and	
	if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 11
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	
(q)	any other information requested by the competent authority.	Section 12

1. Introduction

Universal Coal Development IV (Pty) Ltd (UCDIV) on behalf of Anglo Operations (Pty) Ltd (Anglo) appointed Digby Wells Environmental (Digby Wells) to undertake the necessary studies in support of the Dalyshope Project Mining Right Application (MRA), issued with reference number LP 30/1/2/3/2/1 (10183) EM. This report will be focussing on the Fauna and Flora Assessments for the Environmental Impact Assessment (EIA) Phase.

The main aim in developing the Fauna and Flora Report is to minimise and mitigate the cumulative impacts caused by mining and industrial activities and to restore land back to a satisfactory standard. It is best practice to develop the Rehabilitation and Closure Plan (RCP) as early as possible to ensure the optimal management of rehabilitation and closure issues that may arise. It is critical that a mine's RCP is defined and understood from before mining progresses and is complimentary to the objectives and goals set.

Anglo propose to develop a coal mine on the farms Klaarwater 231LQ and Dalyshope 232LQ in the Limpopo Province, approximately 60 km west of Lephalale. UCDIV will develop the Project in collaboration with Anglo as the current holders of the Prospecting Rights, authorised in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).

1.1. Study Area

The Dalyshope Project proposes the development of a coal mine on the farms Klaarwater 231LQ and Dalyshope 232LQ in the Limpopo Province, approximately 60 km west of Lephalale, covering an extent of 1 630.5 hectares (ha). The proposed Project is situated in the Waterberg Coalfield, an area which is currently largely undeveloped and characterised by undisturbed Bushveld, game farming, hunting, tourism and agriculture. Human activity in proximity to the Project includes farmhouses, game lodges, farmworker accommodation and cattle kraals. The locality of the Project area is depicted in Figure 1-1 and Figure 1-2.

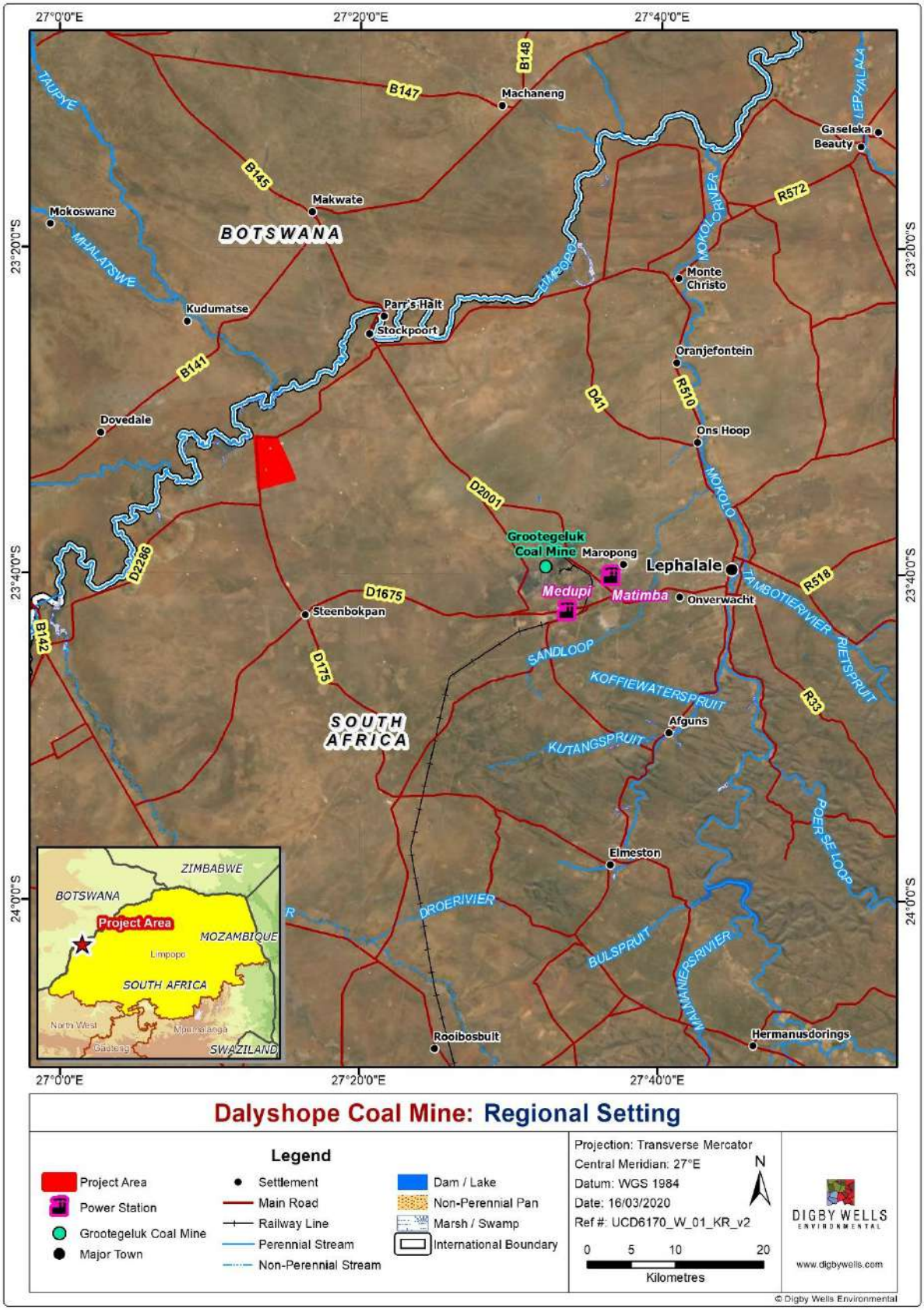

Figure 1-1: Regional Setting

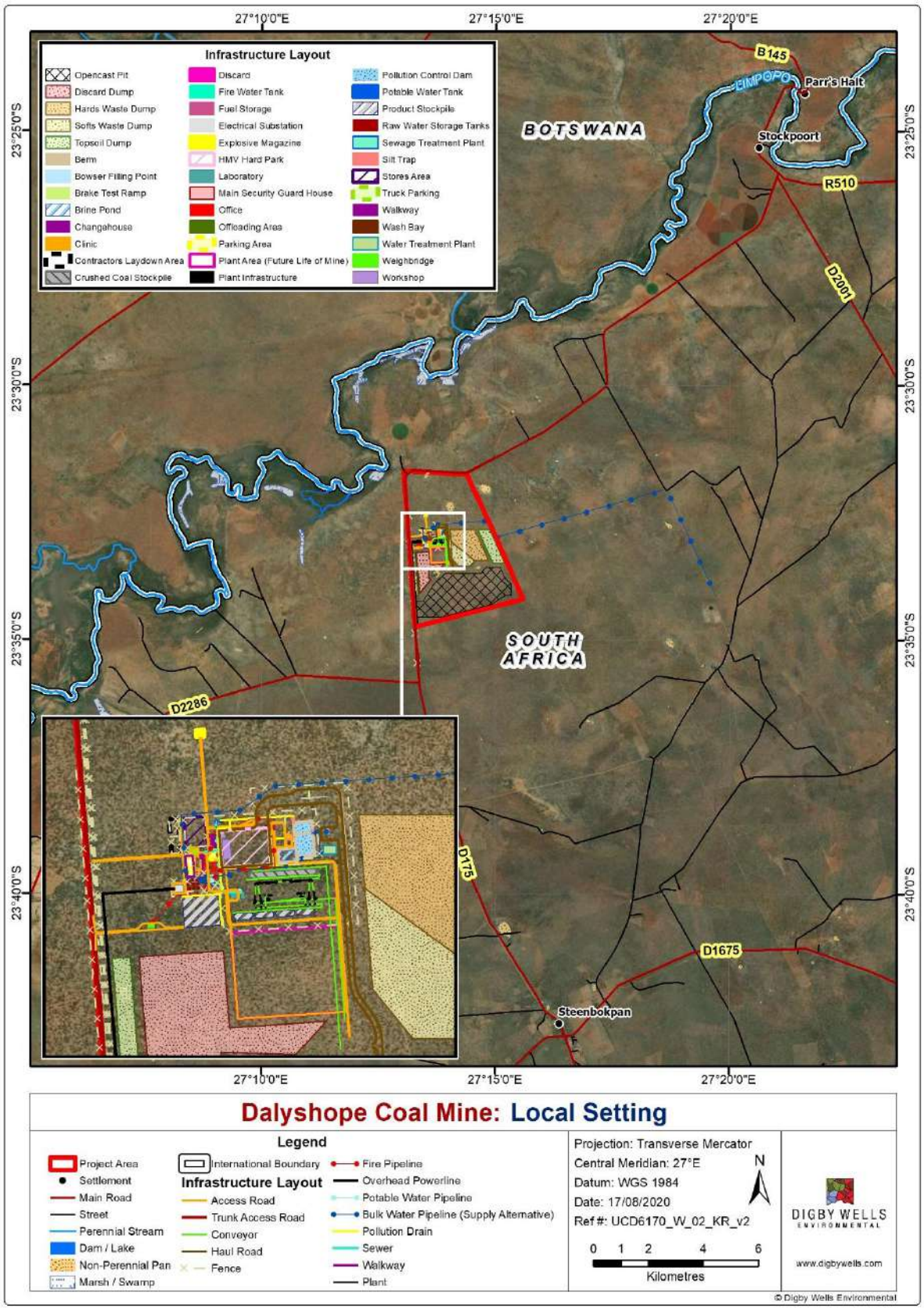

Figure 1-2 Local Setting

2. Project Description

The Farm Dalyshope 232 LQ and the Farm Klaarwater 231 LQ are the directly affected farm portions with respect to this application process. This application considers the establishment of a contractor operated, truck and shovel opencast mine producing approximately 2.4 million tonnes per annum (Mtpa) of thermal coal product for approximately five years. After five years, the mine will ramp up production to approximately 12 Mtpa of product for approximately 25 years from a single open pit (OC1), giving a total life of mine of 30 years.

Activities associated with an MRA trigger Activity 17[1] of the EIA Regulations, 2014 (GN R 984 of 4 December 2014), as amended (EIA Regulations, 2014) promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA). To comply with the requirements of the national legislative framework, UCDIV on behalf of Anglo Operations (Pty) Ltd must complete a Scoping and EIA process, including detailed specialist studies. In addition to this process, an Integrated Water Use Licence (IWUL) for the Project is required to comply with the requirements encapsulated in the National Water Act of 1998 (Act No. 36 of 1998) (NWA).

2.1. Alternatives Considered

Alternatives to be considered to ensure minimal impacts to the fauna and flora include:

- Reduce surface infrastructure and footprints on areas with a high density of protected flora;
- Avoid construction and movement of heavy machinery in sensitive vegetation types such as pans and wetlands;
- Reduce the amount of water and land for operations and associate infrastructure;
- Implement alien invasive plant management to ensure concurrent rehabilitation is followed;
- Reduce waste materials and waste outputs; and
- Replenish removed indigenous identified vegetation after decommissioning.

2.2. Mining

Opencast strip mining using selective mining techniques was the preferred mining method for this deposit. This method suits coal seams that are situated relatively close to surface and in a consistent, flat lying orientation.

The mine will be accessed by a boxcut and ramp arrangement located in the north-east corner of the farm Dalyshope. Overburden material will be hauled to spoil until such time as sufficient void has been created within the pit to allow for in-pit tipping. Selective mining of the coal

[1] Additional Listed Activities in terms of the NEMA EIA Regulations, 2014 (as amended) will be identified and included in the application on receipt of a detailed project description.

seams is not required due to the specification of the product required but selective mining of the partings will be conducted.

ROM coal from the pit will be crushed in a primary crusher at the pit head. The crushed coal will be transported by conveyor belt from the pit head to stockpiles before being taken to the washing plant. Coal will be removed from the stockpile and fed into the plant. The coal will be screened to remove -50mm coal. The oversize coal will be crushed in a secondary crusher before rejoining the -50mm coal. The -50mm coal will be fed into the cyclone plant whereby it will be washed at a density of 1.80 to produce product and discard.

The mine will have an average production rate of 6 Mtpa ROM for the first five years and will then increase to an average production rate of 30 Mtpa ROM for the remaining Life of Mine (LOM).

The washing plant will be in modular format with two modules each capable of a throughput of 1,000 tons per hour.

The discard will be taken by conveyor belt back to the pit head where it will be loaded into trucks to be deposited back into the bottom of the pit.

The product will be placed on stockpiles before being transported to the market. The product will either be transported by road haulers on the district/provincial road or by means of rail should a rail line prove economically viable.

2.3. Proposed Infrastructure and Activities

The proposed infrastructure and activities expected to impact the fauna and flora of the Project area are listed in Table 2-1 below. Infrastructure that will be constructed includes:

- Workshop;
- Two PCDs;
- Offices;
- Change-house;
- Stores;
- Laboratory;
- Water Treatment Plant;
- Diesel farm;
- Brake-test ramp;
- LDV and light vehicle access road;
- Truck access road; and
- Provincial road upgrade from Steenbokpan to the mining site

Table 2-1: Project Phases and Associated Activities

Project Phase	Project Activity
Construction Phase	Site/vegetation clearance
	Access and haul road construction
	Infrastructure construction
	Diesel storage and explosives magazine
	Topsoil stockpiling
Operational Phase	Open pit establishment
	Removal of rock (blasting)
	Stockpiling (rock dumps, soils, ROM, discard dump) establishment and operation
	Diesel storage and explosives magazine
	Operation of the open pit workings
	Operating processing plant
	Operating sewage treatment plant
	Water use and storage on-site – during the operation water will be required for various domestic and industrial uses. Two pollution control dams will be constructed that capture water from the mining area which will be stored and used accordingly
	Storage, handling and treatment of hazardous products (including fuel, explosives and oil) and waste
	Maintenance activities – through the operations maintenance will need to be undertaken to ensure that all infrastructure in operating optimally and does not pose a threat to human or environmental health. Maintenance will include haul roads, processing plant, machinery, water and stormwater management infrastructure, stockpile areas, dumps, etc
Decommissioning Phase	Demolition and removal of infrastructure – once mining activities have been concluded infrastructure will be demolished in preparation of the final land rehabilitation.
	Rehabilitation – rehabilitation mainly consists of spreading of the preserved subsoil and topsoil, profiling of the land and re-vegetation
	Post-closure monitoring and rehabilitation

3. Relevant Legislation, Standards and Guidelines

The Project is required to comply with all the obligations in terms of the provisions of the NEMA. The additional guidelines directing the Fauna and Flora Impact Assessment are detailed below in Table 3-1.

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

Legislation	Description
International frameworks and best practice guidelines	Convention on Biological Diversity (Rio de Janeiro, 1992).
	United Nations Convention to Combat Desertification.
	The Bonn Convention on the Conservation of Migratory Species of Wild Animals.
	The Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora.
National legislation and frameworks	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) affords threatened or protected species a legal status and protection.
	National Spatial Biodiversity Assessment: site specific findings.
	Additionally, wetlands are protected under various Acts including the National Environmental Management Act, 1998 (Act No. 107 of 1998), National Water Act, 1998 (Act No. 36 of 1998), and the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983).
Provincial and municipal legislation and frameworks	Limpopo Environmental Management, 2003 (Act No. 7 of 2003) (LEMA).
	Limpopo State of the Environment Report Overview, 2003.
	Waterberg Environmental Management Plan.

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: Assumption and Limitations

Assumptions, and Limitations	Consequences
Due to access limitations, the Riparian vegetation recorded in the Digby Wells survey in 2014 was not accessed during the survey in 2020. For monitoring purposes and a continuous flow of data, the vegetation community has been included in this report to maintain the consistency of data.	No updated Riparian vegetation data was collected to use for the purpose of this report.

Assumptions, and Limitations	Consequences
The fauna and flora assessment occurred during a two-day site visit during the wet season/summer and was undertaken during February 2020. The assessment focussed on the Project area, specifically the proposed infrastructure and open cast pit (OC1) areas. Broader focus of the assessment was on the farms Klaarwater and Dalyshope.	The OC1 Area was focused on the proposed pit area (OC1), and the infrastructure areas. Only the farms Klaarwater and Dalyshope were assessed. It is recommended to conduct a biannual survey through the dry and wet season to get a thorough investigation of and cover the Project area.

5. Expertise of the Specialist

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, scoping reports, bat surveys, species relocation and vegetation reports consists of her repertoire of work.

Danie Otto is a Director and manages the Southern 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 more than 20 years of experience in the mining industry in environmental and specialist assessments, management plans, audits, rehabilitation, and research.

He has experience in eight 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.

6. Methodology

The methodology is described for this Impact Assessment. To complete the proposed scope of work, several tasks needed to be completed, these tasks are explained separately below.

6.1. Desktop and Literature Review

A desktop study was undertaken, aiming to identify:

- Potential species in the site area according to the South African National Biodiversity Institute (SANBI);
- Potential Red Data species and their current status;
- Expected vegetation type and community structure (Mucina and Rutherford 2006); and
- Current Biodiversity and Ecosystem Status.

6.1.1. Vegetation Communities

Vegetation communities were broadly defined based on a preliminary site visit. Communities were defined by their dominant species, terrains and habitat features.

6.1.2. Species List

The species list was compiled from both the description of the vegetation type of the Study Area supplied by Mucina and Rutherford (2006) as well as the SANBI PRECIS (National Herbarium Pretoria (**PRE**) **C**omputerised **I**nformation **S**ystem) list.

6.1.3. Species of Special Concern

From the collected species list, a list of Species of Conservation Concern (SCC) can be recorded. In order to be fully comprehensive, this list includes plants that have been characterised by the following:

- The SANBI Red List of South African plants version 2012.1;
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA) listed species;
- National Forests Act, 1998 (Act No. 84 of 1998) (NFA) Protected Trees;
- Limpopo Protected Plants; and
- The South African Red Data defined by the International Union of Conservation Concern (IUCN) – various threat categories can be seen in Table 6-1.

Table 6-1: Red Data Categories (IUCN, 2010)

Category		Description
Extinct	(EX)	No known individuals remaining.
Extinct in the Wild	(EW)	Known only to survive in captivity.
Critically Endangered	(CR)	Extremely high risk of extinction in the wild.
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.
Least Concern	(LC)	Lowest risk. Does not qualify for a more at-risk category. Widespread and abundant taxa are included in this 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.

6.2. Fauna

Lists of expected faunal species were drawn up from several different sources and the IUCN Red Data species likely to be found on site, was determined. Lists were drawn up for plants, mammals, birds, reptiles, and amphibians. The full list of expected species can be found in the Appendices A, B, C, D and E respectively.

Fauna sampling methods included opportunistic sightings, as well as the use of Sherman traps, camera traps and pitfall traps (for invertebrates and small reptiles). Large mammals were recorded using tracks and signs, as well as opportunistic sightings and camera traps (trail cameras) placed throughout the site, mainly at water points.

Table 6-2 describes the reference information which was used in the identification of the SCC for the Project area.

Table 6-2: Reference Sources for Species of Conservation Concern

Reference	Description
Red List South Africa	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.

Reference	Description
PRECIS	The Pretoria Computerised Information System (PRECIS) list was obtained from the South African National Biodiversity Institute (SANBI) which lists all the Red Data plant species officially recorded by SANBI. This list represents only those species that may occur in the grid in which the sites fall, thus it is regarded as a guideline as to what is likely to occur. The sites sampled are only a very small portion of the whole grid and habitats suitable for certain species in these PRECIS lists may not be present at the sites sampled. It is therefore not unusual for species in the PRECIS list to be absent from the sampling sites
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). Plants and animals that have been evaluated to have a low risk of extinction are classified as Least Concern. (IUCN.org).
CITES	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.
National and Provincial Legislation	Identified SCC during the field investigations were all protected trees listed by the South African National Forest Act, 1998 (Act No. 84 of 1998). All flora and fauna species, listed by the National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004). All specially protected (Schedule 2) and protected species (Schedule 3) as listed by Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003).

7. Findings and Discussion

The findings of the fauna and flora of the Project area during the wet season/summer survey (2020) are detailed below.

7.1. Baseline Description

The Dalyshope Study Area falls within the Limpopo Sweet Bushveld (SVcb19) as described by Mucina and Rutherford (2006) (Figure 7-2). This vegetation type occurs within Limpopo Province at an altitude of 700-1000 metres above mean sea level. This vegetation type extends across the border, into Botswana and consists of plains, which are traversed by several tributaries of the Limpopo River.

A Critical Biodiversity Area (CBA) and Protected Area are located within a close proximity to the Project Area (see Figure 7-1 and Figure 7-3). Majority of the infrastructure layout lies within an identified CBA, according to SANBI (2013). CBAs are areas required to meet biodiversity targets for ecosystems and ecological processes, as identified in a systematic biodiversity plan (SANBI, 2020). The ranking assigned to the CBA categories is based on their biodiversity characteristics, spatial configuration and requirements for meeting targets for both biodiversity pattern and ecological processes (Desmet *et al*. 2013).

The region experiences summer rainfall with very dry winters which include shoulder months of May and September. The Mean Annual Precipitation (MAP) is about 350 mm. Frost is fairly infrequent. The mean monthly maximum and minimum temperatures are 38.2°C and 2.1°C respectively.

The vegetation is comprised of short, open woodland with high grazing capacity of the sweet veld. Areas which have been disturbed are dominated by thickets of Blue Thorn (*Senegalia erubescens)*, Black Thorn (*Senegalia mellifera)* and Sickle Bush (*Dichrostachys 12inereal*) (Mucina and Rutherford, 2006).

Tall trees include Ankle Thorn (*Vachellia robusta)* and Black Monkey Thorn (*Senegalia burkei).* Smaller trees include Blue Thorn (*Senegalia erubescens), Acacia fleckii* (*Senegalia 12inereal*)*, Vachellia nilotica, Senegalia 12inerea, Albizia anthelminitica, Boscia albitrunca, Combretum apiculatum,* and *Terminalia sericea.*

Field observations during the 2013 survey by Digby Wells were taken into consideration for the compilation of this report and have been mentioned accordingly throughout the Baseline Description.

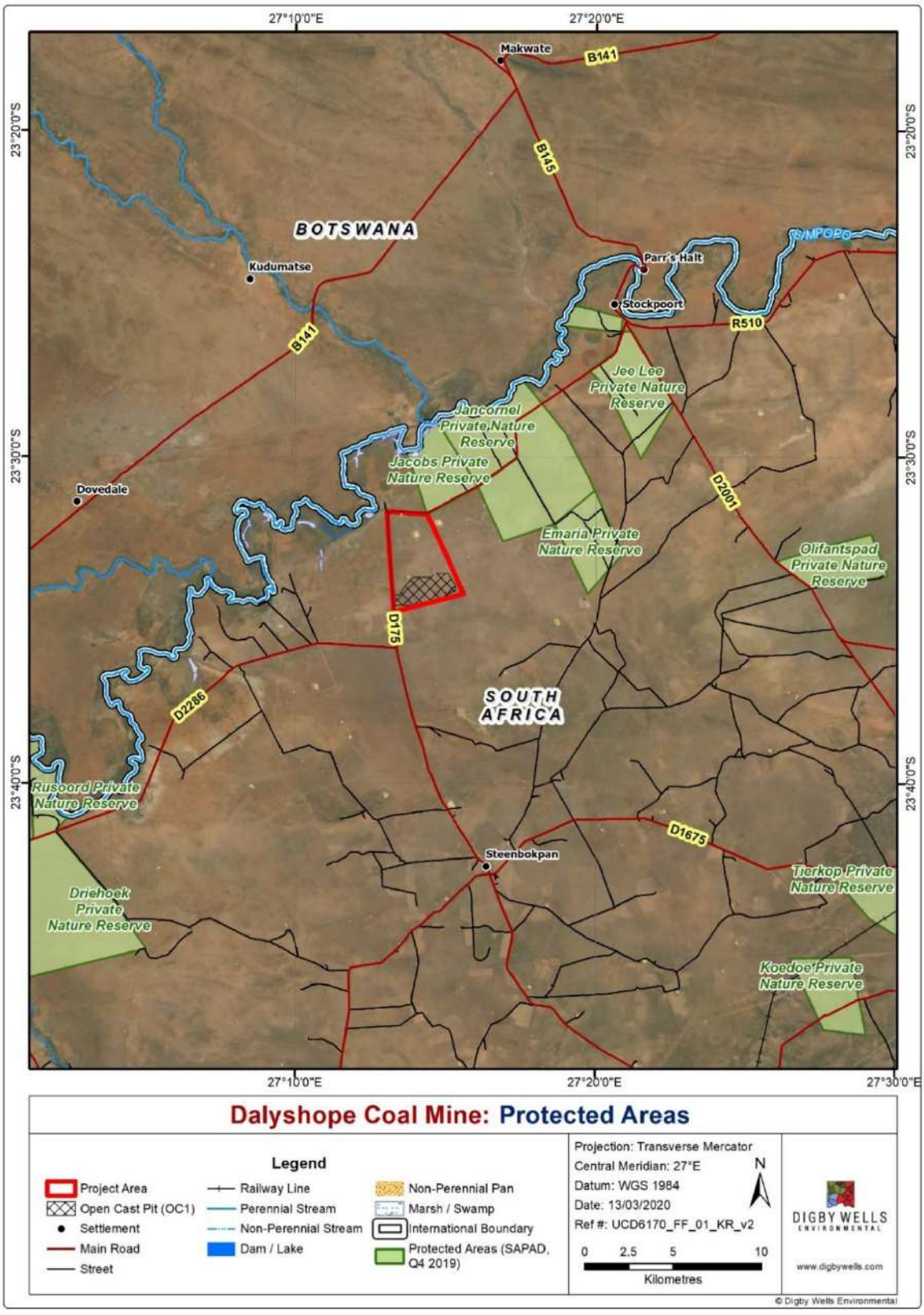

Figure 7-1: Protected Areas in proximity to the Dalyshope site (SAPAD, 2019)

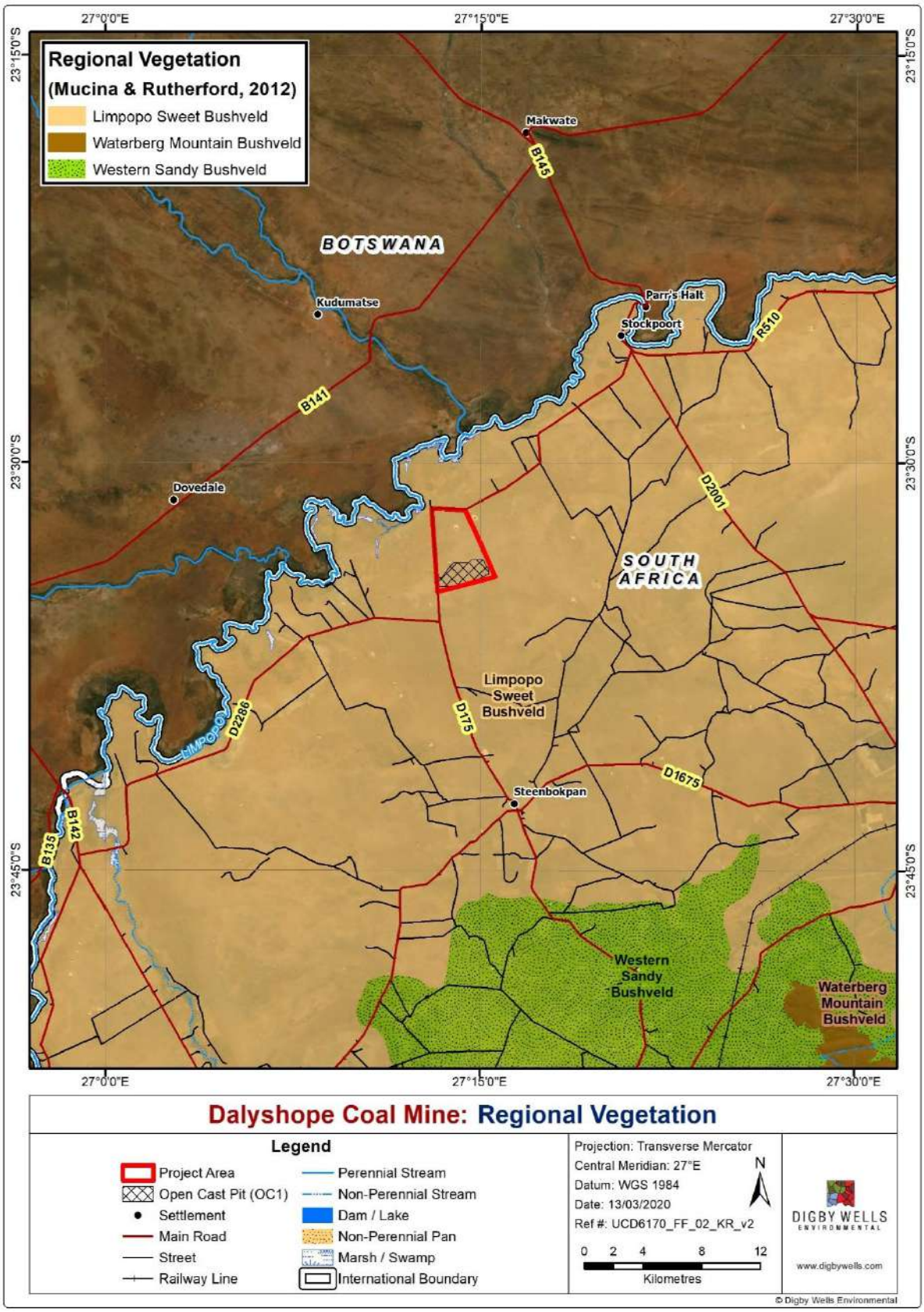

Figure 7-2: Regional Vegetation Type (Mucina and Rutherford, 2006)

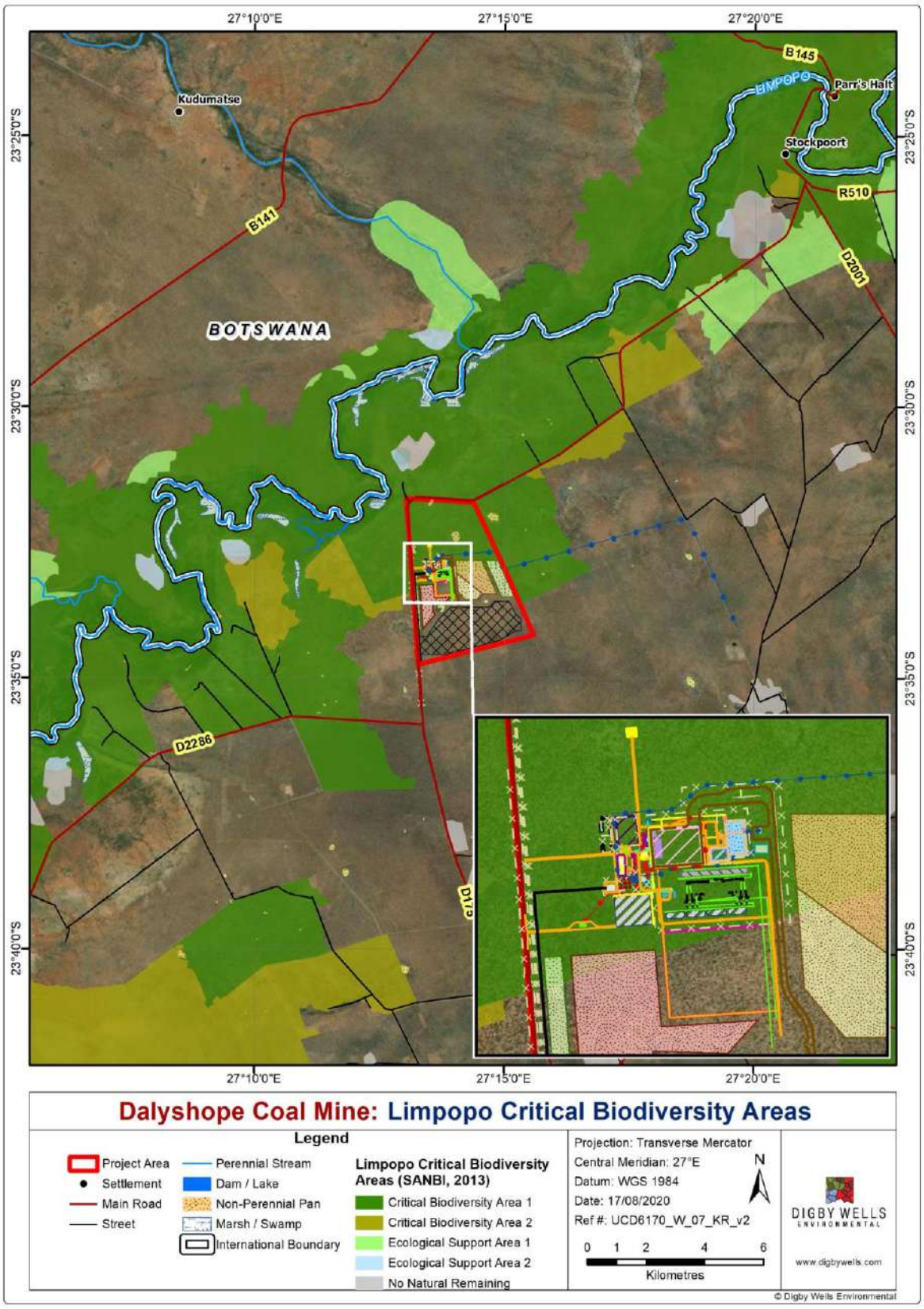

Figure 7-3: Limpopo Critical Biodiversity Areas within Project area (SANBI, 2013)

7.1.1. Species of Conservation Concern

The Project area lies within two Quarter Degree Squares (QDS), namely 2327CA and 2327CB. According to the PRECIS, no Red Data species are expected to occur across these regions. Elaborated below in the succeeding headings is a discussion on what SCC species (fauna and flora) occur within the Project area.

7.1.1.1. Protected Flora

Three Nationally Protected Tree species (according to Schedule A the National Forests Act (Act. 89 of 1998) (NFA)) and one Declining yet Least Concern (IUCN status) species (according to the South African Red Data list) was identified during the field investigations (Table 7-1). In addition, one provincially protected according to Schedule 12 of the Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA) plant species, *Grewia rogersii*, was recorded during the field surveys in 2013. It is important to note that this does not necessarily imply that additional SCC do not occur on site.

Table 7-1:Floral SCC identified within the Project area

Family	Scientific name	Common name	Protected status
CAPPARACEAE	*Boscia albitrunca*	Shepherds Bush Tree	Schedule A of NFA
COMBRETACEAE	*Combretum imberbe*	Leadwood	Schedule A of NFA
FABACEAE	*Vachellia erioloba*	Camel Thorn	Schedule A of NFA
MALVACEAE	*Grewia rogersii*	Waterberg Raisin	Schedule 12 of LEMA

7.1.1.2. Protected Fauna

The field work searched for various animal groups including small mammals, large mammals, birds, reptiles, amphibians and invertebrates (specifically butterflies, scorpions and baboon spiders).

7.1.1.2.1. Mammals

The diversity of vegetation types present ensures an ecologically diverse assemblage of plant species which in turn supports a variety of mammal species. Some of the farms surrounding the Dalyshope Project area are involved in the wildlife industry (mostly hunting) and access to some of these farms was restricted. Accordingly, species lists could not be compiled. As a result, the list provided below is restricted to species naturally occurring in the area and does not include introduced or re-introduced species.

Opportunistic sightings during the site survey in February 2020 of mammals included Gemsbok (*Oryx gazella*), Impala (*Aepyceros melampus*), Porcupine (*Hystrix africaeaustralis*), Brwon Hyeana (*Hyaena brunnea*) (NT), Warthog (*Phacochoerus africanus*), and a Vlei Rat (*Otomys irroratus*). Leopard (*Panthera pardus)* was recorded in the Project area during the 2013 surveys.

Of the mammals potentially occurring on site, 17 have been assigned a Red Data status. These species are listed in Table 7-2 below.

Table 7-2: Red Data mammal species likely to be found in the Project area

Common Name	Status	IUCN Status
African Elephant	Vulnerable	Least Concern
African Weasel	N/A	Lower Risk – least concern
Brown Hyaena	Near Threatened	Lower Risk – near threatened
Bushveld Gerbil	N/A	Least Concern
Darling's Horseshoe Bat	Near Threatened	Least Concern
Cheetah	Vulnerable	Vulnerable – Decreasing
Forest Shrew	N/A	Least Concern
Leopard	Vulnerable	Vulnerable – Decreasing
Geoffroy's Horseshoe Bat	Near Threatened	Least Concern
Greater Dwarf Shrew	N/A	
Hippo	Vulnerable	Least Concern
Honey Badger	Near Threatened	Lower Risk – least concern
Least Dwarf Shrew	N/A	Least Concern
Lesser Dwarf Shrew	N/A	Least Concern
Lesser Grey-browned Musk Shrew	N/A	Least Concern
Lesser Red Musk Shrew	N/A	Least Concern
Reddish-grey Musk Shrew	N/A	Least Concern
Rock Dormouse	N/A	Least Concern
Rusty Bat	Near Threatened	Least Concern
Sable Antelope	Vulnerable	Lower Risk – conservation dependent
Schreiber's Long-fingered Bat	Near Threatened	Near Threatened
Serval	Near Threatened	Least Concern
Short-eared Trident Bat	Critically endangered	Vulnerable
Short-snouted Elephant-shrew	N/A	Least Concern
Single-striped Mouse	N/A	Least Concern
South African Hedgehog	Near Threatened	Lower Risk – Least Concern
Spotted-necked Otter	Near Threatened	Least Concern
Sundevall's Leaf-nosed Bat	N/A	Least Concern

Common Name	Status	IUCN Status
Swamp Musk Shrew	N/A	Least Concern
Temminck's Hairy Bat	Near Threatened	Least Concern
Tiny Musk Shrew	N/A	Least Concern
Water Rat	Near Threatened	Least Concern
Welwitsch's Hairy Bat	Near Threatened	Least Concern

7.1.1.2.2. Avifauna

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 (The Bird Community Index, 2007). Land cover is directly linked to habitats within the Project area.

The diversity of these habitats should give rise to many different species. According to the South African Bird Atlas Project (SABAP2), almost 300 species of birds have been identified in the area; the majority of these birds are comprised of bushveld species. All birds that could be present within QDS 2327 CA and CB are listed in Appendix C. Of these species, 14 have been assigned a Red Data status, 25 are either endemic or near-endemic to South Africa. These species are listed in the Table 7-3 below. The Endangered Saddle-billed Stork was seen on site.

Table 7-3: Red Data avifauna species likely to be found in the Project area

Common Name	Scientific Name	Status	Endemicity
Babbler, Southern Pied	*Turdoides bicolor*		Endemic
Barbet, Acacia Pied	*Tricholaema leucomelas*		Near-endemic
Bateleur, Bateleur	*Terathopius ecaudatus*	VU	
Bulbul, African Red-eyed	*Pycnonotus nigricans*		Near-endemic
Bustard, Kori	*Ardeotis kori*	VU	
Canary, Yellow	*Crithagra flaviventris*		Near-endemic
Eagle, Martial	*Polemaetus bellicosus*	VU	
Eagle, Tawny	*Aquila rapax*	VU	
Falcon, Lanner	*Falco biarmicus*	NT	
Finch, Scaly-feathered	*Sporopipes squamifrons*		Near-endemic
Flamingo, Greater	*Phoenicopterus ruber*	NT	
Flycatcher, Marico	*Bradornis mariquensis*		Near-endemic

Common Name	Scientific Name	Status	Endemicity
Goshawk, Southern Pale Chanting	*Melierax canorus*		Near-endemic
Hornbill, Southern Yellow-billed	*Tockus leucomelas*		Near-endemic
Korhaan, Red-crested	*Lophotis ruficrista*		Near-endemic
Lark, Sabota	*Calendulauda sabota*		Near-endemic
Oxpecker, Red-billed	*Buphagus erythrorhynchus*	NT	
Painted-snipe, Greater	*Rostratula benghalensis*	NT	
Pratincole, Black-winged	*Glareola nordmanni*	NT	
Prinia, Black-chested	*Prinia flavicans*		Near-endemic
Sandgrouse, Burchell's	*Pterocles burchelli*		Near-endemic
Sandgrouse, Double-banded	*Pterocles bicinctus*		Near-endemic
Scrub-Robin, Kalahari	*Cercotrichas paena*		Near-endemic
Shrike, Crimson-breasted	*Laniarius atrococcineus*		Near-endemic
Shrike, Southern White-crowned	*Eurocephalus anguitimens*		Near-endemic
Sparrow, Cape	*Passer melanurus*		Near-endemic
Sparrow, Great	*Passer motitensis*		Near-endemic
Spurfowl, Natal	*Pternistis natalensis*		Near-endemic
Starling, Burchell's	*Lamprotornis australis*		Near-endemic
Stork, Marabou	*Leptoptilos crumeniferus*	NT	
Stork, Saddle-billed	*Ephippiorhynchus senegalensis*	EN	
Stork, Yellow-billed	*Mycteria ibis*	NT	
Tit, Ashy	*Parus cinerascens*		Near-endemic
Tit-Babbler, Chestnut-vented	*Parisoma subcaeruleum*		Near-endemic
Vulture, Lappet-faced	*Torgos tracheliotus*	VU	
Vulture, White-backed	*Gyps africanus*	VU	
White-eye, Cape	*Zosterops virens*		Endemic
Whydah, Shaft-tailed	*Vidua regia*		Near-endemic
Wren-Warbler, Barred	*Calamonastes fasciolatus*		Near-endemic

7.1.1.2.3. Reptiles

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. The presence of few rocky out crops within the Study Area could mean few reptile species are present.

Reptiles expected to occur on site are listed in Appendix D (Strategic Environmental Focus, 2007). Of these species, two have been assigned a Red Data status; and these species are listed in Table 7-4.

Table 7-4: Red Data reptile species likely to be found on the Project area

Common Name	Scientific Name	Status
Aurora House Snake	*Lamprophis aurora*	Rare
Southern African Python	*Python natalensis*	Vulnerable

7.1.1.2.4. Amphibians

Amphibians are viewed to be good indicators of changes to the whole ecosystem because 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 (Duellman and Trueb 1986). Additionally, amphibians are sensitive to water quality and ultra violet radiation because of their permeable skin (Gerlanc and Kaufman 2005). Activities such as feeding and dispersal are spent in terrestrial environments (Waddle, 2006). 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..

According to Carruthers (2001), frogs occur throughout southern Africa. A number of factors influence their distribution, and they are generally restricted to the habitat type they prefer, especially in their choice of breeding site. The choices available of these habitats coincide with different biomes, these biomes in turn, are distinguished by means of biotic and abiotic features prevalent within them. Therefore, a collection of amphibians associated with the savanna biome will all choose to breed under the prevailing biotic and abiotic features present. All the species of frogs associated with the savanna biome are listed in Appendix E. Further niche differentiation is encountered by means of geographic location within the biome, this differentiation includes banks of pans, open water, inundated grasses, reed beds, trees, rivers and open ground, all of which are present within the Project area. Red Data amphibians expected to occur on site are listed in the Table 7-5 below.

Table 7-5: Red Data amphibian species likely to be found in the Project area

Common Name	Scientific Name	Status
Giant Bullfrog	*Pyxicephalus adspersus*	Near Threatened
Golden Leaf-Folding Frog	*Afrixalus aureus*	Rare
Pickersgill's Reed Frog	*Hyperolius pickersgilli*	Rare

7.1.1.2.5. Invertebrates

Butterflies are a good indication of the 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 and catch, and to identify. It is for this reason that Lepidoptera will be used as the primary focus for the vertebrate survey.

Red Data species are listed in Table 7-6. The specific Red Data conservation status was not always known.

Table 7-6: Red Data Lepidoptera (moths and butterflies) species likely to be found in the Project area

Scientific Name	Habitat	Status
Acraea (Acreae) machequena	Bushveld	Red Data
Aloeides dentatis maseruna	Grassland	Vulnerable
Andronymus neander neander	Bushveld	Red Data
Gegenes hottentota	Riparian	Vulnerable
Lepidochrysops hypopodia	Grassland	Red Data
Lepidochrysops praeterita	Grassland	Red Data
Metisella meninx	Riparian	Red Data
Neita neita	Bushveld	Red Data
Platylesches dolomitica	Grassland	Vulnerable
Spialia paula	Bushveld	Red Data
Tuxentius melaena griqua	Riparian	Red Data

7.2. Vegetation Communities

A site visit during the wet season/summer was conducted in February 2020 for the Dalyshope and Klaarwater farms and determined that the vegetation was similar to the description provided by Mucina and Rutherford (2006) (Limpopo Sweet Bushveld). The overall condition of the Project area was good with sandy soils, high levels of termitaria (termite) activity and evident signs of moderate grazing.

Dominance of species varied marginally throughout the project area with an abundance of cosmopolitan species such as *Boscia* spp. And *Grewia* spp. Various portions of the project area were dominated by smaller trees of *Senegalia erubescens*, *Terminalia sericea, Dichrostachys cinereal, Combretum apiculatum* and interspersed with *Commiphora*

pyracanthoides and numerous forbs such as *Crotalaria* sp., *Tephrosia multijuga* and *Tribulus terrestris*.

Five major vegetation types were noted within and adjacent to the Project area. Three of these are types of bushveld with different dominant species, and the fourth a very distinctive watercourse (pan vegetation). The five identified vegetation communities are:

- Acacia (Senegalia and Vachellia) and Boscia woodland;
- Combretum woodland;
- Terminalia woodland;
- Pan vegetation; and
- Riparian vegetation (adjacent to Study Area).

Most of the project site is comprised of bushveld vegetation with a small tree and herbaceous layer indicating a Savanna Woodland.

7.2.1. Acacia (Senegalia and Vachelia) and Boscia woodland

This vegetation community is found on flat sandy soils. The community covers a large portion of the Project area. A strata of vegetation was observed namely the upper, shrub and herbaceous layer. The upper layer was dominated by *Senegalia mellifera* (Black Thorn), *Senegalia erubescens* (Blue Thorn), *Boscia albitrunca* (Shepherds Bush Tree) and *Boscia foetida* (Shepherds Tree) with few *Vachellia erioloba*.

The shrub layer consisted of vast amounts of *Grewia flava* (Raisin Bush), *G. flavescens* (Sandpaper Raisin Bush), *Commiphora pyracanthoides* (Corkwood), *Euphorbia mauritanica* and *Dichrostachys cinereal* (Sickle Bush). The herbaceous layer consisted of *Aristida congesta* subsp. *Congesta*, *Aristida congesta* subsp. *Barbicollis, Stipagrostis uniplumis, Schmidtia papophoroides, Melinis repens, Eragrostis trichophora, Perotis patens, Dactyloctenium aegyptium* and *Urochloa mosambicensis*. Forbs such as *Aptosimum lineare* (Veld Violet), *Ceratotheca triloba* (Limpopo Foxglove), *Crotalaria* spp. (abundant throughout the site) and *Indigophera sordida* were observed in and amongst the herbaceous layer. Figure 7-4 illustrates the species identified within this vegetation community.

Figure 7-4: Top left: *Ceratotheca triloba*, top middle: *Aptosimum lineare*, top right: *Crotalaria* sp, bottom left: *Boscia albitrunca,* bottom middle: *Grewia flava*, bottom right: *Senegalia erubescens*

7.2.2. Combretum Woodland

This vegetation unit is located over soft sandy soils and predominantly comprise of *Combretum apiculatum* (Red Bushwillow) with a few *Combretum imbere* (Leadwood) around certain riparian areas and scattered throughout Project area. As the *Acacia* (*Senegalia* and *Vachelia*) vegetation unit transitions into the *Combretum* woodland, an ecotone between the two units is observed and *Senegalia tortilis* contribute as part of the woody component in this unit. Grasses observed include a dominance in *Eragrostis pallens* patches with scattered *Aristida congesta* var. *congesta* and *A. congesta* var. *barbicollis*. Other grasses included *Digitaria eriantha* and *Dactyloctenium aegytium*. Forbs such as *Vigna vexillata* (Sweet Pea), *Lablab purpureus* (Lablab Bean), *Asparagus* sp., *Commelina africana* var. *krebsiana* with abundant *Ceratotheca triloba* (Limpopo Foxglove) among the bare patches of soil. Figure 7-5 illustrates the species identified within this vegetation community.

Figure 7-5: *Combretum imberbe* (left), *Vachellia erioloba* (middle) and *Lablab pupureus* (right)

7.2.3. Terminalia Woodland

This vegetation community is found on deep sandy soils. The community covers a large portion of the Project Area with three vegetation strata occur. The upper layer consists of trees which are dominated primarily by *Terminalia sericea* (Silver Cluster Leaf) with the occurrence of *Combretum apiculatum* (Red Bushwillow). The herbaceous layer is dominated by *Eragrostis pallens* but various other cosmopolitan grass species occur within this community *Aristida congesta* subsp.*congesta* and *Aristida congesta* subsp*. Barbicollis* as well as *Urochloa mosambicensis*. The shrub layer is dominated by colonies of *Elephantorhiza oblique* (Figure 7-6) while *Grewia flava* (Raisin Bush) is prolific in some areas.

Figure 7-6: Terminalia vegetation (left) and *Elephantorhiza oblique* (right)

7.2.4. Pan Vegetation

The habitat found on the edge of episodic endorheic depression pans (Digby Wells Wetland Report, 2020) was found to be heavily impacted on by grazing and trampling. Floral diversity during the summer survey was moderate in comparison to other Vegetation Units in the Study Area. This habitat, however, provides important ecological functions as well as a high diversity of faunal species, particularly birds and amphibians. The substrate in and on the periphery of the pans was comprised of grey clays that receive seasonal inundation.

The vegetation around the pans consisted of a fringe of *Senegalia mellifera, Vachellia tortilis* and the limited occurrence of *Combretum imberbe* (Leadwood), with few other tree species recorded. Grass cover during the winter survey was low (approximately 20% ground cover) and cattle activity was high. Grasses and forbs showed a unique diversity from the remainder of the site, typical of seasonally wet areas and included grasses: *Panicum repens* (Couch Panicum), *Echinochloa holubii* (Kalahari Water Grass), *Diplachne fusca* (Swamp Grass), *Hemarthia altissima* (Swamp Couch) and *Dichnanthum alatum* (Vlei Finger Grass) and forbs *Hibiscus trionum* (Bladder Weed) and *Geigera burke*i (Knoppiesvermeerbos). Owing to the seasonality of the pans, sedge diversity and abundance was not high but some *Cyperus* and *Marsilea* spp. (aquatic ferns) were identified.

Ephemeral pans generally provide good habitat for frog species which are able to breed in temporary environments of seasonal inundation (Du Preez and Caruthers, 2009); Red Data species such as Bullfrogs may occur. Common and characteristic species are represented photographically *Ammocharis coranica* (Ground Lily) (see Figure 7-7) and *Coprinopsis atramentaria* (Ink Cap (Mushroom).

Figure 7-7: Pan (left) and *Ammocharis coranica* (right)

7.2.5. Riparian Vegetation

The Riparian Woodland was comprised of hydrophytic plants and tall trees along the riverbank adjacent to an open-riparian woodland (landscape images). These two variations are described below.

7.2.5.1. Faidherbia albida – Phragmites australis

Vegetation occurring on the Limpopo River bank included tall trees such as *Combretum erythrophyllum* (River Bushwillow) and *Faidherbia albida* (Ana Tree) reaching up to 15 m in height, as well as patches of *Phragmites australis* (Common reed).

Areas of seepage in proximity to the river were colonised by dense stands of *Typha capensis* (Cape Bulrush). Grass species identified included *Chloris roxburghiana, Panicum maximum* and *Schmidta pappophoroides*.

7.2.5.2. Combretum imberbe

The Riparian Woodland consisted of an assemblage of *Vachellia tortilis, Combretum imberbe* and *Ziziphus mucronata*. Tree height was estimated to be an average of 6 m. The ground was completely bare in the majority of the area, with the exception of limited grass cover and alien forb invasion.

7.2.6. Grazing Intensity and Land Use

Land within the Project area appears to be, for the most part, effectively managed and in fair ecological condition. Sporadic patches that are heavily utilised and overgrazed, do however exist. Some of the consequences of overgrazing include: increased erosion due to reduced vegetation cover; increased colonisation of native invasive species such as *Senegalia mellifera* and *Dichrostachys cinerea;* increased colonisation of unpalatable climax grasses that are typical of overgrazed land and; an overall decrease in plant diversity due to an inability of grass species to recover after reserve nutrients in roots are depleted (Van Oudtshoorn, 2009).

7.3. Fauna

Fauna occurring in the Project area include assemblages within terrestrial and wetland ecosystems: mammals, birds, reptiles, amphibians and invertebrates. Each of these assemblages occurs within unique habitats. The main habitats occurring in the Project area are the Bushveld (Woodland) Vegetation units and the Non-Perennial Episodic Endorheic Depression Pans (Digby Wells Wetland Report, 2020) and Riparian area.

As the Project area is used primarily for game hunting, there are large number of mammals, both naturally occurring and introduced. Most of the mammals make use of the Bushveld unit for grazing, foraging and hunting. The Riparian areas support large mammals such as Hippopotamus and provide refuge for many avifauna. The Pans support the likes of ungulates such as Impala and Oryx with smaller mammals such as Water Mongoose (*Atilax paludinosus*), Black Backed Jackal (*Canis mesomelas*) and Red Veld Rat (*Aethomys chrysophilus*).

Reptiles occur throughout the property and are not restricted by fences, as some larger mammals. As the survey was conducted during the summer the likes of many juvenile snakes were observed. During the survey in 2020, encounters with juvenile Black Mamba (*Dendroaspis polylepis*), Snouted Cobra (*Naja annulifera*), Puff Adder (*Bitis arietans*) and Flap-neck Chameleon (*Chamaeleo* sp.), demonstrated the active ectothermic species. Due to the close proximity of the Limpopo River, although not sighted during the survey, Nile Crocodiles have been seen by the local landowners. Observations of amphibians were not far behind in terms of numbers with opportunistic recordings of African Bullfrog (*Pyxicephalus edulis*), Foam Nest Frog (*Chiromantis* sp) and Giant Bullfrog (*Pyxicephalus adspersus*).

Avifauna was abundant during the survey and present amongst all habitat units within the Project area. Many species of migratory birds from central and eastern Africa reach their southern limit near the Limpopo River system. The presence of the river and pan systems in and adjacent to the Project area offer an array of rare and interesting birds. Most notably Fish Eagle (*Haliaeetus vocifer*), Spur-winged Goose (*Plectropterus gambensis*), Saddle-billed Stork (*Ephippiorhynchus senegalensis*) (IUCN, Decreasing Population), Marabou Stork (*Leptoptilos crumenifer*), Black Winged Stilt (*Himantopus himantopus*), Red Billed Teal (*Anas erythrorhyncha*) and African Crake (*Crex egregia*), to name a few that were observed in the pan vegetation in the central region of the Project area.

Invertebrates were common given it was after the rainy season, particularly the Corn Crickets (*Acanthoplus discoidalis*). Many Butterflies, Lacewings, Scorpion burrows, Velvet Mites, Spiders as well as Baboon Spider burrows were observed during the survey, location of the Baboon Spider burrow is portrayed in the Sensitivity map in Figure 7-13.

7.3.1. Mammals

Several mammal species were recorded from the Study Area from opportunistic sightings and camera traps. The majority of the farms in the area are involved in the hunting industry and, as such, have both naturally occurring and introduced large mammals on the farms. A full species list is presented in Appendix B Red Data (either South Africa or IUCN).

Table 7-7: Red Data listed Mammals within the Project area

Scientific Name	Common Name	IUCN Status	Protected Status
Hyeaena brunnea	Brown Hyaena	NT (Population Decreasing)	Protected
Panthera pardus	Leopard	Vulnerable	Protected

Brown Hyaena are confined to the limits of the southern African subregion with exception of a marginal extension into the arid parts of south-western Angola (Weasel *et al.* 2008). Brown Hyena are associated with the Nama-Karoo, Succulent Karoo and Savanna Biomes and occur in regions of low MAR in semi-desert scrub (Skinner and Chimimba, 2005). Canopy cover is an essential component of their habitat and they have often been reported to seek shelter under *Boscia albitrunca* trees (ubiquitous on the Dalyshope and Klaarwater farm portions) or holes underground.

Brown Hyaena are solitary foragers but most of them live in groups. The territory of a single clan can be as large as 400 km^2. Their diet includes small mammals, birds, reptiles and insects as well as eggs and occasionally fruit.

According to estimates from the IUCN, the total population size varies from 5000 to 8000 individuals (Wiesel *et al.* 2008). Major threats include human persecution in the form of poisoning, trapping and shooting as well as minor threats from traditional medicine hunters. According to the IUCN Red List (2008), the leopard is Near Threatened (NT). South Africa's National List of Threatened or Protected Species (2007) gave the leopards a status of Vulnerable and the Convention on the International Trade Endangered Species (CITES) placed it in Appendix I, meaning that commercial trade is prohibited and the export and import of skins and hunting trophies is limited through the quota system.

Several large mammals were sighted during the field survey which included both introduced animals and those naturally occurring on site. Introduced mammals include the Sable Antelope, as well as the Oryx. Naturally occurring animals (those that move under, through or over the existing game fences) include Cheetah, Leopard, Impala, Waterbuck, Eland and Kudu, amongst others.

7.3.2. Avifauna

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 (The Bird Community Index, 2007). Land cover is directly linked to habitats within the Study Area. The diversity of these habitats should give rise to many different species. According to the South African Bird Atlas Project (SABAP2), almost 300 species of birds have been identified in the area; the majority of these birds are comprised of Bushveld species. All birds that could be present within (Quarter Degree Square) QDS 2327 CA and CB are listed in Appendix C. Of these 300 species, 14 have been assigned a Red Data status, 25 are either endemic or near-endemic to South Africa, these species of special concern that have been recorded from the Study Area are listed in Table 7-8 below. Figure 7-8 shows some of the birds photographically captured during the February 2020 site survey.

Figure 7-8: Fish Eagle (left) and Purple Roller (right)

The Project area would be considered to be unique from an avifaunal perspective in that if falls within the transition area of the “dry west meets the more tropical east” zone. This gives rise to a number of interesting avifaunal phenomena. Furthermore, the Limpopo River system contains many species from east and central Africa that have reached their southern limit and therefore the project site and related farms offer a suite of extremely interesting range-restricted birds.

These include, but not limited to:

- Meves's Starling;
- Senegal Coucal;
- Bronzwinged Courser;
- Three-banded Course;
- Tropical Boubou; and
- Thrush Nightingale.

The Tropical Boubou, Thrush Nightingale and a number of different warbler species were all located and verified through the use of recorded bird calls. These species prefer the tickets associated with riparian vegetation and for them to be found so far west along the Limpopo is in itself quite unique.

Table 7-8: Red Data birds, SCC and Endemicity of the avifaunal species found in the Dalyshope Project area

Common name	Scientific name	IUCN status	Endemicity	Recorded 2013	Recorded 2020
Oxpecker, Red-billed	*Buphagus erythrorhynchus*	NT		x	x
Babbler, Southern Pied	*Turdoides bicolor*		Endemic	x	x
Barbet, Acacia Pied	*Tricholaema leucomelas*		Near-endemic	x	x
Bateleur	*Terathopius ecaudatus*	VU		x	x
Boubou, Tropical	*Laniarius aethiopicus*	Uncommon	Near-endemic	x	x
Bulbul, African Red-eyed	*Pycnonotus nigricans*		Near-endemic	x	x
Bustard, Kori	*Ardeotis kori*	VU		x	
Courser, Three-banded	*Rhinoptilus cinctus*	Uncommon	Near-endemic	x	x
Crake, African	*Crecopsis egregia*		Uncommon	x	x
Eagle, Martial	*Polemaetus bellicosus*	VU		x	
Eagle, Tawny	*Aquila rapax*	VU		x	x
Finch, Scaly-feathered	*Sporopipes squamifrons*		Near-endemic	x	
Flycatcher, Marico	*Bradornis mariquensis*		Near-endemic	x	x
Goshawk, Southern Pale Chanting	*Melierax canorus*		Near-endemic	x	x
Hornbill, Southern Yellow-billed	*Tockus leucomelas*		Near-endemic	x	x
Kestrel, Lesser	*Falco naumanni*	VU		x	x

Common name	Scientific name	IUCN status	Endemicity	Recorded 2013	Recorded 2020
Korhaan, Red-crested	*Lophotis ruficrista*		Near-endemic	x	x
Korhaan, Black Bellied		LC			x
Lark, Sabota	*Calendulauda sabota*		Near-endemic	x	
Nightingale, Thrush	*Luscinia luscinia*		Uncommon	x	x
Painted-snipe, Greater	*Rostratula benghalensis*	NT		x	
Prinia, Black-chested	*Prinia flavicans*		Near-endemic	x	x
Sandgrouse, Burchell's	*Pterocles burchelli*		Near-endemic	x	
Sandgrouse, Double-banded	*Pterocles bicinctus*		Near-endemic	x	x
Shrike, Crimson-breasted	*Laniarius atrococcineus*		Near-endemic	x	x
Sparrow, Cape	*Passer melanurus*		Near-endemic		x
Sparrow, Great	*Passer motitensis*		Near-endemic		x
Stork, Marabou	*Leptoptilos crumeniferus*	NT		x	x
Stork, Yellow-billed	*Mycteria ibis*	NT		x	x
Swallow, Mosque	*Cecropis senegalensis*		Localised	x	x
Tit-Babbler, Chestnut-vented	*Parisoma subcaeruleum*		Near-endemic	x	
Vulture, Cape	*Gyps coprotheres*	VU	Endemic	x	
Vulture, Lappet-faced	*Torgos tracheliotus*	VU		x	
Vulture, White-backed	*Gyps africanus*	VU		x	x

Common name	Scientific name	IUCN status	Endemicity	Recorded 2013	Recorded 2020
Warbler, Little-rush	*Bradypterus baboecela*		Uncommon	x	x
Whitethroat, Common	*Sylvia communis*		Localised	x	x
Whydah, Shaft-tailed	*Vidua regia*		Near-endemic	x	x
Wren-Warbler, Barred	*Calamonastes fasciolatus*		Near-endemic	x	x

7.3.3. Reptiles

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. The brevity of the survey meant that relatively few reptiles were observed compared to that of mammals and birds, however the habitat throughout the site is ideal for a variety of species.

Although no crocodiles were sighted during the February 2020 survey, it was brought to our attention from landowners that a number of Nile Crocodile *(Crocodylus niloticus)* were reported at the pans on both the Klaarwater and Dalyshope farms. It is surmised that due to the close proximity of the Limpopo River a number of younger individuals have sought refuge in the quieter pans in the immediate vicinity.

During the recent wet season survey of February 2020, a number of reptile sightings were recorded and species such as Black Mamba (*Dendroaspis polylepis*), Snouted Cobra (*Naja annulifera*), Puff Adder (*Bitis arietans*) and Flap-neck Chameleon (*Chamaeleo* sp.) were encountered during the site survey. A Marsh Terrapin (*Pelomedusa subrufa*) and Leopard Tortoise (*Stigmochelys pardalis*) were located near pan vegetation, see below Figure 7-9.

Figure 7-9: Marsh Terrapin (left) and Leopard Tortoise (right)

During the 2014 survey, tracks of a South African Python (*Python natalensis*) were identified near the pan system on the Klaarwater farm. This species is listed as “vulnerable” and is by far the largest snake species in Southern Africa, reaching a maximum length of five meters and a mass of 60kg. It is a strong and muscular snake with a triangular head that is distinctive from the rest of the body. The Southern African Python can be found in a variety of micro habitats including large riparian trees, rocky outcrops, large termite mounds and vlei areas all of which occur throughout the farms.

It is rated as vulnerable in the latest Red Data Book (2011) for South Africa and Swaziland mainly because it is exploited for human consumption. It is unlikely that this species will retain this threat classification using the latest IUCN criteria since it appears to be relatively common

in protected areas and widespread. Outside the protected areas, the species seems to be on the decline.

Reptiles expected to occur on site are listed in Appendix D (Strategic Environmental Focus, 2007). Of the species likely to occur in the area, two have been assigned a Red Data status (neither of which were found on site); these species are listed in Table 7-9.

Table 7-9: Red Data reptile species likely to be found on the Dalyshope Project area

Common Name	Scientific Name	Status
Aurora House Snake	*Lamprophis aurora*	Rare
Southern African Python	*Python natalensis*	Vulnerable

7.3.4. Amphibians

Amphibians are viewed to be good indicators of changes to the whole ecosystem because 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 (Duellman and Trueb, 1986). Additionally, amphibians are sensitive to water quality and ultra violet radiation because of their permeable skin (Gerlanc and Kaufman, 2005). Activities such as feeding and dispersal are spent in terrestrial environments (Waddle, 2006). 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 within the Study Area (pans and riparian areas) provides a number of different species of amphibians.

According to Carruthers (2001), frogs occur throughout southern Africa. A number of factors influence their distribution, and they are generally restricted to the habitat type they prefer, especially in their choice of breeding site. The choices available of these habitats coincide with different biomes, these biomes in turn, are distinguished by means of biotic and abiotic features prevalent within them. Therefore, a collection of amphibians associated with the Savanna biome will all choose to breed under the prevailing biotic and abiotic features present. All the species of frogs associated with the Savanna biome are listed in Appendix E, (those found in the study site are indicated). Further niche differentiation is encountered by means of geographic location within the biome, this differentiation includes banks of pans, open water, inundated grasses, reed beds, trees, rivers and open ground, all of which are present within the area of interest. Red Data amphibians expected to occur on site are listed in the Table 7-10 below.

Table 7-10: Red Data amphibian species likely to be found in the Dalyshope Project area

Common Name	Scientific Name	Status	LEMA 2003
Giant Bullfrog	*Pyxicephalus adspersus**	Endangered	Protected
Golden Leaf-Folding Frog	*Afrixalus aureus*	Rare	
Pickersgill's Reed Frog	*Hyperolius pickersgilli*	Rare	

During the survey undertaken in February 2020, a Foam Nest Frog (*Chiromantis* sp), African Bullfrog (*Pyxicephalus edulis*) and a Giant Bullfrog (*Pyxicephalus adspersus*) were identified within the large pan in Klaarwater (Figure 7-10 below). 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 (Unpubl. Data and personal 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, 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. According to Yetman, C (2012), the Giant Bullfrog has been recorded burrowing as far as 1km around their breeding sites. To determine the extent of the presence of their burrows within the Project area and the infrastructure, further investigations is recommended to locate the burrows. Records include species such as African Marsh Harriers, Marsh Owl, Saddle-billed Stork (sighted at the large pan), Pelicans and the larger egrets (Great White, Yellow Billed and Little) all feeding on this species.

Figure 7-10: Images of Amphibians: *Chiromantis* sp. (top right), *Pyxicephalis edulis* (bottom right) and *Pyxicephalus adspersus* (left)

7.3.5. Invertebrates

Butterflies are a good indication of the 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 and catch, and to identify. It is for this reason that Lepidoptera were used as the primary focus for the invertebrate survey.

In addition to the butterflies, baboon spiders and scorpions were also identified (Figure 7-11). A number of Baboon Spider (*Augacephalus ezendami*) burrows were found adjacent to a pan on the Klaarwater property and in the central portion of the Project area (see location of burrows on Sensitivity Map Figure 7-13). In general, South Africa has a rich diversity of Baboon Spiders, represented by eight genera and 44 sub species of which 35 are endemic to the region. They belong to the family Theraphosidae. These spiders are known as Baboon Spiders in Africa, but they are referred to as tarantulas elsewhere. The common name comes from the hairy appearance of the spider and from the pads of the spider's "feet" which resemble the colour and texture of that of a baboon's finger (Labello, 2013).

Currently the baboon spider has not formally been assessed for the IUCN Red Data List, but within South Africa it is included on the draft list of Threatened or Protected Species (ToPS). This restriction means that it is illegal to collect, transport, or keep these spiders without a permit.

Images seen in Figure 7-11 depict the invertebrates encountered during the site survey at the Project area.

Figure 7-11: Images of Invertebrates found on site

Top row: Scorpion burrow (left), Baboon Spider burrow (right). Middle row: Common Joker (left), Velvet Mite (middle) and Baboon Spider burrow (right). Bottom row: Shield-back Bug (left), Garden Orb (middle) and Dotted Veld Antlion (right).

7.4. Sensitivity Assessment

It is important to allow for detailed conservation planning to meet biodiversity targets in South Africa's variety of ecosystems. Guidelines are essential to consult for development projects, and form part of the sensitivity analysis. Areas reserved for meeting conservation and biodiversity targets should not be developed, and therefore hold a high sensitivity value. In addition, sensitivity analysis in the field based on much finer scale data can be used to verify the larger scale assessments and put it into a more localised context.

7.4.1. Protected Areas

The Project area does not fall within any Protected Areas however there are several Nature Reserves within a 100 km radius of the site. Located within approximately 50 km of the D'nyala Nature Reserve, 65 km from the Hans Strijdom Nature Reserve, 97 km from Marakela National Park and 112 km from the Atherstone Nature Reserve. More detail on each of these are provided below:

- D'nyala Nature Reserve contains abundant mammals including predators. It overlooks the Tabotie River and occupies an estimated area of 8000 ha.
- Hans Strijdom Nature Reserve is located on the Mokolo Dam, the largest impoundment in the Limpopo Province. This reserve is popular for recreational Bass fishing and occupies an area of approximately 5130 ha.
- Marakele National Park covers an area of about 45 000 ha. The largest colony of Cape Griffon Vultures are found here (roughly 800 breeding pairs).
- Atherstone Nature Reserve covers roughly 23 500 ha of land and is located within the proximity to Dwaalboom in the Limpopo Province. The reserve conserves areas of Savanna and some grassland habitat. Various mammals are protected there including Zebra, Giraffe, Elephants and Black Rhino.

The map below (Figure 7-12) illustrates the location of Private Reserves in relation to the Project area.

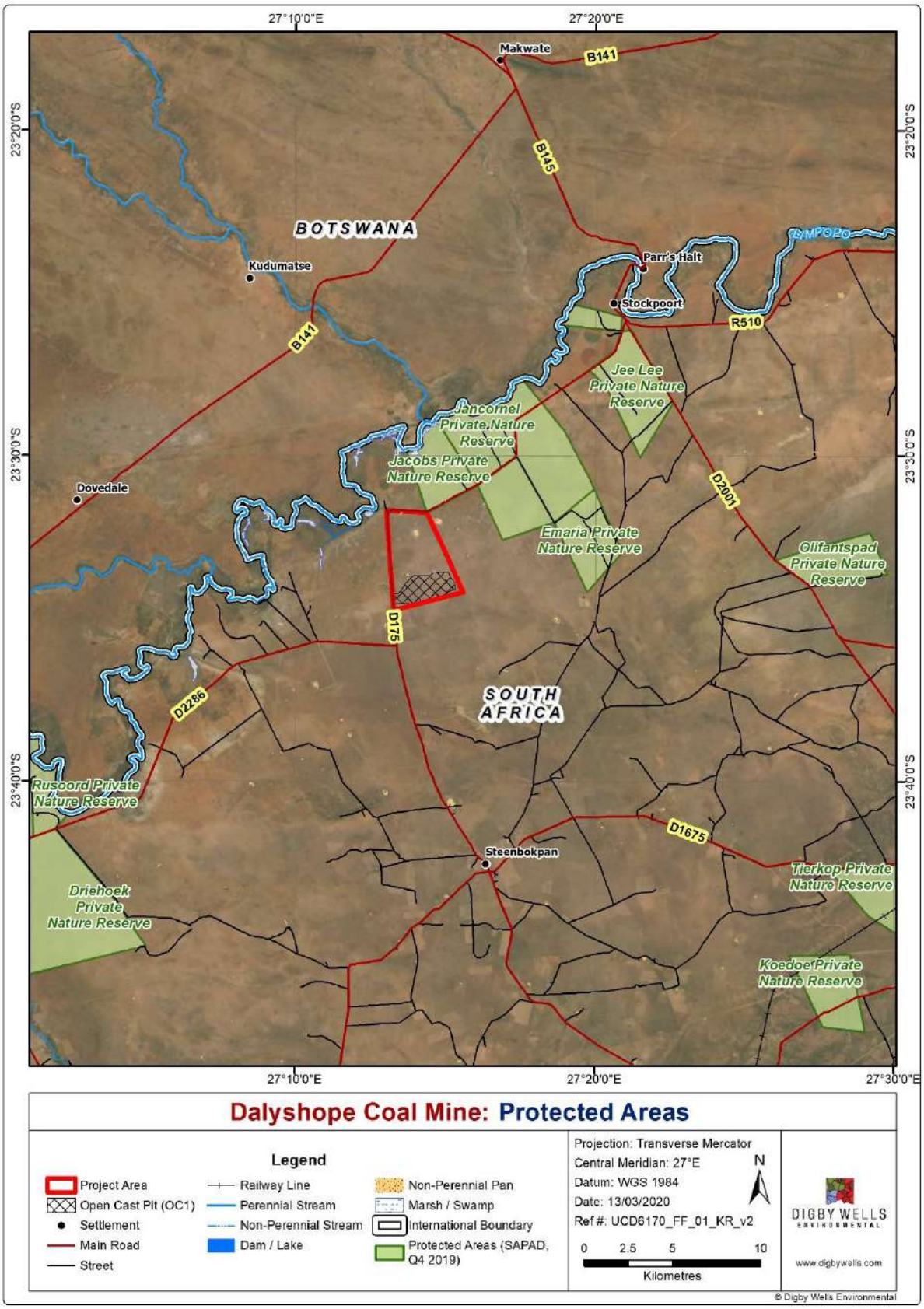
27°10'0"E
27°20'0"E
27°30'0"E
23°20'0"S
23°30'0"S
23°40'0"S
Makwate
B141
B145
BOTSWANA
Kudumatse
Parr's Halt
Stockpoort
R510
LIMPOPO
B141
Jee Lee Private Nature Reserve
Jancornel Private Nature Reserve
Jacobs Private Nature Reserve
Dovedale
D2001
Emaria Private Nature Reserve
Olifantspad Private Nature Reserve
D175
SOUTH AFRICA
D2286
Rusoord Private Nature Reserve
D1675
Steenbokpan
Tierkop Private Nature Reserve
Driehoek Private Nature Reserve
Koedoef Private Nature Reserve
Dalyshope Coal Mine: Protected Areas
Legend
Project Area
Open Cast Pit (OC1)
Settlement
Main Road
Street
Railway Line
Perennial Stream
Non-Perennial Stream
Dam / Lake
Non-Perennial Pan
Marsh / Swamp
International Boundary
Protected Areas (SAPAD, Q4 2019)
Projection: Transverse Mercator
Central Meridian: 27°E
Datum: WGS 1984
Date: 13/03/2020
Ref #: UCD6170_FF_01_KR_v2
N
0 2.5 5 10
Kilometres
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Figure 7-12: Protected Areas in proximity to the Project area

7.4.2. Important Bird Areas

No important birding areas have been identified within close proximity to the Project area.

7.4.3. Threatened Ecosystems

The list of national Threatened Ecosystems has been gazetted (NEM:BA: National list of ecosystems that are threatened and in need of protection) and result in several implications in terms of development within these areas. Four basic principles were established for the identification of threatened ecosystems. These include:

- The approach must be explicit and repeatable;
- The approach must be target driven and systematic, especially for threatened ecosystems;
- The approach must follow the same logic as the IUCN approach to listing threatened species, whereby a number of criteria are developed, and an ecosystem is listed based on its highest-ranking criterion; and
- The identification of ecosystems to be listed must be based on scientifically credible, practical and simple criteria, which must translate into spatially explicit identification of ecosystems.

Areas were delineated based on as fine a scale as possible and are defined by one of several assessments:

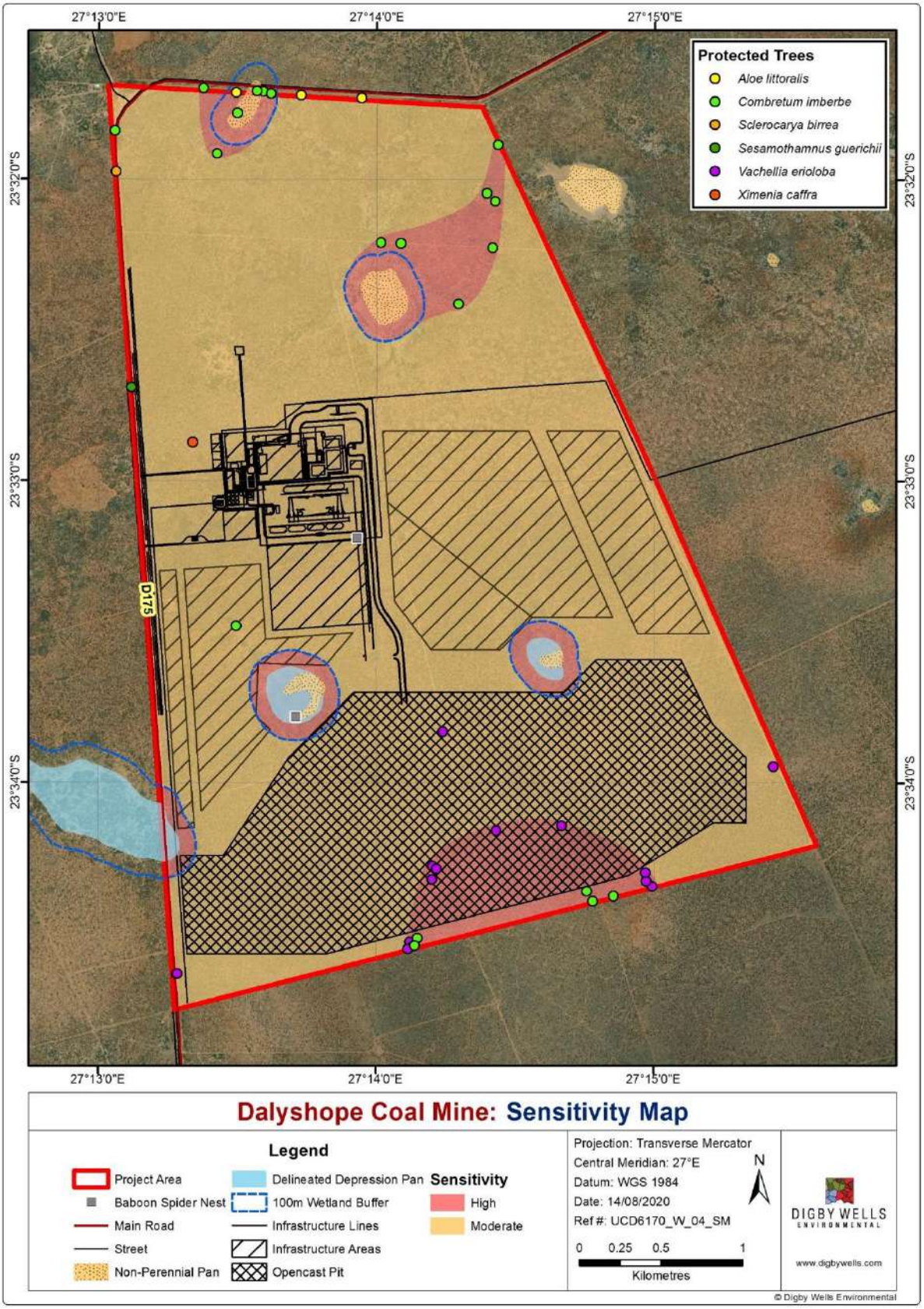
- The South African Vegetation Map (Mucina and Rutherford 2006);
- National forest types recognised by the Department of Water Affairs and Forestry (DWAF);
- Priority areas identified in a provincial systematic biodiversity plan; and
- High irreplaceability forest patches or clusters identified by DWAF.

7.4.4. Biodiversity Value Assessment

The biodiversity value assessment takes into account all of the plans mentioned above (Threatened Ecosystems and NPAES), as well as the field data gathered during the site visits. The outcome of this assessment depicts sensitivity ranging from moderate to high in the Project area. High sensitivity was assigned to the Riparian area and Pans owing to the ecosystem services provided and their irreplaceability as unique biodiversity features. In addition, floral SCC were identified throughout the Project area, influencing areas of sensitivity. Clusters of *Combretum imberbe* and *Vachellia erioloba* were found in intermittent pockets during the field survey (Figure 7-13). *Boscia albitrunca* and *B. foetida* were observed throughout the entire site and a few *Aloe littoralis's* were found along the northern boundary.

It should be noted that one *Sesamothamus guerichii* and a *Sclerocarya birrea* were observed on the western boundary on the adjacent property (outside the Project area).

The Savanna vegetation in the Project area was in good ecological condition and is mostly allocated moderate sensitivity with the exception of the Pan and Riparian vegetation.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23°32'0"S
23°33'0"S
23°34'0"S
D175
Protected Trees
Aloe littoralis
Combretum imberbe
Sclerocarya birrea
Sesamothamnus guerichii
Vachellia erioloba
Ximenia caffra
Dalyshope Coal Mine: Sensitivity Map
Legend
Project Area
Baboon Spider Nest
Main Road
Street
Non-Perennial Pan
Delineated Depression Pan
100m Wetland Buffer
Infrastructure Lines
Infrastructure Areas
Opencast Pit
Sensitivity
High
Moderate
Projection: Transverse Mercator
Central Meridian: 27°E
Datum: WGS 1984
Date: 14/08/2020
Ref #: UCD6170_W_04_SM
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Figure 7-13: Sensitive areas within the Project Area

8. 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 possibly will 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, SCC identified (faunal and floral). 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 (mainly cattle grazing, wildlife, natural grassland and fallow land) will be negatively impacted due to the mining and infrastructure. This will result in a loss of grazing, wildlife (game farming) 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, further degrading the land.

Methodology used to for the impact assessment is represented in Appendix F.

8.1. Construction Phase

Activities during the Construction Phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 8-1.

Table 8-1: Construction Phase Interactions and Impacts of Activity

Interaction	Impact
Vegetation clearing	• Removal of all vegetation within the development footprint, permits the loss of vegetation communities (including floral SCC), biodiversity and ecosystem services; and • Soil compaction, increased runoff and soil erosion.
Diesel storage	• Potential spillage of hydrocarbons (diesel/fuel) thus contaminating the soil and ground water.

Interaction	Impact
Access and road constructions	• Removal of vegetation, AIP proliferation and faunal casualties; • Increased vehicle movement; and • Increased dust, compaction and sedimentation.
Rock blasting	• Increased dust dispersal, faunal casualties and vegetation removal; and • Changes to the landscape, causing ponding and undulating topographies.
Stockpiles and dumping	• Vegetation removal, dust pollution, soil erosion, compaction, sedimentation and AIP proliferation.

8.1.1. Impact Description

A large portion of the Dalyshope 232LQ habitat will be excavated and destroyed as a result of the Open Cast Pit 1 (OC1). Identified vegetation types within this area will result in permanent reduction of the natural habitat of all faunal species that reside there. Furthermore, the confirmed presence of protected trees (see Protected Flora) *Boscia albitrunca, Combretum imberbe* and *Vachellia erioloba* supports the nature of the vegetation types.

The habitats within the proposed area of development will be directly impacted on, as the existing vegetation, which is considered the woodlands and pan vegetations (discussed in 7.1), will be removed to facilitate the construction of the mine and related infrastructure. The placement of the infrastructure will include the complete removal of vegetation present on the footprints of the mine infrastructure.

8.1.1.1. Management Objectives

Management objective for the site clearance activity will include informing the mine where the location of the vegetation communities is, including the location 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 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. In the instance of Dalyshope protected trees have been identified in the proposed development footprint and will be removed for the construction of the mine. To permit the removal of the protected trees, a replacement and replanting strategy must be adhered to re-establish the loss of such species, after the life of the mine. A tree permit assessment is required and is discussed further in Management Actions below.

8.1.1.2. Management Actions

To avoid or minimise the potential impacts, the management actions and targets discussed below should be implemented:

- 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; 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.
- A tree permit assessment is needed as protected trees are within the development footprint area. This survey will identify and quantify all the protected trees that will be impacted by the development and will ensure accordance with all necessary legislative requirements for the removal of the protected trees. Rehabilitation will require replanting of these trees as part of a replacement strategy and must accord with the number of protected trees originally removed. Details of this strategy is further elaborated in the Decommissioning phase.
- As the project footprint foresees the removal of numerous protected trees, it is recommended that small and sapling individual trees be harvested for the rehabilitation phase. Any protected trees below a height of 100 cm should be harvested and bagged and stored in nursery for later use. It is recommended that the smaller individuals be harvested as the removal and replanting of larger more mature individuals has a much lower survival rate than that of younger trees. A community driven operation can be set up to orchestrate and develop a nursery for harvesting and growing the flora that will be used to revegetate mine after closure.

8.1.1.3. Impact Ratings

Impacts associated with the construction phase are presented below in Table 8-2.

Table 8-2: Construction Phase Interactions, and Impacts of Activity Rating

1. Activity, and Interaction: Site/vegetation clearance			
Impact Description: • Loss of plant communities including floral SCC; • Loss of biodiversity; • Increased erosion; • Potential for AIP proliferation; • Loss of faunal habitat including faunal SCC; and • Loss of vegetation types including Woodland and Pan vegetation			
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 OC1 Area and infrastructure layout	
Severity	6	Serious loss of the vegetation communities (including woodlands and pans) limiting ecosystem functioning	
Probability	7	Definite probability of vegetation clearing particularly in the OC1 Area and infrastructure layout	
Nature	Negative		
Mitigation measures			
• Keep site clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to wetlands (pans); • Keep site clearing and impacts to the Dalyshope MRA; • Alien plant management strategy should be implemented; • Make use of existing roads to encourage minimal impacts/footprint to the OC1 Area; and • Relocation of the Baboon Spider's is recommended (See location on Sensitivity Map); • The footprint of the mine should be as compact as possible from a design point of view. • Avoid *Combretum imberbe* and *Vachellia erioloba* stands in sensitive areas. • Adhere to 100 m protective buffers around pans. • Replacement of removed protected trees, discussed in detail in 12.5.2 Management Actions of Decommissioning phase.			
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 OC1 area and infrastructure layout.	
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		
2. Activity, and Interaction: Access and haul roads construction			
Impact Description: • Removal of vegetation and basal layer; • Increased proliferation of AIPs • Increased faunal casualties; and • Increased dust pollution.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	6	The impact of haul roads will extend beyond the life of the project.	Moderate (negative) - 91
Extent	3	Loss of fauna and flora will only occur within the impacted area and its near surroundings.	
Intensity	4	If not mitigated serious loss will occur to the moderately sensitive environment.	
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 removed vegetation and SCC during rehab phase;
- Construction must be kept within the infrastructure footprint area, to reduce as much fragmentation as possible; 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		

3. Activity, and Interaction: Rock blasting and operation of Open Pits workings

Impact Description:

- Heavy machinery utilised increasing vehicle movement in the area, increasing soil compaction, habitat disturbances and vegetation removal;
- Blasting will increase loss of habitat, faunal casualties, loss of ecosystem functioning and encourage habitat fragmentation;
- Natural vegetation will be removed for the Open Pits working promoting edge effects and AIP proliferation; and
- Increased dust pollution 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.	
Nature	Negative		
Mitigation measures			
• Restoration and rehabilitation of removed vegetation and SCC during rehab phase; • Construction must be kept within the infrastructure footprint area, to reduce as much fragmentation as possible; • 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.			
Post-Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	4	The impact will occur during the life of the project.	Minor (negative) - 60
Extent	3	Loss of fauna and flora and habitat degradation is extending only as far as the development area.	
Intensity	3	Moderate loss, and/or effects to biological or physical resources or moderate sensitive environments, affecting ecosystem functioning.	
Probability	6	High probability that the impact will continue to occur.	
Nature	Negative		

8.2. Operational Phase

Activities during the Operational Phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 8-3.

Table 8-3: Operational Phases Interactions and Impacts

Interaction	Impact
Diesel storage and fuelling of diesel on site	• Potential spillage of hydrocarbon thus contaminating the soil, ground water and surrounding areas.
Coal Transportation: vehicle, and heavy machinery movement	• Removal of soil and vegetation, increased faunal casualties (road kill); and • Increased erosion and sedimentation decreasing vegetation cover.
Open-pit establishment	• Removal of vegetation, habitats and increased soil erosion and compaction.
Stockpiles, rock blasting and dumping	• Destruction of vegetation and habitat, dust pollution, soil erosion and AIP proliferation. • Increased vehicle movement in the area, increasing soil compaction, and runoff potential; and • Unexpected changes in the topography and overall habitats.

8.2.1. Impact Description

Site clearance will take place in areas where the infrastructure will expand, this could be the expansion of waste rock dumps and stockpiles, open cast pits and structural set-ups of the mine such as housing or storage of building material.

The establishment and operation of the open pit blasting of rock, diesel storage and coal transportation impact the current habitat. 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 operative phase will increase dust production and if not mitigated will have negative impacts on the surrounding vegetation and habitats

8.2.1.1. 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. Establishing the amount of protected trees that will be removed for the construction of the mine will give an indication of how many will need to be replanted as an offset to the loss.

8.2.1.2. Management Actions

- 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).

8.2.1.3. Impact Ratings

The operational phase impacts are rated in Table 8-4.

Table 8-4: Operational Phase Interactions, and Impacts of Activity Rating

1. Activity, and Interaction: Coal transportation, vehicle and heavy machinery movement			
Impacts: • Habitat destruction by removal of vegetation; • Increase in dust production; • AIP spread; • Increased compaction, erosion, and consequently sedimentation potential; • Increased faunal casualties.			
Prior Mitigation			
Dimension	**Rating**	**Motivation**	**Significance**
Duration	5	The impact of habitat destruction will occur during the life of the project, although reduced during the decommissioning phase.	Minor (negative) - 72
Extent	3	Majority of the impacts will occur within the OC1 Area and access roads.	
Intensity	4	Soil compaction and erosion further degrading the habitat, increased vehicular activity and loss of vegetation due to increased runoff from compacted areas.	
Probability	6	Movement of vehicles and heavy mine machinery will result in habitat degradation.	
Nature	Negative		
Mitigation measures			

- The footprint of the mine should be kept as small as possible with only necessary areas being cleared;
- Existing roads should be used with no new roads constructed, if new roads need to be constructed, these should be done outside of the identified vegetation communities and as close as possible to the existing roads;
- Access should be restricted to already impacted areas (haul roads, open pits and dumps) by rehabilitating these areas as soon as possible by removal of infrastructure and planting;
- To minimise loss of Faunal SCC, awareness campaigns with activated anti-poaching units incorporated during the mine life cycle. Security patrols to prevent snaring. Create a sanctuary for faunal species identified within the Project area during the operational phase;
- Alien invasive plants should be continuously monitored and controlled throughout the life of the mine and thereafter. It is recommended that AIP programme be established to control the spread; and
- Monitoring of the vegetation communities present must be completed every 2 years to document to impacts of the edge effect and fragmentation.

Post-Mitigation

Dimension	Rating	Motivation	Significance
Duration	5	The impact will occur on a long-term basis, specifically during the construction, and operational phases.	Negligible (negative) - 40
Extent	3	Habitat degradation is confined only to limited areas, provided that soil management measures are implemented	
Intensity	2	Minor loss, and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning.	
Probability	4	There is a probability that the impact will occur if mitigation measures are not implemented.	
Nature	Negative		

2. Activity, and Interaction: Open-pit establishment, stockpiles, rock blasting and dumping

Impacts:

- Removal of vegetation, habitats and increased soil erosion and compaction;
- Loss of faunal SCC;
- Destruction of and changes to the habitats;
- Increased dust pollution due to erosion and vehicular activity; and
- Risk of AIP proliferation.

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 discussed in Section 10. • Keep sight clearing to a minimal, and restrict vehicle movement outside of dedicated areas, specifically close to 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		
3. Activity, and Interaction: Diesel storage, and fuelling of diesel on site			
Impacts: • 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	5	The impact will occur during the life of the project, although reduced during the decommissioning phase	Minor Negative (- 84)
Extent	3	Most contamination will occur within the OC1 Area.	
Intensity	5	Serious medium-term environmental effects and limiting ecosystem functioning. Damage can be irreparable if not mitigated.	
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 sealed 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	Minor - 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		

8.3. Decommissioning Phase

Activities during the decommissioning phase that may have potential impacts on the vegetation communities, biodiversity and ecosystem function are listed in Table 8-5.

Table 8-5: Decommissioning Phase Interactions and Impacts

Interaction	Impact
Demolition, and removal of infrastructure – once mining activities have been concluded infrastructure will be demolished in preparation for the final land rehabilitation	• 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.
Movement of vehicles, and heavy machinery	• Compaction of soil; • Increased runoff potential; and • Increased erosion, and consequently sedimentation potential.
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; and • Environmental Management Plan.

8.3.1. Impact Description

The decommissioning phase will enable the rehabilitation of the removed indigenous vegetation and protected trees. Trees that were propagated in a nursery will be used in the appropriate vegetation types for rehabilitation.

The demolition of the ancillary infrastructure may also take place, whereby these will be dismantled and trucked away.

8.3.1.1. 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 to furthermore reduce any impacts that may occur during this phase.

8.3.1.2. Management Actions

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

Thereafter the removal of the infrastructure (ancillary infrastructure) will be completed and the footprints of these areas also rehabilitated. This will be completed so as to not harm or negatively impact surrounding vegetation. The protected trees that are removed will be replanted with an offsetting ratio where a removed small, medium and large tree will be replanted with one small, two small and three small trees, respectively.

Furthermore, the rehabilitation (of all infrastructure footprints discussed) must be conducted in such a manner to achieve aims for the process. These aims will be to ensure the footprint areas are vegetated and that potential erosion through runoff and wind does not occur. Efforts will be maximised if rehabilitation is completed before the first rains fall so as to make use of the rainfall to assist in plant recruitment.

8.3.1.3. Impact Ratings

Impacts associated with the rehabilitation of the open cast pits and stockpiles together with the demolition and removal of the infrastructure area are presented in Table 8-6.

Table 8-6: Decommissioning Phase Interactions, and Impacts of Activity Rating

1. 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 OC1 Area.	

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) - 32
Extent	2	The impact is limited only to specific areas, provided that mitigation measures are implemented.	
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		

2. 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	Extending across the OC1 Area and mine infrastructure and to neighbouring environments.	
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, open pits 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; • Ensure proper stormwater management designs are in place to ensure no run-off or pooling occurs; 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		

3. 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 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; • 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		

4. Activity, and Interaction: Post-closure monitoring and rehabilitation

Impact Description:

- Minimal negative impacts on the environment; and
- Environmental Monitoring Plan.

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 to ensure adequate plant recruitment;
- Stockpiles, open pits and dumps are to be rehabilitated;
- Ensure sufficient irrigation (can use water cart) and fertilizing of newly planted vegetation to facilitate a 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		

8.4. 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.

Albeit the Limpopo Sweet Bushveld vegetation type is assigned a Least Concern conservation status, large portions of this vegetation type are under threat due to expanding mining operations. The cumulative loss of the vegetation type as well as the SCC within it should be considered proactively.

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. The primary impacts will be fragmentation and edge effects with a reduction in movement of remaining naturally occurring wildlife (not confined to game farms for example: Kudu, Leopard, Cheetah) and isolation of pockets of vegetation.

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.

8.5. Unplanned and Low Risk Events

Major unplanned risks are associated with infrastructure 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. Table 8-7 goes into detail of unplanned risks and mitigation measures.

Table 8-7: Unplanned Events and Associated Mitigation Measures

Unplanned Risk	Mitigation Measures
Leaking or spillage of hazardous substances from pipelines and waste storage	• If a spill occurs, it is to be cleaned up immediately (Drizit/Zupazorbtype 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 incur, the appropriate authorities are to be notified and the incident recorded.
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, tackifiers and soil stabilisers that don't harden the soils.

9. Environmental Management Plan

The objective of an Environmental Management Plan (EMP) is to present mitigations (a) to manage undue or reasonably avoidable adverse impacts associated with the development of the project and (b) to 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 are 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;
- Gauge if predicted benefits of the project are being achieved and maximized; and gain information for improving similar projects and ESIA practice in the future.

The EMP is described in Table 9-1 below.

Table 9-1: 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, diesel storage, and explosive magazine and Open Cast Pits; 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. • 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 outside of dedicated sensitive areas (see sensitivity map), specifically close to wetlands (pans); • Make use of existing roads to encourage minimal impacts/footprint to the Project Area; • Removal of vegetation is unavoidable in some areas of the Project Area, the same species that have been removed should be replaced and purchased via local nurseries during the rehabilitation phase; • Whilst the removal of vegetation and topsoil is underway, key monitoring methods should be focussed on the prevention of AIP proliferation during the construction and operational phase; • 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 various stockpiles with chemical dust suppressants; • 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) • Operating crush, and screen, and coal washing plant.	• 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 encourage minimal impacts/footprint to the Project Area; • Monitor AIPs and ensure measures are in place to prevent spread and proliferation; • Avoid pockets of *Combretum imberbe* and *Vachellia erioloba* (see Sensitivity Map); • Adhere to a protective 100 m buffer around the pans as per the recommended Digby Wells Wetland Report 2020. Further investigation is recommended to determine the extent of the presence of burrows of the *Pyxicephalus adspersus* in relation to the infrastructure of the Project area; • In support of the Digby Wells Soil Land Use and Land Capability Report 2020, excavated topsoil should be stockpiled separate from the subsoil to enhance the rehabilitation process. Long term stockpiles should be revegetated to minimise loss of soil quality and minimise AIPs; • Management of dust may involve the spraying of water and / or covering exposed pits with chemical dust suppressants; • 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 Soil Land Use and Land Capability Report 2020, a Topsoil Management Plan (TMP) must be prepared to demonstrate how topsoil will be preserved in a condition as near as possible to its pre-mining condition to allow successful mine rehabilitation (Statham, 2014). In addition, a Storm Water Management Plan (SWMP) should already be implemented. This should consider all high land capability area, 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; • Demolition, and removal of infrastructure – once mining activities have been concluded infrastructure will be demolished in preparation for the final land rehabilitation. • Rehabilitation – rehabilitation mainly consists of reprofiling the landscape via re-vegetation, and landscaping of the preserved subsoil and topsoil;. • Post-closure monitoring, and rehabilitation	• 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..	• 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. Ensure the landscape has been reprofiled with the preserved topsoils and subsoils. Replant saplings and small trees removed and preserved during construction phase. • Ensure removal of all AIPs. This can be done manually and if necessary, with a systemic solution; • 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; and • Rehabilitation and Monitoring Plan should be implemented.	***Modify, remedy, control, or stop*** Concurrent rehabilitation through the life of mine	Life of Decommissioning Phase

10. 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 10-1 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
- Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003) (LEMA).

Table 10-1: Monitoring Plan

Monitoring Element	Comment	Frequency	Responsibility
Alien Invasive Management	During the operational phase the presence if AIPs should be detected and monitored. 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 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 disturbance (and on adjacent undisturbed	Annually during the wet season for the first five years after rehabilitation.	Botanist / Flora Specialist

Monitoring Element	Comment	Frequency	Responsibility
	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

11. Stakeholder Engagement Comments Received

The Stakeholder Engagement has been completed in part, as a process separate from the Fauna and Flora Impact Assessment. Interested and Affected Party (I&AP) comments submitted in relevance to the ecological resources during the SEP, were considered in the Impact Assessment Section and is stipulated in Table 11-1 below.

Table 11-1: Stakeholder Engagement Comment

Category	Comment Raised	Contributor	Organisation / Company	Date	Method	Response
Are there any environmental, social or heritage features on the proposed project area we need to be aware of	Question of classification of area by Limpopo Government- in terms of Limpopo Bioregional plan	Dr Llew Taylor	WESSA (the Wildlife and Environment Society of South Africa)	29-Apr-2020	Registration and Comment sheet	Limpopo Sweet Bushveld is not currently threatened (Least Threatened)
Project impacts on socio-economic-conditions (e.g. livelihoods, farms, business, household)	Fauna and Flora. We are greatly concerned about the resultant habitat destruction, movement barriers and wildlife vehicle collisions that will occur. From a socio-economic perspective we are concerned about the loss of ecosystem services.	Ashleigh Dare	The Endangered Wildlife Trust	24-Jul-20	Registration and Comment sheet	Speed limits as per mine health and safety policy and procedures. Awareness to the staff of the mine on activities of diurnal and nocturnal wildlife. Fences to be installed to keep animals out. Ecosystem loss is inevitable. There are mitigation measures aimed at reducing this impact. Buffer zones be adhered to around pans.

Category	Comment Raised	Contributor	Organisation / Company	Date	Method	Response
Are there any environmental, social or heritage features on the proposed project area we need to be aware of?	Detailed above. This area is of high importance to free roaming cheetah (a listed species in the TOPS list, listing un vulnerable). Further this Coal Mine could impact on the water of the Limpopo River.					Education, fences, (refer to recommendation)
How do you think the project might (affect) you?	Wildlife will also be impacted as the project will contribute to habitat destruction.	Ditiro Jan Majapholo	Community Member	24-Jul-20	Registration and Comment sheet	All mitigation measures are structed to minimise negative impacts.

12. Recommendations

The following actions are recommended to reduce adverse effects on the fauna and flora of the Project Area (Table 12-1).

Table 12-1: Possible Impacts and Recommendations

Possible Impacts	Recommendations	Person Responsible
Loss of Fauna SCC	• All identified faunal SCC identified must be located and relocated, if possible, before the construction phase (please see Table 9-1 for Giant Bullfrog recommendations)	Field specialist, and PM
Loss of Vegetation cover and Flora SCC	• All floral SCC must be identified and located. Regional relocation of protected tree species within development footprint must be instilled to offset the overall loss of floral SCC within the Project Area. As recommended in Section 9, replanting of suitable saplings, small trees and indigenous flora during the rehabilitation phase as a means to re-vegetate the area after decommissioning the mine.	Field Specialist, and PM
Habitat and landscape fragmentation	• Restriction of vehicle movement over sensitive areas to reduce degradation of untouched areas. • Minimise unnecessary removal of the natural vegetation cover outside the development footprint. • After rehabilitation the area must be fenced, and animals should be kept off the area until the vegetation is self-sustaining and established.	Field Specialist, Communal Nursery and PM

13. 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 is feasible and should be considered. However, it is highly recommended that concurrent rehabilitation, management and mitigation measures are correctly implemented to minimise all potential impacts (identified in Section 8) on the fauna and flora of the site.

Managing measures to minimise potential negative impacts as set out in Section 9 should form part of the conditions for the environmental authorisation. Tree Removal Permit applications will be required for the removal of identified protected tree species within the development footprint, so it is strictly advised to keep development and removal within the footprint. It is also highly recommended that water courses (wetlands and pans) be avoided and not impacted with at least 100 m zones of regulation buffers to any infrastructure and construction activities.

Fauna and flora management measures and monitoring requirements as set out in this report should form part of the conditions of an environmental authorisation and be included in the EMPr.

14. Conclusion

UCDIV on behalf of Anglo Operations (Pty) Ltd appointed Digby Wells to undertake the environmental authorisations required for the proposed development of Dalyshope Coal Mining Project.

The Fauna and Flora Assessment Report has been compiled in terms of Appendix 6 of the NEMA EIA Regulations, 2014, (as amended) in terms of the Scoping, and EIA process which is being followed in applying for Environmental Authorisation.

The proposed development area falls within the Limpopo Sweet Bushveld vegetation type within the Savanna Biome. Five vegetation communities were identified namely, *Acacia* (*Senegalia* and *Vachellia*) and *Boscia* woodland, *Combretum* woodland, *Terminalia* woodland, Pan vegetation and Riparian vegetation. The area is primarily used for game hunting and cattle grazing, as there are large number of mammals, both naturally occurring and introduced. Floral SCC identified within the development footprint consisted of *Boscia albitrunca*, *Combretum imberbe* and *Vachellia erioloba.* Faunal SCC consisted of two Baboon Spider nests that were located within the Project area.

The potential impacts due to the mining activities on the fauna and flora is low to major if mismanaged.

The impacts associated with the proposed development include:

- Removal of all vegetation within the development footprint, permits the loss of vegetation communities (including floral and faunal SCC), biodiversity and ecosystem services;
- Habitat fragmentation and edge effects;
- Contamination and erosion of the soils and surrounding grounds; and
- AIP proliferation.

Recommendations are made for the EIA phase to ensure that the rehabilitation plan, mitigation measures and continuous monitoring measures are in place, and encourage a concurrent rehabilitation and monitoring plan.

In conclusion, based on the results and finding of the impact assessment, Digby Wells does not object to the Project, taken into consideration the EMP, Monitoring Program and Recommendations are adhered to.

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Appendix A: Plant Species List

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
Acanthaceae	*Barleria lancifolia*				x	
	Blepharis subvolubilis var. subvolubilis				x	
	Chaetecanthus sp.				x	
	Justicia exigua		x			
	Justicia odora	x				
Amaryllidaceae	*Ammocharis coranica*				x	x
	Crinum sp.				x	
	Nerine gaboronensis				x	
Amaranthaceae	*Achyranthes aspera*				x	
	Cyathula lanceolota				x	
	Gomphrena celesiodes				x	
	Hermbstaedtia fleckii					x
	Hermbstaedtia odorata		x	x	x	
	Leucosphaera baenesii			x	x	
Anacardiaceae	*Ozoroa sp.*				x	
Apocynaceae	*Adenium oleifolium*	x				

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Pentarrhiunium sp.				x	x
Asparagaceae	*Asparagus cooperi*		x			
	Asparagus densiflorus				x	
	Asparagus nelsii		x			
	Asparagus sp.				x	x
Asphodelaceae	*Aloe sp*				x	
Asteraceae	*Felicia muricata*			x	x	x
	Geigera burkei				x	
	Kleinia fulgens				x	
	Laggera decurrens	x				
	Vernonia fastigiata		x			
Bignoniaceae	*Catophractes alexandri*			x	x	
	Rhigozum brevispinosum		x			
	Rhigozum obovatum			x	x	
Boraginaceae	*Ehretia rigida*			x	x	
	Heliotropium ciliatum		x			

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
Brassicaceae	*Lepidium africanum*					x
Burseraceae	*Commiphora africana*			x	x	
	Commiphora pyracanthoides			x	x	x
	Commiphora sp.				x	
Cactaceae	*Opuntia imbricata*				x	x
Capparaceae	*Boscia albitrunca*			x	x	x
	Boscia foetida				x	x
	Cadaba aphylla			x	x	x
	Cadaba termitaria				x	x
	Cleome rubella					x
Celastraceae	*Gymnosporia buxifolia*				x	
	Gymnosporia senegalensis			x	x	
	Maytenus tenuispina					x
Combretaceae	*Combretum sp.*				x	
	Combretum apiculatum			x	x	x
	Combretum hereroense			x	x	x

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Combretum imberbe				x	x
	Terminalia sericea	x		x	x	x
Commelinaceae	*Commelina africana var. krebsiana*					x
	Commelina benghalensis			x	x	
	Commelina sp.				x	
Convolvulaceae	*Evolvulus alsinoides*				x	x
	Ipomea magnusiana				x	x
	Ipomea obscura				x	
	Ipomoea magnusiana	x				
	Merremia kentrocaulos	x				x
Cucurbitaceae	*Acanthosicyos naudinianus*			x	x	
Cyperaceae	*Bulbostylis hispidula*					x
	Cyperus rupestris				x	x
	Cyperus thorncroftii				x	
	Fuirena sp.				x	

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Isolepis diabolica		x			
	Marsilea sp.				x	x
	Schoenoplectus paludicola		x			
	Schoenoplectus senegalensis	x				
Dichapetalaceae	*Dichapetalum cymosum*		x			x
Dracaenaceae	*Sansevieria aethiopica*					x
	Sanseviera pearsonii				x	
Ebenaceae	*Diospyros lycioides subsp. lycioides*		x			
	Euclea natalensis					x
	Euclea undulata			x	x	
Euphorbiaceae	*Euphorbia mauritanica*					x
	Euphorbia rhombifolia		x			
Fabaceae	*Acacia burkei*			x	x	
	Acacia erioloba					x
	Acacia erubescens			x	x	x
	Acacia fleckii			x	x	x

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Acacia gerradii				x	
	Acacia karoo				x	
	Acacia mellifera				x	
	Acacia nigrescens				x	x
	Acacia nilotica			x	x	x
	Acacia robusta			x	x	
	Acacia senegal var. rostrata			x	x	x
	Acacia tenuspina			x	x	
	Acacia tortillis				x	x
	Albizia anthelmintica			x	x	
	Bauhinia petersiana		x		x	x
	Chamaecrista comosa				x	
	Crotalaria sp.					x
	Crotalaria distans subsp. distans		x			x
	Dichrostachys cinerea			x	x	x
	Elephantorrhiza elephantina				x	x

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Faidherbia albida				x	
	Indigofera daleodes			x	x	x
	Indigofera sordida	x				
	Lablab purpureus					x
	Lablab purpureus var. ucinatus				x	
	Neorautanenia ficifolia		x			
	Peltephorum africanum				x	x
	Senegalia burkei					x
	Senna italica				x	
	Sesbania bispinosa var. bispinosa				x	
	Sphenostylis angustifolia					x
	Sutherlandia frutescens	x				
	Tephrosia krausiana				x	
	Tephrosia multijuga					x
	Tephrosia purpurea subsp. leptostachya var. pubescens		x		x	
	Tephrosia retusa				x	x

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Tribulus terrestris				x	x
	Vigna frutescens				x	x
	Vigna vexillata vexillata				x	x
Geraniaceae	*Monsonia glauca*		x			
Lamiaceae	*Acrotome inflata*				x	
	Hemizygia eliottii			x	x	
	Ocimum americanum var. americanum				x	x
	Plectranthus neochilus			x	x	
Malvaceae	*Gossypium herbaceum subsp. africanum*			x	x	
	Grewia avellana		x			
	Grewia bicolor				x	
	Grewia flava			x	x	x
	Grewia flavescens				x	x
	Grewia monticola				x	
	Grewia occidentalis				x	

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Grewia rogersii				x	
	Hermannia modesta		x			
	Hibiscus physaloides				x	
	Hibiscus syriaca		x			
	Hibiscus trionium				x	x
	Waltheria indica				x	x
Molluginaceae	*Limeum fenustratum*				x	x
	Limeum viscosum					x
Nyctaginaceae	*Phaeoptilum spinosum*			x	x	
Olacaceae	*Ximenia americana var. microphylla*		x			x
Orobonaceae	*Striga gesnerioides*		x			
Pedaliaceae	*Ceratotheca triloba*				x	x
	Dicerocaryum senecioides					x
	Harpagophytum procumbens subsp. transvaalense			x	x	
	Sesamum alatum				x	

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Sesamum triphyllum					x
Poaceae	*Aristida adscensionis*	x			x	
	Aristida congesta subs. Barbicollis				x	
	Aristida congesta subsp. Congesta				x	xx
	Aristida diffusa				x	
	Aristida junciformis				x	
	Aristida scabrivalvis subsp. scabrivalvis	x				
	Aristida stipitata subsp. stipitata		x		x	
	Bothriochloa insculpta	x				
	Chloris pycnothrix	x				x
	Chloris roxburghiana				x	
	Chloris virgata					x
	Cymbopogon nardus			x	x	
	Cynodon dactylon				x	x
	Cynodon sp				x	

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Dactyloctenium aegyptium					x
	Dichanthium annulatum var. papillosum	x			x	
	Dichnanthum alatum				x	
	Digitaria erianthra	x	x	x	x	
	Diplachne fusca				x	
	Echinochloa holubii				x	
	Ehrharta erecta					x
	Enneapogon cenchroides			x	x	x
	Eragrostis barbinodis		x			
	Eragrostis biflora		x			
	Eragrostis cylindriflora	x				
	Eragrostis lehmannia			x	x	x
	Eragrostis pallens		x	x	x	x
	Eragrostis racemosa					
	Eragrostis rigidior			x	x	
	Eragrostis sp.				x	

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Eragrostis superba	x				
	Eragrostis trichophora			x	x	
	Hemarthia altissima				x	
	Ischaemum afrum			x	x	
	Megaloprotachne albescens		x			
	Melinis repens				x	x
	Microchloa sp.?					
	Panicum coloratum	x		x	x	x
	Panicum maximum		x	x	x	x
	Panicum maximum					
	Panicum repens				x	x
	Panicum sp.				x	
	Perotis patens		x		x	x
	Phragmites australis				x	
	Pogonarthria squarrosa		x		x	x
	Schmidtia pappophoroides		x	x	x	x

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Setaria verticillata			x	x	x
	Sporobolus sp.				x	x
	Striptogrostis neumi					x
	Stipagrostis uniplumis var. uniplumis		x	x	x	
	Tragus berteronianus					x
	Triraphis schinzii		x			
	Urochloa brachyura		x			
	Urochloa mosambicensis	x		x	x	x
Portulacaceae	*Portulaca kermesina*					x
	Portulaca sp.				x	
Rhamnaceae	*Ziziphus mucronata*				x	x
Rubiaceae	*Pavetta harborii*		x			
Scrophulariaceae	*Aptosimum lineare*				x	x
Solanaceae	*Datura stramonium*				x	
	Lyceum cinereum				x	x
	Solanum catombelense		x		x	

Family	Species	2327CA	2327CB	Mucina & Rutherford SVcb19	Identified on site 2014	Identified on site 2020
	Solanum pseudocapsicum				x	x
	Solanum sp.				x	
Typhaceae	*Typha capensis*				x	
Verbenaceae	*Chascanum incisum*		x		x	
	Lippia rhemanii				x	x
	Verbena bonariensis				x	
Viscaceae	*Viscum rotundifolium*				x	

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Appendix B: Mammal Species List

Common Name	Scientific Name	SA Red Data Status	IUCN status	Recorded (Wet Season)	Recorded by farmer
Grey /Common Duiker	*Sylvicapra grimmia*			X	X
Klipspringer	*Oreotragus oreotragus*				
Impala	*Aepyceros melampus*			X	X
Steenbok	*Raphicerus campestris*			X	X
Common Warthog	*Phacochoerus africanus*			X	X
Bushpig	*Potamochoerus larvatus*				X
Grey Rhebok	*Pelea capreolus*				
Common Eland	*Taurotragus oryx*			X	X
Blesbok	*Damaliscus pygargus phillips*				
Common Reedbuck	*Redunca arundinum*				
Bushbuck	*Tragelaphus scriptus*			X	X
Red Hartebeest	*Alcelaphus buselaphus caama*				
Plains Zebra	*Equus quagga*			X	
White Rhinoceros	*Ceratotherium simum*		NT		
Blue Wildebeest	*Connochaetes taurinus*			X	X
Sable Antelope	*Hippotragus nige*	VU		X	X

Common Name	Scientific Name	SA Red Data Status	IUCN status	Recorded (Wet Season)	Recorded by farmer
Nyala	*Nyala angasii*			X	
Kudu	*Tragelaphus strepsiceros*				X
Waterbuck	*Kobus ellipsiprymnus*				X
Hippopotamus	*Hippopotamus amphibius*	VU			X
Cape Buffalo	*Syncerus caffer*				
Slender Mongoose	*Galerella sanguinea*			X	
Striped Polecat	*Ictonyx striatus*				
Small-spotted Genet	*Genetta genetta*				
Large-spotted Genet	*Genetta tigrina*				
Yellow Mongoose	*Cynictis penicillata*				
Dwarf Mongoose	*Helogale parvula*				
White-tailed Mongoose	*Ichneumia albicauda*				
Black-backed Jackal	*Canis mesomelas*			X	X
Honey Badger	*Mellivora capensis*	NT			X
African Wild Cat	*Felis silvestris lybica*				X
Leopard	*Panthera pardus*			X	X
Serval	*Leptailurus serval*	NT			X

Common Name	Scientific Name	SA Red Data Status	IUCN status	Recorded (Wet Season)	Recorded by farmer
Banded Mongoose	*Mungos mungo*			X	X
Caracal	*Caracal caracal*				X
Aardwolf	*Proteles cristata*				
African Weasel	*Poecilogale albinucha*				
Brown Hyaena	*Hyaena brunnea*	NT		X	X
Water Mongoose	*Atilax paludinosus*			X	X
Spotted-necked Otter	*Hydrictis maculicollis*	NT			
Cape Clawless Otter	*Aonyx capensis*				
Bushveld Horseshoe Bat	*Rhinolophus simulator*				
Mauritian Tomb Bat	*Taphozous mauritianus*				
Egyptian Slit-faced Bat	*Nycteris thebaica*				
Straw Coloured Fruit Bat	*Eidolon helvum*				
Cape Serotine Bat	*Neoromicia capensis*				
Schreiber's Long-fingered Bat	*Miniopterus schreibersii*	NT			
Darling's Horseshoe Bat	*Rhinolophus darlingi*	NT			
Egyptian Free-tailed Bat	*Tadarida aegyptiaca*				
Lesser Yellow House Bat	*Scotophilus dinganii*				

Common Name	Scientific Name	SA Red Data Status	IUCN status	Recorded (Wet Season)	Recorded by farmer
Rusty Bat	*Pipistrellus rusticus*	NT			
Short-eared Trident Bat	*Cloeotis percivali*	CR			
Reddish-gray Musk Shrew	*Crocidura cyanea*				
South African Hedgehog	*Atelerix frontalis*	NT			X
Lesser Red Musk Shrew	*Crocidura hirta*				
Tiny Musk Shrew	*Crocidura fuscomurina*				
Lesser Grey-browned Musk Shrew	*Crocidura silacea*				
Least Dwarf Shrew	*Suncus infinitesimus*				
Greater Dwarf Shrew	*Suncus lixus*				
Long-tailed Forest Shrew	*Myosorex longicaudatus*				
Swamp Musk Shrew	*Crocidura mariquensis*				
Lesser Dwarf Shrew	*Suncus varilla*				
Cape/Desert Hare	*Lepus capensis*				
Scrub Hare	*Lepus saxatilis*			X	X
Jameson's Red Rock Rabbit	*Pronolagus randensis*				
Short-snouted Elephant-shrew	*Elephantulus brachyrhynchus*				
Rock Elephant Shrew	*Elephantulus myurus*				

Common Name	Scientific Name	SA Red Data Status	IUCN status	Recorded (Wet Season)	Recorded by farmer
Vervet Monkey	*Chlorocebus pygerythrus*			X	X
Chacma Baboon	*Papio ursinus*			X	X
Southern Lesser Galago	*Galago senegalensis*				X
Common Mole-rat	*Cryptomys hottentotus*				
Multimammate Mouse	*Mastomys natalensis*				
South African Porcupine	*Hystrix africaeaustralis*			X	X
Pygmy mouse	*Mus minutoides*				
Pouched mouse	*Saccostomus campestris*				
Bushveld Gerbil	*Gerbilliscus leucogaster*				
Tree Rat	*Rattus rattus*				
Spiny Mouse	*Acomys spinosissimus*				
Namaqua Rock Mouse	*Aethomys namaquensis*				
Fat Mouse	*Steatomys pratensis*				
Woodland Dormouse	*Graphiurus murinus*			X	
South African Springhare	*Pedetes capensis*			X	
Tree Squirrel	*Paraxerus cepapi*			X	
Highveld gerbil	*Gerbilliscus brantsii*				

Common Name	Scientific Name	SA Red Data Status	IUCN status	Recorded (Wet Season)	Recorded by farmer
Single-striped Mouse	*Lemniscomys rosalia*				X
Red Veld Rat	*Aethomys chrysophilus*			X	
Chestnut Climbing Mouse	*Dendromus mystacalis*				
Kreb's Fat Mouse	*Steatomys krebsii*				
Rock Dormouse	*Graphiurus platyops*				
Greater Cane Rat	*Thryonomys swinderianus*				
Angoni Vlei Rat	*Otomys angoniensis*				
Grey Climbing mouse	*Dendromus melanotis*				
Vlei Rat					
Rock Hyrax/Dassie	*Procavia capensis*				
Aardvark/Ant bear	*Orycteropus afer*				X

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Appendix C: Bird Species List

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
1	Stork, Saddle-billed	*Ephippiorhynchus senegalensis*	EN		X
2	Falcon, Lanner	*Falco biarmicus*	NT		
3	Flamingo, Greater	*Phoenicopterus ruber*	NT		
4	Oxpecker, Red-billed	*Buphagus erythrorhynchus*	NT		X
5	Painted-snipe, Greater	*Rostratula benghalensis*	NT		X
6	Pratincole, Black-winged	*Glareola nordmanni*	NT		
7	Stork, Marabou	*Leptoptilos crumeniferus*	NT		
8	Stork, Yellow-billed	*Mycteria ibis*	NT		
9	Bateleur, Bateleur	*Terathopius ecaudatus*	VU		
10	Bustard, Kori	*Ardeotis kori*	VU		X
11	Eagle, Martial	*Polemaetus bellicosus*	VU		
12	Eagle, Tawny	*Aquila rapax*	VU		X
13	Vulture, Lappet-faced	*Torgos tracheliotus*	VU		
14	Vulture, White-backed	*Gyps africanus*	VU		
15	Babbler, Southern Pied	*Turdoides bicolor*		Endemic	
16	White-eye, Cape	*Zosterops virens*		Endemic	
17	Barbet, Acacia Pied	*Tricholaema leucomelas*		Near-endemic	

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
18	Bulbul, African Red-eyed	*Pycnonotus nigricans*		Near-endemic	
19	Canary, Yellow	*Crithagra flaviventris*		Near-endemic	
20	Finch, Scaly-feathered	*Sporopipes squamifrons*		Near-endemic	
21	Flycatcher, Marico	*Bradornis mariquensis*		Near-endemic	
22	Goshawk, Southern Pale Chanting	*Melierax canorus*		Near-endemic	x
23	Hornbill, Southern Yellow-billed	*Tockus leucomelas*		Near-endemic	x
24	Korhaan, Red-crested	*Lophotis ruficrista*		Near-endemic	
25	Lark, Sabota	*Calendulauda sabota*		Near-endemic	
26	Prinia, Black-chested	*Prinia flavicans*		Near-endemic	
27	Sandgrouse, Burchell's	*Pterocles burchelli*		Near-endemic	
28	Sandgrouse, Double-banded	*Pterocles bicinctus*		Near-endemic	
29	Scrub-Robin, Kalahari	*Cercotrichas paena*		Near-endemic	
30	Shrike, Crimson-breasted	*Laniarius atrococcineus*		Near-endemic	
31	Shrike, Southern White-crowned	*Eurocephalus anguitimens*		Near-endemic	
32	Sparrow, Cape	*Passer melanurus*		Near-endemic	
33	Sparrow, Great	*Passer motitensis*		Near-endemic	

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
34	Spurfowl, Natal	*Pternistis natalensis*		Near-endemic	
35	Starling, Burchell's	*Lamprotornis australis*		Near-endemic	
36	Tit, Ashy	*Parus cinerascens*		Near-endemic	
37	Tit-Babbler, Chestnut-vented	*Parisoma subcaeruleum*		Near-endemic	
38	Whydah, Shaft-tailed	*Vidua regia*		Near-endemic	X
39	Wren-Warbler, Barred	*Calamonastes fasciolatus*		Near-endemic	
40	Avocet, Pied	*Recurvirostra avosetta*			
41	Barbet, Crested	*Trachyphonus vaillantii*			X
42	Batis, Chinspot	*Batis molitor*			
43	Bee-eater, Blue-cheeked	*Merops persicus*			X
44	Bee-eater, European	*Merops apiaster*			X
45	Bee-eater, Little	*Merops pusillus*			
46	Bee-eater, Southern Carmine	*Merops nubicoides*			X
47	Bee-eater, Swallow-tailed	*Merops hirundineus*			X
48	Bishop, Yellow-crowned	*Euplectes afer*			
49	Brubru, Brubru	*Nilaus afer*			
50	Buffalo-Weaver, Red-billed	*Bubalornis niger*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
51	Bulbul, Dark-capped	*Pycnonotus tricolor*			
52	Bunting, Cinnamon-breasted	*Emberiza tahapisi*			X
53	Bunting, Golden-breasted	*Emberiza flaviventris*			x
54	Bush-Shrike, Orange-breasted	*Telophorus sulfureopectus*			
55	Buttonquail, Kurrichane	*Turnix sylvaticus*			
56	Buzzard, Steppe	*Buteo vulpinus*			
57	Camaroptera, Grey-backed	*Camaroptera brevicaudata*			
58	Canary, Black-throated	*Crithagra atrogularis*			
59	Canary, Yellow-fronted	*Crithagra mozambicus*			
60	Cisticola, Rattling	*Cisticola chiniana*			
61	Cormorant, Reed	*Phalacrocorax africanus*			
62	Courser, Bronze-winged	*Rhinoptilus chalcopterus*			
63	Crombec, Long-billed	*Sylvietta rufescens*			
64	Cuckoo, Black	*Cuculus clamosus*			
65	Cuckoo, Diderick	*Chrysococcyx caprius*			
66	Cuckoo, Jacobin	*Clamator jacobinus*			
67	Cuckoo, Klaas's	*Chrysococcyx klaas*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
68	Cuckoo, Red-chested	*Cuculus solitarius*			
69	Cuckooshrike, Black	*Campephaga flava*			
70	Dove, Laughing	*Streptopelia senegalensis*			x
71	Dove, Namaqua	*Oena capensis*			x
72	Drongo, Fork-tailed	*Dicrurus adsimilis*			x
73	Duck, Comb	*Sarkidiornis melanotos*			
74	Duck, Maccoa	*Oxyura maccoa*			
75	Duck, White-faced	*Dendrocygna viduata*			
76	Duck, Yellow-billed	*Anas undulata*			
77	Eagle, Wahlberg's	*Aquila wahlbergi*			x
78	Eagle-Owl, Spotted	*Bubo africanus*			x
79	Egret, Cattle	*Bubulcus ibis*			
80	Egret, Great	*Egretta alba*			
81	Egret, Little	*Egretta garzetta*			
82	Eremomela, Burnt-necked	*Eremomela usticollis*			
83	Eremomela, Yellow-bellied	*Eremomela icteropygialis*			
84	Falcon, Amur	*Falco amurensis*			X

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
85	Finch, Cut-throat	*Amadina fasciata*			
86	Firefinch, Jameson's	*Lagonosticta rhodopareia*			X
87	Francolin, Crested	*Dendroperdix sephaena*			
88	Go-away-bird, Grey	*Corythaixoides concolor*			X
89	Goose, Egyptian	*Alopochen aegyptiacus*			X
90	Goose, Spur-winged	*Plectropterus gambensis*			X
91	Goshawk, Gabar	*Melierax gabar*			
92	Grebe, Little	*Tachybaptus ruficollis*			X
93	Greenshank, Common	*Tringa nebularia*			
94	Guineafowl, Helmeted	*Numida meleagris*			X
95	Gull, Grey-headed	*Larus cirrocephalus*			
96	Hamerkop, Hamerkop	*Scopus umbretta*			X
97	Helmet-Shrike, White-crested	*Prionops plumatus*			
98	Heron, Black-headed	*Ardea melanocephala*			
99	Heron, Grey	*Ardea cinerea*			
100	Honeyguide, Greater	*Indicator indicator*			
101	Honeyguide, Lesser	*Indicator minor*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
102	Hoopoe, African	*Upupa africana*			
103	Hornbill, African Grey	*Tockus nasutus*			X
104	Hornbill, Red-billed	*Tockus erythrorhynchus*			
105	Ibis, African Sacred	*Threskiornis aethiopicus*			
106	Ibis, Glossy	*Plegadis falcinellus*			
107	Ibis, Hadeda	*Bostrychia hagedash*			
108	Jacana, African	*Actophilornis africanus*			;
109	Kingfisher, Brown-hooded	*Halcyon albiventris*			X
110	Kingfisher, Woodland	*Halcyon senegalensis*			
111	Kite, Yellow-billed	*Milvus aegyptius*			
112	Lapwing, Blacksmith	*Vanellus armatus*			X
113	Lapwing, Crowned	*Vanellus coronatus*			
114	Lark, Fawn-coloured	*Calendulauda africanoides*			
115	Lark, Monotonous	*Mirafra passerina*			
116	Lark, Rufous-naped	*Mirafra africana*			
117	Martin, Banded	*Riparia cincta*			
118	Masked-Weaver, Lesser	*Ploceus intermedius*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
119	Masked-Weaver, Southern	*Ploceus velatus*			
120	Mousebird, Red-faced	*Urocolius indicus*			
121	Myna, Common	*Acridotheres tristis*			
122	Nightjar, Fiery-necked	*Caprimulgus pectoralis*			x
123	Nightjar, Rufous-cheeked	*Caprimulgus rufigena*			
124	Oriole, Black-headed	*Oriolus larvatus*			
125	Owl, Barn	*Tyto alba*			x
126	Paradise-Flycatcher, African	*Terpsiphone viridis*			
127	Paradise-Whydah, Long-tailed	*Vidua paradisaea*			X
128	Pigeon, Speckled	*Columba guinea*			
129	Plover, Kittlitz's	*Charadrius pecuarius*			
130	Plover, Three-banded	*Charadrius tricollaris*			x
131	Prinia, Tawny-flanked	*Prinia subflava*			
132	Puffback, Black-backed	*Dryoscopus cubla*			
133	Pytilia, Green-winged	*Pytilia melba*			X
134	Quail, Harlequin	*Coturnix delegorguei*			
135	Quelea, Red-billed	*Quelea quelea*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
136	Robin-Chat, Cape	*Cossypha caffra*			
137	Roller, Lilac-breasted	*Coracias caudatus*			
138	Roller, Purple	*Coracias naevius*			X
139	Ruff, Ruff	*Philomachus pugnax*			
140	Sandpiper, Common	*Actitis hypoleucos*			
141	Sandpiper, Wood	*Tringa glareola*			
142	Scimitarbill, Common	*Rhinopomastus cyanomelas*			
143	Scops-Owl, Southern White-faced	*Ptilopsus granti*			
144	Scrub-Robin, White-browed	*Cercotrichas leucophrys*			
145	Shrike, Lesser Grey	*Lanius minor*			
146	Shrike, Magpie	*Corvinella melanoleuca*			
147	Shrike, Red-backed	*Lanius collurio*			X
148	Snake-Eagle, Black-chested	*Circaetus pectoralis*			X
149	Snake-Eagle, Brown	*Circaetus cinereus*			
150	Sparrow, House	*Passer domesticus*			
151	Sparrow, Southern Grey-headed	*Passer diffusus*			
152	Sparrow-Weaver, White-browed	*Plocepasser mahali*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
153	Spoonbill, African	*Platalea alba*			
154	Spurfowl, Swainson's	*Pternistis swainsonii*			
155	Starling, Cape Glossy	*Lamprotornis nitens*			
156	Starling, Violet-backed	*Cinnyricinclus leucogaster*			
157	Starling, Wattled	*Creatophora cinerea*			
158	Stilt, Black-winged	*Himantopus himantopus*			x
159	Stint, Little	*Calidris minuta*			
160	Stonechat, African	*Saxicola torquatus*			
161	Stork, White	*Ciconia ciconia*			
162	Sunbird, Marico	*Cinnyris mariquensis*			
163	Sunbird, White-bellied	*Cinnyris talatala*			
164	Swallow, Barn	*Hirundo rustica*			
165	Swallow, Greater Striped	*Hirundo cucullata*			
166	Swallow, Red-breasted	*Hirundo semirufa*			
167	Swallow, Wire-tailed	*Hirundo smithii*			
168	Swift, Little	*Apus affinis*			
169	Tchagra, Black-crowned	*Tchagra senegalus*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
170	Tchagra, Brown-crowned	*Tchagra australis*			
171	Teal, Cape	*Anas capensis*			
172	Teal, Red-billed	*Anas erythrorhyncha*			
173	Tern, White-winged	*Chlidonias leucopterus*			
174	Thick-knee, Spotted	*Burhinus capensis*			X
175	Thick-knee, Water	*Burhinus vermiculatus*			
176	Thrush, Groundscraper	*Psophocichla litsipsirupa*			
177	Tit, Southern Black	*Parus niger*			
178	Turtle-Dove, Cape	*Streptopelia capicola*			
179	Warbler, Garden	*Sylvia borin*			
180	Warbler, Icterine	*Hippolais icterina*			
181	Warbler, Olive-tree	*Hippolais olivetorum*			
182	Warbler, Willow	*Phylloscopus trochilus*			
183	Waxbill, Black-faced	*Estrilda erythronotos*			x
184	Waxbill, Blue	*Uraeginthus angolensis*			x
185	Waxbill, Violet-eared	*Granatina granatina*			x
186	Whitethroat, Common	*Sylvia communis*			

No.	Common name	Scientific name	IUCN status	Endemicity	Recorded (wet season)
187	Whydah, Pin-tailed	*Vidua macroura*			X
188	Wood-Dove, Emerald-spotted	*Turtur chalcospilos*			x
189	Woodpecker, Cardinal	*Dendropicos fuscescens*			
190	Woodpecker, Golden-tailed	*Campethera abingoni*			
191	Coucal, Burchell's	*Centropus burchelli*			x
192	Dove, red-eyed	*Streptopelia semitorquata*			x
193	Flycatcher, southern black	*Melaenornis pammelaina*			
194	Weaver, village	*Ploceus cucullatus*			
195	Lark, red capped	*Calandrella cinerea*			
196	Finch, red-headed	*Amadina erythrocephala*			
197	Vulture, Cape	*Gyps coprotheres*			
198	Maeve's Starling	*Lamprotornis mevesii*			

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Appendix D: Reptile Species List

Scientific name	Common name	Distribution within Limpopo	Recorded from Dalyshope site
Acanthocercus atricollis	Southern Tree Agama	Limited	
Acontias percivali	Percival's Legless Skink	Narrow	
Acontias plumbeus	Giant Legless Skink	Limited	
Agama aculeata	Ground Agama	Wide	
Agama armata	Peter's Ground Agama	Wide	
Agama atra	Southern Rock Agama	Limited	
Amblyodipsas concolor	Natal Purple glossed Snake	Narrow	
Amblyodipsas polylepis	Common Purple glossed Snake	Wide	
Aparallactus capensis	Cape Centipede Eater	Wide	
Aspidelaps scutatus	Shield nose Snake	Limited	
Bitis arietans	Puff Adder	Wide	X
Causus defilippii	Snouted Night Adder	Limited	
Causus rhombeatus	Common Night Adder	Wide	
Chamaeleo dilepsis	Flap neck Chameleon	Wide	
Cordylus breyeri	Waterberg Girdled Lizard	Narrow	
Cordylus tropidosternum	Tropical Girdled Lizard	Limited	
Cordylus vandami	Van Dam's Girdled Lizard	Narrow	
Cordylus vittifer	Transvaal Girdled Lizard	Wide	
Crotaphopeltis hotamboeia	Herald Snake	Wide	
Dalophia pistillum	Blunt tailed Worm Lizard	Narrow	
Dasypeltis scabra	Common Egg eater	Wide	
Dendroaspis polylepsis	Black Mamba	Limited	X
Dispholidus typus	Boomslang	Wide	
Duberria lutrix	Common Slug eater	Wide	
Elapsoidea boulengeri	Boulenger's Garter Snake	Limited	
Elapsoidea sunderwallii	Sundervall's Garter Snake	Wide	

Scientific name	Common name	Distribution within Limpopo	Recorded from Dalyshope site
Geochelone pardalis	Leopard Tortoise	Wide	X
Gerrhosaurus flavigularis	Yellow throated Plated Lizard	Wide	
Gerrhosaurus major	Roughscaled Plated Lizard	Limited	
Gerrhosaurus nigrolineatus	Black lined Plated Lizard	Limited L	
Gerrhosaurus validus	Giant Plated Lizard	Limited	
Hemachatus haemachatus	Rinkhals	Limited	
Heliobolus lugubris	Bushveld Lizard	Wide	X
Homopholis wahlbergii	Wahlberg's Velvet Gecko	Limited	
Homoroselaps lacteus	Spotted Harlequin Snake	Limited	
Ichnotropis capensis	Cape Rough scaled Lizard	Limited	
Ichnotropis squamulosa	Common Rough scaled Lizard	Wide	
Kinixys lobatsiana	Lobatse Hinged Tortoise	Limited	
Kinixys spekii	Speke's Hinged Tortoise	Limited	
Lamprophis aurora	Aurora House Snake	Wide	
Lamprophis fuliginosus	Brown House Snake	Wide	
Lamprophis guttatus	Spotted House Snake	Limited	
Lamprophis inornatus	Olive House Snake	Limited	
Leptotyphlops conjunctus	Cape Thread Snake	Limited	
Leptotyphlops longicaudus	Long tailed Thread Snake	Limited	
Leptotyphlops scutifrons	Peters' Thread Snake	Wide	
Lycodonomorphus rufulus	Common Brown Water Snake	Wide	
Lycophidion capense	Cape Wolf Snake	Wide	
Lycophidion variegatum	Variegated Wolf Snake	Limited	
Lygodactylus capensis	Cape Dwarf Gecko	Wide	
Lygosoma sundervallii	Sundervall's Writhing Skink	Limited	

Scientific name	Common name	Distribution within Limpopo	Recorded from Dalyshope site
Mabuya capensis	Cape Skink	Wide	
Mabuya striata	Striped Skink	Wide	X
Mabuya varia	Variable Skink	Wide	X
Mehelya capensis	Cape File Snake	Wide	
Mehelya nyassae	Black File Snake	Wide	
Monopeltis infuscata	Dusky Spade snouted Worm Lizard	Wide	
Naja annulifera	Snouted Cobra	Limited	X
Naja mossambica	Mozambique Spitting Cobra	Wide	X
Nucras holubi	Holub's Sandveld Lizard	Wide	
Nucras intertexta	Spotted Sandveld Lizard	Wide	
Nucras ornata	Ornate Sandveld Lizard	Wide	
Pachydactylus punctatus	Speckled Thicktoed Gecko	Limited	
Pachydactylus turneri	Turner's Thicktoed Gecko	Limited	
Panaspis sp.	Spotted neck Snake-eyed Skink	Limited	
Panaspis wahlbergii	Wahlberg's Snake-eyed Skink	Wide	
Pedioplanis lineoocellata	Spotted Sand Lizard	Limited	
Pelomedusa subrufa	Marsh or Helmeted Terrapin	Wide	X
Pelusios sinuatus	Serrated Hinged Terrapin	Limited	
Philothamnus hoplogaster	Green Water Snake	Wide	
Philothamnus natalensis	Eastern Green Snake	Limited	
Philothamnus semivariegatus	Spotted Bush Snake	Wide	
Prosymna bivittata	Twostriped Shovelsnout	Limited	
Prosymna sundervallii	Sundervall's Shovelsnout	Limited	
Psammophis brevirostris	Shortsnouted Grass Snake	Wide	
Psammophis crucifer	Cross marked Grass Snake	Limited	

Scientific name	Common name	Distribution within Limpopo	Recorded from Dalyshope site
Psammophis mossambicus	Olive Grass Snake	Wide	
Psammophis subtaeniatus	Stripe bellied Sand Snake	Limited	
Psammophylax rhombeatus	Rhombic Skaapsteker	Wide	
Psammophylax tritaeniatus	Striped Skaapsteker	Wide	
Pseudaspis cana	Mole Snake	Wide	
Python natalensis	Southern African Python	Wide	X
Rhinotyphlops lalandei	Delalande's Beaked Blind Snake	Wide	
Telescopus semiannulatus	Eastern Tiger Snake	Wide	
Typhlops bibronii	Bibron's Blind Snake	Wide	
Varanus albigularis	Rock Monitor	Wide	
Varanus niloticus	Water Monitor	Wide	X

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Appendix E: Amphibian Species List

Scientific Name	Common Name	IUCN Status	Recorded Dalyshope
Afrana angolensis	Common River Frog		X
Afrixalus aureus	Golden Leaf-Folding Frog	Rare	
Breviceps adspersus	Bushveld Rain Frog		X
Bufo fenoulheti	Northern Pygmy Toad		
Bufo garmani	Olive Toad		
Bufo gutturalis	Guttural Toad		
Cacosternum boettgeri	Common Caco		
Chiromantis xerampelina	Southern Foam Next Frog		X
Hyperolius pickersgilli	Pickersgill's Reed Frog	Rare	
Kassina senegalensis	Bubbling Kassina		
Phrynobatrachus mababiensis	Dwarf Puddle Frog		
Phrynobatrachus natalensis	Snoring Puddle Frog		
Phrynomantis bifasciatus	Banded Rubber Frog		
Ptychadena anchietae	Plain Grass frog		X
Pyxicephalus adspersus	Giant Bullfrog	Endangered	X*
Schismaderma carens	Red Toad		
Tomopterna cryptotis	Tremolo Sand Frog		
Xenopus laevis	Common Platanna		

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Appendix F: Impact Assessment Methodology

Rating	Intensity/Replaceability		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.
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.

Rating	Intensity/Replaceability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
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.
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.
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.

Rating	Intensity/Replaceability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
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.

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

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 the 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 from 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 the 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 major and usually a long-term change to the (natural and/or social) environment and result in severe 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) (-)